BALIKESİR SAĞLIK BİLİMLERİ DERGİSİ

BALIKESIR HEALTH SCIENCES JOURNAL

BALIKESİR ÜNİVERSİTESİ

SAĞLIK BİLİMLERİ ENSTİTÜSÜ

ISSN:2146-9601
E-ISSN:2147-2238

CİLT VOLUME 13 SAYI ISSUE 2

AĞUSTOS AUGUST 2024

EDİTÖR KURULU / EDITORIAL BOARD

MİZANPAJ EDİTÖRLERİ / LAYOUT EDITORS

YAZIM EDİTÖRLERİ / COPYEDITORS

İLETİŞİM ADRESİ / CORRESPONDENCE ADDRESS

Prof. Dr. Şükrü Metin PANCARCI
Balıkesir Üniversitesi Sağlık Bilimleri Enstitüsü, Çağış Yerleşkesi 10145 BALIKESİR
Faks: (0266) 612 10 09 **E-posta:** pancarci@balikesir.edu.tr, bsbd@balikesir.edu.tr
Web: https://dergipark.org.tr/tr/pub/balikesirsbd

İÇİNDEKİLER / CONTENTS

ORİJİNAL MAKALE / ORIGINAL ARTICLE

Balıkesir Sağlık Bilimleri Dergisi / BAUN Sağ Bil Derg
Balıkesir Health Sciences Journal / BAUN Health Sci J
ISSN: 2146-9601- e ISSN: 2147-2238
Doi: https://doi.org/10.53424/balikesirsbd.1343488

The Relationship Between Physical Activity Level and Fear of Childbirth (Tokophobia) in Pregnant Women: A Cross-Sectional Study

Zeynep YILDIZ KIZKIN [1], Ali Ömer ACAR [2], Masoud Amir RASHEDI BONAB [3], Yusuf HASIRCI [3], Zübeyir SARI [4]

[1]Artvin Coruh University, Vocational School of Health Services, Occupational Therapy
[2] Acıbadem University, Vocational School of Health Services, Occupational Therapy, Physiotherapy
[3] Marmara University, Institude of Health Sciences, Department of Physiotherapy and Rehabilitation
[4] Marmara University, Faculty of Health Sciences, Department of Physiotherapy and Rehabilitation

Geliş Tarihi / Received: *15.08.2023*, ***Kabul Tarihi / Accepted:*** *09.12.2023*

ABSTRACT

Objective: This study aims to determine the relationship between physical activity level and tokophobia in pregnant women. **Materials and Methods:** 81 healthy pregnant women at 14-40 weeks of gestation were included in the study. The participant's physical activity levels were measured using the Pregnancy Physical Activity Questionnaire (PPAQ), and their tokophobia was evaluated using the WIJMA Delivery Expectation/Experience Scale (W-DEQ). The W-DEQ results are divided into four subgroups: low fear of childbirth (W-DEQ score ≤ 37), moderate fear of childbirth (W-DEQ score between 38 and 65), severe fear of childbirth (W-DEQ score 66-84), and clinical fear of childbirth (W-DEQ score ≥ 85). **Results:** We found a low level of tokophobia in participants (W-DEQ 3.57 ± 36.19). Low-intensity physical activity decreased in the third trimester (78.82 ± 40.88 MET-min/week) compared to the second trimester (120.10 ± 54.80 MET-min/week) (p = 0.001). Housework/care activities decreased in the third trimester (105.81 ± 56.09 MET-min/week) compared to the second trimester (162.08 ± 98.08 MET-min/week) (p = 0.023). Low-tokophobia pregnant women (141.54 MET-min/week) were more active than moderate-tokophobia pregnant women (73.01MET-min/week) (p = 0.026). A moderately strong negative correlation existed between the total W-DEQ score and the total PPAQ score (r = -0.431; p = 0.000). **Conclusion:** It was determined that the physical activity levels of the pregnant women decreased as the trimester of pregnancy progressed, and the level of physical activity decreased as tokophobia increased.

Keywords: Pregnancy, Exercise, Phobia, Parturition, Pregnancy.

Gebelerde Fiziksel Aktivite Düzeyinin Doğum Korkusu (Tokofobi) ile İlişkisi: Kesitsel Bir Çalışma

ÖZ

Amaç: Bu çalışmanın amacı gebelerde fiziksel aktivite düzeyi ile tokofobi arasındaki ilişkiyi belirlemektir. **Gereç ve Yöntem:** Çalışmaya 14-40 gebelik haftaları arasındaki 81 sağlıklı gebe dahil edildi. Katılımcıların fiziksel aktivite düzeyleri Gebelik Fiziksel Aktivite Anketi (PPAQ) ile tokofobi ise WIJMA Doğum Beklenti/Deneyim Ölçeği (W-DEQ) kullanılarak değerlendirildi. W-DEQ sonuçları dört alt gruba ayrılır: Düşük doğum korkusu (W-DEQ puanı ≤ 37), orta düzeyde doğum korkusu (W-DEQ puanı 38-65 arası), şiddetli doğum korkusu (W-DEQ puanı 66-84) ve klinik doğum korkusu (W-DEQ puanı ≥ 85). **Bulgular:** Katılımcılarda düşük düzeyde tokofobi bulundu (W-DEQ 3,57 ± 36,19). Düşük yoğunluklu fiziksel aktivite üçüncü trimesterde (78,82 ± 40,88 MET-dk/hafta) ikinci trimestere göre (120,10±54,80 MET-dk/hafta) azaldı (p = 0,001). Ev işleri/bakım aktiviteleri üçüncü trimesterde (105,81 ± 56,09 MET-dk/hafta) ikinci trimestere göre (162,08 ± 98,08 MET-dk/hafta) azaldı (p = 0,023). Düşük tokofobili gebeler (141,54 MET-dk/hafta), orta tokofobili gebelere (73,01MET-dk/hafta) göre daha aktifti (p = 0,026). Toplam W-DEQ puanı ile toplam PPAQ puanı arasında orta derecede güçlü bir negatif korelasyon vardı (r = -0,431; p = 0,000). **Sonuç:** Gebelerin trimester ilerledikçe fiziksel aktivite düzeylerinin düştüğü, tokofobi arttıkça fiziksel aktivite düzeylerinin düştüğü belirlendi.

Anahtar Kelimeler: Hamilelik, Egzersiz, Fobi, Doğum, Hamilelik.

Sorumlu Yazar / Corresponding Author: Zeynep YILDIZ KIZKIN, Artvin Çoruh University, Vocational School of Health Services, Occupational Therapy, Artvin, Türkiye
E-mail: pt.zeynepyildiz@gmail.com

Bu makaleye atıf yapmak için / Cite this article: Yıldız Kızkın, Z. Acar, A.Ö., Rashedi Bonab, M.A. Hasırcı, Y., & Sarı, Z. (2024). The relationship between physical activity level and fear of childbirth (tokophobia) in pregnant women: a cross-sectional study. *BAUN Health Sci J, 13*(2), 227-233 https://doi.org/10.53424/balikesirsbd.1343488

INTRODUCTION

Tokophobia is the fear of childbirth experienced before, during, and after birth (Wijma et al., 1998). However, an appropriate level of tokophobia motivates expectant mothers to prepare for birth (Wijma et al., 1998).

The frequency of tokophobia is 12.40% in the second trimester and 13.50% in the last period of the third trimester (Hildingsson et al., 2011). Women may experience tokophobia at mild, moderate, and high intensity. Prevalence of moderate fear of childbirth in pregnant women varies between 18-31%, and the prevalence of severe fear of childbirth is between 2-11% (Mortazavi & Agah, 2018). In general, authors reported that the fear of childbirth is higher in women who are pregnant for the first time (nulliparous) compared to those who have previously been pregnant (multiparous) (Pirdadeh Beiranvand et al., 2017).

Tokophobia can affect women from childhood to old age (Hofberg & Ward, 2003). Among the reasons are hearing or witnessing the fearful birth stories of others, not getting enough support from the family and spouse during pregnancy and at the time of birth, previous births with vacuum or forceps, insufficient information about birth, lack of trust in healthcare professionals and inadequate psychological support given by the obstetrician (Striebich et al., 2018). Review dealing with birth-related concerns include fears of pregnant women such as pain, panic, the feeling of failure in childbirth, loss of control, injury to the child and the mother, emergency cesarean section, excessive bleeding, adverse effects on their sexual life, death of the mother or child, and the development of complications during delivery (Striebich et al., 2018).

Physical activity involves muscle contraction that increases heart and respiratory rate, requiring more energy than basal metabolism (Harrison et al., 2018).

It has been shown in the literature that physical activity in pregnant women contributes to the health of both the mother and the infant. Many studies have reported the benefits of physical activity and exercise in preventing many risks during pregnancy, including reducing the chances of excessive weight gain, preeclampsia, gestational diabetes, gestational hypertension, prenatal depression, macrosomia, and improving psychological well-being. Evidence also reports that physical activity during pregnancy reduces preterm birth rates, provides physical fitness, improves sleep quality, reduces cesarean risk, reduces postpartum recovery and delivery time, reduces fatigue, stress, anxiety, depression, and low back pain, and improves health. Despite the reported benefits of regular physical activity in the literature, it has been reported that the level of physical activity during pregnancy is lower compared to the pre-pregnancy period (Harrison et al., 2018). While physical activity is crucial during pregnancy, studies investigating the relationship between tokophobia, and physical activity are limited in the literature.

This study aimed to investigate the relationship between physical activity level and fear of childbirth (tokophobia) in pregnant women in the 2nd and 3rd trimesters of pregnancy (14-40 weeks).

MATERIALS AND METHODS

Study type

This cross-sectional study was conducted online with community-dwelling pregnant women on the Google Forms web survey platform (Google LLC, Mountain View, CA, USA) online between May 2021 and July 2021.

Study group

The study population included 81 pregnant volunteers from Artvin in 2021 who were in their 2nd or 3rd trimesters (between 14-40 weeks) and met inclusion criteria.

Sample Size

The effect size was used according to the average tokophobia score in a reference study examining the tokophobia in nulliparous and multiparous pregnant women to calculate the sample size. In this study, the effect size of the groups was 0.53 (Cohen's d) (Gün, 2018). In the G*Power v3.1.9.6 program, power analysis revealed the necessary sample size to be n=63 with a d=0.53, α=0.05, β at 95% conditions. 81 individuals were included in the study to achieve 95% power.

Variables

The Pregnancy Evaluation Form was used to record information about the pregnant participants, including their age, BMI, gestation week, number of children, educational status, smoking/alcohol consumption, miscarriage/abortion status, and trimester. Their physical activity levels were assessed using the Pregnancy Physical Activity Questionnaire (PPAQ), and their tokophobia was evaluated through the Wijma Delivery Expectancy/Experience Questionnaire (W-DEQ)-A.

Inclusion Criteria

•Being a healthy pregnant woman,
•Being between the ages of 18-40,
•Not having difficulties in communicating to understand and answer the evaluation questions correctly,
•Being at 14-40 weeks of gestation,
•To have regular perinatal control.

Exclusion Criteria

•Chronic illness or obesity,
•Having a history of orthopedic, neurological, rheumatological, or cardiopulmonary disease or surgery,
•History of 2 or more miscarriages
•Multiple pregnancies,
•High-risk pregnancy,
•Continuous vaginal bleeding
•Pre-pregnancy Body Mass Index (BMI) less than 17.50

Procedures

The Pregnancy Physical Activity Questionnaire (PPAQ)

The Pregnancy Physical Activity Questionnaire (PPAQ), which evaluates 32 activities, determines the physical activity levels of pregnant women only (Chasan-Taber et al., 2004). The PPAQ questionnaire covers housework/caregiving, occupational tasks, sports/exercise, transportation, and inactivity. Participants report how much time they spend on each activity weekly or daily. It takes around 10-15 minutes to complete independently (Chasan-Taber et al., 2004).

The PPAQ includes pregnancy activities such as walking, dancing, jogging, and swimming. To calculate weekly energy expenditure, the duration of time spent on each activity is multiplied by activity-specific intensities (MET values), and scores are expressed as MET hours per week (MET-h/week). To determine the average daily energy expenditure (MET-h/day), the activity intensity (METs) is multiplied by the time spent on each activity itself. The intensity of each activity is classified as sedentary (< 1.5 METs), mild (1.5-3.0 METs), moderate (3.0-6.0 METs), and severe (> 6.0 METs), and average MET-hours spent per week at each intensity level is calculated. Activities are also classified according to their types (housework/caring activities, occupational activities, and sports/exercise), and the average number of MET-hours spent per week in each activity type is calculated (Inter Class Correlation Coefficient (ICC) = 0.78 - 0.93) (Chasan-Taber et al., 2004). The PPAQ was validated and published in Turkey in 2015 (Cronbach's alpha (α) = 0.93 - 0.95) (Tosun et al., 2015).

Wijma Delivery Expectancy/Experience Questionnaire (W-DEQ)

The Wijma Delivery Expectation/Experience Scale (W-DEQ) has two versions, A and B, which measure tokophobia prenatal and postpartum, respectively. This study used the "A" version of the W-DEQ. W-DEQ measures tokophobia in women on a scale of 0 to 5, with 0 as "extremely" and 5 as "not at all". Scores range from 0 to 165, with higher scores indicating higher levels of tokophobia. The W-DEQ results are divided into four subgroups: low (W-DEQ score ≤ 37), moderate (W-DEQ score between 38 and 65), severe (W-DEQ score 66 -84), and clinical tokophobia (W-DEQ score ≥ 85) (ICC = 0.83 – 0.99) (Wijma et al., 1998). The Turkish validity and reliability study of the W-DEQ scale was conducted recently (α = 0.88 – 0.96) (Korukcu et al., 2012).

Statistical analysis

The "Statistical Package for Social Sciences" (SPSS) Version 24 (SPSS Inc., Chicago, IL, USA) program was used in the data analysis of this study. Statistical significance was evaluated at the $p < 0.05$ level in all analyses. The results obtained in our study were tested for conformity to normal distribution with the "Kolmogorov-Smirnov" test. Descriptive statistics are shown as mean ± standard deviation for normally distributed continuous variables and as numbers and (%) for categorical variables. For comparisons between groups, the "Independent T-test" analysis was used for comparisons means between two independent groups, and the "AVONA Test" was used for comparisons between groups of three. The correlation between the variables was investigated using the Spearman correlation test. The correlation coefficients were labelled as follows: 0 - 0.2 very weak, 0.2 - 0.4 weak, 0.4 - 0.6 moderate, 0.6 - 0.8 strong, and "0.8" and above as very strong.

Ethical considerations

Ethics committee approval for this study was obtained from Artvin Coruh University Rectorate Ethics Committee (Decision No: E-18457941-050-99-1067 Decision Date: 30.04.2021). This study was conducted by the Declaration of Helsinki (World Medical Association, 2018), and informed consent was obtained from the participants via the online form before data collection.

RESULTS

The study included 81 pregnant women with an average age of 30.02 ± 3.38 years. Among them, 20 (24.70%) were in their second trimester, while 61 (75.30%) were in their third trimester. Their before of pregnancy BMI mean was 25.87 ± 2.99 kg/m^2, and the average week of gestation was 29.49 ± 5.50. The study revealed that 15 (18.50%) of the pregnant women had abortions or miscarriages. Moreover, 54 (66.70%) reported no smoking habit, while 72 (88.90%) did not consume alcohol (Table 1).

Table 1. Demographic characteristics of pregnant women (n = 81).

Variables	**Mean ± SD**		**Miscarriage/Abortion Status**	**n**	**%**
Age (Year)	30.02 ± 3.38		Yes	15	18.50
Height (cm)	167.52 ± 5.79		No	66	81.50
Weight (kg)	72.55 ± 8.68		**Smoking Status**	**n**	**%**
BMI (kg/m^2)	25.87 ± 2.99		Smokers	27	33.30
Gestation week	29.49 ± 5.50		Non-Smokers	54	66.70
Number of Children	0.58 ± 0.74		**Alcohol Use Status**	**n**	**%**
Education Status	**n**	**%**	User	9	11.10
Primary education	10	12.30	Non-User	72	88.90
High school	20	24.70	**Trimester**	**n**	**%**
Associate degree	2	2.50	2nd Trimester	20	24.70
Bachelor degree	35	43.20	3rd Trimester	61	75.30
Postgraduate degree	14	17.30			

SD: Standart deviation

The pregnant women in our study had a low fear of childbirth, with an average W-DEQ score below 37 (3.57 ± 36.19). Low-intensity physical activity decreased in the third trimester (78.82 ± 40.88 MET-min/week) compared to the second trimester (120.10 ± 54.80 MET-min/week) (p = 0.001). Similarly, housework/caregiving activities decreased in the third trimester (105.81 ± 56.09 MET-min/week) compared to the second trimester (162.08 ± 98.08 MET-min/week) (p = 0.023) (Table 2).

The tokophobia scores of individuals with high education levels (-5.21 ± 35.88) were statically lower compared to individuals with low education levels (primary education, high school) (18,50 ± 32.04) (p = 0.004) (Table 3).

Table 2. Comparison of physical activity and tokophobia according to pregnancy trimesters.

	2nd Trimester	3rd Trimester	Total	p
	Mean ± SD (n = 20)	Mean ± SD (n = 61)	Mean ± SD (n = 81)	
Physical Activity (MET-min/week)				
Total PPAQ	301.68 ± 125.29	244.07 ± 103.73	258.30 ± 111.46	0.44
Sedentary activity	54.57 ± 39.97	67.27 ± 33.12	64.13 ± 35.10	0.162
Low-intensity activity	120.10 ± 54.80	78.82 ± 40.88	89.01 ± 47.82	0.001*
Moderate-intensity activity	121.10 ± 75.45	91.89 ± 68.81	99.10 ± 71.16	0.112
High-intensity activity	5.91 ± 11.32	6.10 ± 12.07	6.05 ± 11.82	0.951
Household/caregiving activity	162.08 ± 98.08	105.81 ± 56.09	119.71 ± 72.39	0.023*
Occupational activity	34.87 ± 44.40	35.45 ± 53.53	35.31 ± 51.16	0.965
Sports/exercise	44.26 ± 41.31	39.46 ± 42.82	40.64 ± 42.25	0.662
Fear of Childbirth (Tokophobia)				
Total W-DEQ	-6.25 ± 37.04	6.79 ± 35.63	3.57 ± 36.19	0.164

SD: Standart deviation, PPAQ: The Pregnancy Physical Activity Questionnaire, W-DEQ: Wijma Delivery Expectation/Experience Scale. * Statistically significant difference (p < 0.05), The comparison of the variables was carried out with the Independent Sample T-Test.

Table 3. Comparison of tokophobia by birth experience, miscarriage/ abortion, and education status.

	Tokophobia	p		Tokophobia	p		Tokophobia	p
	Mean ± SD			Mean ± SD			Mean ± SD	
Birth Experience			**Miscarriage/Abortion Status**			**Education Status**		
Nulliparous (n=45)	-4.86 ± 35.11	0.60	Yes (n=15)	11.47 ± 34.95	0.352	High Education Level	-5.21 ± 35.88	0.004*
Multiparous (n=36)	10.31 ± 36.01		No (n = 66)	1.77 ± 36.49		Low Education Level	18.50 ± 32.04	

SD: Standart deviation, * Statistically significant difference (p < 0.05), The comparison of the variables was carried out with the Independent Sample T-Test.

A significant difference was observed in terms of physical activity scores and tokophobia levels of pregnant women (F (2) = 3.97, p = 0.023). In the Post Hoc Test (LSD), pregnant women with low tokophobia (141.54 MET-min/week) were found to be more active than those with moderate tokophobia (73.01 MET-min/week) (p = 0.026) (Table 4). A moderately strong negative correlation was found between the total W-DEQ and the total PPAQ score (r = -0.431; p = 0.000). There is a moderate negative correlation between low-intensity activity and total W-DEQ scores (r = -0.416; p = 0.000), as well as between moderate-intensity activity and total W-DEQ scores (r = -0.503; p = 0.000). Additionally, there is a moderately strong negative correlation between housework/caregiving activities and total W-DEQ scores (r = -0.327; p = 0.003), and between sports/exercise activities and total W-DEQ scores (r = -0.510; p = 0.000) (Table 5).

Table 4. Comparison of physical activities of pregnant women according to tokophobia levels.

Tokophobia Levels			**Physical Activity**		
			Mean		**p**
Low	Moderate		68.53		0.026*
	High		141.54		0.071
Moderate	Low		-68.53		0.026*
	High		73.01		0.368
High	Low		-141.54		0.071
	Moderate		-73.01		0.368
Source of Variance	**Sum of Squares**	**Sd**	**Average of Squares**	**F**	**p**
Intergroup	91717	2	45858.50	3.97	0.023*
Intragrop	902144.98	78	11565.97		
Total	993861.98	80			

SD: Standart deviation, * Statistically significant difference ($p < 0.05$), The comparison of the variables was carried out with the ANOVA Test.

Table 5. The relationship between tokophobia and physical activity level in pregnant women.

	Total W-DEQ	
	r	**p**
Total PPAQ	-0.431	0.000*
Sedentary activity	0.077	0.493
Low-intensity activity	-0.416	0.000*
Moderate-intensity activity	-0.503	0.000*
High-intensity activity	-0.111	0.324
Household/caregiving activity	-0.327	0.003*
Occupational activity	-0.194	0.083
Sports/exercise	-0.510	0.000*

* Statistically significant difference ($p < 0.05$), The relationship between the variables was calculated with the Spearman Correlation Coefficient.

DISCUSSION

This study aimed to investigate the effects of physical activity on tokophobia in pregnant women.

This study determined that the pregnant participants had low tokophobia. In Turkey, pregnant women experience severe tokophobia, while international studies show moderate tokophobia (Adams et al., 2012; Barut & Uçar, 2018; Hall et al., 2012; Onchonga et al., 2020; Størksen et al., 2013). In this study, individuals with higher education levels had lower tokophobia scores than those with lower education levels. Some women may be more likely to experience tokophobia, a fear of childbirth, due to factors such as low education, lack of social support, and exposure to negative pregnancy and childbirth stories (Erkaya et al., 2017; Pirdadeh Beiranvand et al., 2017). A 2018 study in Israel found that 75% of pregnant women had low to moderate fear of childbirth, while 25% had high or very high fear. Factors contributing to tokophobia included concerns about episiotomy, labour control, pain, and future sexual life (Demšar et al., 2018). In similar studies, it has been reported that pregnant women with tokophobia prefer cesarean section more, and psychoeducation sessions performed individually or in groups for nulliparous women have the potential to reduce the number of cesarean sections due to severe tokophobia (Striebich et al., 2018; Weaver et al., 2012).

This research shows that pregnant women tend to reduce low-intensity physical activities and housework/caregiving as their pregnancy progresses, which is consistent with the findings of Guelinckx et al., particularly in the third trimester (Guelinckx et al., 2009). Hayes et al. reported a decline in daily physical activity from 37 to 23 minutes by 35 weeks of pregnancy (Hayes et al., 2012). In Adeniyi et al.'s study, pregnant women engaged mostly in indoor physical activities, which decreased as the pregnancy progressed (Adeniyi & Ogwumike, 2014).

According to this research, pregnant women with low tokophobia tend to be more active than those with moderate tokophobia. Additionally, it was discovered that as physical activity increased, tokophobia decreased. After reviewing the literature, it was found that only two studies have explored the relationship between physical activity and tokophobia. In both studies, it was found that women who engaged in physical activity were less likely to experience tokophobia (Mortazavi & Agah, 2018; Onchonga et al., 2020). However, these studies did not evaluate physical activity with standard measurement

methods. A low level of physical activity is one of the determinants of tokophobia.

This study revealed that there was no relationship between being multiparous/nulliparous and the level of tokophobia. A review presented different results from our study, and it was stated that tokophobia was more common after the 21st week of pregnancy and in nulliparous women (Striebich et al., 2018). It has been found that moderate/severe dyspareunia during first intercourse, poor health, unwanted pregnancy, and low levels of physical activity are the factors that contribute to tokophobia in multiparous women. On the other hand, nulliparous women, the lack of support from their partners, opinions of other women about their current pregnancies, and physical inactivity for less than 30 minutes per week are the determinants of tokophobia (Mortazavi & Agah, 2018).

This research found that experiencing miscarriage or abortion is linked to severe tokophobia. Previous pregnancy, miscarriage, or abortion experiences were not associated with tokophobia in a prior study (Koc et al., 2020).

It is recommended by the American College of Obstetrics and Gynecology that healthy pregnant women should participate in low to moderate regular physical activity for at least 30 minutes every day, if possible, throughout pregnancy (Obstetricians & Gynecologists, 2015). Physical activity during pregnancy increases serotonin and endorphin levels and maintains mental and physical health (Field, 2009, 2012; Guszkowska, 2013; Kołomańska et al., 2019; Price et al., 2012).

Limitations of the study

This study was the first to explore the correlation between physical activity levels among pregnant women and their fear of childbirth on a national scale. It was discovered that numerous global studies on this subject did not employ standardized assessment techniques to evaluate physical activity. However, our study methodology is strong in this aspect. Additionally, we utilized physical activity measurement approaches that are specifically tailored for pregnant women, further strengthening our findings. Moving forward, we recommend that subsequent research should increase their sample size, incorporate physical activity training, and monitor the progression of tokophobia about heightened physical activity.

CONCLUSION

Research shows that expectant mothers who engage in physical activity may experience a reduction in tokophobia. As a result, it is advisable to keep a close watch on the physical activity of pregnant women and educate them about its advantages. Pregnant women should also be enrolled in an exercise or prenatal preparation session through online or face-to-face interviews to reduce their tokophobia.

Acknowledgments

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors. Our study was registered on clinicaltrails.gov with the number NCT04922346.

Conflict of Interest

The authors declare no potential conflicts of interest concerning the research, authorship, and/or publication of this article.

Author Contributions

Plan, design: ZYK, AÖA, MARB, YH; **Material, methods, and data collection:** ZYK, AÖA, MARB, YH; **Data analysis and comments:** ZYK, AÖA; **Writing and corrections:** ZYK, AÖA, MARB, YH, ZS.

Funding

The research expenses have been covered by the researchers themselves, and no support has been received from any institution or organization.

Ethical considerations

Ethics committee approval for this study was obtained from Artvin Coruh University Rectorate Ethics Committee (Decision No: E-18457941-050-99-1067 Decision Date: 30.04.2021). This study was conducted by the Declaration of Helsinki (World Medical Association, 2018), and informed consent was obtained from the participants via the online form before data collection.

REFERENCES

Adams, S. S., Eberhard-Gran, M., & Eskild, A. (2012). Fear of childbirth and duration of labour: a study of 2206 women with intended vaginal delivery. *BJOG: An International Journal of Obstetrics & Gynaecology*, *119*(10), 1238-1246. https://doi.org/10.1111/j.1471-0528.2012.03433.x

Adeniyi, A. F., & Ogwumike, O. O. (2014). Physical activity and energy expenditure: findings from the Ibadan Pregnant Women's Survey. *Afr J Reprod Health*, *18*(2), 117-126.

Barut, S., & Uçar, T. (2018). Gebelerde doğum öz yeterlilik algısının doğum korkusu ile ilişkisi. *Mersin Üniversitesi Sağlık Bilimleri Dergisi*, 107-115. https://doi.org/10.26559/mersinsbd.331077

Chasan-Taber, L., Schmidt, M. D., Roberts, D. E., Hosmer, D., Markenson, G., & Freedson, P. S. (2004). Development and Validation of a Pregnancy Physical Activity Questionnaire. *Medicine & Science in Sports & Exercise*, *36*(10), 1750-1760. https://doi.org/10.1249/01.mss.0000142303.49306.0d

Demšar, K., Svetina, M., Verdenik, I., Tul, N., Blickstein, I., & Globevnik Velikonja, V. (2018). Tokophobia (fear of childbirth): prevalence and risk factors. *Journal of Perinatal Medicine*, *46*(2), 151-154. https://doi.org/10.1515/jpm-2016-0282

Erkaya, R., Karabulutlu, Ö., & Çalık, K. Y. (2017). Defining Childbirth Fear And Anxiety Levels In Pregnant Women. *Procedia - Social and Behavioral Sciences*, *237*, 1045-1052. https://doi.org/10.1016/j.sbspro.2017.02.151

Field, T. (2009). Complementary and alternative therapies research. In: American Psychological Association.

Field, T. (2012). Prenatal exercise research. *Infant Behavior and Development*, *35*(3), 397-407. https://doi.org/10.1016/j.infbeh.2011.10.001

Guelinckx, I., Devlieger, R., Mullie, P., & Vansant, G. (2009). Effect of lifestyle intervention on dietary habits, physical activity, and gestational weight gain in obese pregnant women: a randomized controlled trial. *The American Journal of Clinical Nutrition*, *91*(2), 373-380. https://doi.org/10.3945/ajcn.2009.28166

Guszkowska, M. (2013). The effect of exercise and childbirth classes on fear of childbirth and locus of labor pain control. *Anxiety, Stress, & Coping*, *27*(2), 176-189. https://doi.org/10.1080/10615806.2013.830107

Hall, W. A., Stoll, K., Hutton, E. K., & Brown, H. (2012). A prospective study of effects of psychological factors and sleep on obstetric interventions, mode of birth, and neonatal outcomes among low-risk British Columbian women. *BMC pregnancy and childbirth*, *12*, 78-78. https://doi.org/10.1186/1471-2393-12-78

Harrison, A. L., Taylor, N. F., Shields, N., & Frawley, H. C. (2018). Attitudes, barriers and enablers to physical activity in pregnant women: a systematic review. *Journal of Physiotherapy*, *64*(1), 24-32. https://doi.org/10.1016/j.jphys.2017.11.012

Hayes, L., Kinnunen, T., Robson, S., McParlin, C., Poston, L., & Bell, R. (2012). Factors associated with level of physical activity in obese pregnant women participating in the upbeat pilot trial. *Archives of Disease in Childhood - Fetal and Neonatal Edition*, *97*(Suppl 1), A41.43-A41. https://doi.org/10.1136/fetalneonatal-2012-301809.130

Hildingsson, I., Nilsson, C., Karlström, A., & Lundgren, I. (2011). A Longitudinal Survey of Childbirth-Related Fear and Associated Factors. *Journal of Obstetric, Gynecologic & Neonatal Nursing*, *40*(5), 532-543. https://doi.org/10.1111/j.1552-6909.2011.01274.x

Hofberg, K., & Ward, M. R. (2003). Fear of pregnancy and childbirth. *Postgraduate medical journal*, *79*(935), 505-510. https://doi.org/10.1136/pmj.79.935.505

Koc, A. E., Colak, S., Colak, G. V., Pusuroglu, M., & Hocaoglu, C. (2020). Investigating fear of childbirth in pregnant women and its relationship between anxiety sensitivity and somatosensory amplification. *Journal of Obstetrics and Gynaecology*, *41*(2), 217-223. https://doi.org/10.1080/01443615.2020.1732894

Kołomańska, D., Zarawski, M., & Mazur-Bialy, A. (2019). Physical Activity and Depressive Disorders in Pregnant Women-A Systematic Review. *Medicina (Kaunas, Lithuania)*, *55*(5), 212. https://doi.org/10.3390/medicina55050212

Korukcu, O., Kukulu, K., & Firat, M. Z. (2012). The reliability and validity of the Turkish version of the Wijma Delivery Expectancy/Experience Questionnaire (W-DEQ) with pregnant women. *Journal of Psychiatric and Mental Health Nursing*, *19*(3), 193-202. https://doi.org/10.1111/j.1365-2850.2011.01694.x

Mortazavi, F., & Agah, J. (2018). Childbirth Fear and Associated Factors in a Sample of Pregnant Iranian Women. *Oman medical journal*, *33*(6), 497-505. https://doi.org/10.5001/omj.2018.91

Obstetricians, A. C. o., & Gynecologists. (2015). Committee opinion no. 650. *Obstetrics & Gynecology*, *126*(6), e135-e142.

Onchonga, D., MoghaddamHosseini, V., Keraka, M., & Várnagy, Á. (2020). Prevalence of fear of childbirth in a sample of gravida women in Kenya. *Sexual & Reproductive Healthcare*, *24*, 100510. https://doi.org/10.1016/j.srhc.2020.100510

Pirdadeh Beiranvand, S., Behboodi Moghadam, Z., Salsali, M., Alavi Majd, H., Birjandi, M., & Bostani Khalesi, Z. (2017). Prevalence of Fear of Childbirth and Its Associated Factors in Primigravid Women: A Cross-Sectional Study. *Shiraz E-Medical Journal*, *18*(11). https://doi.org/10.5812/semj.61896

Price, B. B., Amini, S. B., & Kappeler, K. (2012). Exercise in Pregnancy. *Medicine & Science in Sports & Exercise*, *44*(12), 2263-2269. https://doi.org/10.1249/mss.0b013e318267ad67

Størksen, H. T., Garthus-Niegel, S., Vangen, S., & Eberhard-Gran, M. (2013). The impact of previous birth experiences on maternal fear of childbirth. *Acta Obstetricia et Gynecologica Scandinavica*, *92*(3), 318-324. https://doi.org/10.1111/aogs.12072

Striebich, S., Mattern, E., & Ayerle, G. M. (2018). Support for pregnant women identified with fear of childbirth (FOC)/tokophobia – A systematic review of approaches and interventions. *Midwifery*, *61*, 97-115. https://doi.org/10.1016/j.midw.2018.02.013

Tosun, O. C., Solmaz, U., Ekin, A., Tosun, G., Mutlu, E. K., Okyay, E., Adiyeke, M., Gezer, C., Mat, E., & Malkoc, M. (2015). The Turkish version of the pregnancy physical activity questionnaire: cross-cultural adaptation, reliability, and validity. *Journal of physical therapy science*, *27*(10), 3215-3221. https://doi.org/10.1589/jpts.27.3215

Weaver, J., Browne, J., Aras-Payne, A., & Magill-Cuerden, J. (2012). A comprehensive systematic review of the impact of planned interventions offered to pregnant women who have requested a caesarean section as a result of tokophobia (fear of childbirth). *JBI Library of Systematic Reviews*, *10*(28), 1-20. https://doi.org/10.11124/jbisrir-2012-322

Wijma, K., Wijma, B., & Zar, M. (1998). Psychometric aspects of the W-DEQ; a new questionnaire for the measurement of fear of childbirth. *Journal of Psychosomatic Obstetrics & Gynecology*, *19*(2), 84-97. https://doi.org/10.3109/01674829809048501

ORİJİNAL MAKALE / ORIGINAL ARTICLE

Balıkesir Sağlık Bilimleri Dergisi / BAUN Sağ Bil Derg
Balıkesir Health Sciences Journal / BAUN Health Sci J
ISSN: 2146-9601- e ISSN: 2147-2238
Doi: https://doi.org/10.53424/balikesirsbd.1403834

Determination of Paraoxonase 1 Activity and Phenotype Distribution in Cervical Disk Herniation Patients

Utku ADİLAY[1], Salim KATAR[1], Kübra ÇIKRIKÇI[2], Nahit GENCER[2]

[1] Balikesir University, School of Medicine, Department of Neurosurgery
[2] Balikesir University, Faculty of Science and Literature, Department of Chemistry

Geliş Tarihi / Received: *12.12.2023,* ***Kabul Tarihi / Accepted:*** *02.01.2024*

ABSTRACT

Objectives: Cervical disk herniation (CDH) is a common disease that usually develops as a result of intervertebral disk degeneration (IVDD) or trauma, which can cause pain or neurological deficiency by nevre root or spinal cord compression. Paraoxonase 1 (PON1) has antioxidant qualities, and its function may vary based on genetic variations and ethnic background. This study aims to compare PON1 activity and phenotype distribution in CDH patients and individuals without the condition. **Materials and Methods:** This study involved 70 CDH patients and 70 individuals in good health. Spectrophotometric tests were conducted to measure the serum PON1 and arylesterase (ARE) activities. The PON1 ratio, which indicates the salt-stimulated PON/ARE level, showed a three-peak distribution. This ratio was utilized to determine the various phenotypes; QQ, QR, and RR for each participant.**Results:** The PON1 activity was lower in CDH patients compared to the healthy individuals ($p < 0.05$). CDH patients exhibited a statistically significant QQ phenotype in comparison to the healthy participants ($p < 0.05$).**Conclusion:** Patients with CDH exhibited significantly reduced PON1 activity, indicating that low PON1 activity and the PON1 QQ phenotype could potentially be a risk factor for the development of CDH.

Keywords: Cervical disk herniation, Paraoxonase, Phenotype, PON1.

Servikal Disk Herniasyonlu Hastalarda Paraoksonaz 1 Aktivitesinin ve Fenotip Dağılımının Belirlenmesi

ÖZ

Amaç: Servikal disk herniasyonu (SDH), genellikle intervertebral disk dejenerasyonu (IVDD) veya travmanın bir sonucu olarak gelişen yaygın bir hastalıktır ve sinir kökü veya omurilik sıkışması nedeniyle ağrı veya nörolojik bozukluklara yol açabilir. Paraoksonaz1 (PON1), antioksidan özelliklere sahiptir ve genetik varyasyonlara ve etnik kökene bağlı olarak fonksiyonu değişebilir. Bu çalışmanın amacı, servikal disk herniasyonlu hastalar ve sağlıklı bireylerde PON1 aktivitesini ve fenotip dağılımını karşılaştırmaktır. **Gereç ve Yöntem:** Bu çalışmada 70 SDH hastası ve 70 sağlıklı birey yer aldı. Serum PON1 ve arilesteraz (ARE) aktivitelerini ölçmek için spektrofotometrik testler yapıldı. Tuz uyaranlı PON/ARE seviyesini gösteren PON1 oranı, üç tepe dağılımını gösterdi. Bu oran, her katılımcı için farklı fenotipleri belirlemek için kullanıldı; QQ, QR ve RR. **Bulgular:** PON1 aktivitesi, SDH hastalarında sağlıklı bireylere göre daha düşüktü ($p <0.05$). SDH hastaları, sağlıklı katılımcılara göre istatistiksel olarak anlamlı bir QQ fenotipi sergiledi ($p <0.05$). **Sonuç:** SDH hastalar, belirgin şekilde azalmış PON1 aktivitesi sergiledi, bu da düşük PON1 aktivitesinin ve PON1 QQ fenotipinin potansiyel olarak SDH gelişimi için bir risk faktörü olabileceğini göstermektedir.

Anahtar Kelimeler: Servikal disk herniasyonu, Paraoksonaz, Fenotip, PON1.

Sorumlu Yazar / Corresponding Author: Utku ADİLAY, Balikesir University, School of Medicine, Department of Neurosurgery, Balikesir, Türkiye
E-mail: utkuadilay@hotmail.com

Bu makaleye atıf yapmak için / Cite this article: Adilay, U., Katar, S., Çıkrıkçı, K., & Gencer, N. (2024). Determination of paraoxonase 1 activity and phenotype distribution in cervical disk herniation patients. *BAUN Health Sci J, 13*(2), 234-239. https://doi.org/10.53424/balikesirsbd.1403834

INTRODUCTION

Cervical disk herniation (CDH) is a common disease that usually develops as a result of intervertebral disk degeneration (IVDD) or trauma, which can cause pain or neurological deficiency by nevre root or spinal cord compression. Recent investigations have demonstrated that specific inflammation, in addition to mechanical problems, is an important cause of disk degeneration and disk herniation (Bailey & Badgley, 1960; Boger et al., 1986). It has been shown that there are changes in inflammatory enzyme levels in the blood in cases of cervical disc herniation (Ethemoğlu et al., 2020). While oxidative stress is known to cause chronic inflammation, we have limited information about its effect on disk degeneration and CDH.

Paraoxonase 1 (PON1, EC.3.1.8.1) and arylesterase (ARE) are two enzymes that derive from the same gene and possess analogous active sites. PON1 an antioxidant enzyme linked to plasma high-density lipoproteins (HDL), has been shown to protect low-density lipoprotein (LDL) and HDL from oxidation by free radical sand reduce oxidative stres (Draganov et al., 2004; Balcı et al., 2004). The PON1 enzyme is found in many tissues and serums, including liver, kidneys, thin cartilage and the brain primarily, where the activity of the enzym is influenced by genetic and environmental factors (Sarioglu et al., 2015). PON 1 was associated with intervertebral disk degeneration (Chen et al., 2019).

Prior research has explored the PON1 activity in individuals with CDH, yet the PON1 phenotypes and their influence on CDH development are still undetermined. This research investigated the occurrence and activitiy of PON1 phenotypes in CDH patients and a control group. Three distinct PON1 phenotypes were identified by comparing the PON and ARE activities of PON1

MATERIALS AND METHODS

Study groups.

This study involved 70 patients diagnosed with CDH (mean age: 45.48 ±6.5 years, age range: 25–70 years) who were treated at the Balıkesir University Neurosurgery Department, along with 70 healthy individuals. The inclusion criteria for CDH patients encompassed ipsilateral radicular pain and MRI confirmation of extruded or sequestered CDH. Exclusion criteria for subject selection included degenerative spondylolisthesis, ossified posterior longitudinal ligament availability, the presence of accompanying inflammatory diseases such as infectious diseases and autoimmune disorders, neoplastic diseases, familial hypercholesterolemia, as well as liver, pulmonary, kidney, and heart diseases. Smoking habit was also an exclusion criterion.

The control group for this study comprised 70 healthy individuals (mean age: 42.26 ± 5.6 years, age range: 24–70 years) with no history of CDH or radicular pain, and who did not meet any of the exclusion criteria. Consistent strenuous manual labor and heavy lifting are recognized as risk factors for CDH in humans. To ensure a valid comparison, we selected a control group consisting of individuals with similar lifestyles and work statuses as the CDH patients.

Blood samples

Venous blood samples (6 mL) were obtained from 70 CDH patients and 70 control subjects who had fasted overnight. The samples were then centrifuged (10 min at 3,000 xg), and the resulting sera were stored in tubes at −30°C until further analyses.

Measurement of PON1 and ARE activities

The PON1 enzyme activity was evaluated using the method established by Eckerson et al. (Eckerson et al., 1983). This method involved measuring the hydrolysis rate of PON1 spectrophotometrically by monitoring the increase in absorbance at 412 nm resulting from the generation of p-nitrophenol, using paraoxon (p-nitrophenyl phosphate, Sigma Chemical Co.) as a substrate at 37°C for 1 minute. The PON1 enzyme activity was determined based on the molar extinction coefficient of 17100 M−1 cm−1. One unit (U) of PON activity was defined as 1 µmol of p-nitrophenol formed in 1 minute. Fresh paraoxon substrate was prepared daily. For phenotype distribution, PON catalysis was determined in a pH 10.5 phosphate buffer containing 1M NaCl.

The activity of ARE was evaluated through spectrophotometric analysis, which involved measuring the rise in absorbance at 270 nm for a duration of 1 minute at 25°C, using a phenylacetate substrate. The enzyme activity was determined using a molar extinction coefficient of 1310 M−1 cm−1. One unit (U) of ARE activity was defined as the formation of 1 µmol of phenylacetate in 1 minute. . Fresh phenylacetate substrate was prepared on a daily basis.

PON1 phenotype distribution

The dual-substrate technique was employed to establish the phenotypic distribution of PON1 (La Du & Eckerson, 1984). The PON1 enzyme activity is determined by the 192 Q/R polymorphism, which affects the phenotypic distribution of the enzyme. Individuals with the Q allele exhibit lower PON1 enzyme activity compared to those with the R allele. Blood paraoxon hydrolysis capacity is used to assess PON1 enzyme activity, which reflects the 192 Q/R polymorphism and changes in the concentration of the PON1 enzyme.

The genetic polymorphism at codon 192Q/R exists in two forms: Q (low activity) and R (high activity). The ratio of PON catalysis in a 1 M NaCl-containing buffer to phenylacetate catalysis was utilized to determine the presence of the three phenotypes (QQ, QR, and RR). The paraoxon hydrolysis activity associated with the R allele of PON1 is eight times greater than that associated with the Q allele. The PON Q/R polymorphism has been shown to impact serum concentration and enzyme activity.

A single alteration in the amino acid sequence determines the enzyme's structure and its activity. Individuals with the Q (glutamine) rather than R (arginine) at position 192 exhibit reduced serum PON

enzyme activity. Homozygous carriers of the R allele have a higher enzyme concentration compared to homozygous Q individuals. The R allele is linked to elevated PON activity, while the Q polymorphism is associated with lower PON activity. Q/Q is correlated with reduced activity, whereas R/R and Q/R are linked to heightened activity.

The cut-off values for the various phenotypes are as follows: low enzyme activity, QQ type, ratio<3.0; moderate enzyme activity, QR type, ratio 3.0–7.0; high enzyme activity, RR type, ratio >7.0 (La Du &Eckerson, 1984)

Statistical analysis

The Kolmogorov-Smirnov test was used to evaluate the normal distribution of the parametric variables. A comparison of the patients' ages between the two study groups was conducted using an independent sample t-test. The gender distribution among the groups was assessed using a Chi-square test. PON1 and ARE activities in the CDH and control groups were compared using the Mann–Whitney U-test. The distribution of PON1 phenotypes in patient and control subjects was also evaluated using a Chi-square test. Statistical significance was determined using a significance level of $p< 0.05$. All statistical analyses were conducted using SP-SS 20.0 statistical software.

Ethical considerations

The study received approval from the Balıkesir University Clinical Research Ethics Committee (Decision No. 2022/93, Date: 07/09/2022). All CDH patients and control individuals provided verbal and written consent before participating in the study.

RESULTS

The research involved 70 individuals with CDH and 70 healthy participants. Table 1 presents the age, gender, and clinical characteristics of the CDH and control groups.

Table 1. Clinical parameters of subjects.

Variable	CDH (n=70)	Control (n=70)	*P**
Sex (M/F)	33/37	32/38	>0.05
Age	45.48±6.5	42.26±5.6	>0.05
CDH Level			
C4-C5			8
C5-C6			35
C6-C7			27

* Independent sample t test, chi-square test , *p < 0.05, statistically significant.

There were no statistically significant variances in the mean age and gender distribution between the CDH patients and the healty group, and none of the participants met the exclusion criteria.

The PON1 activity in CDH patients was significantly lower compared to that of the control subjects (26.27 ± 10.7 vs. 61.17 ± 12.8 IU) ($p < 0.05$).

Table 2. Biochemical parameters of subjects.

Parameters	CDH (n=70)	Control (n=70)	*P value
PON1 activity (U ml^{-1})	26.27 ± 10.7	61.17 ± 12.8	p<0.05
ARE activity (U ml^{-1})	84.78 ± 12.4	96.25 ± 14.3	p>0.05

*Mann-Whitney U test, PON1: Paraoxonase, ARE: Arylesterase *p < 0.05, statistically significant

Table 3. PON1 phenotype distribution in CDH and control groups.

		Phenotypes			Total
		QQ	QR	RR	
Groups	CDH	37 (52.9%)	16 (22.9%)	17 (24.2%)	70 (100%)
	Control	19 (27.1%)	28 (40%)	23 (32%)	70 (100%
Total		56 (40%)	44 (31.4%)	40 (28.6%)	140 (100%)

*Chi-square test, QQ phenotype distribution was more common in CDH group than in control group *(p<0.05)*

Additionally, the ARE activity was assessed to determine the phenotype frequency in both the CDH and control groups, respectively (84.78 ± 12.4 vs. 96.25 ± 14.3 IU) ($p > 0.05$) (Table 2). CDH patients exhibited a notably higher frequency of the QQ phenotype in comparison to the control subjects, and this difference was statistically significant ($p < 0.05$) (Table 3) (Figure 1).

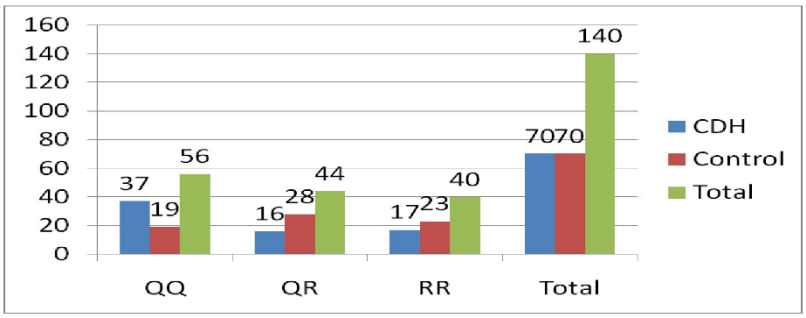


Figure 1. PON1 phenotype distribution in CDH and control groups.

DISCUSSION

Cervical disk herniation is a prevalent condition associated with neck pain, stemming from IVDD, and it is a primary cause of radiculopathy in adults. Disc degeneration is a process characterized by biochemical, vascular and anatomical changes in the intervertebral disk, where extrinsink, intrinsink and genetic factors play a role. Although the underlying physio pathological mechanisms have not been fully clarified, degenerative cervical disc disease is an anatomical adaptation process of the spine to load and mechanical stress, and is characterized by clinical syndrome ssuch as disc hernia or spondylosis. Cervical spondylosis is a term generally used to describe developing vertebral changes in the degenerative back ground, and cervical disk herniation is often part of this degenerate phenomen on (Borovkova et al., 2017). Past studies have identified that inflammatory reactions and oxidative stress are the leading causes of extracellular matrix degradation and a reduction in nucleus pulposus cells. Alleviating inflammatory responses and oxidative stress could potentially mitigate the advancement of IVDD and CDH (Chen et al., 2019).

The most important production site of PON1 in the body is the liver and it is distributed throughout the body from there (Deakin et al., 2002). PON1 activity may be impacted by smoking and dietary habits (Mouhamed et al., 2012). Research suggests that the consumption of butter, certain fruits, and lifestyle factors such as moderate alcohol consumption can elevate PON1 activity (Costa et al., 2011). The study excluded individuals using medication for atherosclerosis, diabetes mellitus, coronary heart disease (Mirdamadi et al., 2008), hypertension, rheumatoid arthritis, neurological, liver conditions. Participants with a history of cancer or hepatitis, and those using antipsychotic, serum lipid-lowering, cigarette, and antioxidant medications were also not included in the study.

Several research studies have documented the anti-inflammatory or antioxidant characteristics of PON1. Recent research has found that inflammation and oxidative stress can change the microenvironment of nucleus pulposus cells, resulting in IVDD. (Risbud & Shapiro, 2014; Dimozi et al., 2015). In addition, multiple research studies have explored the association between PON1 phenotype and various disease (Zhao et al., 2012; Bassu et al., 2023; Ayan et al., 2019). While there are investigations into the link between PON1 activity and IVDD or LDH (Chen et al., 2019; Karabağ & Sezen, 2016), no study has specifically examined the relationship between PON1 phenotype distribution and CDH.

Chen et al. reported that PON1 expression is indicative of severe IVDD; PON1 has been demonstrated to have a crucial role in preserving the homeostatic balance of intervertebral discs. (Chen et al., 2019). Chen et al demonstrated a robust correlation between the anti-inflammatory and antioxidant characteristics of PON1 and the process of IVDD. Our findings indicate that PON1 expression is considerably diminished in severely degenerated cervical disks, and there is an inverse relationship between PON1 expression and IVDD.

Chen et al. (Chen et al., 2019) conducted a study to explore the role of PON1 in the gene expression process related to IVDD. They identified several variations in the PON1 gene, including two common polymorphisms at amino acid codons 55 and 192 within the coding region. Additionally, they identified five single nucleotide polymorphisms in the promoter region at positions −108, −126, −162, −832, and −909. The researchers used PCR analysis to investigate the relationship between IVDD and PON1 in their study. On the other hand, Karabag et al. (Karabağ and Sezen, 2016) focused on examining the association between PON1 and LDH. They also investigated the correlation between levels of lipid hydroperoxide (LOOH), total oxidative status, total antioxidative status markers, and LDH. The authors utilized the Eckerson method (Eckerson et al., 1983) to measure PON1 activity. However, they did not perform phenotype

classification and did not compare the relationship with LDH.

In our study, we compared the PON1 activity between the patient and control groups using the Gan method. This involved measuring the increase in absorbance at 412 nm using paraoxon as a substrate. Additionally, we determined the PON1 phenotype distribution in both groups using the dual-substrate method. This method utilizes phenyl acetate and paraoxon as substrates, and the equation provided in the material and methods section was used for calculation. It is worth noting that no previous study has examined the correlation between PON1 phenotype distribution and CDH using the method proposed in our study.

Therefore, we hypothesized that there may be a relationship between PON1 activity, ARE activity/phenotype distribution, and CDH disease. In our study, we compared the activities of PON1 and ARE, as well as the phenotype distribution of PON1, between individuals with CDH and healthy individuals. PON1 is known for its anti-inflammatory and anti-oxidative properties (Borovkova et al., 2017; Furlong et al., 2016; Mackness & Mackness, 2015). Our findings showed that CDH patients had significantly lower PON1 activity compared to control individuals, suggesting a link between low PON1 activity and CDH. Furthermore, we conducted a comparison of the ARE activity in order to assess the distribution of PON1 phenotype between individuals with CDH and those who are healthy.. We measured and compared the three PON1 phenotypes (QQ, QR, RR) in CDH and healthy subjects, and observed that the CDH group had a significantly higher frequency of the QQ phenotype compared to the control group. .This study is the first to investigate PON1 phenotypes in CDH, and our findings demonstrate that the CDH group has a significantly higher frequency of the QQ phenotype compared to control subjects.

CONCLUSION

Our research revealed that the CDH patient group exhibited reduced PON activity compared to the control group, and the Q allele was more prevalent in the CDH patient group. Previous literature has indicated that individuals with Q alleles have diminished PON1 activity, which corroborates our findings. In addition, our study revealed a significantly higher prevalence of the QQ phenotype in the CDH group compared to the control group.However, further investigation across multiple centers is required to validate whether the QQ phenotype is a risk factor for CDH disease. One of the strengths of our research is that it is the first to investigate PON1 phenotypes in both individuals with CDH and those who are healthy. Nevertheless, it is crucial to acknowledge that this research was carried out at a solitary facility with a restricted number of participants, thus restricting the applicability of our results

Acknowledgement

The authors would like to extend their sincere thanks to anyone who contributed to this study.

Conflict of Interest

The author declare no potential conflicts of interest with respect to the research, authorship and/or publication of this article.

Author Contributions

Plan, design: UA, SK; **Material, methods and data collection:**UA, SK, NG; **Data analysis and comments:** NG, KÇ; **Writing and corrections:**UA, SK.

Funding

None

Ethical considerations

The study received approval from the Balıkesir University Clinical Research Ethics Committee (Decision No. 2022/93, Date: 07/09/2022). All CDH patients and control individuals provided verbal and written consent before participating in the study**.**

REFERENCES

Ayan, D., Senes, M., Caycı, A. B., Söylemez, S., Eren, N., Altuntas, Y., & Oztürk, F. Y. (2019). Evaluation of paraoxonase, aryylesterase and homocysteine thiolactonase activities in patients with diabetes and incipient diabetic nephropathy. *Journal of Medical Biochemistry*, *38*, 481–488. https://doi.org/10.2478/jomb-2019-0014

Bailey, R. W., & Badgley, C. E. (1960). Stabilization of the cervical spine by anterior fusion. *Journal of Bone and Joint Surgery*, 42, 565-59

Balcı, Ö.E., Donma, O., & Ekmekçi, H. (2004). Paraokonaz. *Cerrahpaşa Tıp Derg*, *35*, 78-82.

Bassu, S., Mangoni, A. A., Argiolas, D., Carru, C., Pirina, P., Fois, A. G., & Zinell, A. (2022). A systematic review and meta-analysis of paraoxonase 1 activity in asthma. *Clinical and Experimental Medicine*, *23*, 1067–1074. https://doi.org/10.1007/s10238-022-00930-0

Boger, D. C. (1986). Traction device to improve CT imaging of lower cervical spine. *AJNR*, *7*, 719.

Borovkova, E. I., Antipova, N. V., Komeenko, T. V., Shakparonov, M. I., & Borovkov, I. M. (2017). Paraoxonase: The universal factor of antioxidant defense in human body. *Vestn Ross Akad Med Nauk*, *72*(1), 5–10. https://doi.org/10.15690/vramn764

Chen, F., Liu, H., Li, Z., Pei, Y., Wang, H., Zhang, J., Wang, J., & Zheng, Z. (2019). Paraoxonase 1 was negatively associated with intervertebral disc degeneration. *Spine (PhilaPa 1976)*, *44*(18), E1053-E1062. https://doi.org/10.1097/brs.0000000000003059

Costa, L. G., Giordano, G., & Furlong, C. E. (2011). Pharmacological and dietary modulators of paraoxonase 1 (PON1) activity and expression: the hunt goes on. *Biochem Pharmacol*, *81*(3), 337-344. https://doi.org/10.1016/j.bcp.2010.11.008

Deakin, S., Leviev, I., Gomaraschi, M., Calabresi, L., Francesshini, G., & James, R. W. (2002). Enzymatically active paraoxonase-1 is located at the external membrane of producing cells and released by a high-affinity, saturable, desorption mechanism. Journal of Biological Chemistry, *277*, 4301–4308. https://doi.org/10.1074/jbc.M107440200

Dimozi, A., Mavrogonatou, E., & Sklirou, A. (2015). Oxidative stress inhibits the proliferation, induces premature senescence and promotes a catabolic phenotype in human nucleus pulposus intervertebral disc cells. *European Cell Materials*, *30*, 89-102. https://doi.org/10.22203/ecm.v030a07

Draganov, D. I., & La Du, B. N. (2004). Pharmacogenetics of paraoxonases: A brief review. *Naunyn-Schmiedeberg's Archives of Pharmacology*, *369*, 78-88. https://doi.org/10.1007/s00210-003-0833-1

Eckerson, H. W., Wyte, C. M., & La Du, B. N. (1983). The human serum paraoxonase/arylesterase polymorphism. *American Journal of Human Genetics*, *35*, 1126-1138.

Ethemoğlu, K. B., & Erkoç, Y. S. (2020). Is there any relationship between cervical disc herniation and blood inflammatory response? *Cureus*, *12*(8), e10161. https://doi.org/10.7759/cureus.10161

Furlong, C. E., Marsillach, J., Jarvik, G. P., & Costa, L. G. (2016). Paraoxonases-1, -2, and -3: What are their functions? *Chemical Biology & Interactions*, *259*, 51-62. https://doi.org/10.1016%2Fj.cbi.2016.05.036

Karabağ, H., & Sezen, H. (2016). The relation of lumbar disc herniation with increased lipid hydroperoxide, paraoxonase 1, and total oxidative status. *Crescent Journal of Medical and Biological Sciences, 3*(3), 86-90. https://sid.ir/paper/344940/en

La Du, B. N., & Eckerson, H. W. (1984). The polymorphic paraoxonase/arylesterase isozymes of human serum. *Federation Proceedings*, *43*(8), 2338-2341.

Mackness, M., & Mackness, B. (2015). Human paraoxonase-1 (PON1): Gene structure and expression, promiscuous activities and multiple physiological roles. *Gene*, (1), 12–21. https://doi.org/10.1016/j.gene.2015.04.088

Mirdamadi, H. Z., Sztanek, F., Derdak, Z., Seres, Z., Seres, I., Harangi, M., & Paragh, G. (2008). The human paraoxonase-1 phenotype modifies the effect of statins on paraoxonase activity and lipid parameters. *British Journal of Clinical Pharmacology*, *66*(3), 366-374. https://doi.org/10.1111/j.1365-2125.2008.03213.x

Mouhamed, D., Ezzaher, A., Mechri, A., Neffati, F., Omezzine, A., Bouslama, A., Gaha, L., Douki, W., & Najjar, M. (2012). Effect of cigarette smoking on paraoxonase 1 activity according to PON1 L55M and PON1 Q192R gene polymorphisms. *Environmental Health and Preventive Medicine*, *17*(4), 316–321. https://doi.org/10.1007%2Fs12199-011-0256-4

Risbud, M. V., & Shapiro, I. M. (2014). Role of cytokines in intervertebral disc degeneration: Pain and disc content. *Nature Reviews Rheumatology*, *10*(1), 44-56. https://doi.org/10.1038/nrrheum.2013.160

Sarioglu, N., Hismiogullari, A. A., Erel, F., Demir, D., & Gencer, D. (2015). Paraoxonase 1 phenotype and paraoxonase activity. *Iranian Journal of Allergy, Asthma, and Immunology*, *14*(1), 60-66.

Zhao, Y., Ma, Y., Fang, Y., Liu, L., Wu, S., Fu, D., & Wang, X. (2012). Association between PON1 activity and coronary heart disease risk: A meta-analysis based on 43 studies. *Molecular Genetics and Metabolism*, *105*, 141–148. https://doi.org/10.1016/j.ymgme.2011.09.018

ORIGINAL ARTICLE

Balıkesir Health Sciences Journal / BAUN Health Sci J
ISSN: 2146-9601- e ISSN: 2147-2238
Doi: https://doi.org/10.53424/balikesirsbd.1398800

Examination of the Health Perception Levels of Elite Level Judoists

Ramazan ERDOĞAN [1], Ahmethan YILDIRAK [1], Korhan KAVURAN [1]

[1]Bitlis Eren University, School of Physical Education and Sports

Geliş Tarihi / Received: *01.12.2023,* ***Kabul Tarihi / Accepted:*** *11.01.2024*

ABSTRACT

Objective: Health perception includes individuals' physical, physiological and psychological characteristics. Health perception is extremely important for athletes' quality of life and sports performance, especially in elite level athletes, due to intense competition and training pace. The objective of this research was carried out to reveal the health perception levels of elite judokas. **Materials and Methods:** The research group's sample group consisted of 91 (35 Female, 56 Male) volunteer athletes who were actively licensed in the judo branch at the elite level. In the study, the "Personal Information Form" was applied online to determine the demographic information of the participants, and the "Health Perception Scale" developed by Diamond et al., (2007) and adapted into Turkish by Kadıoğlu and Yıldız (2012) was applied online to determine their health perception levels. For data analysis, the SPSS package program was utilized, and significance was set at $p<0.05$. **Results:** According to the research findings, athletes' health perception levels were found to be medium, with male athletes' health perception levels being higher than female athletes. It has been discovered that as athletes' ages and years of participation in sports increase, so do their health perception levels. Furthermore, athletes who consume enough and balanced diet, athletes who drink more fluids and athletes who receive nutrition training have higher levels of health perception. **Conclusion:** Ultimately, it was revealed that the research group's health perceptions were on the medium level, and that sports years, age nutrition, and fluid consumption were crucial for health.

Keywords: Health, Health Perception, Judo.

Elit Düzeydeki Judocuların Sağlık Algı Düzeylerinin İncelenmesi

ÖZ

Amaç: Sağlık algısı bireylerin fiziksel, fizyolojik ve psikolojik özelliklerini içermektedir. Yoğun rekabet ve antrenman temposu nedeniyle özellikle elit seviyedeki sporcularda sağlık algısı sporcuların yaşam kalitesi ve spor performansı açısından son derece önemlidir. Bu araştırmanın amacı elit judocuların sağlık algı düzeylerini ortaya koymaktır. **Gereç ve Yöntem:** Araştırma grubunun örneklem grubunu judo branşında aktif olarak elit düzeyde lisanslı 91 (35 Kadın, 56 Erkek) gönüllü sporcu oluşturmuştur. Araştırmada katılımcıların demografik bilgilerini belirlemek için "Kişisel Bilgi Formu" ile sağlık algı düzeylerini belirlemek için Diamond ve ark., (2007) tarafından geliştirilen, Kadıoğlu ve Yıldız (2012) tarafından Türkçe'ye uyarlanan "Sağlık Algısı Ölçeği" çevrimiçi olarak uygulandı. Verilerin analizinde SPSS paket programından yararlanıldı ve anlamlılık $p<0,05$ olarak belirlendi. **Bulgular:** Araştırma bulgularına göre sporcuların sağlık algı düzeyleri orta düzeyde olup, erkek sporcuların sağlık algı düzeyleri kadın sporculara göre daha yüksek bulunmuştur. Sporcuların yaşı ve spora katılım süresi arttıkça sağlık algı düzeylerinin de arttığı belirlenmiştir. Ayrıca yeterli ve dengeli beslenen sporcuların, daha fazla sıvı tüketen sporcuların ve beslenme eğitimi alan sporcuların sağlık algısı daha yüksek düzeyde olduğu görülmüştür. **Sonuç:** Araştırma grubunun sağlık algılarının orta düzeyde olduğu, spor yılı, yaş, beslenme ve sıvı tüketiminin sağlık açısından önemli olduğu belirlenmiştir.

Anahtar Kelimeler: Sağlık, Sağlık Algısı, Judo.

Sorumlu Yazar / Corresponding Author: [1]Bitlis Eren University School of Physical Education and Sports, Bitlis, Türkiye
E-mail: ramaznerdogan@hotmail.com

Bu makaleye atıf yapmak için / Cite this article: Erdoğan, R., Yıldırak, A., & Kavuran, K. (2024). Examination of the health perception levels of elite level judoists. *BAUN Health Sci J, 13*(2), 240-247 https://doi.org/10.53424/balikesirsbd.1398800

INTRODUCTION

Health is a crucial concept that defines a person's quality of life while also expressing physical, mental, and social well-being and is regarded as one of people's most valued assets (Avci et al., 2004). From this vantage point, health plays a critical role in people's ability to enjoy and shape their lives. People's health views, therefore, not only affect their lives favorably, but also contribute to them living a happy, productive, and meaningful existence (Hayran, 2011).

Dursun et al. (2019) describe health perception as the notion that represents individuals' perceptions on their own health as well as health issues in general. Individuals' health-related knowledge, experiences, and personal beliefs all contribute to this view. Health perception is known to have a significant influence in people's lives when they make health-related decisions, seek health services, and adopt healthy lifestyles (Açıksöz et al., 2013). Furthermore, how people perceive their health might have an indirect impact on their health habits and awareness of their obligations (Tugut, 2008). Apart from all other factors, whether people's perceptions of health are positive or bad influences their health and lives (Klein Velderman et al., 2010).A positive attitude toward health may motivate people to take more preventative health measures, visit the doctor more frequently, or live healthier lives. A negative health perception, on the other hand, may lead to neglected health concerns, unhealthy habits, and issues such as access to health services (Alkan et al., 2017). According to this knowledge, athletes can combat stress and psychological difficulties through frequent involvement in sports activities as well as proper and balanced nutrition. According to research conducted in this regard, participating in sports on a regular basis provides numerous health benefits (Köse, 2020; Crowson et al., 2013; Metsios et al., 2009). Furthermore, frequent sports activities help people live a healthier lifestyle by raising their awareness of their own bodies and health (Hünük and Demirhan, 2003). Aside from these aspects, those who develop the habit of participating in sports have a better understanding of how their bodies react (Heper et al., 2012). Sports, in addition to being an essential component of a healthy lifestyle, can be stated to aid in the development of a healthy quality of life in the coming years (Erşahin, 2023). Athletes with good sports health and physical fitness levels can take their sports performance to the next level in this setting. Individual and team sports have different conceptions of health, although they both contribute to human health. Individual sports are known to increase personal motivation, contribute positively to personal development, and are important in terms of stress management. While team sports are important in strengthening social bonds, gaining discipline, and encouraging competition in the desired direction, individual sports are known to increase personal motivation, contribute positively to personal development, and are important in terms of stress management. Athlete health is prioritized alongside athletic performance, and training should aim to improve and safeguard athletes' health. (Dogan, 2001). According to this knowledge, criteria such as health perception and keeping a healthy lifestyle in judo, one of the individual sports, are vital for the growth of athletes' sports performance and health. Athletes engaging in this sport must have advanced technical knowledge that integrates physical, physiological, psychological, and mental skills, as well as be in good physical and mental health (Kavlu, 2002; Franchini et al., 2011). Additionally, judokas must accurately assess their own health status and enhance their health perception. It is well recognized that determining and enhancing judokas' health perception levels will improve both their athletic performance and their quality of life. The main objective of this research was conducted to find out the levels of health perception of elite judoists.

MATERIALS AND METHODS

Research group

The research population comprises of licensed judo athletes in the Eastern and Southeastern Anatolia Region, and the sample group formed with 91 (35 Female, 56 Male) volunteer judo athletes who are actively licensed at the elite level.

Collection of data

The researchers created a survey including the "Personal Information Form" and "The health Perception Scale" to collect data for the study.

Data collection tools

The Personal Information Form encapsulates descriptive questions including students' gender, age, height, body weight, income status, nutrition and physical activity status.

Health perception scale

Diamond et al. (2007) improved it, and Kadioglu and Yildiz (2012) conducted a Turkish validity and reliability research, with a Cronbach's alpha value of 0.77. The scale has 15 items and is divided into four sub-dimensions: "Control Base, Personal awareness, Assurance, and Importance of Health." The "Health Perception" score is the sum of the scores received from the sub-dimensions. Positive expressions are rated directly on the scale, whereas negative expressions are assessed in reverse. The scale's lowest possible score is 15 points, and its highest possible score is 75 points. Control Base (min=5, max=25), Personal awareness (min=3, max=15), Assurance (min=4, max=20), and Significance of Health (min=3, max=15) are the subcategories. The scale's Cronbach's alpha coefficient was found to be 0.77. Cronbach's alpha coefficients for the subscales range from 0.60 to 0.76.

Analysis of data

The SPSS statistics tool was applied to analyze the data. The demographic information and health perception levels of the research group were described using descriptive statistics such as percentage, frequency, arithmetic mean, and standard deviation. The skewness

and kurtosis values of the data were examined to see if they indicated a normal distribution. The data is deemed properly distributed if the skewness and kurtosis values are between +2 and -2 (George and Mallery, 2010).

After ensuring that the data had a normal distribution, intra-group comparisons were made using the Independent Samples t and One-Way ANOVA tests. The level for significance had been established at $p<0.05$.

Ethical considerations

In addition, Bitlis Eren University Ethical Principles and Ethics Committee approval was obtained before starting the study (2023/09-19).

Table 1. Mean, standard deviation, skewness and kurtosis values for the health perception level scale and its sub-dimensions.

Variables	Mean	Standard Deviation	Skewness	Kurtosis
Aqs+	8.58	4.04	.976	.425
Certainty Sub Dimension	14.20	4.11	.249	-.026
Importance of Health Sub Dimension	10.20	2.90	-.348	-.259
Self Awareness Sub Dimension	10.04	2.89	-.213	-.417
Health Perception Scale Total Score	43.04	2.89	.639	1.753

RESULTS

When Table 2 is examined, 38.5% are female, 61.5% are male, 57.1% are 12-16 years old, 22.0% are 17-21 years old, 20.9% are 21 years old and over. 23.1% are 140-150 cm 29.7% are 151-160 cm 20.9% are 161-170cm 26.4% are 171 cm and above 41.8% are 40-50 kg % It was observed that 18.7% of them were 51-60 kg, 19.8% were 61-70 kg and 19.8% were 71 kg and above. In addition, 18.7% have low income, 67.0% have medium income, 14.3% have high income, 40.7% have received nutrition education, 59.3% have not received nutrition education and 5.5% have chronic diseases. 94.5% have no chronic disease, 25.3% have been exercising for 1-3 years, 53.8% have been doing sports for 4-6 years, 20.9% have exercising for 6 years or more, 12.1% have been exercising for 6 years or more. 1 day 18.7% 2 days 16.5% 3 days 52.7% 4 days or more weekly exercise 12.1% 1 liter or less 45.1% 1, 5 liters 22.0% 2 liters 20.9% consume 2.5 liters or more of liquid daily 9.9% 1 meal 28.6% 2 meals 48.4% 3 meals % It was observed that 13.2% consumed 4 or more meals, 31.9% did not skip meals, 58.2% skipped morning meals and 9.9% skipped lunch (Table 2). When Table 3 is assessed, the items "I will stay healthy if I exercise and eat right" and "I consider about my well-being too much and it is based on me whether I am healthy or not" are 3.78±1.20, 3.48±1.27, 3.34± respectively. It was monitored that they agreed at a high rate with an average of 1.26. The items "being healthy is a matter of luck", being healthy is largely a matter of luck and I cannot change my health no matter what I do were 2.12 ±1.33, 2.09±1.22, 2, It was observed that they participated at a low level with an average of 08±1.15. The Control Base sub-dimension is 8.58, the Assurance sub-dimension is 14.20±4.11, the importance of health sub-dimension is 10.20±2.90, the personal awareness sub-dimension is 10.04±2.89 and the total health perception scale is 43.04. It was determined that it has an average of ±8.90. (Table 3). When Table 4 is examined, it is determined that there is a statistically important difference between the mean scores of the Control Base sub-dimension and personal awareness sub-dimensions according to the nutrition education variable ($p<0.05$), yet no statistically important difference was observed between the mean scores of the total, Assurance, and importance of health sub-dimensions of the health perception scale ($p>0.05$). Furthermore, no statistically important difference was found between the gender and persistent illness factors and the average health perception scale total, Control Base, Assurance, value of health, and personal-awareness subscale scores ($p>0.05$) (Table 4). When Table 5 was reviewed, it was determined that there was a statistically important difference between the age and daily fluid consumption variables, as well as the health perception scale total and importance of health sub-dimension mean scores ($p<0.05$), but no significant difference between the Control Base, assurance, and personal awareness sub-dimension mean scores ($p>0.05$). While the height variable, the athlete's year variable, and the average score of the importance of health sub-dimension were found to be statistically important ($p<0.05$), there was no significant difference between the health perception scale total, Control Base, assurance, and personal-awareness sub-dimensions ($p>0.05$). Besides, there was no statistically important difference found between body weight, income status, weekly physical activity, and number of main meals per day and the average score of the health perception scale total, Control Base, assurance, importance of health, and personal-awareness subscales ($p>0.05$) (Table 5).

Table 2. Demographic characteristics of judoists.

Variables		Frequency	Percentage (%)
Gender	Female	35	38.5
	Male	56	61.5
Age	12-16 years old	52	57.1
	17-21 years old	20	22.0
	21 years old and over	19	20.9
Height	140-150 cm	21	23.1
	151-160 cm	27	29.7
	161-170 cm	19	20.9
	171 cm and over	24	26.4
Body Weight	40-50 kg	38	41.8
	51-60 kg	17	18.7
	61-70 kg	18	19.8
	71 kg and over	18	19.8
Income Status	Low	17	18.7
	Middle	61	67.0
	High	13	14.3
Have you received nutrition training?	Yes	37	40.7
	No	54	59.3
Have you got a chronic Illness?	Yes	5	5.5
	No	86	94.5
How long Have you been doing sports?	1-3 years	23	25.3
	4-6 years	49	53.8
	6 years and over	19	20.9
How many days a week do you do physical activity?	1 day	11	12.1
	2 days	17	18.7
	3 days	15	16.5
	4 days and over	48	52.7
How many liters is your daily fluid consumption?	1 liter and below	11	12.1
	1.5 liters	41	45.1
	2 liters	20	22.0
	2.5 liters and over	19	20.9
How many main meals per day?	1 course	9	9.9
	2 courses	26	28.6
	3 courses	44	48.4
	4 courses and more	12	13.2
Main meal you skipped?	I do not skip any courses	29	31.9
	Morning	53	58.2
	Lunch	9	9.9

Table 3. Health perception of judoists.

	$\bar{x}$	Sd
Being healthy is a matter of luck	2.12	1.33
Being healthy is largely a matter of luck	2.09	1.22
No matter what I do. whether I'm healthy or sick. it happens anyway.	2.27	1.18
No matter what I do. I can't change my health	2.08	1.15
If I am healthy. it is a blessing from God	2.96	1.42
There is so much different information on the types of foods that protect health that I don't know what to do.	2.94	1.20
I'm often confused about what I need to do to stay healthy	2.76	1.11

Table 3 (Continued). Health perception of judoists.

	$\bar{x}$	Sd
I want to be healthier. but I can't do what I need to do yet	2.93	1.21
I can't understand everything I read about healthy eating	2.59	1.14
I think about my health a lot.	3.48	1.27
My health is the most important consideration in my life	3.50	1.19
I'm willing to spend more money on things that are healthy for me	3.21	1.32
I can be as healthy as I want	2.92	1.21
Whether I'm healthy or not is up to me.	3.34	1.26
I stay healthy if I exercise and eat right	3.78	1.20
Control Center Sub Dimension	8.58	4.04
Certainty Sub Dimension	14.20	4.11
Importance of Health Sub Dimension	10.20	2.90
Self-Awareness Sub Dimension	10.04	2.89
Health Perception Scale Total Score	43.04	8.90

Table 4. Health perception t test analyzes of judoists regarding demographic information.

Variables	Scale of Health Perception mean±sd	Control Base mean±sd	Assurance mean±sd	Significance of Health mean±sd	Personal Awareness mean±sd
Gender					
Female	42.31±8.59	8.40±4.36	13.40±3.80	10.31±2.37	10.20±2.81
Male	43.50±9.14	8.69±3.86	14.71±4.24	10.14±3.21	9.94±2.96
Statistics	t= -.616	t= -.339	t= -1.493	t= .292	t= .404
	p= 0.54	p= 0.73	p=0.13	p=0.77	p=0.68
Nutrition Training					
Yes	44.05±10.57	10.32±4.53	14.62±4.07	9.70±3.24	9.29±2.87
No	42.35±7.58	7.31±3.11	13.92±4.15	10.55±2.62	10.55±2.82
Statistic	t= .894	t= 3.888	t= .791	t= -1.381	t= -2.071
	p= 0.37	**p= 0.00**	p=0.43	p=0.17	**p=0.04**
Chronic Illness					
Yes	38.60±6.54	9.20±3.27	12.20±4.32	7.80±2.16	9.40±3.78
No	43.30±8.98	8.54±4.09	14.32±4.09	10.34±2.89	10.08±2.86
Statistic	t= 1.150	t= -.350	t= 1.125	t= 1.934	t= .509
	p= 0.25	p= 0.72	p=0.26	p=0.05	p=0.61

Table 5. Variance analysis of judoists' health perception regarding demographic ınformation.

Variables	Scale of Health Perception mean±sd	Control Base mean±sd	Assurance mean±sd	Significance of Health mean±sd	Personal Awareness mean±sd
Age					
12-16 years old	40.84±8.74	8.00±3.57	13.90±4.15	9.42±2.85	9.51±2.68
17-21 years old	44.00±8.18	8.65±4.54	14.25±4.24	10.75±2.59	10.35±3.28
21 years old and over	48.05±8.23	10.10±4.49	15.00±3.98	11.78±2.69	11.15±2.83
Statistic	F= 5.133	F= 1.931	F= .490	F= 5.564	F= 2.444
	Sig= 0.00	Sig= 0.15	Sig=0.61	**Sig=0.00**	Sig=0.09
Height					
140-150 cm	41.14±9.91	8.14±3.69	15.00±4.38	9.00±3.06	9.00±2.82
151-160 cm	44.00±9.10	9.11±4.58	14.22±3.88	10.44±2.35	10.22±3.09
161-170 cm	41.84±4.58	8.89±2.40	13.84±3.32	9.57±2.52	9.52±2.22
171 cm and over	44.58±10.33	8.12±4.79	13.79±4.79	11.50±3.18	11.16±2.94
Statistic	F= .771	F= .396	F= .384	F= 3.394	F= 2.459
	Sig= 0.51	Sig= 0.77	Sig=0.76	**Sig=0.02**	Sig=0.06

Table 5 (Continued). Variance analysis of judoists' health perception regarding demographic information

Variables	Scale of Health Perception mean±sd	Control Base mean±sd	Assurance mean±sd	Significance of Health mean±sd	Personal Awareness mean±sd
Body Weight					
40-50 kg	42.26±9.74	8.68±4.12	14.36±4.16	9.81±2.97	9.39±2.89
51-60 kg	42.64±5.29	7.76±2.94	14.64±3.33	9.88±2.66	10.35±3.06
61-70 kg	41.55±9.05	7.88±3.72	13.00±4.11	10.38±3.10	10.27±2.78
71 kg and over	46.55±9.40	9.83±4.96	14.66±4.74	11.16±2.77	10.88±2.78
Statistic	F= 1.217	F= .991	F= .668	F= .976	F= 1.260
	Sig= 0.30	Sig= 0.40	Sig=0.57	Sig=0.40	Sig=0.29
Income Status					
Low	42.52±7.55	8.70±3.70	13.47±3.06	10.17±3.20	10.17±3.06
Middle	42.31±9.23	8.11±4.03	14.08±4.15	10.26±2.83	9.85±3.04
Good	47.15±8.44	10.61±4.13	15.76±4.95	10.00±3.05	10.76±1.78
Statistic	F= 1.641	F= 2.112	F= 1.245	F= 0.44	F= 553
	Sig= 0.20	Sig= 0.12	Sig=0.29	Sig=0.95	Sig=0.57
Athlete Year					
1-3 years	41.52±9.90	9.17±4.04	14.47±4.33	8.56±3.15	9.30±2.49
4-6 years	42.83±8.75	8.26±3.93	14.16±4.02	10.44±2.59	9.95±3.14
6 years and over	45.42±7.96	8.68±4.44	14.00±4.28	11.57±2.54	11.15±2.43
Statistic	F= 1.026	F= .398	F= 0.75	F= 6.704	F= 2.233
	Sig= 0.36	Sig= 0.67	Sig=0.92	**Sig=0.00**	Sig=0.13
Weekly Physical					
1 day	42.18±7.52	9.54±3.61	14.18±4.21	9.09±2.30	9.39±1.74
2 days	42.29±7.94	8.64±3.83	14.11±3.12	10.35±3.48	9.17±2.32
3 days	44.00±10.29	9.06±4.31	14.06±4.33	10.33±3.49	10.53±3.46
4 days and over	43.20±9.28	8.18±4.18	14.29±4.43	10.37±2.63	10.35±3.07
Statistic	F= .134	F= .426	F= .015	F= .609	F= 1.037
	Sig= 0.94	Sig= 0.73	Sig=0.99	Sig=0.61	Sig=0.38
Daily Liquid					
1 liter and below	36.45±7.07	7.09±2.50	12.36±4.38	8.09±3.20	8.90±2.46
1.5 liters	42.00±7.26	8.14±3.35	13.97±3.29	9.87±2.72	10.00±2.92
2 liters	44.70±9.86	8.60±4.39	14.25±4.50	11.10±3.11	10.75±3.20
2.5 liters and over	47.36±9.85	10.36±5.26	15.73±4.86	11.21±2.22	10.05±2.71
Statistic	F= 4.355	F= 1.956	F= 1.694	F= 3.830	F= .960
	Sig= 0.00	Sig= 0.12	Sig=0.17	**Sig=0.01**	Sig=0.41
Daily Main Course					
1 course	36.33±8.55	8.11±4.40	11.44±3.60	8.33±2.82	8.44±3.08
2 courses	40.76±7.07	8.34±3.04	13.80±3.21	9.30±2.96	9.30±2.32
3 courses	45.09±8.59	8.93±4.27	14.63±4.25	10.90±2.76	10.61±2.99
4 courses and over	45.50±11.00	8.16±5.09	15.58±5.03	11.00±2.44	10.75±3.01
	F= 3.641	F= .217	F= 2.118	F= 3.495	F= 2.383
	Sig= 0.01	Sig= 0.88	Sig=0.10	**Sig=0.01**	Sig=0.75
Main course that You					
I do not skip any course	41.41±6.94	8.17±3.53	13.06±3.49	10.10±2.60	10.06±2.86
Morning	43.49±9.99	8.86±4.35	14.52±4.37	10.20±3.21	9.88±2.88
Lunch	45.66±7.46	8.22±3.92	16.00±3.80	10.55±2.00	10.88±3.25
Statistic	F= .941	F= .312	F= 2.182	F= .081	F= .456
	Sig= 0.39	Sig= 0.73	Sig=0.11	Sig=0.92	Sig=0.63

DISCUSSION

This study was conducted to investigate the health perception levels of elite judokas. As a result of the research, the health perception scale total score average of judokas was at a medium level of 43.04±8,90, in the sub-dimensions of the scale, the Accuracy sub-dimension had the highest score average of 14.20±4.11, and among the sub-dimensions of the scale, the Control Base sub-dimension. It was pointed that the dimension had the lowest mean score with 8.58±4.04. It was pointed out that there was no difference in the health perception levels of judokas in terms of the gender variable and that the health perception scale total score average of male judokas was higher than female judokas. In terms of judokas' health perception levels and nutrition education, there is a difference in the total score average of the Control Base sub-dimension and personal awareness sub-dimension, and the total score

average of the health perception scale of the athletes who took nutrition training was higher than the athletes who did not take nutrition training. There was no difference in health perception levels between the research groups and persistent disease, while athletes without persistent illness had a higher average health perception scale score than athletes with persistent illness. The athletes' health perception scale total score average differed from the importance of health subscale score average and the age variable, and the health perception score averages rose with age. In the research group, judokas with a high income had a higher average health perception scale total score than judokas with a medium or low income. Athletes who had been attending in sports for at least 6 years had a higher average health perception scale score than other athletes. When the studies are analyzed; Çilingir and Aydın (2017) revealed a statistically important difference between the Control Base sub-dimension and precision sub-dimension mean score of the age variable, but no relationship between the chronic disease, gender, and income level variables and the health perception scale total score mean and sub-dimensions. Perrin et al. (2002) found that in terms of gender-related health perception, males perceived themselves to be healthier, while women perceived themselves to be more stressed. In the research completed by Kuloğlu and Uslu (2022), they suggested that there was no significant relationship between the variables of gender, age, height and weight and the health perception scale total score average and its sub-dimensions. In their study, Olgun and Kutlu (2022) determined that there is a significant relationship between the Assurance sub-dimension of age and chronic disease variables and the total score average of the health perception scale, and that there is a significant difference between the personal awareness and importance of health sub-dimension average score of the gender variable. Condello et al., (2016) found that playing sports on a regular basis, as well as actively participating in sports, is crucial in influencing participants' perceptions of physical and mental health in later life. Öztürk and Kolcu (2022) discovered a statistically important difference between the health perception scale total score average of individuals without chronic diseases and the health perception scale total score average of individuals with chronic diseases in their study of individuals aged 20-64 along the Covid-19 epidemic. In their study of nurse students' health perception levels, Demir et al. (2021) explored a statistically important difference between the income status variable and the total score average of the Assurance sub-dimension, but no significant difference between the gender and persistent disease variables and the scale of health perception total score average and sub-dimensions. Tunç et al. (2023) discovered a statistically important difference between age, education level, income level, exercise status, chronic disease, and the total and sub-dimensions of the health perception scale in their study. Shirom and Toker (2008) revealed a statistically important difference between the health perception scale total score and sub-dimensions of age, gender, and physical activity frequency factors in their investigation. In the study conducted by İzgüden and Gökkaya (2022), it was determined that there was a statistically important difference between the variables of age and weekly exercise and the health perception scale total score average and the importance of health sub-dimension mean score average, but no relationship was discovered between the gender variable and the health perception scale total score average and sub-dimensions. In their study, Lee et al (2020) found that health perception influences sports involvement favorably. Zhou (2022) specified that athletes with high physical levels had a greater perception of health, and persons with good eating habits had a better perception of health in his study studying the perception of health and sports motivation of university students. In their research, Lasandro et al., (2021) discovered that there was no significant difference in terms of gender and mental and physical health of athletes, and that athletes had a higher health quality of life than inactive people. In the study done by Çayırlı and Bedirhan (2020), they noticed a statistically important difference between the perceived financial position variable and the total score average of the assurance sub-dimension, nevertheless there was no statistically important difference between the age variable and the total score average and sub-dimensions of the scale of health perception.

CONCLUSION

In the final analysis, the research found that athletes' health perception was medium, male athletes had greater health perception levels than female athletes, and nutrition instruction was crucial in terms of health perception. Furthermore, as years of sports, age, and body weight grow, so do health perception levels, and appropriate and balanced diet and fluid consumption are vital for health perception. In line with these results, it can be suggested that conducting studies on the health perception levels of athletes will positively affect both their quality of life and sports performance, and that studies on the health perception levels of athletes in different sports branches and age groups can be recommended.

Acknowledgement

The authors would like to thank anyone who contributed to this study sincerely.

Conflict of Interest

The author declare no potential conflicts of interest with respect to the research, authorship and/or publication of this article.

Author Contributions

Plan, design: RE, KK, AY; **Material, methods and data collection**: RE, KK, AY; **Data analysis and comments:** RE, KK, AY; **Writing and corrections:** RE, KK, AY

Funding

None

Ethical considerations

In addition, Bitlis Eren University Ethical Principles and Ethics Committee approval was obtained before starting the study (2023/09-19).

REFERENCES

Açıksöz, S., Uzun, Ş., & Arslan, F. (2013). Examining the relationship between nursing students' health perception and health promotion behaviors. *Gülhane Medical Journal, 55*(3), e181-e187

Alkan, S. A, Özdelikara, A., & Boğa, N. M. (2017). Determining the health perceptions of nursing students. *Gümüşhane University Journal of Health Sciences, 6*(2), 11-21.

Avcı, K., & Pala, K. (2004) Evaluation of the Quality of Life of Research Assistants and Specialist Doctors Working at Uludağ University Faculty of Medicine. *Uludağ University Faculty of Medicine Journal. 30*(2): 81-85.

Condello, G., Capranica, L., Stager, J., Forte, R., Falbo, S., Di Baldassarre, A., & Pesce, C. (2016). Physical activity and health perception in aging: Do body mass and satisfaction matter? A three-path mediated link. PLoS One, 11(9), e0160805.

Crowson, C. S., Liao, K. P., Davis, J. M., Solomon, D. H., Matteson, E. L., Knutson, K. L., Hlatky, M. A., & Gabriel, S. E. (2013). Rheumatoi Darth Ritisand Cardiovascular Disease. American Heart Journal, 166(4), 622-628.

Çayırlı, R. Ö., & Demirhan, B. (2020). Examining the Relationship Between the Reasons for Involvement in Sports Activities and Health Perceptions of Women Taking Pilates Training. *International Journal of Sports Culture and Science, 8*(4), 275-285.

Çilingir, D., & Aydin, A. (2017). Health perception of students studying in the nursing department. *Florence Nightingale Journal of Nursing, 25*(3), 167-176.

Demir, G., Özen.B., & Savaş, M. (2021). Health Perception in First-Year Nursing Students. *Journal of Health Sciences, 30*(3), 295-300.

Diamond, J. J., Becker, J. A., Arenson, C. A., Chambers, C. V., & Rosenthal, M. P. (2007). Development of a scale to measure adults' perceptions of health: Preliminary findings. Journal of Community Psychology, 35(5), 557-561.

Dogan, D. G. (2001). *A research on social factors affecting success in sports*. (Doctoral dissertation, Sakarya University (Turkey).

Dursun, S.İ., Vural, B., Keskin, B., Kaçar, H.B., Beyhan, A., & Kadıoğlu, H. (2019). The relationship between traditional/complementary medicine attitude and health literacy and health perception in adults. *Journal of Public Health Nursing, 1*(1), 1-10.

Erşahin, B. (2023). *The relationship between physical activity level and quality of life of individuals exercising in sports and healthy living centers* (Master's thesis, Aksaray University Health Sciences Institute).

Franchini., E, Vecchio., F. B. D, Matsushigue., K. A. & Artioli., G. G. (2011). Physiological profiles of elite judo athletes. Sports Med, 41, 147-66. https://doi.org/10.2165/11538580-000000000-00000

George, D., & Mallery, M. (2010). *SPSS for windows step bystep: A simple guide and reference*.

Hayran, O. (2011). Health and disease. *Journal of Health Thought and Medical Culture, 23*, 82-85.

Heper, E., Sertkaya, Ö. G. Ö., Koca, C., Ertan, H., Kale, M., & Terekli, S. (2012). *Introduction to Sports Sciences. Eşkişehir: Open Education Faculty Publication*, 1.

Hünük, D., & Demirhan, G. (2003). Comparison of the attitudes of eighth grade primary school, first grade high school and university students towards physical education and sports. *Journal of Sports Sciences, 14*(4),175-184.

İzgüden, D., & Gökkaya, D. (2022). Examining the Relationship Between Individuals' Health Perceptions and Obesity Awareness. *Selcuk Health Journal, 3*(3), 205-220.

Kadıoğlu, H. & Yıldız, A. (2012). Validity and reliability of the Turkish translation of the Health Perception Scale. *Turkish Clinics Journal of Medical Sciences, 32*(1), 47-53.

Kavlu, M. (2002). *Investigation of coach behaviors in sports education (Judo model)*. Diss. Marmara University.

Klein Velderman, M., Crone, M.R., Wiefferink, C.H., & Reijneveld, S.A. (2009). Identification and management of psychosocial problems among toddlers by preventive child health care professionals. *European Journal of Public Health, 20*(3), 332-338.

Köse, M. (2020). *Examining the relationship between personality types and psychological well-being levels of individuals according to their sports activities* (Master's thesis). Niğde Ömer Halisdemir University.

Kuloğlu, Y., & Uslu, K. (2022). The Effect of Health Literacy Level on Health Perception in Future Healthcare Workers. *Doğuş University Journal, 23*(1),255-277.

Lee, SM, Jeong, HC, So, WY, & Youn, HS (2020). The mediating effect of sports participation on the relationship between health perception and health promotion behavior in adolescents. *International Journal of Environmental Research and Public Health, 17* (18), 6744.

Metsios, G. S., Stavropoulos-Kalinoglou, A., Panoulas, V. F., Wilson, M., Nevill, A. M., Koutedakis, Y., & Kitas, G. D. (2009). Association of physical inactivity with increased cardiovascular risk in patients with rheumatoid arthritis. *European Journal of Preventive Cardiology, 16*(2), 188-194.

Olgun, Z., & Kutlu, R. (2022). Evaluation of Health Perception and Healthy Lifestyle Behaviors of Individuals Applying to the Family Medicine Polyclinic. *Turkish Journal Of Family Medicine And Primary Care, 16*(1), 196-205.

Öztürk, G., & Kolcu, M. (2022). Health Perception of Individuals Aged 20-64 During the Covid-19 Pandemic. *Journal of İnönü University Vocational School of Health Services, 10*(2), 681-692.

Perrin, C., Ferron, C., Gueguen, R., & Deschamps, J. P. (2002). Lifestyle patterns concerning sports and physical activity, and perceptions of health. *Soz Praventivmed 47*, 162–171.

Shirom, A., Toker, S., Berliner, S., Shapira, I., & Melamed, S. (2008). The effects of physical fitness and feeling vigorous on self-rated health. *Health Psychology, 27*(5), 567.

Tuğut, N., & Bekar, M. (2008). The relationship between university students' health perception and healthy lifestyle behaviors. *Atatürk University School of Nursing Journal, 11*(3), 17-26.

Tunç, T., Demirci, H. F. & Şahin, M. (2023). Coronavirus Anxiety in the Context of Health Perception and Life Satisfaction. *Black Sea Journal of Health Science, 6* (3), 446-456. https://doi.org/10.19127/bshealthscience.1250617

ORİJİNAL MAKALE / ORIGINAL ARTICLE
Balıkesir Sağlık Bilimleri Dergisi / BAUN Sağ Bil Derg
Balıkesir Health Sciences Journal / BAUN Health Sci J
ISSN: 2146-9601- e ISSN: 2147-2238
Doi: https://doi.org/10.53424/balikesirsbd.1367262

The Effect of Childbirth Education Classes Pregnant Women's Childbirth Attitudes and Happiness

Seda KARAÇAY YIKAR [1], Ebru VAR [2], Evşen NAZİK [3]

[1] Çukurova University, Faculty of Health Sciences, Department of Obstetrics and Gynecologic Nursing
[2]Adana City Hospital
[3] Çukurova University, Faculty of Health Sciences, Department of Obstetrics and Gynecologic Nursing

Geliş Tarihi / Received: *27.09.2023,* ***Kabul Tarihi / Accepted:*** *11.01.2024*

ABSTRACT
Objective: This study aims to identify the effect of childbirth education classes on pregnant women's childbirth attitudes and happiness. **Materials and Methods:** This study is a quasi-experimental research with a control group. Thirty-four participants were included in the control and the experimental groups (N = 68). Data were collected through the Personal Information Form, the Oxford Happiness Questionnaire (OHQ), and the Childbirth Attitudes Questionnaire (CAQ). **Results:** In the 1st, 2nd, and 3rd interviews, the difference between the total mean scores of the pregnant women's OHQ was insignificant in the experimental and control groups ($p>0.05$). In the 1st and 2nd interviews, the difference between the total mean scores of the pregnant women's CAQ was insignificant in the experimental and control groups ($p > 0.05$). In the 3rd interview, the CAQ total mean score of the pregnant women in the experimental group was found to be 26.85±8.5 while that of the control group was 38.14±10.18; the difference between the groups was found to be statistically significant ($p < 0.05$). **Conclusion:** The primipara women who participated in the childbirth class were found to have developed positive childbirth attitudes. Participation in the childbirth class was found to affect intra-group happiness. This result indicates that pregnancy is a pleasing process for women.
Keywords: Childbirth Education, Classes, Pregnant Women, Childbirth Attitudes, Happiness.

Doğuma Hazırlık Sınıflarında Verilen Eğitimin Gebelerde Doğum Tutumu ve Mutluluğa Etkisi

ÖZ
Amaç: Araştırma, doğuma hazırlık sınıflarında verilen eğitimin gebelerin doğum tutumu ve mutluluğa etkisini belirlemek amacıyla yapılmıştır. **Materyal ve Metod:** Bu çalışma yarı deneysel bir tipte yapılmıştır. Kontrol ve deney grubuna 34 kişi alınmıştır (n=68). **Bulgular:** 1.,2 ve 3. görüşmelerde deney ve kontrol grubundaki gebelerin OHQ'den aldıkları toplam puan ortalamaları arasındaki farkın istatistiksel olarak anlamlı olmadığı saptanmıştır ($p>0.05$). 1. ve 2. görüşmede görüşmelerde deney ve kontrol grubundaki gebelerin CAQ'den aldıkları toplam puan ortalamaları arasındaki farkın istatistiksel olarak anlamlı olmadığı saptanmıştır ($p>0.05$). 3.görüşmede deney grubundaki gebelerin CAQ'den aldıkları toplam puan ortalamasının 26.85±8.50, kontrol grubundaki gebelerin 38.14±10.18 olduğu belirlenmiş ve gruplar arasındaki farkın istatistiksel olarak anlamlı olduğu saptanmıştır ($p<0.05$). **Sonuç:** Doğuma hazırlık sınıfına katılan primipar kadınların doğuma ilişkin olumlu tutum geliştirdiği görülmektedir.
Anahtar Kelimeler: Doğum Eğitimi, Dersler, Hamile Kadınlar, Doğum Tutumları, Mutluluk.

Sorumlu Yazar / Corresponding Author: Seda KARAÇAY YIKAR, Cukurova University, Faculty of Health Sciences, Department of Obstetrics and Gynecologic Nursing, Adana, Türkiye
E-mail: sedakrcyyikar@gmail.com

Bu makaleye atıf yapmak için / Cite this article: Karaçay Yıkar,S., Var, E.,& Nazik, E. (2024). The effect of childbirth education classes pregnant women's childbirth attitudes and happiness. *BAUN Health Sci J, 13*(2), 248-253. https://doi.org/10.53424/balikesirsbd.1367262

INTRODUCTION

Despite being a physiological phenomenon to be experienced by any woman at reproductive age, pregnancy is a transition period that causes anxiety and stress in the woman's life. As to childbirth, although it is natural, it is a painful process whose outcomes cannot be predicted, and it carries severe morbidity and even mortality risks for both the mother and the baby (Korukcu et al., 2017). During the pregnancy period, pregnant women try to adapt to the physiological and psychological changes caused by pregnancy while they also develop childbirth attitudes by preparing themselves for labor. Attitudes of pregnant women towards childbirth are affected by many factors. Pregnant women's childbirth attitudes may vary depending on the effects of these factors (Gencer & Ejder Apay, 2020).

Pregnancy and having children are approved by society; however, the changes experienced in the process could be a source of happiness for some women while they may cause unhappiness for some other women. Happiness is "well-being and satisfaction; satisfying or pleasurable experiences". Aristoteles, who presented a systematic view of happiness, defined happiness as "the appropriate behavior of the soul to the logic" and "appropriate activity of the soul to virtue" (Gencer & Ejder Apay, 2020). Body and pregnancy perceptions are affected positively in women who feel ready for pregnancy, see pregnancy as a unique period, and experience the happiness of giving birth to a baby shortly after accepting the pregnancy. Happiness during pregnancy is also associated with decreased pain and increased pain tolerance (Coskun et al., 2020).

Childbirth classes date back to the 1930s; they have recently become more popular and gained momentum. In this regard, pregnant women, their partners, and family members are provided with education for pregnancy, childbirth, and preparation for the postpartum period and parenthood. Childbirth education topics such as practices enhancing childbirth, breathing exercises, appropriate physical activities, procedures during labor, informing about the interventions, pain, informing about the course of actions, providing a safe environment, presence of a companion who could comfort the pregnant woman, massage practices, distraction methods, etc. could enable effective pain management by decreasing fear that might develop during labor (Arslan et al., 2019). Turgut et al. investigated the effect of the education received by pregnant women who participated in childbirth classes and found that the post-test mean scores were higher than the pre-test mean scores, and the difference between them was statistically significant (Turgut et al., 2017).

This study aims to identify the effect of childbirth education classes on pregnant women's childbirth attitudes and happiness. The findings are believed to contribute to the presentation of the education and consultancy services provided to pregnant women and their families.

MATERIALS AND METHODS

Study type

This study was designed as a quasi-experimental study with a control group to identify the effects of the education given in childbirth classes on pregnant women's childbirth attitudes and happiness. The study was conducted in Adana City Hospital, affiliated with the Ministry of Health in the Republic of Turkey, between September 2019 and February 2020.

Study Population

While the pregnant women participating in the childbirth education classes formed the experimental group, the group receiving the standard prenatal care constituted the control group. The criteria for participating in the study were:

- Being 18 years or older,
- Pregnancy at 20 weeks or more
- Not having a diagnosis for risk pregnancy
- Being primigravida
- Having a living and only one fetus
- Being open to communication and cooperation
- Understanding and speaking Turkish

The sample size calculation was performed using the GPower 3.1 program; when the power was taken at 80% and alpha=0.05, the total sample size calculated using a student t-test was 68. The study was conducted with 68 women (34 in the experimental group and 34 in the control group).

Data Collection

The Personal Information Form: The form comprises 11 questions that include pregnant women's socio-demographics (age, education level, working or not, economic condition, family type, etc.) and obstetric features (Gencer & Ejder Apay, 2020).

The Oxford Happiness Questionnaire (OHQ): The Oxford Happiness Questionnaire was developed by Hills and Argyle, and it was adapted to Turkish by Dogan and Akinci Cotok (Dogan and Akinci Cotok, 2011). The one-factor scale comprises 29 items rated on a 6-point Likert scale (1-I strongly disagree, 2-I moderately disagree, 3-I slightly disagree, 4-I slightly agree, 5-I moderately agree, 6-I strongly agree). Items 1, 6, 10, 13, 14, 19, 23, 24, 27, 28, 29 and 18 are coded reversely in the OHQ. The scores obtained from the scale range from 29 to 174. Higher scores indicate higher happiness levels. Reliability and validity analyses indicated Cronbach's Alpha coefficient to be 0.84. Cronbach's alpha coefficient was found to be 0.84 in this study.

The Childbirth Attitudes Questionnaire (CAQ): The Childbirth Attitudes Questionnaire was developed by Nancy K. Lowe in 2000 to measure the fear of childbirth (Lowe, 2000). The reliability and validity of the Turkish form were tested by Donmez et al. in 2014 (Donmez et al., 2014). The Childbirth Attitudes Questionnaire is composed of 16 items. The scale score is calculated by averaging the 16 items. The

responses on the scale are scored between 1 and 4, indicating "1-no anxiety", "2-low anxiety", "3-moderate anxiety", and "4-high anxiety"—the scores to be obtained from the scale range between 16 and 64. Higher total scale scores indicate higher anxiety. Cronbach's alpha of the Turkish adaptation of the scale was 0.83. This study found Cronbach's alpha coefficient to be 0.91.

Collection of the data

The education in the childbirth class was given to the health personnel working in this unit by the midwife, who is also one of the researchers of this study. The pregnant women's childbirth attitudes and happiness levels were identified through three interviews conducted within one-week intervals. The childbirth class was composed of three sessions. The sessions conducted every week were completed in three weeks.

Experimental group

1st Interview: The experimental group comprised pregnant women who attended the childbirth class. The pregnant women who attended the class were administered the Personal Information Form, the Oxford Happiness Scale, and the Childbirth Attitudes Questionnaire before the education. Then, they were taught the education topics in the first session.

2nd interview: The second interview was conducted one week after the first interview. Before the education, the pregnant women were administered the Oxford Happiness Scale and the Childbirth Attitudes Questionnaire. Then, they were taught the education topics in the second session.

3rd interview: The third interview was conducted one week after the second. The pregnant women were first taught the education topics in the third session. They were then administered the Oxford Happiness Scale and the Childbirth Attitudes Questionnaire.

Control group

The control group comprised pregnant women who had routine prenatal care. Three interviews were conducted in one-week intervals. The first interview included the introduction and the administration of the Personal Information Form, the Oxford Happiness Scale, and the Childbirth Attitudes Questionnaire. For the second and third interviews, the participants were called by phone and asked to fill in the Oxford Happiness Scale and the Childbirth Attitudes Questionnaire.

Statistical analyses

The statistical analyses were performed using SPSS for Windows version 22.0. Percentage, arithmetic mean, standard deviation, chi-square test, Mann-Whitney U test, and Wilcoxon test were used to analyze the data. The level of significance was accepted as $p < 0.05$.

Ethical considerations

Before conducting the research, approval from the Ethics Board of the School of Medicine, Cukurova University (01.06.2018/78-1), written approvals from the institutions where the study was to be performed, and verbal consent from the participants was obtained.

RESULTS

Findings regarding sociodemographic and obstetric variables of the pregnant women. The sociodemographic and obstetric characteristics of the experimental and control groups were generally homogeneous, and the difference between the groups was not statistically significant (p> 005) in the study.

When the OHQ mean scores of the women in the first interview were compared, the mean score of the experimental group was found to be 99.67±14.76, and that of the control group was found to be 98±20.54; the difference between the groups was not statistically significant ($p > 0.05$) (Table 1).

When the pregnant women's OHQ mean scores in the second interview were compared, the mean score of the experimental group was found to be 100.94± 10.87, and the mean score of the control group was found to be 100.97±14.00; the difference between the groups was not statistically significant ($p > 0.05$). When the pregnant women's CAQ mean scores were compared, the intra-group difference in the experimental and control groups was statistically significant ($p < 0.05$). When the pregnant women's OHQ mean scores in the third interview were compared, the mean score of the experimental group was found to be 100.29±12.27, and the mean score of the control group was found to be 99.58±11.43; the difference between the groups was not statistically significant ($p > 0.05$) (Table 1).

When the pregnant women's CAQ mean scores in the first interview were compared, the mean score of the experimental group was found to be 39.00±9.98, and the mean score of the control group was found to be 35.67±10.61; the difference between the groups was not statistically significant ($p > 0.05$) (Table 2).

When the pregnant women's CAQ mean scores in the second interview were compared, the mean score of the experimental group was found to be 31.91±7.27, and that of the control group was found to be 33.38±11.92; the difference between the groups was not statistically significant ($p > 0.05$). The intra-group difference in the CAQ mean scores of the pregnant women in the experimental group was found to be statistically significant ($p < 0.05$) (Table 2).

The pregnant women's CAQ mean scores in the third interview were compared; the mean score of the experimental group was found to be 26.85±8.59, and the mean score of the control group was found to be 38.14±10.18; the difference within and between the groups was found to be statistically significant ($p < 0.05$) (Table 2).

Table 1. Comparison of the OHQ mean scores of the pregnant women in the experimental and control groups.

Interview	Experimental group Mean±s.s	Medyan	Control group Mean±s.s	Medyan	p*
1st Interview	99.67±14.76	97.5	98±20.54	96.5	0.589 m
2nd interview In Group Change p**	100.94± 10.87	98.5 **0.001** w	100.97±14.00	103.0 **0.036** w	0.811 m
3rd interview In Group Change p**	100.29±12.27	98.0 0.442 w	99.58±11.43	101.5 0.150 w	0.878 m

m:Mann-Whitney, you test, w:Wilcoxon Test, *Between groups, **Within groups

Table 2. Comparison of the CAQ mean scores of the pregnant women in the experimental and control groups.

Interview	Experimental group Mean±s.s	Medyan	Control group Mean±s.s	Medyan	p*
1st Interview	39.00±9.98	38.5	35.67±10.61	37.0	0.155 m
2nd interview In Group Change p**	31.91±7.27 **0.001** w	32.5	33.38±11.92 0.149 w	32.0	0.830 m
3rd interview In Group Change p**	26.85±8.59 **0.001** w	24.5	38.14±10.18 **0.002** w	30.5	**0.000 m**

m: Mann-Whitney you test, w: Wilcoxon Test, *Between groups, **Within groups

DISCUSSION

This study aims to identify the effect of childbirth education classes on pregnant women's childbirth attitudes and happiness. Sociodemographic and obstetric features of the pregnant women in the experimental and control groups were distributed homogeneously.

When the OHQ total mean scores of the pregnant women in the experimental and control groups were compared, a significant difference was found between the intra-group scale mean scores of the experimental group in the second and third interviews ($p<0.05$). OHQ total mean scores of the pregnant women in the experimental and control groups showed no statistically significant inter-group differences ($p>0.05$). A review of the related literature showed that no studies investigated the effects of education in childbirth classes on mothers' happiness levels. Their study that utilized the Oxford Happiness Questionnaire-Short Form reported that the pregnant women's scale total mean score was 24.74±4.34, and they were happy about their pregnancy (Turk et al., 2017). Pakseresht ,Mahboobi, Bostani Khalesi, and Atrkar Roshan (2019) reported the OHQ scale total mean score as 131.62±28.57. Tesfa (2020) followed the pregnant women for six months, reporting that the OHQ total mean scores increased with advancing pregnancy. In this study, most of the pregnant women in both groups were found to have a planned pregnancy, which could be considered to explain the non-significant differences between the groups. In addition, since the participating women were primigravida, pregnancy is considered to make them feel happy as they would experience the sense of motherhood for the first time. The significant intra-group difference found in the second interview is considered to have been affected by the adaptation to pregnancy with advancing stages.

An analysis of the CAQ total mean scores of the pregnant women in the experimental and control groups indicated statistically significant differences between the second and third interviews ($p<0.05$). An analysis of the intra-group CAQ scale total mean scores of the experimental and control groups indicated statistically significant differences ($p<0.05$). The significant differences in the third interview are considered to result from the education topics given in the second session, which included the benefits of vaginal delivery, risks of cesarean section, signs, and stages of labor, labor contractions, and non-pharmacological methods in coping with pain, strain techniques, breathing exercises, labor positions, comforting massage techniques, and relaxation exercises. The topics in the session are considered to have affected pregnant women's childbirth attitudes more. In addition, successive education sessions might have positively affected the attitudes of pregnant women toward childbirth. In their meta-analysis, Sheen and Slade (2018) reported that one of the reasons for women's fear of childbirth was a lack of adequate knowledge about childbirth. Ucar and Golbasi and Akin, Yesil, Yucel, and Boyaci found that the fear of childbirth

decreased in women who received an education. Mete, Cicek, Akin, Alus Tokat, Camlibel, and Uludag et al. reported that readiness to labor was higher and fear of childbirth was lower in pregnant women who received education in a childbirth class. Bektaş Pardes (2017) also reported that the fear of childbirth decreased in women who received education. Duncan, Cohn, Chao, Cook, Riccobono, and Bardacke (2017) and Alanya Tosun, Sahin, Ozkaya, Bulut, Bilen, and Sipahi (2021) reported that the fear of childbirth decreased in women who participated in childbirth classes, and they experienced less pain during labor. Ricchil, La Corte, Molinazzi, Messina, Banchelli, and Neri (2020) found that pregnant women who received education preferred cesarean section less. In their qualitative study investigating pregnant women's desires to participate in childbirth classes, Ben Merav Ben Natan, Maayan Ashkenazi, and Masarwe (2016) reported that they wanted to participate and thought they would have a more comforting process in the labor and postpartum period. Kacperczyk-Bartnik, Bartnik, Symonides, Sroka-Ostrowska, Dobrowolska-Redo, and Romejko-Wolniewicz (2019) reported that the pregnant women who participated in childbirth classes had less fear of birth and remained calmer during labor. Hatamleh, Abujilban, Shaker Abdelmahdi Abuabeda, and Abuhammada (2019) reported that the labor duration was shorter in those who received education, and they started breastfeeding earlier.

Limitations and Strengths of the Study

A limitation of this study was that it was conducted in a single center. It is recommended that the research be conducted in larger sample groups. The study's strength is that it is essential in determining the effectiveness of the education given in determining pregnant women's happiness and birth attitude.

CONCLUSION

Women's childbirth attitudes could change positively by disseminating the childbirth classes and forming supportive and encouraging education content in these classes to decrease the fear of childbirth and increase self-confidence. Pregnant women's knowledge could be increased by providing them with regular education, and they could demonstrate positive childbirth attitudes. Pregnancy is a pleasing phenomenon for most future mothers. Although it is a pleasing experience, it may sometimes cause stress. In this regard, it is self-evident that pregnant women who spend this particular period more positively in a childbirth class could be happier.

Acknowledgment

The authors are grateful to all the patients who participated in this study, the midwives who supported the data collection process, and Zeynep Tok and Arzu Guneş.

Conflict of Interest

The author declares no potential conflicts of interest concerning this article's research, authorship, and/or publication.

Author Contributions

Plan, design: SKY, EV, EN; **Material, methods, and data collection:** SKY, EV; **Data analysis and comments:** SKY, EV; **Writing and corrections:** SKY, EV, EN

Funding

The author(s) have not received the following financial support for the research.

Ethical considerations

Before conducting the research, approval from the Ethics Board of the School of Medicine, Cukurova University (01.06.2018/78-1), written approvals from the institutions where the study was to be performed, and verbal consent from the participants was obtained.

REFERENCES

Akin, B., Yesil, Y., Yücel, U., Boyacı., B.(2018). The effect of training given in prenatal educationclasses on pregnancy fear level, *Life Sciences*, *13*(2), 11-20, http://dx.doi.org/10.12739/NWSA.2018.13.2.4B00

Alanya Tosun, S., Sahin, E., Ozkaya, E., Bulut, M., Bilen, IB., Sipahi, M. (2021). Systematic birth preparation programs positively influence the childbirth fear: a cross-sectional study. *Mid Blac Sea Journal of Health Sci, 7*(2),254-261. Doı: http://dx.doi.org/10.19127/mbsjohs.935018

Arslan ,S., Okcu, G., Coskun ,A. M., Temiz F. (2019).Women's perceptıon of pregnancy and the affectıng factors, *Hsp*, *6*(1), 179-192. Doı: http://dx.doi.org/10.17681/hsp.432333

Coskun, A.M., Arslan, S., Okcu, G. (2020). An analysis of pregnancy perception of pregnant women in terms of stress, demographic and obstetric characteristics, *Head,17*(1),1 http://dx.doi.org/10.5222/HEAD.2020.001

Dogan, T., Akinci Cotok, N. (2011). Turkish adaptation of oxford happiness scale short form: validity and reliability study, *Turkish Journal of Psychological Counselingand Guidance*, *4* (36),165-172.

Donmez, S., Dag, H., Celik, N., Yeniel, O., Kavlak, O. (2014). Turkish version of the childbirth attitudes questionnaire, *Turkiye Klinikleri J Gynecol Obst*, *24*(4),212-8.

Duncan, L., Cohn, M., Chao, M.A., Cook, J., Riccobono, J., Bardacke, N.(2017). Benefits of preparing for childbirth with mindfulness training: a randomized controlled trial with active comparison, *BMC Pregnancy And Childbirth*, 17–140. http://dx.doi.org/10.1186/s12884-017-1319-3

Gencer, E., Ejder Apay, S.(2020). Does pregnancy desire affect subjective happiness? *Journal of Psychiatric Nursing*, *11*(2),88-97 http://dx.doi.org/10.14744/phd.2019.63496

Hatamleh, R., Abujilban, S., Shaker Abdelmahdi Abuabeda, A,C., Abuhammada, S. (2019). The effects of a childbirth preparation course on birth outcomes among nulliparous, *Jordanian Women Midwifery*, *72*,23–29.

http://dx.doi.org/10.1016/j.midw.2019.02.002

Kacperczyk-Bartnik, J., Bartnik,P.,Symonides, A., Sroka-Ostrowska,N., Dobrowolska-Redo,A.,Romejko-Wolniewicz, E. (2019). Association between antenatal classes attendance and perceived fear and pain during labour. *Taiwanese Journal Of Obstetrics & Gynecology*, *58*, 492-496. http://dx.doi.org/10.1016/j.tjog.2019.05.011.

Aydin, R., Kabukcuoglu, K.(2017). Investigation of the relationship between the psychosocial health status and fear of childbirth in healthy pregnancies. *Clinical and Experimental Health Sciences, 7,* 152- 8 http://dx.doi.org/10.5152/clinexphealthsci.2017.359

Lowe., NK. (2000). Self-efficacy for labor and childbirth fears in nulliparous pregnant women, *Journal of Psychosomatic Obstetrics & Gynecology, 21*(4),219–24.

Mete, S., Cicek, A.O., Alus Tokat., A. M., Camlibel., A. M., Uludag ,B. E. (2017). The effects of birth preparation classes on fear of birth, birth preference and readiness for delivery. *Turkiye Klinikleri Journal of Nursing Sciences.*, *9*(3), 201-6. http://dx.doi.org/10.5336/nurses.2016-53977

Merav Ben Natan, AB., Maayan Ashkenazi, A., Masarwe, S . (2016). Intentions of muslim arab women in israel to attend prenatal classes. *Women And Birth, 29*, 8– http://dx.doi.org/10.1016/j.wombi.2015.07.009

Pakseresht, S., Mahboobi Nejad, T., Bostani Khalesi, Z., Atrkar Roshan, Z. (2019). Predictors of happiness among pregnant women: a regression analysis, *Electronic Physician, 11*(4),7629-7635. http://dx.doi.org/10.19082/7629

Ricchil, A., La Corte, S., Molinazzi, M.T., Messina, M. P., Banchelli, F., Neri, I. (2020). Study of childbirth education classes and evaluation of their effectiveness, Clin Ter, 171 (1),78-86 http://dx.doi.org/10.7417/CT.2020.2193

Sheen, K., Slade, P. (2018). Examining the content and moderators of women's fears for giving birth: A meta-synthesis, *Journal of Clinical Nursing, 27*,2523– 2535. http://dx.doi.org/10.1111/jocn.14219

Tesfa, D. (2020). Level of happiness and its associated factors among pregnant women in south gondar zone hospitals, north central Ethiopia *International Journal Of Women's Health, 12*,983–991 DOI https://doi.org/10.2147/IJWH.S275709

Turk, R., Sakar, T., Erkaya, R. (2017). The effect of pregnancy on happiness. rocedia, *Social And Behavioral Sciences*, 237, 1247 – 1253. http://dx.doi.org/10.1016/j.sbspro.2017.02.198

Turgut, N., Güldür A, Çakmakçı H , Şerbetçi G , Yıldırım F&Ender Yumru, A. (2017). A study about knowledge level of pregnants that educated in pregnancy school, *JAREN, 3*(1), 1-8. http://dx.doi.org/10.5222/jaren.2017.001

Ucar, T., Golbasi, Z.(2019). Effect of an educational program based on cognitive behavioral techniques on fear of childbirth and the birth process, *Journal Of Psychosomatic Obstetrics & Gynecology, 40*(2),146–155.

ORİJİNAL MAKALE / ORIGINAL ARTICLE
Balıkesir Sağlık Bilimleri Dergisi / BAUN Sağ Bil Derg
Balıkesir Health Sciences Journal / BAUN Health Sci J
ISSN: 2146-9601- e ISSN: 2147-2238
Doi: https://doi.org/10.53424/balikesirsbd.1386027

Changes in Chord Mu (µ) Length Before and After Cataract Surgery

Ali KÜÇÜKÖDÜK[1], Hüseyin TÜRE[2]

[1]Karamanoğlu Mehmetbey University, Faculty of Medicine, Department of Ophthalmology
[2]Karaman Training and Research Hospital

Geliş Tarihi / Received: *04.11.2023* ***Kabul Tarihi / Accepted:*** *18.01.2024*

ABSTRACT
Objective: Comparison of chord µ length, a potential marker that may gain importance especially in multifocal lens implantation, before and after phacoemulsification surgery and intraocular lens (IOL) implantation in patients with cataracts.
Methods: This retrospective study included 33 eyes of 33 patients who underwent phacoemulsification surgery between December 2022 and February 2023. Corneal topography (Pentacam HR, Oculus, Wetzlar, optikgerate GmbH) was performed on each patient before and after surgery. The values obtained before and at least 3 months after surgery were compared using the Student-t test. **Results:** There were 18 (54.5%) males and 15 (45.5%) females among the 33 patients who participated in the study. The average age was 67.27 ± 10.93 years. The postoperative mean chord µ lenght was significantly lower than the preoperative mean chord µ lenght (p=0.002). Additionally, the mean postoperative pupil size was significantly lower than the mean preoperative pupil size (p=0.000). There is a weak positive relationship between the change in chord µ length and the change in pupil size, but this relationship is not statistically significant (p>0.05). No statistically significant relationship was found between any of the other binary variables. **Conclusion:** Centralization is crucial in refractive surgery and multifocal IOL implantation to prevent high-order aberrations and photic phenomena. Therefore, it seems useful for surgeons to be familiar with chord µ measurements, especially regarding surgical preparation. It should be considered that changes in chord mu values may influence the development of photic phenomena. A decrease in chord mu after phacoemulsification may assist the surgeon in the preoperative decision-making process in patients at risk of photic phenomena or in patients with borderline values**.**
Keywords: Phacoemulsification, Intraocular Lens Implantation, Chord Mu, Angle Kappa.

Katarakt Cerrahisi Öncesi ve Sonrası Chord Mu (µ) Uzunluğundaki Değişim

ÖZ
Amaç: Kataraktlı hastalarda fakoemülsifikasyon cerrahisi ve göz içi lens (GİL) implantasyonundan önce ve sonra, özellikle çok odaklı lens implantasyonunda önem kazanabilecek potansiyel bir belirteç olan chord µ uzunluğunun karşılaştırılması. **Gereç ve yöntem:** Retrospektif olarak yürütülen bu çalışmada Aralık 2022- Şubat 2023 tarihleri arasında fakoemülsifikasyon cerrahisi yapılan 33 hastanın 33 gözü çalışmaya dahil edilmiştir. Her olguya ameliyat öncesinde ve sonrasında kornea topografisi testi (Pentacam HR, Oculus, Wetzlar, optikgerate GmbH) uygulanmıştır. Ameliyat öncesi ve en az 3 ay sonrası elde edilen değerler Student-t testi ile karşılatırılmıştır. **Bulgular:** Çalışmaya dahil edilen 33 hastanın %54.5'i erkek (n=18) ve %45.5'i kadın (n=15) idi. Yaş ortalaması 67.27 ± 10.93 yıl olarak hesaplandı. Ameliyat sonrası chord µ ortalaması ameliyat öncesi chord µ ortalamasına göre istatistiksel olarak anlamlı bir şekilde daha düşük bulunmuştur (p=0.002). Ameliyat sonrası pupil büyüklüğü ortalaması ameliyat öncesi ortalamasına göre istatistiksel olarak anlamlı bir şekilde daha düşük bulunmuştur (p=0.000). Chord µ uzunluğundaki değişim ile pupil büyüklüğündeki değişim arasında zayıf pozitif bir ilişki olup bu ilişki istatistiksel anlamlılığa ulaşmamaktadır (p>0.05). Diğer ikili değişkenlerin hiçbiri arasında istatistiksel olarak anlamlı bir ilişki tespit edilememiştir. **Sonuç:** Doğru santralizasyon, hem refraktif cerrahide hem de multifokal GİL implantasyonunda, yüksek dereceli aberasyonları ve fotik fenomenlerin oluşmasını önlemek için önemlidir. Bu nedenle cerrahların, özellikle cerrahi hazırlık ile ilgili olarak, chord µ ölçümlerine aşina olmaları faydalı görünmektedir. Chord mu değerlerindeki değişikliklerin fotik fenomenlerin oluşumuna etki edebileceği gözönünde bulundurulmalıdır. Fakoemülsifikasyon sonrası chord mu değerlerinin azalıyor olması fotik fenomen oluşumu riski olan veya sınır değerdeki hastalarda preoperative karar verme sürecinde cerraha yardımcı olabilir.
Anahtar Kelimeler: Fakoemülsifikasyon, Göz İçi Lens İmplantasyonu, Chord Mu, Kappa Açısı.

Sorumlu Yazar / Corresponding Author: Ali KÜÇÜKÖDÜK, Karamanoğlu Mehmetbey University, Faculty of Medicine, Department of Ophthalmology, Karaman, Turkey
E-mail: alikucukoduk@gmail.com

Bu makaleye atıf yapmak için / Cite this article: Küçüködük, A., & Türe, H. (2024). Changes in Chord Mu (µ) Length Before and After Cataract Surgery. *BAUN Health Sci J, 13*(2), 254-258. https://doi.org/10.53424/balikesirsbd.1386027

INTRODUCTION

In recent years, the range of intraocular lens (IOL) options used in phacoemulsification has expanded significantly. Especially in the use of trifocal and extended depth of focus IOLs, ensuring optimum visual results and minimizing photic events such as glare and halo requires good IOL centralization (Chang & Waring, 2014; Park et al., 2012; Prakash et al., 2011). Particularly in patients undergoing IOL implantation for refractive purposes, dysphotopsia, glare and halos are the most common causes of postoperative dissatisfaction. (de Vries et al., 2011). In order to prevent these complaints and to choose the right IOL, the visual axes and the angles formed between them (kappa, lambda and alpha) were examined in depth (Chang & Waring, 2014; Schwiegerling, 2013). It is known that in the presence of a wide-angle kappa, diffractive images deteriorate and the postoperative dysphotopic phenomenon increases. Anterior segment diagnostic devices such as corneal topography, which are frequently used for preoperative refractive planning, take a 2-dimensional image of the anterior segment while the eye is fixed coaxially to the light source (Mandell, 1995; Rodríguez-Vallejo et al., 2019). The devices process this image and estimate the distance between the vertex normal (Purkinje-Sanson reflection) and the center of the pupil. Thus, the 2-dimensional displacement between the vertex normal and the pupil center is measured instead of the true kappa angle. Since both parameters are widely confused in clinical use, Chang and Waring defined a new term, chord μ, to express this 2-dimensional displacement (Rodríguez-Vallejo et al., 2019). Chord μ length refers to the 2-dimensional distance between the corneal light reflex and the pupillary center, which refers to the distance between 2 points rather than angles (Chang & Waring, 2014; Holladay et al., 2017). In advance, Holladay defined the difference between the apparent chord μ (the distance between the Purkinje image and the center of the pupil viewed from the cornea) and the actual chord μ (the value measured at the pupil level, unaffected by the magnifying effect of the cornea) (Holladay, 2019). Some corneal topography devices, such as Pentacam, can measure the actual chord μ length. Studies in the literature have examined the distribution and determinants of the kappa angle in depth, however, studies on chord μ are quite limited. Therefore, this study aimed to compare chord μ length before and after cataract surgery.

MATERIALS AND METHODS

Participants

This retrospective study was carried out at Karamanoglu Mehmetbey University Ophthalmology Clinic. Patients who underwent phacoemulsification surgery between December 2022 and February 2023 were included in this study.

Inclusion criteria were as follows: 1. Absence of corneal or lens opacity that would prevent anterior and posterior segment imaging, 2. Corneal astigmatism below 1 diopter. Cataract cases with a non-nuclear component were not included in the study as they may affect image quality. A cut-off value for spherical refractive error was not determined because of the myopic effect of nuclear cataract. Instead, the relationship between the change in chord mu and axial length was statistically evaluated. Patients with pseudoexfoliation syndrome and those with a history of alpha-adrenergic antagonist use were excluded from the study. Cases with any ocular disease besides cataract, suspected keratoconus, previous eye surgery, low cooperation, intraoperative iris damage and IOL decentralization during follow-up were excluded. Thirty-three eyes of 33 patients were enrolled.

Procedure

Preoperative evaluation was performed in 10 days before operation, and postoperative evaluation was performed at the earliest 3 months after surgery. All patients were evaluated in terms of visual acuity, biomicroscopic anterior segment and posterior segment findings and in addition, intraocular pressure measurement, optical coherence tomography (NIDEK RS3000 Advance, NIDEK CO., LTD., Japan), optical biometry (NIDEK AL-Scan, NIDEK CO., LTD., Japan) and corneal topography (Pentacam HR, Oculus, Wetzlar, optikgerate GmbH). The chord μ values of the patients were recorded before and after the operation. In order to prevent the measurements from being affected by pupil dilation, pre- and post-operative measurements were made in the same scotopic conditions before pupil dilation.

All surgical procedures were carried out by the same ophthalmologist (A.K) with standard phacoemulsification techniques. A transparent corneal incision was made with a 2.8 mm blade at 135 degrees, and auxiliary incisions were made at 0 and 180 degrees. In all patients included in the study, single piece hydrophobic IOL was placed in a capsule, and there were no complications during or after the operation. After the surgery, antibiotics (moxifloxacin 0.5%, QID) were administered for 1 week, steroid (dexamethasone 0.01%, QID at the beginning and tapered on a weekly basis) and artificial tear drops (hyaluronic acid 0.15%, QID) for 4 weeks.

Statistical Analysis

The collected data was evaluated with the IBM SPSS Statistics 21 package program. Kolmogrov-Smirnov test was applied for the normality of the population. Two independent samples t-test or Mann Whitney U test was used to examine the change between two independent groups. Wilcoxon test was used to calculate the difference between two dependent groups. Wilcoxon test was applied while examining the difference between the two dependent groups. Relationships between continuous variables were analyzed with the Pearson Chi-Square test. In all analyzes, the level of significance was taken as 0.05.

Ethical considerations

The study was conducted with the approval of the Clinical Research Ethics Committee of Karamanoglu Mehmetbey University (decision no: 06-2023/03) on 20.06.2023 in accordance with the Declaration of Helsinki. All participants were included in the study after obtaining informed consent forms.

RESULTS

Demographic data of the cases, changes in pre- and postoperative parameters are presented in tables 1 and 2. The data shows a statistically significant difference between the mean chord μ lenght before and after surgery. The postoperative mean chord μ length was significantly lower than the preoperative mean chord μ length (p=0.002). Similarly, the mean pupil size after phacoemulsification was significantly lower than the preoperative size (p=0.000). There was a weak positive correlation between the change in chord μ length and the change in pupil size, but this correlation was not statistically significant (p>0.05). There was no significant change in pre- and post-operative average keratometry values (p>0.05).

There was no significant difference in mean chord μ length between genders (p=0.361). A weak negative relationship between chord μ length and axial length was observed, but it was not statistically significant (p>0.05). Similarly, a weak positive relationship between chord μ length and preoperative anterior chamber depth was observed, but it was not statistically significant (p>0.05). No statistically significant relationship was found between any of the binary variables, including chord μ length and age (p>0.05).

Table 1. Frequency distribution regarding gender.

Gender	n	%
Male	18	54.5
Female	15	45.5
Total	33	100.0

Table 2. Descriptive statistics for continuous variables.

Variables	Min.	Max.	Mean	Std. Deviation
Preoperative Chord μ Lenght (mm)	0.05	1.04	0.39	0.24
Postoperative Chord μ Lenght (mm)	0.09	0.55	0.24	0.11
Preoperative Pupil Size (mm)	2.26	4.49	3.01	1.35
Postoperative Pupil Size (mm)	1.92	4.09	2.66	0.46
Axial Lenght (mm)	21.41	25.62	23.48	0.90
Anterior Chamber Depth (mm)	2.56	3.81	3.21	0.33
Age (years)	47.00	88.00	67.27	10.93
Preoparative Average Keratometry (diopters)	40.22	49.68	43.68	2.27
Postoperative Average Keratometry (diopters)	40.34	50.1	44.02	2.36

DISCUSSION

The study demonstrated a significant decrease in chord μ length after surgery. However, there was no statistically significant difference observed between chord μ length and pupil size, age, gender, anterior chamber depth, average keratometry and axial length. The results suggest that changes in the anterior chamber structures after phacoemulsification may influence the chord μ lenght.

In order to prevent decreased visual quality due to inappropriate centralization after corneal photoablation or IOL implantation, some clinical references like angle kappa, alpha or lambda, have been suggested (Arba Mosquera et al., 2015). It is noted that the terminology of kappa angle used in this context may cause inconsistencies in the literature and may be confused with lambda angle, which is predominantly referred to as the angle between the pupillary axis and the visual axis. The main reason for this is the assumption that both angles display close levels when the fixation point is distant (Moshirfar et al., 2013). On the other hand, angle kappa and chord mu can be considered as measuring the same clinical marker by different methods. A comparison between the preoperative and postoperative kappa angle revealed a significant alteration in the magnitude of the kappa angle during the postoperative examinations, alongside vector displacement post-surgery (Wang et al., 2020). Furthermore, post-surgery displacement of the pupil center away from the corneal center indicates that the kappa angle's ability to predict the success of mIOL implantation may not be dependable. One prominent reason for the shift in kappa angle is the possibility that the surgical procedure itself - likely due to exposure to ultrasonic energy and/or drug toxicity - can result in minor harm to the iris, ultimately leading to alterations in the shape, size, and location of the pupil. The shift in pupil center with changes in pupil size is an established fact (Yang et al., 2002). Additionally, the study reports a vector displacement in the corneal reflex relative to the corneal center before and after surgery, implying that the visual axis may undergo changes pre- and post-surgery. Since changes to the line of sight are possible, particularly in cortical or localized posterior subcapsular type cataracts, the clinical manifestation of the potential alteration in the visual axis pre- and post-phacoemulsification surgery is reflected in the alteration of the kappa angle.

The problem about the confusion about angle kappa among the ophthalmologists is the determination of the

visual axis and the pupil axis and the measurement of the angle between them. The visual axis, when a patient is fixating on a light source and viewing it coaxially, is very close to the location of the apparent first Purkinje-Sanson image. However, the pupil axis is the line drawn through the apparent centre of the pupil perpendicular to the corneal surface. The term apparent centre is used because it refers to the image of the pupil as seen through the cornea, which means that fixation must be moved nasally until the reflex is centred on the pupil and perpendicular to the cornea. The only clinical instrument that can measure this angle is the synoptophore, which is difficult to find. This is not the case with Scheimpflug tomography (i.e. Pentacam, Oculus). These instruments measure the actual distance from the axis to the actual pupil centre, which is smaller because it is not because it is not enlarged or shifted by the cornea. This distance would be referred to as the actual chord μ.

Chang and Waring recommended the use of this clinical indicator called chord μ to avoid misunderstandings that arose in earlier literature and to address discrepancies between various equipment configurations (Chang & Waring, 2014). Eyes with chord μ values >600 μm appear to be at greater risk for halo and glare complaints with diffractive multifocal IOLs (Holladay, 2019). Holladay et al. They reported the mean apparent chord μ value as 0.3 ± 0.15 mm and the upper limit of normal as 0.60 mm (mean ± 2.0 SD). The actual chord μ length was measured to be 0.2 ± 0.11 mm on average; thus, it can be seen that the upper limit of the real chord μ normal values is 0.42 mm. (Holladay, 2019). In our study, the apparent chord μ value was calculated as 0.39±0.24, which is close to the upper limit in Holladay's definition.

The most comprehensive cohort of chord μ length included 15,930 eyes of 8564 patients (Jiang et al., 2020). Chord μ length has been shown to increase linearly with age in both men and women. Multiple regression shows that chord μ increases with advanced age, male gender, and larger pupil size, but decreases inversely with axial length, keratometry, and anterior chamber depth.

In a study in which 8 patients underwent pinhole pupilloplasty, it was shown that the mean chord μ length was statistically significantly lower after surgery (Narang et al., 2019). It is stated that the correlation between the change in chord μ length and the change in mean pupil size is not significant. Although pupillary surgery was not performed in the patients in our study, similar results were obtained. Several studies investigating the change in pupil diameter after phacoemulsification have reported a statistically significant decrease in pupil diameter of 11-13% (Dick et al., 2005; Keuch & Bleckmann, 2002). Reasons for this change include the effect of increased anterior chamber volume after lens removal, replacement of the average 4.4mm lens with a much thinner IOL, and as a result of these anatomical changes, it has been suggested that the movement of the iris constrictor muscles may lead to a decrease in pupil diameter due to free movement and full capacity contraction of the iris muscles. However, this effect has been shown to be more pronounced in diabetic patients (Simsek & Toptan, 2023).

In a review of the studies on the change in chord-μ length after phacoemulsification surgery, Wang et al. (Wang et al., 2020) and Fernandez et al. (Fernández et al., 2018) reported that postoperative chord μ length decreased significantly, while Şener et al. (Şener et al., 2022) in a study conducted in our country, stated no significant change. In this study, however, it was shown that the chord μ length decreased significantly at the postoperative 3rd month. Two studies (Prakash et al., 2011; Karhanová et al., 2013) have shown that halos and glare are more likely to occur with diffractive multifocal IOLs when the apparent chord m is abnormally high (>0.60mm).

Limitations

Limitations of our study include its retrospective design. Secondly, because it did not include different types of cataracts, we have no data on the change in chord mu in cases other than nuclear cataract. It is well known that the recovery period after cataract surgery can last up to 6 months postoperatively and beyond. Due to the difficulties encountered during the data collection phase, the desired standardization could not be achieved.

CONCLUSION

Proper centralization is a necessity in both refractive operations and refractive IOL implantation to avoid the occurrence of high-grade aberrations and photic events. Therefore, it seems useful for surgeons to be familiar with chord μ measurements, especially regarding surgical preparation. Future studies with a larger patient population more standardized follow-up will be used to understand the predictive value of chord μ in both phacoemulsification surgery and corneal laser surgery.

Acknowledgments

None

Conflict of Interest

The authors report no conflicts of interest to declare.

Author Contributions

Plan, design: AK, HT; **Material, methods, and data collection:** AK, HT; **Data analysis and comments:** AK, HT; **Writing and corrections:** AK, HT

Funding

None

Ethical considerations

The study was conducted with the approval of the Clinical Research Ethics Committee of Karamanoglu Mehmetbey University (decision no: 06-2023/03) on 20.06.2023 in accordance with the Declaration of Helsinki. All participants were included in the study after obtaining informed consent forms.

REFERENCES

Arba Mosquera, S., Verma, S., & McAlinden, C. (2015). Centration axis in refractive surgery. *Eye and Vision*, *2*, 4. https://doi.org/10.1186/s40662-015-0014-6.

Chang, D. H., & Waring, G. O. t. (2014). The subject-fixated coaxially sighted corneal light reflex: a clinical marker for centration of refractive treatments and devices. *American Journal of Ophthalmology*, *158*(5), 863-874. https://doi.org/10.1016/j.a jo.2014.06.028.

de Vries, N. E., Webers, C. A., Touwslager, W. R., Bauer, N. J., de Brabander, J., Berendschot, T. T., & Nuijts, R. M. (2011). Dissatisfaction after implantation of multifocal intraocular lenses. *Journal of Cataract and Refractive Surgery*, *37*(5), 859-865. https://doi.org/10.1016/j.jcrs.2010.11.032.

Dick, H. B., Aliyeva, S., Tehrani, M. (2005). Change in pupil size after implantation of an iris-fixated toric phakic intraocular lens. *Journal of Cataract and Refractive Surgery*, *31*(2), 302-307. https://doi.org/10.1016/j.jcrs.2004.04.040 .

Fernández, J., Rodríguez-Vallejo, M., Martínez, J., Tauste, A., & Piñero, D. P. (2018). Biometric Factors Associated with the Visual Performance of a High Addition Multifocal Intraocular Lens. *Current Eye Research*, *43*(8), 998-1005. https:// doi.org/10.1080/02713683.2018.1478981.

Holladay, J. T. (2019). Apparent chord mu and actual chord mu and their clinical value. *Journal of Cataract and Refractive Surgery*, *45*(8), 1198-1199. https://doi.org/10.1016/j.jcrs.2019.03.029.

Holladay, J. T., Calogero, D., Hilmantel, G., Glasser, A., MacRae, S., Masket, S., Stark, W., Tarver, M. E., Nguyen, T., & Eydelman, M. (2017). Special Report: American Academy of Ophthalmology Task Force Summary Statement for Measurement of Tilt, Decentration, and Chord Length. *Ophthalmology*, *124*(1), 144-146. https:// doi.org/10.1016/j.ophtha.2016.09.030.

Jiang, J. Y., Hodge, C., & Lawless, M. (2020). Understanding chord mu through a large population-based study. *Clinical and Experimental Ophthalmology*, *48*(7), 998-1001. https://doi.org/10.1 111/ceo.13800.

Karhanová, M., Marešová, K., Pluháček, F., Mlčák, P., Vláčil, O. & Sín M. (2013). The importance of angle kappa for centration of multifocal intraocular lenses. *Czech and Slovak Oftalmology*, *69*(2), 64-68.

Keuch, R.J., Bleckmann, H. (2002). Pupil diameter changes and reaction after posterior chamber phakic intraocular lens implantation. *Journal of Cataract and Refractive Surgery*, *28*(12), 2170-2172. https://doi.org/10.1016/s0886-3350(02)01355-x

Mandell, R. B. (1995). Locating the corneal sighting center from videokeratography. *Journal of Cataract and Refractive Surgery*, *11*(4), 253-259. https://doi.org/10.3928/1081-597x-19950701-09.

Moshirfar, M., Hoggan, R. N., & Muthappan, V. (2013). Angle Kappa and its importance in refractive surgery. *Oman Journal of Ophthalmology*, *6*(3), 151-158. https://doi.org/10.4103/0974-620x.122268.

Narang, P., Holladay, J., Agarwal, A., Jaganathasamy, N., Kumar, D. A., & Sivagnanam, S. (2019). Application of Purkinje images for pinhole pupilloplasty and relevance to chord length mu. *Journal of Cataract and Refractive Surgery*, *45*(6), 745-751. https://doi.org/10.1016/j.jcrs.2019.02.037.

Park, C. Y., Oh, S. Y., & Chuck, R. S. (2012). Measurement of angle kappa and centration in refractive surgery. *Current Opinion in Ophthalmology*, *23*(4), 269-275. https://doi.org/10.109 7/ICU.0b013e3283543c41.

Prakash, G., Prakash, D. R., Agarwal, A., Kumar, D. A., Agarwal, A., & Jacob, S. (2011). Predictive factor and kappa angle analysis for visual satisfactions in patients with multifocal IOL implantation. *Eye*, *25*(9), 1187-1193. https://doi.org/10.1038/eye.2011.150.

Rodríguez-Vallejo, M., Piñero, D. P., & Fernández, J. (2019). Avoiding misinterpretations of Kappa angle for clinical research studies with Pentacam. *Journal of Optometry*, *12(*2), 71-73. https://doi.org/10.1016/j.optom.2018.03.003.

Schwiegerling, J. T. (2013). Eye axes and their relevance to alignment of corneal refractive procedures. *Journal of Refractive Surgery*, *29*(8), 515-516. https://doi.org/10.3928/1081597x-20130719-01.

Simsek A, Toptan M. (2023). The evaluation of pupil diameter by using Sirius before and after phacoemulsification in healthy, diabetic and hypertension patients. Medicine (Baltimore), *102*(16), e33223. https://doi.org/10.1097 /MD.0000000000033223

Şener, H., Polat, O. A., & Çetinkaya, Z. (2022). Fakoemülsifikasyon Cerrahisi Sonrasında Korneal Topografide Chord Mu (μ) Değerinin Değişiminin Değerlendirilmesi. *MN Opthalmology/MN Oftalmoloji*, *29*(4), 233-237.

Wang, R., Long, T., Gu, X., & Ma, T. (2020). Changes in angle kappa and angle alpha before and after cataract surgery. *Journal of Cataract and Refractive Surgery*, *46*(3), 365-371. https://doi.org/ 10.1097/j.jcrs.0000000000000063.

Yang, Y., Thompson, K., & Burns, S. A. (2002). Pupil location under mesopic, photopic, and pharmacologically dilated conditions. *Investigative Ophthalmology and Visual Science*, *43*(7), 2508-2512.

ORİJİNAL MAKALE / ORIGINAL ARTICLE

Balıkesir Sağlık Bilimleri Dergisi / BAUN Sağ Bil Derg
Balıkesir Health Sciences Journal / BAUN Health Sci J
ISSN: 2146-9601- e ISSN: 2147-2238
Doi: https://doi.org/10.53424/balikesirsbd.1398035

The Interrelationship of Eating Behaviors in Overweight and Obese Adults

Hande ÖNGÜN YILMAZ [1], Gizem KÖSE [2], Ahmet Murat GÜNAL [3], Bekir Kürşat AYDIN [3], Salim YILMAZ [4]

[1] Bandırma Onyedi Eylül University, Faculty of Health Sciences, Department of Nutrition and Dietetics
[2] Acıbadem Mehmet Ali Aydinlar University, Faculty of Health Sciences, Department of Nutrition and Dietetics
[3] Istanbul Okan University, Faculty of Health Sciences, Department of Nutrition and Dietetics
[4] Acıbadem Mehmet Ali Aydinlar University, Faculty of Health Sciences

Geliş Tarihi / Received: *29.11.2023,* ***Kabul Tarihi / Accepted:*** *21.01.2024*

ABSTRACT

Objective: Nutrition is a complex behavior influenced by homeostatic and non-homeostatic processes. Emotional and environmental triggers can affect non-homeostatic processes, leading to hedonistic, emotional, and night eating. This study aimed to investigate the relationship between hedonistic eating, emotional eating, and night eating syndrome in overweight and obese adults. **Materials and Methods:** 562 overweight and obese adults participated in the study. The data were collected using a general information and anthropometric measurements form, the Hedonistic Eating Scale (HES), the Emotional Eater Questionnaire (EEQ), and the Night Eating Questionnaire (NEQ). **Results:** Results showed that 8.2% of participants had emotional eating syndrome, and 25.6% had night eating syndrome. Obese participants were found to have higher rates of emotional eating and night eating syndrome than overweight participants. There were positive correlations between EEQ with HES ($r=0.468$, $p<0.001$); NEQ with HES ($r=0.231$, $p<0.001$); NEQ with EEQ ($r=0.416$, $p<0.001$); BMI and EEQ ($r=0.128$, $p<0.01$). Also, emotional eating increases night eating syndrome risk by 9%, while hedonic eating increases by 2%. The progression from overweight to obese was increased by 5.7% for emotional eating and 3.3% for night eating. **Conclusion:** The results suggest that there are significant associations between eating behaviors in overweight and obese individuals. This study provides insights and a better understanding of factors that trigger overeating in overweight and obese individuals.

Keywords: Eating Behaviors, Emotional Eating, Hedonistic Eating, Night Eating Syndrome, Obesity.

Fazla Kilolu ve Obez Yetişkinlerde Yeme Davranışları İlişkisi

ÖZ

Amaç: Beslenme homeostatik ve homeostatik olmayan süreçlerden etkilenen karmaşık bir davranıştır. Duygusal ve çevresel tetikleyiciler homeostatik olmayan süreçleri etkileyerek hedonistik, duygusal ve gece yemeye yol açabilir. Bu araştırmanın amacı fazla kilolu ve obez yetişkinlerde hedonistik yeme, duygusal yeme ve gece yeme sendromu arasındaki ilişkiyi araştırmaktır. **Gereç ve Yöntem:** Araştırmaya toplam 562 fazla kilolu ve obez yetişkin katılmıştır. Veriler genel bilgi ve antropometrik ölçüm formu, Hedonistik Yeme Ölçeği (HES), Duygusal Yeme Ölçeği (DYÖ) ve Gece Yeme Anketi (GYA) kullanılarak toplanmıştır. **Bulgular:** Araştırma sonuçları katılımcıların %8,2'sinin duygusal yeme sendromuna, %25,6'sının ise gece yeme sendromuna sahip olduğunu göstermiştir. Obez katılımcıların fazla kilolu katılımcılara göre daha yüksek oranda duygusal yeme ve gece yeme sendromuna sahip olduğu bulunmuştur. DYÖ ile HES arasında ($r=0,468$, $p<0,001$); HES ile GYA arasında ($r=0,231$, $p<0,001$); DYÖ ile GYA arasında ($r=0,416$, $p<0,001$); BKİ ve DYÖ arasında ($r=0,128$, $p<0,01$) pozitif korelasyon saptanmıştır. Duygusal yeme sendromu gece yeme sendromu riskini %9 oranında artırırken, hedonik yeme ise %2 oranında artırmaktadır. Fazla kilolulukten obeziteye geçiş duygusal yemede %5,7, gece yemede ise %3,3 artmaktadır. **Sonuç:** Araştırma sonuçları fazla kilolu ve obez bireylerde yeme davranışları arasında anlamlı ilişkiler olduğunu göstermektedir. Bu araştırma, fazla kilolu ve obez bireylerde aşırı yemeyi tetikleyen faktörlerin daha iyi anlaşılmasını sağlamaktadır.

Anahtar Kelimeler: Yeme Davranışları, Duygusal Yeme, Hedonistik Yeme, Gece Yeme Sendromu, Obezite.

Sorumlu Yazar / Corresponding Author: Hande ÖNGÜN YILMAZ, Bandırma Önеydi Eylül University, Faculty of Health Sciences, Department of Nutrition and Dietetics, Balıkesir, Türkiye
E-mail: dythandeongun@gmail.com; hyilmaz@bandirma.edu.tr

Bu makaleye atıf yapmak için / Cite this article: Yılmaz Öngün, H., Köse, G., Günal, A.M., Aydın, B.K., & Yılmaz, S. (2024). The interrelationship of eating behaviors in overweight and obese adults. *BAUN Health Sci J, 13*(2), 259-267. https://doi.org/10.53424/balikesirsbd.1398035

INTRODUCTION

The regulation of nutrition involves both homeostatic and non-homeostatic processes that are influenced by physiological needs and psychological factors. Hedonic hunger, for instance, refers to an increased appetite and pleasure derived from food consumption, typically driven by the taste, smell, and other sensory properties of foods, rather than by physiological need (Gunduz et al., 2020; Köse & Şanlıer, 2015; Yu et al., 2015). Hedonic mechanisms can override homeostatic signals, leading to excessive food intake (Köse & Şanlıer, 2015). This type of eating behavior is often associated with emotional eating and eating disorders, particularly in cases where there are disruptions to the hedonic system (Lutter & Nestler, 2009).

Nutrition is a complex behavior affected by a range of environmental and emotional triggers. Environmental triggers, such as the sight and smell of food, or the presence of others consuming food, can all impact an individual's food choices and intake, while emotional triggers, such as stress or fluctuations in mood, can also influence eating behavior (Gunduz et al., 2020). These triggers are at the core of hedonic eating, which involves the consumption of food for pleasure rather than for physiological needs. The relationship between mental state and nutrition is complex: while negative emotional states like depression, anxiety, and anger can sometimes lead to loss of appetite and aversion to eating (Demirel et al., 2014; Ibrahim et al., 2016; Meule et al., 2014), in emotional eating, excessive amounts of food are consumed in response to negative emotions (Barnhart et al., 2020; Bourdier et al., 2018; Braden et al., 2018). Emotional eating often involves the consumption of high-carbohydrate, high-fat, and energy-dense foods (Nolan & Geliebter, 2012), and can lead to binge eating, weight gain, and obesity over time (Braden et al., 2018; Erkaya et al., 2020; Nolan & Geliebter, 2012).

When evaluating nutrition, it is important to consider the distribution of food intake throughout the day and the reasons for consumption (Sevincer et al., 2016). Increased food consumption in the evening, also known as night eating syndrome (NES), can develop into a disorder characterized by a lack of appetite in the morning, excessive food intake in the evening, and sleep disturbances (Civil Arslan et al., 2015). NES was initially identified in individuals with treatment-resistant obesity and is marked by recurrent eating episodes that occur either upon waking from sleep or after dinner (Konttinen et al., 2010). Individuals with NES also report experiencing negative mood states in the evening and are more likely to experience depression at night (Atasoy et al., 2014).

Numerous studies have demonstrated that psychological factors may affect nutrition, including appetite and food consumption (Bourdier et al., 2018; Braden et al., 2018). With the increased availability of delicious foods, overeating can occur in a non-homeostatic way due to motivational processes (Braden et al., 2018). Factors such as pleasure from food consumption, changes in mood, and negative emotions, especially in the evening, can trigger overeating (Escandón-Nagel et al., 2018; Nolan & Geliebter, 2012). This study aims to examine the relationships between hedonic eating, emotional eating, night eating syndrome, and BMI and sociodemographic characteristics in overweight and obese adults who exhibit symptoms and behaviors consistent with these conditions. Specifically, this research hypothesizes that hedonic and emotional eating increases the risk of night eating syndrome and obesity in this population.

MATERIALS AND METHODS

Study type

This cross-sectional study was conducted online from January to December 2021.

Study group

The study included a sample of 562 overweight and obese adults (257 women, 305 men) who volunteered to participate. Participants were asked to fill out a data collection form online via Google Forms. Out of 878 individuals who completed the form, we excluded 63 individuals under the age of 18 and 56 or over 65. Body Mass Index (BMI) calculations were based on height and body weight information provided by participants, using the World Health Organization's BMI classification for adults (WHO, 2000), our study included individuals with a BMI higher than 25 kg/m2. Therefore, we further excluded 197 participants with a BMI less than 25 kg/m2. The remaining sample size of 562 individuals was deemed sufficient based on the unknown universe sample account, with a minimum of 385 participants needed for a confidence level of 95% and a margin of error of 5%.

Dependent and independent variables

The independent variables of this research are hedonic eating, emotional eating, and night eating syndrome. The dependent variables are overweight and obesity.

Procedures

A comprehensive online data collection form consisting of four parts was created to collect data for the study using Google Forms. The first section of the form included questions related to participants' general information, such as age, educational status, and employment status, as well as anthropometric measurements such as height and weight. BMI was then calculated using this information, and participants were classified as overweight (BMI between 25.00-29.99 kg/m²) or obese (BMI 30.00 kg/m² or higher) according to the World Health Organization's BMI classification for adults (WHO, 2000). The following three sections include scales.

Hedonistic Eating Scale (HES): The second part of the form has the Hedonistic Eating Scale (HES), a tool developed by Atik et al. (2019) to evaluate hedonistic eating behaviors. The HES consists of 15 items designed to assess situations that reflect hedonistic eating habits. The scale has been reported to have high internal consistency, with a coefficient of 0.968. Scores

on the scale can range from 15-75, with higher scores indicating a greater tendency toward hedonistic eating. This study's Cronbach's alpha value of the HES found 0.935.

Emotional Eater Questionnaire (EEQ): The third part of the form has the Emotional Eater Questionnaire (EEQ), developed by Garaulet et al. (2012) to assess emotional eating behaviors and Arslantaş et al. (2019) conducted the Turkish validity and reliability study of the scale, reporting an internal consistency coefficient of 0.84. The total score on the scale ranges from 0-30, with higher scores indicating a higher level of emotional eating behavior. In the Turkish adaptation, the cutoff score was determined as 21, indicating the presence of emotional eating behavior if the score was 21 and above. In this study, Cronbach's alpha value of the EEQ was found to be 0.880.

Night Eating Questionnaire (NEQ): Allison et al. (2008) developed the Night Eating Questionnaire (NEQ) for the screening of night eating syndrome, and its Turkish validity and reliability study was conducted by Atasoy et al. (2014). The internal consistency coefficient of the Turkish adaptation of the NEQ is reported as 0.69. The NEQ consists of 14 items, and the total score that can be obtained from the questionnaire is between 0-52 (Allison et al., 2008). In the Turkish adaptation of NEQ, a cutoff score of 18 was determined, and a questionnaire score of 18 and above was suggested as a diagnosis of the night-eating syndrome (Atasoy et al., 2014). In this study, Cronbach's alpha value of the NEQ was 0.714.

Statistical analysis

Statistical analyses were conducted using IBM SPSS Version 20.0 for Windows (SPSS, Chicago, IL, USA). The analysis involved several statistical tests, each tailored to specific aspects of the data. Spearman's Correlation was employed to assess the strength and direction of associations between continuous, non-normally distributed variables such as eating behavior scores and BMI. For comparing differences between two independent groups, particularly in cases of non-parametric data, the Mann-Whitney U test was utilized. When comparing more than two groups, the Kruskal Wallis H test was applied, especially useful for evaluating variables like age categories or different BMI classifications. In the post-hoc analysis, evaluation was conducted using Dunn's test following the H test. Logistic regression was utilized to ascertain the effect. The significance of the model was evaluated using the Omnibus test through the chi-square statistic, while the Hosmer and Lemeshow test was employed to determine the model's goodness of fit, ensuring that the predicted observations were not significantly different from the actual values. Additionally, the explanatory power of the variance was understood through the Nagelkerke R square value. The data were interpreted at a 95% confidence level.

Ethical considerations

Before the study, we obtained ethical approval from the Istanbul Okan University Ethics Committee (Date: 09.12.2020, Number: 129-18) under the Helsinki Declaration. Research participation was voluntary. Data were collected within a year following the ethics committee's approval.

RESULTS

A total of 562 participants took part in the study, comprising 257 women (45.7%) and 305 men (54.3%). The mean age of the participants was 34.15 ± 12.87 years, with no significant difference observed between females (35.52 ± 13.12 years) and males (33.01 ± 12.56 years) ($p > 0.05$). Descriptive statistics of the participants are presented in Table 1.

Table 1. Descriptive statistics of the participant.

Variable	n *(%)*	Variable	n *(%)*
Sex		**BMI Classification**	
Women	257 *(45.7)*	Overweight	416 *(74.0)*
Men	305 *(54.3)*	Obese	146 *(26.0)*
Marital Status		**Emotional Eating**	
Single	268 *(47.7)*	Present (<21)	46 *(8.2)*
Married	294 *(52.3)*	Absent (≥21)	516 *(91.8)*
Educational Status		**Night Eating Syndrome**	
Elementary School	48 *(8.5)*	Present (<18)	144 *(25.6)*
Secondary School	32 *(5.7)*	Absent (≥18)	418 *(74.4)*
High School	120 *(21.4)*		**Mean ± *SD***
University	362 *(64.4)*	**Age (year)**	34.15 ± *12.87*
Employment Status		**BMI (kg/m^2)**	28.62 ± *3.21*
Housewife	66 *(11.7)*	**HES**	46.47 ± *13.05*
Student	159 *(28.3)*	**EEQ**	11.37 ± *6.50*
Employed	255 *(45.4)*	**NEQ**	14.65 ± *6.58*
Unemployed	49 *(8.7)*		
Retired	33 *(5.9)*		

SD: Standard Deviation; HES: Hedonistic Eating Scale; EEQ: Emotional Eater Questionnaire; NEQ: Night Eating Questionnaire; BMI: Body Mass Index

The study found that 70.4% (n=181) of the women were overweight, while 29.6% (n=76) were obese. Among the men, 77.0% (n=235) were overweight and 23.0% (n=70) were obese. No significant difference was observed between BMI classification and sex (p> 0.05).

The prevalence of emotional eating and night eating syndrome was found to be significantly higher in the obese group compared to the overweight group (13.7% vs. 6.3% and 34.2% vs. 22.6%, respectively) (all p <0.01).

In Table 2, HES, EEQ, and NEQ scores based on the participants' socio-demographic characteristics and BMI classification were shown. Median HES scores were found to be significantly higher among singles compared to married individuals (p <0.01) and among students compared to other groups (p <0.001). Median EEQ scores were significantly higher among women compared to men (p <0.01), singles compared to married individuals, university graduates compared to other groups, and students compared to other groups (all p <0.001). Median NEQ scores were significantly higher among singles compared to married individuals (p <0.001). Median EEQ and NEQ scores were found to be significantly higher among obese individuals compared to those who were overweight (p <0.001 and p <0.01, respectively).

Table 2. Relationship between socio-demographic characteristics and BMI classification with HES, EEQ, and NEQ scores.

Variable	HES Median (Q1-Q3)	z/χ2	p	EEQ Median (Q1-Q3)	z/χ2	p	NEQ Median (Q1-Q3)	z/χ2	p
Sex									
Women (n=257)	45.00 (36.50-52.00)	-1.818$_z$	0.069	12.00 (8.00-16.00)	**-3.335$_z$**	**0.001***	13.00 (11.00-18.00)	-0.765$_z$	0.444
Men (n=305)	46.00 (38.50-57.00)			10.00 (6.00-15.00)			13.00 (10.00-18.00)		
Marital Status									
Single (n=268)	47.50 (40.00-58.00)	**-3.415** χ^2	**0.001***	12.00 (8.00-17.00)	**-4.456$_z$**	**<0.001****	14.00 (11.00-19.00)	**-4.519$_z$**	**<0.001****
Married (n=294)	44.00 (36.00-52.00)			10.00 (5.00-14.00)			12.00 (10.00-16.00)		
Educational Status									
Elementary School (n=48)	45.50 (32.00-51.50)	7.195 χ^2	0.066	7.00 (3.00-12.75)	**22.795** χ^2	**<0.001****	12.00 (9.00-15.00)	6.550 χ^2	0.088
Secondary School (n=32)	42.00 (34.25-50.00)			9.00 (4.00-13.50)			13.00 (9.00-16.00)		
High School (n=120)	44.00 (37.00-54.75)			10.00 (5.00-15.00)			13.00 (10.00-17.00)		
University (n=362)	46.00 (38.00-55.25)			11.00 (8.00-16.00)			14.00 (10.00-18.00)		
Employment Status									
Housewife (n=66)	44.50 (34.75-51.25)	**20.409** χ^2	**<0.001****	9.00 (5.00-13.00)	**26.747** χ^2	**<0.001****	13.00 (10.75-18.00)	7.722 χ^2	0.102
Student (n=159)	48.00 (40.00-59.00)			13.00 (9.00-18.00)			14.00 (11.00-19.00)		
Employed (n=255)	44.00 (36.00-53.00)			10.00 (6.00-14.00)			13.00 (10.00-17.00)		
Unemployed (n=49)	51.00 (42.00-62.00)			12.00 (7.50-17.50)			13.00 (11.00-18.50)		
Retired (n=33)	42.00 (35.50-49.50)			10.00 (5.00-13.50)			12.00 (10.00-15.50)		
BMI Classification									
Overweight (n=416)	46.00 (37.00-54.75)	-0.879$_z$	0.379	11.00 (6.00-15.00)	**-3.853$_z$**	**<0.001****	13.00 (10.00-17.00)	**-2.653$_z$**	**0.008***
Obese (n=146)	46.50 (37.75-55.25)			11.50 (9.00-18.00)			14.00 (11.00-21.00)		

*p<0.01; **p<0.001; z: Mann Whitney U Test; χ2: Kruskal Wallis H Test; Q1-Q3: 25th-75th percentile. HES: Hedonistic Eating; EEQ: Emotional Eating; NEQ: Night Eating; BMI: Body Mass Index

In Table 3, The Hedonistic Eating Score (HES) exhibited a positive correlation with the Emotional Eating Quotient (EEQ; r = 0.468, p < 0.001) and the Night Eating Quotient (NEQ; r = 0.231, p < 0.001). However, HES did not show a significant correlation with BMI (r = -0.009, p = 0.834). Notably, there was a

significant negative correlation between HES and age (r = -0.224, p < 0.001). The EEQ also displayed a significant positive correlation with NEQ (r = 0.416, p < 0.001), a small but significant positive correlation with BMI (r = 0.128, p = 0.002), and a negative correlation with age (r = -0.221, p < 0.001). NEQ was negatively correlated with age (r = -0.189, p < 0.001) but showed no significant correlation with BMI (r = -0.051, p = 0.226). Additionally, a significant positive correlation was observed between BMI and age (r = 0.237, p < 0.001).

Table 3. Relationship between HES, EEQ, NEQ scores, BMI levels, and age (n = 562).

	HES		EEQ		NEQ		BMI (kg/m^2)		Age (year)	
	r	**p**	**r**	**p**	**r**	**p**	**r**	**p**	**r**	**p**
HES	1	-	**0.468**	**<0.001****	**0.231**	**<0.001****	-0.009	0.834	**-0.224**	**<0.001****
EEQ			1	-	**0.416**	**<0.001****	**0.128**	**0.002***	**-0.221**	**<0.001****
NEQ					1	-	0.051	0.226	**-0.189**	**<0.001****
BMI (kg/m^2)							1	-	**0.237**	**<0.001****
Age (year)									1	-

*p<0.01; **p<0.001; Spearman's rho, HES: Hedonistic Eating; EEQ: Emotional Eating; NEQ: Night Eating; BMI: Body Mass Index

In Table 4, it was shown that the effect of EEQ and HES on NEQ and BMI classification as dependent variables. In Model 1, the impact of participants' emotional eating (EEQ) and hedonic eating (HES) tendencies on the presence of Night Eating Syndrome (NES) risk was examined. Model 1 met the assumptions and provided significant results, explaining 13.3% of the variance. In Model 2, there were three independent variables, including emotional eating (EEQ), hedonic eating (HES), and night eating behaviors, and their impact on BMI classification was investigated. Model 2 also produced significant results, explaining 5.2% of the variance, and met the assumptions.

In Model 1, it was found that emotional eating and hedonic eating have a significant effect on night eating (p<0.05). Considering the positive Beta coefficient and coding, both emotional eating and hedonic eating are factors that increase the risk of night eating syndrome. The equations are provided below:

$$\ln\left(\frac{P(NE = Risk\ Present)}{P(NE = Risk\ Absent)}\right) = -3.086 + 0.087 \times (EEQ) + 0.020 \times (HES)$$

$$P(NE = Risk\ Present) = \frac{e^{-3.086+0.087\times(EEQ)+0.020\times(HES)}}{1 + e^{-3.086+0.087*(EEQ)+0.020*(HES)}}$$

$$P(NE = Risk\ Absent) = 1 - P(NE = Risk\ Present)$$

In Model 2, it was found that emotional eating, hedonic eating, and night eating have a significant effect on BMI classification in participants who are distributed in overweight and obese classes (p<0.05).

Table 4. Logistic regression model for BMI classification, NEQ, EEQ, and HES.

	Dependent	Independent	β	SE	Wald	p	Exp(β)	Confidence Interval 95%	
								Lower	Upper
Model 1	NEQ Groups	EEQ	0.087	0.018	23.780	**<0.001**	1.090	1.053	1.130
		HES	0.020	0.009	5.060	**0.024***	1.020	1.002	1.039
		Constant	*-3.086*	*0.405*	*57.994*	*<0.001*	*0.046*		
	Omnibus Test of Model: χ2: 53.223; p<0.001; Nagelkerke R^2: 0.133 Hosmer and Lemeshow Test: χ2: 6.925; p=.545>.05								
Model 2	BMI Classification	EEQ	0.055	0.018	9.677	**0.002****	1.057	1.020	1.094
		HES	-0.011	0.009	1.668	0.197	0.989	0.971	1.007
		NEQ	0.032	0.015	4.451	**0.035***	1.033	1.003	1.063
		Constant	*-1.682*	*0.390*	*18.570*	*<0.001*	*0.186*		
	Omnibus Test of Model: χ2: 20.350; p<0.001; Nagelkerke R^2: 0.052 Hosmer and Lemeshow Test: χ2: 14.978; p=.060>.05								

Model 1 Codes: 0: NE Risk Absent, 1: NE Risk Present, Model 2: Codes: 1: Overweight, 2: Obese, *p<0.05; **p<0.01; ***: p<0.001; HES: Hedonistic Eating; EEQ: Emotional Eating; NEQ: Night Eating; BMI: Body Mass Index

The model showed that hedonic eating did not create a significant model on BMI classification, indicating that the shift from overweight to obese participants was not related to hedonic eating. However, considering the positive Beta coefficient and coding, both emotional eating and night eating tendencies lead individuals from the overweight class to the obese class. The equations are provided below:

$$\ln\left(\frac{P(BMI = Overweight)}{P(BMI = Obese)}\right) = -1.682 + 0.055 \times (EEQ) - 0.011 \times (HES) + 0.032 \times (NEQ)$$

$$P(BMI = Overweight) = \frac{e^{-1.682+0.055\times(EEQ)-0.011\times(HES)+0.032\times(NEQ)}}{1 - 1.682 + 0.055 \times (EEQ) - 0.011 \times (HES) + 0.032 \times (NEQ)}$$

$$P(Obese) = 1 - P(Overweight)$$

It was observed that the explanatory coefficient of emotional eating and hedonic eating on night eating syndrome risk is 0.133, and the explanatory coefficient of emotional eating and night eating on the risk of progression from overweight to obese is 0.052. In both models, independent variables that have a significant effect contribute to the higher coding of the dependent variable. Based on this information, the effect ratios were calculated as follows:

$$Effect\ rate\ = (exp(\beta_i)\ - 1) * 100$$

It has been determined that emotional eating increases the risk of night eating syndrome by 9%, and hedonic eating increases it by 2%. The risk of progressing from overweight to obese is increased by 5.7% for emotional eating and by 3.3% for night eating.

DISCUSSION

The pleasure from eating, emotional state, and overeating especially in the evening may result in obesity (Escandón-Nagel et al., 2018). In this study, the relationship between hedonistic eating, emotional eating, and night eating of overweight and obese participants was evaluated. This research has shown that there were important associations between hedonistic eating, emotional eating, and night eating syndrome in overweight and obese individuals. At the end of the study, results supported our hypothesis as hedonistic eating and emotional eating caused an increase in night eating syndrome and obesity.

Given that the HES scale was specifically designed for individuals with obesity, it is crucial to focus on the high-BMI population in research. In our study, 74.0% of participants had a BMI above 25 kg/m2, with 26.0% classified as obese (BMI > 30 kg/m2). Notably, these BMI distributions closely resemble those reported in previous development studies of the HES, EEQ, and NEQ scales (Allison et al., 2008; Atik et al., 2019; Garaulet et al., 2012), thereby enabling a more rigorous evaluation of the scales. Our large sample size further enhances the statistical power of our findings.

The original HES study focused exclusively on obese patients and did not report any information on mean or cutoff scores (Atik et al., 2019). In our study, we calculated the mean HES score to be 46.47 ± 13.05. We found no significant relationships between HES scores and BMI, sex, or educational status. However, we did observe that single participants had higher HES scores than married ones, and students had higher scores than other groups. Additionally, a negative correlation between age and HES score was stated. As the first investigation to employ HES, our study provides valuable insights into the literature on hedonistic eating. We believe that our results will contribute significantly to the field.

Given the close link between emotional eating and hedonistic eating (Meule et al., 2014), our study aimed to assess emotional eating behaviors alongside hedonistic eating. While previous research has typically used sub-factors of other scales to measure emotional eating (Erkaya et al., 2020; Meule et al., 2014; Nolan & Geliebter, 2012), we applied the EEQ in this study. Our objective was to identify the presence of emotional eating across various scoring groups on the EEQ. Although most studies have not provided explicit cutoff scores for the EEQ (Arslantas et al., 2019; Garaulet et al., 2012), higher EEQ scores have generally been reported in women (Rasouli et al., 2019). In the Turkish adaptation of the EEQ, emotional eating was observed in 10% of participants (Arslantas et al., 2019). In our study, we found that 8.2% of participants exhibited emotional eating behaviors, with a mean EEQ score of 11.37 ± 6.50. Women had higher EEQ scores than men, and median EEQ scores were higher among single, university graduated, and student participants compared to their respective comparison groups.

Numerous studies have documented the relationship between emotional eating and BMI (Meule et al., 2014; Nolan & Geliebter, 2012), highlighting its significance as a social issue (Konttinen et al., 2010). In the Turkish adaptation of the EEQ, no significant association was reported between emotional eating and BMI; however, when individuals with a BMI of 25 kg/m2 or higher were compared to those with lower BMIs, higher levels of emotional eating were observed in the former group (Arslantas et al., 2019). In a study focused on obese individuals, researchers identified a significant correlation between BMI and both EEQ scores and binge eating (Escandón-Nagel et al., 2018). Other research has shown that EEQ scores increased with higher BMI in both sex (Farhangi, 2019; Rasouli et al., 2019). Our study found that the median EEQ scores of obese individuals were higher than those of overweight individuals, and a positive correlation was observed between BMI and EEQ. Consistent with previous findings, we found a negative association between age and EEQ, as demonstrated in a study conducted in Spain (Escandón-Nagel et al., 2018).

Several studies have linked night eating to emotional eating (Konttinen et al., 2010; Nasirzadeh et al., 2018). In fact, one study found that poor sleep quality was strongly associated with emotional eating (Saleh-Ghadimi et al., 2019). As a concern, eating for pleasure or to avoid negative emotions can lead to problems with night eating (Meule et al., 2014). To assess night eating, the NEQ was used in this study. Previous research using NEQ has shown mean scores ranging from 13.09 ± 4.69 to 33.1 ± 7.5 (Allison et al., 2008; Atasoy et al., 2014; Civil Arslan et al.,

2015; Eray et al., 2019; He et al., 2018). Our study's mean NEQ score was 14.65 ± 6.58, which falls within this range. The relationship between night eating and demographic factors such as sex, marital status, education, and employment status has been studied in several previous studies, with mixed results. While some studies found no significant relationship between these factors and night eating (Atasoy et al., 2014; Civil Arslan et al., 2015; Sevincer et al., 2016), others found that night-eating syndrome was more prevalent in individuals with low education who live alone (He et al., 2018) or in men (Saleh-Ghadimi et al., 2019). In our study, we found that the median NEQ scores of singles were higher than those of married individuals.

Numerous studies have established a correlation between night-eating syndrome and elevated BMI (Bruzas & Allison, 2019; Calugi et al., 2009; Eray et al., 2019). For instance, Allison et al. (2008) and Atasoy et al. (2014) conducted studies with obese participants and found that 62% and 68.8% of them, respectively, met the diagnostic criteria for night-eating syndrome. Eray et al. (2019) found that 11.7% of their participants with a mean BMI of 40.5 ± 15.4 kg/m2 had night-eating syndrome. In contrast, He et al. (2018) reported a lower frequency of 2.8% for night-eating syndrome in a large student population in China after excluding those with binge-eating disorder. Similarly, Sevincer et al. (2016) found a frequency of 9.5% for night-eating syndrome in their study, which screened for eating disorders, and showed a higher prevalence in individuals with BMI above normal. Civil Arslan et al. (2015) found that 16.5% of their overweight and obese psychiatric patients had NEQ scores above 25 and 7.6% were diagnosed with night-eating syndrome according to diagnostic criteria. Calugi et al. (2009) also found a strong correlation between NEQ scores and class II and III obesity. However, Riccobono et al. (2020) did not observe a significant relationship between night-eating syndrome and BMI in a study of individuals with a normal BMI, although some participants achieved a cutoff score of 5.3%. Our study found that 25.6% of our participants had night-eating syndrome, and obese participants had higher median NEQ scores than those who were overweight. The varying frequency reported across studies may be attributed to differences in samples and cultural factors.

Limitations

The findings of this cross-sectional study, obtained through an online survey, are subject to several limitations that warrant consideration. The reliance on an online data collection method and self-reported data for height, weight, and eating behaviors may introduce selection and reporting biases, potentially impacting the generalizability and accuracy of the results. Additionally, it is critical to acknowledge that the strength of causal inferences in this study is inherently weaker when compared to longitudinal designs, as the cross-sectional design does not preclude causal relationships but provides a less robust basis for such interpretations. Furthermore, the exclusion of individuals under the age of 18 and over 65, as well as those with a BMI below 25 kg/m², limits the applicability of the findings to a broader population. The relatively lower internal consistency coefficients of some scales, particularly the NEQ, might also affect the reliability of these measurements. Despite these limitations, the study is believed to provide valuable insights, highlighting the need for further research to deepen the understanding of the relationships between eating behaviors and obesity in diverse populations.

CONCLUSION

Our hypothesis was confirmed through regression analysis, which measured the impact of various factors on BMI classification, night eating syndrome, emotional eating, and hedonistic eating. The analysis revealed that an increase in individuals' hedonistic eating and emotional eating scores had an increasing effect on the likelihood of night-eating syndrome. Moreover, emotional eating and night eating behaviors were also found to have an increasing effect on an individual's risk of obesity. We also found that hedonistic eating behaviors did not directly affect BMI classification but could trigger night eating behavior. Additionally, night eating has been associated with a higher risk of obesity. Emotional eating behavior was found to have a direct impact on both night eating behavior and obesity. Overall, our findings suggest that addressing emotional eating behaviors may help reduce the likelihood of night eating syndrome and obesity.

Our research highlights the importance of understanding hedonic mechanisms, emotional states, and night eating behaviors that contribute to weight gain and obesity. This information provides valuable insights for future research on these issues.

This study is the first known study that examined the relationships between hedonistic eating, emotional eating, and night eating in overweight and obese individuals. The results demonstrate that these three states are interconnected and may contribute to increased food consumption and obesity beyond physiological satiety. The study's pioneering use of the newly developed hedonistic eating scale provides a unique contribution to the existing literature on this subject.

Acknowledgement

None

Conflict of Interest

The author declares no potential conflicts of interest concerning for to the research, authorship, and/or publication of this article.

Author Contributions
Plan, design: HÖY; GK; AMG; BKA, SY; **Material, methods and data collection:** HÖY; GK; AMG; BKA, SY; **Data analysis and comments:** HÖY; GK; AMG; BKA, SY; **Writing and corrections:** HÖY; GK; AMG; BKA, SY.

Funding
None

Ethical considerations
Before the study, we obtained ethical approval from the Istanbul Okan University Ethics Committee (Date: 09.12.2020, Number: 129-18) under the Helsinki Declaration. Research participation was voluntary. Data were collected within a year following the ethics committee's approval.

REFERENCES

Allison, K. C., Lundgren, J. D., O'Reardon, J. P., Martino, N. S., Sarwer, D. B., Wadden, T. A., Crosby, R. D., Engel, S. G., & Stunkard, A. J. (2008). The Night Eating Questionnaire (NEQ): Psychometric properties of a measure of severity of the Night Eating Syndrome. *Eating Behaviors*, *9*(1), 62–72. https://doi.org/10.1016/j.eatbeh.2007.03.007

Arslantas, H., Dereboy, F., Yuksel, R., & Inalkac, S. (2020). Validity and Reliability of the Turkish Version of the Emotional Eater Questionnaire (EEQ-TR). *Turkish Journal of Psychiatry 31*(2), 122-130.https://doi.org/10.5080/u23520

Atasoy, N., Saracli, O., Konuk, N., Ankarali, H., Guriz, S., Akdemir, A., Sevincer, G., & Atik, L. (2014). The reliability and validity of Turkish version of The Night Eating Questionnaire in psychiatric outpatient population. *Anatolian Journal of Psychiatry*, *15*(3), 238. https://doi.org/10.5455/apd.39829

Atik, D., Neşe, A., & Özcan Yüce, U. (2019). Ölçek Geliştirme Çalışması: Hedonistik Yeme Ölçeği. *Acta Medica Alanya*, *3*(2), 147–153. https://doi.org/10.30565/medalanya.545200

Barnhart, W. R., Braden, A. L., & Jordan, A. K. (2020). Negative and positive emotional eating uniquely interact with ease of activation, intensity, and duration of emotional reactivity to predict increased binge eating. *Appetite*, *151*, 104688. https://doi.org/10.1016/j.appet.2020.104688

Bourdier, L., Morvan, Y., Kotbagi, G., Kern, L., Romo, L., & Berthoz, S. (2018). Examination of emotion-induced changes in eating: A latent profile analysis of the Emotional Appetite Questionnaire. *Appetite*, *123*, 72–81. https://doi.org/10.1016/j.appet.2017.11.108

Braden, A., Musher-Eizenman, D., Watford, T., & Emley, E. (2018). Eating when depressed, anxious, bored, or happy: Are emotional eating types associated with unique psychological and physical health correlates? *Appetite*, *125*, 410–417. https://doi.org/10.1016/j.appet.2018.02.022

Bruzas, M. B., & Allison, K. C. (2019). A Review of the Relationship between Night Eating Syndrome and Body Mass Index. *Current Obesity Reports*, *8*(2), 145–155. https://doi.org/10.1007/s13679-019-00331-7

Calugi, S., Dalle Grave, R., & Marchesini, G. (2009). Night eating syndrome in class II–III obesity: metabolic and psychopathological features. International *Journal of Obesity*, *33*(8), 899–904. https://doi.org/10.1038/ijo.2009.105

Civil Arslan, F., Tiryaki, A., Sağlam Aykut, D., Özkorumak, E., Çalişkan İlter, Z., & Günaydin, D. (2015). The Prevalence of Night Eating Syndrome among Outpatient Overweight or Obese Individuals with Serious Mental Illness. *Türk Psikiyatri Dergisi*. *26*(4), 242–248.

Demirel, B., Yavuz, K., Karadere, M., Safak, Y., & Turkcapar, M. (2014). The Emotional Appetite Questionnaire (EMAQ)'s Reliability and Validity and Relationship with Body Mass Index and Emotional Schemas. *Journal of Cognitive-Behavioral Psychotherapy and Research*, *3*(3), 171. https://doi.org/10.5455/JCBPR.44046

Eray, A., Ateş, E., & Set, T. (2019). Investigation of Night Eating Syndrome Frequency in Adults in a Family Health Center. *Turkish Journal of Family Medicine and Primary Care*, *13*(3), 300–304. https://doi.org/10.21763/tjfmpc.610577

Erkaya, Z. B., Oğuzöncül, A. F., & Kurt, O. (2020). Bir Sağlık Hizmetleri Meslek Yüksekokulundaki Öğrencilerde Duygusal İştah ile Obezite Arasındaki İlişkinin Değerlendirilmesi. *BAUN Sağ Bil Derg*, *9*(1), 37–44.

Escandón-Nagel, N., Peró, M., Grau, A., Soriano, J., & Feixas, G. (2018). Emotional eating and cognitive conflicts as predictors of binge eating disorder in patients with obesity. *International Journal of Clinical and Health Psychology*, *18*(1), 52–59. https://doi.org/10.1016/j.ijchp.2017.09.003

Farhangi, M. A. (2019). Night Eating Syndrome and Its Relationship with Emotional Eating, Sleep Quality and Nutritional Status Among Adolescents' Boys. *Community Mental Health Journal*, *55*(8), 1411–1418. https://doi.org/10.1007/s10597-019-00395-8

Garaulet, M., Canteras, M., Morales, E., López-Guimera, G., Sánchez-Carracedo, D., & Corbalán-Tutau, M. D. (2012). Validation of a questionnaire on emotional eating for use in cases of obesity: the Emotional Eater Questionnaire (EEQ). *Nutricion Hospitalaria*, *27*(2), 645–651. https://doi.org/10.1590/S0212161120120002000 43

Gunduz, N., Akhalil, M., Sevgi, E. N., Üniversitesi, D., Fakültesi, S. B., Ve, B., & Bölümü, D. (2020). Hedonik Açlık. *Izmir Democracy University Health Sciences Journal 3*(1), 80–96.

He, J., Huang, F., Yan, J., Wu, W., Cai, Z., & Fan, X. (2018). Prevalence, demographic correlates, and association with psychological distress of night eating syndrome among Chinese college students. *Psychology, Health & Medicine*, *23*(5), 578–584. https://doi.org/10.1080/13548506.2017.1400669

Ibrahim, M., Thearle, M. S., Krakoff, J., & Gluck, M. E. (2016). Perceived stress and anhedonia predict short-and long-term weight change, respectively, in healthy adults. *Eating Behaviors*, *21*, 214–219. https://doi.org/10.1016/j.eatbeh.2016.03.009

Konttinen, H., Männistö, S., Sarlio-Lähteenkorva, S., Silventoinen, K., & Haukkala, A. (2010). Emotional eating, depressive symptoms and self-reported food consumption. A population-based

study. *Appetite*, *54*(3), 473–479. https://doi.org/10.1016/j.appet.2010.01.014

Köse, S., & Şanlıer, N. (2015). Hedonic Hunger and Obesity: Review. *Turkiye Klinikleri Journal of Endocrinology*, *10*(1), 16–23. https://doi.org/10.5336/endocrin.2014-41443

Lutter, M., & Nestler, E. J. (2009). Homeostatic and Hedonic Signals Interact in the Regulation of Food Intake. *The Journal of Nutrition*, *139*(3), 629–632. https://doi.org/10.3945/jn.108.097618

Meule, A., Allison, K. C., & Platte, P. (2014). Emotional Eating Moderates the Relationship of Night Eating with Binge Eating and Body Mass. *European Eating Disorders Review*, *22*(2), 147–151. https://doi.org/10.1002/erv.2272

Nasirzadeh, Y., Kantarovich, K., Wnuk, S., Okrainec, A., Cassin, S. E., Hawa, R., & Sockalingam, S. (2018). Binge Eating, Loss of Control over Eating, Emotional Eating, and Night Eating After Bariatric Surgery: Results from the Toronto Bari-PSYCH Cohort Study. *Obesity Surgery*, *28*(7), 2032–2039. https://doi.org/10.1007/s11695-018-3137-8

Nolan, L. J., & Geliebter, A. (2012). Night eating is associated with emotional and external eating in college students. *Eating Behaviors*, *13*(3), 202–206. https://doi.org/10.1016/j.eatbeh.2012.02.002

Rasouli, A., Moludi, J., Foroumandi, E., Shahsavari, S., & Ebrahimi, B. (2019). Emotional eating in relation to anthropometric indices and dietary energy intake based on gender. *Mediterranean Journal of Nutrition and Metabolism*, *12*(2), 131–139. https://doi.org/10.3233/MNM-180247

Riccobono, G., Iannitelli, A., Pompili, A., Iorio, C., Stratta, P., Rossi, R., Bersani, G., & Pacitti, F. (2020). Night Eating Syndrome, circadian rhythms and seasonality: a study in a population of Italian university students. *Rivista Di Psichiatria*, *55*(1), 47–52. https://doi.org/10.1708/3301.32719

Saleh-Ghadimi, S., Dehghan, P., Abbasalizad Farhangi, M., Asghari-Jafarabadi, M., & Jafari-Vayghan, H. (2019). Could emotional eating act as a mediator between sleep quality and food intake in female students? *BioPsychoSocial Medicine*, *13*(1), 15. https://doi.org/10.1186/s13030-019-0154-3

Sevincer, G. M., Ince, E., Taymur, I., & Konuk, N. (2016). Night Eating Syndrome Frequency in University Students: Association with Impulsivity, Depression, and Anxiety. Klinik Psikofarmakoloji *Bülteni-Bulletin of Clinical Psychopharmacology*, *26*(3), 238–247. https://doi.org/10.5455/bcp.20160322093750

WHO. (2000). Obesity: preventing and managing the global epidemic. Report of a WHO consultation. World Health Organization Technical Report Series, 894, i–xii, 1–253.

Yu, Y., Vasselli, J. R., Zhang, Y., Mechanick, J. I., Korner, J., & Peterli, R. (2015). Metabolic vs. hedonic obesity: a conceptual distinction and its clinical implications. *Obesity Reviews*, *16*(3), 234–247. https://doi.org/10.1111/obr.12246

ORİJİNAL MAKALE / ORIGINAL ARTICLE

Balıkesir Sağlık Bilimleri Dergisi / BAUN Sağ Bil Derg
Balıkesir Health Sciences Journal / BAUN Health Sci J
ISSN: 2146-9601- e ISSN: 2147-2238
Doi: https://doi.org/10.53424/balikesirsbd.1335795

The Effects of Prenatal Depression Levels on Prenatal Attachment: The Moderating Role of Adverse Childhood Experiences

Cansu AKDAG TOPAL [1], Merve MERT KARADAŞ [2], Irem KARAKURT [3], Handan BOZTEPE [3]

[1] Başkent University, Faculty of Health Sciences, Nursing Department
[2] Hacettepe University, Faculty of Nursing, Obstetric and Gynecology Department
[3] Atilim University, Faculty of Health Sciences, Nursing Department

Geliş Tarihi / Received: *01.08.2023,* ***Kabul Tarihi / Accepted:*** *09.02.2024*

ABSTRACT

Objective: This study was conducted to determine the effects of childhood traumas (ACE) and prenatal depression (BECK) on prenatal attachment. **Materials and Methods:** The study population consisted of 277 women in Ankara, Turkey, who were pregnant from 05/01/2022 to 09/01/2022. The pregnant women in the sample were administered the prenatal attachment scale, prenatal depression scale, and childhood trauma scale. The data were analyzed using descriptive statistics and quantile regression analysis. **Results:** The women's childhood trauma experiences mean score was 2.25±1.47 (min-max: 0.00-6.00), prenatal attachment mean score was 42.50±9.82 (min-max: 21.00-67.00), and depression mean score was 7.44±8.45 (min-max: 0.00-37.00). In terms of tau values, the R^2 values for the 1st, 2nd, and 3rd quantile values were found to be 0.014, 0.016, and 0.007, respectively. According to these results, while the BECK variable was statistically significant for tau=0.25, the ACE variable was not. In the model, the BECK and ACE variables are statistically significant for tau=0.50 but not for tau=0.75. **Conclusion:** Our study has demonstrated that prenatal attachment levels can be negatively impacted by childhood traumas and prenatal depression. By taking necessary precautions and implementing programs, it is possible to impact prenatal attachment positively.

Keywords: Depression, Attachment, Adverse Childhood Experience, Pregnancy, Nursing.

Doğum Öncesi Depresyon Düzeylerinin Doğum Öncesi Bağlanmaya Etkisi: Olumsuz Çocukluk Çağı Deneyimlerinin Düzenleyici Rolü

ÖZ

Amaç: Bu çalışma, çocukluk çağı travmalarının ve prenatal depresyonun, prenatal bağlanma üzerindeki etkilerini belirlemek amacıyla yapılmıştır **Gereç ve Yöntem:** Araştırmanın örneklemini Ankara'da 05/01/2022- 09/01/2022 tarihleri arasında gebe olan 277 kadın oluşturmuştur. Gebelere prenatal bağlanma ölçeği, prenatal depresyon ölçeği ve çocukluk çağı travma ölçeği uygulandı. Veriler, tanımlayıcı istatistikler ve kantil regresyon analizi kullanılarak analiz edildi. **Bulgular:** Kadınların çocukluk çağı travma puan ortalamaları 2.25±1.47 (min-maks: 0.00-6.00), prenatal bağlanma puan ortalamaları 42.50±9.82 (min-maks: 21.00-67.00), depresyon puan ortalamaları 7.44±8.45 (min-maks: 0.00-37.00) olarak bulundu. Tau değerleri açısından 1., 2. ve 3. kantil değerleri için R^2 değerleri sırasıyla 0.014, 0.016 ve 0.007 olarak bulunmuştur. Bu sonuçlara göre tau=0.25 için BECK değişkeni istatistiksel olarak anlamlı bulunurken, ACE değişkeni anlamlı çıkmamıştır. Modelde BECK ve ACE değişkenleri tau=0.50 için istatistiksel olarak anlamlı iken tau=0.75 için anlamlı değildir. **Sonuç:** Bu çalışma prenatal bağlanma düzeylerinin çocukluk çağı travmaları ve prenatal depresyondan olumsuz etkilenebileceğini göstermiştir.

Anahtar Kelimeler: Depresyon, Bağlanma, Olumsuz Çocukluk Çağı Deneyimi, Gebelik, Hemşirelik.

Sorumlu Yazar / Corresponding Author: Cansu AKDAG TOPAL, Başkent University, Faculty of Health Sciences, Nursing Department, Ankara, Türkiye
E-mail: cansua05@gmail.com

Bu makaleye atıf yapmak için / Cite this article: Akdag Topal, C., Mert Karadaş, M., Karakurt, I., & Boztepe, H. (2024). The effects of prenatal depression levels on prenatal attachment: the moderating role of adverse childhood experiences *BAUN Health Sci J, 13*(2), 268-275. https://doi.org/10.53424/balikesirsbd.1335795

INTRODUCTION

Due to biological, psychological, and social changes, pregnancy is regarded as a time of vulnerability. While the mother's identity grows throughout pregnancy, there are also noticeable physical changes in the mother's appearance (Camacho et al., 2010). Many expectant women feel conflicted about being pregnant. Women may also feel anxious about their pregnancies, deliveries, and postpartum periods. Pregnancy can be seen from a psychosocial standpoint as a highly emotional condition that can be a significant stressor (Bjelica et al., 2018).

Both a woman's current experiences and her past experiences might have an impact on her pregnancy. The onset and severity of depression symptoms in the perinatal period are particularly influenced by childhood trauma events, which may return during pregnancy (Oosterman et al., 2019; Stigger et al., 2020). The Diagnostic and Statistical Manual of Mental Disorders (DSM-V) defines childhood trauma as exposure to sexual violence, actual or threatened death, or severe damage (American Psychiatric Association, 2013). Being directly exposed to trauma, witnessing trauma, or knowing about the trauma that occurred to a close friend or relative are all included in this (De Bellis & Zisk, 2014). Recent research suggests that stressful childhood experiences can lead to major mental illnesses such as postpartum depression (Barnett et al., 2019; Mal-Sarkar et al., 2021; Okafor et al., 2021). Prenatal maternal depression endangers the health of both moms and newborns. Prenatal depression affects roughly 22% of women, according to studies (Avalos et al., 2016; Fields et al., 2022; Mukherjee et al., 2016) , and it has been found to be a risk factor for postnatal depression(Verreault et al., 2014). Prenatal depression is linked to spontaneous abortions, premature births, maternal substance abuse, low APGAR ratings at birth, and poor mother-infant interactions. Furthermore, children of women suffering from prenatal depression are at risk of developing mental illnesses such as depression (Nowak et al., 2022). As a result, it is critical to comprehend childhood traumas that may result in prenatal depression in the mother.

Maternal childhood trauma may also have a negative impact on mother-infant attachment during pregnancy (Caglayan et al., 2022), and prenatal depression may be an important aspect influencing prenatal attachment (Berthelot et al., 2020; Rollè et al., 2020). Prenatal attachment is characterized as the mother's interest in and attachment behaviours toward her unborn baby and the establishment and acceptance of a loving relationship with the infant (Kara & Nazik, 2021; Salehi & Kohan, 2017). As mother-infant attachment begins during pregnancy and affects postnatal attachment (Caglayan et al., 2022), prenatal attachment is vital in accepting the role of parenthood (Tani et al., 2018).

The experience of becoming a parent and accepting the role of motherhood can be influenced by the mother's past life experiences. In this context, there are studies stating that childhood traumas may be a reason for increasing the development of weak prenatal attachment (Berthelot et al., 2020; Caglayan et al., 2022; Christie et al., 2017). Research indicates that prenatal depression is a significant factor in reduced prenatal attachment, and that mothers with psychiatric disorders often experience decreased attachment during both the prenatal and postnatal periods (Berthelot et al., 2020; Hicks et al., 2018; Özcan et al., 2018). Inadequate prenatal care for both the mother and her baby is connected with low and weak prenatal attachment (Maddahi et al., 2016).

Despite existing literature on the impact of childhood traumas on pregnancy(Mal-Sarkar et al., 2021; Millar et al., 2021; Moog et al., 2016; Nowak et al., 2022; Olsen, 2018; Reuveni et al., 2021), there is a gap in understanding regarding the potential effects of childhood traumas on prenatal attachment and prenatal depression (Berthelot et al., 2020; Caglayan et al., 2022; Nowak et al., 2022). The identification of factors that may affect maternal and infant health is critical for providing adequate care to pregnant women and mitigating potential risks. Accordingly, the current investigation aimed to explore the potential impact of childhood traumas on prenatal depression and prenatal attachment.

Research uqestions;

This study' research questions are following;

- Do prenatal depression levels of pregnant women affect prenatal attachment levels of them?
- Do adverse childhood experiences levels of pregnant women affect prenatal attachment levels of them?

MATERIALS AND METHODS

Settings and participants

The research was conducted on pregnant women in Ankara, Turkey, between May 1, 2022, and September 1, 2022. G*Power 3.1.9.2 (Franz Faul, Universitat Kiel, Germany) was used to determine the sample size of women. It was planned to include 257 women in the study sample with 2 independent predictor variables, with an effect level of medium (0.05), a power level of 90%, and a significance level of 0.05. A total of 305 women were evaluated in terms of eligibility for the study, and 28 women were not included in the study sample because they did not meet the research criteria. The research was completed with 277 women. According to the power analysis at the end of the research, this research was completed at a 92% power level. It is worth noting that a sample size of over 100 is generally considered appropriate for applying a quantile regression (Lê Cook & Manning, 2013). The final sample size for this study was 277, which was deemed sufficient to conduct both multilinear regression and quantile regression. The individuals attending the obstetrics and gynecology outpatient clinic at the hospital were informed about the study. Face-to-face

interviews were conducted to administer questionnaires to those who met the inclusion criteria. Pregnant women who can speak, understand, and write Turkish and have a pregnancy of 20 weeks or more were included in the study. The primary hypothesis posited that pregnant women exposed to childhood traumas would exhibit a decline in prenatal attachment and an increase in prenatal depression levels. In this study, the dependent variable was prenatal attachment score of women and the independent variables were adverse childhood experiences and depression scores of women.

Data collection tools

The data collected by prenatal attachment scale, prenatal depression scale, and childhood trauma scale.

The Prenatal Attachment Inventory

The Prenatal Attachment Inventory was developed to examine pregnant women's prenatal attachment levels. Muller developed the Prenatal Attachment Inventory in 1993. The scale was created to describe pregnant women's thoughts, feelings, and events and measure their attachment levels to the fetus during the prenatal period. The scale has 21 items in total with a 4-point Likert structure. Each item on the scale is worth between 1 and 4 points, and the total scale score is derived by assigning 1 point to the "Never" response, 2 points to the "Sometimes" response, 3 points to the "Often" response, and 4 points to the "Always" response. The scale yields a minimum score of 21 and a maximum score of 84. The higher the pregnant woman's total score on the scale, the stronger her level of attachment. Yilmaz and Beji (2013) performed the scale's Turkish validity and reliability, reporting an internal consistency coefficient of 0.84. This study's Cronbach alpha value was found to be 0.87.

Adverse Childhood Experiences Scale

In order to evaluate any negative experiences during childhood, the Childhood Adverse Experiences Scale Turkish Form (ACE-TR) was used. This survey was developed by Kaiser Permanente- Department of Preventive Medicine in 1997 and asks about emotional, physical, and sexual violence, as well as neglect and divorce, that occurred during the first 18 years of a person's life (Felitti et al., 1998). The scale, which consists of 10 items, is a self-report scale that allows for a yes-no binary response. Gündüz et al. (2018) conducted the Turkish validity and reliability study. Cronbach's alpha was calculated to be 0.742. There is no cutoff point on the scale. The childhood negative experience score is considered high as the scale score increases. This study's Cronbach alpha value was found to be 0.70.

Beck Depression Scale

The level of depression in women was evaluated using the Beck Depression Scale. This assessment tool was created by Beck et al. in 1961 to determine the behavioral indications of depression in both adolescents and adults (Beck, 1961). In 1978, the scale for measuring a patient's status was modified. The severity duplications were eliminated, and patients were required to mark their condition for the previous week, including the present day. In terms of violence, the levels are categorized as follows: minimal (0-9), mild (10-16), moderate (17-29), and severe (30-63) (Hisli, 1989).

Data collection

The researchers gathered the data in person from the Ankara Training and Research Hospital located in Ankara, Turkey. The participants were informed about the study and received an informed consent form before replying to survey. We collected data from expectant mothers in their second and third trimesters by conducting a survey that lasted approximately 15 minutes. The information was then transferred into SPSS 26.0, where it was evaluated and analyzed. This study's Cronbach alpha value was found to be 0.88.

Statistical analysis

Normal distribution condition could not be met in the data and regression model, PAI variable was modeled using quantile regression analysis, which does not require a normality condition. The regression analysis results were performed with R software (R Core Team, 2023) and a quantreg package (Koenker, 2023).

Ethical considerations

Ethic committee approval was obtained from the University Human Research Ethics Committee (Reference Number: E-59394181-604.01.02-33841, Date: 26.04.2022). The authors granted permission for the use of the scales. Prior to filling out the data collection forms, pregnant women were informed about the study and that their participation was completely voluntary. No personal or institutional information was requested as part of the study.

RESULTS

The prenatal attachment inventory scores used in the study were found to be unsuitable for normal distribution due to the Shapiro-Wilk test ($W=0.985$, $p=0.009<0.05$). Additionally, the residuals in the linear regression model estimated by prenatal attachment inventory were not normally distributed ($W=0.986$, $p=0.009<0.014$).

Table 1 presents the socio-demographic characteristics of women. The mean age of the women was 26.97±5.12, and the mean age of their partners was 30.81±5.19. The pre-pregnancy weight of the women was determined as 61.04±9.62. 42.4% of the mothers were graduated from primary school and 40.1% were graduated from high school, 29.6% of the partners were graduated from primary school and 43.3% were graduated from high school. 98.6% of mothers live in the city center and 74.4% do not work. 68.2% of mothers have income equal to or higher than their expenses. Only 17% of mothers smoke during pregnancy. The pregnancies of 70.8% of the mothers were planned. 12.2% of the mothers experienced complications in their previous pregnancies, and 22.0% of the mothers experienced complications in postpartum period in their previous pregnancies.

Table 1: Sociodemographic characteristics of women.

Characteristic	n	%
Age (M±SD)	26.97±5.12 (min-max: 17.0-42.0)	
Partner Age (M±SD)	30.81±5.19 (min-max:20.0-46.0)	
Prenatal weight of women (M±SD)	61.04±9.62 (min-max: 40.0-97.0)	
Newborn weight (g) (M±SD)	3274.21±357.49 (min-max:2270.0-4200.0)	
Education		
Primary education	117	42.2
High school	111	40.1
Graduate/postgraduate	49	17.7
Living area		
City center	273	98.6
Country	4	1.4
Working status		
Yes	71	25.6
No	206	74.4
Partner Education		
Primary education	82	29.6
High school	120	43.3
Graduate/postgraduate	75	27.1
Perceived Economic Situation		
Income less than expense	88	31.8
Income equal/more than expense	189	68.2
Smoking		
Yes	47	17.0
No	213	76.8
Quit	17	6.2
Planned pregnancy		
Yes	197	71.1
No	80	28.9
Birth*		
Vaginal	140	61.0
Cesarean section	90	39.0
Previous birth complications*		
Yes	28	27.1
No	202	72.9
Previous postpartum complications*		
No	216	93.9
Yes	14	6.1

* There is no data on primiparous pregnant women.

Table 2. Score distrubitiun of scales.

Scales	Interquartile Range	Mean	Sd.
ACE	2.00	2.25	1.47
PAI	11.00	42.50	9.82
BECK	11.50	7.44	8.45

ACE: Childhood Adverse Experiences Scale, PAI: The Prenatal Attachment Inventory, BECK: Beck Depression Scale

Table 2 shows the total mean scores of the scales in the study. The women's childhood trauma mean score was 2.25±1.47 (min-max: 0.00-6.00), prenatal attachment mean score was 42.50±9.82 (min-max: 21.00-67.00), and depression mean score was 7.44±8.45 (min-max: 0.00-37.00).

Table 3 presents the results of the quantile regression model created for three different tau values. In terms of tau values, the R2 values for the 1st, 2nd, and 3rd quantile values were found to be 0.014, 0.016 and 0.007, respectively. According to these results, while the BECK variable was statistically significant for tau=0.25, the ACE variable was not. In the model, the BECK and ACE variables are statistically significant for tau=0.50 but not for tau=0.75

Table 3. Factors influensing PAI using quantile regression analysis.

Tau	Coefficient	Beta	SH(Beta)	t	p	R^2
Scales	**Min**	**Max**	**X**	**Sd.**	**<0.001**	
	BECK	-0.205	0.073	-2.809	**0.005**	0.014
	ACE	-0.241	0.500	-0.481	0.631	
Tau=0.50	Constant	47.895	2.501	19.147	**<0.001**	
	BECK	-0.211	0.097	-2.174	**0.031**	0.016
	ACE	-0.737	0.368	-2.002	**0.046**	
Tau=0.75	Constant	52.435	3.918	13.384	**<0.001**	
	BECK	-0.043	0.144	-0.301	0.763	0.007
	ACE	-0.739	0.664	-1.113	0.267	

R^2: Koenker-Machado, PAI: The Prenatal Attachment Inventory, ACE: Childhood Adverse Experiences Scale, BECK: Beck Depression Scale

DISCUSSION

This study was conducted to determine the effects of childhood traumas and prenatal depression on prenatal attachment. The study's central hypothesis was that prenatal attachment levels would decrease in pregnant women exposed to childhood traumas and prenatal depression. Based on the quantile regression analysis conducted in the study, it is evident that the ACE and BECK variables hold significant statistical value. Therefore, it can be concluded that the hypothesis has been accepted. There is a variance in the conclusions drawn from the literature regarding this matter (Çağlayan et al., 2023; Brown et al.,2021; Hinesley et al., 2020; Sancho- Rossignol et al., 2018; Zhang et al., 2021; Berthelot et al., 2019).

The attachment between a mother and her baby begins during the prenatal period, intensifies with the movements of the developing fetus, and reaches its zenith at the time of birth. This bond is commonly known as prenatal attachment (Coşkuner Potur et al., 2020). Prenatal attachment is directly related to parental behaviors both during pregnancy and the postpartum period. It is believed that forming a strong bond with the fetus is crucial in helping the mother prepare for motherhood, fostering a sense of affection and care towards the infant, and positively impacting the baby's growth and development. (Ozcan et al., 2019). There are several factors that can influence prenatal attachment (Cheraghi et al., 2022; Schaal et al., 2023), such as childhood trauma and prenatal depression (Berthelot et al., 2019; Brown et al., 2021; Çağlayan et al., 2023; Hinesley et al., 2020; Sancho-Rossignol et al., 2018; Zhang et al., 2021).

Experiences like abuse, neglect, and family dysfunction (such as divorce) that occur before age 18 are known as childhood traumas. These traumas can lead to both physical and mental health issues later in life. (Osofsky et al., 2021). Research has been conducted on the impact of childhood traumas on pregnancy and postpartum periods. However, there is a lack of studies exploring the effects of childhood traumas on prenatal attachment (Sancho-Rossignol et al., 2018; Osofsky et al., 2021). Like our study, in a study conducted by Sancho-Rossignol et al. (2018), the connection between pregnant women's exposure to domestic violence during childhood and their prenatal attachment was investigated. According to the research, pregnant women who were exposed to domestic violence during their childhood have lower levels of prenatal attachment (Sancho- Rossignol et al., 2018). Another cross-sectional study similar to our study was conducted by Çağlayan et al. (2023) to explore the impact of childhood traumas on prenatal attachment. Their findings showed that all types of childhood trauma were linked to lower prenatal attachment scores (Çağlayan et al., 2023). In contrast to our study, some previous research revealed that childhood traumas did not directly impact prenatal attachment (Hinesley, 2020; Berthelot, 2019). The discrepancy between our study and the literature may stem from the concept of "psychological resilience." Resilience may be higher in populations with different demographics, such as those with higher levels of education. Individuals with better psychological resilience may therefore be less prone to exhibit psychological symptoms, even if they have experienced childhood trauma (Berthelot, 2019). However, more research is needed in this area due to the limited number of existing studies.

Prenatal depression is a significant factor affecting attachment during pregnancy (Berthelot et al., 2020). Several studies have explored the impact of prenatal depression on prenatal attachment and found that pregnant women with depressive symptoms tend to have lower levels of prenatal attachment, which is consistent with the results of our own study (Goecke et al., 2012; Arguz Cildir, 2020; Medina et al., 2022). A systematic review of 41 studies that support our study found a negative correlation between prenatal attachment and prenatal depression (Rollè et al., 2020). It can pose difficulties for mothers-to-be to adapt to their new responsibilities, ultimately leading to reduced prenatal attachment. Furthermore, another systematic review, including 35 studies, found that detecting and treating depressive symptoms in the prenatal period is an important point in achieving prenatal attachment (Lefkovics et al., 2014). In addition, Lieto et al. (2017) assessed the prenatal attachment status of 156 pregnant women and discovered a significant link between prenatal depression and reduced prenatal attachment (Lieto et al. 2017). Similar to the literature, our current study

revealed a negative effect of prenatal depression on prenatal attachment. It is essential to develop programs that prevent and reduce prenatal depression during the antenatal period to ensure

Limitations and strengths

The study included pregnant women who had reached the 20th week of their pregnancy and had applied to the Antenatal Polyclinic at Ankara Training and Research Hospital. As a result, the findings of our study cannot be generalized. The PAI, ACE, and BECK scales were used to collect self-reported data for the study. For future research, it is suggested that a "longitudinal study model" be utilized. In addition, future studies should consider factors that may affect prenatal attachment, such as age, gestational week, resilience, and coping behaviors. Our study found that the average ACE scale was 2.25 (min 0.00; max 6.00) To better evaluate our findings, it may be useful to expand the range of the ACE score. Despite these limitations, our study is important as it investigates how childhood traumas and prenatal depression impact prenatal attachment.

CONCLUSION

Overall, our study has demonstrated that prenatal attachment levels can be negatively impacted by childhood traumas and prenatal depression. It is important to identify pregnant women who have experienced childhood trauma and prenatal depression during the prenatal period. By taking necessary precautions and implementing programs, it is possible to positively impact prenatal attachment. Healthy prenatal attachment can lead to several benefits, such as aiding pregnant women in adapting to motherhood, preventing complications, maintaining mother-infant attachment after birth, and promoting the baby's development.

Acknowledgement

The authors would like to extend their sincere thanks to anyone who contributed to this study.

Conflict of Interest

The authors declare no potential conflicts of interest with respect to the research, authorship and/or publication of this article.

Author Contributions

Plan, design: CAT; MMK; HB; İK; **Material, methods and data collection:** CAT; İK; **Data analysis and comments:** CAT; MMK; HB; **Writing and corrections:**.CAT; MMK; HB; İK.

Funding

None

Ethical considerations

Ethic committee approval was obtained from the University Human Research Ethics Committee (Reference Number: E-59394181-604.01.02-33841, Date: 26.04.2022). The authors granted permission for the use of the scales. Prior to filling out the data collection forms, pregnant women were informed about the study and that their participation was completely voluntary. No personal or institutional information was requested as part of the study.

REFERENCES

American Psychiatric Association. (2013). *Diagnostic and Statistical Manual of Mental Disorders* (Fifth edit). American Psychiatric Publishing.

Arguz Cildir, D., Ozbek, A., Topuzoglu, A., Orcin, E., & Janbakhishov, C. E. (2020). Association of prenatal attachment and early childhood emotional, behavioral, and developmental characteristics: A longitudinal study. *Infant Mental Health Journal*, *41*(4), 517-529. https://doi.org/10.1007/s00737-013-0357-8

Avalos, L. A., Raine-Bennett, T., Chen, H., Adams, A. S., & Flanagan, T. (2016). Improved perinatal depression screening, treatment, and outcomes with a universal obstetric program. *Obstetrics and Gynecology*, *127*(5), 917. https://doi.org/10.1097/AOG.0000000000001403

Barnett, W., Pellowski, J., Kuo, C., Koen, N., Donald, K. A., Zar, H. J., & Stein, D. J. (2019). Food-insecure pregnant women in South Africa: a cross-sectional exploration of maternal depression as a mediator of violence and trauma risk factors. *BMJ Open*, *9*(3), e018277. https://doi.org/10.1136/bmjopen-2017-018277

Berthelot, N., Lemieux, R., Garon-Bissonnette, J., & Muzik, M. (2020). Prenatal attachment, parental confidence, and mental health in expecting parents: the role of childhood trauma. *Journal of Midwifery & Women's Health*, *65*(1), 85–95. https://doi.org/10.1111/jmwh.13034

Bjelica, A., Cetkovic, N., Trninic-Pjevic, A., & Mladenovic-Segedi, L. (2018). The phenomenon of pregnancy—A psychological view. *Ginekologia Polska*, *89*(2), 102–106. https://doi.org/10.5603/GP.a2018.0017

Brown, R. H., Eisner, M., Walker, S., Tomlinson, M., Fearon, P., Dunne, M. P., ... & Murray, A. L. (2021). The impact of maternal adverse childhood experiences and prenatal depressive symptoms on foetal attachment: Preliminary evidence from expectant mothers across eight middle-income countries. *Journal of Affective Disorders*, 295, 612-619. https://doi.org/10.1016/j.jad.2021.08.066

Caglayan, I. S. C., Cicek, A. U., Yilmaz, Y., & Sahin, A. E. (2022). The Role of Childhood Trauma on Prenatal Attachment: A Cross-Sectional Study. *The Journal of Nervous and Mental Disease*, 10–1097. https://doi.org/10.1097/NMD.0000000000001610

Camacho, K. G., Vargens, O., Progianti, J. M., & Spindola, T. (2010). Living repercussions and transformations of a pregnancy: Pregnant's perspective. *Ciencia y Enfermería*, *16*, 115–125.

Chen, M., Wang, G., Sun, X., Meng, M., Jiang, Y., Sun, W., ... & Jiang, F. (2023). The effects of maternal prenatal depression on child mental health: The

moderating role of maternal childhood trauma. *Journal of Affective Disorders, 324*, 403-409. Living repercussions and transformations of a pregnancy: Pregnant's perspective. https://doi.org/10.1016/j.jad.2022.12.109

Cheraghi, P., & Jamshidimanesh, M. (2022). Relationship Between Maternal-Fetal Attachment With Anxiety and Demographic Factors in High-risk Pregnancy Primipara Women. *Iran Journal of Nursing, 34*(134), 46-59.

Christie, H., Talmon, A., Schäfer, S. K., De Haan, A., Vang, M. L., Haag, K., Gilbar, O., Alisic, E., & Brown, E. (2017). The transition to parenthood following a history of childhood maltreatment: a review of the literature on prospective and new parents' experiences. *European Journal of Psychotraumatology*, *8*(sup7), 1492834. https://doi.org/0.1080/20008198.2018.1492834

De Bellis, M. D., & Zisk, A. (2014). The biological effects of childhood trauma. *Child and Adolescent Psychiatric Clinics*, *23*(2), 185–222. https://doi.org/10.1016/j.chc.2014.01.002

Felitti, V. J., Anda, R. F., Nordenberg, D., Williamson, D. F., Spitz, A. M., Edwards, V., & Marks, J. S. (1998). Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults: The Adverse Childhood Experiences (ACE) Study. *American journal of preventive medicine*, *14*(4), 245-258. https://doi.org/10.1016/S0749-3797(98)00017-8

Fields, K., Shreffler, K. M., Ciciolla, L., Baraldi, A. N., & Anderson, M. (2022). Maternal childhood adversity and prenatal depression: the protective role of father support. *Archives of Women's Mental Health*, 1–9. https://doi.org/10.1007/s00737-022-01278-w

Goecke, T. W., Voigt, F., Faschingbauer, F., Spangler, G., Beckmann, M. W., & Beetz, A. (2012). The association of prenatal attachment and perinatal factors with pre-and postpartum depression in first-time mothers. *Archives of gynecology and obstetrics*, *286*, 309-316. https://doi.org/10.1007/s00404-012-2286-6

Grigoriadis, S., VonderPorten, E. H., Mamisashvili, L., Tomlinson, G., Dennis, C. L., Koren, G., ... & Ross, L. E. (2013). The impact of maternal depression during pregnancy on perinatal outcomes: a systematic review and meta-analysis. *The Journal of clinical psychiatry*, *74*(4), 8615. https://doi.org/10.4088/JCP.12r07968

Hicks, L. M., Dayton, C. J., Brown, S., Muzik, M., & Raveau, H. (2018). Mindfulness moderates depression and quality of prenatal attachment in expectant parents. *Mindfulness*, *9*(5), 1604–1614. https://doi.org/10.1007/s12671-018-0907-2

Hinesley, J., Amstadter, A., Sood, A., Perera, R. A., Ramus, R., & Kornstein, S. (2020). Adverse childhood experiences, maternal/fetal attachment, and maternal mental health. *Women's Health Reports*, *1*(1), 550-555. https://doi.org/10.1089/whr.2020.0085

Kara, P., & Nazik, E. (2021). Effects of anxiety and social support levels on the prenatal attachment of pregnant women with preeclampsia. *Cukurova Medical Journal*, *46*(3), 889–896. https://doi.org/10.17826/cumj.894664

Koenker, R. (2021). quantreg: Quantile Regression. R package version 5.95. URL https://cran.r-project.org/package=quantreg

Lê Cook, B., & Manning, W. G. (2013). Thinking beyond the mean: A practical guide for using quantile regression methods for health services research. *Shanghai Archives of Psychiatry*, *25*(1), 55–59. https://doi.org/10.3969/j.issn.1002-0829.2013.01.011

Lefkovics, E., Baji, I., & Rigó, J. (2014). Impact of maternal depression on pregnancies and on early attachment. *Infant mental health journal*, *35*(4), 354-365. https://doi.org/10.1002/imhj.21450

Maddahi, M. S., Dolatian, M., & Talebi, A. (2016). Correlation of maternal-fetal attachment and health practices during pregnancy with neonatal outcomes. *Electronic Physician*, *8*(7), 2639. https://doi.org/10.19082/2639

Mal-Sarkar, T., Keyes, K., Koen, N., Barnett, W., Myer, L., Rutherford, C., Zar, H. J., Stein, D. J., & Lund, C. (2021). The relationship between childhood trauma, socioeconomic status, and maternal depression among pregnant women in a south African birth cohort study. *SSM-Population Health*, *14*, 100770. https://doi.org/10.1016/j.ssmph.2021.100770

Mcfarland J, Salisbury A.L, Battle C.L, Hawes K., Halloran K., Lester B.M. (2011). Major depressive disorder during pregnancy and emotional attachment to the fetus. *Archives of Women's Mental Health*; 14: 425-434. https://doi.org/10.1007/s00737-011-0237-z

Medina, N. Y., Edwards, R. C., Zhang, Y., & Hans, S. L. (2022). A longitudinal investigation of young mothers' prenatal attachment, depressive symptoms, and early parenting behaviour. *Journal of Reproductive and Infant Psychology*, *40*(2), 196-211. https://doi.org/10.1080/02646838.2021.1886257

Millar, H. C., Lorber, S., Vandermorris, A., Thompson, G., Thompson, M., Allen, L., Aggarwal, A., & Spitzer, R. F. (2021). "No, you need to explain what you are doing": obstetric care experiences and preferences of adolescent mothers with a history of childhood trauma. *Journal of Pediatric and Adolescent Gynecology*, *34*(4), 538–545. https://doi.org/10.1016/j.jpag.2021.01.006

Moog, N. K., Buss, C., Entringer, S., Shahbaba, B., Gillen, D. L., Hobel, C. J., & Wadhwa, P. D. (2016). Maternal exposure to childhood trauma is associated during pregnancy with placental-fetal stress physiology. *Biological Psychiatry*, *79*(10), 831–839. https://doi.org/10.1016/j.biopsych.2015.08.032

Mukherjee, S., Trepka, M. J., Pierre-Victor, D., Bahelah, R., & Avent, T. (2016). Racial/ethnic disparities in antenatal depression in the United States: A systematic review. *Maternal and Child Health Journal*, *20*(9), 1780–1797. https://doi.org/10.1007/s10995-016-1989-x

Muller, M. E., & Mercer, R. T. (1993). Development of the prenatal attachment inventory. *Western Journal of Nursing Research*, *15*(2),

199-215. https://doi.org/10.1177/0193945993015002

Nieto, L., Lara, M. A., & Navarrete, L. (2017). Prenatal predictors of maternal attachment and their association with postpartum depressive symptoms in Mexican women at risk of depression. *Maternal and Child Health Journal, 21*, 1250-1259. https://doi.org/10.1007/s10995-016-2223-6

Nowak, A. L., Braungart-Rieker, J. M., & Kuo, P. X. (2022). Social support moderates the relation between childhood trauma and prenatal depressive symptoms in adolescent mothers. *Journal of Reproductive and Infant Psychology*, *40*(6), 644–658. https://doi.org/10.1080/02646838.2021.1938980

Okafor, C. N., Barnett, W., Zar, H. J., Nhapi, R., Koen, N., Shoptaw, S., & Stein, D. J. (2021). Associations of emotional, physical, or sexual intimate partner violence and depression symptoms among South African women in a prospective cohort study. *Journal of Interpersonal Violence*, *36*(9–10), NP5060–NP5083. https://doi.org/10.1177/0886260518796522

Olsen, J. M. (2018). Integrative review of pregnancy health risks and outcomes associated with adverse childhood experiences. *Journal of Obstetric, Gynecologic & Neonatal Nursing*, *47*(6), 783–794. https://doi.org/10.1016/j.jogn.2018.09.005

Oosterman, M., Schuengel, C., Forrer, M. L., & De Moor, M. H. M. (2019). The impact of childhood trauma and psychophysiological reactivity on at-risk women's adjustment to parenthood. *Development and Psychopathology*, *31*(1), 127–141. https://doi.org/10.1017/S0954579418001591

Osofsky, J. D., Osofsky, H. J., Frazer, A. L., Fields-Olivieri, M. A., Many, M., Selby, M., ... & Conrad, E. (2021). The importance of adverse childhood experiences during the perinatal period. *American Psychologist, 76*(2), 350. https://doi.org/10.1037/amp0000770

Ozcan, H., Ustundag, M. F., Yilmaz, M., Aydinoglu, U., Ersoy, A. O., & Eyi, E. G. Y. (2019). The Relationships between Prenatal Attachment, Basic Personality Traits, Styles of Coping with Stress, Depression, and Anxiety, and Marital Adjustment Among Women in the Third Trimester of Pregnancy. *The Eurasian journal of medicine, 51*(3), 232–236. https://doi.org/10.5152/eurasianjmed.2019.15302

Özcan, N. K., Boyacıoğlu, N. E., Dikeç, G., Dinç, H., Enginkaya, S., & Tomruk, N. (2018). Prenatal and postnatal attachment among Turkish mothers diagnosed with a mental health disorder. *Issues in Mental Health Nursing*, *39*(9), 795–801. https://doi.org/10.1080/01612840.2018.1455773

Potur, D., Doğan Merih, Y., & Demirci, N., (2020). Evaluation of Factors Affecting Prenatal Attachment In Primipara and Multipara Women. Journal of Academic Research in Nursing , vol.6, no.1, 132-140. https://doi.org/10.5222/jaren.2020.65265

R Core Team (2023). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL https://www.R-project.org/.

Racine, N., Zumwalt, K., McDonald, S., Tough, S., & Madigan, S. (2020). Perinatal depression: The role of maternal adverse childhood experiences and social support. *Journal of Affective Disorders, 263*, 576-581. https://doi.org/10.1016/j.jad.2019.11.030

Reuveni, I., Lauria, M., Monk, C., & Werner, E. (2021). The impact of childhood trauma on psychological interventions for depression during pregnancy and postpartum: a systematic review. *Archives of Women's Mental Health*, *24*(3), 367–380. https://doi.org/10.1007/s00737-020-01066-4

Rollè, L., Giordano, M., Santoniccolo, F., & Trombetta, T. (2020). Prenatal attachment and perinatal depression: a systematic review. *International Journal of Environmental Research and Public Health, 17*(8), 2644. https://doi.org/10.3390/ijerph17082644

Salehi, K., & Kohan, S. (2017). Maternal-fetal attachment: What we know and what we need to know. *International Journal of Pregnancy & Child Birth*, *2*(5), 38.

Sancho-Rossignol, A., Schilliger, Z., Cordero, M. I., Rusconi Serpa, S., Epiney, M., Hüppi, P., ... & Schechter, D. S. (2018). The association of maternal exposure to domestic violence during childhood with prenatal attachment, maternal-fetal heart rate, and infant behavioral regulation. *Frontiers in Psychiatry, 9*, 358. https://doi.org/10.3389/fpsyt.2018.00358

Schaal, N. K., Marca-Ghaemmaghami, P. L., Märthesheimer, S., Hepp, P., Preis, H., Mahaffey, B., ... & Castro, R. A. (2023). Associations of stress, anxiety, and partner satisfaction with maternal-fetal attachment in women pregnant during the COVID-19 pandemic: an online study. *BMC Pregnancy and Childbirth, 23*(1), 1-8. https://doi.org/10.1186/s12884-023-05804-1

Stigger, R. S., Martins, C. de S. R., de Matos, M. B., Trettim, J. P., da Cunha, G. K., Scholl, C. C., Ramos, M. P., dos Santos Motta, J. V., Ghisleni, G., & Pinheiro, R. T. (2020). Is Maternal Exposure to Childhood Trauma Associated With Maternal-Fetal Attachment? *Interpersona: An International Journal on Personal Relationships*, *14*(2), 200–210. https://doi.org/10.5964/ijpr.v14i2.3983

Tani, F., Castagna, V., & Ponti, L. (2018). Women who had positive relationships with their own mothers reported good attachments to their first child before and after birth. *Acta Paediatrica*, *107*(4), 633–637. https://doi.org/10.1111/apa.14162

Verreault, N., Da Costa, D., Marchand, A., Ireland, K., Dritsa, M., & Khalifé, S. (2014). Rates and risk factors associated with depressive symptoms during pregnancy and with postpartum onset. *Journal of Psychosomatic Obstetrics & Gynecology*, *35*(3), 84–91. https://doi.org/10.3109/0167482X.2014.947953

Zhang, L., Wang, L., Cui, S., Yuan, Q., Huang, C., & Zhou, X. (2021). Prenatal depression in women in the third trimester: Prevalence, predictive factors, and relationship with maternal-fetal attachment. *Frontiers in Public Health, 8*, 602005. https://doi.org/10.3389/fpubh.2020.602005

ORİJİNAL MAKALE / ORIGINAL ARTICLE
Balıkesir Sağlık Bilimleri Dergisi / BAUN Sağ Bil Derg
Balıkesir Health Sciences Journal / BAUN Health Sci J
ISSN: 2146-9601- e ISSN: 2147-2238
Doi: https://doi.org/10.53424/balikesirsbd.1251718

Relationship between Breast Cancer Fear and Prevention Behaviors of Female Healthcare Professionals

Sevval BOSTANCI[1,2], Ayse AKALIN[3]

[1] Düzce Ataturk State Hospital
[2] Düzce University, Graduate Education Institute
[3] Düzce University, Faculty of Health Sciences, Department of Nursing

Geliş Tarihi / Received: *15.02.2023,* ***Kabul Tarihi / Accepted:*** *19.02.2024*

ABSTRACT

Objective: The objective of this study was to investigate the relationship between breast cancer fear and breast cancer prevention behaviors of female healthcare professionals (HCPs). **Materials and Methods:** This descriptive correlational study involved a convenience sample of 338 nurses, midwives and physicians working at a state hospital in Turkey. Data were collected using Questionnaire Form, Breast Cancer Fear Scale (BCFS), and Scale of Factors Affecting Women's Breast Cancer Prevention Behaviors (ASSISTS). **Results:** The mean scores on BCFS and ASSISTS were 26.71±7.65 and 123.36±15.49 respectively, indicating breast cancer fear were high and breast cancer prevention behaviors were moderately. The higher breast cancer prevention behavior scores among the HCPs who were working longer years, working longer years in night shift, those having breast problems, and undergone breast biopsy, those performing breast self-examination, undergone clinical breast examination and mammography ($p < 0.05$). There was no significant association between breast cancer fear and breast cancer prevention behaviors ($p > 0.05$). **Conclusion:** Professional education and training in breast cancer prevention behaviors and addressing fear on breast cancer are likely to result in reduced barriers to develop prevention behaviors.

Keywords: Breast Cancer, Prevention Behaviors, Fear, Healthcare Professional.

Kadın Sağlık Profesyonellerinin Meme Kanseri Korkusu ile Önleme Davranışları Arasındaki İlişki

ÖZ

Amaç: Bu çalışmanın amacı, kadın sağlık profesyonellerinin meme kanseri korkusu ile meme kanseri önleme davranışları arasındaki ilişkiyi incelemektir. **Gereç ve Yöntem:** Bu tanımlayıcı ve ilişki arayıcı çalışma, Türkiye'de bir devlet hastanesinde çalışan 338 hemşire, ebe ve hekimin uygun örneklemini içermektedir. Veriler Anket formu, Meme Kanseri Korku Ölçeği (MKKÖ) ve Kadınların Meme Kanserinden Korunma Davranışlarını Etkileyen Faktörler Ölçeği (MEKÖD) kullanılarak toplanmıştır. **Bulgular:** MKKÖ ve MEKÖD puan ortalamaları sırasıyla 26.71±7.65 ve 123.36±15.49 olup meme kanseri korkusunun yüksek ve meme kanserini önleme davranışlarının orta düzeyde olduğunu göstermektedir. Daha uzun yıl çalışan, daha uzun yıl gece vardiyasında çalışan, meme sorunu olan, meme biyopsisi yaptıran, kendi kendine meme muayenesi yapan, klinik meme muayenesi yaptıran ve mamografi çektiren kadın sağlık profesyonellerinin meme kanserini önleme davranış puanları daha yüksektir ($p < 0.05$). Meme kanseri korkusu ile meme kanserini önleme davranışları arasında anlamlı bir ilişki bulunmamıştır ($p > 0.05$). **Sonuç:** Meme kanseri önleme davranışları ve meme kanseri korkusunu ele alma konusunda mesleki eğitim ve öğretim, önleme davranışlarının geliştirilmesine yönelik engellerin azaltılmasına katkı sağlayacaktır.

Anahtar Kelimeler: Meme Kanseri, Önleme Davranışları, Korku, Sağlık Profesyonelleri.

Sorumlu Yazar / Corresponding Author: Ayse AKALIN, Düzce University, Faculty of Health Sciences, Department of Nursing, Düzce, Türkiye
E-mail: ayseakalin@duzce.edu.tr

Bu makaleye atıf yapmak için / Cite this article: Bostanci, S., & Akalin, A. (2024). Relationship between breast cancer fear and prevention behaviors of female healthcare professionals. *BAUN Health Sci J, 13*(2), 276-284. https://doi.org/10.53424/balikesirsbd.1251718

INTRODUCTION

Over the world, the most common cancer is breast cancer and the second leading cause of cancer death after lung cancer (Ferlay et al., 2020). Female breast cancer ranks first as the most common cancer type and has a high rate in cancer-related mortality among females in Turkey (Ferlay et al., 2020). GLOBOCAN 2020 estimated the worldwide age-specific, standardized breast cancer prevalence as 47.8 per 100.000 and mortality as 13.6 per 100.000 (Sung et al., 2021). The breast cancer prevalence is 46.6 per 100.000 and mortality rate as 12.9 per 100.000 in Turkey (Sung et al., 2021).

Breast self-examination (BSE), breast self-awareness, clinical breast examination (CBE) and screening mammography can potentially increase early detection of breast cancer to improve treatment outcomes (Fitzgerald et al., 2015). National breast cancer screening standards covers BSE once a month, CBE once a year and mammogram every two years for women aged 40-69 years in Turkey (Turkey Cancer Control Programme, 2021). Besides, women over the age of 20 are recommended BSE once a month and CBE once a year for life. Screening is conducted by Family Health Centers and Cancer Early Diagnosis, Screening and Education Centers (KETEM) free of charge (Turkey Cancer Control Programme, 2021).

The increase in breast cancer rates reveals the concept of fear of breast cancer (FBC). FBC is a psychological and physiological response to the possibility of breast cancer (Secginli, 2012). Fear can occur as a preventive reason for being diagnosed with breast cancer, loss of the breast, other problems that may occur with cancer, pain and thoughts of death, and early diagnosis behaviors (Champion et al., 2004; Secginli, 2012). The most negative effect of FBC is the fact that it causes avoidance behavior. Developing avoidance behavior to cope with fear also prevents early diagnosis. For these reasons, fear of breast cancer is considered an important factor among reasons for delayed diagnosis and treatment (Awwad et al., 2022; Özkan & Taylan, 2021).

Being female is the major risk factor for developing breast cancer (Fitzgerald et al., 2015). In addition to the gender-related risk factors, female healthcare professionals (HCPs) work with many risk factors that increase the risk of breast cancer. Existing studies suggest that occupational exposures such as night shift, chemical exposures, and stress at work or ionizing radiation increase the risk for breast cancer (Shen, Hsieh, Pan, Wu and Chuang, 2021). In this context, female HCPs constitute an important group in terms of having high risk for breast cancer and their role in the prevention and early diagnosis of breast cancer (Shen et al., 2021). They should be aware of the factors that prevent and facilitate behaviors to develop positive behaviors in themselves and in the individuals to whom they provide health services (Mekonnen, 2020; Shen et al., 2021). It is also very important to explore the level of fear and plan the relevant interventions for this in developing early diagnosis behaviors for breast cancer. Therefore, our aim in this study was to investigate breast cancer fear and breast cancer prevention behaviors among female HCPs and to determine the relationship between breast cancer fear and breast cancer prevention behaviors.

Research questions

- What is the breast cancer fear level of women HCPs?
- What is the level of breast cancer prevention behaviors of women HCPs?
- Are there any differences between some characteristics of women HCPs and their breast cancer fear and breast cancer prevention behaviors?
- Is there a relationship between breast cancer fear and breast cancer prevention behaviors of women HCPs?

MATERIALS AND METHODS

Study type

This study is descriptive and correlational study design.

Place and time of the study

This study was conducted at a state hospital located in the northwest of Turkey between April and June 2021.

Population and sample

The study population consisted of 350 female HCPs, 242 of whom were nurses or midwives and 108 were physicians at a state hospital. The study was carried out on the whole population. The convenience sample of the study consisted of female HCPs who were at work at the hospital when the data collected, did not have breast cancer diagnosis and volunteered to participate in the study ($n_{nursing}$= 163, $n_{phsician}$= 100, $n_{midwife}$= 75). Five female HCPs who were on maternity leave when the study data was being conducted and four female HCPs who could not participate in the study due to workload, were not included in the study. A total of 338 women HCPs were included in the study and the participation rate was 97%.

Dependent and independent variables

Dependent variables of the research includes the scores of breast cancer fear scale (BCFS) and scale of factors affecting women's breast cancer prevention behaviors. (ASSISTS). Independent variables of the study includes socio-demographic characteristics, obstetric characteristics, breast cancer risk factors, and breast cancer early diagnostic behaviors.

Data collection tools

Questionnaire form

A self-constructed form was developed making use of the relevant literature (Bulut & Bulut, 2017; Cal, Kabatas Yildiz, Aydin and Avci, 2018; Ersin & Dedeoğlu, 2020). The form consisted of 29 questions about socio-demographic and obstetric characteristics, risk factors for breast cancer, and

breast cancer early diagnosis behaviors. Body mass index (BMI) was calculated based on the self-reported of participants via this formul (kg)/[height(m)]^2. A BMI of below 18.5 kg/m2 were defined as underweight; 18.5–24.99 as normal weight; 25.0–29.99 as overweight and 30 kg/m2 or over as obese (World Health Organization [WHO], 2014).

Breast cancer fear scale

The BCFS was developed by Champion (Champion et al., 2004) to examine the breast cancer fear by determining the emotional responses of women to breast cancer and screening. The Turkish validity and reliability test of the scale was conducted by Secginli (2012). The scale consists of eight items with 5-point Likert-type. Scoring between 8-15 on the scale indicates low breast cancer fear, scoring between 16-23 indicates moderate breast cancer fear, and scoring between 24-40 indicates a high level of breast cancer fear (min=8; max=40). In the study of Secginli (2012) the Cronbach alpha of the scale was 0.90. In our study, the Cronbach alpha was 0.89.

Scale of factors affecting women's breast cancer prevention behaviors

ASSISTS was developed by Khazaee-Pool et al., (2016) to determine the factors affecting breast cancer prevention behaviors of women. The Turkish validity and reliability test of the scale was conducted by Turan and Yiğit (2021). The scale consists of 33 items with 5-point Likert-type and seven sub-scales namely support systems, motivation, attitude, self-efficacy, self-care, stress management, and information seeking. Total scores range from 33 to 165. A high score indicates positive behavior in breast cancer prevention behaviors. Eight items (items 1, 2, 3, 18, 19, 21, 22 and 23) are reversely scored when answering the items in the scale. In the study of Turan and Yiğit (2021), the Cronbach alpha of the scale was 0.75. In our study, the Cronbach alpha was 0.85.

Data collection

Data were collected via face-to-face interviews. Interviews were made without causing any disruption in the routine treatment and follow-up hours and taking into account the social distance measures to ensure protection against coronavirus disease. Filling in the data collection forms lasted for 10 to 15 minutes.

Statistical analysis

Data were analysed using IBM SPSS, version 26 (IBM Corp., Armonk, NY, USA). Number, percentage, mean, and standard deviation were used as descriptive statistics. To compare the difference between variables with two measures and with more than two measures in independent samples were used independent t-test and one-way ANOVA with Tukey multiple comparison, respectively. Pearson's correlation analyses was used to investigate the relations between two independent continuous variables. Sstatistical significance level was $p \leq 0.05$.

Ethical considerations

The ethic committee approval from Non-Interventional Health Research Ethical Committee of a State University (Approval No. 2021/48, 15 February 2021), institutional permissions and permissions for using the scales were obtained. Verbal and written informed consent was obtained from the participants included in the study. The study conducted in accordance with the principles of the Declaration of Helsinki.

RESULTS

A total of 350 female HCPs were approached to participate in our study, 338 female HCPs (97%) were included in the data analysis. The mean age of the participants was 32.60±6.89 (min=23, max=49), the mean age at menarche was 13.41±1.85 (min=12, max=20), the mean age for the first delivery was 25.59±2.91 (min=20, max=35), the mean number of pregnancy was 2.05±0.94 (min=1, max=6) and the mean working period was 7.62±6.65 years.

Most participants were with a university diploma (52.1%), were nurses (48.2%), were married (58.9%) and had been working for 0-5 years (52.1%). Most participants had a child (47.3%), breastfeed after birth (94.4%), gave first delivery at the age of 30 or younger (95.6%), had two pregnancies (48.1%), and worked in a night shift (74.3%) for 0-5 years (65.3%). Approximately one in fifth of the participants were smokers (18.0%), 2.7% were alcohol users and 22.2% did regular physical activity. A breast-related health problem was reported by 9.2% of participants, 6.5% had a biopsy and 18.8% had family history of breast cancer.

Among the participants, 74.6% performed regular BSE, 33.1% undergone CBE and 13.6% had an at least one mammography. Among the reasons for not performing BSE, were mostly absence of complaints (53.5%) and were the fear of finding a breast lump (19.8%). Among the reasons for not undergone CBS, were mostly absence of complaints (41.6%) and were not expected to get breast cancer (31.4%). Among the reasons for not having a mammogram were mostly absence of complaints (66.8%) (Table 1).

The mean BCFS score of the participants in our study was 26.71±7.65 (min=8, max=40). Of all participants, 7.9% had low, 24.6% moderate and 67.5% high level breast cancer fear. The item with the highest mean of the scale items was "I am afraid when I think of breast cancer" with 3.87, and the item with the lowest mean was "I get angry when I think of breast cancer" with 2.38. The mean ASSISTS score of the participants in our study was 123.36±15.49 (min=81, max=160). The mean score of ASSISTS subscales were; supportive systems 14.90±3.88, motivation 18.04±2.19, attitude 29.02±4.89, self-efficacy 15.65±2.93, self-care 19.72±3.99, stress management 10.79±2.53, and information seeking 15.24±3.12, respectively (Table 2).

In the study, the ASSISTS scores of the participants showed statistically significant differences depending

on the variables of education status, working year, duration of work on night shift, BMI, breast problem, breast biopsy, BSE, CBE and mammography ($p<0.05$). Accordingly, the ASSISTS mean score of those with high school and associate degree education were statistically significantly higher than those with undergraduate or graduate degree ($p=0.013$). The ASSISTS mean score of those working for 11 years or more and above was statistically significantly higher than those between 0-10 years ($p=0.010$). Those who had worked at night shift for 11 years or more had a statistically significant higher ASSISTS mean score than those with a 0-10 year period ($p=0.002$). Those who were overweight and obese depending on their BMI score had higher ASSISTS mean score than those underweight ($p=0.039$). The ASSISTS mean scores of those who had breast problems were significantly higher than those who did not ($p<0.001$). The ASSISTS mean scores of those who had a biopsy were significantly higher than those who did not have ($p<0.001$). The ASSISTS mean scores of those who did BSE were significantly higher than those who did not ($p<0.001$). The ASSISTS mean scores of those who had CBE were significantly higher than those who did not have CBE ($p<0.001$). The ASSISTS mean scores of those who had mammography were significantly higher than those who did not have ($p<0.001$). BCFS scores did not show a statistically significant difference according to the variables of age, occupation, working style, smoking and regular physical activity ($p>0.05$). In addition, the BCFS scores of the participants did not show a statistically significant difference by the variables of age, education status, profession, working year, shift pattern, duration of night shift work, smoking, regular physical activity, BMI, breast problems, breast biopsy, BSE, CBE and mammogram ($p>0.05$) (Table 3). Table 4 shows no statistically significant correlation between BCFS and ASSISTS total scores (r:-0.018; $p>0.05$).

Table 1. Distribution of breast cancer prevention behaviors (n=338).

Breast cancer prevention behaviors	**n**	**%***
Breast self-examination		
Yes	252	74.6
No	86	25.4
Reasons for not doing BSE (n:86)		
No complaints	46	53.5
Fear of finding a breast lump	17	19.8
Not having time	9	10.5
Fear of feeling pain	9	10.5
Others (not necessary, boring)	5	5.8
Clinical breast examination		
Yes	112	33.1
No	226	66.9
Reason for not having/undergone clinical breast examination (n:226)		
No complaints	94	41.6
Not expecting to get breast cancer	71	31.4
Not having time	35	15.5
Fear of being diagnosed	20	8.8
Others (be ashamed, fear of feeling pain)	6	2.7
Mammography		
Yes	46	13.6
No	292	86.4
Reason for not having a mammography (n:292)		
No complaints	195	66.8
Not having time	31	10.6
Fear of being diagnosed	29	9.9
Exposure to radiation	18	6.2
Others (fear of feeling pain, be ashamed)	19	6.5

***Column percentage.

DISCUSSION

Our study was conducted to investigate breast cancer fear and breast cancer prevention behaviors among female HCPs and to determine the relationship between fear of breast cancer and breast cancer prevention behaviors. In the study, we found high levels of breast cancer fear and moderate level of breast cancer prevention behaviors among female HCPs. The study results showed that there was a difference between the female HCPs' education, working year, night work duration, BMI, breast

problems, breast biopsy, BSE, CBE and mammography, and ASSISTS mean scores. The results also stated that the breast cancer fears of female HCPs have no relation with women's breast cancer prevention behaviors. In our study, 74.6% of female HCPs applied BSE, 33.1% had CBE and 13.6% had mammogram. Among female HCPs in Turkey, BSE rates range from 76.1% to 61.2%, CBE rates to 53.7% to 6.7%, and mammogram rates to vary between 20.5% and 8.6% (Bulut & Bulut, 2017; Cal et al., 2018; Çakmak & Güler, 2017; Ersin & Dedeoğlu, 2020; Kulakçı-Altıntaş & Korkmaz-Aslan, 2019). A recent systematic review was reported BSE among women HCWs in Ethiopia between 80.7% and 32.5% (Mekonnen, 2020).

Table 2. The mean scores of BCFS and ASSISTS (n=338).

BCFS Items	**Mean**	**SD**	**Min-Max**
When I think about breast cancer, I get scared	3.87	1.18	1-5
When I think about breast cancer, I feel nervous	2.38	1.25	1-5
When I think about breast cancer, I get upset.	3.86	1.19	1-5
When I think about breast cancer, I get depressed.	2.85	1.34	1-5
When I think about breast cancer, I get edgy	3.74	1.20	1-5
When I think about breast cancer, my heart beats faster	2.75	1.37	1-5
When I think about breast cancer, I feel uneasy	3.56	1.31	1-5
When I think about breast cancer, I feel anxious.	3.71	1.27	1-5
Total of BCFS	26.71	7.65	8-40
Level of Breast Cancer Fear	**n**	**%**	
Low (score 8–15)	27	7.9	
Moderate (score 16–23)	83	24.6	
High (score 24–40)	228	67.5	
ASSISTS Subscales	**Mean**	**SD**	**Min-Max**
Supportive systems	14.90	3.88	5-20
Motivation	18.04	2.19	10-20
Attitude	29.02	4.89	14-40
Self-efficacy	15.65	2.93	6-20
Self-care	19.72	3.99	10-30
Stress management	10.79	2.53	4-15
Information seeking	15.24	3.12	7-20
Total of ASSISTS	123.36	15.49	81-160

BCFS: Breast Cancer Fear Scale; ASSISTS: Scale of Factors Affecting Women's Breast Cancer Prevention Behaviors

In the study of Andegiorgish, Kidane and Gebrezgi (2018), it was stated that 75.5% of the nurses in Eritrea had BSE, 30% had CBE and 11.3% had mammography. In the study of Heena et al., (2019), in Saudi Arabia, a total of female HCPs reported 74.7% practicing BSE, 24.1% had undergone CBE, and 18.7% had ever undergone mammography. The results of our study are consistent with the results of other studies. However, this shows that breast cancer prevention behaviors were not at a desirable level among female HCPs. The most important way to develop preventive health behaviors is to provide education programs to increase knowledge and create awareness. Therefore, greater efforts may be needed to strengthen HCPs' awareness of breast cancer. In this context, it could be said that in-service training programs are necessary in order to improve awareness of female HCPs about breast cancer and their behaviors for preventing breast cancer. In our study, as a reason for not having a BSE, CBE and mammogram of female HCPs were mostly the absence of any complaint. In the literature, the main reason for not undergoing a BSE or CBE is also not having any complaint, and one reason for not having a mammogram, is also not considering it necessary (Azem et al., 2015; Çakmak & Güler, 2017; Heena et al., 2019). These results suggest that even if females are HCPs, they could not take responsibility for their own health as long as there are no sign nor symptom of breast cancer. In this context, it is needed to provide education about the barriers of female HCPs in the implementation breast cancer prevention behaviors, and to increase their knowledge and

awareness levels by ensuring that the importance of the behaviors is comprehended. In our study, female HCPs have high levels of breast cancer fear.

Our study finding suggests that the level of fear breast cancer may be unique, even among HCPs with a high level of awareness of breast cancer. The result of our study is consistent with the results of other studies (Cal et al., 2018; Emami et al., 2021). In the study of Ersin and Dedeoğlu (2020), it is seen that the breast cancer fear is moderately high among nurses. This results show that the level of fear triggered by breast cancer has not changed much, despite the positive epidemiological changes that have occurred in many developed countries.

In our study, the breast cancer prevention behaviors of female HCPs were moderately positive. This result is similar to the studies conducted Emami et al. (2021), Gül and Büyükbayram (2022), Turan (2019). In addition, we found that the lowest subscale mean scores in our study were self-care and stress management. Self-care includes personal skills, abilities, behaviors, and habits that encourage engaging in preventative behaviors. Stress management includes approaches such as self-help, prayer, positive thinking, sleep and rest time, which aim to control the stress level. When we are aware of the importance of preventive behaviors, we will have more motivation to perform such behaviors (Khazaee-Pool et al., 2016; Turan, 2019). In this context, self-care and stress management issues should be included in the in-service trainings to be planned to increase the positive attitudes and awareness of female HCPs towards breast cancer prevention behaviors.

Table 3. The mean scores of BCFS and ASSISTS according to some characteristics (n=338).

Characteristics	n(%)	BCFS Mean±SD	Analysis	ASSISTS Mean±SD	Analysis
Age (years)					
≤29	144(42.6)	26.17±7.78		121.58±15.15	
30-39	118(34.9)	27.81±7.26		124.12±15.38	
40≥	76(22.5)	26.04±7.91	[a]0.155	125.57±16.14	[a]0.155
Education status					
College and associate degree	37(10.9)	28.32±8.24		130.43±17.60	
Undergraduate degree	176(52.1)	26.30±6.86		122.57±15.62	**[a]0.013*;**
Postgraduate	125(37.0)	26.80±8.48	[a]0.339	122.36±14.18	1-2,3[c]
Profession					
Nurse	163(48.2)	25.90±7.57		123.95±15.18	
Midwife	75(22.2)	26.57±7.27		125.07±18.13	
Physician	100(29.6)	28.13±7.93	[b]0.071	121.12±13.66	[a]0.199
Working years					
0-10 years	237(70.1)	27.16±7.57		121.94±15.03	
11 years and more	101(29.9)	25.63±7.57	[b]0.091	126.68±16.11	**[b]0.010***
Shift patterns					
Day	87(25.7)	25.49±8.05		123.80±16.36	
Night	251(74.3)	27.13±7.48	[b]0.086	123.21±15.21	[b]0.757
Night shift work duration					
0-10 years	214(63.3)	27.43±7.51		121.95±14.80	
11 years and more	37(10.9)	25.35±7.6	[b]0.117	130.46±14.93	**[b]0.002***
Smoking					
Smokers	61(18.0)	26.66±7.74		123.02±17.31	
Non-smokers	277(82.0)	26.72±7.65	[b]0.951	123.44±15.10	[b]0.848
Regular physical activity					
Yes	75(22.2)	24.99±7.87		126.05±15.94	
No	263(77.8)	27.20±7.53	[b]0.848	122.59±15.31	[b]0.951
BMI[d] (n=140)					
Underweight (<18.5 kg/m^2)	16(11.5)	28.62±7.21		115.88±17.69	
Overweight and obese (>25 kg/m^2)	124(88.5)	25.50±9.98	[b]0.140	124.76±15.87	**[b]0.039***
Breast problem[e]					
Yes	31(9.2)	26.29±8.90		132.48±15.51	
No	307(90.8)	26.75±7.53	[b]0.749	122.44±15.22	**[b]<0.001****
Breast biopsy					
Yes	22(6.5)	25.91±9.89		133.68±12.49	
No	316(93.5)	26.77±7.49	[b]0.612	122.64±15.44	**[b]<0.001****

Table 3. (Continued) The mean scores of BCFS and ASSISTS according to some characteristics (n=338).

Characteristics	n(%)	BCFS Mean±SD	Analysis	ASSISTS Mean±SD	Analysis
Breast self-examination					
Yes	252(74.6)	26.61±7.54		127.58±14.52	
No	86(25.4)	27.00±8.01	[b]0.685	110.99±11.04	[b]**<0.001****
Clinical breast examination					
Yes	112(33.1)	26.79±7.23		132.92±14.52	
No	226(66.9)	26.67±7.87	[b]0.898	118.62±13.70	[b]**<0.001****
Mammography					
Yes	46(13.6)	28.26±7.88		136.43±12.80	
No	292(86.4)	26.47±7.60	[b]0.139	121.30±14.88	[b]**<0.001****

ASSISTS: Scale of factors affecting women's breast cancer prevention behaviors, BMI: Body Mass Index, *p<0.05; **p<0.001; [a]One-Way ANOVA, [b]Independent t-test, [c]difference between the groups, [d]normal BMI is not included, [e]breast lump and nipple discharge

Table 4. Pearson correlation analysis between BCFS and ASSISTS scores.

	Analyses	Breast Cancer Fear Scale
Scale of Factors Affecting Women's Breast Cancer Prevention Behaviors	r	-0.018
	p	0.740

BCFS: Breast Cancer Fear Scale, ASSISTS: Scale of Factors Affecting Women's Breast Cancer Prevention Behaviors, r: Pearson correlation coefficient

Working at night shifts and being exposed to artificial light cause irregularity in melatonin hormone secretion, which increases the risk for breast cancer among HCPs. It is stated that the risk level of breast cancer increases as the working year increases among female HCPs (Shen et al., 2021). In our study, it is seen that the breast cancer prevention behaviors of those with longer working years and longer working the night shift are higher. It can be thought that this situation is related to the increase in the awareness of being in the risk group with the increase in the age and stress factors, which are among the breast cancer risk factors, together with the increase in the working years of the HCPs.

Healthy lifestyle behavior education programs for prevention of breast cancer, such as regular exercise, adequate and balanced nutrition, and weight control especially after menopause, are important. Overweight and obesity is among the risk factors for breast cancer. Estrogen biosynthesis after menopause is catalyzed in adipose tissue. Being overweight or obese after menopause can increase the risk of breast cancer by increasing the estrogen level in women (Picon-Ruiz, Morata-Tarifa, Valle-Goffin, Friedman and Slingerland, 2017). In our study, it is seen that the breast cancer prevention behaviors of those with overweight and obese are higher. It can be thought that this situation is related to the fact that being in the risk group increases awareness about prevention behaviors. In our study, breast cancer prevention behaviors positively affected those who had breast problems and had a biopsy. This finding shows that it is effective in the positive development of early diagnosis behaviors, as it increases the risk perception of breast problems. In the study of Kulakçı-Altıntaş and Korkmaz-Aslan (2019), it is reported that those who have breast problems adopt breast cancer early diagnosis behaviors more.

The practice of breast cancer early diagnosis behaviors by HCPs is important in reducing breast cancer mortality and morbidity rates as a role model for the society (Mekonnen, 2020; Shen et al., 2021). In our study, regular BSE, CBE and mammogram had a positive effect on breast cancer prevention behaviors. Our study finding is compatible with the literature (Gül & Büyükbayram, 2022). These results are promising in terms of raising awareness of regular practice of breast cancer prevention behaviors and training on prevention of breast cancer and revealing the importance of early diagnosis and prevention of breast cancer.

In a recent meta-synthesis study conducted by Ozkan and Taylan (2021) the barriers to participation in breast cancer screening was identified as fear, perception of breast cancer and beliefs, embarrassment, lack of knowledge and motivation, negative experiences and socio-economic status. The "fear" was found to be one of the most important a barrier to participation in breast cancer screenings (Ozkan & Taylan, 2021). In our study, although it was found that as the breast cancer fear level increased, breast cancer prevention behaviors decreased, and there is not any relation found between. In the study of Ersin and Dedeoğlu (2020), it was found that, as

the level of breast cancer fear increases, there is an increase in early diagnosis behaviors. In the study of Emami et al., (2021), no relationship was found between breast cancer fear and mammogram screenings. In the study conducted by Abu Awwad, Hossain, Mackey, Brennan, and Adam (2022), fear of breast cancer was identified as both an enabling factor and a barrier to breast cancer screening. In this context, it seems that breast cancer fear has different effects on early diagnosis behaviors. Our study shows similarities and differences with the literature.

Strengths and limitations of study

To the best of our knowledge, this is the first study to investigate the relationship between breast cancer fear and breast cancer prevention behavior of women HCPs who are in the risk groups for breast cancer and having a key role in gaining early diagnosis behaviors. However, it also has a number of limitations. Firstly, ASSISTS scale does not include samples from the studies conducted in different societies. This limited the comparison of our study results with other studies. Secondly, the sample of the study was limited to the women HCPs who is nurse, midwife, and physician in a state hospital. Therefore, further multi-centered studies with larger populations are necessary, including other women HCPs. The final limitation is using of a sample from single-centered. Therefore, that would limit representativeness and generalizability of the results to the entire women HCPs of Turkey.

CONCLUSION

In conclusion, the study revealed that women HCPs had high levels of breast cancer fear and their breast cancer prevention behaviors were not sufficient. It was found that approximately three-quarters of women HCPs had BSE, two-fifth had CBE and one-fifth had mammograms. The study findings also indicated higher breast cancer prevention behavior scores among the HCPs who were working longer years and night shifts, those having breast problems, and undergone breast biopsy, those performing breast self-examination, undergone clinical breast examination and mammography. These results reveal that the importance of decreasing the fear and risk of breast cancer and developing breast cancer prevention behaviors, which may help reduce morbidity and mortality due to breast cancer is required. In this context, it is recommended to plan both undergraduate and postgraduate trainings in order to reduce the fear and risks of breast cancer, and to develop prevention behaviors of women HCPs who have a high risk of breast cancer and play a key role in gaining early diagnosis behavior.

Acknowledgement

This study was produced from the master's thesis of the first author. The authors sincerely appreciate to all healthcare professionals who took part in the research.

Conflict of Interest

The authors declare no potential conflicts of interest with respect to the research, authorship and/or publication of this article.

Author Contributions

Plan, design: SB, AA; **Material, methods and data collection:** SB, AA; **Data analysis and comments:** SB, AA; **Writing and corrections:** SB, AA.

Funding

None

Ethical considerations

The ethic committee approval from Non-Interventional Health Research Ethical Committee of a State University (Approval No. 2021/48, 15 February 2021), institutional permissions and permissions for using the scales were obtained. Verbal and written informed consent was obtained from the participants included in the study. The study conducted in accordance with the principles of the Declaration of Helsinki.

REFERENCES

Abu Awwad, D., Hossain, S. Z., Mackey M., Brennan, P., & Adam, S. (2022). Optimising awareness and knowledge of breast cancer screening for nurses through train-the-trainer workshops. *Journal of Cancer Education*, *37*, 1209–1219. https://doi.org/10.1007/s13187-020-01942-8

Andegiorgish, A. K., Kidane, E. A., & Gebrezgi, M. T. (2018). Knowledge, attitude, and practice of breast cancer among nurses in hospitals in Asmara, Eritrea. *BMC Nursing*, *17*, 33. https://doi.org/10.1186/s12912-018-0300-4

Azeem, E., Gillani, S. W., Siddiqui, A., Shammary, H. A. A., Poh, V., Syed Sulaiman, S. A., & Baig, M. (2015). Knowledge, attitude and behavior of healthcare providers towards breast cancer in Malaysia: a systematic review. *Asian Pacific Journal of Cancer Prevention*, *16*(13), 5233–5235. https://doi.org/10.7314/apjcp.2015.16.13.5233

Bulut, A., & Bulut, A. (2017). Knowledge, attitudes and behaviors of primary health care nurses and midwives in breast cancer early diagnosis applications. *Breast Cancer (Dove Medical Press)*, *9*, 163–169. https://doi.org/10.2147/BCTT.S126124

Cal, A., Kabatas Yildiz, M., & Aydin Avci, I. (2018). Examination of knowledge and fear levels of breast cancer with the spiritual characteristics of nurses. *Frontiers in Public Health*, *6*, 331. https://doi.org/10.3389/fpubh.2018.00331

Champion, V. L., Skinner, C. S., Menon, U., Rawl, S., Giesler, R. B., Monahan, P., & Daggy, J. (2004). A breast cancer fear scale: psychometric development. *Journal of Health Psychology*, *9*(6), 753–762. https://doi.org/10.1177/1359105304045383

Çakmak, R., & Güler, G. (2017). Kadın sağlık çalışanlarında kanser tarama davranışları. *The Turkish Journal of Gynecologic Oncology*, *10*(4), 25-32.

Emami, L., Ghahramanian, A., Rahmani, A., Aghazadeh, A. M., Onyeka, T. C., & Nabighadim, A. (2021). Beliefs, fear and awareness of women about breast cancer: Effects on mammography screening practices. *Nursing Open*, *8*(2), 890–899. https://doi.org/10.

1002/nop2.696

Ersin, F., & Dedeoğlu, G. (2020). The effect of breast cancer fear and fatalism perceptions on breast cancer early diagnosis behaviors of the nurses. *Gevher Nesibe Journal of Medical & Health Sciences*, *5*(9), 146-153. https://doi.org/10.46648/gnj.166

Ferlay, J., Laversanne, M., Ervik, M., Lam, F., Colombet, M., Mery, L., Piñeros, M., Znaor, A., Soerjomataram, I., & Bray, F. (2020). Global cancer observatory: *Cancer today*. Lyon, France: International Agency for Research on Cancer. Retrieved May 15, 2022 from https://gco.iarc.fr/today.

Gül, S., & Büyükbayram, Z. (2022). Identification of women's breast cancer prevention behaviors and the associated factors: The case of the southeastern Anatolia Region. *Health Care for Women International*, 1–17. https://doi.org/10.1080/07399332.2021.2021914

Heena, H., Durrani, S., Riaz, M., AlFayyad, I., Tabasim, R., Parvez, G., & Abu-Shaheen, A. (2019). Knowledge, attitudes, and practices related to breast cancer screening among female health care professionals: a cross sectional study. *BMC Women's Health*, *19*(1), 122. https://doi.org/10.1186/s12905-019-0819-x

Khazaee-Pool, M., Majlessi, F., Montazeri, A., Pashaei, T., Gholami, A., & Ponnet, K. (2016). Development and psychometric testing of a new instrument to measure factors influencing women's breast cancer prevention behaviors (ASSISTS). *BMC Women's Health*, *16*, 40. https://doi.org/10.1186/s12905-016-0318-2

Kulakçı-Altıntaş, H., & Korkmaz-Aslan, G. (2019). The effect of breast cancer fatalism perception on breast cancer health beliefs of the midwives and nurses. *Journal of Hacettepe University Faculty of Nursing*, *6*(1), 10-19. https://doi.org/10.31125/hunhemsire.544103

Lauby-Secretan, B., Scoccianti, C., Loomis, D., Benbrahim-Tallaa, L., Bouvard, V., Bianchini, F., Straif, K., & International Agency for Research on Cancer Handbook Working Group. (2015). Breast-cancer screening viewpoint of the IARC Working Group. *The New England journal of medicine*, *372*(24), 2353–2358. https://doi.org/10.1056/NEJMsr1504363

Mekonnen, B. D. (2020). Breast self-examination practice and associated factors among female healthcare workers in Ethiopia: A systematic review and meta-analysis. *PloS One*, *15*(11), e0241961. https://doi.org/10.1371/journal.pone.0241961

Özkan, İ., & Taylan, S. (2021). Barriers to women's breast cancer-screening behaviors in several countries: A meta-synthesis study. *Health Care for Women International*, *42*(7-9), 1013-1043. https://doi.org/10.1080/07399332.2020.1814777

Picon-Ruiz, M., Morata-Tarifa, C., Valle-Goffin, J. J., Friedman, E. R., & Slingerland, J. M. (2017). Obesity and adverse breast cancer risk and outcome: Mechanistic insights and strategies for intervention. *CA: A Cancer Journal for Clinicians*, *67*(5), 378–397. https://doi.org/10.3322/caac.21405

Secginli, S. (2012). Mammography self-efficacy scale and breast cancer fear scale: Psychometric testing of the Turkish versions. *Cancer Nursing*, *35*(5), 365–373. http://doi.org/10.1097/NCC.0b013e3182331a9a

Shen, C. T., Hsieh, H. M., Pan, C. H., Wu, M. T., & Chuang, Y. S. (2021). Breast cancer risk among female health professionals: A 35-year population-based longitudinal cohort study in Taiwan. *American Journal of Preventive Medicine*, *61*(6), 831-840. https://doi.org/10.1016/j.amepre.2021.05.024

Sung, H., Ferlay, J., Siegel, R. L., Laversanne, M., Soerjomataram, I., Jemal, A., & Bray, F. (2021). Global cancer statistics 2020: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA: A Cancer Journal for Clinicians*, *71*(3), 209–249. https://doi.org/10.3322/caac.21660

Turan, Z. (2019). Validity and reliability study of the scale of factors affecting women's breast cancer prevention behaviors [Unpublished doctoral dissertation]. University of Hasan Kalyoncu.

Turan, Z., & Yiğit, F. (2021). Validity and reliability study of the scale of factors affecting women's breast cancer prevention behaviors. *Kocaeli Medical Journal*, *10*(3), 407-420. https://doi.org/10.5505/ktd.2021.77598

Turkey Cancer Control Program. (2021). Ministry of Health of Turkey, General Directorate of Public, Ankara, 2021.

World Health Organization. (2014). *Obesity and overweight. Fact Sheet*, Geneva, Switzerland: World Health Organization. Retrieved May 15, 2022 from https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight

ORİJİNAL MAKALE / ORIGINAL ARTICLE

Balıkesir Sağlık Bilimleri Dergisi / BAUN Sağ Bil Derg
Balıkesir Health Sciences Journal / BAUN Health Sci J
ISSN: 2146-9601- e ISSN: 2147-2238
Doi: https://doi.org/10.53424/balikesirsbd.1362540

Childhood Traumas and Difficulties in Emotion Regulation of Individuals Who Worked as Laborers in Their Childhood

Maksude YILDIRIM[1], Sinan ASLAN[1]

[1] Adıyaman University, Faculty of Health Sciences, Child Health and Diseases Nursing
[2] Kahramanmaraş İstiklal University, Faculty of Health Sciences, Department of Nursing

Geliş Tarihi / Received: *18/09/2023,* ***Kabul Tarihi / Accepted:*** *21/02/2024*

ABSTRACT

Objective: This study examined the childhood traumas and difficulties in emotional regulation of individuals who worked as workers in their childhood. **Materials and Methods:** The population of this descriptive study consists of individuals living in our country and working as workers in their childhood. The sample size was calculated using the A-priori Sample Size Calculator for the Multiple Regression program. The data of the study were collected via an online form using the "Childhood Trauma Questionnaire (CTQ-28)", "Difficulties in Emotion Regulation Scale-Brief Form (DERS-16)" and "Introductory Characteristics Form" prepared by the researcher, Percentage, mean, correlation, standard deviation, ANOVA, Kruskal Wallis, T-test, Mann Whitney-u, and regression analyses were used to evaluate the data. **Results:** It was determined that the average CTQ-28 score of the participants was 42.00±12.87, and the average DERS-16 score was 38.47±13.89. It was determined that there was a low-level relationship between CTQ-28 and DERS-16 and that the CTQ-28 independent variable explained 18% of the total variance of the DERS-16 dependent variable (R^2=0.182). **Conclusion:** As the average childhood trauma score of individuals increases, difficulties in emotion regulation also increase.
Keywords: Child labor, Childhood trauma, Emotional regulation.

Çocukluklarında İşçi Olarak Çalışan Bireylerin Çocukluk Çağı Travmaları ve Duygu Düzenleme Güçlükleri

ÖZ

Amaç: Bu çalışma çocukluklarında işçi olarak çalışan bireylerin çocukluk çağı travmaları ve duygu düzenleme güçlüklerini incelemek amacıyla yapılmıştır. **Gereç ve Yöntem:** Tanımlayıcı türde yapılan bu çalışmanın evrenini ülkemizde yaşayan ve çocukluklarında işçi olarak çalışan bireyler oluşturmaktadır. A-priori Sample Size Calculator for Multiple Regresyon programı kullanılarak örneklem büyüklüğü hesaplanmıştır. Çalışmanın verileri "Çocukluk Çağı Ruhsal Travma Ölçeği (CTQ-28)", "Duygu Düzenleme Güçlüğü Ölçeği-Kısa Formu (DDGÖ-16)" ve araştırmacı tarafından hazırlanan "Tanıtıcı Özellikler Formu" kullanılarak online form aracılığı ile toplanmıştır. Verilerin değerlendirilmesinde yüzde, ortalama, korelasyon, standart sapma, ANOVA, Kruskal Wallis, T-test, Mann Whitney-u ve regresyon analizi kullanılmıştır. **Bulgular:** Katılımcıların CTQ-28 puan ortalamalarının 42.00±12.87, DDGÖ puan ortalamalarının ise 38.47±13.89 olduğu belirlenmiştir. CTQ-28 ile DDGÖ arasında düşük düzeyde bir ilişki olduğu ve CTQ-28 bağımsız değişkeninin, DDGÖ bağımlı değişkeninin toplam varyansının %18'ini açıkladığı tespit edilmiştir (R^2=0.182). **Sonuç:** Bireylerin çocukluk çağı travma puan ortalamaları arttıkça duygu düzenleme güçlükleri de artmaktadır.
Anahtar Kelimeler: Çocuk işçi, Çocukluk çağı travma, Duygu düzenleme.

Sorumlu Yazar / Corresponding Author: Maksude YILDIRIM, Adıyaman University, Faculty of Health Sciences, Child Health and Diseases Nursing, Adiyaman, Turkiye
E-mail: yildirimmaksude@gmail.com

Bu makaleye atıf yapmak için / Cite this article: Yıldırım., M., & Aslan, S. (2024). Childhood traumas and difficulties in emotion regulation of individuals who worked as laborers in their childhood. *BAUN Health Sci J, 13*(2), 285-293. https://doi.org/10.53424/balikesirsbd.1362540

INTRODUCTION

When growth and development occur rapidly and care and protection are needed, childhood is the most critical phase of an individual's life (Çöpoğlu, 2018). Different definitions have been made regarding childhood based on the child's innocence and cognitive, sexual, and physical development. However, they all have a common goal to separate children from adults (Sağlam & Aral, 2016). It is an essential problem that children, who are different from adults in every aspect and perhaps more vulnerable than them, are employed as "child laborers" in jobs designed for adults. A study conducted in our country stated that children working as agricultural workers work an average of 10.33 hours per day, and 32.8% of them do not continue their education (Karadeniz et al., 2021). In the context of human rights and children's rights, it can be said that working children are deprived of their rights, such as healthy living, education, healthy life, and play.

Traumatic experiences such as neglect and abuse that individuals are exposed to before the age of 18, divorce of parents, loss of one or both parents, being separated from their parents for any reason, witnessing violence, migration, or experiencing a natural disaster are defined as childhood trauma (Karakaya et al., 2021). It can be mentioned that child labor, which is a type of economic abuse, can also cause trauma in children. It is known that childhood trauma is associated with depressive symptoms (Fan et al., 2023; Gürsoy & Mechmet, 2023), self-harming behaviors (Bakar Kahraman & Kizilay Çankaya, 2020), anxiety and stress (Gürsoy & Mechmet, 2023), and difficulties in emotional regulation (Alpay et al., 2017; Dereboy et al., 2018; Doba et al., 2022). Emotion regulation is "the internal and external processes responsible for monitoring, evaluating, and modifying individuals' emotional responses to achieve their goals" (Thompson, 1994; Yiğit & Guzey Yiğit, 2019). It is known that traumatic events experienced in childhood cause emotional regulation difficulties (Gruhn & Compas, 2020). It is stated that people who have difficulties in emotional regulation have low levels of self-compassion and higher narcissistic characteristics (Aktaş & Şahin, 2018). For this reason, it is essential to identify situations that cause difficulty in emotional regulation and intervene early to support healthy personality development. When the literature was examined, no study was found examining childhood trauma and difficulties in emotion regulation of individuals who worked as workers during their childhood. This study was conducted to examine childhood trauma and difficulties in emotion regulation of individuals who worked as workers in their childhood.

MATERIALS AND METHODS

Study type

This study was conducted as a descriptive study to examine the childhood trauma and difficulties in emotion regulation of individuals who worked as workers in their childhood.

Population and sample of the study

The study data was collected between May 2022 and May 2023. The population of the study consists of individuals living in our country and working as workers in their childhood. The sample size was calculated using the A-priori Sample Size Calculator for the Multiple Regression program (alpha level .05, effect size 0.15, number of variables 11, and desired statistical power level 0.80), and it was determined that at least 122 people should be reached as a result of the calculation (Soper, 2023). The snowball sampling method, one of the non-probability sampling methods, was used to reach the individuals included in the study. The study was completed with the participation of 125 people who worked as workers in their childhoods.

Data collection tools

The data of the study were collected using the "Childhood Trauma Questionnaire (CTQ-28)", "Difficulties in Emotion Regulation Scale-Brief Form (DERS-16)" and "Introductory Characteristics Form" prepared by the researcher. The data of the study was collected using an online survey form in order to reach more individuals. An attempt was made to reach people by sharing the link to the study on social media platforms (Instagram and WhatsApp) and using the snowball sampling method through people in the immediate vicinity.

Introductory Characteristics Form : It consists of 11 questions, including the sociodemographic characteristics of the participants.

Childhood Trauma Questionnaire (CTQ-28): The scale was developed by Bernstein and friends in 1994 to retrospectively evaluate abuse and neglect experiences before the age of 20. The Turkish validity and reliability study of the scale was conducted by Şar and friends in 2012. The 5-point Likert style scale, consisting of a total of 28 items, has 5 sub-dimensions (sexual, emotional, physical abuse, and physical, emotional neglect). High total scores on the scale are an indicator of childhood trauma. The scale score is calculated by reversing the scores obtained from the items of positive expressions. (Şar et al., 2012). Cronbach's alpha value, calculated as 0.93 in the original study, was calculated as 0.89 in this study.

Difficulties in Emotion Regulation Scale-Brief Form (DERS-16): The Turkish validity and reliability study of the scale developed by Bjureberg and friends was conducted by Yiğit and Yiğit in 2019. The 5-point Likert-type scale, consisting of 16 items, has 5 sub-dimensions (clarity, impulse, goals, non-acceptance, strategies). Although there are no reverse-scored items in the scale, difficulties in emotional regulation increase as the score received

from the scale increases. (Yiğit & Guzey Yiğit, 2019). Cronbach's alpha value, calculated as 0.92 in the original study, was calculated as 0.93 in this study.

Evaluation of data

The IBM SPSS Statistics 25.0 program evaluated the research data (IBM Corp. Released 2017. IBM SPSS Statistics for Windows, Version 25.0. Armonk, NY). Whether the data showed normal distribution was examined with the Kolmogorov-Smirnov test results. An Independent T-test was used to compare two customarily distributed groups, and an ANOVA test was used to compare more than two normally distributed groups. The Mann-Whitney U test was used to compare two groups that were not normally distributed, and the Kruskal-Wallis test was used to compare more than two groups that were not normally distributed. Correlation analysis was performed to examine the relationship between CTQ-28 and DERS-16. Linear regression analysis was used to examine the effect of CTQ-28 and DERS-16. The statistical significance level was accepted as $p<0.05$.

Ethical considerations

The necessary ethics committee permission (Inonu University Scientific Research and Publication Ethics Board, Decision Number: 2022/3381 Date: 12/04/2022) was obtained before starting the research. Voluntary consent was obtained from the participants in the form created online. Participants could participate in the study after ticking the checkbox below the information explaining the purpose of the study.

RESULTS

It was determined that the average age of participants was 33.39±9.55, the majority of them were male, they were married, they had a university and above education level, their income was equal to their expenses, they started working between the ages of 10-15, they grew up in a nuclear family, they had between 5 and 9 siblings, they had an oppressive-authoritarian, they worked because of financial difficulties, and the majority of them did not have difficulty controlling their emotions. (Table 1).

It was determined that the average CTQ-28 score was 42.00±12.87 and the average DERS-16 score was 38.47±13.89 (Table 2).

Table 1. Sociodemographic characteristics (n=125).

	n	%
The average age		33.39±9.55
Gender		
Woman	60	48.0
Man	65	52.0
Marital status		
Married	70	56.0
Single	55	44.0
Educational status		
High school and less	24	19.2
University and more	101	80.8
Income status		
Income is less than expenses	43	34.4
Income equals expenses	48	38.4
Income exceeds expenses	34	27.2
Age to start working		
Before age 10	36	28.8
10-15 years old	54	43.2
16-18 years old	35	28.0
The industry he worked in as a child		
Agriculture	41	32.8
Industry	21	16.8
Service	63	50.4
The type of family he/she grew up in		
Nuclear family	80	64.0
Extended family	45	36.0

Table 1. (continues) Sociodemographic characteristics (n=125).

	n	%
Number of siblings		
Between 0-4	27	21.6
Between 5-9	70	56.0
10 and above	28	22.4
Family attitude in childhood		
Oppressive-authoritarian	61	48.8
Overindulgent	10	8.0
Overprotective	14	11.2
Reassuring	40	32.0
Reason for working as a child		
I worked voluntarily	41	32.8
I worked with the pressure of my family	17	13.6
I worked due to financial difficulties	67	53.6
Status of difficulty in controlling emotions		
Yes	60	48.0
No	65	52.0

Table 2. CTQ-28 and DERS-16 score averages.

Scales	Mean±Sd	Median (Min-Max)
CTQ-28	42.00±12.87	(26.00-89.00)
DERS-16	38.47±13.89	(16.00-76.00)

Sd: Standard deviation, **Min:** Minimum**, Max:** Maximum

When the sociodemographic characteristics of the participants and their CTQ-28 score averages were compared, It was found that there was a relationship between CTQ-28 score averages and the age at which the participants started working as children, their family's attitude towards them in their childhood, their reasons for working as a child, status of difficulty in controlling their emotions. It has been determined that the mean CTQ-28 scores of individuals who started working before age 10, who have an oppressive-authoritarian family attitude, who work under the pressure of their families, and who have difficulty controlling their emotions are higher (Table 3).

When the sociodemographic characteristics of the participants and DERS-16 score averages are compared. It was determined that there was a relationship between the gender of the participants, their family's attitude towards them in childhood, their difficulty in controlling their emotions, and their difficulties in emotion regulation. It was determined that the average DERS-16 score of female individuals who had difficulty controlling their emotions was higher. In contrast, the average DERS-16 score of participants who grew up with a reassuring parental attitude was lower (Table 3).

The correlation analysis results determined a low-level relationship (Karagöz, 2019) between CTQ-28 and DERS-16 (Table 4).

In order to determine its effect on childhood trauma on difficulties in emotional regulation, a regression model was established and tested in which DERS-16 was determined as the dependent variable, and CTQ-28 was determined as the independent variable. The established model was found to be significant as a result of the regression analysis ($F=27.434$, $p \leq .000$). The CTQ-28 independent variable explains 18% of the total variance of the DERS-16 dependent variable ($R^2=0.182$) (Table 5).

Table 3. Sociodemographic characteristics and CTQ-28, and DERS-16.

	n	CTQ-28	DERS-16
		Mean±Sd	Mean±Sd
Gender			
Woman	60	42.58±13.26	41.11±15.21
Man	65	41.46±12.58	36.03±12.7
Test		t=0.485 p=0.629	**t=4.966** **p=0.042**
Marital status			
Married	70	41.37±13.03	39.92±14.63
Single	55	42.80±12.74	36.61±12.80
Test		t=-0.614 p=0.540	U=1679.000 p=0.221
Age to start working			
Before age 10	36	47.91±15.99	41.02±14.14
10-15 years old	54	39.18±10.98	36.62±14.23
16-18 years old	35	40.25±10.02	38.68±13.05
Test		**F=5.831** **p=0.004**	F=1.089 p=0.340
The type of family he/she grew up in			
Nuclear family	80	41.63±13.00	37.77±14.23
Extended family	45	42.64±12.77	39.71±13.35
Test		t=-0.418 p=0.677	U=1643.000 p=0.419
Number of siblings			
Between 0-4	27	37.88±10.03	36.85±14.72
Between 5-9	70	42.94±13.14	38.40±13.44
10 and above	28	43.60±14.17	40.21±14.52
Test		F=1.804 p=0.169	F=0.400 p=0.671
Family attitude in childhood			
Oppressive-authoritarian	61	48.90±14.08	42.34±13.81
Overindulgent	10	36.90±8.21	34.80±13.68
Overprotective	14	37.42±5.87	42.92±14.15
Reassuring	40	34.35±6.79	31.92±11.51
Test		**F=15.840** **p≤0.000**	**F=5.866** **p≤0.001**
Reason for working as a child			
I worked voluntarily	41	36.09±8.694	35.73±15.36
I worked with the pressure of my family	17	47.11±16.24	42.88±13.76
I worked due to financial difficulties	67	44.31±12.96	39.02±12.80
Test		**F=7.427** **p≤0.001**	KW=4.487 p=0.106
Status of difficulty in controlling emotions			
Yes	60	46.93±13.54	44.98±13.66
No	65	37.44±10.40	32.46±11.20
Test		**t=4.365** **p≤0.000**	**t=0.095** **p≤0.00**

Sd: Standard deviation; t: Independent T-test; U: Mann-Whitney U test; F: ANO

Table 4. The relationship between CTQ-28 and DERS-16.

		DERS-16
CTQ-28	**r**	0.427
	p	0.000

Table 5. Effect of CTQ-28 on DERS-16.

	B	SE	β	t	p	R^2
Constant	19.114	3.864		4.946	0.000	0.182
CTQ-28	0.461	0.088	0.427	5.238	0.000	
SE=12.619, F=27.434, p=0.000						

B: Unstandardized Coefficients Beta, **SE:** Standard Error, **β:** Standardized Beta, **F:** ANOVA, **R^2:** R Square.

DISCUSSION

Freud said, "The foundations of our present personality lie in our childhood". For this reason, we can say that the foundations of people's traumas and emotional regulation difficulties are laid in their childhood (Öztanrıöver & Bugay Sökmez, 2022). However, having to work during childhood, which has an essential place in shaping personality, may cause problems in mental, physical, and social areas both in childhood and adulthood. In this study, childhood trauma and emotional regulation difficulties of adults who worked as workers during their childhood were examined. It was determined that the average CTQ-28 score of the participants was 42.00±12.87, and the average DERS-16 score was 38.47±13.89. When the literature was examined, no study was found examining childhood trauma and difficulties in emotion regulation of individuals who worked as workers during their childhood. However, when the maximum and minimum scores obtained from the CTQ-28 and DERS-16 scales are examined (Şar et al., 2012; Yiğit & Guzey Yiğit, 2019), it can be said that the participants' childhood trauma and difficulties in emotion regulation are at an intermediate level.

Stressful events that children encounter while growing up can have long-term or permanent effects on their biopsychosocial development (Taşören, 2022). One of the critical stressors that can be encountered during childhood is having to work at a young age. In a study conducted in our country, when children working as agricultural workers were asked about their future expectations, 30% of them stated that they wanted to have a profession, 18% of them stated that they did not want to be oppressed, and did not want to be a worker, and 13.6% of them stated that they did not have any expectations. The same study stated that 32.8% of children did not continue their education life (Karadeniz et al., 2021). As can be understood from the study findings, working as a worker in childhood makes it difficult for children to continue their education and hinders their dreams of getting a good profession or not working as a worker. Alternatively, it causes them to lose their hopes for the future at a very young age. However, no study has been found showing the effects of working as a worker during childhood in adulthood. In this study, the sociodemographic characteristics of the participants who worked as workers in their childhood were compared with their CTQ-28 score averages. It was found that there was a relationship between CTQ-28 score averages and the age at which the participants started working as children, their family's attitude towards them in their childhood, their reasons for working as a child, and status of difficulty in controlling their emotions. It has been determined that the mean CTQ-28 scores of individuals who started working before the age of 10, who have an oppressive-authoritarian family attitude, who work under the pressure of their families, and who have difficulty controlling their emotions are higher. Younger children will also have less ability to protect themselves. For this reason, it is thought that as the age of exposure to traumatic life events decreases, the adverse effects on the child will increase. In our study, this is thought to be the reason why childhood trauma is higher in individuals who had to work before the age of 10. In addition, parents' relationships with their children are thought to be critical in helping them cope with the traumatic events they experience. It has been determined that an authoritarian/oppressive parental attitude, in which there is a distant relationship between the parent and the child, excessive control over the child, and sometimes coercive punishments (Çoban et al., 2021), is associated with childhood trauma (Beşer et al., 2019). In this study, it was determined that childhood trauma was higher in individuals who worked under the pressure of their families. It is thought that this may be related to the oppressive parental attitude. Children who remain silent in the face of the events they experience and sometimes their parents' attitudes may also have difficulties expressing their emotions in the future. Studies have determined that there is a positive relationship between childhood trauma and difficulties in emotional regulation (Akpınar & Gümüş Demir, 2022; Özdamaca, 2023). In our study, it is thought that this is the reason why the average childhood trauma score of individuals who have difficulty controlling their emotions is higher. In addition, no study has been found in the literature examining the childhood trauma of individuals who worked as workers during their childhood. When studies on childhood trauma in different groups were examined, studies similar to our study results were found that stated that gender (Yüksel & Gökçearslan Çifci, 2017; Aydın & Bal, 2022; Terzioğlu et al., 2023; Nia et al, 2023) and marital status (Terzioğlu et al., 2023) did not affect childhood trauma and that individuals who grew up in a family with a democratic family attitude had lower childhood trauma scores (Akarsu et al., 2022). In addition, contrary to our study findings, studies have also been found stating that

people whose marital status is married (Gürsoy & Mechmet, 2023; Mechmet & Gürsoy, 2023), who grew up in a family of relatives (Gürsoy & Mechmet, 2023), and whose gender is male have higher average trauma childhood scores.

Adverse life events experienced in childhood do not only remain in childhood but can also occur in the form of severe physical and psychological problems (Öztanrıöver & Bugay Sökmez, 2022). For this reason, studies examining the effects of working as a worker in childhood on adulthood are valuable. In this study, we compare the sociodemographic characteristics and emotional regulation difficulties of individuals who worked as workers in their childhood. When the sociodemographic characteristics of the participants and DERS-16 score averages are compared, It was determined that there was a relationship between the participants' gender, their family's attitude towards them in childhood, their difficulty in controlling their emotions, and their difficulties in emotion regulation. It was determined that the average DERS-16 score of female individuals who had difficulty controlling their emotions was higher. In contrast, the average DERS-16 score of participants who grew up with a reassuring parental attitude was lower. It is known that girls have better empathy skills (Abanoz et al., 2022). Girls with high empathy skills are thought to be more sensitive to the events around them. For this reason, it is thought that women who had to work as workers in their childhood have higher emotional regulation difficulties. One of the most critical factors affecting social and emotional development during childhood is parental attitudes because it is known that there is a relationship between the emotional attitudes and skills of the mother and the emotional attitudes and skills of the child. In addition, the emotional skills that individuals have are shaped by the reactions of parents to their children's behavior (Çalışkan Sarı & Şahin-Acar, 2018). It is thought that children who grow up with a reassuring parental attitude have less difficulty in regulating emotions.

According to the results of the analysis conducted to examine the relationship between childhood psychological trauma and difficulties in emotional regulation, it was determined that there was a low-level relationship between CTQ-28 and DERS-16. Additionally, CTQ-28 was determined to have an 18% effect on DERS-16. In Gümüş Demir's study with university students, it was determined that there was a positive relationship between CTQ-28 and DERS-16 (Akpınar & Gümüş Demir, 2022). A study using a scale that associated higher scores with better emotion regulation found that there was a negative relationship between emotion regulation and childhood trauma (Hébert et al., 2018). So, we can say that they reached a similar result to our study finding. In the study conducted by Dereboy and her friends, it is stated that, similar to our study finding, childhood trauma has a significant effect on difficulties in emotional regulation and explains 18% of the total change (Dereboy et al., 2018).

CONCLUSION

Traumatic events experienced in childhood, when the foundations of personality are laid, may emerge as physiological or psychological problems in later periods. It is vital to examine the effects of child labor, which is considered a type of economic abuse, during adulthood. Our study, which examined the childhood traumas and emotion regulation difficulties of individuals who worked as workers in their childhood, determined that the participants' childhood traumas and emotion regulation difficulties were at a moderate level. It is recommended that the childhood traumas of individuals who worked as workers in their childhood be examined in larger sample groups.

Limitations of study

The fact that childhood trauma, which has psychiatric and cognitive dimensions, was evaluated only with the CTQ-28 scale, which is based on self-report, and the data was collected through an online survey are essential limitations of the study. Collecting data online may have resulted in the participants' high socioeconomic and educational levels. At the same time, since the CTQ-28 scale evaluates traumatic situations experienced during childhood, the possibility that people may have difficulty remembering is another study limitation. One of the critical limitations of the study is that, in addition to childhood trauma, the effects of other variables that may affect emotion regulation difficulties were not examined. At the same time, since this study is a cross-sectional study, the findings cannot be interpreted in a cause-effect relationship.

Acknowledgment

Thank you to everyone who supported our research.

Conflict of Interest

There is no conflict of interest between the authors.

Author Contributions

Plan, design: MY, SA; **Material, methods, and data collection:** MY, SA; **Data analysis and comments:** MY; **Writing and corrections:** MY.

Funding

Any institution or organization did not support this study.

Ethical Approval

Institution: Inonu University Scientific Research and Publication Ethics Board (Health Sciences Non-invasive Clinical Research Ethics Committee)
Date: 12/04/2022
Approval no: 2022/3381

REFERENCES

Abanoz, T., Gülay Ogelman, H., & Saraç, S. (2022). Social and emotional competence of young children by gender. *Journal of Research in Education and Teaching*, *11*(3), 95–104.

Akarsu, Ö., Budak, M. İ., & Okanlı, A. (2022). The relationship of childhood trauma with cyberbullying and cyber victimization among university students. *Archives of Psychiatric Nursing*, *41*, 181–187. https://doi.org/10.1016/j.apnu.2022.06.004

Aktaş, A., & Şahin, M. (2018). Narsisistik özellik, öz-şefkat ve duygu düzenleme güçlüğü arasındaki ilişkinin incelenmesi. *ASEAD, 5(6),* 362-374.

Akpınar, B., & Gümüş Demir, Z. (2022). Investigation of the relationship between childhood trauma, alexithymia, and emotion regulation difficulty in university students. *International Journal of Social Sciences*, *6*(26), 509–535. https://doi.org/10.52096/usbd.6.26.33

Alpay, E. H., Aydin, A., & Bellur, Z. (2017). The mediating role of the emotion regulation difficulties on the relationship between childhood traumas and posttraumatic stress. *Turkish Journal of Clinical Psychiatry*, *20*, 218–226. https://doi.org/10.5505/kpd.2017.98852

Aydın, D., & Bal, Ş. N. (2022). Foreign children in comparing childhood trauma to age and gender. *Ahi Bilge Dergisi (ABED)*, *2*(2), 148–164.

Bakar Kahraman, B., & Kizilay Çankaya, P. (2020). Childhood traumas, difficulty in emotion regulation and coping strategies in adult patients with nonsuicidal self-injury. *Anatolian Journal of Psychiatry*, *21*(4), 349–358. https://doi.org/10.5455/apd.70047

Beşer, N. G., Arabacı, L. B., Uzunoğlu, G., Bilaç, Ö., & Ozan, E. (2019). The determination of parent attitude and childhood trauma in adolescents pushed into crime. *Turkish Journal of Clinical Psychiatry*, *22*, 219–227. https://doi.org/10.5505/kpd.2019.94834

Çalışkan Sarı, A., & Şahin-Acar, B. (2018). The role of mothers' parenting attitudes and child's perceived parenting attitudes on children's emotion recognition. *Nesne Journal of Psychology*, *6*(12), 27–50. https://doi.org/10.7816/nesne-06-12-02

Çoban, A., Bilgen, Z., İdrisoğlu, Ö., Sönmez, İ., Türe Köse, H. B., & Ünlü Bozkurt, H. (2021). Examining the relationship between emotional and behavioral problems and parental attitude: Content analysis. *International Journal of Society Research*, *18*(Özel Sayı), 4302–4335. https://doi.org/10.26466/opus.907851

Çöpoğlu, M. (2018). Child labor in Turkey. *Iğdır Üniversitesi Sosyal Bilimler Dergisi*, *14*, 357–398.

Dereboy, Ç., Şahin Demirkapı, E., Şakiroğlu, M., & Şafak Öztürk, C. (2018). The relationship between childhood traumas, identity development, difficulties in emotion regulation and psychopathology. *Turkish Journal of Psychiatry*, *29*(4), 269–278.

Doba, K., Saloppé, X., Choukri, F., & Nandrino, J. L. (2022). Childhood trauma and posttraumatic stress symptoms in adolescents and young adults: The mediating role of mentalizing and emotion regulation strategies. *Child Abuse and Neglect*, *132*, 105815. https://doi.org/10.1016/j.chiabu.2022.105815

Fan, L., Chen, Y., Zhu, M., Mao, Z., & Li, N. (2023). Correlation between childhood trauma experience and depressive symptoms among young adults: The potential mediating role of loneliness. *Child Abuse and Neglect*, *144*, 106358. https://doi.org/10.1016/j.chiabu.2023.106358

Gruhn, M. A., & Compas, B. E. (2020). Effects of maltreatment on coping and emotion regulation in childhood and adolescence: A meta-analytic review. *Child Abuse & Neglect*, *103*, 104446. https://doi.org/10.1016/j.chiabu.2020.104446

Gürsoy, M. Y., & Mechmet, F. C. (2023). Correlations between childhood trauma and depression, anxiety, and stress levels in nurses. *Archives of Psychiatric Nursing*, *45*, 164–168. https://doi.org/10.1016/j.apnu.2023.06.018

Hébert, M., Langevin, R., & Oussaïd, E. (2018). Cumulative childhood trauma, emotion regulation, dissociation, and behavior problems in school-aged sexual abuse victims. *Journal of Affective Disorders*, *225*, 306–312. https://doi.org/10.1016/j.jad.2017.08.044

Karadeniz, O., Akın, E., & Abacı, N. İ. (2021). Child labor in hazelnut agriculture: Case of Giresun, Piraziz district. *Anadolu Journal of Agricultural Sciences*, *36*, 398–407. https://doi.org/10.7161/omuanajas.908552

Karagöz, Y. (2019). SPSS-AMOS-META Uygulamalı Nicel-Nitel-Karma, Bilimsel Araştırma Yöntemleri ve Yayın Etiği. Güncellenmiş ve Geliştirilmiş 2.Basım. Atlas Akademik Basım Yayın Dağıtım Tic. Ltd. Şti. Ankara. pp:19.

Karakaya, A., Çakmakkaya, B. Y., Akpınar, T., & Yılmaz, Y. (2021). Prevention of crime in the context of childhood traumas. *Social Sciences Research Journal (SSRJ)*, *10*(1), 195–204.

Mechmet, F. C., & Gürsoy, M. Y. (2023). Childhood traumas among nursing students and associated factors. *Archives of Psychiatric Nursing*, *43*, 98–105. https://doi.org/10.1016/j.apnu.2023.01.004

Nia, A. B., Weleff, J., Fogelman, N., Nourbakhsh, S., & Sinha, R. (2023). Regular cannabis use is associated with history of childhood and lifetime trauma in a non-clinical community sample. *Journal of Psychiatric Research*, *159*, 159–164. https://doi.org/10.1016/j.jpsychires.2023.01.036

Özdamaca, K. (2023). Investigation of the relationship of childhood trauma with emotion regulation, psychopathology. *Education And Society In The 21st Century*, *12*(34), 105–121.

Öztanrıöver, S., & Bugay Sökmez, A. (2022). Childhood traumas and developing safe shield skills: A case study. *The Journal of Clinical and Mental Health Counseling*, *2*(2), 1–32.

Sağlam, M., & Aral, N. (2016). Tarihsel süreç içerisinde çocuk ve çocukluk kavramları. *Çocuk ve Medeniyet*, *1*(2), 43–55. https://dergipark.org.tr/tr/pub/cm/issue/57207/807848

Şar, V., Öztürk, E., & Ikikardeş, E. (2012). Validity and Reliability of the Turkish version of childhood trauma questionnaire. *Journal of Medical Sciences*, *32*(4), 1054–1063. https://doi.org/10.5336/medsci.2011-26947

Soper, D. S. (2023). *Soper, D.S. (2023). A-priori Sample Size Calculator for Multiple Regression [Software]. Available from https://www.danielsoper.com/statcalc Accession date: 29.06.2023*.

Taşören, A. B. (2022). Working with childhood trauma: The traumaplay model. *Dokuz Eylul University The Journal of Graduate School of Social Sciences*, *24*(2), 707–726.

Terzioğlu, Ö. P., Çelikay Söyler, H., & Menekşe, Ö. (2023). The relationship between childhood traumas and social anxiety and feelings of loneliness. *Journal of Social, Humanities and Administrative Sciences*, *6*(2), 160–182. https://doi.org/10.26677/tr1010.2023.1177

Thompson, R. A. (1994). Emotion regulation: A theme in search of definition. *Monographs of the Society for Research in Child Development, 59(2/3)*, 25–52.

Yiğit, İ., & Guzey Yiğit, M. (2019). Psychometric properties of Turkish version of difficulties in emotion regulation scale-brief form (DERS-16). *Current Psychology*, *38*, 1503–1511. https://doi.org/10.1007/s12144-017-9712-7

Yüksel, M., & Gökçearslan Çifci, E. (2017). Examining childhood trauma level of adult convicts in terms of some variables. *TAAD, 30*, 57-86.

Zeng, Y., Fu, Y., Zhang, Y., Jiang, Y., Liu, J., & Li, J. (2023). Emotion regulation in undergraduate nursing students: A latent profile analysis. *Nurse Education in Practice*, *7*, 103722. https://doi.org/10.1016/j.nepr.2023.103722

ORİJİNAL MAKALE / ORIGINAL ARTICLE

Balıkesir Sağlık Bilimleri Dergisi / BAUN Sağ Bil Derg
Balıkesir Health Sciences Journal / BAUN Health Sci J
ISSN: 2146-9601- e ISSN: 2147-2238
Doi: https://doi.org/10.53424/balikesirsbd.1355623

The Effect of Bingo Games and Board Games Applied to Nursing Students in Pharmacology Lessons On Lesson Motivation

Birsel MOLU [1], Alev YILDIRIM KESKİN [1]

[1] Selçuk University, Akşehir Kadir Yallagöz Health School, Department of Nursing

Geliş Tarihi / Received: *05.09.2023*, ***Kabul Tarihi / Accepted:*** *25.02.2024*

ABSTRACT

Objective: This study aims to investigate the effect of bingo games and board games methods on the motivation levels of nursing students taking pharmacology courses. **Materials and Methods:** A quasi-experimental study with a post-test only design was conducted with 72 nursing students at a state university in Türkiye between March and April 2023. Data collection was carried out using an Information Form to gather demographic data, a Bingo Game played with cards, and a Board Game consisting of a game board, game pieces, drawing data cards, drawing blanks question cards, winding paths, and scoring mechanisms. The students were divided into two groups, Group A and Group B, by the student affairs office for administrative purposes, unrelated to the study. Both groups participated in play sessions after pharmacology lectures throughout the semester. Group A played a modified version of the bingo game that included pharmacology concepts, while Group B played a modified board game incorporating pharmacology concepts. The instructional material motivation of the students was assessed with using the Instructional Materials Motivation Scale (IMMS). The study followed a structured approach within the specified time frame, utilizing the bingo and board games as interactive teaching tools in the pharmacology course. All topics related to the pharmacology course were taught to both groups by the same instructor for two hours in one day a week throughout the semester. **Results:** The mean IMMS total score was 132.91±20.06 for the bingo group. The mean IMMS score was 124.80±20.54 for the board game group. The mean scores of the IMMS for total and sub-dimensions were not significantly different between the bingo game and board game groups ($p > 0.05$). **Conclusion:** The study found that there was no significant difference in the motivation levels of nursing students who used bingo or board games as reinforcement in pharmacology lessons.

Keywords: Pharmacology, Nurse education, Nursing student, Motivation, Bingo game, Board game.

Hemşirelik Öğrencilerine Farmakoloji Derslerinde Uygulanan Bingo ve Masa Oyunlarının Ders Motivasyonuna Etkisi

ÖZ

Amaç: Bu çalışma farmakoloji dersi alan hemşirelik öğrencilerinin motivasyon düzeylerine bingo oyunu ve masa oyunu yöntemlerinin etkisini araştırmayı amaçlamaktadır. **Gereç ve Yöntem:** Mart ve Nisan 2023 tarihleri arasında Türkiye'deki bir devlet üniversitesinde okuyan 72 hemşirelik öğrencisi ile sadece son test tasarımına sahip yarı deneysel bir çalışma yürütülmüştür. Veri toplama işlemi, demografik verileri toplamak için bilgi formu, kartlarla oynanan bir Bingo Oyunu ve bir oyun tahtası, oyun parçaları, çizim veri kartları, boşluk çekme soru kartları, dolambaçlı yollar ve puanlama mekanizmalarından oluşan bir masa oyunu kullanılarak gerçekleştirilmiştir. Öğrenciler, öğrenci işleri tarafından çalışmayla ilgisi olmayan idari amaçlarla A Grubu ve B Grubu olmak üzere iki gruba ayrılmıştır. Her iki grup da dönem boyunca farmakoloji derslerinden sonra oyun oturumlarına katıldı. A Grubu, farmakoloji kavramlarını içeren bingo oyununun değiştirilmiş bir versiyonunu oynarken, B Grubu, farmakoloji kavramlarını içeren değiştirilmiş bir masa oyunu oynadı. Öğrencilerin öğretim materyali motivasyonları Öğretim Materyalleri Motivasyon Ölçeği (ÖMMÖ) kullanılarak değerlendirildi. Çalışma, farmakoloji dersinde interaktif öğretim araçları olarak bingo ve masa oyunlarını kullanarak, belirlenen zaman dilimi içerisinde yapılandırılmış bir yaklaşım izlemiştir. Farmakoloji dersi ile ilgili tüm konular her iki gruba da dönem boyunca haftada bir gün ikişer saat aynı öğretim elemanı tarafından anlatılmıştır. **Bulgular:** Öğretim Materyalleri Motivasyon Ölçeği toplam puan ortalaması bingo grubu için 132.91±20.06'dır. Masa oyunu grubunun ÖMMÖ puan ortalaması 124.80±20.54'tür. Öğretim Materyalleri Motivasyon Ölçeği toplam ve alt boyutlarının ortalama puanları bingo oyunu ve masa oyunu grupları arasında anlamlı farklılık göstermemektedir ($p>0.05$). **Sonuç:** Çalışmada, farmakoloji derslerinde pekiştireç olarak bingo veya masa oyunu kullanan hemşirelik öğrencilerinin motivasyon düzeylerinde anlamlı bir fark olmadığı bulunmuştur.

Anahtar kelimeler: Farmakoloji, Hemşire eğitimi, Hemşirelik öğrencisi, Motivasyon, Bingo oyunu, Masa oyunu.

Sorumlu Yazar / Corresponding Author: Birsel Molu, Selçuk University, Akşehir Kadir Yallagöz Health School, Department of Nursing, Konya, Türkiye
E-mail: brslml@hotmail.com

Bu makaleye atıf yapmak için / Cite this article: Molu, B., & Yıldırım Keskin, A. (2024). The effect of bingo games and board games applied to nursing students in pharmacology lessons on lesson motivation. *BAUN HealthSci J, 13*(2), 294-300. https://doi.org/10.53424/balikesirsbd.1355623

INTRODUCTION

Nursing education equips future nurses with the knowledge, skills, and attitudes they need to deliver safe, effective, and quality care to patients. However, it has become difficult for nursing educators to focus nursing students on their courses (Brown, 2018). Especially in basic science courses (such as pharmacology, anatomy, and physiology), traditional education methods do not attract students' interest, and they often have difficulty learning the subjects (Xu, 2016).

Pharmacology is a core course in nursing education, and it is important for nursing students' safe drug administration in clinical settings. However, traditional pharmacology teaching methods, which usually involve memorization without practical application, are not effective in achieving this goal (Yiin & Chern, 2023). Pharmacology is a course that many nursing students approach with fear. Students in these courses often find it difficult to learn the language of pharmacology while at the same time being forced to memorize large amounts of new information. In nursing schools, pharmacology courses are often taught traditionally, through dense and lengthy PowerPoint slides, and students may remember some of this information (McEnroe-Petitte & Farris, 2020). As the field of education evolves, innovative and engaging approaches to teaching have become increasingly important in ensuring effective learning outcomes. In recent years, alternative teaching methods such as gamification have gained popularity in nursing education to increase student engagement and motivation (Elzeky, Elhabashy, Ali, & Allam, 2022). Gamification is the application of game design principles to non-game contexts to make them more engaging and motivating (McEnroe-Petitte & Farris, 2020). Bingo and board games are two examples of gamification techniques used to increase student motivation and engagement in nursing education (Brown, 2020; Chang & Yeh, 2021; Hsieh, 2016). The first of these approaches is the inclusion of board games in the academic curriculum. Studies have demonstrated the benefits of implementing gamification strategies in various educational settings, including nursing education (Chang et al., 2022; Wu, Chen, Hwang, & LEE, 2023). In particular, board games are used in courses due to their effectiveness in supplementing traditional learning methods by increasing student engagement and promoting better recall of course materials (Luchi, Cardozo, & Marcondes, 2019; McEnroe-Petitte & Farris, 2020). As a result, the inclusion of board game interventions can offer nursing students a better learning environment. Board games have been found to increase knowledge retention, change real-world behaviors, and influence therapeutic outcomes through their ability to make learning more fun and easier (Lickiewicz, Hughes, & Makara-Studzińska, 2020). The second interaction method is the use of bingo (Brown, 2020). Similar to the board game, the bingo game also encourages student for learning (Brown, 2020; Chang et al., 2022; Hsieh, 2016).

Games have been used in nursing education to improve cognitive function, satisfaction, motivation, and learning in a variety of ways (Branney & Priego-Hernández, 2018; Chang et al., 2022; Fernandes, Marcolan, & Rosado, 2022; Xu, 2016). Therefore, studies on the effectiveness of these techniques in increasing nursing students' motivation and engagement in pharmacology courses are needed. This study aims to investigate the effect of bingo games and board games methods on the motivation levels of nursing students taking pharmacology courses.

Research Question

What is the effect of the application of bingo games and board games methods on the motivation levels of nursing students taking pharmacology courses?

MATERIALS AND METHODS

Research design, setting, and time frame

A quasi-experimental study with a post-test only design was conducted with nursing students at a state university in Türkiye between March and April 2023. At the beginning of each semester at the state university where the study was conducted, the students are divided into two groups, Group A and Group B, by the student affairs office. This division is unrelated to the specific study on bingo games and board games in pharmacology courses. The group division is a common practice for administrative purposes within the university and is not influenced by the study itself.

The population and the sample of the research

The study was conducted with a sample of 90 first-year nursing students from a state university in Türkiye. The inclusion criteria for the study were defined as follows: being a first year nursing student, not having received education within the scope of pharmacology courses before, and voluntary participation. The exclusion criteria for the study included students who were absent during the data collection phase or who withdrew from the study for any reason. The study was completed with 72 students after nine students in each group were absent during the data collection phase.

Data collection

"Information Form", "Bingo Game and Board Game", and "Instructional Materials Motivation Scale (IMMS)" were used to collect the data.

Information Form: A information form was developed by the researchers to collect demographic data from the participants, such as their age, gender, socio-economic status, and level of satisfaction with games.

***BINGO Game*:** Bingo is a game played with cards; each bingo card has five columns and five rows, and each card has 25 boxes with numbers. Winning five consecutive squares vertically, horizontally, or from corner to corner is enough to succeed in bingo. Students who knew the questions tried to complete the sequence by closing that number (Barros, Sarmento, Gutteres, Belo, & Goncalves, 2022; Brown, 2020).

Figure 1. Bingo card

Board Game: A game board and game pieces were prepared for the board game. It consisted of a drawing data card, drawing blanks question card blanks, winding paths, and scoring for returning to the beginning for unknown questions and going to the final. In the data card, questions on all subjects of pharmacology, information about drugs, ways of administration, and nursing care were prepared. Before starting the game, the rules of the game were explained to the students.

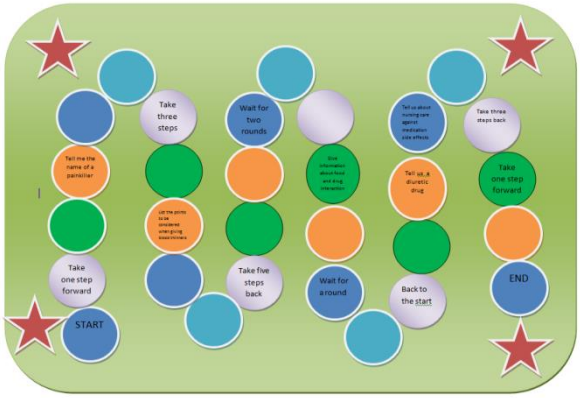


Figure 2. Board game.

Instructional Materials Motivation Scale (IMMS): The IMMS is a 33-item, four-dimensional (attention, relevance, confidence, satisfaction) measurement tool developed by Keller (2009) based on the Attention, Relevance, Confidence, Satisfaction (ARCS) Model. It was adapted into Turkish by Dinçer and Doğanay (2016). The original IMMS scale has 36 items. The scores range from 33 to 165, with higher scores indicating higher levels of motivation towards the instructional material. The Cronbach alpha value for the whole scale is 0.96. In this study, the IMMS Cronbach alpha value was found to be 0.79.

Application and instructional material

At the beginning of each semester at the state university where the study was conducted, the students are divided into two groups, Group A and Group B, by the student affairs office. This division is unrelated to the specific study on bingo games and board games in pharmacology courses. The group division is a common practice for administrative purposes within the university and is not influenced by the study itself.

Throughout the semester, after the pharmacology lecture, both Group A and Group B participated in play sessions. The game sessions took place regularly, in particular once at the end of each lecture. After the lecture, students in Group A played a modified version of the bingo game that included pharmacology concepts, while students in Group B played a modified board game that also included pharmacology concepts.

All topics related to the pharmacology course were taught to both groups by the same instructor using the traditional PowerPoint method for 2 hours between 08:30 and 10:10 one day a week during the semester. Traditional PowerPoints were prepared by utilizing the mentioned sources (Frandsen & Pennington, 2014; Harris, Nagy, & Vardaxis, 2014). At the end of the lesson, the students in group A played a bingo game adapted to the pharmacology course by the researchers, and group B played a board game adapted to the pharmacology course. After the game, all groups filled out the "Student Information Form" and "IMMS".

In the study, both the Bingo game and the board game were played by all students at the same time. Here's some further explanatory information about each game and how they were conducted:

Bingo Game: Bingo is a game played with cards, where each card has 5 columns and 5 rows, totaling 25 boxes with numbers. Students, who knew the questions, tried to complete a sequence by closing the corresponding number on their bingo card. The game was played in a group setting, with all participants playing simultaneously. The correct answers were checked during the game by the instructor and a student not participating in the game. Winners in the bingo game were determined by reaching a certain pattern on the bingo cards. The aim of the game was to mark or cover five consecutive squares vertically, horizontally or diagonally. During the game, as the instructor or designated person asked questions related to the pharmacology course, students who knew the answers marked or covered the corresponding number on the bingo cards. When a student successfully marked a pattern of five consecutive squares in any direction (vertically, horizontally or diagonally), student said "Bingo" to indicate that student had completed the required pattern and won the game. The game had multiple winners. The first student to obtain the winning pattern and say "Bingo" would be considered the winner of that round of the game.

Board Game: The board game included a game board, game pieces, drawing data cards, drawing blanks question cards, winding paths, and scoring for returning to the beginning in case of unknown questions and progressing towards the final. The data cards contained questions related to various subjects of pharmacology, including information about drugs, ways of administration, and nursing care. Before starting the game, the rules of the board game were explained to the students. Similar to the Bingo game, all students played the board game simultaneously in a group setting. In the board game, the winner of the game must answer the

questions on the game board and reach the goal. At the end of the game, the person who knows the most questions and reaches the goal wins the game. There is one minute for each question to be known. If the question is not answered within one minute, that student is waiting for one round of penalty time. The questions in both groups were prepared to reinforce the topics covered in the course (Frandsen & Pennington, 2014; Harris, Nagy, & Vardaxis, 2014). The playing time of both games was 45 minutes.

Data analysis

The data were analyzed with using SPSS 22, a statistical software program. The following statistical parameters and tests were used: frequency, mean, percentage, standard deviation, independent t-test, Mann-Whitney U test, and chi-square test. A p-value of 0.05 was considered to be statistically significant.

Ethical considerations

To implement the study and collect the data, permissions were obtained from the Selçuk University, Akşehir Kadir Yallagöz Health School (15.12.2022-E.424040), and from Selçuk University, Faculty of Medicine, Local Ethics Committee (18.01.2023-E.431666). Verbal and written consents from the students who would participate in the study, and permission to use the scale from the relevant persons were also obtained.

RESULTS

Table 1 shows the distribution and comparisons of the bingo and board game groups according to their individual and family characteristics. It was seen that 47.2% of the students in the bingo game group were between the ages of 18-19, 86.1% were female, 88.9% lived in a nuclear family, 52.8% had good academic achievement, 77.8% played a game related to education in the lesson, 100% liked the bingo game applied, 97.2% thought that the applied game contributed to learning, and they wanted to use game materials in other lessons.

It was determined that 58.3% of the students in the board game group were between the ages of 18-19, 66.7% were female, 72.2% lived in a large family, 50% had average academic achievement, 91.7% played a game related to education in the lesson, 94.4% liked the applied board game, 91.7% thought that the applied game contributed to learning, and 94.4% were willing to use game materials in other lessons. The two groups were comparable in terms of control variables, as there were no significant differences in the distribution of individual and familial characteristics (p=0.178, p=0.052, p=0.148, p=0.775).

Table 1. The individual and family characteristics of the two groups were compared (n = 72).

Characteristics		Bingo game (n=36)		Board game (n=36)		Test and significance value	
		n	%	n	%	x^{2*}	p
Age	18-19	17	47.2	21	58.3	7.635	0.178
	20-21	17	47.2	15	41.7		
	22 and above	2	5.6	-	-		
Gender	Female	31	86.1	24	66.7	3.773	0.052
	Male	5	13.9	12	33.3		
Family type	Nuclear family	32	88.9	6	16.7	3.824	0.148
	Extended family	4	11.1	26	72.2		
	Fragmented family	-	-	4	11.1		
Family income	Income less than expenditure	5	13.9	6	16.7	0.511	0.775
	Income equal to expenditure	25	69.4	26	72.2		
	Income more than expenditure	6	16.7	4	11.1		
Academic success status	Good	19	52.8	17	47.2	0.229	0.892
	Moderate	17	47.2	19	52.8		
Previous experience of playing games in class	Yes	28	77.8	33	91.7	2.683	0.101
	No	8	22.2	3	8.3		
Appreciation of the implemented game	Yes	36	100.0	34	94.4	2.057	0.151
	No	-	-	2	5.6		
Contribution of the applied game to learning	Yes	35	97.2	33	91.7	1.059	0.303
	No	1	2.8	3	8.3		
Request to use play activities in other lessons	Yes	35	97.2	34	94.4	0.348	0.555
	No	1	2.8	2	5.6		

***X^2**= Pearson Chi-square test.

Table 2 shows the mean scores of the IMMS and its sub-dimensions for the bingo game and board game groups. The mean scores of the attention and concern sub-dimensions of the IMMS were 39.44 ± 5.68 and 31.55±9.30, respectively, for the bingo group. The mean scores of the trust and satisfaction sub-dimensions of the IMMS were 37.55±8.53 and 24.36±3.91, respectively. The mean total score of the IMMS was 132.91±20.06. The mean scores of the attention, interest, confidence, and satisfaction sub-dimensions of the IMMS for the board game group were 37.16±6.42, 28.61±5.00, 35.33±9.13, and 23.69±5.73, respectively. The mean IMMS score was 124.80±20.54. The mean IMMS scores and all sub-dimension mean scores of the bingo game group and the board game group were not significantly different.

Table 2. Mean scores of IMMS and ıts sub-dimensions for Bingo and Board game groups (n=72).

	Bingo game	Board game	t/U	p
	Mean ± SD	Mean ± SD		
Attention	39.44±5.68	37.16±6.42	U= 507.50**	0.113
Relevance	31.55±9.30	28.61±5.00	U=546**	0.249
Confidence	37.55±8.53	35.33±9.13	t=1.067*	0.290
Satisfaction	24.36±3.91	23.69±5.73	U=525**	0.164
Total IMMS	132.91±20.06	124.80±20.54	U=511**	0.123

*Independent groups t-test, **Mann-Whitney U test.

DISCUSSION

Motivating students in nursing education is very important to increase their learning experience and participation. In recent years, gamification techniques have attracted attention as practical tools to promote motivation and active participation in educational settings. This study aims to investigate the potential benefits of two gamification methods, bingo and board games, in increasing student motivation in nursing education.

A comparison of the distribution of individual and familial characteristics between the groups revealed no significant differences (Table 1). The current finding, expressed by almost all students in both groups, revealed that they would like to use game materials in other courses, and it supports the idea that these techniques could be interesting and motivating for students. The absence of a control group without gamification intervention in this study limits our ability to draw firm conclusions about the effects of these techniques on motivation and learning outcomes. However, the high levels of satisfaction and perceived effectiveness reported by students in both groups provide some evidence for the potential benefits of gamification in nursing education. The finding that 100% of the students in the bingo game group enjoyed the game is particularly noteworthy, as it suggests that this method may be particularly appealing to nursing students. However, it is important to note that individual preferences for gamification techniques could vary widely, and other factors such as the specific learning context and characteristics of the student population may also influence the effectiveness of these interventions. Previous studies have also shown that nursing students are satisfied with bingo and board games in courses, and those games have an effect on their learning motivation (Brown, 2020; Lin, Lin, Wang, Su, & Huang, 2021; McEnroe-Petitte & Farris, 2020; Sailer, Hense, Mayr, & Mandl, 2017).

This study examined the effectiveness of bingo and board games in increasing student motivation in nursing education. The IMMS scores were not significantly different between the bingo and board game groups for any of the sub-dimensions. This finding is consistent with previous research, which has shown that both bingo and board games can be effective in motivating students (Branney & Priego-Hernández, 2018; Manning-Stanley, Pickering, Bonnett, & MacKay, 2022). In a study by Koivisto and Haavisto (2018), it was found that gamification interventions in nursing education had a positive effect on learning outcomes, but the effect sizes were generally small and not significant (Koivisto et al., 2018). In a study conducted by Aras and Çiftçi (2021), it was found that a game-based learning approach and a question-and-answer method using Kahoot! did not provide significant improvements in student motivation and learning outcomes in the infection control course (Aras & Çiftçi, 2021). The lack of a significant difference in the study may be due to factors such as the level of competition and feedback provided in the game. It may be linked to different types of students and learning contexts. Therefore, it should be noted that further research is needed to identify the most effective gamification strategies. The findings of this study are largely consistent with existing literature on gamification in nursing education, which suggests that active student engagement is a key factor in promoting motivation and learning outcomes (Branney & Priego-Hernández, 2018; Koivisto et al., 2018; Maharjan et al., 2022; Manning-Stanley et al., 2022).

The effectiveness of any teaching method in nurse education depends on the active participation of the students. While the current study suggests that both bingo and board game methods may be equally effective in increasing motivation, it could be considered that neither method has superiority over student motivation. Although the current study focused on immediate effects, examining the sustainability of motivational benefits over time would be valuable for educators and curriculum planners. Furthermore, investigating the potential synergistic effects of combining gamification techniques with other instructional strategies may further increase student motivation and learning outcomes (Brown, 2020; Chang et al., 2022; Hsieh, 2016; Ozdemir & Dinc, 2022).

Limitations of study

The study's findings may not be generalizable to other populations of nursing students due to its limited sample size and single-university setting. The absence of a control group without gamification intervention in this study limits our ability to draw firm conclusions about the effects of these techniques on motivation and learning outcomes.

CONCLUSION

The study indicated no significant difference in the effectiveness of bingo and board games in increasing the motivation levels of nursing students taking pharmacology courses. Therefore, it could be suggested that both bingo and board game methods could be used as alternative teaching methods to increase nursing students' motivation in pharmacology courses. The effectiveness of these methods may be affected by the specific characteristics of the students and the context in which they are used.

Acknowledgement

The authors would like to extend their sincere thanks to anyone who contributed to this study.

Conflict of Interest

The author declare no potential conflicts of interest withrespect to the research, authorship and/or publication ofthis article.

Author Contributions

Plan, design: BM, AYK; **Material, methods and data collection:** BM, AYK; **Data analysis and comments:** BM, AYK; **Writing and corrections:** BM, AYK.

Funding

None.

Ethical considerations

To implement the study and collect the data, permissions were obtained from the Selçuk University, Akşehir Kadir Yallagöz Health School (15.12.2022-E.424040), and from Selçuk University, Faculty of Medicine, Local Ethics Committee (18.01.2023-E.431666). Verbal and written consents from the students who would participate in the study, and permission to use the scale from the relevant persons were also obtained.

REFERENCES

Aras, G. N., & Çiftçi, B. (2021). Comparison of the effect of reinforcement with question-answer and kahoot method on the success and motivation levels of nursing students: A quasi-experimental review. *Nurse Education Today, 102*, 104930. https://doi.org/10.1016/j.nedt.2021.104930.

Barros, I., Sarmento, J., Gutteres, C., Belo, F., & Goncalves, A. (2022). Using bingo to teach english plural nouns. *ISCE: Journal of Innovative Studies on Character and Education, 6*(2), 312-326.

Branney, J., & Priego-Hernández, J. (2018). A mixed methods evaluation of team-based learning for applied pathophysiology in undergraduate nursing education. *Nurse Education Today, 61*, 127-133. https://doi.org/10.1016/j.nedt.2017.11.014.

Brown, T. (2018). Using Jenga to teach risk management concepts to senior nursing students. *Journal of Nursing Education, 57*(12), 765-765. https://doi.org/10.3928/01484834-20181119-12.

Brown, T. (2020). BINGO! Patient safety. *Nurse Educator, 45*(1), 60. https://doi.org/10.1097/NNE.0000000000000737

Chang, W.-L., & Yeh, Y.-c. (2021). A blended design of game-based learning for motivation, knowledge sharing and critical thinking enhancement. *Technology, Pedagogy and Education, 30*(2), 271-285. https://doi.org/10.1080/147 5939X.2021.1885482.

Chang, Y.-S., Hu, S. H., Kuo, S.-W., Chang, K.-M., Kuo, C.-L., Nguyen, T. V., & Chuang, Y.-H. (2022). Effects of board game play on nursing students' medication knowledge: A randomized controlled trial. *Nurse Education in Practice, 63*, 103412. https://doi.org/10.1016/j.nepr.2022.103412.

Dinçer, S., & Doğanay, A. (2016). Turkish adaptation study of the motivation scale for instructional material (IMMS). *Primary Education Online*, 15(4). https://doi.org/10.17051/io.2016.19056.

Elzeky, M. E., Elhabashy, H. M., Ali, W. G., & Allam, S. M. (2022). Effect of gamified flipped classroom on improving nursing students' skills competency and learning motivation: a randomized controlled trial. *BMC nursing, 21*(1), 316. https://doi.org/10.1186/s12912-022-01096-6.

Fernandes, C. N., Marcolan, L. F., & Rosado, S. R. (2022). *The efficiency of using games in the teaching and learning process about burn victims.* Paper presented at the EDULEARN22 Proceedings. https://doi.org/10.21125/ed ulearn.2022.1542

Frandsen, G., & Pennington, S. S. (2014). Abrams' clinical drug therapy rational drug applications for nurses. Akademisyen Medical Bookstore.

Harris, P., Nagy, S., & Vardaxis, N. (2014). *Mosby's dictionary of medicine, nursing and health professions-australian & new zealand edition-eBook*. Elsevier Health Sciences.

Hsieh, C. (2016). Bingo! team-based game in english medical terminology for baccalaureate nursing students. *International Archives of Nursing and Health Care, 2*(2), 2-3.

Keller, J. (2009). Motivational design for learning and performance: the ARCS model approach. Springer Science & Business Media.

Koivisto, J.-M., Haavisto, E., Niemi, H., Haho, P., Nylund, S., & Multisilta, J. (2018). Design principles for simulation games for learning clinical reasoning: A design-based research approach. *Nurse Education Today, 60*, 114-120. https://doi.org/10.1016/j.nedt.2017.10.002.

Lickiewicz, J., Hughes, P., & Makara-Studzińska, M. (2020). The use of board games in healthcare teaching. *Nursing Problems/Problemy Pielęgniarstwa, 28*(2), 71-74. https:// doi.org/10.5114/ppiel.2020.98766.

Lin, H.-C. K., Lin, Y.-H., Wang, T.-H., Su, L.-K., & Huang, Y.-M. (2021). Effects of incorporating augmented reality into a board game for high school students' learning motivation and acceptance in health education. *Sustainability, 13*(6), 3333. https://doi.org/10.3390/su13063333.

Luchi, K. C. G., Cardozo, L. T., & Marcondes, F. K. (2019). Increased learning by using board game on muscular system physiology compared with guided study. *Advances in physiology education, 43*(2), 149-154. https://doi.org/10.1152/advan.00165.2018.

Maharjan, N., Kuroda, K., Silwal, G., Toyama, S., Ominato, Y., Tsuchida, Y., Ichitsubo, M. (2022). Implementation of design based learning for the development of SDGs educational games. *Journal of Technology and Science Education, 12*(2), 496-509. http://dx.doi.org/10.3926/jotse.1578.

Manning-Stanley, A., Pickering, V., Bonnett, L., & MacKay, S. (2022). *The use of a flıpped-classroom and team-based learning (tbl) approach: replacing a standard lecture with an interactive 'bingo'session to deliver undergraduate content on abdominal pathology*. Paper presented at the INTED2022 Proceedings. https://doi.org/10.21125/int ed.2022.1615.

McEnroe-Petitte, D., & Farris, C. (2020). Using gaming as an active teaching strategy in nursing education. *Teaching and Learning in Nursing*, *15*(1), 61-65. https://doi.org/10.1016/j.teln.2019.09.002.

Ozdemir, E. K., & Dinc, L. (2022). Game-based learning in undergraduate nursing education: A systematic review of mixed-method studies. *Nurse Education in Practice*, 103375. https://doi.org/10.1016/j.nepr.2022.103375.

Sailer, M., Hense, J. U., Mayr, S. K., & Mandl, H. (2017). How gamification motivates: An experimental study of the effects of specific game design elements on psychological need satisfaction. *Computers in human behavior*, *69*, 371-380. https://doi.org/10.1016/j.chb.2016.12.033.

Wu, C.-S., Chen, M.-F., Hwang, H.-L., & LEE, B.-O. (2023). Effectiveness of a nursing board games in psychiatric nursing course for undergraduate nursing students: an experimental design. *Nurse Education in Practice*, 103657. https://doi.org/10.1016/j.nepr.2023.103657.

Xu, J.-h. (2016). Toolbox of teaching strategies in nurse education. *Chinese Nursing Research*, *3*(2), 54-57. https://doi.org/10.1016/j.cnre.2016.06.002.

Yiin, S.-J., & Chern, C.-L. (2023). The effects of an active learning mechanism on cognitive load and learning achievement: A new approach for pharmacology teaching to Taiwanese nursing students. *Nurse Education Today*, *124*, 105756. https://doi.org/10.1016/j.nedt.2023.105756.

ORİJİNAL MAKALE / ORIGINAL ARTICLE
Balıkesir Sağlık Bilimleri Dergisi / BAUN Sağ Bil Derg
Balıkesir Health Sciences Journal / BAUN Health Sci J
ISSN: 2146-9601- e ISSN: 2147-2238
Doi: https://doi.org/10.53424/balikesirsbd.1333859

Prevalence of Early Loss of Teeth 0-16 Year-Old Turkish Pediatric Population: A Ten-Year Retrospective Study

Ozgur DOGAN[1], Fatma Duygu DERTLI[2], Suat Serhan ALTINTEPE DOGAN[3], Meliksah URAL[1]

[1] Afyonkarahisar Health Science University, Department of Pediatric Dentistry
[2] Pediatric Dentist, Eskisehir
[3] Afyonkarahisar Health Science University, Department of Periodontology

Geliş Tarihi / Received: *28.07.2023* ***Kabul Tarihi / Accepted:*** *26.02.2024*

ABSTRACT

Objective: This retrospective study aims to estimate the extraction frequencies of primary and permanent teeth in Turkish pediatric dental patients according to age and sex. **Materials and Methods:**Data collected from 21.856 patients aged 0-16 between 2012 and 2021 were evaluated. During the evaluation phase, patients were grouped according to their age and sex. Primary teeth, permanent first molars, and premolar teeth extraction were evaluated separately.A total of 19.502 records were evaluated. Microsoft Excel and SPSS data analysis software were used to analyze the data. To analyze the data, we used student t-tests, one-way ANOVA, Games-Howell post hoc, and chi-square tests to analyze the data. We adhere to the standard statistical significance level of 0.05. **Results:**The most commonly extracted permanent teeth are the first molars in the mandibula and the molar and premolars in the maxilla. Boys had higher tooth extraction than girls ($p<0.05$).Moreover, upper primary first molars were extracted in boys, and lower primary first molars were extracted in girls ($p<0.001$). **Conclusion:**Although great developments in smart technological devices and innovations in dentistry, tooth caries, and related tooth extractions are still the most frequently used dental procedure. Further studies on smart device-based dental hygiene education may reduce tooth extractions to provide training about these devices.

Keywords: Tooth Extraction, Permanent First Molar, Premolar Tooth Extraction.

0-16 Yaş Türk Pediatrik Popülasyonunda Erken Diş Kaybı Prevelansı: 10 Yıllık Retrospektif Çalışma

ÖZ

Amaç: Bu retrospektif çalışmanın amacı, Türk çocuk hastalarda yaş ve cinsiyete göre süt ve daimi dişlerin çekim sıklıklarını tahmin etmektir. **Gereç ve Yöntem:** 2012-2021 yılları arasında 0-16 yaş arası 21.856 hastadan toplanan veriler değerlendirilmiştir. Değerlendirme aşamasında hastalar yaş ve cinsiyetlerine göre gruplandırıldı. Süt dişleri, daimi birinci büyük azı dişleri ve premolar diş çekimleri ayrı ayrı değerlendirildi. Toplam 19.502 kayıt değerlendirilmiştir.Verileri analiz etmek için Microsoft Excel ve SPSS veri analizi yazılımları kullanılmıştır. Verileri analiz etmek için öğrenci t-testleri, tek yönlü ANOVA, Games-Howell post hoc ve ki-kare testleri kullanılmıştır. Standart istatistiksel anlamlılık düzeyi olan 0.05'e bağlı kalınmıştır. **Bulgular:** En sık çekilen daimî dişler mandibuladaki birinci molar dişler ve maksilladaki molar ve premolar dişlerdir. Erkeklerde diş çekimi kızlara göre daha fazladır ($p<0.05$). Ayrıca, erkeklerde üst birinci molar dişler, kızlarda ise alt birinci molar dişler daha sık çekilmiştir ($p<0.001$). **Sonuç:** Teknolojik cihazlardaki büyük gelişmeler ve diş hekimliğindeki yeniliklere rağmen, diş çürükleri ve buna bağlı diş çekimleri hala en sık kullanılan tedavi prosedürüdür, Akıllı cihaz tabanlı oral hijyen eğitimi üzerine yapılacak daha fazla çalışma, eğitim vermek için kullanılırsa diş çekimlerini azaltabilir.

Anahtar Kelimeler: Diş Çekimi, Molar Diş, Premolar Diş Çekimi.

Sorumlu Yazar / Corresponding Author: Melikşah URAL, Afyonkarahisar Health Science University, Department of Pediatric Dentistry, Aftonkarahisar, Türkiye
E-mail: meliksahural@gmail.com

Bu makaleye atıf yapmak için / Cite this article: Dogan, O., Dertli, F. D., Altıntepe Dogan, S. S., & Ural, M. (2024). Prevalence of early loss of teeth 0-16 year-old Turkish pediatric population: a ten-year retrospective study. *BAUN Health Sci J, 13(*2), 301-309. https://doi.org/10.53424/balikesirsbd.1333859

INTRODUCTION

Properly developing dentofacial structures and establishing normal occlusal relationships are both possible by keeping the teeth healthy in both primary and young permanent dentition (Monte-Santo & ark., 2018). Primary teeth lost before the normal exfoliating time are called premature tooth loss (Tatlı & Sarı, 2022). Despite advances in modern dentistry, The extraction of teeth remains frequently performed in dentistry (Alsheneifi & Hughes, 2001). Appropriate childhood healthcare is essential for developing healthy teeth and a correct occlusal relationship. Therefore, maintaining healthy dentition is the responsibility of all dentists, especially pediatric dentists in childhood (Bamashmoos & ark., 2020).

Pathologies that cause tooth extraction have previously been revealed in detail in the literature. Several reasons can lead to dental extractions, including caries, periodontitis, traumatic dental injuries, impacted teeth, unsuccessful dental procedures, and orthodontic treatment (Caldas, Marcenes & Sheiham, 2000; Chestnutt, Binnie & Taylor, 2000; Matthews, Smith & Hanscom 2001; Perera & Ekanayake, 2011; Tatlı & Sarı, 2022). Despite other etiological causes, caries and periodontitis are the two most common major reasons of extractions (Akhter,Hassan,Aida,Zaman & Morita, 2008; Chrysanthakopoulos & Nikolaos, 2011; Tatlı & Sarı, 2022). Studies have indicated that the number of teeth extracted generally increases with age (Lesolang, Motloba & Lalloo, 2009). The number of extracted teeth and whether they have previously been treated indicate socioeconomic status and oral hygiene level (Chrysanthakopoulos & Nikolao, 2011; Miyaura ,Matsuka, Morita, Yamashita & Watanabe, 1999; Tokuç & Çelik, 2022).

The primary goals of modern dentistry is to prevent premature tooth loss. Determining the teeth that are more commonly lost is essential in preventing tooth loss. Recent studies state that the frequency of tooth extraction has decreased. In contrast, others indicate that it has increased in recent years (Perera & Ekanayake,2011, Müller, Naharro & Carlsson, 2007). The common attribute of all studies is that further studies should incorporate larger populations. The present study, which analyzes the prevalence of tooth extraction, has the largest pediatric population in Turkey.

MATERIALS AND METHODS

Study type

We analyzed data from 21.856 patients, ranging in age from 0 to 16 years, who had experienced tooth extraction at Afyonkarahisar Health Sciences University Faculty of Dentistry between 2012 and 2021. The Department of Pediatric Dentistry has provided dentistry services since 2012 using the same ENLIL database (Efe Eroğlu Information Technologies Industry and Trade Limited Company, Odunpazarı, Eskişehir). The data of the dental treatment access codes and their corresponding dental treatment terminology in the database were compared. Periapical radiographs of the patients who underwent tooth extraction were examined with code 401051, and orthopantomographic X-ray images were examined with code 401080. The system code in this database was defined as 405010-1 for primary tooth extraction, 405010-2 for permanent tooth extraction, and 405021 for permanent tooth extraction with complications. These data entered into the ENLIL database were filtered and divided into groups after they were imported into the Excel (Excel, Office 365, Microsoft) numerical data processing software. The decision on the consistency of the clinical procedure and the codes entered into the system, the elimination of mistakes, and the accuracy of the data entered into the system were checked and approved by four researchers separately. After analyzing the data, it was found that 19.502 patients out of 21.856 were eligible to be included in the study. 2354 (10.77%) person were excluded from the analysis, including those who entered the system with the wrong transaction code, who had tooth extraction inconsistent with their age, and who did not have radiography. The pediatric dentistry clinic is only available for individuals under 16. Therefore, the study did not include individuals who were 16 years old or older. The teeth and ages were divided into specific groups to provide accurate statistical evaluation results and ease of analysis.

Less frequently extracted teeth in the pediatric population were excluded from the study to avoid disturbing the homogeneity of the statistical evaluation and to interpret the results more accurately.

Statistical analysis

SPSS (v.21, IBM Corporation, Armonk, NY, USA) software was used to dissect the data. Standard deviation and median (minimum-maximum) were used as descriptors for quantitative variables, and the number of patients (percentage) was used for qualitative variables. If there was a difference between a qualitative variable and two categories in a quantitative variable, a student t-test was utilized since standard distribution assumptions were provided. Thus, one-way ANOVA was used to determine whether there was a difference between the categories of the qualitative variable and more than two categories in a quantitative variable. The chi-square test was used to examine the relationship between two qualitative variables. Paired groups that created a significant difference were examined with the Games Howell post hoc test. The statistical significance level was set at 0.05.

Ethical considerations

The Afyonkarahisar Health Sciences University, Faculty of Medicine Ethics Committee, 2022/6, approved this study. All participants signed an informed consent form, and all procedures performed

in studies involving human participants were in accordance with the Helsinki Declaration.

Patients were categorized into one of the abovementioned groups, as appropriate, and then formed into groups (Table 1). The individuals with extracted teeth were grouped by sex, determining the tooth group extracted. Furthermore, the group of primary teeth extracted most frequently were categorized based on the age of the patients (Table 2). Tables 2, 3, and 4 groups and evaluate the distribution of primary and permanent teeth based on age and sex.

RESULTS

The average age of the patients who had a tooth extraction was 8.13 (mean) (Table 1) (Figure 1). The most frequently extracted tooth group among primary dentition was the lower primary molars, followed by upper primary molars and upper primary incisors (Table 1) (Figure 2). The mandibular molars were the most frequently extracted permanent teeth (Table 1), followed by maxillary molars and maxillary premolars (Table 2) (Figure 3). The maxillary and mandibular permanent first molars were compared. A significant age difference between maxillary and mandibular permanent molar extraction has been determined ($p<0.001$) (Table 2). After comparing the data by sex, it was found that boys had a higher frequency of permanent first molar extraction on the maxilla. The girls had a higher rate of lower permanent first molar ($p>0.05$) (Figure 4). Only the maxillary and mandibular permanent first molars showed a significant difference in age between the tooth groups ($p<0.001$) (Table 2) (Figure 5). Additionally, there were notable age and sex variations between the different permanent tooth groups ($p<0.001$). The majority of the permanent upper molars consisted of boys, while the upper premolars, lower premolars, and the majority of the lower molars consisted of girls (Table 4).

Comparisons were made for primary tooth groups, and significant differences were found between them in terms of age and sex ($p<0.001$ and $p<0.001$, respectively). The mandibular primary incisors were extracted most frequently at six years of age, and the primary molar group was at 8.5. The lower primary incisors and upper and lower primary canine tooth extraction procedures were mostly performed on girls ($p>0.05$) (Table 2).

Table 1. Descriptive values.

Variables		**(%)**
Age (years)	**Mean ± SD**	8.13 ± 2.20
	Median (Min-Max)	8.00 (0.00-16.00)
Primary tooth, n (%)	Maxillary Primary Incisor	2770 (15.2)
	Mandibular Primary Incisor	1421 (7.8)
	Maxillary And Mandibular Primary Canines	1414 (7.8)
	Maxillary Primary Molars	5738 (31.6)
	Mandibular Primary Molars	6827 (37.6)
Permanent tooth, n (%)	Maxillary Premolars	240 (23.8)
	Mandibular Premolars	82 (8.1)
	Maxillary Molars	264 (26.2)
	Mandibular Molars	421 (41.9)
Tooth Groups, n (%)	Primary Tooth	18170 (94.7)
	Permanent Tooth	1007 (5.3)
Permanent First Molar, n (%)	Maxillary Permanent First Molar	264 (38.5)
	Mandibular Permanent First Molar	421 (61,5)
Sex, n (%)	Male	10202 (53.2)
	Female	8975 (46.8)

SD: Standard Deviation, **Min:** Minimum, **Max:** Maximum.

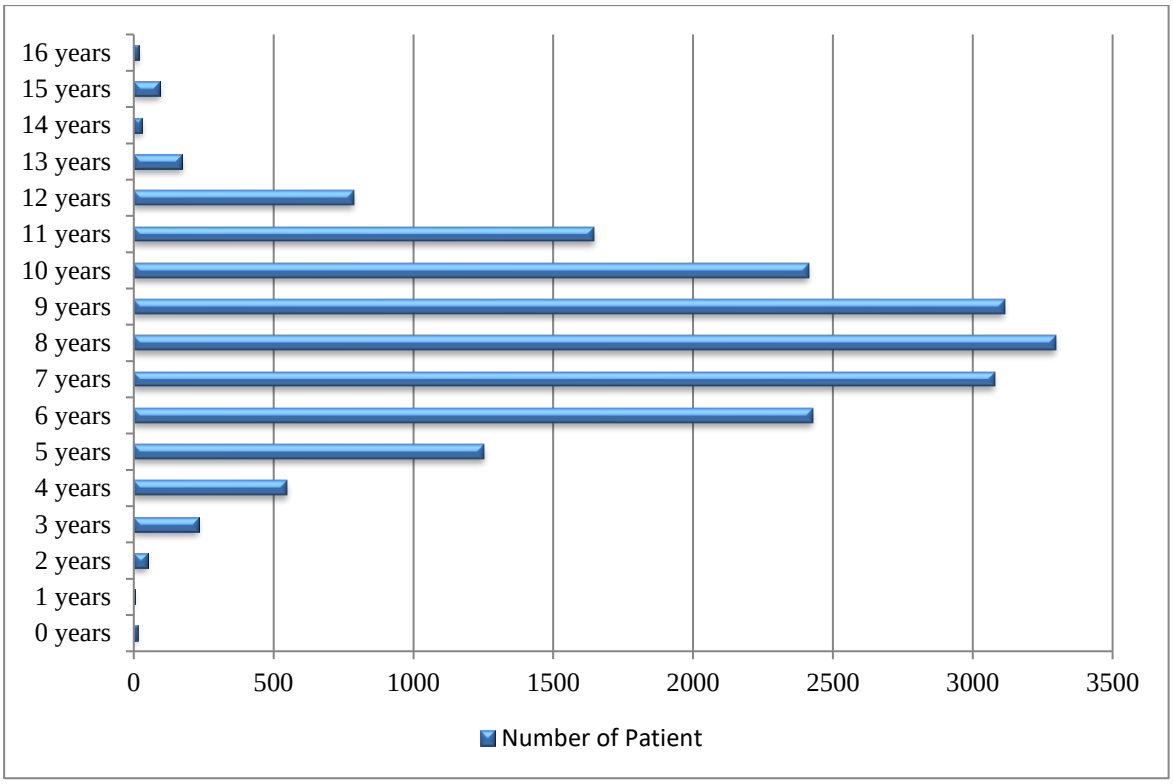


Figure 1. Distribution of the number of patients admitted by age.

Table 2. The relation of the extraction of primary teeth with age and sex.

Variables		Maxillary Primary Incisor	Mandibular Primary Incisor	Maxillary and Mandibular Primary Canines	Maxillary Primary Molars	Mandibular Primary Molars	p
Age (years)	**Mean±SD**	6.20 ± 1.77	6.60 ± 1.27	9.93 ± 1.54	8.46 ± 2.01	8.17 ± 1.82	<0.001[a]
	Median (Min-Max)	6.00 (1.00-12.00)	7.00 (0.00-11.00)	10.00 (2.00-12.00)	9.00 (2.00-12.00)	8.00 (3.00-12.00)	
Sex, n (%)	Male	1602(57.8)	694 (48.8)	660 (46.7)	3094 (53.9)	3732 (54.7)	<0.001[b]
	Female	1168(42.2)	727 (51.2)	754 (53.3)	2644 (46.1)	3095 (45.3)	

Table 3. Comparison of maxillary and mandibular permanent first molars.

Variables		Maxillary Permanent First Molar	Mandibular Permanent First Molar	p
Age (years)	Mean ± SD	9.76 ± 1.50	9.30 ± 1.58	<0.001[a]
	Median (Min-Max)	10.00 (6.00-14.00)	9.00 (6.00-13.00)	
Sex n (%)	Male	137 (51.9)	195 (46.3)	0.155[b]
	Female	127 (48.1)	226 (53.7)	

SD: Standard Deviation, Min: Minimum, Max: Maximum, a: Student's t-test, b: Chi-square test

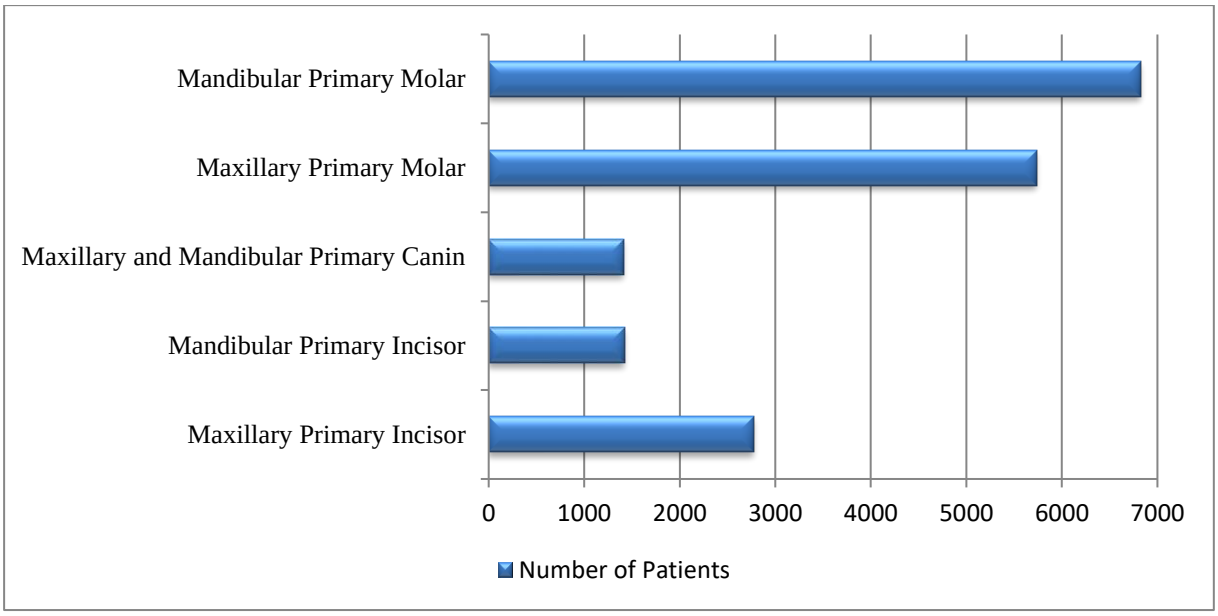


Figure 2. Distribution of the number of patients admitted by primary tooth types.

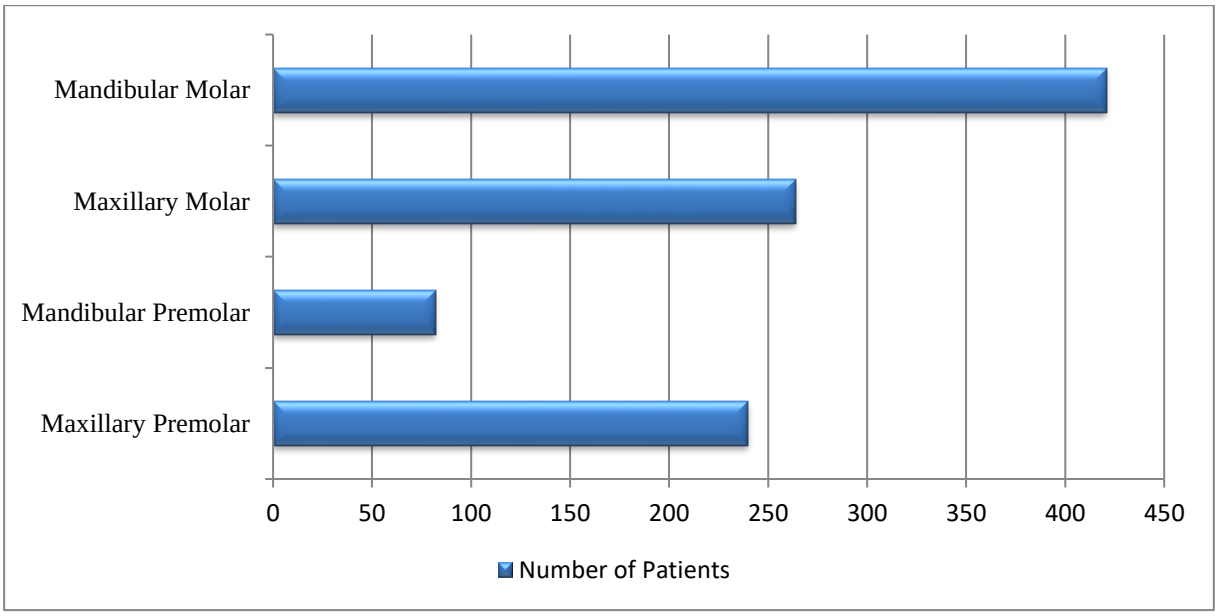


Figure 3. Distribution of the number of patients admitted by permanent tooth type.

Table 4. Comparison to permanent tooth.

Variables		**Maxillary Premolar**	**Mandibular Premolar**	**Maxillary Molar**	**Mandibular Molar**	**p**
Age (years)	**Mean±SD**	14.13 ± 1.05	12.62 ± 0.54	9.76 ± 1.50	9.30 ± 1.58	<0.001[a]
	Median (Min-Max)	14.00 (13.00 -16.00)	13.00 (11.00-13.00)	10.00 (6.00-14.00)	9.00 (6.00-14.00)	
Sex, n (%)	Male	71 (29.6)	17 (20.7)	137 (51.9)	195 (46.3)	<0.001[b]
	Female	169 (70.4)	65 (79.3)	127 (48.1)	226 (53.7)	

SD: Max standard deviation, Min: minimum, Max: maximum, a: one-way ANOVA test, b: chi-square test

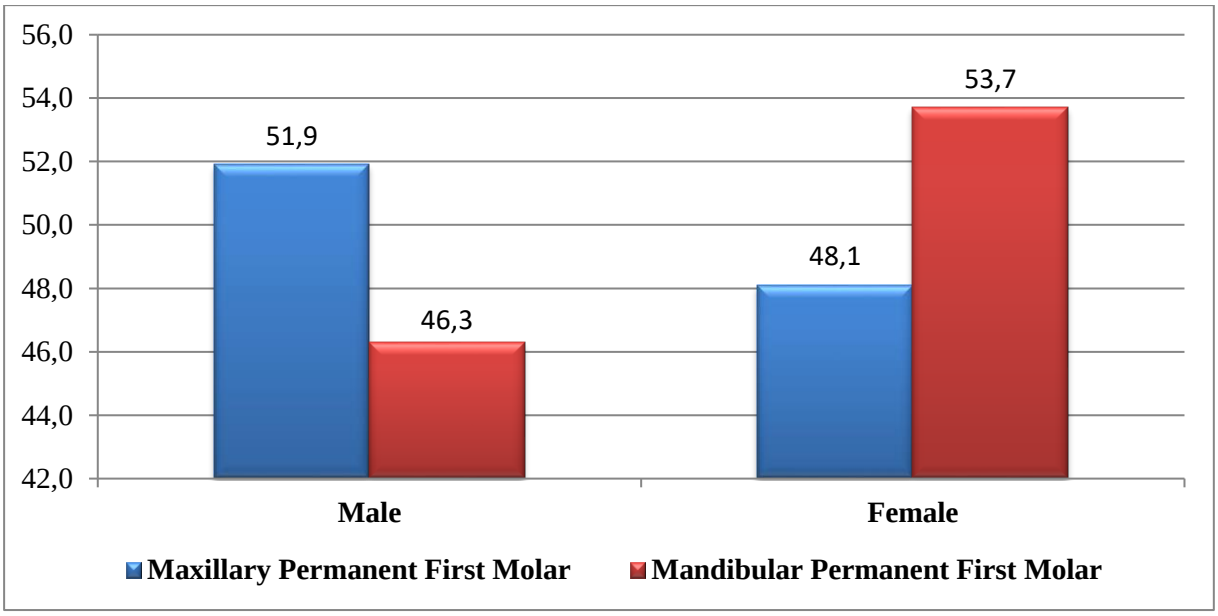
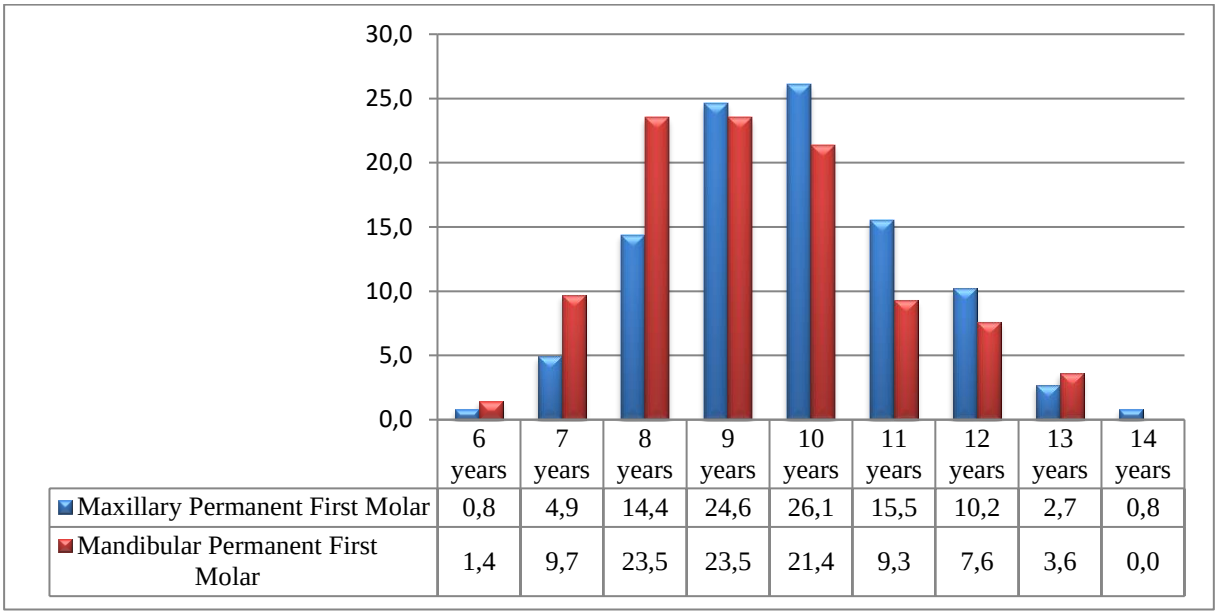


Figure 4. Distribution of permanent first molar tooth types by sex.



	6 years	7 years	8 years	9 years	10 years	11 years	12 years	13 years	14 years
Maxillary Permanent First Molar	0,8	4,9	14,4	24,6	26,1	15,5	10,2	2,7	0,8
Mandibular Permanent First Molar	1,4	9,7	23,5	23,5	21,4	9,3	7,6	3,6	0,0

Figure 5. Distribution of permanent first molar types by age group.

DISCUSSION

There is limited research on tooth extraction frequency among the general population in Turkey and pediatric patients (Demiriz & Hazar Bodrumlu, 2018; Tatlı & Sarı, 2022). The prevalence of tooth extraction with the most extensive sample group among the studies conducted in the Turkish pediatric population was evaluated. The data from 19.502 people were examined within the scope of the study.

Previous studies suggested that accessible dental health services can significantly affect individuals views and attitudes toward oral health (Angelillo, Nabilo & Pavila, 1996; Burdurlu, Dagasan, Cabbar, Karakurt & Atalay, 2020). Tooth caries still maintain the characteristic of being the primary etiological cause of tooth extraction in developing countries (Al-Shammari, Al-Ansari, Al-Melh, & Al-Khabbaz, 2006). More effective education and awareness-raising strategies can be developed to prevent tooth loss by examining and evaluating tooth extraction causes and prevalence according to age groups(Alsheneifi & Hughes, 2001).

Parents worldwide do not take their children to visit the dentist unless they complain of pain(Ahamed et al., 2012). Another reason is that parents avoid treatment, thinking that permanent teeth can replace primary teeth in the future (Burdurlu et al., 2020). The process of tooth extraction can significantly diminish the quality of life for individuals, regardless of whether they are children or adults (Al-Omiri, Karasneh, Lynch, Lamey & Clifford, 2009; Brennan et al., 2008). Uncontrolled dental caries and related tooth extractions in childhood lead to a loss of teeth over the years, leading to earlier onset of physical

disability and a higher early death rate in old age (Holm-Pedersen, Schultz-Larsen, Christiansen, & Avlund, 2008). As a result of the study, the most frequently extracted primary tooth group primary mandibular molars, followed by primary maxillary molars, primary incisors. The results were consistent with the previous studies of Bani et al.,(Bani et al., 2015) Demiriz & Bodrumlu (Demiriz & Hazar Bodrumlu, 2018). Burdurlu et al.,(Burdurlu et al., 2020), and Tatlı & Sarı(Tatlı & Sarı, 2022). These results were also previously reported by Tatlı & Sarı,(Tatlı & Sarı, 2022) Burdurlu et al.,(Burdurlu et al., 2020) and Bani et al.(Bani et al., 2015). In this study, it was found that boys had a higher rate of tooth extraction compared to girls. This observation can be attributed to the analysis of a large sample group (Tatlı & Sarı, 2022), which determined that boys lost their primary teeth significantly more than girls.

Pathologies such as the placement of the first molars at the end of the dental arch, their contact with the second primary molars, deep pits and fissures on the occlusal surface, and hypomineralization of the maxilla as well as incisors led to more caries, restorations, endodontic treatment, and tooth extraction in these teeth. The mandibular first molars were the most extracted permanent teeth, as shown in previous studies (Esin Günal, 2020; Halicioglu Toptas, Akkas, & Celikoglu, 2014; Tatlı & Sarı, 2022; Tokuç & Çelik, 2022). Maxillary molars and maxillary premolars, followed this. The results show that mandibular molars are lost significantly earlier than maxillary molars. The extraction age in mandibular molars is predominantly 9. The maxillary molars are mainly extracted at the age of 10.

In adolescents and young adults, premolar extractions, mainly upper ones, are performed as a part of orthodontic treatment (Halicioglu Toptas, Akkas, & Celikoglu, 2014). Anterior tooth crowding and lip protrusion are corrected by maxillary permanent first premolar extraction and, less frequently, second premolar extraction. In addition, the treatment protocol includes provision of occlusal rehabilitation in hyper-divergent face types and reduction of the vertical facial dimension (Kouvelis et al., 2018). In this study, evaluating the prevalence of extracted teeth and orthopantomographic examinations, the researchers confirmed that most of the maxillary and mandibular premolars were extracted because of the caries, unsuccessful treatments, compensation-balance procedures. Based on this information, premolars are extracted for orthodontic purposes. The upper premolars were extracted significantly more than the lower premolars. Maxillary premolar teeth are extracted at a significantly higher rate in girls than boys. There is a need for further studies on the Turkish population in this regard (Kouvelis et al., 2018).

The most important limitation is the inability to analyze the causes of extraction. The records of patients who visited the clinic were analyzed, focusing on a large sample of patients over the age of 10. The ENLIL data system has no data entry window where the reason for extraction is entered. However, in the data filtering, thickness checking, and analysis processes carried out by all four experimenters simultaneously, caries were the most common reason for extraction. Many parents do not have enough information about the early loss of primary teeth and the pathologies it can cause. Parents and caregivers are responsible for children's oral hygiene habits. Although it seems possible to avoid early tooth loss and its complications in pediatric and adolescent patients by educating parents, this issue is still controversial in the literature (Selwitz, Ismail & Pitts 2007). Studies have determined that school-based oral education programs generally give more effective results than community-based oral education programs (Larsen, Larsen, Handwerker, Kim, & Rosenthal, 2009).

It has been noted that the most frequently extracted teeth among adolescents are the mandibular molars, which are permanent molars. The results obtained in the current study confirm this. The cause for the extraction of permanent mandibular molars is similar to primary molars. In addition, it is one of the earliest permanent teeth to erupt in the mouth for most people. Individuals with active caries are more prone to experiencing early tooth caries during the eruption.

Limitations of study

There are significant limitations to this retrospective study, which analyzed patient records spanning a decade. In the 10-year retrospective design of this study, there is a high probability of mistakes in patient information. Researchers have invested significant effort in minimizing the occurrence of mistakes. One of the significant limitations is that the ENLIL database lacks information on the reasons for tooth extractions. In case of conflicting information regarding the age and the extracted tooth, the researchers reviewed the orthopantomography film of the patient again. Approximately 3000 patients were excluded from the study in this way. Based on our analysis, we have identified the most frequent mistakes that occur during data entry.

- Labeling of permanent tooth numbers despite primary tooth extraction.
- Entering permanent tooth extraction numbers into the system as primary tooth numbers.
- Tooth extraction without taking any radiographs from the patients to be extracted.
- Residual root extraction can make it seem like the primary tooth was extracted again.
- Supernumerary tooth extraction entered into the system as the number of the adjacent tooth. (No supernumerary tooth extraction entry information exists in the ENLIL database.)
- Spontaneously exfoliated teeth entered on the system as a later extraction by a dentist.
- Entering teeth lost due to trauma into the system as extractions by a dentist.

The number of final patients decreased to 19,502 with the elimination of mistakes by examining such reasons in detail.

This study, carried out by examining the data extensively, is one of the rare studies conducted in Turkey on this subject and in this context. The obtained data was collected exclusively from one city. Afyonkarahisar is a city located west of central Anatolia in Turkey. Its sociodemographic structure reflects the diversity found throughout Turkey (Müjgan, 2007). Studies with larger sample sizes and multi-centers are necessary to confirm the outcomes. The current study determined that tooth extraction was performed on babies under one year old. However, the majority of these patients lack radiographs. It was determined that these babies' primary incisors and natal/neonatal lower incisors were extracted. These babies were not excluded from the study, assuming that they had their primary teeth extracted.

According to the findings of the study, it was observed that boys had a higher incidence of extraction. Although this issue has been mentioned in the literature, it remains controversial. Boys may resist following parental instructions; they are more active and may express a stronger desire to conduct their tooth brushing (Peretz & Efrat, 2008). The lower instances of these factors in girls can often lead to the prevention of extraction procedures. Studies on patient compliance in dental clinics have shown that boys tend to have higher treatment compliance rates than girls (Peretz & Efrat, 2008).

CONCLUSION

Awareness should be raised through oral hygiene education for preschool and school children. Parents and children should be advised that dental caries is preventable, and that caries treatment is essential in the early period. Thus, tooth extraction and related complications can be prevented. All dentists should explain in detail to their patients and parents the importance of healthy dentition and how to maintain it.

Acknowledgement

The authors would like to extend their sincere thanks to anyone who contributed to this study.

Conflict of Interest

The author declare no potential conflicts of interest with respect to the research, authorship and/or publication of this article.

Author Contributions

Plan, design: ÖD, FDD; **Material, methods and data collection:** SSAD, FDD; **Data analysis and comments:** ÖD; **Writing and corrections:** ÖD, MU

Funding

None.

Ethical considerations

The Afyonkarahisar Health Sciences University, Faculty of Medicine Ethics Committee, 2022/6, approved this study. All participants signed an informed consent form, and all procedures performed in studies involving human participants were in accordance with the Helsinki Declaration.

REFERENCES

Ahamed, S. S., Reddy, V., Krishnakumar, R., Mohan, M., Sugumaran, D., & Rao, A. (2012). Prevalence of early loss of primary teeth in 5-10-year-old school children in Chidambaram Town. *Contemporary Clinical Dentistry*, *3*(1), 27. https://doi.org/10.4103/0976-237X.94542

Akhter, R., Hassan, N. M. M., Aida, J., Zaman, K. U., & Morita, M. (2008). risk indicators for tooth loss due to caries and periodontal disease in recipients of free dental treatment in an adult population in Bangladesh. *Oral Health & Preventive Dentistry*, *6*(3), 199–207.

Al-Omiri, M. K., Karasneh, J. A., Lynch, E., Lamey, P.-J., & Clifford, T. J. (2009). Impacts of missing upper anterior teeth on daily living. *International Dental Journal*, *59*(3), 127–132.

Al-Shammari, K. F., Al-Ansari, J. M., Al-Melh, M. A., & Al-Khabbaz, (2006). Reasons for tooth extraction in Kuwait. *Medical Principles and Practice*, *15*(6), 417–422. https://doi.org/10.1159/000095486

Alsheneifi, T., & Hughes, C. V. (2001). Reasons for dental extractions in children. *Pediatric Dentistry*, *23*(2), 109–112.

Angelillo, I. F., Nobile, C. G. A., & Pavia, M. (1996). Survey of reasons for extraction of permanent teeth in Italy. *Community Dentistry and Oral Epidemiology*, *24*(5), 336–340. https://doi.org/10.1111/j.1600-0528.1996.tb00872.x

Bamashmoos, K. A. O., Alhasani, A. H., Al-Akwa, A. A. Y., Zabara, A. Q. M. Q., Al-Shamahy, H. A. wahab, Al-deen, H. M. S., & Al-labani, M. A. et al. (2020). Prevalence of premature loss of prımary teeth at the age of 6-10 y ears in Sana'a City, Yemen. *Universal Journal of Pharmaceutical Research*. https://doi.org/10.22270/ujpr.v5i4.439

Bani, M., Akal, N., Bodur, H., Odabaş, M. E., Tüzüner, T., Delilbaşı, A. E., & Özdoğan, Y. T. et al. (2015). The reasons for extractions of primary teeth in Turkish Children. *European Journal of Paediatric Dentistry*, *16*(3), 187–190.

Brennan, D. S., Spencer, A. J., & Roberts-Thomson, K. F. (2008). Tooth loss, chewing ability and quality of life. *Quality of Life Research*, *17*(2), 227–235. https://doi.org/10.1007/s11136-007-9293-2

Burdurlu, Ç., Dagasan, V., Cabbar, F., Karakurt, C., & Atalay, B. (2020). Retrospective analysis of primary teeth extractions. *Yeditepe Dental Journal*, *16*(1), 49–53. https://doi.org/10.5505/yeditepe.2020.14227

Caldas, A. F., Marcenes, W., & Sheiham, A. (2000). Reasons for tooth extraction in a Brazilian population. *International Dental Journal*, *50*(5), 267–273. https://doi.org/10.1111/j.1875-595X.2000.tb00564.x

Chrysanthakopoulos, Nikolaos A. (2011). reasons for extraction of permanent teeth in greece: a five-year follow-up study. *International Dental Journal*, *61*(1), 19–24. https://doi.org/10.1111/j.1875-595X. 2011 00004.x

Demiriz L., & Hazar Bodrumlu, E. (2018). reasons for the extraction of primary teeth in primary school-age children in Zonguldak, Turkey: a retrospective study. *Meandros Medical and Dental Journal*, *19*(1), 32–38. https://doi.org/10.4274/meandros.21939

Esin Günal, P. B. (2020). Çocuk hastalarda erken diş kaybının yaşa ve diş grubuna göre incelenmesi. *Ankara Üniversitesi Diş Hekimliği Fakültesi Dergisi*, *1–3*(47), 27–35.

Halicioglu, K., Toptas, O., Akkas, I., & Celikoglu, M. (2014). Permanent first molar extraction in adolescents and young adults and its effect on the development of third molar. *Clinical Oral Investigations*, *18*(5), 1489–1494. https://doi.org/10.1007/s00784-013-1121-1

Holm-Pedersen, P., Schultz-Larsen, K., Christiansen, N., & Avlund, K. (2008). Tooth loss and subsequent disability and mortality in old age. *Journal of the American Geriatrics Society*, *56*(3), 429–435. https://doi.org/10.1111/j.1532-5415.2007.01602.x

Kouvelis G, Dritsas K, Doulis I, Kloukos D, Gkantidis N. Effect of orthodontic treatment with 4 premolar extractions compared with nonextraction treatment on the vertical dimension of the face: A systematic review. *American Journal of Orthodontics and Dentofacial Orthopedics*. 2018;154(2):175-187.

Larsen , C. D., Larsen, M. D., Handwerker, L. B., Kim, M. S., & Rosenthal, M. (2009). A comparison of urban school- and community-based dental clinics. *Journal of School Health*, *79*(3), 116–122. https://doi.org/10.1111/j.1746-1561.2008.00395.x

Lesolang , R. R., Motloba, D. P., & Lalloo, R. (2009). Patterns And Reasons Fo Clinic: 1998-2002. *SADJ : Journal of the South African Dental Association = Tydskrif van Die Suid* r Tooth Extraction At The Winterveldt,-*Afrikaanse Tandheelkundige Vereniging*, *64*(5), 214–215, 218.

Matthews, D. C., Smith, C. G., & Hanscom, S. L. (2001). Tooth loss in periodontal patients. *Journal (Canadian Dental Association)*, *67*(4), 207–210.

Miyaura , K., Matsuka, Y., Morita, M., Yamashita, A., & Watanabe, T. (1999). comparison of biting forces in different age and sex groups: a study of biting efficiency with mobile and non-mobile teeth. *Journal of Oral Rehabilitation*, *26*(3), 223–227. https://doi.org/10.1046/j.1365-2842.1999.00364.x

Monte Santo , A. S., Viana, S. V. C., Moreira, K. M. S., Imparato, J. C. P., Mendes, F. M., & Bonini, G. A. V. C., et al. (2018). Prevalence of early loss of primary molar and its impact in schoolchildren's quality of life. *International Journal Of Paediatric Dentistry*, *28*(6), 595–601. https://doi.org/10.1111/ipd.12416

Müjgan , G. (2007). *Kentleşme sürecinde akrabalık ve komşuluk kültürü*. Afyon Kocatepe Üniversitesi, Afyonkarahisar

Müller, F., Naharro, M., & Carlsson, G. E. (2007). What are the prevalence and incidence of tooth loss in the adult and elderly population in Europe? *Clinical Oral Implants Research*, *18*, 2–14. https://doi.org/10.1111/j.1600-0501.2007.01459.x

Perera, R., & Ekanayake, L. (2011). Tooth loss in Sri Lankan adults. *International Dental Journal*, *61*(1), 7–11. https://doi.org/10.1111/j.1875-595X.2011.00002.x

Peretz, B., & Efrat, J. (2008). Dental anxiety among young adolescent patients in Israel. *International Journal of Paediatric Dentistry*, *10*(2), 126–132. https://doi.org/10.1046/j.1365-263x.2000.00181.x

Selwitz, R. H., Ismail, A. I., & Pitts, N. B. (2007). Dental caries. *The Lancet*, *369*(9555), 51–59. https://doi.org/10.1016/S0140-6736(07)60031-2

Tatlı, E. C., & Sarı, A. H. (2022). Evaluation of the frequency of primary and permanent teeth extraction in children at a dental hospital: a cross-sectional study. *Turkiye Klinikleri Journal of Dental Sciences*, *28*(4), 839–845. https://doi.org/10.5336/dentalsci.2022-90792

Tokuç, M., & Çelik, M. (2022). Çocuklarda Diş çürüğü nedeniyle birinci büyük azı dişi çekimlerinin incelenmesi. *Acta Odontologica Turcica*, 16–20. https://doi.org/10.17214/gaziaot.90551

ORİJİNAL MAKALE / ORIGINAL ARTICLE

Balıkesir Sağlık Bilimleri Dergisi / BAUN Sağ Bil Derg
Balıkesir Health Sciences Journal / BAUN Health Sci J
ISSN: 2146-9601- e ISSN: 2147-2238
Doi: https://doi.org/10.53424/balikesirsbd.1356261

The Relationship Between Passive Smoking and Caries Experience in 1-12 Years Old Children and Its Influencing Factors

Ebru HAZAR BODRUMLU[1], Esra ŞAHİN[1], Hanife CAN[1]

[1] Zonguldak Bülent Ecevit University, Faculty of Dentistry, Department of Pediatric Dentistry

Geliş Tarihi / Received: *06.09.2023* , ***Kabul Tarihi / Accepted:*** *06.03.2024*

ABSTRACT

Aim: The aim of this study was to evaluate the relationship between passive smoking and dental caries to which children 1-12 years old are exposed to smoke by their parents and the factors affecting this relationship. **Material and Methods:** The examination data of 900 children aged 1-12 years who were admitted to Zonguldak Bulent Ecevit University, Faculty of Dentistry, Department of Pediatric Dentistry between December 2020 and May 2021 for various reasons and underwent routine examinations and met the study criteria were retrospectively analyzed. Sociodemographic characteristics, passive smoking status and dmft/DMFT scores of the children were recorded. The relationship between passive smoking status and dmft/DMFT scores and the factors affecting this relationship were analyzed. **Results:** Statistically significant correlation was found between passive smoking status and dmft/DMFT scores of children **(p=0.000).** At the same time, a significant relationship was found between passive smoking and income level ($p<0.05$). However, no significant relationship was found between passive smoking and sex and parental education level ($p>0.05$). **Conclusion:** Passive smoking is thought to be a risk factor in caries formation. Therefore, it is important to reduce exposure to passive smoking in order to protect both oral and dental health as well as general health of children.

Keywords: Cigarette Smoke, Child, Dental Caries, Passive Smoking.

1-12 Yaş Arası Çocuklarda Pasif Sigara İçiciliği ile Çürük Deneyimi Arasındaki İlişki ve Etkileyen Faktörler

ÖZ

Amaç: Bu çalışmanın amacı, 1-12 yaş arası çocukların ebeveynleri tarafından maruz bırakıldığı pasif içicilik durumu ile diş çürükleri arasındaki ilişkinin ve bu ilişkiyi etkileyen faktörlerin değerlendirilmesidir. **Gereç ve Yöntem:** Zonguldak Bülent Ecevit Üniversitesi Diş Hekimliği Fakültesi Pedodonti Anabilim Dalı Kliniği'ne Aralık 2020-Mayıs 2021 tarihleri arasında çeşitli sebeplerle başvurmuş ve rutin muayene işlemi yapılmış, çalışma kriterlerini sağlayan 1-12 yaş arasındaki 900 çocuğa ait muayene verileri retrospektif olarak incelendi. Çocukların sosyodemografik özellikleri, pasif sigara içicilik durumu ve dmft/DMFT skorları kayıt altına alındı. Çocukların pasif içicilik durumu ile dmft/DMFT skorları arasındaki ilişki ve bu ilişkiyi etkileyen faktörler incelendi. **Bulgular:** Sonuçlar incelendiğinde çocukların pasif içicilik durumu ile dmft/DMFT skorları arasında istatistiksel olarak anlamlı ilişki tespit edildi ($p=0.000$). Aynı zamanda pasif sigara içiciliği ile gelir düzeyi arasında anlamlı bir ilişki bulundu ($p<0.05$). Ancak pasif sigara içiciliği ile cinsiyet, ebeveynlerin eğitim durumu arasında anlamlı ilişki saptanmadı ($p>0.05$). **Sonuç:** Pasif sigara içiciliği çürük oluşumunda bir risk faktörü olabileceği düşünülmektedir. Bu sebeple çocukların hem ağız ve diş sağlığı hem de genel sağlığının korunması açısından pasif sigara içiciliğine maruziyetin azaltılması önemlidir.

Anahtar Kelimeler: Sigara Dumanı, Çocuk, Diş Çürüğü, Pasif İçicilik.

Sorumlu Yazar / Corresponding Author: Ebru HAZAR BODRUMLU, Zonguldak Bülent Ecevit University, Faculty of Dentistry, Department of Pediatric Dentistry, Zonguldak, Turkey
E-mail: hazarebru@yahoo.com

Bu makaleye atıf yapmak için / Cite this article: *Bodrumlu Hazar*, E., Şahin, E., & Can, H. (2024). The Relationship Between Passive Smoking and Caries Experience in 1-12 Years Old Children and Its Influencing Factors. *BAUN Health Sci J, 13*(2), 310-316. https://doi.org/10.53424/balikesirsbd.1356261

INTRODUCTION

Dental caries is a preventable, chronic, infectious, contagious and multifactorial disease (Touger-Decker and van Loveren, 2003). Cariogenic bacteria, fermentable carbohydrates, host and sufficient time are the main components that play a role in caries development, a disturbed balance between protective and risk factors affects the commencement and development of dental caries. The known risk factors for caries contain high numbers of acidogenic and cariogenic bacteria in the mouth, decreased salivary flow rate and buffering capacity, sensitive tooth surface, presence of maladapted dental restorations, inadequate oral hygiene habits, high intake of fermentable carbohydrates, inadequate knowledge and attitudes towards oral care habits (Chin, Kowolik and Stookey, 2015; González-Valero et al., 2018; Harris, Nicoll, Adair and Pine 2004). It is also argued that other factors such as gender, environmental, genetics, age and smoking affect the development of dental caries (Bartal, 2001).

Passive smoking, is defined as the inhalation of smoke and all detrimental substances released as a result of the combustion of tobacco products by non-smokers in open or closed areas (Avşar, Darka, Topaloğlu and Bek 2008; Jenkins, Tomkins and Guerin 2000). According to a report published by the World Health Organization in 2009, it was reported that 700 million children are exposed to cigarette smoke by their own parents, mostly at home (WHO, 2009). In Turkey, passive smoking was reported to be 81.3% in the primary school period (Ersu et al., 2004). The fact that children exposed to passive smoking have smaller bronchi and less developed immune systems causes children to be more affected by this situation. Passive smoking is reported to increase susceptibility to cancer, heart disease, asthma, respiratory diseases and neurological problems (Avşar et al., 2008; Florescu et al., 2009). In addition to systemic diseases, passive smoking also affects dental development, oral and dental health in children (Avşar, Topaloglu and HazarBodrumlu 2013). Passive smoking causes suppression of the immune system and vitamin C deficiency in children, leading to an increase in the number of cariogenic bacteria. On the other hand, when a mother who smokes and breastfeeds her baby, she plays a role in the progression of dental caries by causing oral transmission of toxic products to the baby and early colonisation of *Streptococcus mutans*. (Avşar et al., 2008; Avşar, Darka, Hazar Bodrumlu and Bek 2009; Bernabé, MacRitchie, Longbottom, Pitts and Sabbah 2017; Strauss, 2001). In addition, passive smoking affects the function and structure of the salivary glands, causing a decrease in salivary flow rate, buffering capacity and protective factors in the composition of saliva, leading to an increase in *S. mutans* colonization (Avşar et al., 2009). It is stated that environmental cigarette smoke negatively affects oral and dental health because it contains more than 4.000 chemical products (WHO, 2009). There is a lack of research investigating the correlation between passive smoking and dental caries in a significant sample size. The aim of this research was to evaluate the relationship between environmental tobacco smoke and caries and the factors affecting this relationship in children exposed to passive smoking by their parents.

MATERIALS AND METHODS

Design, setting, and sample

In this study, the examination records of 1.500 children who participated to Zonguldak Bulent Ecevit University Faculty of Dentistry, Department of Pediatric Dentistry between December 2020 and May 2021 for various reasons and underwent routine examination procedures were retrospectively analyzed. The null hypothesis is that there is no relationship between passive smoking and dental caries.

Data collection

As a result of this examination, 900 examination forms of 900 systemically healthy children aged 1-12 years without any syndromes and dental anomalies were evaluated. The patients with systemic disease, who use regular medication, had dental anomalies, and had a history of dental trauma were excluded from the study. Based on reference article results, with 95% confidence (1-α), 95% test power (1-β), and f2=0.105 effect size, the total number of cases to be included in the study was determined as 285. Age, sex, the reason for presentation to the clinic, smoking status of parents, family income level, educational level of parents and dmft/DMFT(decayed, missed, filled teeth) scores of children were recorded from the examination records of the patients. The data were collected in a blinded by a single researcher who is a specialist in pediatric dentistry. Based on these data, dmft/DMFT scores, parental education level and family income level were compared between children with and without passive smoking. At the same time, children who were passive smokers were grouped as children whose mothers smoked, children whose fathers smoked and children whose both parents smoked and their dmft scores were evaluated.

Statistical analysis

Descriptive statistical data (number, percentage, mean, standard deviation, minimum, maximum and median) were presented in the study. In the statistical analysis, the normality assumption was first checked with the Shapiro Wilk test. Mann Whitney U test was used to evaluate the difference between the averages of two independent groups that did not fit the normal distribution. Kruskal Wallis test was utilised to evaluate the means of three or more groups that did not have normal distribution. In the evaluation of the relationship between variables, Pearson Chi-Square test was used when the sample size assumption (expected value>5) was met; Fisher's Exact test was used when it was not met. Multinominal Logistic Regression analysis was utilised to model the dependent variable with independent variables. The datas were analysed in IBM SPSS 25 programme.

Ethical considerations

Ethics committee approval was received from Zonguldak Bulent Ecevit University Non-Interventional Clinical Research Ethics Committee with the decision dated 14.06.2023 and numbered 2023/12.

RESULTS

Within the scope of the study, 900 children, 474 (52%) girls and 426 boys (47.3%) aged 1-12 years, were evaluated. The mean age of the children in the current study was 7.15 years. The mean dmft/DMFT index scores of the children were 6.57. The smoking status of the parents of the children is shown in Table 1.

Table 1. Smoking status of the family.

		n	%
Smoking status of the family	Yes	422	46.9
	No	478	53.1
The smoker	Mother	62	14.7
	Father	271	64.2
	Both of them	89	21.1

In the study, the significant difference was found between passive smoking and income level ($p<0.05$). It was observed that children of middle-income families were more exposed to passive smoking. No significant differences were found between smoking status and sex, mother's and father's levels of education ($p>0.05$) (Table 2).

Table 2. Demographic characteristics of children and passive smoking status.

			Passive Smoking			
	Girl		**Yes**	**No**	**Test value**	**p**
Sex		**n**	226	248	0.251	0.616
		%	47.7	52.3		
		%S.D.	53.6	51.9		
	Boy	**n**	196	230		
		%	46.0	54.0		
		%S.D.	46.4	48.1		
Family monthly income	Low	**n**	16	22	8.308	**0.016***
		%	42.1	57.9		
		%S.D.	3.8	4.6		
	Middle	**n**	226	210		
		%	51.8	48.2		
		%S.D.	53.6	43.9		
	High	**n**	180	246		
		%	42.3	57.7		
		%S.D.	42.7	51.5		
Mother's education level	No education	**n**	3	2	6.208	0.287
		%	60.0	40.0		
		%S.D.	0.7	0.4		
	Primary School	**n**	88	106		
		%	45.4	54.6		
		%S.D.	20.9	22.2		
	Middle School	**n**	104	96		
		%	52.0	48.0		
		%S.D.	24.6	20.1		
	High School	**n**	159	172		
		%	48.0	52.0		
		%S.D.	37.7	36.0		
	University	**n**	62	91		
		%	40.5	59.5		
		%S.D.	14.7	19.0		
	MSc/PhD	**n**	6	11		
		%	35.3	64.7		
		%S.D.	1.4	2.3		

Table 2 (continue). Demographic characteristics of children and passive smoking status.

					Test value	p
Father's education level	No education	**n**	0	1	9.408	0.094
		%	0.0	100.0		
		%S.D.	0.0	0.2		
	Primary school	**n**	71	79		
		%	47.3	52.7		
		%S.D.	16.8	16.6		
	Middle school	**n**	101	84		
		%	54.6	45.4		
		%S.D.	23.9	17.6		
	High school	**n**	166	194		
		%	46.1	53.9		
		%S.D.	39.3	40.7		
	University	**n**	78	104		
		%	42.9	57.1		
		%S.D.	18.5	21.8		
	MSc/PhD	**n**	6	15		
		%	28.6	71.4		
		%S.D.	1.4	3.1		

*p<0.05 and S.D: Smoking status.

In present study, the significant relationship was found between the mean ages of children according to passive smoking status (p<0.05). The mean age of children who were passive smokers was higher than the mean age of children who were not passive smokers. The significant relationship was found between the mean dmft/DMFT index scores of children according to parental smoking status (p<0.05). The mean dmft/DMFT score of children exposed to cigarette smoke was higher than the mean dmft/DMFT score of those who were not exposed (Table 3).

Table 3. Comparison of age and dmft/DMFT scores of children according to passive smoking.

	Cigarette smoke exposure	n	X	Standard deviation	Median	Rank average	Test value	P
Age	Yes	422	7.46	3.26	5.9	473.07	91333.0	**0.014***
	No	478	6.87	3.20	7	430.57		
dmft/DMFT	Yes	420	7.27	4.14	5.8	493.04	82093.5	**0.000***
	No	478	5.94	4.36	6	411.24		

*p<0.05

In the study, no significant difference was found between the mean dmft/DMFT scores of children according to the parents who smoked at home (p>0.05) (Table 4). The null hypothesis is rejected.

Table 4. dmft/DMFT scores of children according to smoking parents.

dmft/DMFT	Smoking Parents	n	X	Standard deviation	Median	Rank average	Test statistic	P
	Mother	62	8.0484	4.622	8	232.12	2.3300	0.31
	Father	269	7.1078	4.085	7	206.47		
	Both of them	89	7.2247	3.945	7	207.61		

DISCUSSION

Environmental tobacco smoke refers to the mixed of main smoke exhaled and side stream smoke that contamines the air where tobacco is smoked. Exposure to environmental tobacco smoke is called passive smoking (Chan-Yeung & Dimich-Ward, 2003). Tobacco and tobacco smoke contain more than 4.000 different compounds, containing tar, carbonmonoxide, hydrogen cyanide, ammonia, formaldehyde, benzen and nicotine (John, Savitz and Sandler 1991). Cigarettes account for approximately 65-85% of global tobacco use. Approximately 20-80% of the World population is affected by the damaging effects of cigarette smoke. The negative effects of passive smoking are similar to those of active smoking and children are more vulnerable to those effects than adults in the first years of life (Bartal, 2001). Children are exposed to passive smoking in many different ways. In the prenatal period by the mother being an active or passive smoker, and in the postnatal period if the child being exposed to cigarette smoke by parents and other family members lead to passive smoking in children (Majorana et al., 2014; Tanaka, Miyake and Sasaki 2010).

In the current study, we investigated the impact of passive smoking on dental caries in children aged 1-12 years. The results show that children who were passive smokers had higher dmft/DMFT index scores. Mosharrafian et al. (Mosharrafian, Lohoni and Mokhtari 2020) also reported that a significant relationship between caries and secondhand smoking in children and children who exposed to cigarette smoke have been found to have more caries. It has been reported that this may be related to the cotinine in cigarettes affecting oral tissues and increasing plaque accumulation. Similarly, Nayani et al. (Nayani et al., 2018) evaluated the relationship between environmental tobacco smoke and dental caries in children aged 5-14 years and reported a relationship between passive smoking and caries. The reason for this was reported as an increase in the number of cariogenic bacteria and suppressing the immune system by nicotine via reducing the phagocytic activity of monocytes and neutrophils. Similar to this study, Tanaka et al. (Tanaka et al., 2015) reported the relationship between environmental tobacco smoke and caries in children during primary and permanent dentition in a study conducted in children aged 1-14 years in Japan. Patil (Patil, 2016) reported a correlation between environmental tobacco smoke and caries' prevalence in permanent teeth in a study conducted in children aged 4-11 years in the USA. It is thought be that the results of this study might be related to the susceptibility of children who are passive smokers to mouth breathing, the inhalation of cigarette smoke through the mouth and the transmission of toxic substances from the parent who is an active smoker to the child, resulting in an increase in the number of *S.mutans.* In contrast to this study results, Nakayama and Mori (Nakayama and Mori, 2015) reported that there was no significant relationship between secondhand smoking and dental caries in 3-aged children. It has been reported that frequently eating sugary foods is a factor in the formation of dental caries. In addition, in the present study, it was reported that there was no relationship between the dmft/DMFT index scores observed in children who were passive smokers and whether the parents were active smokers or not. In contrast to this study, in a similar study conducted by Williams et al. (Williams, Kwan and Parsons, 2000), a significant difference was found between children's dmft/DMFT scores and active smoker parents. It was reported that dmft/DMFT scores were higher in children whose mothers were active smokers. It is thought that the reason why no significant difference was observed in this study's result may be due to the fact that the number of children whose mothers were active smokers was less in the study group.

In the literature, it is reported that there is a relationship between environmental tobacco smoke and various sociodemographic factors. It has been observed that passive smoking at homes and indoor workplaces is higher in societies with low socioeconomic levels (Nazar, Lee, Arora and Millett 2016). In this study, a significant difference was found between family income status and children's exposure to passive smoking and a higher rate of secondhand smoke exposure was observed in children of middle-income families. Similarly, Nayani et al. (Nayani et al., 2018) reported that the children from families with low socioeconomic status were more exposed to environmental tobacco smoke. It was also reported that the pervasiveness of caries was higher in children whose families with low socioeconomic status. In a systematic review, 11 studies on the relationship between parental smoking status and family income statu were examined and as a result of this review, it was reported that there was a relationship between low income statutus and passive smoking in 10 of the relevant studies (Orton, Jones, Cooper,Lewis and Coleman 2014). In this study, no relationship was observed between the parents' education status and passive smoking in children. Similar to the results of this study, in the study conducted by Umutlu (Umutlu, 2022) concerning the effect of planned education given to parents about smoking in the home environment and passive smoking exposure of children, no significant relationship was observed between the educational level of parents and passive smoking of children. In the study conducted by Akçay and Özcebe (Akçay and Özcebe, 2018) on passive smoking in children in the home environment, it was reported that there was no significant relationship between smoking and mother's education statu, while there was a significant ralationship between smoking and father's education level. Gilman et al. (Gilman et al., 2008) reported that the number of cigarette packs smoked per year was higher in individuals with lower than high school education. In a systematic review, it has been reported that there was a significant relationship between parent's smoking status and lower levels of education and children being exposed to cigarette smoke mostly and continuously in the home environment (Orton et al., 2014). The variations in the results of all these studies may be related to the type of study, study populations with various cultures, different lifestyles and differences in dietary factors.

CONCLUSION

Passive smoking is a public health problem that affects not only general health but also oral and dental health. In the present study's results show that there is a relationship between passive smoking and dental caries. Reducing passive smoking is important not only for improving children's oral health for preventing other chronic diseases as well. For this reason, early education of parents about passive smoking is consequential.

Limitations of the study

As the research only covered Zonguldak Province, it cannot be generalized to Türkiye. Research data are limited to employee statements.

Acknowledgement

The authors would like to extend their sincere thanks to anyone who contributed to this study.

Conflict of Interest

The authors declare no potential conflicts of interest with respect to the research, authorship and/or publication of this article.

Author Contributions

Plan, design: EHB, CH, ŞE; **Material, methods and data collection:** EHB, CH, ŞE; **Data analysis and comments:** EHB, CH, ŞE; **Writing and corrections:** EHB CH, ŞE.

Funding

None.

Ethical considerations

Ethics committee approval was received from Zonguldak Bulent Ecevit University Non-Interventional Clinical Research Ethics Committee with the decision dated 14.06.2023 and numbered 2023/12.

REFERENCES

Akçay, D., & Özcebe, L. (2018). Çocukların evde sigara dumanından pasif etkilenme durumlarının incelenmesi. Zeynep Kamil Tıp Bülteni.

Avsar, A., Topaloglu, B., & Hazar-Bodrumlu, E. (2013). Association of passive smoking with dental development in young children. *European Journal of Paediatric Dentistry*, *14*(3), 215–218.

Avşar, A., Darka, O., Hazar Bodrumlu, E. & Bek, Y. (2009). Evaluation of the relationship between passive smoking and salivary electrolytes, protein, secretory IgA, sialic acid and amylase in young children. *Archives of Oral Biology*, *54*(5), 457–463. https://doi.org/10.1016/j.archoralbio.2009.01.017

Avşar, A., Darka, O., Topaloğlu, B., & Bek, Y. (2008). Association of passive smoking with caries and related salivary biomarkers in young children. *Archives of Oral Biology*, *53*(10), 969–974.

Bartal, M. (2001). Health effects of tobacco use and exposure. *Monaldi Archives For Chest Disease*, *56*(6), 545–554.

Bernabé, E., MacRitchie, H., Longbottom, C., Pitts, N. B., & Sabbah, W. (2017). Birth weight, breastfeeding, maternal smoking and caries trajectories. *Journal of dental research*, *96*(2), 171–178. https://doi.org/10.1177/0022034516678181

Chan-Yeung, M., & Dimich-Ward, H. (2003). Respiratory health effects of exposure to environmental tobacco smoke. *Respirology (Carlton, Vic.)*, *8*(2), 131–139.

Chin, J. R., Kowolik, J. E., & Stookey, G. K. (2015). Dental caries in the child and adolescent. *McDonald and Avery's Dentistry for the Child and Adolescent*, 155-176. https://doi.org/10.1016/b978-0-323-28745-6.00009-0

Ersu, R., Arman, A. R., Save, D., Karadag, B., Karakoc, F., Berkem, M., et al. (2004). Prevalence of snoring and symptoms of sleep-disordered breathing in primary school children in istanbul. *Chest*, *126*(1), 19–24.

Florescu, A., Ferrence, R., Einarson, T., Selby, P., Soldin, O., & Koren, G. (2009). Methods for quantification of exposure to cigarette smoking and environmental tobacco smoke: Focus on developmental toxicology. *Therapeutic Drug Monitoring*, *31*(1), 14–30.

Gilman, S. E., Martin, L. T., Abrams, D. B., Kawachi, I., Kubzansky, L., Loucks, E. B., et al. (2008). Educational attainment and cigarette smoking: A causal association? *International Journal of Epidemiology*, *37*(3), 615–624.

González-Valero, L., Montiel-Company, J. M., Bellot-Arcís, C., Almerich-Torres, T., Iranzo-Cortés, J. E., & Almerich-Silla, J. M. (2018). Association between passive tobacco exposure and caries in children and adolescents. A systematic review and meta-analysis. *PloS one*, *13*(8), e0202497. https://doi.org/10.1371/journal.pone.0202497

Harris, R., Nicoll, A. D., Adair, P. M., & Pine, C. M. (2004). Risk factors for dental caries in young children: A systematic review of the literature. *Community Dental Health*, *21*(1 Suppl), 71–85.

Jenkins, R. A., Tomkins, B., & Guerin, M. R. (2000). The Chemistry of Environmental Tobacco Smoke: Composition and Measurement. CRC Press.

John, E. M., Savitz, D. A., & Sandler, D. P. (1991). Prenatal exposure to parents' smoking and childhood cancer. *American Journal of Epidemiology*, *133*(2), 123–132.

Majorana, A., Cagetti, M. G., Bardellini, E., Amadori, F., Conti, G., Strohmenger, L., et al. (2014). Feeding and smoking habits as cumulative risk factors for early childhood caries in toddlers, after adjustment for several behavioral determinants: A retrospective study. *BMC Pediatrics*, 14, 45. https://doi.org/10.1186/1471-2431-14-45

Mosharrafian, S., Lohoni, S., & Mokhtari, S. (2020). Association between dental caries and passive smoking and its related factors in children aged 3-9 years old. International Journal of Clinical Pediatric Dentistry, 13(6), 600–605.

Nakayama, Y., & Mori, M. (2015). Association of environmental tobacco smoke and snacking habits with the risk of early childhood caries among 3-year-old Japanese children. Journal of Public Health Dentistry, 75(2), 157–162. https://doi.org/10.1111/jphd.12085

Nayani, A. A., Iqbal, R., Azam, S. I., Khan, F. R., Khan, A. H., Janjua, N., et al. (2018). Association between environmental tobacco smoke and dental caries amongst 5-14 years old children in Karachi, Pakistan. JPMA. *The Journal of The Pakistan Medical Association*, *68*(2), 203–209.

Nazar, G. P., Lee, J. T., Arora, M., & Millett, C. (2016). Socioeconomic inequalities in secondhand smoke exposure at home and at work in 15 low- and middle-income countries. Nicotine & Tobacco Research: Official journal of the Society for Research on Nicotine and Tobacco, 18(5), 1230–1239. https://doi.org/10.1093/ntr/ntv261

Orton, S., Jones, L. L., Cooper, S., Lewis, S., & Coleman, T. (2014). Predictors of children's secondhand smoke exposure at home: A systematic review and narrative synthesis of the evidence. *PloS one*, *9*(11), e112690. https://doi.org/10.1371/journal.pone.0112690

Patil, A. (2016). Secondhand smoke: A man-made disaster to oral health of children!. Children, 5(12), 13258-13261

Strauss R. S. (2001). Environmental tobacco smoke and serum vitamin C levels in children. *Pediatrics*, *107*(3), 540–542.

Tanaka, K., Miyake, Y., & Sasaki, S. (2010). Intake of dairy products and the prevalence of dental caries in young children. *Journal of Dentistry*, *38*(7), 579–583.

Tanaka, S., Shinzawa, M., Tokumasu, H., Seto, K., Tanaka, S., & Kawakami, K. (2015). Secondhand smoke and incidence of dental caries in deciduous teeth among children in Japan: population based retrospective cohort study. *BMJ (Clinical Research Ed.)*, *351*, h5397. https://doi.org/10.1136/bmj.h5397

Touger-Decker, R., & van Loveren, C. (2003). Sugars and dental caries. *The American Journal of Clinical Nutrition*, *78*(4), 881S–892S.

Umutlu, S. (2022). Ebeveynlere verilen planlı eğitimin ev ortamında sigara içilme durumuna ve 0-5 yaş arası çocuklarin pasif içicilik maruziyetine etkisi. Yüksek Lisans Tezi, Sivas Cumhuriyet Üniversitesi, Sivas.

Williams, S. A., Kwan, S. Y., & Parsons, S. (2000). Parental smoking practices and caries experience in pre-school children. *Caries Research*, *34*(2), 117–122.

World Health Organization. (2009). WHO report on the global tobacco epidemic, 2009: Implementing smoke-free environments. World Health Organization.

ORİJİNAL MAKALE / ORIGINAL ARTICLE

Balıkesir Sağlık Bilimleri Dergisi / BAUN Sağ Bil Derg
Balıkesir Health Sciences Journal / BAUN Health Sci J
ISSN: 2146-9601- e ISSN: 2147-2238
Doi: https://doi.org/10.53424/balikesirsbd.1396096

Pressure Ulcer in Intensive Care, Still?

Lütfiye Nur UZUN [1], Hümeyra HANÇER TOK [2]

[1]Bolu Provincial Health Directorate
[2]Sivas Cumhuriyet University, Susehri School of Health-Department of Nursing

Geliş Tarihi / Received: *25.11.2023,* ***Kabul Tarihi / Accepted:*** *06.03.2024*

ABSTRACT

Objectives: The aim of this study was to determine the prevalence of pressure ulcers, alongside pressure ulcer risks, sites, stages and risk factors in patients treated in tertiary intensive care units. **Material and Methods:** This study had a retrospective-descriptive design. The population of this study consisted of N=424 patients followed up in the tertiary intensive care unit of a state hospital between May 1 2022-May 1 2023. An informational form and Braden Scale for Predicting Pressure Ulcer Risk were used as data collection tools. Data collection was performed retrospectively via electronic health records. Means±standard deviation, numbers, percentages, and Kruskal-Wallis, Mann-Whitney U and Spearman's rho tests were used to analyze the data. **Results:** In this patient population, the total prevalence of pressure ulcers was 35.4% (n=150), the prevalence of hospital-acquired pressure ulcers was 12.9% (n=55), and the prevalence of existing pressure ulcers was 22.4% (n=95). All in all, 49.3% of patients had stage II pressure ulcers. The most common site of pressure ulcers was the sacrococcygeal region (65.3%). The mean Braden Scale for Predicting Pressure Ulcer Risk score was 10.56±1.6**. Conclusion:** The patients in this study were considered at risk for pressure ulcers. The results of this study highlight the importance of pressure ulcer risk identification, assessment, and strategies for intensive care patients. Today, the majority of patients still have pressure ulcer. Therefore, this study is important in terms of including up-to-date data.
Keywords: Pressure ulcers, Intensive Care Units, Prevalence.

Yoğun Bakımda Basınç Ülseri, Hala?

ÖZ

Amaç: Bu çalışma üçüncü basamak yoğun bakım ünitesinde tedavi gören hastaların basınç yarası gelişme durumları, basınç yarası risk düzeyi, basınç yarası gelişen bölgeleri, basınç yarası evreleri ve ilişkili olabileceği düşünülen risk faktörlerini belirlemek amacıyla yapılmıştır. **Materyal ve Metot:** Bu çalışma, retrospektif-tanımlayıcı olarak yapılmıştır. Çalışmanın evrenini "01.05.2022-01.05.2023" tarihleri arasında bir devlet hastanesinin üçüncü basamak yoğun bakım ünitesinde takip edilen N=424 hasta oluşturmuştur. Veri toplama aracı olarak; veri toplama formu ve Braden Basınç Ülseri Risk Değerlendirme Ölçeği kullanılmıştır. Veri toplama işlemi elektronik sağlık kayıtları üzerinden retrospektif olarak gerçekleştirilmiştir. Verilerin analizinde ortalama standart sapma, sayı, yüzde, Kruskal-Wallis, Mann-Whitney U ve Spearman's rho testleri kullanılmıştır. **Bulgular:** Bu hasta popülasyonunun basınç yarası prevalansı %35.4 (n=150), hastaların hastanede tedavi görürken basınç yarası gelişme prevalansı %12.9 (n=55), servise yatış öncesi basınç yarası gelişme prevalansı %22.4 (n=95) olarak hesaplanmıştır. Hastaların %49.3'ünde evre II basınç yarası geliştiği ve en çok %65.3 ile sakrokoksigeal bölgede basınç yarası oluştuğu görülmüştür. Bu çalışmaya dahil edilen hastaların Braden Basınç Ülseri Risk Değerlendirme Ölçeği puan ortalamaları 10.56 ±1.6'dır. **Sonuç:** Bu çalışmadaki hastaların basınç ülseri açısından risk altında olduğu kabul edildi. Bu çalışmanın sonuçları, yoğun bakım hastaları için basınç ülseri riskinin tanımlanması, değerlendirilmesi ve stratejilerinin önemini vurgulamaktadır. Günümüzde hastaların büyük çoğunluğunda hâlâ basınç ülseri bulunmaktadır. Bu nedenle bu çalışma güncel verileri içermesi açısından önemlidir.

Anahtar Kelimeler: Basınç yaraları, Yoğun Bakım Üniteleri, Prevalans.

Sorumlu Yazar / Corresponding Author: *Hümeyra HANÇER TOK,* Sivas Cumhuriyet University, Susehri School of Health-Department of Nursing, Sivas, Turkey.
E-mail: hancertok@gmail.com

Bu makaleye atıf yapmak için / Cite this article: *Uzun L. N. & Hançer Tok, H. (2024). Pressure ulcer in intensive care, stillt. BAUN Health Sci J, 13*(2), 317-323. https://doi.org/10.53424/balikesirsbd.1396096

INTRODUCTION

Pressure ulcers are localized areas of injury to the skin or subcutaneous soft tissues, most often on bony prominences, occurring as a result of intense and prolonged pressure or shearing (Haesler, 2019). Pressure ulcers can cause pain, poor quality of life, limited mobility, loss of productivity, social isolation, and depression. In addition, the incidence of pressure ulcers is considered as a parameter of nursing care quality that affects mortality-morbidity, patient safety, and care procedures (Hajhosseini et al., 2020; Kıraner et al., 2016). Despite expenditures (labor, money, time) on prevention and treatment, pressure ulcers are still prevalent (Hajhosseini et al., 2020; Song et al., 2020). The frequency of hospital-acquired pressure ulcers is reported to be 12.8% (Li et al., 2020), while this rate can be as high as 18.8% in intensive care units (Osis & Diccini, 2020). Evidence suggests that intensive care patients have a higher risk of pressure ulcers than other patient groups (Fatma & Dikmen, 2017). Conditions common in intensive care patients, such as clinical instability, sedation, mechanical ventilation, multiple treatments, limited physical activity and nutrition, perfusion disorders, comorbidities, and conditions that disrupt body integrity, such as incontinence and diarrhea, make these patients more vulnerable to pressure ulcers (Jomar et al., 2019). A risk assessment is necessary to determine the danger of pressure ulcers and the means of preventing their progression to later stages. The Health Quality Standards Version 6.1 published by the Department of Health Quality, Accreditation and Employee Rights of the General Directorate of Health Services of Türkiye indicates that patients receiving treatment in hospitals should be assessed for risk of pressure ulcers with evidence-based scales, and measures should be taken to prevent pressure ulcers according to the determined risk. The prevalence of pressure ulcers are also recorded and monitored in intensive care units to evaluate and improve the quality of patient care (Sağlık Hizmetleri Genel Müdürlüğü & Sağlıkta Kalite Akreditasyon ve Çalışan Hakları Dairesi Başkanlığı, 2020). Assessing pressure ulcer risk of patients in intensive care units and taking necessary precautions are a sign of effective nursing care (Karaca Sivrikaya & Sarıkaya, 2020).

This study aimed to determine the prevalence of pressure ulcers, pressure ulcer risks, sites, stages and risk factors in patients treated in tertiary intensive care units.

MATERIALS AND METHODS

Study type

This study was retrospective-descriptive in design.

Study group

The population of this study consisted of N=424 patients followed up in the tertiary intensive care unit of a state hospital between May 1, 2022 and May 1, 2023. The study group included n=150 patients who were admitted to the clinic with existing pressure ulcers or had hospital-acquired pressure ulcers, were 18 years of age or older, and whose data was accessed through electronic health records.

Data collection tools

Data Collection Form: This form consisted of 11 questions prepared by the researchers inquiring about the patient's gender, age, body mass index (BMI), intubation status, chronic diseases, length of hospitalization, mode of admission, site and stage of their pressure ulcers, and whether these ulcers developed before or after admission.

Braden Pressure Ulcer Risk Assessment Scale: This scale was developed by Braden and Bergstorm (1987). It has six dimensions, and it can be used for a wide age range of patients. These dimensions are sensory perception (4 points), skin moisture (4 points), mobility (4 points), physical activity (4 points), nutrition (4 points) and friction (3 points). The score range is 6 to 23; 12 points and below is considered high risk; 13-14 points demonstrates a moderate risk; and 15-16 points constitutes a mild risk (Bergstrom, 1987; Fırat Küçük & Sucudağ, 2017).

Data collection

The electronic health records (N=424) for patients treated in the tertiary intensive care unit between May 1, 2022 and May 1, 2023 were examined retrospectively. Data on gender, age, BMI, intubation status, chronic diseases, length of hospitalization, mode of admission, Braden Scale scores, site and stage of pressure ulcers and whether these ulcers occurred before or after admission was recorded and examined for patients (n=150) who had pressure ulcers.

Statistical analysis

Data was analyzed with using SPSS Version 25. Age, BMI, length of hospitalization, and Braden Scale scores were presented as means±standard deviation. Percentages and frequencies were used to evaluate gender, intubation status, chronic diseases, mode of admission, site and stage of pressure ulcers, whether pressure ulcers occurred before or after admission. A histogram graph of skewness-kurtosis values were used to test the normality of distribution of Braden Scale scores (Akgül, 2005). Since the data were not normally distributed, Kruskal-Wallis, Mann-Whitney U and Spearman's rho tests were used to analyze the data. The findings were evaluated at a 95% confidence interval, and a significance of $p<0.05$ was considered to be significant.

Ethical considerations

Written permission was obtained from the institution where the study was conducted. Approval (2023/151) was obtained from the clinical research ethics committee.

RESULTS

Of the students, 56.1% were nursing students. It was found that 63.3% of these patients had existing pressure ulcers prior to being admitted to the intensive care unit, and the 36.7% of these patients had hospital-acquired pressure ulcers. The prevalence of pressure ulcers in this patient population was 35.4% (n=150 of N=424). While the incidence of hospital-acquired pressure ulcers in the intensive care unit was 12.9%, 22.4% of patients admitted to the clinic had already pressure ulcers.

Table 1. Some demographic characteristics of the patients and their relationship with Braden Scale scores (n=150).

Demographic characteristics	n	%	Braden Scale	Statistics
Gender				
Female	72	48.0	10.47±1.5	U^b=2699.00, Z=-0.423, p=0.673
Male	78	52.0	10.64±1.7	
Intubation				
Yes	92	61.3	10.51±1.5	U^b=2580.00, Z=-0.350 p=0.726
No	58	38.7	10.63±1.7	
Body Mass Index				
Underweight	2	1.3	9.50±.0.7	X^2=4.592^c, df=4 p=0.332
Healthy	60	40.0	10.53±1.7	
Overweight	50	33.4	10.40±1.3	
Obese	35	23.3	10.74±1.7	
Morbidly obese	3	2.0	12.33±2.0	
Chronic diseases				
Yes	132	88.0	10.56±1.6	U^b=1145.00, Z=-0.256 p=0.798
No	18	12.0	10.50±1.65	
Mode of admission				
From emergency ward	51	34.0	10.35±1.5	U^b=2243.00, Z=-1.151 p=0.250
Transferred between wards	99	66.0	10.66±1.7	
Diagnosis at admission [a]				
Circulatory diseases	36	24.0	10.47±1.5	X^2=6.718^c, df=4 p=0.152
Respiratory diseases	64	42.7	10.87±1.8	
Infectious diseases	23	15.3	10.08±1.1	
Other	18	12.0	9.94±0.9	
Renal diseases	9	6.0	11.11±1.8	
When the pressure ulcer occurred				
After admission	55	36.7	10.36±1.2	U^b=2460.00, Z=-0.613 p=0.540
Before admission	95	63.3	10.67±1.7	
Age	77.77± 13.1 (21-94) years			r=0.064^d p=0.435
Length of hospitalization	22.02±19.7 (1-97) days			r=0.092^d p=0.263
Braden Scale Mean Score	10.56 ±1.60 (6-16) points			r=-^{d} p=1

[a]Circulatory: anemia, arrest, hypotension, heart failure, cardiac arrest, subdural hematoma, CVA
Respiratory: COPD, pneumonia, respiratory failure, dyspnea
Infectious: Covid-19, sepsis, Other: Alzheimer's, malnutrition, confusion, pressure ulcer, femur fracture, cancer, coma
Renal: chronic renal failure, acute renal failure,
[b] Mann-Whitney U, [c]Kruskal-Wallis, [d] Spearman's rho

Some demographic characteristics of the patients and the results of Braden Scale score analysis are shown in Table 1. Accordingly, 48.0% of the patients were female, and 61.3% were intubated. Body mass index results suggested that 23.3% of the patients were obese and 88% had chronic diseases. Hospitalization data indicated that 42.7% of patients were hospitalized due to respiratory diseases, and 66.0% of patients were transferred from another ward. The mean age was 77.77± 13.10 years, and mean length of hospitalization was 22.02±19.7 days. The mean Braden Scale score was 10.56±1.6. There was no significant relationship between gender, intubation, body mass index, chronic diseases, mode of admission, diagnosis at admission, age, length of hospitalization and the Braden Scale scores (Table 1).

Table 2 shows data on the pressure ulcers of patients. Accordingly, 49.3% of patients had stage II pressure ulcers and the most common site of pressure ulcers was the sacrococcygeal region (65.3%).

Table 2. Data on the pressure ulcers of patients (n=150).

	Total (n=150)		Patients with hospital-acquired pressure ulcers (n=55)		Patients with existing pressure ulcers (n=95)	
Variable	**n**	**%**	**n**	**%**	**n**	**%**
Pressure ulcer stage						
Stage I	31	20.7	10	18.2	21	22.1
Stage II	74	49.3	31	56.4	43	45.3
Stage III	30	20.0	13	23.6	17	17.9
Stage IV	15	10.0	1	1.8	14	14.7
Dorsal[a]						
No	135	90.0	53	96.4	82	86.3
Yes	15	10.0	2	3.6	13	13.7
Elbows[a]						
No	145	96.7	54	98.2	91	95.8
Yes	5	3.3	1	1.8	4	4.2
Sacrococcygeal[a]						
No	52	34.7	12	21.8	40	42.1
Yes	98	65.3	43	78.2	55	57.9
Femur lateral[a]						
No	133	88.7	53	96.4	80	84.2
Yes	17	11.3	2	3.6	15	15.8
Hip[a]						
No	134	89.3	51	92.7	83	87.4
Yes	16	10.7	4	7.3	12	12.6
Heel[a]						
No	134	89.3	51	92.7	83	87.4
Yes	16	10.7	4	7.3	12	12.6
Side of the foot[a]						
No	134	89.3	52	94.5	82	86.3
Yes	16	10.7	3	5.5	13	13.7
End of the shoulder[a]						
No	144	96.0	51	92.7	93	97.9
Yes	6	4.0	4	7.3	2	2.1

a: Some patients had pressure ulcers in more than one region.

DISCUSSION

In this study, no significant relationship was found between gender, intubation, body mass index, chronic diseases, mode of admission, diagnosis at admission, age and length of hospitalization and pressure ulcer risk (Table 1). Other studies on intensive care patients also suggest that gender and pressure ulcer incidence are not related (Amini et al., 2022; Farid et al., 2022). However, Avşar and Karadağ (2016) reported that female patients in intensive care had a higher level of risk than male patients (Avşar & Karadağ, 2016). Kopp et al. (2011) also indicated that there was no association between advanced age and risk of pressure ulcers, although they examined patients older than 70 years who underwent surgery for hip fracture (Kopp et al., 2011). In contrast, some studies show that pressure ulcer risk increases with age (Ness et al., 2018; Webster et al., 2015). A study conducted with surgical patients suggested that low BMI posed a risk for pressure ulcers (Aloweni et al., 2019), while another study reported that patients with high BMI (obese) were at risk for pressure ulcers (Ness et al., 2018). Strazzieri-Pulido et al. (2019) found that intubated patients were 3.5 times more likely to have pressure ulcers, and each day of hospitalization increased the risk of pressure ulcers by 10.9% (Strazzieri-Pulido et al., 2019). In addition, there are studies reporting that variables of having comorbid diseases (Bilik & Çömez, 2017), mode of admission and diagnosis at admission (Ateşgöz et al., 2022) increase the risk of pressure ulcers. It is not clear whether pressure ulcers are preventable in intensive care patients. Patient characteristics and non-modifiable risk factors such as age, gender, weight, and disease severity complicate this issue (Cox, 2017; Edsberg et al., 2014). Jacq et al. (2021) explained that there is no consensus on which risk factors affect risk of pressure ulcers in

patients receiving treatment in critical services such as intensive care units. They attributed this to the heterogeneity of the critical patient population of intensive care units (Jacq et al., 2021). Despite the lack of consensus and the inconclusive results obtained from this study, the identification of risk factors that independently predict pressure ulcers among intensive care patients should be considered important for targeted pressure ulcer prevention interventions.

In this study, the prevalence of pressure ulcers was found to be 35.4% in patients followed up in the intensive care unit, and 12.9% of these occurred after admission to the intensive care unit. Labeau et al. (2021) found that the total and hospital-acquired prevalence of pressure ulcers was 26.6% and 16.2%, respectively (Labeau et al., 2021). Cox et al. (2017) reported in their systematic review that the overall prevalence of pressure ulcers for intensive care patients in the United States was 14.3%, while the prevalence of hospital-acquired pressure ulcers was 5.85% (Cox, 2017). In a European study, it was reported that the prevalence of pressure ulcers in intensive care units varied between 14% and 42% (De Laat et al., 2006). In contrast, a multicenter study conducted in Türkiye found prevalence of pressure ulcers to be 11.43% (Sayan et al., 2020). There is considerable heterogeneity between study results regarding pressure ulcer prevalence, incidence, and rate of hospital-acquired cases (Li et al., 2020). Determining the prevalence of pressure ulcers is important for understanding the current condition of health care and further health care planning (Tubaishat et al., 2018). Prior studies suggest that intensive care patients are at high risk for pressure ulcers due to disease-specific complexities as well as the multitude of advanced technologies used in intensive care units (Cox, 2017). The difference between prevalence values found in this study and those found in other studies (Cox, 2017; Labeau et al., 2021; Sayan et al., 2020) may be due to differences between patient populations and health care conditions of different countries. The results of this study highlight the need to focus on pressure ulcers in critical intensive care patients. Care must be taken to determine the risk of pressure ulcers and provide nursing care to prevent these ulcers according to assessed risk levels.

As a result of this study, it was found that 49.3% of the tertiary intensive care patients had stage II pressure ulcers, and that most had cropped up in the sacrococcygeal region (65.3%). Other studies have shown that the sacrococcygeal region is the most common site for pressure ulcers, and that most of them are stage II (Cox, 2017; Kıraner et al., 2016; Li et al., 2020; Sayan et al., 2020; Strazzieri-Pulido et al., 2019). The results of this study were consistent with the literature, supporting the notion that pressure ulcers are an important and ongoing problem. The fact that most pressure ulcers are identified as stage II may be due to nurses' inability to recognize stage I pressure ulcers. This draws attention to the importance of continuous skin evaluation for pressure ulcers, and learning to recognize the appearance of stage I pressure ulcers so that their progression can be prevented.

The pressure ulcer risk of intensive care patients was evaluated in this study, using the Braden Scale for Predicting Pressure Ulcer Risk, and results showed that the pressure ulcer risk was high. Early detection of the patients' pressure ulcer risk status via the Braden Scale score is useful in combination with appropriate nursing care practices and preventive measures. It is also worth noting that the progression of the wound stage is slowed, and the development of pressure ulcers are reduced when good judgment is used by nurses (Sayan et al., 2020). Primary responsibility for the care of intensive care patients belong to nurses. In addition, the high prevalence of pressure ulcers in this high-risk patient group, pressure ulcers most commonly being stage II and the sacrococcygeal region being the most common site of pressure ulcers are of concern. Thus, it is recommended to bring attention to pressure ulcer risk through in-service training for nurses.

Limitations of study

This study was conducted in an intensive care unit located in a single center. Research data were collected retrospectively through electronic health records. For this reason, the patients and their data included in this study were considered for limitations.

CONCLUSION

As a result of this study, no significant relationships of gender, intubation, body mass index, chronic diseases, mode of admission, diagnosis at admission, age and length of hospitalization were found with the Braden Scale scores. One-third of the general patient population had pressure ulcers, and most pressure ulcers were stage II. Pressure ulcers were most common in the sacrococcygeal region. The patients in this study were considered at risk for pressure ulcers. The results of this study highlight the importance of pressure ulcer risk identification, assessment, and strategies for intensive care patients. Today, the majority of patients still have pressure ulcer. Therefore, this study is important in terms of including up-to-date data.

According to the results of this study; It is recommended that patients treated in tertiary intensive care units are considered to be at high risk for the development of pressure ulcers, and appropriate precautions should be taken. Furthermore, awareness about the stages of pressure ulcers should be increased, and training should be organized to detect pressure ulcers at stage I level. Moreover, studies to determine the prevalence of pressure ulcers should be continued at regular intervals.

Acknowledgement

The authors would like to extend their sincere thanks to anyone who contributed to this study.

Conflict of Interest
The author declare no potential conflicts of interest with respect to the research, authorship and/or publication of this article.

Author Contributions
Plan, design: LNU, HHT; **Material, methods and data collection:** LNU, HHT; **Data analysis and comments:**LNU, HHT; **Writing and corrections:** LNU, HHT

Funding
None.

Ethical Considerations
Written permission was obtained from the institution where the study was conducted. Approval (2023/151) was obtained from the clinical research ethics committee.

REFERENCES

Akgül, A. (2005). Tıbbi araştırmalarda istatistiksel analiz teknikleri "SPSS uygulamaları.(2. Baskı). Ankara: Emek Ofset.

Aloweni, F., Ang, S. Y., Fook-Chong, S., Agus, N., Yong, P., Goh, M. M., Tucker-Kellogg, L., & Soh, R. C. (2019). A prediction tool for hospital-acquired pressure ulcers among surgical patients: Surgical pressure ulcer risk score. *International Wound Journal, 16*(1), 164–175. https://doi.org/10.1111/iwj. 13007

Amini, M., Mansouri, F., Vafaee, K., Janbakhsh, A., Mahdavikian, S., Moradi, Y., & Fallahi, M. (2022). Factors affecting the incidence and prevalence of pressure ulcers in COVID-19 patients admitted with a Braden scale below 14 in the intensive care unit: Retrospective cohort study. *International Wound Journal*. https://doi.org/10.1111/iwj.13804

Ateşgöz, F., Köse, G., Seki, Z., Sağlık, S., Kulaksızoğlu, N., Ülgen, N., & İnci, Ö. (2022). Bir Eğitim ve Araştırma Hastanesindeki Basınç Yarası Prevalansı Ve Risk Faktörlerinin Belirlenmesi: Nokta Prevalans Çalışması. *Karya Journal of Health Science, 3*(1), 6–12. https://doi.org/10.52831/kjhs.1 013181

Avşar, P., & Karadağ, A. (2016). Waterlow basınç ülseri risk değerlendirme ölçeği'nin türkçeye uyarlanması, geçerlik-güvenirlik çalışması. *Hacettepe Üniversitesi Hemşirelik Fakültesi Dergisi, 3*(3), 1–15.

Bergstrom, N. (1987). The Braden Scale for predicting pressure sore risk. *Reflections after 25 years Nurs Res, 36*(4), 205–210. https://doi.org/10.1097/01.ASW.0000411403.11392.10

Bilik, Ö., & Çömez, S. (2017). Basınç Yaraları ve Hemşirelik Bakımı. *Turkiye Klinikleri j Surg Nurs-Special Topics, 3*(3), 164–175.

Cox, J. (2017). Pressure Injury Risk Factors in Adult Critical Care Patients: A Review of the Literature. *Ostomy/Wound Management, 63*(11), 30–43.

De Laat, E., Schoonhoven, L., Pickkers, P., Verbeek, A. L. M., & van Achterberg, T. (2006). Epidemiology, risk and prevention of pressure ulcers in critically ill patients: a literature review. *Journal of Wound Care, 15*(6), 269–275. https:// doi.org/10.12968/jowc.2006.15.6.26920

Edsberg, L. E., Langemo, D., Baharestani, M. M., Posthauer, M. E., & Goldberg, M. (2014). Unavoidable pressure injury: state of the science and consensus outcomes. *Journal of Wound Ostomy & Continence Nursing, 41*(4), 313–334. https://doi.org/10.1097/WON.0000000000000050

Farid, J., Amin, R., Sheikh, M. A., Irfan, M., AlRuwaili, R., Alruwaili, M., Ali, N. H., Albarrak, A. M., & Rahman, S. (2022). Prevalence and prediction of pressure ulcers in admitted stroke patients in a tertiary care hospital. *Journal of Tissue Viability, 31*(4), 768–775. https://doi.org/10.1016/j.jtv.2022.07.010

Fatma, T., & Dikmen, Y. (2017). Yoğun bakım hastalarında basınç yaraları: risk faktörleri ve önlemler. *Journal of Human Rhythm, 3*(4), 177–182.

Fırat Küçük, H., & Sucudağ, G. (2017). Basınç yarası değerlendirilmesinde sık kullanılan ölçekler. *JAREN, 3*(1), 49– https://doi.org/54. 10.5222/jaren.2017.049

Haesler, E. (2019). Prevention and treatment of pressure ulcers/injuries: clinical practice guideline. The International Guideline: European Pressure Ulcer Advisory Panel, National Pressure Injury Advisory Panel and Pan Pacific Pressure Injury Alliance.

Hajhosseini, B., Longaker, M. T., & Gurtner, G. C. (2020). Pressure injury. *Annals of Surgery, 271*(4), 671–679. https://doi. org/10.1097/SLA.0000000000003567

Jacq, G., Valera, S., Muller, G., Decormeille, G., Youssoufa, A., Poiroux, L., Allaert, F., Barrois, B., Rigaudier, F., Ferreira, P., Huard, D., Heming, N., Aissaoui, N., Barbar, S., Boissier, F., Grimaldi, D., Hraiech, S., Lascarrou, J. B., Piton, G., & Michel, P. (2021). Prevalence of pressure injuries among critically ill patients and factors associated with their occurrence in the intensive care unit: The PRESSURE study. *Australian Critical Care, 34*(5), 411–418. https://doi.org/10.1016/j.aucc. 2020.12.001

Jomar, R. T., Jesus, R. P. de, Jesus, M. P. de, Gouveia, B. R., Pinto, E. N., & Pires, A. da S. (2019). Incidence of pressure injury in an oncological intensive care unit. *Revista Brasileira de Enfermagem, 72*, 1490–1495. https://doi.org/10.1590/0034-7167-2018-0356

Karaca Sivrikaya, S., & Sarıkaya, S. (2020). Yoğun Bakım Hastalarında Bası Ülseri, Önleme ve Hemşirelik Bakımı. *Yoğun Bakım Hemşireliği Dergisi, 24*(2), 139–149.

Kıraner, E., Terzi, B., Uzun Ekinci, A., & Tunalı, B. (2016). Yoğun bakım ünitemizdeki basınç yarası insidansı ve risk faktörlerinin belirlenmesi. *Yoğun Bakım Hemşireliği Dergisi, 20*(2), 78–83.

Kopp, L., Obruba, P., Edelmann, K., Procházka, B., Blšťáková, K., & Celko, A. M. (2011). [Pressure ulcer and mortality risk after surgical treatment of proximal femoral fractures in the elderly]. *Acta chirurgiae orthopaedicae et traumatologiae Cechoslovaca, 78*(2), 156–160.

Labeau, S. O., Afonso, E., Benbenishty, J., Blackwood, B., Boulanger, C., Brett, S. J., Calvino-Gunther, S., Chaboyer, W., Coyer, F., & Deschepper, M. (2021). Correction to: Prevalence, associated factors and outcomes of pressure injuries in adult intensive care unit patients: the DecubICUs study. *Intensive Care Medicine, 47*(4), 503–520. https://doi.org/10.1007/s00134-020-06234-9

Li, Z., Lin, F., Thalib, L., & Chaboyer, W. (2020). Global prevalence and incidence of pressure injuries in hospitalised adult patients: A systematic review and meta-analysis. *International Journal of Nursing Studies, 105*, 103546.

Ness, S. J., Hickling, D. F., Bell, J. J., & Collins, P. F. (2018). The pressures of obesity: the relationship between obesity, malnutrition and pressure injuries in hospital inpatients. *Clinical Nutrition, 37*(5), 1569–1574. https://doi.org/10.1016/ j.ijnurstu.2020.103546

Osis, S. L., & Diccini, S. (2020). Incidence and risk factors associated with pressure injury in patients with traumatic brain injury. *International Journal of Nursing Practice, 26*(3), e12821. https://doi.org/10.1111/ijn.12821

Sağlık Hizmetleri Genel Müdürlüğü, & Sağlıkta Kalite Akreditasyon ve Çalışan Hakları Dairesi Başkanlığı. (2020). SKS Hastane (Sürüm 6.1) (1. Baskı). T.C. Sağlık Bakanlığı. https://shgmkalitedb.saglik.gov.tr/Eklenti/41258/0/sks hastane-seti-s-61--09082021pdf.pdf

Sayan, H. E., Girgin, N. K., & Asan, A. (2020). Prevalence of pressure ulcers in hospitalized adult patients in Bursa, Turkey: a multicentre, point prevalence study. *Journal of Evaluation in Clinical Practice, 26*(6), 1669–1676. https://doi.org/10.11 11jep.13354

Song, Y., Wang, L., Yu, H., Yuan, B., Shen, H., Du, L., Cai, J., & Chen, H. (2020). Zinc therapy Is a reasonable choice for patients with pressure injuries: a systematic review and meta-analysis. *Nutrition in Clinical Practice, 35*(6), 1001–1009. https://doi.org/10.1002/ncp.10485

Strazzieri-Pulido, K. C., S. González, C. V., Nogueira, P. C., Padilha, K. G., & G. Santos, V. L. C. (2019). Pressure injuries in critical patients: Incidence, patient-associated factors, and nursing workload. *Journal of Nursing Management, 27*(2), 301–310. https://doi.org/10.1111/jonm.12671

Tubaishat, A., Papanikolaou, P., Anthony, D., & Habiballah, L. (2018). Pressure ulcers prevalence in the acute care setting: a systematic review, 2000-2015. *Clinical Nursing Research, 27*(6), 643–659. https://doi.org/10.1177/105477381 7705541

Webster, J., Lister, C., Corry, J., Holland, M., Coleman, K., & Marquart, L. (2015). Incidence and risk factors for surgically acquired pressure ulcers. *Journal of Wound, Ostomy and Continence Nursing, 42*(2), 138–144. https://doi.org/10.1097/ WON.0000000000000092

ORİJİNAL MAKALE / ORIGINAL ARTICLE

Balıkesir Sağlık Bilimleri Dergisi / BAUN Sağ Bil Derg
Balıkesir Health Sciences Journal / BAUN Health Sci J
ISSN: 2146-9601- e ISSN: 2147-2238
Doi: https://doi.org/10.53424/balikesirsbd.1406477

Trends and Current Topics in Artificial Intelligence in Nursing Research: A Bibliometric Analysis and Science Mapping

Ayşe ÇİÇEK KORKMAZ[1]

[1] Bandırma Onyedi Eylül University, Faculty of Health Sciences, Nursing Management Department

Geliş Tarihi / Received: *19.12.2023* ***Kabul Tarihi / Accepted:*** *06.03.2024*

ABSTRACT

Objective: This study aimed to draw a science mapping of research trends, current topics in artificial intelligence in nursing, and the information structure of the literature using bibliometric methods. **Materials and Methods:** This was a bibliometric study. Study data were collected from WoSCC on August 08, 2023. Analyses were made through science mapping, Microsoft Excel, and VOSviewer. **Results:** The study included 316 publications dated 1984-2023. There was a rapid increase in the publications and citations from 2018-2023. Related publications were made by 1148 authors, and CIN-Computers, Informatics, Nursing was the journal published and cited most, among others. Thirty-one countries contributed to the publications, of which 45.2% were produced in the USA. In recent years, the topics have been patient safety, depression, ChatGPT, and Chatbot. **Conclusion:** This bibliometric study shows a synergy between the general policies of countries on Artificial Intelligence in recent years and the increasing number of publications in the last four years. However, this study also reveals that research on artificial intelligence in nursing is nascent. Managers and research nurses should lead the use of AI applications in nursing services management and nursing training and encourage research on the topic.

Key Words: Artificial Intelligence, Nursing, Bibliometric Analysis, Research Trends, VOSviewer.

Hemşirelikte Yapay Zekâ Araştırmalarında Trendler ve Güncel Konular: Bibliyometrik Analiz ve Bilimsel Haritalama

ÖZ

Amaç: Bu çalışma, hemşirelikte yapay zekâ alanında yapılan çalışmaların araştırma trendlerini, mevcut konularını ve literatürün bilgi yapısını bibliyometrik yöntemlerle bilim haritasını ortaya çıkarmayı amaçlamıştır. **Gereç ve Yöntem:** Bu bibliyometrik bir çalışmadır. Çalışmanın verileri, 8 Ağustos 2023 tarihinde Web of Science Core Collection veri tabanından toplandı. Verilerin analizinde bilimsel haritalama analizi yapıldı, Microsoft Excel ve VOSviewer programları kullanıldı. **Bulgular:** Çalışmaya 1984-2023 yılları arasında 316 yayın dahil edildi. 2018-2023 yılları arasında yayın ve atıf sayısında hızlı bir artış olduğu bulundu. Alandaki yayınların 1148 yazar tarafından gerçekleştirildiği ve dergiler arasında en çok yayın ve atıf alan "CIN-Computers, Informatics, Nursing" dergisinin olduğu belirlendi. Yayınlara 53 farklı ülkenin katkı sağladığı ve bu yayınların %45.2'sinin Amerika Birleşik Devletleri'nde üretildiği belirlendi. Son yıllarda güncel konular hasta güvenliği, depresyon, ChatGPT ve Chatbot idi. **Sonuç:** Bu bibliyometrik çalışma, son yıllarda ülkelerin yapay zekâ konusunda belirledikleri genel politikalar ile son dört yılda artan yayın sayısı arasında bir sinerji oluştuğunu göstermektedir. Bununla birlikte, yapay zekâ çalışmalarının hemşirelik alanında yeni ve henüz kuluçka döneminde bir alan olduğunu ortaya koymaktadır. Yönetici ve araştırmacı hemşireler yapay zekâ uygulamalarının hemşirelik hizmetleri yönetiminde ve hemşirelik eğitiminde kullanımına yönelik önderlik etmeli ve konuyla ilgili araştırmaların yapılmasını teşvik etmelidir.

Anahtar Kelimeler: Yapay Zekâ, Hemşirelik, Bibliyometrik Analiz, Araştırma Trendleri, VOSviewer.

Sorumlu Yazar / Corresponding Author: Ayşe ÇİÇEK KORKMAZ, Bandırma Onyedi Eylül University, Faculty of Health Sciences, Nursing Management Department
E-mail: akorkmaz@bandirma.edu.tr

Bu makaleye atıf yapmak için / Cite this article: Çiçek Korkmaz, A. (2024). Trends and current topics in artificial intelligence in nursing research: a bibliometric analysis and science mapping. *BAUN Health Sci J, 13*(2), 324-338. https://doi.org/10.53424/balikesirsbd.1406477

INTRODUCTION

The continuous development of technology and the rapid emergence of artificial intelligence (AI) has significantly impacted several fields, including nursing (Korkmaz et al., 2023; Topol, 2019). AI, typically defined as the development of computer systems capable of performing tasks that require human intelligence (Janiesch et al., 2021), has been increasingly integrated into nursing practices due to its potential to enhance patient care and health outcomes (Konttila et al., 2019).

AI applications in nursing have recently broadened to encompass diverse technologies. This includes machine learning algorithms for predictive analytics, natural language processing for electronic medical records, and robotic systems for patient care (Bates et al., 2020). As Bates et al. (2020) identified, foundational AI technologies such as machine learning, deep learning, expert systems, and robotics have a historical significance in nursing and are pivotal in forging its future. The application of these technologies in nursing care has been noted to have increased recently (Jeong, 2020).

According to Kwon et al. (2019), machine learning, as a critical component of AI, emphasizes data analysis for making precise predictions, paving the way for enhanced clinical decision-making and advancing nursing science. This approach to leveraging clinical data represents just one aspect of AI's application in nursing. Deep learning, an extension of machine learning, employs multi-layered artificial neural networks, contributing to developing "deep" neural networks, a method renowned for its depth and complexity (Jeong, 2020). Additionally, expert systems mimic the decision-making capabilities of human experts by utilizing extensive knowledge bases and inferential reasoning, further broadening AI's application in nursing (Aristoteles et al., 2023). Integrating these AI technologies within nursing yields numerous benefits, directly impacting patient care and the nursing profession. For instance, machine learning and deep learning facilitate the streamlined collection and monitoring of vital signs (Bose et al., 2019; Kwon et al., 2019) and the accelerated diagnosis of conditions such as falls and pressure ulcers (Easton-Garrett et al., 2020; Sullivan et al., 2019). Expert systems enhance decision-making, enabling more accurate and timely nursing diagnoses (Courtney et al., 2008).

ChatGPT has emerged as an innovative tool in nursing education and practice in recent years. It is being used for evaluating student performance in education (Bahroun et al., 2023; Javaid et al., 2023) and as an interactive resource in patient education (Gunawan, 2023). Additionally, it offers significant support in practice by providing nurses with quick access to information on medications and medical interventions (Ahmed, 2023). These innovations can improve clinical decision-making, facilitate administrative duties, simplify patient monitoring, and support patient education and self-management (Davenport & Kalakota, 2019). Furthermore, they can reduce nurses' workloads, simplify their routines, save time for patient care activities, and allow healthier data to be obtained and analyzed faster (Pepito & Locsin, 2019). Considering all these aspects, AI applications will have a significant and positive impact on making nursing applications more efficient and safer, reducing costs, losses, and the duration of hospitalization due to medical errors in nursing services, and improving the quality of nursing care (Robert, 2019). While AI's integration into nursing practices continues to gain momentum, ethical considerations, including its effect on patient confidentiality, data security, and nurse-patient relationships, have emerged (Stokes & Palmer, 2020). Researchers have sought answers to such questions as “What will happen when these robots take part in healthcare?”, “Will robots have the same rights as nurses? " "Will robots be our slaves?” “Will robots be paid for the work they do?” “Will nurses be held responsible for the mistakes made by robots?” and “Can robots be loaded with emotion?” (Şendir et al., 2019). However, the researchers have not found answers to these questions.

Von Gerich et al. (2021) underscored the increasing influence of AI in nursing, highlighting the need to explore the opportunities and challenges presented by AI technologies in this domain. In this context, bibliometric analyses are a robust tool for an in-depth examination of AI research in nursing. Recent such analyses, like those by Shi et al. (2022) and Chang (2022), have provided valuable contributions to the literature. However, there remains a need for an updated and comprehensive analysis of AI's growing role in nursing.

This study addresses this gap by detailing the latest trends, leading domains, and journals in AI research within nursing while shedding light on new research directions and focal points. In an era of rapid technological advancements, this research seeks to understand AI's role in nursing better. Therefore, for researchers and professionals wanting a thorough grasp of the impact of AI in nursing, this study offers a comprehensive perspective, adding to the current knowledge in the literature.

Considering the rising significance of AI in nursing, this study seeks to 1) ascertain current publication trends, 2) pinpoint dominant research domains and leading journals, 3) identify prominent countries, research conglomerates, and researchers, and 4) discern emergent research trends and current topics.

The growing significance of bibliometrics in nursing research

In recent years, bibliometric studies have garnered significant attention from researchers aiming to gauge the quality and volume of research outcomes within nursing. As a quantitative method to dissect scientific publications, bibliometrics holds paramount significance in offering a robust methodology for nursing research (Çiçek Korkmaz & Altuntaş, 2022; Kantek & Yeşilbaş, 2020; Kokol et al., 2018). The reasons for its prominence are manifold:

- ***Mapping research trends and patterns:*** Bibliometric endeavors offer researchers and practitioners invaluable insights, shedding light on

the prevalent research trends, emergent topics, and areas of focus in nursing (Yan et al., 2022). Such insights mirror the discipline's current trajectory and spotlight potential lacunae beckoning further exploration (Kokol et al., 2018).

- ***Evaluating Research Quality and Impact:*** Bibliometric analyses empower scholars to appraise the resonance and caliber of nursing research. This is achieved by sifting through citation patterns and scrutinizing journal impact factors and other pertinent metrics (Downing et al., 2021). Such evaluations play a pivotal role in helping researchers comprehend the ramifications of their scholarly endeavors (Sweileh et al., 2019).
- ***Spotlighting Pioneering Authors, Institutions, and Journals:*** Through bibliometrics, one can unveil the vanguard of nursing research—be it individual scholars, academic institutions, or journals—by probing the volume and influence of their publications (Kantek & Yeşilbaş, 2020; Yanbing et al., 2020). Such revelations are a compass for networking, facilitating collaboration, and drawing comparisons (Downing et al., 2021).
- ***Facilitating interdisciplinary collaboration:*** Nursing, as a discipline, routinely intersects with fields such as medicine, psychology, and public health (Oerman et al., 2019). Bibliometric evaluations can unveil these cross-disciplinary synergies, fostering more prosperous collaboration across varied research domains (Kokol et al., 2018).
- ***Informing decision-making and policy development:*** Policymakers, healthcare strategists, nursing managers, and educators can draw immense value from bibliometric studies (Galetsi & Katsaliaki, 2020). The data extracted serves as a lodestar for informed decision-making in resource allocation, financial planning, or curriculum design, ensuring the nursing sector remains vibrant and responsive (Sweileh et al., 2019).

MATERIALS AND METHODS

Study type

This bibliometric research study was structured to cover the relevant issue by monitoring the following stages described by Öztürk (2021, p.47):

1. Defining the aim of the bibliometric study.
2. Creating a dataset related to the relevant literature (see Figure 1):
   - Selection of the database.
   - Determination of search terms.
   - Application of filtering (inclusion and exclusion criteria).
   - Downloading of the dataset.
3. Conducting the bibliometric analysis and reporting the findings:
   - Performance analysis (summarizing the performance of prolific research constituents using publication, citation, and publication-citation measures).
   - Science mapping (summarizing the bibliometric structure using citation, co-citation, co-authorship, and co-word analysis).
4. Interpretation of the analysis results and findings.

Data collection (identification and selection of the publications)

A comprehensive search was conducted on the Web of Science Core Collection (WoSCC) database on August 08, 2023, using the following search terms: "artificial intelligence*," "machine learning," "deep learning*," "artificial neural networks*," "expert systems*," "natural language processing*," "hybrid intelligence*," and "robotic*." Initially, 853121 publications were retrieved without limitations on publication dates or languages.

According to the PRISMA flow diagram, as presented in Figure 1, publications were filtered by relevance to the nursing field, and the list was reduced to 646. This selection was further refined by considering only those articles indexed in specific citation databases: "Science Citation Index Expanded (SCI-E), "Social Sciences Citation Index (SSCI), "And Emerging Sources Citation Index (ESCI) " bringing the count to 614 publications. Language criteria were applied next, restricting the selection to only English language articles (n=598). To ensure a focus on high-quality and relevant content, criteria were applied to include specific types of works: articles, reviews, and editorial materials. This criterion reduced the list to 566 publications. Upon a detailed review, 250 publications that did not align with the study's goals were excluded, leaving 316 publications for analysis. The entire search and selection process is visually represented in the flowchart provided in Figure 1.

Statistical analysis

The bibliometric data of the selected publications were retrieved in TXT format from the WoSCC database. This data was subsequently imported into Microsoft Excel and VOSviewer software for further analysis. During the initial phase, keywords were standardized to ensure consistency. Variations in spelling or alternative expressions of the same term (for example, "artificial ıntellıgence" versus "artificial intelligence" and "nurse" versus "nurse staffing") were identified and unified. Any irrelevant or nonsensical words (such as "cfır," "cross-") were removed to enhance the accuracy of the analysis. VOSviewer software was employed to generate network visualizations.

Ethical considerations

Given the nature of this bibliometric study, no ethics committee approval was required. Since bibliometric studies use open-access data, they do not require an ethics committee event.

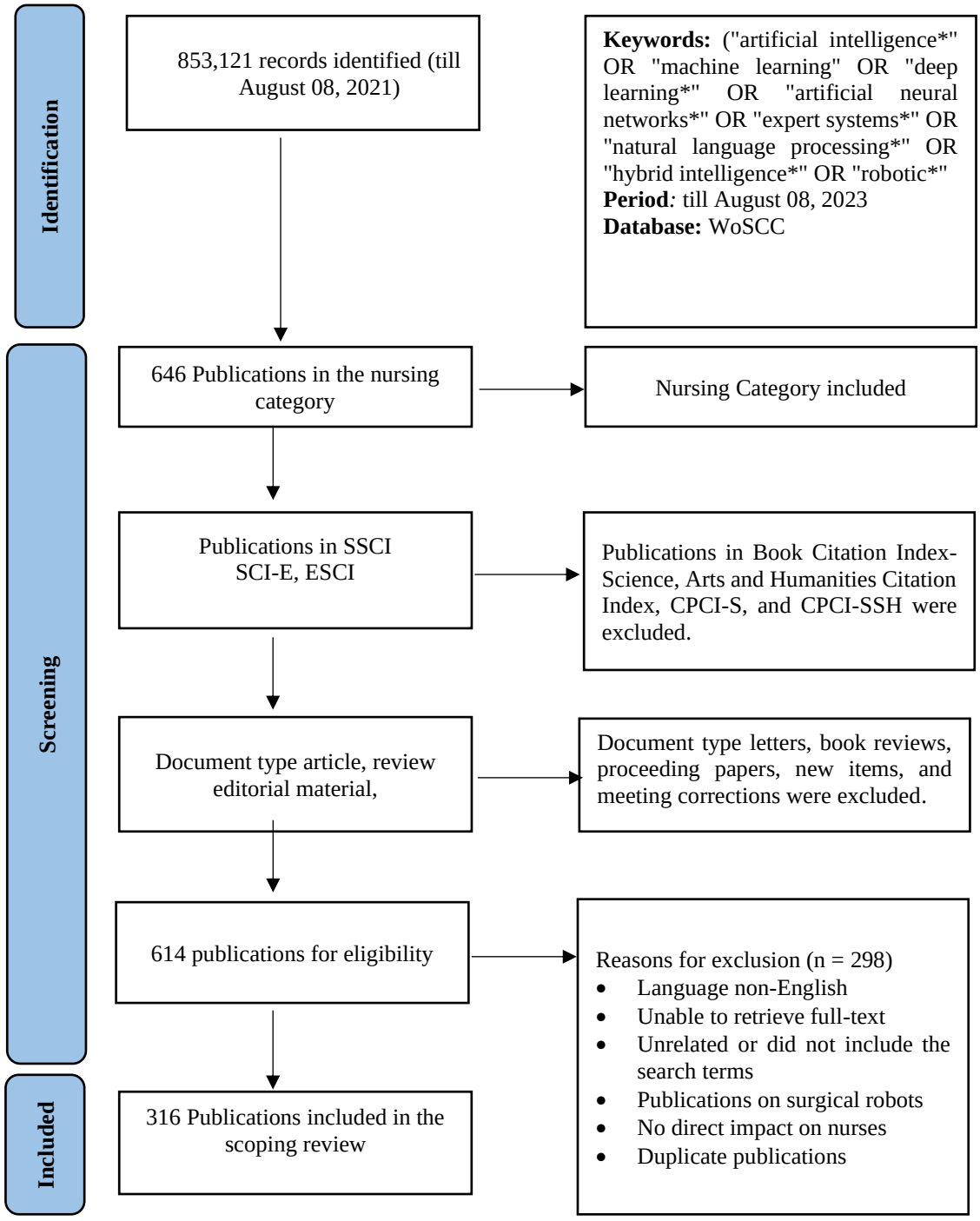


Figure 1. PRISMA flow diagram of the included publications.

RESULTS

The following findings were obtained within the study's purpose. The study findings are shown in the table and figures.

General trends of publications

Reviewing the number of publications is essential to measure the developmental trend of the AI-related research area. In this study, Figure 2 examines the trend in the number of publications and citations of AI-related publications, primarily in nursing, over the years.

The first study on AI in nursing was found to be published in 1984. Although there was no increase in the studies conducted from 1984 to 2015, a gradual increase was observed in the number of AI studies as of 2017, and 272 publications were produced in the last five years (2018-2023) and the year 2022 had the most publications with 71 studies. The publications had 2210 citations; the highest number was achieved in 2022 (609). Moreover, the number of citations gradually increased as of 2017,

and 86.3 of the total citations were carried out in the last four years (2018-2023) (Figure 2).

The studies' publication types from 1984 to 2023 were articles (72.7%) and editorial materials (11.5%).

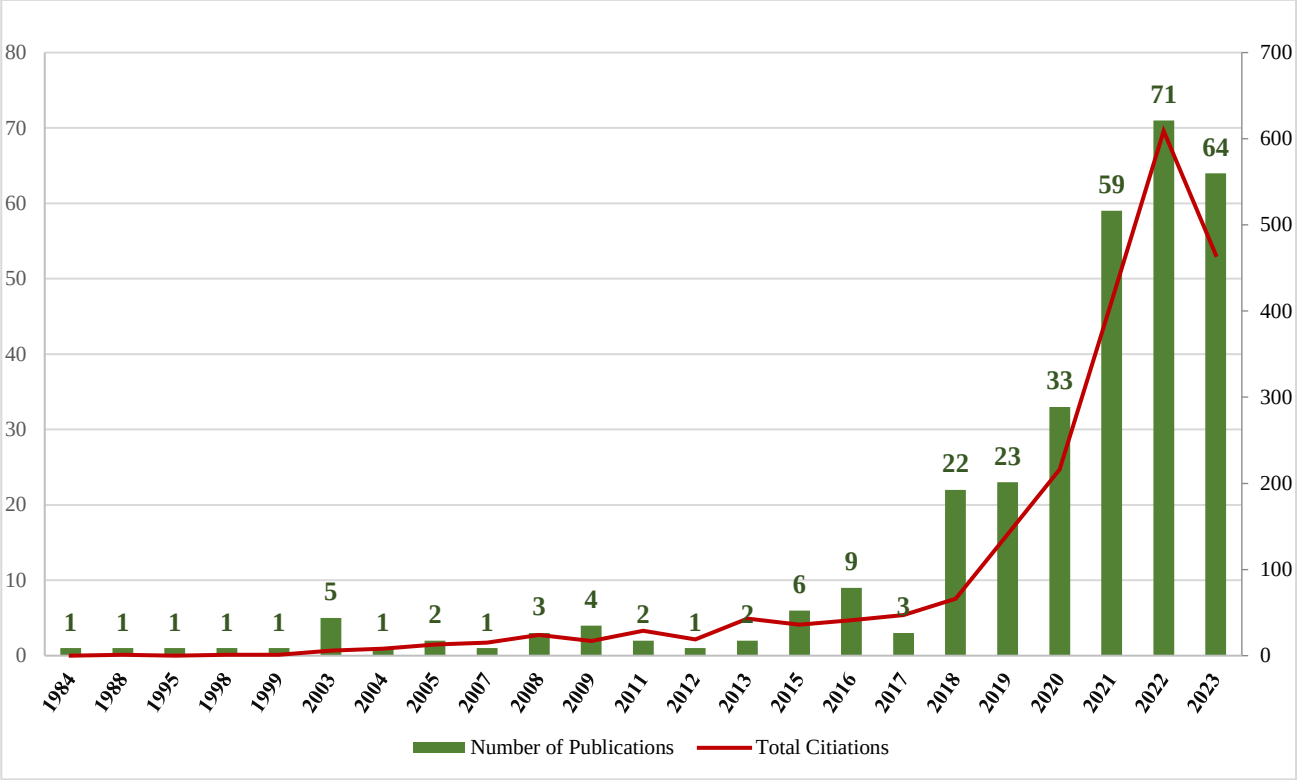


Figure 2. Yearly trend and citation of publications (1984 to 2023).

Dominant research areas and influential journals

The publications were found to have been published in 22 research areas and 100 journals. The nursing field (n=316) was the essential inclusion point of the research. It was followed by Computer Science Interdisciplinary Applications (n=34), Medical Informatics (n=34), Management (n=17), and Education Scientific Disciplines (n=14), respectively.

The relevant publication analysis of the journals was examined, and many journals stood out. Regarding productivity, the top seven journals produced 104 publications, and 32.9% of all publications were produced in these journals. It has been determined that the most prolific journal on AI is "CIN-Computers, Informatics, Nursing," which stands out with 34 publications. "Journal of Nursing Management" ranks second with 17 publications, while 'Nurse Education Today' is third with 14 publications. The first relevant publication was in the "Journal of Nursing Administration." Regarding the journals' number of citations per publication, the publications in these journals were found to be highly cited (see Figure 3). The top three journals that were cited the most were CIN-Computers, Informatics, Nursing (246 citations), Nurse Education Today (245 citations), and Journal of Advanced Nursing (212 citations), respectively.

Influential countries, research groups, and researchers

The most productive countries and collaborations

A total of 53 countries contributed to the publications, and 50.9% of these countries produced three or more publications. The USA produced the highest number of publications (143), and its contribution rate to nursing was 45.2%. Then China (34 publications), Japan (21 publications), South Korea (18 publications), and Australia (16 publications), respectively, were included among the top five countries. The rate of contribution to nursing by these top five countries that produced the highest number of publications was 73.4%. The USA contributed to nursing the most by achieving the highest number of citations (1075 citations). England followed this country (251 citations), followed by Australia (201 citations), Japan (151 citations), China (146 citations), and Finland (142 citations), respectively. Figure 4 presents the collaboration networks among the countries. The general collaboration among the countries was found in three different clusters (in blue, red, and yellow colors), and the TLS was found to be 348. The USA had the most vital collaboration network with maximum link strength (TLS=221). The most robust collaboration networks were between the USA and Japan (TLS= 27) and between the USA and England (TLS=21) (see Figure 4).

The most productive and influential authors and collaborations

1148 authors produced the publications included in the research. Of the publications, 67.4% were produced by three or more authors, and most were produced by two (49 publications) or four (50 publications) authors. There were publications produced by ten or more authors (n=15). For example, 35 authors collaborated on an article published by Papadopoulos et al. (2023). Only 114 authors produced more than one publication. Figure 5 shows the network map of the collaboration among authors with two or more publications (Number of publications on the left, citations on the right of Figure 5). Topaz M. was the most productive author (n=11), followed by Locsin RC. (n=9). O'Connor S. and Tanioka T. had an equal number of publications (n=7) (see Figure 5).

Topaz M. received the most citations (n=109), followed by O'Connor S. (n=95), and then Finnish researchers Coco K. and Rantanen T. with an equal number of citations (n=83) each. Coco and Rantanen were found to have two publications in collaboration.

Research trends and current topics

Co-occurrence and analysis of keywords

The authors used 797 different words in publications. Figure 6 shows the visual network map of the keywords used at least four times (n=43). The most frequently used keywords were AI (76 times), machine learning (54 times), nursing (50 times), robotics (29 times), and natural language processing (15 times).

The keywords were categorized into four clusters (see Figure 6). The first cluster (red color) consisted of the following words: “AI, artificial neural network, chatbot, ChatGPT, decision support, deep learning, education, healthcare, nursing, nursing research, older people, robots, simulation." The second cluster (green color) consisted of the following words: "big data, cancer, data mining, depression, electronic health record, ethics, machine learning, prediction, systematic review.” The third cluster (blue color) consisted of the following words: “aged, anxiety, attitude, care robot, dementia, nurses, nursing robotics, robotics, technology,” while the fourth cluster (yellow color) consisted of the following words: “Decision making, expert systems, mental health, natural language processing, nursing informatics, pressure ulcer.” The last cluster (lilac color) words: “accidental falls, patient safety, risk assessment, supervised machine learning.”

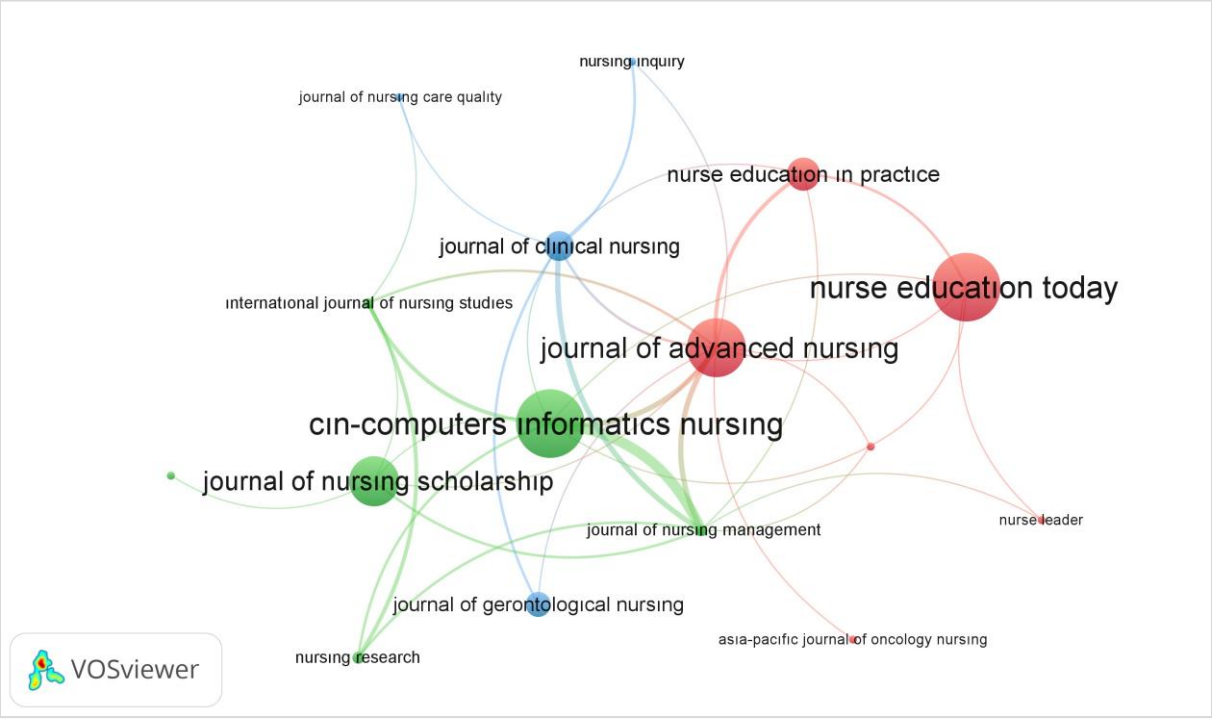


Figure 3. The network of the most influential journals weighted by the number of citations

Figure 6 was created to show the time process of the keywords. The most frequently used keywords toward 2022 were shown in yellow (on the right of Figure 6), whereas the most frequently used keywords toward 2016 were shown in purple (on the left of Figure 6). Regarding the periods, the initial words were "nursing informatics," "expert systems," "decision making," and "data mining." However, the words "patient safety," "depression," "ChatGPT," and "Chatbot" have been updated in recent years.

Highly cited publications

This study found that 11 publications cited were produced by 43 researchers (Table 1). The article entitled "Predicting pressure injury in critical care patients: a machine-learning model " by Alderson et al. (2018) was the most-cited publication (76 citations). In this publication, the authors developed a model using machine learning approaches to predict the risk of pressure injuries in surgical intensive care patients. The publication by O'Connor (2023), which investigated the positive and negative roles of AI chatbots like ChatGPT in nursing education, ranked second with 73 citations. Two publications had the same number of citations. Therefore, the contents of the 11 publications that were cited most were examined. The contents of the 11 most cited publications were examined. Among these publications, six addressed the direct applications of technology and AI in nursing and healthcare, covering areas like machine learning, AI platforms, robotics, data mining, and natural language processing. The remaining five publications delved into the implications and considerations of these technologies for nursing practice and education, encompassing themes such as the future of nursing in a technologically advanced world, simulation-based education, and attitudes towards robotics in healthcare. (Please see the author's word analysis for further detail).

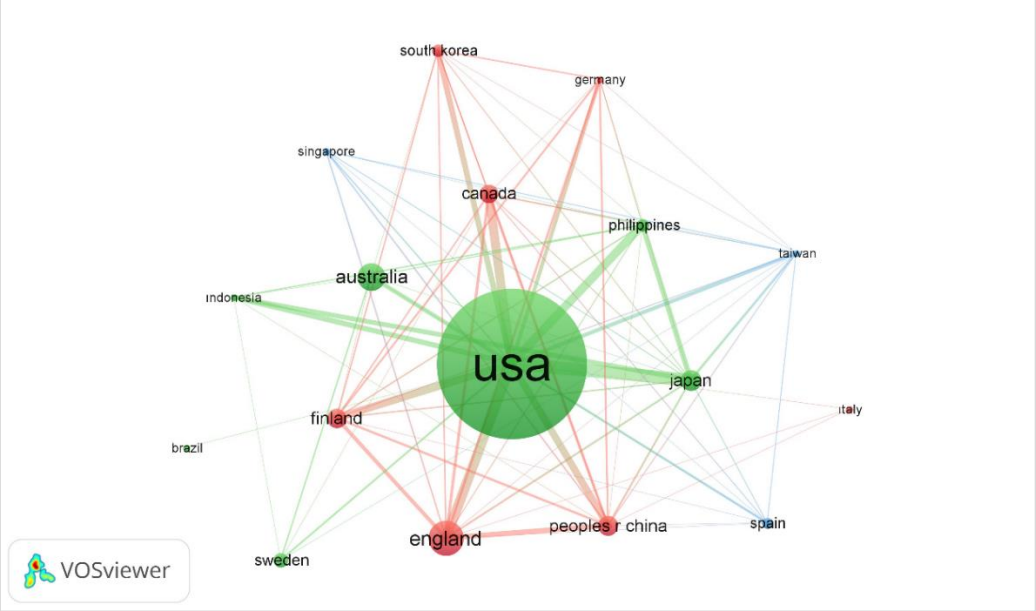


Figure 4. The network of collaboration between countries is weighted by the number of citations (The thicker the line between the two countries, the stronger the research collaboration between them. The closer the two countries are, the closer they are to the research field.)

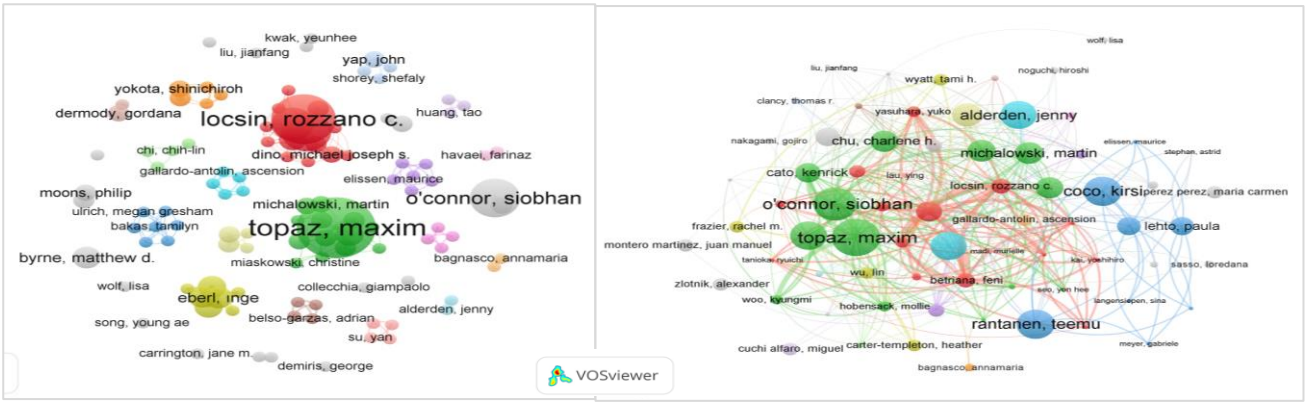
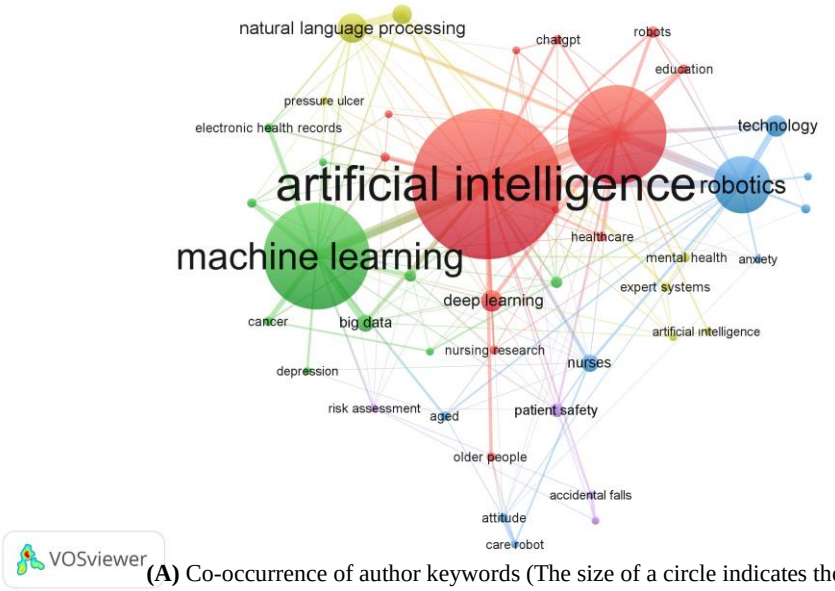
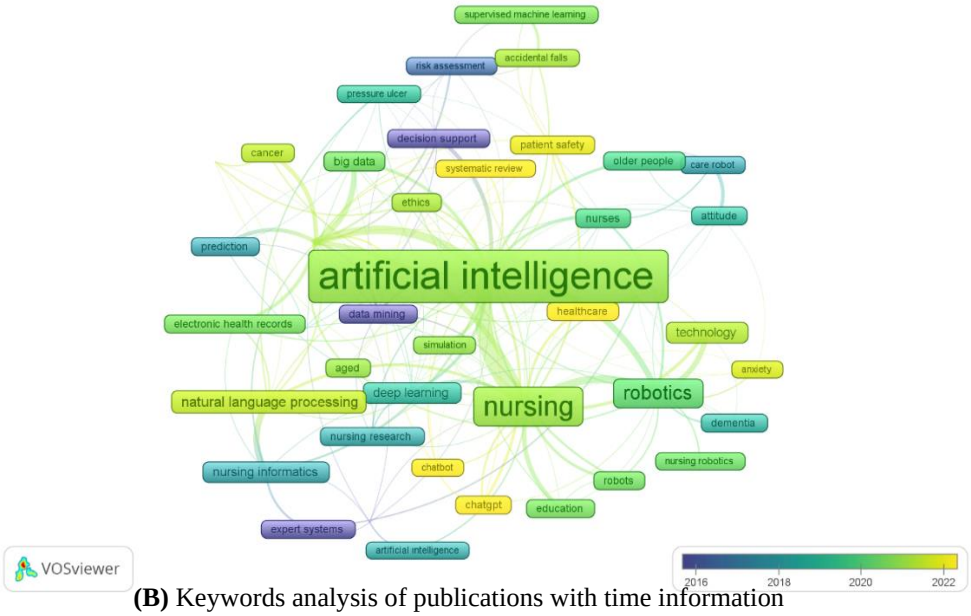


Figure 5. Co-authorship network weighted by the number of documents and citations (The size of a circle is positively correlated with the number of publications or citations. Circle colors and lines between authors indicate co-authorship)



(A) Co-occurrence of author keywords (The size of a circle indicates the frequency of keyword usage. Colors indicate clustering of keywords)



(B) Keywords analysis of publications with time information

Figure 6. Keyword analysis of publications

Table 1. Top-11 of most frequently cited publications (1984 to 2023 (August 08).

No.	Title	Type of AI used (DL, ML, NLP, Chatbot, etc.)	The most obvious results of the research	Original article review or editorial	Author (s), year	Journal	n**
1	Predicting pressure injury in critical care patients: a machine-learning model	ML	Developed a predictive model for pressure injuries in critical care using machine learning (random forest)	Article	Alderden et al., 2018	American Journal of Critical Care	76
2	Open artificial intelligence platforms in nursing education: Tools for academic progress or abuse?	ChatGPT	Explored the potential implications of AI chatbots in nursing education, including their use in student assessments and faculty research, while highlighting ethical considerations and the importance of academic integrity in the face of emerging AI technologies	Editorial	O'Connor, 2023	Nurse Education in Practice	73
3	Futurism in nursing: Technology, robotics and the fundamentals of care	Care robots	Emphasizes the imperative for anticipatory strategies and a posthumanist perspective in integrating advanced technologies within nursing, critically examining the historical trajectory of technology usage in the field and underscoring the necessity for strategic planning in the era of increasing technological integration	Article	Archibald & Barnard, 2018	Journal of Clinical Nursing	65
4	Structured Debriefing in Simulation-Based Education	DL	Emphasizes the critical role of debriefing in simulation-based education for deep learning, highlighting the debriefer's facilitation skills and their importance in creating a safe and supportive learning environment	Article	Palaganas et al., 2016	AACN Advanced Critical Care	55
5	Using a Robotic Cat in Dementia Care: A Pilot Study	Care robots	The study explores the impact of interactive robotic cats on individuals with dementia. It shows reduced agitation and improved quality of life. Interviews with relatives and caregivers reveal positive interaction, communication, and comfort effects. The robotic cat was also found to be user-friendly.	Article	Gustafsson et al., 2015	Journal of Gerontological Nursing	52
6*	Robotics in Nursing: A Scoping Review	Care robots	Identifies rapid evolution in nursing robotics, focusing on assistive and social assistive robots for elderly and disabled care. Emphasizes the need for clear social and legal guidelines to ensure safety and privacy in robot-human interactions and calls for greater collaboration between developers and caregivers for versatile robotic solutions	Review	Maalouf et al., 2018	Journal of Nursing Scholarship	50
	Nurses' needs for care robots in integrated nursing care services	Care robots	The study aims to define nurse expectations for care robots in INCS (inpatient care settings), highlighting that such robots can efficiently support nurses' workload. Results indicate a positive reception towards robotic assistance, emphasizing the necessity of robots working under nurse	Article	Lee et al., 2018	Journal of Advanced Nursing	

			supervision. Suggests future research should focus on enhancing collaborative aspects between care robots, medical professionals, and patients				
7	Can nurses remain relevant in a technologically advanced future?	ML	Emphasizes the role of machine learning in supporting nurses by automating routine tasks, allowing for a greater focus on complex care and critical decision-making, and underscores the importance of integrating this technology into nursing education and practice	Editorial	Pepito & Locsin, 2019	International Journal of Nursing Sciences	47
8	Comfort and Attitudes Towards Robots Among Young, Middle-Aged, and Older Adults: A Cross-Sectional Study	Care robots	It reveals similar attitudes towards robots among younger, middle-aged, and older adults, challenging the notion that older adults are less receptive to robotic assistance. It also highlights implications for nurses in robotic intervention design and use.	Article	Backonja et al., 2018	Journal of Nursing Scholarship	46
9	Data mining as a tool for research and knowledge development in nursing	ML	Highlights the revolutionary impact of data-mining technology in healthcare, similar to how telescopes and microscopes transformed science. Demonstrates data mining's potential in uncovering patterns within large healthcare databases, enhancing inquiry and knowledge. Emphasizes its role in predictive modeling and improving clinical practice through analysis of vast data sets	Article	Berger, & Berger, 2004	CIN-Computers, Informatics, Nursing	42
10	Exploring the Ability of Natural Language Processing to Extract Data from Nursing Narratives	NLP	Evaluate NLP's potential in extracting patient safety, quality measures, and nursing outcomes from narratives, suggesting expansion of MedLEE's (Medical Language Extraction and Encoding) lexicon with nursing terms for enhanced performance.	Article	Hyun et al., 2009	CIN-Computers, Informatics, Nursing	37

*:Publications with the same number of citations; n**:Total Citation
DL:Deep Learning; ML:Machine Learning; NLP:Natural Language Processing

DISCUSSION

The trajectory of AI research in nursing provides a comprehensive understanding of this burgeoning field's evolution and interdisciplinary nature (Galetsi & Katsaliaki, 2020). From its inception in 1984, there was a noticeable stagnation in AI-centric nursing research until 2015. However, a notable uptick in studies began in 2017, resulting in 272 publications between 2018 and 2023. Especially 2022 emerged as a pivotal year with 71 publications, and a high citation count underscored its significant academic impact. This result shows that AI is becoming more and more popular among researchers. Many factors may have influenced this upward trend. First, AI is a recent concept in healthcare, especially nursing interventions (Carroll, 2018). Second, it is believed that humanoid robots equipped with artificial intelligence, developed in and after 2013, could reduce the need for nursing to a certain extent and positively affect the quality of care (Gümüş & Kasap, 2021). These factors may have accelerated AI research, providing new nursing potential. Most contributions, being articles (72.7%), indicate a vibrant empirical investigation buttressed by crucial editorial materials (11.5%).

Furthermore, the current study reveals research categories associated with AI in nursing, specifically Computer Science Interdisciplinary Applications and Medical Informatics. This categorization, characteristic of the WoSCC database, underscores AI research's multifaceted, interdisciplinary character in nursing. This interdisciplinary integration signifies the confluence of nursing with AI and highlights the potential to assimilate insights and methodologies from diverse fields, fostering the expansion and enrichment of nursing research (Oermann et al., 2019). This progressive interdisciplinary convergence underscores AI's transformative and synergistic potential in contemporary nursing research."

The study scrutinized journals focusing on AI within the nursing context. The results revealed that a substantial proportion, approximately 33% of all publications, were contributed by a mere seven prominent journals. This observation indicates that these journals have become central platforms for discourse on AI in nursing. Significantly, 'CIN - Computers, Informatics, and Nursing emerged as a key player. With its 34 publications and an exceptional 246 citations, it is evident that this journal contributes extensively and substantially influences the field (Chang et al., 2021). Such a high citation count emphasizes its esteemed status in the scholarly arena. This understanding can be instrumental in researchers deciding where to channel their attention and manuscript submissions within the domain of AI in nursing.

This research maps out the international landscape of AI in nursing, spotlighting the USA's predominant contribution, accounting for 45.2% of publications and receiving 1075 citations. Their leading position is attributed to notable investments in AI infrastructure, as corroborated by the Federal Register of the USA (2019). Nations like China, Japan, South Korea, and Australia also show robust engagement, propelled by their dedicated AI strategies (Conn, 2018; New Generation of Artificial Intelligence Development Plan, 2017). However, the ranking of countries identified in this study differs from those in AI bibliometric studies in the broader health domain (Tran et al., 2019; Guo et al., 2020; Ho & Wang, 2020). While these rankings may vary over time, they may not comprehensively represent the entire field. Nonetheless, these findings highlight these countries' proactive stance in recognizing and tapping into the potential of AI within the nursing discipline.

This study shows that Turkey still needs to establish a prominent position in AI within nursing research on the international stage. This situation stems from the country's economic and infrastructural constraints. Nonetheless, these challenges highlight the importance of strategic investments in high-growth potential sectors. The scarcity of AI studies in nursing within Turkey necessitates a focused strategy for resource allocation to overcome these fundamental barriers. Emphasizing strategic investment, adopting a multidisciplinary approach to AI development, and enhancing computer literacy from an early educational stage are identified as crucial steps toward leveraging Turkey's potential in this rapidly evolving field. These initiatives aim not only to overcome existing obstacles but also to lay a solid foundation for Turkey to expand its contribution to AI in nursing, keep pace with global advancements, and meet the unique health needs of its population (Ermağan, 2021).

Topaz M. has been identified as the field's most productive and cited author in this study. This outcome signifies the substantial contribution of Topaz M.'s work to nursing research, establishing it as a significant pillar within the domain. With their substantial citation counts, Topaz M., O'Connor S., and Finnish researchers Coco K. and Rantanen T. indicate the broad international impact of nursing research. Despite publishing fewer articles, Finland's substantial citations underscore the essence of research caliber. Collectively, this investigation sheds light on AI's trajectory in nursing, emphasizing global collaboration and the significance of impactful research.

Furthermore, this study underscores the importance of collaboration and cultural diversity in nursing. The research conducted by Papadopoulos and 34 other authors, bringing together nurse academics from various countries, highlights the value of addressing the subject from diverse cultural perspectives. Such collaborations expand the boundaries of research, offering the potential for more comprehensive and practical solutions.

For example, in the relevant study, despite the generally positive views of international nurses and midwives on socially assistive robots (SARs), the technology adoption process encounters resistance and concerns, revealing the significant role of cultural factors in accepting SARs. Specifically, cultural dimensions such as long-term orientation and uncertainty avoidance play a crucial role in attitudes toward technology adoption. These findings emphasize the necessity of considering cultural factors in integrating technologies like SARs into nursing practices (Papadopoulos et al., 2023). Therefore, cultural

considerations must be considered to effectively integrate technological innovations in nursing research and practice (Papadopoulos & Koulouglioti, 2018).

The perspective offered by keyword analysis can aid in understanding the scope and structure of a topic (Galetsi & Katsaliaki, 2020), and such analyses facilitate the identification of primary trends and focal points within the literature (Yan et al., 2022). This study presents an in-depth keyword analysis to identify research trends where AI intersects with nursing. Keywords from one (red) cluster emphasize AI's various types and applications, especially in education. In contrast, another (green) cluster encompasses themes related to the applications of AI technologies in nursing and the ethical considerations these technologies present. A third (lilac) cluster focuses on more specific subjects, such as patient safety and risk assessment associated with AI implementations. In recent years, the rising use of AI technologies, notably robots, in nursing has brought many ethical issues. Both broadly and in the specific context of AI's caregiving roles, concerns center around themes like patient safety and privacy (Stokes & Palmer, 2020; Maalouf, 2018).

Shifting the focus to another keyword (blue) cluster, we observe technology integration in specific healthcare settings, such as elderly care and dementia management. This result shows that researchers are more interested in robotics in nursing. Pepito and Locsin (2019) argue that we have entered an era of robots, which execute tasks and procedures more efficiently and safely than they did in the past. AI-powered healthcare robotics is classified according to target users: doctor healthcare robots, nurse healthcare robots, and home healthcare robots (Alaiad & Zhou, 2014). Some robots help nurses work more efficiently by reducing the number of non-nursing activities that negatively affect patient care. Robots generally fulfill routine and predictable care needs (Booth, 2011). For example, Georgia Tech's "Cody" gives patients bed baths and assists in rehabilitating stroke patients. When nurses are busy, SAM robots can periodically go to patients' rooms and ask them how they are doing (Pepito & Locsin, 2019). Some robots can think like nurses and perform their duties (Şendir et al., 2019). For example, Proficio dispenses drugs accurately and reliably, thus reducing nurses' responsibilities in drug management (Pepito & Locsin, 2019). Robots can also reduce nurses' workload by monitoring the problems that negatively affect the health of dementia patients who require special care and follow-up in care centers. For example, Telepresence robots can assist nurses with tasks by providing audio and visual feedback (Maalouf et al., 2018).

A significant finding of this study is the evolution of keyword usage over time. In the past, concepts such as "nursing informatics" and "data mining" were prominent, but in recent years, interest in AI technologies like "ChatGPT" and "Chatbot" has significantly increased. The launch of ChatGPT has sparked widespread interest in the roles of AI-powered chatbots in education, clinical settings, and the creation of scientific documentation (Choi et al., 2023). The rise of these technologies has enriched nurse education with interactive and personalized learning experiences, significantly enhancing the effectiveness and efficiency of education in areas such as remote patient monitoring. Through ChatGPT, nurses can access various health-related topics, including patient care, clinical skills, and medical research (Liu et al., 2023; Sharma & Sharma, 2023). This technological advancement has created a notable focus in educational research, as highlighted by Zheltukhina et al. (2024), who particularly emphasized ChatGPT in medical and nursing education. The analysis of the most-cited articles in this study also reveals topics that support this development. The evolution of AI topics in nursing research underscores the growth of AI technologies and the increasing interest and awareness in this area. Subjects ranging from predicting pressure injuries in critical care patients to using chatbots in nursing education represent current AI and nursing research trends. Although research trends are dynamic and subject to change, they play a crucial role in identifying the current challenges and opportunities in the field (Liu et al., 2021).

Limitations of study

This study draws exclusively from the WoSCC database, so results may vary with PubMed or Google Scholar databases. As WoSCC focuses on English articles, relevant non-English studies might need to be noticed. The chosen keywords could omit some pertinent articles. Data was last updated on August 08, 2023, omitting newer research. Additionally, recent articles might have accumulated few citations. These factors should be considered when interpreting the study's findings.

CONCLUSION

From 2018 to 2023 (August 08), there has been a noticeable alignment between the increase in AI-related publications in nursing and the broader national AI strategies. This suggests that AI's role in nursing is gradually gaining momentum. As the application of AI in nursing is still in its early phases, it is anticipated to offer significant scientific insights in the future.

AI is and will be a technological development that significantly impacts nursing. Nurses and researchers should explore AI's potential in nursing management and education. In this respect, nurse managers should focus on AI more. For this, nurse managers should lead nurses in developing policies, strategies, or roadmaps for AI applications. They should encourage both international cooperation and collaboration among researchers for AI research. In addition, they should encourage nurses and nursing researchers to conduct further research on the use of AI applications in nursing services management and nursing education. Nurse leaders should be remarkably prepared to guide the establishment of AI-driven strategies and approaches.

This study's findings can serve as a valuable guide for professionals, helping them understand potential research directions and enhancing patient care outcomes. A similar study can be conducted in future databases such

as Google Scholar, Scopus, etc. In this way, how far AI has progressed in nursing can be estimated.

Acknowledgement
None.

Conflict of Interest
No conflict of interest has been declared by the author(s).

Author Contributions
Plan, design: ÇK; **Material, methods and data collection:** ÇK; **Data analysis and comments:** ÇK; **Writing and corrections:** ÇK.

Funding
This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Ethical considerations
Given the nature of this bibliometric study, no ethics committee approval was required. Since bibliometric studies use open-access data, they do not require an ethics committee event.

REFERENCES

Ahmed, S.K. (2023). The Impact of ChatGPT on the Nursing Profession: Revolutionizing Patient Care and Education. *Ann Biomed Eng* 51, 2351–2352. https://doi.org/10.1007/s10439-023-03262-6

Alaiad, A., & Zhou, L. (2014). The determinants of home healthcare robots adoption: An empirical investigation. *International journal of medical informatics*, *83*(11), 825-840. https://doi.org/10.1016/j.ijmedinf.2014.07.003

Alderden, J., Pepper, G. A., Wilson, A., Whitney, J. D., Richardson, S., Butcher, R., Jo Y., & Cummins, M. R. (2018). Predicting pressure injury in critical care patients: a machine-learning model. *American Journal of Critical Care*, *27*(6), 461–468. https://doi.org/10.4037/ajcc2018525

Archibald, M. M., & Barnard, A. (2018). Futurism in nursing: Technology, robotics and the fundamentals of care. *Journal of Clinical Nursing*, *27*(11-12), 2473–2480. https://doi.org/10.1111/jocn.14081

Aristoteles, A., Abie, P. K., Irawati, A. R., Sakethi, D., Lisa, S., Dedy Miswar, D. M., & Rika, N. A. (2023). Development of Nursing Process Expert System for Android-based Nursing Student Learning. *International Journal of Advanced Computer Science and Applications*, *14*(11), 234-239. https://doi.org/10.14569/IJACSA.2023.0141122

Backonja, U., Hall, A. K., Painter, I., Kneale, L., Lazar, A., Cakmak, M., Thompson, H. H., & Demiris, G. (2018). Comfort and attitudes towards robots among young, middle-aged, and older adults: a cross-sectional study. *Journal of Nursing Scholarship*, *50*(6), 623–633. https://doi.org/10.1111/jnu.12430

Bahroun, Z., Anane, C., Ahmed, V., Zacca, A. (2023). Transforming Education: A Comprehensive Review of Generative Artificial Intelligence in Educational Settings through Bibliometric and Content Analysis. *Sustainability*. 15(17), 12983. https://doi.org/10.3390/su151712983

Bates, D. W., Auerbach, A., Schulam, P., Wright, A., & Saria, S. (2020). Reporting and implementing interventions involving machine learning and artificial intelligence. *Annals of Internal Medicine*, 172(11_Supplement), S137-S144. https://doi.org/10.7326/M19-0872

Berger, A. M., & Berger, C. R. (2004). Data mining as a tool for research and knowledge development in nursing. *CIN: Computers, Informatics, Nursing*, *22*(3), 123-131.

Booth, BE. (2011). Robotics in nursing. *Journal of Practical Nursing*, *61*(4), 12-13. Retrieved from https://www.proquest.com/openview/7449a9306fb3f6a0f42b039b653fabb2/1

Bose, E., Maganti, S., Bowles, K. H., Brueshoff, B. L., & Monsen, K. A. (2019). Machine learning methods for identifying critical data elements in nursing documentation. *Nursing Research*, 68(1), 65–72. https://doi.org/10.1097/NNR.0000000000000315.

Carroll, W. M. (2018). Artificial intelligence, nurses, and the quadruple aim. *Online Journal of Nursing Informatics*, 22(2), 3–1.

Chang, C. Y., Gau, M. L., Tang, K. Y., & Hwang, G. J. (2021). Directions of the 100 most cited nursing student education research: A bibliometric and co-citation network analysis. *Nurse Education Today*, 96, 104645. https://doi.org/10.1016/j.nedt.2020.104645

Chang, C. Y., Jen, H. J., & Su, W. S. (2022). Trends in artificial intelligence in nursing: Impacts on nursing management. *Journal of Nursing Management*, 30(8), 3644-3653. https://doi.org/10.1111/jonm.13770

Choi, E.P.H., Lee, J.J., Ho, M.H., Kwok, J.Y.Y., & Lok, K.Y.LW. (2023). Chatting or cheating? The impacts of ChatGPT and other artificial intelligence language models on nurse education. *Nurse Education Today*, *125*, 105796-105796. https://doi.org/10.1016/j.nedt.2023.105796

Conn A. (2018). Artificial Intelligence Policy-Japan. Retrieved from https://futureoflife.org/2018/07/12/ai-policy-japan/

Courtney, K. L., Alexander, G. L., & Demiris, G. (2008). Information technology from novice to expert: implementation implications. *Journal of Nursing Management*, *16*(6), 692–699. https://doi.org/10.1111/j.1365-2834.2007.00829.x

Çiçek Korkmaz, A., & Altuntaş, S. (2022). A bibliometric analysis of COVID-19 publications in nursing by visual mapping method. *Journal of Nursing Management*, 30(6), 1892-1902. https://doi.org/10.1111/jonm.13636

Davenport, T., & Kalakota, R. (2019). The potential for artificial intelligence in healthcare. *Future Healthcare Journal*, 6(2), 94–98. https://doi.org/10.7861/futurehosp.6-2-94

Downing, C., Temane, A., Bader, S. G., Hillyer, J. L., Beatty, S. C., & Hastings-Tolsma, M. (2021). International nursing research collaboration: Visualizing the output and impact of a Fulbright Award. *International Journal of Africa Nursing Sciences*, *p.* 15, 100380. https://doi.org/10.1016/j.ijans.2021.100380

Easton-Garrett, S., Gephart, S., & Nickels, S. (2020). Utilizing artificial intelligence for falls management in memory care. *Geriatric Nursing (New York, NY)*. 10.1016/j.gerinurse.2020.03.011

Ermağan, İ. (2021). Worldwide Artificial Intelligence Studies with a Comparative Perspective: How Ready is Turkey for This Revolution? In *Artificial Intelligence Systems and the Internet of Things in the Digital Era. EAMMIS 2021*, 1st ed.; Lecture Notes in Networks and, Systems; Musleh, A.M., Razzaque, A., Kamal, M.M., Eds.; Springer: Cham, Switzerland, 239, pp. 500–512.

Galetsi, P., & Katsaliaki, K. (2020). Big data analytics in health: An overview and bibliometric study of research activity. *Health Information & Libraries Journal*, 37(1), 5-25. https://doi.org/10.1111/hir.12286

Gunawan, J. (2023). Exploring the future of nursing: Insights from the ChatGPT model. *Belitung Nursing Journal*, 9(1), 1-5. https://doi.org/10.33546/bnj.2551

Guo, Y., Hao, Z., Zhao, S., Gong, J., & Yang, F. (2020). Artificial intelligence in health care: bibliometric analysis. *Journal of Medical Internet Research*, 22(7), e18228. https://doi.org/10.2196/18228

Gustafsson, C., Svanberg, C., & Müllersdorf, M. (2015). Using a robotic cat in dementia care: a pilot study. *Journal of gerontological nursing*, *41*(10), 46-56. https://doi.org/10.3928/00989134-20150806-44

Gümüş, E., & Kasap, E. U. (2021). The Future of the Nursing: Robot Nurses. *Journal of Artificial Intelligence in Health Sciences*,1(2), 20-25. https://doi.org/10.52309/jai.2021.10

Ho, Y. S., & Wang, M. H. (2020). A bibliometric analysis of artificial intelligence publications from 1991 to 2018. COLLNET *Journal of Scientometrics and Information Management*, 14(2), 369-392. https://doi.org/10.1080/09737766.2021.1918032

Hyun, S., Johnson, S. B., & Bakken, S. (2009). Exploring the ability of natural language processing to extract data from nursing narratives. *Computers, informatics, nursing: CIN*, *27*(4), 215. 10.1097/NCN.0b013e3181a91b58

Janiesch, C., Zschech, P., & Heinrich, K. (2021). Machine learning and deep learning. *Electronic Markets*, 31(3), 685-695. https://doi.org/10.1007/s12525-021-00475-2

Javaid, M., Haleem, A., Singh, R.P., Khan, S., & Khan, I.H. (2023). Unlocking the opportunities through ChatGPT Tool towards ameliorating the education system. *Bench Council Transactions on Benchmarks, Standards and Evaluations*, *3*(2), 100115. https://doi.org/10.1016/j.tbench.2023.100115

Jeong, G. H. (2020). Artificial intelligence, machine learning, and deep learning in women's health nursing. *Korean Journal of Women Health Nursing*, *26*(1), 5–9. https://doi.org/10.4069/kjwhn.2020.03.11

Kantek, F., & Yesilbas, H. (2020). Conflict in nursing studies: A bibliometric analysis of the top 100 cited papers. *Journal of Advanced Nursing*, 76(10), 2531– 2546. https://doi.org/10.1111/jan.14463

Kokol, P., Završnik, J., & Vošner, H. B. (2018). Bibliographic-based identification of hot future research topics: an opportunity for hospital librarianship. *Journal of Hospital Librarianship*, 18(4), 315-322. https://doi.org/10.1080/15323269.2018.1509193

Konttila, J., Siira, H., Kyngäs, H., Lahtinen, M., Elo, S., Kääriäinen, M., ... & Mikkonen, K. (2019). Healthcare professionals' competence in digitalisation: A systematic review. *Journal of Clinical Nursing*, 28(5-6), 745-761. https://doi.org/10.1111/jocn.14710

Korkmaz, A., Aktürk, C., & Talan, T. (2023). Analyzing the users' sentiments of ChatGPT using Twitter data. *Iraqi Journal for Computer Science and Mathematics*, *4*(2), 202-214. https://doi.org/10.52866/ijcsm.2023.02.02.018

Kwon, J. Y., Karim, M. E., Topaz, M., & Currie, L. M. (2019). Nurses "seeing forest for the trees" in the age of machine learning: using nursing knowledge to improve relevance and performance. *CIN: Computers, Informatics, Nursing*, *37*(4), 203–212. http://dx.doi.org/10.1097/CIN.0000000000000508

Lee, J. Y., Song, Y. A., Jung, J. Y., Kim, H. J., Kim, B. R., Do, H. K., & Lim, J. Y. (2018). Nurses' needs for care robots in integrated nursing care services. *Journal of Advanced Nursing*, *74*(9), 2094-2105. https://doi.org/10.1111/jan.13711

Liu, J., Liu, F., Fang, J., & Liu, S. (2023). The application of Chat Generative Pre-trained Transformer in nursing education. *Nursing Outlook*, *71*(6), 102064. https://doi.org/10.1016/j.outlook.2023.102064

Liu, S., Zhang, R. Y., & Kishimoto, T. (2021). Analysis and prospect of clinical psychology based on topic models: Hot research topics and scientific trends in the latest decades. *Psychology, Health, and Medicine*, 26 (4),395–407. https://doi.org/10.1080/13548506.2020.1738019

Maalouf, N., Sidaoui, A., Elhajj, I. H., & Asmar, D. (2018). Robotics in nursing: a scoping review. *Journal of Nursing Scholarship*, 50(6), 590-600. https://doi.org/10.1111/jnu.12424

New Generation of Artificial Intelligence Development Plan. The Foundation for Law and International Affairs. State Council Document, July 08, 2017, No. 35. Retrieved from https://flia.org/notice-state-council-issuing-new-generation-artificial-intelligence-development-plan/.

O'Connor, S. (2022). Open artificial intelligence platforms in nursing education: Tools for academic progress or abuse? *Nurse Education in Practice*, *66*, 103537–103537. https://doi.org/10.1016/j.nepr.2022.103537

Oermann, M. H., Chinn, P. L., Carter-Templeton, H., & Nicoll, L. H. (2019). The importance of nursing in nursing publications. *Nurse Author & Editor*, 29(3), 1–6. https://doi.org/10.1111/j.1750-4910.2019.tb00043.x

Özturk, O. (2021). A framework for the design of bibliometric research. Oğuzhan Öztürk and Gökhan Gürler (Ed.). *In Bibliometric Analysis as a Literature Review Tool* (2nd ed, pp. 33–48), Ankara: Nobel publishing house

Palaganas, J. C., Fey, M., & Simon, R. (2016). Structured debriefing in simulation-based education. *AACN Advanced Critical Care*, *27*(1), 78-85. https://doi.org/10.4037/aacnacc2016328

Papadopoulos, I., & Koulouglioti, C. (2018). The influence of culture on attitudes towards humanoid and animal-like robots: An Integrative Review. *Journal of Nursing Scholarship*, *50*(6), 653–665. https://doi.org/10.1111/jnu.12422

Papadopoulos, I.,Wright, S., Koulouglioti, C., Ali, S., Lazzarino, R.,Martín-García, A., … & Nissim, S. (2023). Socially assistive robots in health and social care: Acceptance and cultural factors. Results from an exploratory international online survey.*Japan Journal of Nursing Science*,20(2), e12523. https://doi.org/10.1111/jjns.12523

Pepito, J. A., & Locsin, R. (2019). Can nurses remain relevant in a technologically advanced future? *International journal of nursing sciences*, 6(1), 106-110. https://doi.org/10.1016/j.ijnss.2018.09.013

Robert, N. (2019). How artificial intelligence is changing nursing. *Nursing Management*, 50(9), 30–39. https://doi.org/10.1097/01.NUMA.0000578988.56622.21

Sharma, M., & Sharma, S. (2023). A holistic approach to remote patient monitoring, fueled by ChatGPT and Metaverse technology: The future of nursing education. *Nurse Education Today*, *131*, 105972. https://doi.org/10.1016/j.nedt.2023.105972

Shi, J., Wei, S., Gao, Y., Mei, F., Tian, J., Zhao, Y., & Li, Z. (2022). Global output on artificial intelligence in nursing: A bibliometric analysis and science mapping. *Journal of Nursing Scholarship*, 55(4), 853–863. https://doi.org/10.1111/jnu.12852

Stokes, F., & Palmer, A. (2020). Artificial intelligence and robotics in nursing: ethics of caring as a guide to dividing tasks between AI and humans. *Nursing Philosophy*, 21(4), e12306. https://doi.org/10.1111/nup.12306

Sullivan, S. S., Hewner, S., Chandola, V., & Westra, B. L. (2019). Mortality risk in homebound older adults predicted from routinely collected nursing data. *Nursing Research*, 68(2), 156–166. https://doi.org/10.1097/NNR.0000000000000032

Sweileh, W. M., Huijer, H. A., Al-Jabi, S. W., Zyoud, S. H., & Sawalha, A. F. (2019). Nursing and midwifery research activity in Arab countries from 1950 to 2017. BMC Health Services Research, 19, 340. https://doi.org/10.1186/s12913-019-4178-y

Şendir, M., Şimşekoğlu, N., Kaya, A., Sümer, K. (2019). Nursing in Future Technology. *University of Health Sciences Journal of Nursing*, 1(3), 209-214.

Topol, E. J. (2019). High-performance medicine: the convergence of human and artificial intelligence. Nature Medicine, 25(1), 44–56. https://doi.org/10.1038/s41591-018-0300-7

Tran, B. X., Vu, G. T., Ha, G. H., Vuong, Q. H., Ho, M. T., Vuong, T. T., ... & Ho, R. (2019). Global evolution of research in artificial intelligence in health and medicine: a bibliometric study. *Journal of Clinical Medicine*, 8(3), 360. https://doi.org/10.3390/jcm8030360

Von Gerich, H., Moen, H., Block, L. J., Chu, C. H., DeForest, H., Hobensack, M., ... & Peltonen, L. M. (2021). Artificial Intelligence-based technologies in nursing: A scoping literature review of the evidence. *International Journal of Nursing Studies*, 104153. https://doi.org/10.1016/j.ijnurstu.2021.104153

Yan, S., Zhang, H., & Wang, J. (2022). Trends and hot topics in radiology, nuclear medicine, and medical imaging from 2011–2021: a bibliometric analysis of highly cited papers. *Japanese Journal of Radiology*, 40(8), 847–856. https://doi.org/10.1007/s11604-022-01268-z

Yanbing, S., Ruifang, Z., Chen, W., Shifan, H., Hua, L., & Zhiguang, D. (2020). Bibliometric analysis of the Journal of Nursing Management from 1993 to 2018. *Journal of Nursing Management*, 28, 317 – 331. https://doi.org/10.1111/jonm.12925

Zheltukhina, M. R., Sergeeva, O. V., Masalimova, A. R., Budkevich, R. L., Kosarenko, N. N., & Nesterov, G. V. (2024). A bibliometric analysis of publications on ChatGPT in education: Research patterns and topics. *Online Journal of Communication and Media Technologies*, 14(1), e202405. https://doi.org/10.30935/ojcmt/14103

ORİJİNAL MAKALE / ORIGINAL ARTICLE
Balıkesir Sağlık Bilimleri Dergisi / BAUN Sağ Bil Derg
Balıkesir Health Sciences Journal / BAUN Health Sci J
ISSN: 2146-9601- e ISSN: 2147-2238
Doi: https://doi.org/10.53424/balikesirsbd.1422074

Lactate/Albumin Ratio as a Predictor of Mortality in Patients with Crimean-Congo Hemorrhagic Fever

Yusuf Kenan TEKİN[1], Şimşek ÇELİK[1]

[1] Sivas Cumhuriyet University, Faculty of Medicine, Department of Emergency

Geliş Tarihi / Received: *18.01.2024,* ***Kabul Tarihi / Accepted:*** *19.03.2024*

ABSTRACT
Objective: This study aimed to determine the relationship of lactate/albumin (L/A) ratio with prognosis and fatality in CCHF patients. **Materials and Methods:** A total of 260 patients diagnosed with CCHF between January 2019 and December 2022, 36 of whom were deceased and 224 of whom were alive, were retrospectively included in the study. The findings of survivor and non-survivor patients were compared**. Results:** There was no significant difference between the groups in terms of age and gender. While albumin, glucose and platelet levels were quite low in the patient group who died due to CCHF ($p<0.001$); White blood cells, urea nitrogen, creatinine, alanine aminotransferase, aspartate aminotransferase, sodium, lactate, L/A ratio and high-sensitivity C-reactive protein in the blood were found to be significantly high ($p<0.05$). In the ROC analysis, the highest sensitivity and specificity were calculated as the L/A ratio. **Conclusion:** We found that the L/A ratio can be used as a tool to predict fatality in CCHF patients. In addition, the L/A ratio was more significant in predicting fatality than serum albumin and serum lactate levels alone.
Keywords: Emergency Department, Crimean-Congo Hemorrhagic Fever, Lactate/Albumin Ratio, Fatality.

Kırım-Kongo Kanamalı Ateşi Hastalarında Mortalitenin Belirleyicisi Olarak Laktat/Albümin Oranı

ÖZ
Amaç: Bu çalışma, KKH hastalarında laktat/albümin (L / A) oranının prognoz ve mortalite ile ilişkisini belirlemeyi amaçlamıştır. **Gereç ve Yöntem:** Ocak 2019 ile Aralık 2022 tarihleri arasında KKH tanısı almış, 36'sı mortalite, 224'ü canlı olmak üzere toplam 260 hasta retrospektif olarak çalışmaya dahil edildi. Sağ kalan ve sağ kalan olmayan hastaların bulguları karşılaştırıldı. **Bulgular:** Gruplar arasında yaş ve cinsiyet açısından anlamlı fark yoktu. KKKA nedeniyle ölen hasta grubunda albumin, glukoz ve trombosit düzeyleri oldukça düşük iken ($p<0,001$); Kanda beyaz kan hücreleri, üre nitrojen, kreatinin, alanin aminotransferaz, aspartat aminotransferaz, sodyum, laktat, L/A oranı ve yüksek duyarlıklı C-reaktif protein anlamlı düzeyde yüksek bulundu ($p<0,05$). ROC analizinde en yüksek duyarlılık ve özgüllük L/A oranı olarak hesaplandı. **Sonuç:** L/A oranının KKKA hastalarında fataliteyi öngörmede bir araç olarak kullanılabileceğini bulduk. Ek olarak, L/A oranı, fataliteyi öngörmede tek başına serum albümin ve serum laktat düzeylerine göre daha anlamlıydı.
Anahtar Kelimeler: Acil Servis, Kırım-Kongo Kanamalı Ateşi, Laktat/Albumin Oranı, Fatalite.

Sorumlu Yazar / Corresponding Author: Yusuf Kenan TEKIN, Department of Emergency, Faculty of Medicine, Sivas Cumhuriyet University, Sivas, Türkiye.
E-mail: yktekin@hotmail.com

Bu makaleye atıf yapmak için / Cite this article: Tekın,Y.K., &. Çelik, Ş. (2024). Lactate/Albumin ratio as a predictor of mortality in patients with crimean-congo hemorrhagic fever. *BAUN Health Sci J, 13*(2), 339-345. https://doi.org/10.53424/balikesirsbd.1422074

INTRODUCTION

The Nairovirus (family Bunyaviridae) is a tick-borne virus that causes CCHF, a zoonotic viral illness. The disease's extensive range is related to the Hyalomma tick's global distribution, which serves as the vector for the spread of the virus. Infected animals usually exhibit preclinical symptoms of the disease, while humans die from it. Humans experience nonspecific febrile symptoms that progress to hemorrhagic shock. (Appannanavar & Mishra, 2011; Fillâtreet, Revest, & Tattevin 2019) In our nation, the first prevalence was recorded in 2002. Examining the Ministry of Health's statistics reveals a discernible increase in CCHF notifications over that period. between 2002 and 2008, while there was a decrease in the number of cases and mortality between 2008 and 2017. Cases are observed in many regions of Türkiye. The majority of cases (95%) were detected between March and October (Binici et al., 2022). Humans can contract CCHF by coming into contact with the bodily fluids or tissues of an infected animal, primarily through hard-bodied Hyalomma ticks of the Ixodes family, especially Hyalomma marginatum, with a mortality rate of up to 30%. (Kazan & Sümer, 2019). Individuals in rural endemic areas engaged in animal husbandry are at the highest risk of infection. The incubation period of the virus is 1–13 days. The value of the viral load and the mode of transmission are effective in this regard. The incubation time has been determined to be 1-3 days after a tick bite, 3-6 days after contact with blood or body fluids, and 5-7 days for healthcare-associated disorders. Prolonged prothrombin time (PT), partial thromboplastin time (PTT), hyperbilirubinemia with high transaminases, leukopenia, and thrombocytopenia are among the laboratory abnormalities observed in the patients. (Hawman & Feldmann, 2018; Hawman et al., 2009). Viral RNA can be found using serology and reverse transcriptase polymerase chain reaction (RT-PCR) as diagnostic techniques. When predicting mortality in individuals with sepsis, the lactate/albumin (L/A) ratio is a more reliable diagnostic than lactate (Chebl et al. ,2021). Additionally, it has been demonstrated to be connected to mortality in individuals with moderate to severe traumatic brain injury. (Wang, He, Qu, Zhang, & Xu, 2022). Determining the risk of mortality quickly and effectively in CCHF disease is necessary for triage of the patient, blood product needs, and planning of follow-up strategies. Biomarkers are currently insufficient, though, to determine the mortality risk in CCHF patients. The L/A ratio does predict mortality in a large number of critically ill patients, however it is unclear if it predicts critical disease in patients receiving continuous critical care units. Determining the predictive significance of lactate, albumin, and the L/A ratio in CCHF patients was the aim of this investigation.

MATERIALS AND METHODS

Study type

A descriptve, retrospective study was conducted using medical records of patients with CCHF who applied to Sivas Cumhuriyet University Emergency Department between January 2019 and December 2022.

Study group

Sivas Cumhuriyet University Hospital is a tertiary hospital located in Sivas, east of Central Anatolia. A search of the Sivas Cumhuriyet University Hospital Emergency Department database was conducted to identify CCHF presentations. Each CCHFpatient identified from the initial screening then entered into a clinical database specifically designed for CCHF data acquisition. A total of 260 patients with CCHF were identified. Of the total 260 patients, 36 died and 224 survived.

Dependent and independent variables

While the independent variables of this research are age and gender, the dependent variable is mortality of the CCHF.

Procedures

The database included information about the 260 patient's demographics, complaints on admission, tick contact history, temperature, blood pressure, pulse rate, physical examination findings, complete blood count (CBC), blood biochemistry test, coagulation the panel, treatment, and post-treatment information and follow-up.

Statistical analysis

Based on data from SPSS Data 21.0 (SPSS Inc., Chicago, Illinois, USA), a statistical analysis was conducted. In terms of continuous statistics, mean±SD was used. During data processing, the independent t-test was employed to establish the importance of the variation between each of the averages; the Man-Whitney U test was used when the parametric test assumptions were not met; and the Shapiro-Wilk parametric test was used when the assumptions were satisfied. The appropriate cut-off settings for the L/A ratio were determined using a receiver operating characteristic curve (ROC) analysis. The error level $p<0.05$ value was considered significant.

The inclusion criteria were; patients aged ≥ 18 years; and the emergency department's definitive diagnosis of CCHF by showing viral RNA with RT-PCR after laboratory examinations. Exclusion criteria: patients using drugs such as albuterol and metformin that

change serum lactate values, with liver disease, and patients whose data were not accessible were excluded from the study (Figure 1).

Ethical considerations

The study was approved by the local Ethical Committee of Sivas Cumhuriyet University (approval number and date: 2023-04/20, 19.04.2023).

RESULTS

Table 1 shows no significant differences in age and gender between the two groups. Tick-bite history, mucosal hemorrhage, petechiae, ecchymosis, and somnolence were statistically higher in the non-survivor groups ($p<0.001$ for all). While albumin, glucose and platelet levels were quite low in the patient group who died due to CCHF ($p<0.001$); White blood cells, urea nitrogen, creatinine, alanine aminotransferase, aspartate aminotransferase, sodium, lactate, L/A ratio and high-sensitivity C-reactive protein in the blood were found to be significantly high ($p<0.05$).

Table 1. Demographic characteristics of the non-survivors vs. surviors.

Characteristics	Surviors (n=224, %)	Non-Survivors (n=36, %)	p
Age, year (Mean ± SD)	53.01±16.8	54.94 ±16.9	0.574*
Gender			
Male	152 (67.8)	24 (66.6)	0.359**
Female	72 (32.2)	12 (33.7)	
Tick-bite history			
No	24 (10.8)	1 (2.8)	<0.001†
Yes	200 (89.2)	35 (97.2)	
Mucosal hemorrhage			
No	202 (90.1)	2 (5.6)	<0.001†
Yes	22 (9.9)	34 (94.4)	
Petechiae, ecchymosis			
No	185 (82.5)	4 (11.2)	<0.001†
Yes	39 (17.5)	32 (88.8)	
Somnolence			
No	220 (97.3)	8 (22.4)	<0.001†
Yes	4 (2.7)	28 (77.6)	

:**Student t test, *:**Chi squared test, **†:** Fisher's exact test.

The ROC curve study revealed the resultant L/A ratio had a maximum area of 0.983 and a cut-off of 0.76, with a 94% sensitivity and 90% specificity. (Table2, Table 3, Figure 2, Figure 3).

Table 2. The mean values of blood parameters of the non-survivors vs. surviors.

Variables	Surviors (N= 224 mean±SD)	Non-Survivors (N= 36 mean±SD)	p*
White blood cell (10^3/µl)	3.57 ± 2.72	7.21 ± 4.58	**<0.001**
Hemoglobin (g/dL)	14.57±2.14	14.74± 2.63	0.732
Platelet (103/µl)	81.97 ± 45.32	38.40± 33.53	**<0.001**
Glucose(mg/ dl)	122.32±43.16	84.75±15.10	**<0.001**
BUN(mg/dL)	28.98±17.19	44.01±25.90	**0.003**
Creatinine(mg/dL)	1.58±1.17	2.34±1.70	**0.019**
ALT (IU/L)	91.25±122.70	407.66±491.04	**0.001**
AST(IU/L)	173.98±184.48	1296±2377	**0.008**
Sodium(mEq/L)	134.69±3.55	136.95±3.51	**0.002**
Potassium(mEq/L)	4.20±0.57	4.19±0.82	0.957
Albumin(g/dL)	2.82±0.68	2.34±0.52	**<0.001**
Lactate(U/L)	1.61±0.90	3.58±4.76	**0.001**
Lactate/albumine ratio	0.49±0.19	3.03±2.32	**<0.001**
hs-CRP(mg/l)	35.96±40.73	65.40±42.37	**0.001**

*:Student t-test, BUN: Urea nitrogen in the blood, hs-CRP: high-sensitivity C-reactive protein, ALT: Alanine Aminotransferase, AST: Asparate Aminotransferase.

Table 3. Cut-off value, sensitivity, and specificity of Albumin, Lactate, and Lactate/ Albumin ratio for predicting mortality in crimean congo hemorrhagic fever.

	Albumin (g/dl)	Lactate (mmol/l)	Lactate/ Albumin ratio
Cut-off value	2.86	1.85	0.76
Sensitivity	0.80	0.80	0.94
Specificity	0.63	0.78	0.90
AUC (95% CI)*	0.731(0.641-0.822)	0.788(0.686-0.891)	0.983(964-1000)

*AUC, area under the curve; CI, confidence interval.

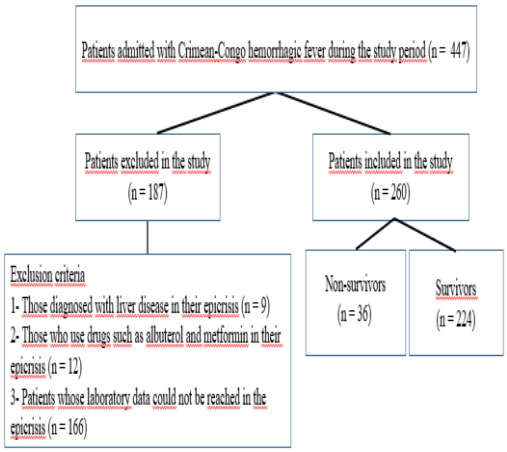


Figure 1. Flow chart of the patients admitted with Crimean–Congo hemorrhagic fever according to inclusion.

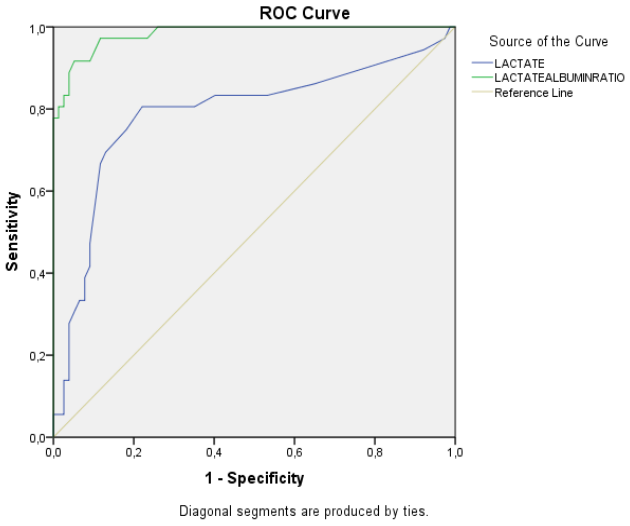


Figure 2. Cut-off value sensitivity, and specificity of the both Lactate, Lactate/albumin ratio for predicting mortality in crimean congo hemorrhagic fever.

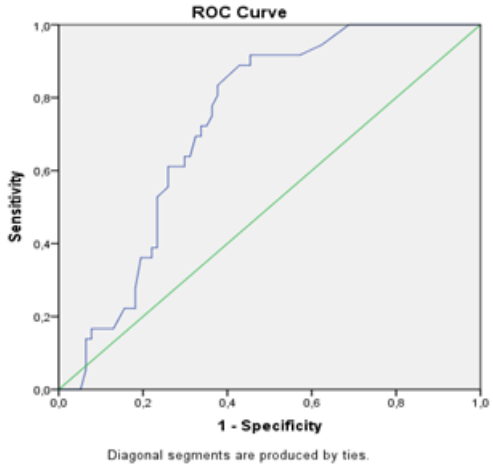


Figure 3. Cut-off value, sensitivity, and specificity of albumin for predicting mortality in Crimean-Congo hemorrhagic fever.

DISCUSSION

Our study results revealed that the L/A ratio was more significant in predicting fatality compared to serum lactate and albumin values in CCHF patients. There is no known definitive treatment for CCHF disease. Treatments are mostly provided in the form of supportive treatment. For the treatment of CHD patients, first of all, treatments with blood and blood products, antiviral therapies, and treatments aimed at preventing organ damage are performed. CCHF is a disease that can often lead to mortality. It is important to provide the necessary treatments and interventions in place and on time to reduce mortality.

Serum albumin is a negative acute-phase protein that decreases in response to inflammatory impulses and is an indicator of adverse clinical outcomes in critical diseases. In patients with impaired liver function, serum levels are also below normal due to decreased serum albumin synthesis (Shin et al., 2018). Among the laboratory changes that can be observed in the course of CCHF disease, it has been observed that there is a decrease in albumin and total protein (Gul Ozturk, Kisa, Kacmaz, & Yesilyurt, 2015; Öngürü & Bodur, 2012). In addition, endothelial damage is an expected condition in the pathogenesis of CCHF, and due to this, plasma and albumin pass into the

extracellular space and their serum levels decrease (Özmen & Parlak, 2020). Swanepoel et al. suggested that albumin levels were low in CCHF patients, resulting in mortality, which is similar to our study results (Swanepoel et al., 1989). The value of lactate in venous blood drawn once from patients suspected of having sepsis upon admission to the emergency room has been demonstrated in the literature to be a good prognostic biomarker for death and organ failure in critically ill patients as well as a dependable risk rating biomarker. (Mikkelsen et al., 2009; Shapiro et al., 2005; Trzeciak et al., 2007). Hyperlactatemia typically indicates tissue hypoperfusion in acute situations (Dellinger et al., 2012). Clinical research has demonstrated that tissue hypoxia, which is defined by supply-dependent oxygen consumption, is the cause of the rise in lactate levels observed in sepsis patients (Friedman, De Backer, Shahla, & Vincent, 1998). According to Filho et al., sepsis patients who die tend to have lower albumin levels and greater lactate levels (Filho et al., 2016). According to Kerget et al., individuals with severe congestive heart failure (CCHF) had a considerably greater lactate ratio than those with mild or moderate CCHF (Kerget, Kerget, & İba Yılmaz, 2021). The study's findings agreed with previous research in the field. For critically ill patients, the L/A ratio serves as the risk classification scale (Gharipour, Razavi, Gharipour, & Mukasa, 2020). Additionally, Wang et al. discovered that in patients with severe sepsis, a high L/A ratio indicated multiple organ failure and higher death (Wang, et al., 2015). According to Bou Chebl et al., baseline serum lactate was not a stronger predictor of in-hospital mortality in adult septic patients than the L/A ratio (Bou Chebl et al., 2020). According to Lu et al., patients experiencing acute respiratory failure may have an L/A ratio that is linked to death (Lu, Guo, Chen, & Zhang, 2021). According to Cakir et al., baseline serum lactate was not as predictive of in-hospital mortality in adult septic patients as the L/A ratio. When predicting clinical outcomes for sepsis patients in the critical care unit, the L/A ratio outperformed lactate or albumin alone (Cakir & Ozkocak Turan, 2021). According to Lau et al., the L/A ratio can be used to predict death in patients with necrotizing fasciitis since it indicates a better prognosis for in-hospital mortality in adult septic patients than baseline serum lactate (Lau, Hsiao, Fann, & Chang, 2021). Kokulu et al. found that the L/A ratio was a more accurate indicator of in-hospital mortality for adult septic patients than baseline blood lactate. Compared to lactate or albumin levels alone, the L/A ratio plays a more important influence on predicting survival for patients receiving cardiopulmonary resuscitation after an out-of-hospital cardiac arrest. (Kokulu & Sert, 2021). In the emergency room, Lee et al. discovered that the L/A ratio was prognostically significant in predicting the development of acute renal damage owing to sepsis (Lee et al., 2019). Our study's findings were supported by this investigation

CONCLUSION

It was determined that the L/A ratio was a more statistically significant and independent predictor of fatality than serum lactate and albumin levels in CCHF patients. Since the L/A ratio is a widely available and moderately priced test in routine laboratory testing, it can help predict fatality in CCHF patients and have a positive impact on patients' evaluation, treatment, and follow-up procedures. However, prospective, multicenter studies involving many patients are needed to routinely use the L/A ratio in CCHF patients and to evaluate its relationship with the clinical situation fully.

There are some limitations in our work; this study's retrospective design, which includes a relatively small patient cohort from a single center and the retrospective acquisition of all data from the medical record database, is its main and most significant limitation.

Acknowledgement

The authors would like to extend their sincere thanks to anyone who contributed to this study.

Conflict of Interest

The author declare no potential conflicts of interest with respect to the research, authorship and/or publication of this article.

Author Contributions

Plan, design: YKT, ŞÇ; **Material, methods and data collection**: YKT, ŞÇ; **Data analysis and comments:** YKT, ŞÇ; **Writing and corrections**: YKT, ŞÇ.

Funding

No funding was received.

Ethical considerations

The study was approved by the local Ethical Committee of Sivas Cumhuriyet University (approval number and date: 2023-04/20, 19.04.2023).

REFERENCES

Appannanavar, S. B., & Mishra, B. (2011). An Update on Crimean Congo Hemorrhagic Fever. *Journal of Global Infectious Diseases*, *3*(3),285–292. https://doi.org/10.4103/0974-777X.83537

Binici, İ., Tarcan, T., Parlak, M., İncecik, Ş., Huyut, Z., & Akbay, H. İ., et al. (2022). Kırım-Kongo kanamalı ateşi olgularının retrospektif olarak incelenmesi. *Van Sag Bil Derg*, *15*(3),294-300. https://doi.org/10.52976/vansaglik.1192996

Bou Chebl, R., Jamali, S., Sabra, M., Safa, R., Berbari, I., & Shami, A., et al. (2020). Lactate/albumin ratio as a predictor of in-hospital mortality in septic patients presenting to the emergency department. *Frontiers in Medicine (Lausanne)*, *22*(7),550182. https://doi.org/10.3389/fmed.2020.550182. eCollection 2020.

Cakir, E., & Ozkocak Turan, I. (2021). Lactate/albumin ratio is more effective than lactate or albumin alone in predicting clinical outcomes in intensive care patients with sepsis. *Scandinavian Journal of Clinical and Laboratory Investigation 81*(3),225-229. https://doi.org/10.1080/00365513.2021.1901306.

Chebl, R. B., Geha, M., Assaf, M., Kattouf, N., Haidar, S., & Abdeldaem, K., et al. (2021) The prognostic value of the lactate/albumin ratio for predicting mortality in septic patients presenting to the emergency department: a prospective studys. *Annals of Medicine*, *53*(1), 2268–2277. https://doi.org/ 10.1080/07853890.2021.2009125.

Dellinger, R. P., Levy, M. M., Rhodes, A., Annane, D., Gerlach, H., & Opal, S. M. et al. (2013). Surviving sepsis campaign: international guidelines for management of severe sepsis and septic shock: 2012. *Critical Care Medicine*, *41*(2),580–637. https://doi.org/10.1097/CCM.0b013e31827e83af.

Filho, R. R., Rocha, L. L., Corrêa, T. D., Pessoa Camila, M.S., Colombo, G., & Cesar Assuncao, M. S. (2016). Blood lactate levels cutoff and mortality prediction in sepsis-time for a reappraisal? A retrospective cohort study. *Shock*, *46*(5), 480–485. https://doi.org/ 10.1097/SHK.0000000000000667

Fillâtre, P., Revest, M., & Tattevin, P. (2019). Crimean Congo hemorrhagic fever: An update. *Medecine et Maladies Infectieuses*, *49*(8),574-585. https://doi.org/10.1016/j.medmal.2019.09.005.

Friedman, G., De Backer, D., Shahla, M., & Vincent, J. L. (1998). Oxygen supply dependency can characterize septic shock. *Intensive Care Medicine*, 24(2), 118–123. https://doi.org/10.1007/s001340050531.

Gharipour, A., Razavi, R., Gharipour, M., & Mukasa, D.(2020). Lactate/albumin ratio: An early prognostic marker in critically ill patients. *The American journal of Emergency Medicine*, *38*(10), 2088–2095. https://doi.org/10.1016/j.ajem.2020.06.067.

Gul, S., Ozturk, D. B., Kisa, U., Kacmaz, B., & Yesilyurt, M. (2015). Procalcitonin Level and Its Predictive Effect on Mortality in Crimean-Congo Hemorrhagic Fever. *Japanese Journal of Infectious Diseases*, *68*(6), 511-513. https://doi.org/10.7883/yoken.JJID.2014.485.

Hawman, D. W., & Feldmann, H. (2018). Recent advances in understanding Crimean–Congo hemorrhagic fever virüs [version 1; referees: 4 approved] F1000Research 7(*F1000 Faculty Rev)*, 1715. https://doi.org/10.12688/f1000research.16189.1

Hawman, G. R., Buzgan, T., Irmak, H., Safran, A., Uzun, R., & Cevik, M. A., et al. The epidemiology of Crimean-Congo hemorrhagic fever in Turkey, 2002–2007. (2009). *International Journal of Infectious Diseases*, *13*(3), 380-386 https://doi.org/10.1016/j.ijid.2008.07.021.

Kazan, F .G., & Sümer, H. (2019). Tokat il merkezinde Kırım Kongo kanamalı ateşi (KKKA) ön tanısıyla hastanede yatan hastaların, KKKA hastalığı hakkında bilgi düzeyi. *Ankara Medical Journal*, *19*(2), 381-395. https://doi.org/10.17098/amj.576498.

Kerget, F., Kerget, B., & İba Yılmaz, S. (2021). The Association Between Procalcitonin, Lactate Level, and Clinical Prognosis in Patients with Crimean-Congo Hemorrhagic Fever. *Duzce Medical Journal*, *23*(3), 299-304. https://doi.org/10.18678/dtfd.1012774.

Kokulu, K., & Sert, E. T. (2021). The role of the lactate/albumin ratio in predicting survival outcomes in patients resuscitated after out-of-hospital cardiac arrest: A preliminary report. *The American Journal of Emergency Medicine*, *50*, 670-674. https://doi.org/10.1016/j.ajem.2021.09.059.

Lau, K. K., Hsiao, C. T., Fann, W. C., & Chang, C. P. (2021). Utility of the Lactate/Albumin Ratio as a Predictor for Mortality in Necrotizing Fasciitis Patients. *Emergency Medicine International*, 2021, 353029. https://doi.org/10.1155/2021/3530298.

Lee, J. W., You, J. S., Chung, S. P., Choa, M., Kong, T., & Ko, D. R., et al. (2019). Lactate/albumin ratio for the prediction of the development of sepsis-induced acute kidney injury in the emergency department. *Journal of the Korean Society of Emergency Medicine*, *30*(1), 22-32. https://doi.org/10.0000/jksem.2019.30.1.22.

Lu, Y., Guo, H., Chen, X., & Zhang Q. (2021). Association between lactate/albumin ratio and all-cause mortality in patients with acute respiratory failure: A retrospective analysis. *PLoS One*, *16*(8), e0255744. https://doi.org/10.1371/journal.pone.0255744.

Mikkelsen, M. E., Miltiades, A. N., Gaieski, D. F., Goyal, M., Fuchs, B. D., & Shah, C. V., et al. (2009). Serum lactate is associated with mortality in severe sepsis independent of organ failure and shock. *Critical Care Medicine*, *37*(5), 1670–1677. https://doi.org/10.1097/CCM.0b013e31819fcf68.

Öngürü, P., & Bodur, H. (2012). Crimean-congo haemorrhagic fever. *Journal of Experimental and Clinical Medicine*, *29*, 175-181. https://doi.org/10.5835/jecm.omu.29.s3.014.

Özmen, Z., & Parlak, Z. (2020). Abdominal US Findings of Crimean-Congo Hemorrhagic Fever. *Journal of Contemporary Medicine, 10*(2), 261-265. https://doi.org/10.16899/jcm.652354.

Shapiro, N.I., Howell, M.D., Talmor, D., Nathanson, L.A., Lisbon, A., & Wolfe, R.E., et al. (2005). Serum lactate as a predictor of mortality in emergency department patients with infection. *Ann Emerg Med*, *45*(5), 524–528. https://doi.org/10.1016/j.annemergmed.2004.12.006.

Shin, J., Hwang, S.Y., Jo, I.J., , Kim, W.Y., Ryoo, S.M., & Kang, G.H., et al. (2018). Prognostic value of the lactate/albumin ratio for predicting 28-day mortality in critically ill sepsis patients. *Shock*, *50*(5), 545–550.https://doi.org/10.1097/SHK.0000000000001128.

Swanepoel, R., Gill, D.E., Shepherd, A.J., Leman, P.A., Mynhardt, J.H., & Harvey, S. (1989). The Clinical Pathology of Crimean-Congo Hemorrhagic Fever. *Reviews of Infectious Diseases*. *11*(4), 794-800. https://doi.org/10.1093/clinids/11.supplement_4.s794.

Trzeciak, S., Dellinger, R.P., Chansky, M.E., Arnold, R.C., Schorr, C., & Milcarek, B., et al. (2007). Serum lactate as a predictor of mortality in patients with infection. *Intensive Care Med*icine *33*(6), 970–977. https://doi.org/10.1007/s00134-007-0563-9.

Wang, B., Chen, G., Cao, Y., Xue, J., Li, J., & Wu, Y. (2015). Correlation of lactate/albumin ratio level to organ failure and mortality in severe sepsis and septic shock. *Journal of Critical Care*, *30*(2), 271-275. https://doi.org/10.1016/j.jcrc.2014.10.030.

Wang, R., He, M., Qu, F., Zhang, J., & Xu, J. (2022). Lactate Albumin Ratio Is Associated with Mortality in Patients with Moderate to Severe Traumatic Brain Injury. *Front Neurol*, 1, 13:662385. https://doi.org/10.3389/fneur.2022.662385. eCollection 2022.

ORİJİNAL MAKALE / ORIGINAL ARTICLE

Balıkesir Sağlık Bilimleri Dergisi / BAUN Sağ Bil Derg
Balıkesir Health Sciences Journal / BAUN Health Sci J
ISSN: 2146-9601- e ISSN: 2147-2238
Doi: https://doi.org/10.53424/balikesirsbd.1318280

The Effect of Pain on Self-Esteem and Self-Care Agency in Hysterectomy: A Cross-Sectional Study

Burcu KÜÇÜKKAYA[1], Hatice Merve ALPTEKİN[2]

[1] Bartın University, Faculty of Health Sciences, Department of Nursing, Department of Obstetrics and Gynecologic Nursing
[2] Kocaeli University, Faculty of Health Sciences, Department of Nursing, Department of Surgical Nursing

Geliş Tarihi / Received: *21.06.2023,* ***Kabul Tarihi / Accepted:*** *20.03.2024*

ABSTRACT

Objective: The study aimed to determine the effect of pain on self-esteem and self-care agency in patients with hysterectomy. **Materials and Methods:** A total of 486 female patients who underwent hysterectomy were included in this cross-sectional study. Patient Identification Form, Rosenberg's Self-Esteem Scale (RSES), Self-Care Agency Scale (SCAS) and VAS were used to collect data. The data were collected face-to-face with the researcher in the patient's room on the 2nd postoperative day in order to be objective and healthy, since the patients experienced severe pain on the 1st postoperative day and their communication could not be maintained in a healthy manner due to the effect of anaesthesia. **Results:** The mean scores of the patients the pain, SCAS, and RSES levels were 3.58 ± 1.42, 117.40 ± 26.67, and 11.74 ± 2.99, respectively. A negative correlation was found between postoperative pain and SCAS, RSES scores, while a positive correlation between SCAS and RSES scores. **Conclusion:** High postoperative pain is negatively correlated with SCAS and RSES in patients with hysterectomy. RSES increase when SCAS increase in patients with hysterectomy. In this context, it is recommended that nurses who are specialists in the field of women's health and diseases nursing provide holistic care by evaluating women's self-care agency, self-esteem and pain levels after hysterectomy.

Keywords: Hysterectomy, Pain, Patient, Self-care, Self-esteem.

Histerektomili Hastaların Yaşadığı Ağrının Belik Saygısı ve Özbakım Gücüne Etkisi

ÖZ

Amaç: Bu çalışma, histerektomili hastaların yaşadığı ağrının benlik saygısı ve öz bakım gücüne etkisini incelemeyi amaçlamaktadır. **Gereç ve Yöntem:** Bu kesitsel çalışmaya histerektomi yapılan toplam 486 kadın hasta dahil edildi. Verilerin toplanmasında; Veri Toplama Formu, Rosenberg Benlik Saygısı Ölçeği (RBSÖ), Özbakım Gücü Ölçeği (ÖBGÖ) ve VAS kullanıldı. Hastaların ameliyat sonrası 1. gün şiddetli ağrı yaşamaları ve iletişimlerinin sağlıklı bir şekilde sürdürülememesi nedeniyle veriler ameliyat sonrası 2. gün hasta odasında yüz yüze toplanmıştır. Veriler SPSS 23.0 programında, tanımlayıcı istatistikler ve korelasyon analizi kullanılarak analiz edilmiştir. **Bulgular:** Hastaların ağrı, kendine bakım gücü ve benlik saygısı puan ortalamaları sırasıyla 3.58±1.42, 117.40±26.67 ve 11.74±2.99 olarak bulundu. Postoperatif ağrı ile ÖBGÖ ve RBSÖ puanları arasında negatif, ÖBGÖ ve RBSÖ puanları arasında pozitif korelasyon saptandı. **Sonuç:** Yüksek postoperatif ağrı, histerektomili hastalarda ÖBGÖ ve RBSÖ ile negatif ilişkilidir. Histerektomili hastalarda ÖBGÖ artarken RBSÖ da arttığını göstermektedir. Bu bağlamda kadın sağlığı ve hastalıkları hemşireliği alanında uzman hemşirelerin histerektomi sonrası kadınların özbakım gücü, benlik saygısı ve ağrı düzeylerini değerlendirerek bütüncül bakım sağlaması önerilmektedir.

Anahtar Kelimeler: Histerektomi, Ağrı, Hasta, Özbakım, Özsaygı.

Sorumlu Yazar / Corresponding Author: Burcu KÜÇÜKKAYA. Bartin University, Faculty of Health Science, Department of Nursing, Department of Obstetrics and Gynecologic Nursing, Bartin/Turkiye.
E-mail: bkucukkaya@bartin.edu.tr

Bu makaleye atıf yapmak için / Cite this article: Küçükkaya, B., & Alptekin, H.A. (2024). The effect of pain on self-esteem and self-care agency in hysterectomy: a cross-sectional study. *BAUN Health Sci J, 13*(2), 346-353. https://doi.org/10.53424/balikesirsbd.1318280

INTRODUCTION

Cancer is a serious condition that has both psychological and psychosocial components, as well as being a medically recognized disease (Cibula et al., 2023). When the Global Cancer Observatory data is analyzed, it is seen that as of 2018, 18.1 million new cancer diagnoses were received worldwide and 9.5 million of the currently diagnosed patients died due to cancer (Global Cancer Observatory, 2018). When cancer data are examined in detail, gynecological cancers are detected as the second most common cancer type in women after breast cancer (Teskereci et al., 2022). This is the case In Türkiye, in line with the Turkish Cancer Statistics (2018) data, it is seen that gynecological cancers are the third most common cancer type. The incidence of uterine cancer is 9.8 per 100,000, 6.1 per 100,000 for ovarian cancer and 4.0 per 100,000 for cervical cancer (Türkiye Cancer Statistics, 2018). While gynecological cancers constitute cervical, uterine, ovarian, tubal, vaginal and vulvar cancers, these cancers are serious and potentially life-threatening diseases (Chen et al., 2021). It has been reported that the incidence of gynecologic cancers is increasing every year the world over, and the resultant mortality is increasing at a corresponding rate (Kocarnik et al., 2022). In parallel with this increase, hysterectomies have increased and are the second most common gynecological surgical procedure after cesarean sections (Abadi and Husain, 2022). Indications for hysterectomy include abnormal uterine bleeding, invasive and preinvasive diseases of the cervix, chronic pelvic pain, adenomyosis, leiomyoma, endometriosis atypical endometrial hyperplasia, pelvic organ prolapse, endometrial cancer, adnexal malignancies, obstetric causes, and gestational trophoblastic diseases (Cibula et al., 2023).

Pain is a common side effect of hysterectomy surgery (Abadi and Husain, 2022). Postoperative pain (PoP) is an acute pain that begins with surgical trauma, gradually decreases, and ends with tissue healing (García-Monasterio et al., 2019). Studies have reported the incidence of acute PoP on the second postoperative day to be from 10% to 82.3% (Scheel et. al., 2017; Sharma and Sitaula, 2021). In hysterectomy patients, approximately two-thirds of the patients reported moderate or even severe acute PoP 48 h after surgery (Langford et al., 2022; Scheel et al., 2017). Many factors affect acute PoP, such as the use of general anaesthesia, physiological and psychological structure of the patient, care of the patient in the preoperative period, psychological and pharmacological preparation of the patient in the postoperative period, and the type, location and duration of surgery (Abadi and Husain, 2022; Janggo et al., 2018). Moreover, the pain which patients experience has an effect on both self-esteem (SE) and self-care agency (SCA) (Darvishi et al., 2020).

Self-esteem (SE) is the power of internal motivational resources, and it focuses on the need for self-assessment or self-assessment itself. This does not mean that one feels superior, perfect, or adequate, but rather that one accepts oneself, establishes an identity, and feels accepted by others (Kanmaz and Osman, 2019). Although any external physical indications of the female reproductive organs having been taken as a result of a hysterectomy are not readily visible, the woman experiences a sense of the loss of integrity, cannot prevent the distortion of her body image, and cannot overcome the feeling of deformity she feels (Goudarzi et al., 2021).

Self-care (SC) is what individuals do to protect their quality and activity of life, health, and well-being. An adult must make continuous personal efforts on behalf of his or her health and well-being (Ong-Artborirak and Seangpraw, 2019; Kanmaz and Osman, 2019). SC levels are important for patients with hysterectomy to control the healing process. SC behaviors include appropriate dietary intake, regular medication use, compliance with fluid restriction, and coping with stress (Ong-Artborirak and Seangpraw, 2019).

Studies have shown that the pain experienced by patients affects depression and low self-esteem (Gunduz et al., 2019; Sharma et al., 2020). Cancer patients, in particular, state that they have difficulty coping with pain and that the level of pain continues to increase as the stages progress (Caraceni and Shkodra, 2019). The literature shows consistent results, and the pain experienced by cancer patients negatively affects the quality of life, preventing patients from moving freely and avoiding activities they enjoy, thus resulting in a decrease in self-esteem and self-care ability (Harorani et al., 2020; Ozdemiroglu et al., 2017) This study aimed to investigate the effect of pain on SE and SCA in patients with hysterectomy. Our examination of the relevant literature revealed that no studies have investigated the effect of pain on SE and SCA in these patients. We believe that our study will support the literature and raise awareness about the effect of pain on self-esteem and self-care ability in hysterectomy patients.

MATERIALS AND METHODS

Study type

This cross-sectional study was conducted using a questionnaire through face-to-face interactions with patients in the Gynaecology Services of İstanbul University Health Practice and Research Hospitals in Türkiye in January and June 2019.

Study group

For calculation of the sample size, G Power 3.0.10 that was a statistical power analysis program designed to analyse different types of power and compute size with graphics options for windows was used. Sample size was calculated based on a previous study by Keskin and Gumus (2011), and participation by 486 patients in the study was determined as sufficient to test the two-way hypothesis with an effect size of .75,

an alpha level of .05, and a power of 80%. The study sample consisted of 486 patients who were hospitalized at the University Health Application and Research Center Gynaecology Service in (Figure 1). The sample of the research was determined using the random haphazard method. Inclusion criteria were as follows: (1) patients 18 or more years of age, (2) patients at postoperative day two after hysterectomy, (2) patients were able to understand, read, write, and speak Turkish, (3) patients did not have any psychiatric problems, and (4) patients agreed to participate in the study.

The data collection tools

Data were collected with the Patient Identification Form, Rosenberg's Self-Esteem Scale (RSES), Self-Care Agency Scale (SCAS), and the Visual Analog Scale (VAS). Before starting the study, the aim of the study was explained and information about the study was given to the patients. Verbal consent was obtained from the patients after the information was given, and the Patient Identification Form, RSES, SCAS, and VAS for pain were recorded by face-to-face interviews in each patient room on the 2nd day after hysterectomy. Since the patients experienced severe pain on the 1st postoperative day and their communication could not be maintained in a healthy manner, the data were collected face-to-face in the patient's room on the 2nd postoperative day. Data collection for each hysterectomy patient took approximately 20 min.

The first part of the survey evaluation of patient identification (sociodemographic, obstetric features, and health status characteristics): This form was created by the researchers after a search and study of the literature; it consisted of 16 questions that included personal characteristics, obstetric features, and health status of the women who had had a hysterectomy (Abadi and Husain, 2022; Logan and Anazodo, 2019).

The second part of the survey (evaluation of the self-esteem): The RSES developed by Rosenberg in 1965 was adapted into Turkish by Cuhadaroglu in 1986. The 63-item scale focuses on the self-esteem of individuals. Scale scores range from 0 to 30. A score of 30 shows maximum self-esteem, scores of 15-25 indicate normal self-esteem, and a score of less than 15 is considered low self-esteem (Cuhadaroglu, 1986). The Cronbach's alpha value, which is the reliability coefficient of the scale, varies between .77 and .88. In this study, the Cronbach alpha value for the RSES was found to be 0.93.

The third part of the survey (evaluation of self-care agency):

The SCAS developed by Kearney and Fleischer in 1979, the scale was adapted into Turkish by Nahcivan in 1993. The scale investigates the individuals' self-evaluation regarding SC and behaviors. The scale consists of 35 items and a maximum of 140 points is obtained from the scale. As the scale score increases, the SCA of individuals increases (Nahcivan, 1993). The Cronbach's alpha value of the reliability coefficient of the scale was found as 0.89. In this study, the Cronbach alpha value for the SCAS was found to be 0.96.

The fourth part of the survey: evaluation of pain: This VAS was used to assess the severity of pain experienced by the patients. It is usually a 10-cm long horizontal line with ''painless'' at one end and ''the worst imaginable pain'' at the other end. A score of "0" on the scale indicates that the person does not feel or does not experience pain, and a score of "10" indicates the most severe level of pain felt or experienced (Price, 1983).

Statistical analysis

Descriptive statistics such as mean and standard deviation, number and percentage were used in the statistical evaluation of the data. The suitability of the study data to the normal distribution was tested with the Kolmogorov-Smirnov test. Cronbach's alpha coefficients were used to evaluate the validity and reliability of SE and SCA power scales in a sample of women who had a hysterectomy. Pearson correlation analysis was used to examine the relationship among the mean scores for RSES, SCAS, and VAS for pain. The statistical significance level was accepted as $p < .05$. IBM SPSS Statistics ver. 23.0 (IBM, Armonk, NY, USA) software which statistical analysis program was used for data analysis.

Ethical considerations

Written permission was obtained from the researchers who conducted the validity and reliability of the scales to be used via e-mail in the planning phase of the study. In order to carry out this study, ethical permission was obtained from Trakya University Faculty of Medicine Scientific Research Evaluation Board (TÜTF-BAEK 2018/455), and written permission was obtained from the institution where the study would be conducted. Before starting the study, patients with hysterectomy were informed about the study and their voluntary participation was ensured by obtaining verbal consent from the patients who agreed to participate.

RESULTS

Patient Identification (sociodemographic, obstetric features, and health status characteristics)

The distribution of patients with hysterectomy according to personal characteristics, obstetric features, and health status in the study is shown Table 1. Although the patients ranged from 33 to 73 years of age, the average age of patients with hysterectomy was 51.22±9.36 years. The majority (56%) of patients with hysterectomy had a secondary education or higher. It was found that 42.4% were employed, 85.9% did not use cigarettes, and 95.7% did not consume alcohol. The majority (88.0%) of patients with hysterectomy were satisfied with their lives, and 35.9% felt unhappy. The majority (78.3%) of patients with hysterectomy did not have a chronic condition, 50.0% were diagnosed with uterine myoma, 45.8% had stage 2nd cancer, 57.6% had total abdominal hysterectomy-bilateral salpingo-oophorectomy surgery, and an average of 2.25±0.26 days had passed

after the hysterectomy surgery. The average gravida and parity of patients with hysterectomy was 2.24±1.30 and 1.80±1.06, respectively (Table 1).

Self-esteem, self-care agency, and pain in women with hysterectomy

The mean RSES score of women with hysterectomy who participated in the study was 11.74±2.99, mean SCAS score was 117.40±26.67, and mean VAS was 3.58±1.42 (Table 2).

Correlation between SE, SCA, and pain in women with hysterectomy

There was a strong and negative correlation between VAS pain score and RSES ($p<0.001$; $r=–0.761$). There was a strong and negative correlation between VAS pain score and SCAS ($p<0.001$; $r=–0.750$). However, it was observed that there was a very strong and positive correlation between RSES and SCAS ($p<0.001$; $r=0.979$) (Table 3).

Table 1. Sociodemographic characteristics of the study group (n=486).

Variables		**n, or mean ± SD**	**%***
Age		51.22 ± 9.36	
Educational status	Primary education and lower	211	43.5
	Secondary education and higher	275	56.5
Occupation	Unemployed	153	31.5
	Employed	206	42.4
	Retired	127	26.1
Income status	Income does not meet expenses	32	6.5
	Income meets expenses	449	92.4
	Income more than expenses	5	1.1
Marital status	Single	169	34.8
	Married	317	65.2
Family type	Nucleus	370	76.1
	Expended	116	23.9
Smoking status	Use	69	14.1
	Not Use	417	85.9
Alcohol consumption status	Consume	21	4.3
	Not consume	465	95.7
Life satisfaction status	Satisfaction	428	88.0
	Not Satisfaction	58	12.0
Felt a sense of self now	Happy	21	4.3
	Unhappy	174	35.9
	Depressive	69	14.1
	Stressful	69	14.1
	Nervous	116	23.9
	Excited	5	1.1
	Other	32	6.5
Chronic condition**	Hypertension	63	13.0
	Diabetes	110	22.8
	None	381	78.3
Indication of hysterectomy	Uterina myoma	243	50.0
	Endometrial Hyperplasia	101	20.7
	Cervical Cancer	32	6.5
	Endometrial Cancer	74	15.2
	Ovarial Cancer	36	7.6
Gynecological cancer stage	2	65	45.8
	3	38	26.8
	4	39	27.4
Type of hysterectomy	Total abdominal hysterectomy-bilateral salpingooferactomy (TAH-BSO)	206	42.4
	Total abdominal hysterectomy (TAH)	280	57.6
Day after hysterectomy		2.25±0.26	
Gravida		2.24±1.30	
Parity		1.80±1.06	
Total		**486**	**100.0**

Table 2. The mean scores of Rosenberg's Self Esteem Scale, The Self-Care Agency Scale and VAS (n=486).

Scales	mean±SD	min.	max.
RSES	11.74 ±2 .99	2	18
SCAS	117.40±26.67	35	140
VAS	3.58±1.42	1	7

Table 3. Examination of the relationship between Rosenberg's Self Esteem Scale, The Self-Care Agency Scale, and VAS (n=486).

Scales	RSES	SCAS	VAS
RSES	-	p<0.001 r=0.979	p<0.001 r=-0.761
SCAS	-	-	p<0.001 r=-0.750
VAS	-	-	-

DISCUSSION

Among the nursing care goals aimed at increasing the SE level and SCA of women with hysterectomy, one primary goal is to ensure that women resume their independent SC activities as soon as possible in the shortest time during the postoperative period. The results of the literature are similar to each other, and it is seen that the pain experienced by cancer patients negatively affects the quality of life, prevents patients from moving freely and avoiding activities they enjoy, thus causing a decrease in self-confidence and self-care ability. Therefore, patients with hysterectomy may be less adversely affected by the physiological and psychological effects experienced at the end of the surgery, and they can participate in SC at the highest level possible by ensuring their well-being. In the study, it was found that self-perception was low, SC was moderate, and pain was moderate (Table 2). Chacko et al. (2016) determined that the most common problem in the first weeks after hysterectomy surgery was pain, and incision pain was present in 45% of the patients. Turkay et al. (2020) they found the mean VAS pain level of the patients in the control group to be 3 points 24 hours after hysterectomy surgery. On the other hand, the patients in the experimental group who chewed gum had an average of 1 point VAS pain level (Turkay et al., 2020). Burma and Kavlak (2021) found the pain levels of the patients who had hysterectomy surgery to be 5.52 ± 1.20. Can et al. (2022) found the mean SE score of women who had hysterectomy surgery to be 1.42 ± 1.31. Kucukkaya and Ercel (2019) found that SCA score of gynecological cancer patients was 111.6±33.0 and was at an intermediate level. Eken et al. (2016) found that the mean SE score was 1.1 ± 0.8 in the total abdominal hysterectomy group and 1.0 ± 0.6 in the total laparoscopic hysterectomy group, and that the SE level was low in both groups. Gun and Komurcu (2013) studied the relationship between SE and SCA in hysterectomy patients. They stated that the mean SE score of the women was found to be 59.93 ± 7.03 and that it was 80.31 ± 8.78 for SCA. The findings of this study and those in the literature support each other: it was found that the perception of SE was low and that SCA and PoP were moderate. Postoperative pain in patients with hysterectomy very possibly has a negative effect on SE. While the reduced sense of feminine traits can lead to a decrease in SE, it may also lead to a sense of emptiness. In this study, it was found that when PoP of hysterectomy patients increased, SE decreased (Table 3). Ozdemiroglu et al. (2017) found that reduced SE was particularly related more often to severe pain, and as the pain of patients increased, SE decreased. Our study findings and the literature showed that, as the PoP level experienced by patients increased, there was a decrease in individual perceived self-esteem. It is seen that the postoperative pain level of the patients negatively affects self-perception and acceptance. It has been proven by studies that if patients' pain cannot be controlled, their SE will decrease. If SE does not increase in the long term, it may cause depression in patients. Hysterectomy surgery causes injury to tissues resulting in PoP in those affected. Since these symptoms eventually lead to reduced SCA, it is important to control PoP. This study found that, as the PoP of patients with hysterectomy increased, SC decreased (Table 3). In their study, Burma and Kavlak (2021) found that the increase in the pain of the patients after hysterectomy surgery affected the recovery negatively. Delayed post-operative recovery of patients will also delay their ability to perform SC. Lynch and LeFort (2016) studied the standardized discharge information after a short-stay hysterectomy and its relationship to SC confidence, perceived recovery, and satisfaction. They stated that, as PoP increased, SC decreased. Overall, it was observed that patients' SCA levels increased with the decrease in their pain, and these results are widely supported by the literature. The fact that patients have pain delays their recovery and prevents them from doing self-care. It is seen that patients with high pain levels have difficulty in accepting their own situation after

surgery and have low SE. This shows that pain affects individuals both physiologically and psychologically. Self-esteem is a central factor in every period of human life, and SE affects SC. This study found that there was a significant relationship between SE and SC in hysterectomy patients. Hysterectomy surgery causes a decrease in SE as it causes feelings such as loss of femininity, reduction, and decrease by the patients. This causes women with hysterectomy to feel worthless. The patients' feeling of worthlessness also affects their physical care. The condition of these patients also causes a decrease in their SC power. Therefore, as the SC level increases, SE increases (Kanmaz and Osman, 2019). Gun et al. (2013) showed that a positive significant relationship was found between SE and SCA levels. The literature and findings of this study are similar—as the SC level increases, SE also increases. The findings of this study support those in the literature that, as the SC level increases in patients with hysterectomy, SE also increases and vice versa.

Limitations of study

This study has some limitations. The first relates to the study being conducted in only two university hospitals. However, the large number of hysterectomy patients assessed gives weight to our study. The second limitation is the lack of assessment of pain, pain management, self-esteem, and self-care power agency after hysterectomy.

CONCLUSION

Studies that focused on psychosocial predictors of pain after hysterectomy showed preoperative and postoperative psychological distress and negative emotional states as risk factors (Giusti et al., 2021; Darvishi et al., 2020). In addition to In addition to variables related to pain, self-esteem, and self-care agency, other relevant factors have been reported such as the patients' personal characteristics and features, the type of indication in hysterectomy, the type of hysterectomy, lower pain threshold, lower levels of health care provided by nurses, and limitation in the nurses' ability to connect with patients and patients' families (Lunde et al., 2020; Scheel et al., 2017). The variables examined in the literature are similar to each other, and this study aims to focus on the pain experienced by women with hysterectomy and examine the effect of post-hysterectomy pain on self-esteem and self-care ability. In this study, as the pain level increased after hysterectomy, self-esteem and self-care agency decreased. Also, as self-esteem decreased after hysterectomy, self-esteem also decreased.

According to these findings, to reduce the level of pain patients have after hysterectomy surgery and to increase self-esteem and self-care, it is recommended that nurses receive training in methods of coping with the pain before the hysterectomy surgery and to provide more effective postoperative care, better aid patients in the evaluation of their pain levels and promote patient self-esteem and self-care power. Reduction of patients' pain using coping methods is generally considered as an effective way to mitigate the preceding list of negative effects that can impact patients from pain by increasing self-esteem and self-care agency. It is important for healthcare personnel providing care to know that self-care power increases in parallel with the increase in self-esteem in hysterectomy cases, in terms of planning the care and education they will provide, considering the relationship between these two concepts.

It is recommended that nurses who specialize in obstetrics and gynaecology take an active role in the implementation and evaluation of the effectiveness of the accepted methods, manage the nursing processes by evaluating the self-esteem and self-care of the patients, and take an active role in evidence-based practices in this field.

Acknowledgements

We did not receive any source of financial grants or other funding. We would like to thank all of the patients who willingly contributed to this research.

Conflict of interest

The authors have no conflict of interest to declare.

Authors contributions

Plan, design: BK, HMA **Material, methods and data collection:** BK, HMA. **Data analysis and comments:** BK, HMA. Drafting of the article: BK, HMA. **Writing and corrections:** BK, HMA.

Funding

None.

Ethical approval

Institution: Trakya University Faculty of Medicine Scientific Research Evaluation Board
Date: 14/01/2019
Approval no: TÜTF-BAEK 2018/455, 01/03

REFERENCES

Abadi, M. N., & Husain, A. A. A. (2022). Postoperative pain management total hysterectomy with intravenous patient-controlled analgesia oxycodone: a case series. *Journal of Anesthesiology and Clinical Research*, *3*(2), 336-341.

Burma, E., & Kavlak, O. (2021). The effect of anxiety, pain and social support on recovery quality in women undergoing hysterectomy. *Balıkesir Journal of Health Sciences*, *10*(3), 325-333. https://doi.org/10.53424/balikesirsbd.940627

Can, A. A., Buldum, A., Değirmenci, F., & Yilmaz, D. V. (2022). The relationship between body perception and self-esteem of women with total abdominal hysterectomy bilateral salfingoopherectomy surgery. *Mersin University Journal of Health Sciences*, *15*(2), 225-233. https://doi.org/10.26559/mersinsbd.1057848

Caraceni, A., & Shkodra, M. (2019). Cancer pain assessment and classification. *Cancers*, *11*(4), 510.

Chacko, B. L., Viswanath, L., & Joy, J. (2016). Assessment of knowledge and practıce of self-care among women undergone hysterectomy. *The Offıcıal Journal Of Traıned Nurses' Associatıon Of Indıa, Kerala Branch*, *11*(4).

Chen, J., You, H., Liu, Y., Kong, Q., Lei, A., & Guo, X. (2021). Association between spiritual well-being, quality of life, anxiety and depression in patients with gynaecological cancer in China. *Medicine*, *100*(1), e24264. https://doi.org/10.1097/MD.0000000000024264.

Cibula, D., Raspollini, M. R., Planchamp, F., Centeno, C., Chargari, C., Felix, A., & Lindegaard, J. (2023). ESGO/ESTRO/ESP Guidelines for the management of patients with cervical cancer–Update 2023. *Virchows Archiv*, *482*, 935-966. https://doi.org/10.1007/s00428-023-03552-3

Cuhadaroğlu, F. (1986). Self-esteem in adolescents. (dissertation) Ankara: Hacettepe Univ.

Darvishi, A., Otaghi, M., & Mami, S. (2020). The effectiveness of spiritual therapy on spiritual well-being, self-esteem and self-efficacy in patients on hemodialysis. *Journal of Religion and Health*, *59*(1), 277-288.

Eken, M. K., İlhan, G., Temizkan, O., Çelik, E. E., Herkiloğlu, D., & Karateke, A. (2016). The impact of abdominal&laparoscopic hysterectomies on women's sexuality and psychological condition. *Turkish Journal of Obstetrics and Gynecology*, *13*(4), 196-202. https://doi.org/10.4274/tjod.71245

García-Monasterio, E. I., Alvárez-Vázquez, J. C., Morado-Quiñoá, P., Pena-Pena, A., Mazón, M. F., Bouso, A. M., & et al. (2019). Post-operative pain management among surgical trauma patients in an acute ward: a best practice implementation project. *JBI Evidence Synthesis*, *17*(9), 1941-1953.

Giusti, E. M., Lacerenza, M., Manzoni, G. M., & Castelnuovo, G. (2021). Psychological and psychosocial predictors of chronic postsurgical pain: a systematic review and meta-analysis. *Pain*, *162*(1), 10-30.

Global Cancer Observatory. Cancer tomorrow. https://gco.iarc.fr/tomorrow/home. Accessed May 15, 2023.

Goudarzi, F., Khadivzadeh, T., Ebadi, A., & Babazadeh, R. (2021). Iranian women's self-concept after hysterectomy: a qualitative study. *Iranian Journal of Nursing and Midwifery Research*, *26*(3), 230.

Gun, Ç., & Komurcu, N. (2013). The relationship between self-esteem and self-care agency in hysterectomy patients. *Journal of Research in Nursing and Midwifery*, *2*(7), 89-95. https://doi.org/10.14303/JRNM.2013.059.lk

Gunduz, N., Usen, A., & Atar, E. A. (2019). The impact of perceived social support on anxiety, depression and severity of pain and burnout among Turkish females with fibromyalgia. *Archives of Rheumatology*, *34*(2), 186.

Harorani, M., Noruzi Zamenjani, M., Golitaleb, M., Davodabady, F., Zahedi, S., Jadidi, A., & Rezaei, M. (2020). Effects of relaxation on self-esteem of patients with cancer: a randomized clinical trial. *Supportive Care in Cancer*, *28*, 405-411.

Janggo, W. O., Msen, Y., Rantetampang, A. L., & Mallongi, A. (2018). The factors affecting pain intensity to patient post operative fracture at Jayapura public hospital. *International Journal of Science & Healthcare Research*, *3*(4), 81-90.

Kanmaz, Z., & Osman, T. A. (2019). The effects of mastectomy and post-mastectomy reconstructive surgery of breast-cancer patients on their depression, self-esteem and self-efficacy beliefs. *Psychiatry and Behavioral Sciences*, *9*(3), 119.

Keskin, G., & Gumus, A. B. (2011). Turkish hysterectomy and mastectomy patients-depression, body image, sexual problems and spouse relationships. *Asian Pacific Journal of Cancer Prevention*, *12*(2), 425-32.

Kocarnik, J. M., Compton, K., Dean, F. E., Fu, W., Gaw, B. L., Harvey, J. D., & Dhimal, M. (2022). Cancer incidence, mortality, years of life lost, years lived with disability, and disability-adjusted life years for 29 cancer groups from 2010 to 2019: a systematic analysis for the global burden of disease study 2019. *JAMA Oncology*, *8*(3), 420-444.

Kucukkaya, B. & Erçel, Ö. (2019). The effect of disease perception on self-care power in gynecologic cancer patients. *Journal of Ege University Faculty of Nursing*, *35*(3), 137-145

Langford, R., Morte, A., Sust, M., Cebrecos, J., Vaqué, A., Ortiz, E., & et al. (2022). Efficacy and safety of co-crystal of tramadol-celecoxib (CTC) in acute moderate-to-severe pain after abdominal hysterectomy: A randomized, double-blind, phase 3 trial (STARDOM2). *European Journal of Pain*, *26*(10), 2083-2096.

Lunde, S., Petersen, K. K., Søgaard-Andersen, E., & Arendt-Nielsen, L. (2020). Preoperative quantitative sensory testing and robot-assisted laparoscopic hysterectomy for endometrial cancer: can chronic postoperative pain be predicted?. *Scandinavian Journal of Pain*, *20*(4), 693-705.

Lynch, K. M., & LeFort, S. M. (2016). Standardized discharge information after short-stay hysterectomy and relationships with self-care confidence, perceived recovery, and satisfaction. *Journal of Obstetric, Gynecologic & Neonatal Nursing*, *45*(5), 41-54. https://doi.org/10.1016/j.jogn.2016.05.003

Nahcıvan, N. (1993). The effect of self care power and family environment on healthy young people.(dissertation) Istanbul: Istanbul Univ.

Ong-Artborirak, P., & Seangpraw, K. (2019). Association between self-care behaviors and quality of life among elderly minority groups on the border of Thailand. *Journal of Multidisciplinary* Healthcare, 1049-1059.

Ozdemiroglu, F., Memis, C. O., Meydan, N., Dogan, B., Kilic, S. M., Sevincok, L., & Karakus, K. (2017). Self-Esteem, Pain and Suicidal Thoughts in a Sample of Cancer Patients. *Journal of Mood Disorders*, *7*(3), 156. https://doi.org/10.5455/jmood.20170804091851

Price, D. D., McGrath, P. A., Rafii, A., & Buckingham, B. (1983). The validation of visual analogue scales as ratio scale measures for chronic and experimental pain. *Pain*, *17*(1), 45-56. https://doi.org/10.1016/0304-3959(83)90126-4

Scheel, J., Sittl, R., Griessinger, N., Strupf, M., Parthum, A., Dimova, V., & Lautenbacher, S. (2017). Psychological predictors of acute postoperative pain after hysterectomy for benign causes. *The Clinical Journal of Pain*, *33*(7), 595-603. https://doi.org/10.1097/AJP.0000000000000442

Sharma, S., Ferreira-Valente, A., de C. Williams, A. C., Abbott, J. H., Pais-Ribeiro, J., & Jensen, M. P. (2020). Group differences between countries and between languages in pain-related beliefs, coping, and catastrophizing in chronic pain: a systematic review. *Pain Medicine, 21*(9), 1847-1862.

Sharma, B. D., & Sitaula, J. (2021). Assessment of postoperative pain and analgesic use in patients undergoing orthopedic surgery. *Journal of Chitwan Medical Colleg*e, *11*(3), 53-57.

Teskereci, G., Arslan, Ü. Ö., & Öncel, S. (2022). The awareness levels of women for gynecologic cancer in Turkey: A cross-sectional study. *International Journal of Gynecology & Obstetrics*, *156*(3), 539-545.

Turkay, U., Yavuz, A., Hortu, I., Terzi, H., & Kale, A. (2020). The impact of chewing gum on postoperative bowel activity and postoperative pain after total laparoscopic hysterectomy. *Journal of Obstetrics and Gynaecology*, *40*(5), 705-709. https://doi.org/10.1080/01443615.2019.1652891.

Türkiye Cancer Statistics. 2018. https://hsgm.saglik.gov.tr/depo/birimler/kanser-db/istatistik/2014-RAPOR_uzuuun.pdf. Accessed November May 15, 2023.

ORİJİNAL MAKALE / ORIGINAL ARTICLE

Balıkesir Sağlık Bilimleri Dergisi / BAUN Sağ Bil Derg
Balıkesir Health Sciences Journal / BAUN Health Sci J
ISSN: 2146-9601- e ISSN: 2147-2238
Doi: https://doi.org/10.53424/balikesirsbd.1406575

The Effect of Anesthesia Induction with Midazolam and Propofol on Hemodynamics in Abdominal Hysterectomy Surgeries

Serkan UÇKUN[1], Emine Nur TOZAN[2]

[1] Balikesir University, Faculty of Medicine, Anesthesiology and Reanimation Department
[2] Private Practice

Geliş Tarihi / Received: *19.12.2023,* ***Kabul Tarihi / Accepted:*** *25.03.2024*

ABSTRACT

Objective: The primary task of anesthesiology is to control the patient's hemodynamic values, including blood pressure and heart rate, from pre-operative to post-operative. Many drugs are used alone or in combination for induction and maintenance of anesthesia. Various hemodynamic responses may develop to these drugs. In our study, we aimed to compare the effects of midazolam and propofol used alone in intravenous anesthesia induction on hemodynamics in patients undergoing abdominal hysterectomy. **Materials and Methods:** A total of 60 ASA I-II patients scheduled for abdominal hysterectomy were included in the study. During anesthesia induction, midazolam (0.2 mg/kg) was administered to Group M (n:30) and propofol 1% (2 mg/kg) was administered to Group P (n:30). Noninvasive systolic blood pressure, diastolic blood pressure, mean blood pressure and minute heart rate values were recorded. **Results:** Systolic blood pressure was significantly lower in group P than in M during intubation, skin incision, extubation and recovery. **Conclusion:** As a result, anesthesia induction with intravenous 0.2 mg/kg midazolam may cause higher systolic blood pressure values than 2 mg/kg propofol. It should not be overlooked that the hemodynamic response that will occur after the use of midazolam during anesthesia monitoring will vary depending on the anesthetic drugs and doses used together.

Keywords: General Anesthesia, Midazolam, Propofol, Hemodynamic.

Abdominal Histerektomi Ameliyatlarında Midazolam ve Propofol ile Anestezi İndüksiyonunun Hemodinami Üzerine Etkisi

ÖZ

Amaç: Anesteziyolojinin birincil görevi, ameliyat öncesinden ameliyat sonrasına kadar hastanın kan basıncı ve kalp atış hızı dahil olmak üzere hemodinamik değerlerini kontrol etmektir. Anestezi indüksiyonu ve idamesi için birçok ilaç tek başına veya kombinasyon halinde kullanılır. Bu ilaçlara karşı çeşitli hemodinamik yanıtlar gelişebilmektedir. Çalışmamızda abdominal histerektomi yapılan hastalarda intravenöz anestezi indüksiyonunda tek başına kullanılan midazolam ve propofolün hemodinami üzerine etkilerini karşılaştırmayı amaçladık. **Gereç ve Yöntem:** Abdominal histerektomi planlanan toplam 60 ASA I-II hasta çalışmaya dahil edildi. Anestezi indüksiyonu sırasında Grup M'ye (n:30) midazolam (0.2 mg/kg) ve Grup P'ye (n:30) propofol %1 (2 mg/kg) uygulandı. Noninvaziv sistolik kan basıncı, diyastolik kan basıncı, ortalama kan basıncı ve dakika kalp atım hızı değerleri kaydedildi. **Bulgular:** Entübasyon, cilt insizyonu, ekstübasyon ve derlenme sırasında sistolik kan basıncı P grubunda M grubuna göre anlamlı olarak daha düşüktü. **Sonuç:** İntravenöz 0,2 mg/kg midazolam ile anestezi indüksiyonu 2 mg/kg propofolden daha yüksek sistolik kan basıncı değerlerine neden olabilir. Anestezi takibi sırasında midazolam kullanımı sonrası oluşacak hemodinamik yanıtın birlikte kullanılan anestezik ilaçlara ve dozlarına bağlı olarak değişeceği göz ardı edilmemelidir.

Anahtar Kelimeler: Genel Anestezi, Midazolam, Propofol, Hemodinami.

Sorumlu Yazar / Corresponding Author: Serkan UÇKUN, Balikesir University, Faculty of Medicine, Anesthesiology and Reanimation Department, Balikesir, Türkiye.
E-mail: serkan.uckun@balikesir.edu.tr

Bu makaleye atıf yapmak için / Cite this article: Uckun, S., & Tozan, E. N. (2024). Effect of anesthesia induction with midazolam on hemodynamics in abdominal hysterectomy surgeries. *BAUN Health Sci J, 13*(2), 354-359. https://doi.org/10.53424/balikesirsbd.1406575

INTRODUCTION

In anesthesia applications, many drugs are used alone or in combination during the induction phase. The maintenance phase can also be provided with anesthetic drugs administered as intravenous infusion, other than inhalation agents. Various hemodynamic responses may develop to intravenous anesthetic drugs used in anesthesia applications. The primary task of anesthesiology is to control the patient's hemodynamic values, including blood pressure and heart rate, from pre-operative to post-operative. An ideal intravenous anesthetic agent is expected to provide rapid and reliable anesthesia induction and recovery, have minimal effects on vital functions, have no effects such as reactions or pain at the injection site, be in a stable solution, and preferably have a solution in water (Kayhan, 2004). Propofol is a short-acting, intravenous sedative-hypnotic used for induction of anesthesia. It provides quick and comfortable induction, which usually occurs within 40 seconds (arm-brain circulation time) following the start of the injection. It causes pain in up to 58% of cases when given from the back of the hand. It is depressant for the cardiovascular system (CVS), lowers blood pressure and cardiac output depending on the dose, and slightly reduces heart rate. In clinical studies, intravenously administered midazolam has been shown to be an adequate agent for induction of general anesthesia (Reves et al., 1985). It can be safely used in general anesthesia induction at a dose of 0.25 mg/kg to 0.35 mg/kg, although there is inter-subject variability (Kyeong et al, 1993). Midazolam is a benzodiazepine derivative with a short duration of action (Conway et al., 2016). The general anesthetic effect begins after intravenous injection (30-100 seconds). Its effects in CVS are minimal and it does not cause pain or irritation during injection. However, midazolam alone is rarely used for anesthesia induction. There are no sufficient studies in the literature comparing the effects of propofol and midazolam used alone in anesthesia induction on hemodynamics. In our study, the effects of midazolam and propofol used during induction on intraoperative hemodynamics in patients undergoing abdominal hysterectomy were compared.

MATERIALS AND METHODS

Study type

Prospective observational study

Study group

Between January 2008 and January 2009, routine preoperative anesthesia visits were made to 60 patients with American Society of Anesthesiologists (ASA) score I-II, ages 35-60, who were scheduled for abdominal hysterectomy, and informed consent was obtained about the study.

Procedures

No premedication was applied to the patients. The patients were divided into two equal groups: those given midazolam during induction (Group M) and those given propofol (Group P). During anesthesia induction, midazolam (0.2 mg/kg) was administered to Group M (n:30) and propofol 1% (2 mg/kg) was administered to Group P (n:30). After standard monitoring was performed on the volunteer patients in both groups, vascular access was established with a 20 G branule. Infusion of 0.9% NaCl solution was started at a constant rate in all patients and infusion was continued throughout the surgery according to the 4-2-1 rule. In the operating room, non-invasive systolic blood pressure, diastolic blood pressure, mean blood pressure, minute heart rate values were recorded at the beginning of anesthesia induction (T1), after intubation (T2), during skin incision (T3), extubation (T4) and in the recovery room at the fifth minute of extubation (T5). During induction of anesthesia, 0.2 mg/kg midazolam, 2 mcg/kg fentanyl, and 0.2 mg/kg cisatracurium were given intravenously to patients in Group M. Patients in Group P received 2 mcg/kg propofol 1%, 2 mcg/kg fentanyl, and 0.2 mg/kg cisatracurium intravenously. After 3 minutes of mask oxygenation, patients were orotracheally intubated. Following orotracheal intubation in both groups, anesthesia was maintained with a mixture of 4-6% desflurane, 50% oxygen and 50% nitrogen oxide. Patients were administered intravenous (0.05-01mcg/kg) fentanyl and (0.02mg/kg) cisatracurium at 45-minute intervals as additional doses. All patients were administered 100 mg tramadol when skin closure stitching was applied. During the surgical skin closure suture stage, the nitrogen protoxide flow was stopped, and a fifty percent air-oxygen mixture was switched to. At the end of skin closure, desflurane was discontinued and air-oxygen flow was continued. Decurarization was achieved by administering 1 mg atropine and 2 mg neostigmine to patients who started spontaneous breathing, and then extubation was performed. Patients who had an eye-opening response with verbal stimulation and had adequate spontaneous respiration were sent to the recovery room. Patients whose Aldrete score reached 9 points in the recovery room were sent to the ward.

Statistical analysis

In this study, statistical analyzes were performed with the NCSS 2007 package program. In addition to descriptive statistical methods (mean, standard deviation) in the evaluation of the data, repeated analysis of variance was used for repeated measurements of multiple groups, Newman Keuls multiple comparison test was used for subgroup comparisons, independent t test was used for comparison of paired groups, and chi-square test was used for comparisons of qualitative data. The results were evaluated at the significance level of $p<0.05$.

Ethical considerations

For this observational study, permission was obtained from the ethics committee of Istanbul Training and Research Hospital (Tarih 02.05.2008; Karar sırano:22, no: 5/8).

RESULTS

No statistically significant difference was observed between the age and weight averages and ASA score distributions of the groups (Table 1). The duration of abdominal hysterectomy surgeries was similar in both groups respects. Groups; They were similar in terms of extubation times, recovery times, and Aldrete score.

While no significant difference was observed between the groups in terms of initial systolic blood pressure averages, the 5th minute systolic blood pressure averages of intubation, skin incision, extubation, and recovery were significantly lower in group P than in M (Table 2).

Table 1. Group M and Group P, age, weight averages and ASA score distributions.

		Group M	Group P	P*
Age (year)		47.53±5.56	45±7.33	0.137
Weight (kg)		70.83±7.76	74.27±8.27	0.103
ASA score	**I**	15 (%50)	19 (%63.3)	0.297
	II	15 (%50)	11 (%36.7)	

ASA: American Society of Anesthesiologists, *P<0.05 is significant.

Table 2. Group M and Group P, systolic blood pressure averages.

Systolic blood pressure (mmHg)	Group M	Group P	P
T1	138.10±18.25	131.70±15.03	0.143
T2	155.87±19.08	135.47±23.32	**0.0001***
T3	124.70±13.41	118.30±15.41	**0.048***
T4	147.57±13.19	132.93±13.23	**0.0001***
T5	134.33±14.14	124.90±13.45	**0.010***

Newman Keuls Multiple Comparison Test	Group M	Group P
Induction / Intubation	**0.001***	0.259
Induction / Incision	**0.001***	**0.001***
Induction / Extubation	**0.008***	0.621
Induction / Recovery	0.222	**0.006***

T1: anesthesia induction, T2: after intubation, T3: during skin incision, T4: extubation, T5: fifth minute of extubation. *P<0.05 is significant.

In Group M, the mean systolic blood pressure after intubation and extubation was significantly higher than the initial value, while the value after skin incision was lower. In Group P, incision and recovery systolic blood pressure averages showed a significant decrease compared to the baseline value (Table 2) (Figure1).

While no significant difference was observed between the mean diastolic blood pressure values of groups M and group P at baseline, during incision and extubation, and also during recovery, a significant decrease was observed in the mean diastolic blood pressure values measured immediately after intubation in group P.The average of diastolic blood pressure values measured during intubation and extubation in both groups was observed to be significantly higher than the baseline (Table 3) (Figure 2) (P<0.05). While no significant difference was observed between the averages of intubation, incision and recovery mean blood pressure, measurements of the groups, the extubation mean blood pressure, averages of group P showed a significant decrease (Table 3) (Figure 3) (P<0.05).

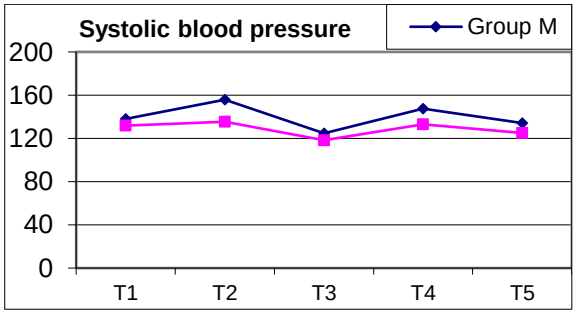


Figure1: Average values of systolic blood pressure.

Table 3: Group M and P, diastolic and mean blood pressure average, mean minute heart rate.

Diastolic blood pressure (mmHg)	Group M	Group P	P
T1	76.03±8.27	73.57±8.98	0.077
T2	88.63±10.52	81.40±16.16	**0.044***
T3	73.67±11.21	68.63±12.49	0.106
T4	83.83±12.58	78.13±11.44	0.071
T5	75.17±13.17	72.37±10.8	0.372
Mean blood pressure (mmHg)			
T1	95.97±8.9	91.97±8.67	0.079
T2	107.40±21.58	98.57±16.08	0.077
T3	87.53±18.3	85.53±12.18	0.620
T4	103.70±9.46	96.60±9.92	**0.006***
T5	94.23±11.22	89.97±11.19	0.146
Minute heart rate (beats/minute)			
T1	81.73±10.18	86.13±7.12	0.057
T2	89.33±9.92	94.40±11.13	0.068
T3	78.70±13.18	78.63±9.55	0.982
T4	97.23±14.05	89.17±10.48	**0.014***
T5	87.03±11.6	83.60±9.07	0.207

T1: anesthesia induction, T2: after intubation, T3: during skin incision, T4: extubation, T5: fifth minute of extubation. *P<0.05 is significant.

While there was no difference in the averages of intubation, incision, and recovery minute heart rate measurements between the groups, the group P extubation minute heart rate averages showed a significant decrease. While intubation and extubation minute heart rate averages in Group M were significantly higher than the baseline values, in Group P, only intubation measurements showed a significant increase compared to the baseline. In addition, the mean values of minute heart rate numbers measured during the incision in group P were significantly lower than the initial values (Table 3) (P<0.05).

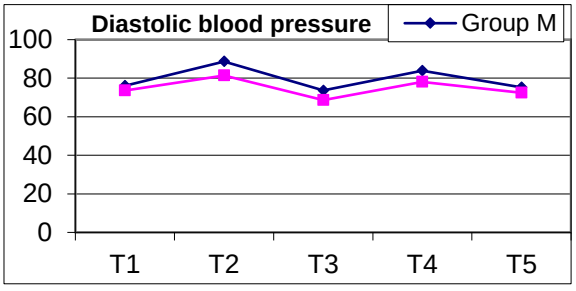


Figure 2: Average values of diastolic blood pressure

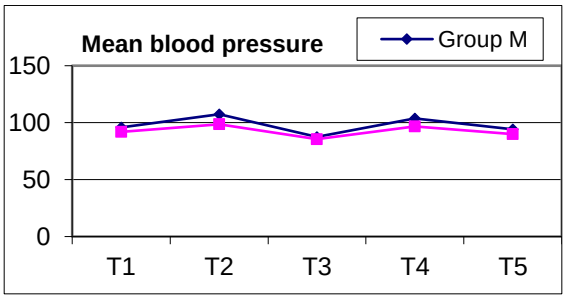


Figure 3: Average values of mean blood pressure

DISCUSSION

In our study, it was observed that midazolam did not prevent the hemodynamic response after induction, and intravenous 0.2 mg/kg midazolam caused higher systolic blood pressure values than 2 mg/kg 1% propofol. Neither drug alone provided hemodynamic stability. Similarly, Bosna et al. (Bosna et al., 2002) reported in their study aiming to compare the hemodynamic effects of midazolam and propofol that hemodynamic stability could not be maintained in both groups. The addition of midazolam during induction of anesthesia has been reported to attenuate intubation-induced increases in blood pressure and minute heart rate, cardiac autonomic system responses, and serum epinephrine and norepinephrine concentrations (Nishiyama et al.,2002). Midazolam helps maintain hemodynamic stability by reducing

the stress response during induction of anesthesia. It may suppress physiologic responses during induction of anesthesia (Jeon et al., 2018). In their fifty percent effective dose (ED50) study, (Mcclune et al., 1992) reported that the doses of midazolam and propofol required to eliminate the eye-opening response to voice command were 0.26 and 1.25 mg/kg, respectively. It has been reported that the same drug doses for midazolam and slightly higher doses for propofol are required for face mask tolerance, and both drugs require similarly higher doses to eliminate the eyelash reflex. In our study, midazolam was used at 0.2 mg/kg, considering that it was given together with fentanyl were used in both groups for anesthesia induction, and after induction, intubation and surgical incision, decreases in hemodynamic parameters were detected in both groups. They reported that propofol-fentanyl and midazolam-fentanyl combinations were similar to each other in terms of hemodynamic stability (Arda et al., 2000). In our study, fentanyl was used in lower doses as 2 microgram/kg and midazolam as 0.2 mg/kg. Midazolam and propofol can be used together, but there is no clarity about the effects of the doses to be applied on hemodynamics. It has been reported that hemodynamic values after induction of anesthesia are lower when propofol and midazolam are used together (midazolam 0.03, 0.06 or 0.12 mg/kg, respectively, followed by propofol 0.3, 0.6 or 0.9 mg/kg administered 2 minutes later) than when used alone (McClune et al., 1992). It has been shown to be synergistic when used within the commonly accepted dosage range. There is a 44% reduction in the ED50 of each agent individually. If 0.13 mg/kg midazolam is used in anesthesia applications, a 52% decrease in propofol dose is required (Short & Chuı, 1991). Another study used midazolam-propofol-alfentanil, evaluating the drugs individually and in combination in 400 patients; Although all responses to two-drug combinations are synergistic, the three-drug combination has been reported to result in a response less than that expected from the effects of the individual agents and their two-drug interactions (Short et al., 1992). We think that the lower hemodynamic responses with propofol compared to midazolam in our study are due to the dose we used. In a study in which general anesthesia induction with propofol was performed by adding 0.03 mg/kg and 0.06 mg/kg intravenous midazolam, it was reported that a significant decrease in systolic blood pressure, diastolic and mean blood pressure was prevented immediately after induction. The authors reported decreased postoperative anxiety score, decreased cortisol response to surgery, and decreased propofol requirement for induction (Mihali et al., 2022). Two specific hypotheses were tested by heart rate variability analysis of heart rate and arterial blood pressure changes during conscious sedation with propofol and midazolam. According to this study, propofol induces a decrease in heart rate and blood pressure by inducing the dominance of parasympathetic activity, while midazolam induces an increase in heart rate and a decrease in blood pressure by inducing the dominance of sympathetic activity (Win et al., 2005). In our study, we think that the lower hemodynamic responses with propofol compared to midazolam may be due to suppression of parasympathetic activity. Propofol's ability to reduce blood pressure during induction of anesthesia has been reported as a 25-40% decrease in systolic blood pressure when administered at an induction dose of 2-2.5 mg/kg, regardless of any cardiovascular disease. It shows that it is a result of the direct negative inotropic effects of propofol as well as its direct effects on arterial and venous vascular tone (Pagel & Warltier, 1993). Additionally, in studies comparing the 2% and 1% formulation of propofol in use reported that the formulations were similar in terms of hemodynamic responses to intubation (Öztürk, 2007; Servin et al., 1997).

CONCLUSION

As a result, anesthesia induction with intravenous 0.2 mg/kg midazolam may cause higher systolic blood pressure values than 2 mg/kg propofol. It should not be overlooked that the hemodynamic response that will occur after the use of midazolam during anesthesia monitoring will vary depending on the anesthetic drugs and doses used together.

Acknowledgement

The authors would like to extend their sincere thanks to anyone who contributed to this study.

Conflict of Interest

The authors declare no potential conflicts of interest with respect to the research, authorship and/or publication of this article.

Author Contributions

Plan, design: S.U.; **Material, methods and data collection:** S.U.; **Data analysis and comments:** S.U., E.N.T.; **Writing and corrections:** S.U., E.N.T.

Funding

None

Ethical considerations

For this observational study, permission was obtained from the ethics committee of Istanbul Training and Research Hospital (Tarih 02.05.2008; Karar sırano:22, no: 5/8).

REFERENCES

Arda, N. B., Ulufer, S. G., Tezal, D., Özbakış, Ç., & Hancı, A. (2000). Effects of Propofol-Fentanyl and Midazolam-Fentanyl Combinations and TIVA on Hemodynamics and Recovery. *The Medical Bulletin of Sisli Etfal Hospital, 34*(3): 20-23.

Bosna, G., Yalçıntuna, İ. B., & Aydın, N. (2002). Comparison of the hemodynamic effects of midazolam and propofol in the induction of general anesthesia. *Haydarpaşa*

Numune Training and Research Hospital Medical Journal, *42*(2): 19-22.

Conway, A., Rolley, J., Sutherland, J. R., & Cochrane Emergency and Critical Care Group. (2016). Cochrane Database of Systematic Reviews: CD009491. https://doi.org/10.1002/14651858.CD009491.pub2.

Jeon, S., Lee, H. J., Do, W., Kim, H. K., Kwon, J. Y., Hwang, B. Y., & Yun, J. (2018). Randomized controlled trial assessing the effectiveness of midazolam premedication as an anxiolytic, analgesic, sedative, and hemodynamic stabilizer. Medicine(Baltimore);*97*(35):e12187. https://doi.org/10.1097/MD.0000000000012187.

Kayhan Z (2004). *Clinical Anesthesia* (3rd Edition) Logos Publishing.

Kyeong, T. M., Myeong, H. L., Yong, I. K., & Jong, R. K. (1993). Induction Dose of Midazolam for General Anesthesia. *Korean Journal of Anesthesiology*; *26*(2):233-242. https://doi.org/10.4097/kjae.1993.26.2.233.

Mcclune, S., Mckay, A. C., Wright, M.C., Patterson, C.C., & Clarke R.S.J. (1992). Synergistic Interaction Between Midazolam And Propofol. *British Journal of Anaesthesia*; *69*:240-245.

Mihalj, M., Karlović, Z., Vladić-Spaić, D., Matić, B., Mikulić, I., Mikulić, V., & Golubović V. (2022). Effects of midazolam co-induction to general anesthesia: A randomized clinical trial. *Medicine (Baltimore); 101*(45): e31400. https://doi: 10.1097/MD.0000000000031400

Nishiyama,T., Misawa, K., Yokoyama, T., & Hanaoka, K. (2002). Effects of combining midazolam and barbiturate on the response to tracheal intubation: changes in autonomic nervous system. *Journal of Clinical Anesthesia*;*14*(5):344–8. https://doi.org/10.1016/s0952-8180(02)00370-7.

Öztürk, Ç. E. (2007). Comparison of 1% and 2% propofol formulations used in induction in terms of injection pain and hemodynamic response to intubation. [Specialization in Medicine Thesis, Osmangazi University Faculty of Medicine, Eskişehir]. http://openaccess.ogu.edu.tr:8080/xmlui/bitstream/handle/11684/2033.

Pagel, P.S., & Warltier, D.C. (1993). Negative inotropic effects of propofol as evaluated by the regional preload recruitable stroke work relationship in chronically instrumented dogs. *Anesthesiology* ;*78*:100-8. https://doi.org/10.1097/00000542-199301000-00015.

Reves, J. G., Fragen, R.J., Vinik, H. R., & Greenblatt D. J. (1985). Midazolam pharmacology and uses. ; *Anesthesiology*, *62*(3): 310-24.

Servin, F. S., Desmonts, J. M., Melloni, C., & Martinelli, G. (1997). A comparison of 2% and 1% formulations of propofol for the induction and maintenance of anaesthesia in surgery of moderate duration. *Anaesthesia*;*52*(12):1216-21. https://doi.org/10.1111/j.1365-2044.1997.222-az0357.x.

Short, T. G., & Chuı, P. T. (1991). Propofol And Midazolam Act Synergistically In Combination. *British Journal of Anaesthesia*; *67*: 539-545.

Short, T. G., Plummer, J. L., & Chui P.T. (1992). Hypnotic and anaesthetic interactions between midazolam, propofol and alfentanil. *British Journal of Anaesthesia*;*69*(2):162-7. https://doi.org/10.1093/bja/69.2.162.

Win, N.N., Fukayama, H., Kohase, H., & Umino, M. (2005). The different effects of intravenous propofol and midazolam sedation on hemodynamic and heart rate variability. *Anesthesia and Analgesia;101*(1):97-102. https://doi.org/10.1213/01.ane.0000156204.89879.5c

ORİJİNAL MAKALE / ORIGINAL ARTICLE

Balıkesir Sağlık Bilimleri Dergisi / BAUN Sağ Bil Derg
Balıkesir Health Sciences Journal / BAUN Health Sci J
ISSN: 2146-9601- e ISSN: 2147-2238
Doi: https://doi.org/10.53424/balikesirsbd.1209471

The Effect of COVID-19 History on Anxiety Levels and Sleep Quality in Patients Hospitalized in the Neurology Service During the Pandemic Period

Tuba CAN AKMAN[1], Feride YARAR[1], Ayşenur YILMAZ[2], Selma TEKİN[3]

[1] Pamukkale University, Faculty of Physical Therapy and Rehabilitation,
[2] Hitit University, Faculty of Health Sciences
[3] Pamukkale University, Faculty of Medicine, Department of Neurology

Geliş Tarihi / Received: *25.11.2022,* ***Kabul Tarihi / Accepted:*** *2.04.2024*

ABSTRACT

Aim: COVID-19, which emerged in the city of Wuhan, China, brought new living conditions with it by affecting the whole world in a short time. This study aimed to determine the anxiety level and sleep quality of neurology patients hospitalized in the neurology service according to their COVID-19 status during the pandemic period. **Materials and Methods**: Research data were collected as face-to-face questions and answers between March 20 and May 20, 2021. One hundred (55 Female, 45 Male) patients participated in the study. The patients were divided into two groups according to whether they had COVID-19 or not. Patients who had COVID-19 were designated as the COVID-19 group, and those who did not were designated as the non-COVID-19 group. The Pittsburgh Sleep Quality Index (PSQI) was used to assess sleep quality and the Coronavirus Anxiety Scale (COAS) was used to assess anxiety level. **Results:** A significant difference was found between the COVID-19 group and non-COVID-19 group for anxiety scale mean scores, total PSQI score averages, and sub-parameters sleep latency, sleep duration, and sleep disturbance ($p<0.05$). There was a positive moderate correlation between anxiety level and sleep quality ($p=0.000$, $r=0.472$). A moderate positive relationship was detected between anxiety level and subjective sleep quality which is one of the sub-parameters of sleep quality ($p=0.000$, $r=0.439$). **Conclusion:** COVID-19 disease has negative effects on the anxiety level and sleep quality of individuals. The extent of these effects should be examined. It is important to consider these effects in treatments.

Keywords: Anxiety, COVID-19, Pandemic, Sleep.

Pandemi Döneminde Nöroloji Servisinde Yatan Hastalarda COVID-19 Öyküsünün Kaygı Düzeyleri ve Uyku Kalitesi Üzerine Etkisi

ÖZ

Amaç: COVID-19, kısa zamanda tüm dünyayı etkisi altına alarak yaşam koşullarını çok büyük oranda etkilemiştir. Bu çalışmanın amacı pandemi sürecinde COVID-19 geçirme durumlarına göre nöroloji servisinde yatan nöroloji hastalarının anksiyete düzeyi ve uyku kalitesini değerlendirmek amacıyla yapılmıştır. **Gereç ve Yöntem:** Araştırma verileri 20 Mart -20 Mayıs 2021 tarihleri arasında yüz yüze soru-cevap olarak toplanmıştır. Araştırmaya, 100 (55 Kadın, 45 Erkek) hasta katılmıştır. Hastalar COVID-19 geçirip geçirmemelerine göre iki gruba ayrılmıştır. COVID-19 hastalığını geçiren kişiler COVID-19 geçiren grup olarak hastalığı geçirmeyenler ise COVID-19 geçirmeyen grup olarak belirlendi. Veri toplama aracı olarak uyku kalitesini değerlendirmek için Pittsburgh Uyku Kalitesi İndeksi (PUKİ), anksiyeteyi değerlendirmek için Koronavirüs anksiyete Ölçeği (KAÖ) kullanılmıştır. **Bulgular:** COVID-19 geçiren grup ve COVID-19 geçirmeyen grup karşılaştırıldığında anksiyete ölçeği puan ortalamaları, PUKİ total puan ortalamaları ve alt parametrelerinden uyku latansı, uyku süresi, uyku bozukluğu arasında anlamlı fark saptandı ($p<0.05$). Anksiyete düzeyi ile uyku kalitesi arasında pozitif yönde orta düzey korelasyon olduğu görüldü ($p=0.000$, $r=0.472$). Anksiyete düzeyi ile uyku kalitesinin alt parametrelerinden öznel uyku kalitesi ($p=0.000$, $r=0.439$) ile pozitif yönde orta düzey anlamlı ilişki saptandı. **Sonuç:** Nörolojik hastalığı olup COVID-19 geçiren bireylerin anksiyete düzeylerinin daha yüksek ve uyku kalitelerinin daha kötü olduğu görülmüştür. Bu etkilerin boyutları incelenmelidir. Ve tedavilerde bu etkilerin göz önünde bulundurularak yapılması önemlidir.

Anahtar Kelimeler: Anksiyete, COVID-19, Pandemi, Uyku.

Sorumlu Yazar / Corresponding Author: Ayşenur YILMAZ, Hitit University, Faculty of Health Sciences, Çorum/Türkiye.
E-mail: fzt.aysenurgungor@gmail.com

Bu makaleye atıf yapmak için / Cite this article: Can Akman, T., Yarar, T. Yılmaz, A., & Tekin, S. (2024). The effect of COVID-19 history on anxiety levels and sleep quality in patients hospitalized in the neurology service during the pandemic period. *BAUN Health Sci J, 13*(2), 360-367. https://doi.org/10.53424/balikesirsbd.1209471

INTRODUCTION

The effects of COVID-19 (coronavirus disease), which spread rapidly first in China and then in almost all countries in the world, continue (World Health Organization, 2022). In studies examining the psychological and social effects of COVID-19, it has been observed that COVID-19 causes radical changes in society in all aspects and negative psychological problems. In a study in which 500 people participated, it was reported that 19% of the participants had depression, 14% had anxiety and 25.4% had worsened mental health after the pandemic (Choi et al., 2020).

In a study on anxiety, and depression conducted with 307 participants, the frequencies of anxiety and depression were reported to be 18.6% and 13.4%, respectively (Dai et al., 2020). In the study of 1210 participants conducted in China during the COVID-19 epidemic, 28.8% of the participants were found to have moderate to severe anxiety symptoms and 16.5% had moderate to severe depression symptoms. Moreover, it was stated that women were more negatively affected by the psychological consequences of the epidemic; It was observed that the scores they got from the stress, anxiety, and depression scales were significantly higher (Wang et al., 2020).

Sleep problems are one of the leading causes of psychological problems. It is known that insomnia affects a person's healthy thinking and psychology, as well as difficulty for sleeping due to sadness, stress, and depression. In addition, sleep quality is one of the concepts that is emphasized in clinical practice and sleep-related research. It is seen that studies on sleep disorders are increasing rapidly all over the world. While it plays a major role in the pathophysiology of chronic diseases, it is worth examining because it is the first deterioration process in acute diseases (İyigün et al., 2017; Huang et al., 2020).

Sleep research is essential because poor sleep quality is a symptom of many medical conditions and there is a high correlation between sleep health and physical as well as psychological health. Sleep plays a very important role in the health of individuals. Inadequate sleep, besides posing a threat to health, causes a decrease in cognitive, psychomotor, and emotional functions. The effect of sleep-related hormonal circulation on immunity and health has been demonstrated. It is reported that people with sleep disorders experience health problems more frequently and more severely. It has been shown that sleep rhythm is affected by many factors and causes disorders. Sleep quality is an important indicator that affects a person's cognitive, physical, and social life. Many reasons affect sleep quality.

Smoking, afternoon coffee consumption, alcohol use, poor sleep hygiene, stress levels and additional diseases are the most common factors that affect sleep quality (İyigün et al., 2017). To prevent the coronavirus pandemic, many states have imposed many restrictions on their citizens to protect their health, and with the theme of 'Life Fits Home', a curfew has been imposed on individuals under the age of 20 and over the age of 65 between March 15 and June 10, 2020, in our country, and all schools and universities, education process remotely, and it was a vacation scheduled online. It can be predicted that the new lifestyle that emerged during the COVID-19 disease pandemic and the measures taken to control the epidemic may also have an impact on sleep quality. Because it is possible to say that stress and lifestyle changes negatively affect sleep quality (Huang et al., 2020).

Fear is an adaptive defense mechanism that is fundamental for survival and involves several biological processes of preparation for a response to potentially threatening events. However, when it is disproportionate, it becomes harmful and can induce several psychiatric disorders (Garcia, 2017; Shin, 2010). In a pandemic, fear increases anxiety, stress levels and insomnia in healthy individuals and intensifies the symptoms of those with pre-existing psychiatric disorders (Shigemura et al., 2019). In previous epidemic situations, the number of those whose mental health was affected tended to be greater than the number of people infected by the disease (Reardon, 2015). Thus, it is of extreme importance to implement public health policies, including assistance protocols concerning individual and collective mental health in conjunction with pandemic response strategies during and after the event. Sleep disorders are frequently seen in neurological patient groups, and anxiety along with depression are seen at high rates in these patient groups. Sleep can be affected by many factors. It needs to be evaluated from multiple perspectives. Sleep quality is one of the most important parameters affecting the quality of life. A person needs quality sleep in order to think clearly, focus on his work, and complete his daily tasks successfully. Improving a person's sleep quality and reducing anxiety will also increase participation in physical therapy and rehabilitation. Therefore, it is extremely important to implement public health policies, including mental health outreach protocols, along with pandemic response strategies during and after the event. Because these policies provide protective and preventive services within the scope of community-based mental health practices, improving mental health and reducing the treatment burden allocated to mental health services.

This study aimed to determine the anxiety levels and sleep quality of neurology patients hospitalized in the neurology service during the pandemic period, according to their COVID-19 history.

MATERIALS AND METHODS

Study type

This cross-sectional study was conducted through face-to-face interviews with patients in Pamukkale University from March- June 2021.

Study group

Over 18 years of age who met the inclusion criteria with neurological disease in the Neurology Inpatient

Service of Pamukkale University Hospital were included in the study. As inclusion criteria, Persons who have a neurological disease (stroke, MS, etc.), can communicate and read, and have no mental problems. As the exclusion criterion, those with a previously diagnosed psychiatric illness and who do not want to participate were excluded from the current study. We invited 114 patients to the study. 14 patients did not want to participate in the survey. A total of 100 people were included in our study.

The effect size of the reference study was determined as d=0.68 (Morin et al., 2003). According to the results of the reference study, assuming that we can obtain a lower effect size (d=0.5), as a result of the power analysis, it has been calculated that 95% power can be obtained at a 95% confidence level. A minimum of 42 people (per group) were included in the study.

Procedures

The socio-demographic characteristics of the participants who met the inclusion criteria were questioned through mutual interviews. After the demographic information of the patients was obtained, it was questioned whether they had COVID-19, and whether they had a family history. Sleep quality was assessed by the Pittsburgh Sleep Quality Index (PSQI), and the Coronavirus Anxiety Inventory (COAS) questionnaire was used to assess anxiety.

Evaluation methods

PSQI ranges from 0 to 21. A total score lower than 5 indicates “good sleep quality” (Buysse et al., 1989). Turkish validity and reliability were established (Ağargün et al., 1996).

COAS which was developed in 2020 and adapted into Turkish by Biçer et al., was used. In this scale, the responses of individuals to the coronavirus in the last two weeks were evaluated. Both scales, consisting of one factor and five items, were created in a Likert style. There are items stating that as the scores obtained from the scale approach 5, reassurance-seeking behaviors increase, and as they go down to 1, reassurance-seeking behaviors decrease (Biçer et al., 2020; Lee et al., 2020).

Statistical analysis

Data were analyzed with SPSS 22.0. Continuous variables were given as mean, and categorical variables were given percentages. The Mann-Whitney U test was used to compare independent group differences and the relations between continuous variables were analyzed with Spearman correlation analysis. Normal distribution of the data was determined by the Kolmogorov-Smirnov test, and the data are not normally distributed. Chi-square analysis was used for the differences between categorical variables.

Ethical considerations

Ethical approval of the study was given by the Pamukkale University Non-Interventional Clinical Research Ethics Committee (decision no:06, date:16/03/2021).

RESULTS

Of individuals with neurological disease who met the inclusion criteria, 46 (20 women, 26 men) had COVID-19, while 54 (35 women, 19 men) were not diagnosed with COVID-19. When the patients were divided into two groups according to whether they had COVID-19 or not, the mean age of the COVID-19 group was 50.93±19.39 years, and the mean age of the non-COVID-19 group was 55.1±17.82 years.

The body mass index of all patients was found to be 25.43±4.07 kg/m2. The mean body mass index was 25.69±3.81 kg/m2 in the COVID-19 group and 25.20±4.31 kg/m2 kg/m2 in the non-COVID-19 group. Demographic and clinical characteristics of groups are given in Table 1.

In the COVID-19 group, the number of people who smoked was 8 (17.4%) and the number of people who drank alcohol was 2 (4.3%); In the non-COVID-19 group, the number of smokers was 3 (5.6%) and no one consumed alcohol. While 37 (80.4%) people in the COVID-19 group had a relative with a history of COVID-19, only 6 (11.1%) people in the non-COVID-19 group had a relative with a history of COVID-19. Seven (15.2%) of individuals with COVID-19 had any surgery while hospitalized. The number of people who had surgery in the group without COVID-19 was determined as 2 (3.7%).

A significant difference was found between the two groups' COAS total scores, PSQI total scores, and sleep latency, sleep duration, and sleep disturbance sub-parameters ($p<0.05$) (Table 2).

There was a correlation between COAS total score and sleep quality ($p=0.000$, $r=0.472$). A moderate positive correlation was found between COAS total score and subjective sleep quality ($p=0.000$, $r=0.439$). There was a moderately positive correlation between COAS total score and sleep delay ($p=0.001$, $r=0.339$) (Table 3).

DISCUSSION

Although it is agreed worldwide that the pandemic is a stressful period, little is known about the consequences after the quarantine and epidemic period. Although there are studies investigating the neuropsychiatric effect of the COVID-19 pandemic in MS patients (Costa-Frossard et al. 2020), there is no study examining the effect of COVID-19 history on coronavirus anxiety level and sleep quality in hospitalized neurology patients.

Table 1. Demographic characteristics of groups.

		COVID-19 Group (n=46)	Non-COVID-19 Group (n=54)	z	p
		X±SD Median (Min-Max)	X±SD Median (Min-Max)		
Year (y)		50.93±19.39 49 (20-90)	55.1±17.82 56.5 (21-88)	-1.498	0.134*
Height (cm)		166.97±8.04 167.5 (152-186)	165.07±8.15 165 (150-182)	-1.051	0.293*
Weight (Kg)		71.44±9.88 73.5 (44.5-95)	68.40±11.04 56.5 (36-88)	-1.408	0.159*
BMI		25.69±3.81 24.9 (18.52-33.66)	25.20±4.31 25.71 (16-32)	-0.149	0.882*
Length of hospital stay (Days)		6.21±3.59 5 (1-15)	6.63±5.91 5 (1-35)	-0.484	0.629*
		n (%)	**n(%)**	**X^2**	**p**
Diagnoses of patients	**Cerebrovascular accident**	17 (37%)	21 (39%)	2.817	0.138**
	Hemiplegia	8 (17%)	8 (15%)		
	MS	5 (11%)	7 (13%)		
	Gullian barre	3 (7%)	5 (9%)		
	Myasthenia gravis	4 (9%)	1 (2%)		
	Peripheral neuropathy	4 (9%)	4 (7%)		
	Parkinson's disease	3 (6%)	5 (9%)		
	Hidrosefali	2 (4%)	3 (6%)		
Sex	**Male**	20 (43.5%)	35 (64.8%)	3.748	0.280**
	Female	26 (56.5%)	19 (35.2%)		
Marital Status	**Married**	41 (89.1%)	44 (81.5%)	3.956	0.253**
	Single	5 (10.9%)	10 (19.5%)		
Educational status	**Out of school**	9 (19.6%)	7 (13%)	2.359	0.770**
	Primary school	19 (41.3%)	30 (55.6%)		
	Middle school	6 (13%)	7 (13%)		
	High school	7 (15.2%)	6 (11.1%)		
	University	5 (10.9%)	4 (7.4%)		

PSQI: Pittsburgh Sleep Quality Index, Min: Minumum, Max: Maximum, BMI: Body mass index; *Man-Whitney u test, **Chi-square test; X: Mean, SD: Standard Deviation, %: percent, p<0.05.

Table 2. Comparison of the anxiety levels and sleep quality of the groups.

Variables	COVID-19 Group (n=46) Mean ±SD Median (Min-Max)	Non-COVID-19 Group (n=54) Mean ±SD Median (Min-Max)	z	p
PSQI Total Point	14.30±3.32 13.5 (10-21)	12.72±3.65 11 (10-21)	-2.417	**0.016**
Subjective sleep quality	2.23±0.94 3 (0-3)	2.11±0.86 2 (0-3)	-0.961	0.337
Sleep latency	2.41±0.93 3 (0-3)	2.01±0.78 2 (1-3)	-2.725	**0.006**
Sleep time	2.08±0.96 2 (0-3)	1.66±0.82 1 (1-3)	-2.466	**0.014**
Habitual sleep activity	1.93±0.99 2 (0-3)	1.90±0.91 2 (0-3)	-0.229	0.819
Sleeping disorder	2.32±0.87 3 (1-3)	1.81±0.97 2 (0-3)	-2.776	**0.006**
Use of sleeping pills	1.69±1.00 2 (0-3)	1.61±0.73 1.5 (0-3)	-0.594	0.553
Daytime dysfunction	1.60±0.93 2 (0-3)	1.59±0.68 1 (1-3)	-0.341	0.733
COAS	13.73±4.33 15 (12-22)	12.55±2.59 12 (10-20)	-2.304	**0.021**

PSQI: Pittsburgh Sleep Quality Index, COAS: Coronavirus Anxiety Inventory; Min: Minumum, Max: Maximum; Man-Whitney u testi; p<0.05

Table 3. Examining the relationship between sleep quality and anxiety.

Variables	COAS	
	p	r
PSQI Total point	**0.000**	0.472
Subjective sleep quality	**0.000**	0.439
Sleep latency	**0.001**	0.339
Sleep time	**0.003**	0.296
Habitual sleep activity	0.498	0.069
Sleeping disorder	**0.033**	0.213
Use of sleeping pills	**0.003**	0.297
Daytime dysfunction	**0.013**	0.249

PSQI: Pittsburgh Sleep Quality Index, COAS: Coronavirus Anxiety Inventory; Spearman correlation, $p<0.05$

The aim of this study was to determine the coronavirus anxiety level and sleep quality of neurology patients hospitalized in the neurology service according to their COVID-19 status during the pandemic period. In our study, where we examined the relationship between sleep quality and coronavirus anxiety in individuals with neurological disease and had COVID-19 and compared them with neurology patients without a history of COVID-19, a relationship was found between coronavirus anxiety and sleep quality. Furthermore, it was determined that neurological patients with COVID-19 had higher coronavirus anxiety levels and worse sleep quality. Sleep can be affected by many factors. It needs to be evaluated from multiple perspectives. Sleep quality is one of the most important parameters affecting the quality of life. A person needs quality sleep to think clearly, focus on his work, and complete his daily tasks successfully (Caminero & Bartolomé, 2011). It was observed that neurology patients who had COVID-19 had higher coronavirus anxiety scores. Anxiety disorder is a mood disorder that is expected in the context of a pandemic. A previous study in China reported that most of its patients experienced moderate to severe anxiety during the pandemic (Costa-Frossard et al. 2020). It is often manifested by poor concentration, insomnia, and high blood pressure (Ma et al., 2018. Long-term anxiety is associated with increased disability, poor quality of life, cognitive impairment, and early death (Abzhandadze et al., 2017, Azizi et al., 2020, Archer et al., 2020, Balfe et al., 2018, Guay et al., 2017). The COVID-19 pandemic creates many uncertainties in individuals' lives, and when these uncertain situations are perceived as threatening, they cause negative reactions in the person and cause anxiety. However, based on the results of this research, it is stated that individuals can maintain their psychological resilience to the extent that they can use their spiritual resources during such trauma periods, which is the key to mental health during this COVID-19 epidemic period (Wang et al., 2019). It has been reported that diseases can be considered as traumatic negative events. It is thought that traumatic events also negatively affect a person's psychology (Archer et al., 2020). In the first days of the epidemic, emptying food shelves, confinement at home, interpreting every physical sensation as a symptom of COVID-19, exposing minds to a shower of dirty information through social media posts, and watching programs about the epidemic on the internet and television for long hours increased fear and panic. According to the sleep survey, a score higher than five indicates a sleep disorder. In our study, it was observed that neurology patients were above 5, regardless of having COVID-19. However, it was seen that there were higher scores in the group that had COVID-19. Stress may not be the only cause of sleep problems during the pandemic (Morin et al., 2003, Sateia 2014). Numerous studies have been conducted investigating sleep problems and their psychological impact during the SARS epidemic (Brooks et al., 2018). However, to our knowledge, there is no study evaluating the sleep quality of neurology patients hospitalized in the neurology service during the COVID-19 pandemic. Our study found that sleep quality decreased in different disease groups during the COVID-19 pandemic, which is consistent with the findings of recent studies (Yuan et al., 2020, Huang & Zhao 2020, Zhang et al., 2020). Decreased sleep quality can exacerbate symptoms of chronic diseases and reduce response to treatment (Caminero & Bartolomé, 2011). Accordingly, there is a need for multidimensional and multi-stage studies investigating sociopsychological factors that can improve sleep quality. It is an undeniable fact that the COVID-19 pandemic brings many uncertainties, especially in health, social, psychological and economic areas.

When we look at the sub-parameters of sleep, there was a difference between the two groups, especially in falling asleep, sleep duration and sleep disturbance. Anxiety in people may delay falling asleep, reduce sleep duration and cause sleep disorders. Neurology patients have existing problems related to sleep. Having a disease such as COVID-19 can increase and exacerbate anxiety and fear in these people. When looked at, most of the relatives of neurology patients

have had COVID-19. In this case, it can cause isolation problems such as fear, avoidance and staying away from people's environment, making these people even more antisocial. This may lead to depressive states in patients. In this respect, patients should be protected from the disease and should be helped to overcome their fears (Yuan et al. 2020).

In our study, when we looked at the relationship between coronavirus anxiety and sleep in neurological patients with COVID-19, it was seen that there was a relationship between sleep quality and falling asleep, especially with the total score. In particular, coronavirus anxiety is related to total score and sleep quality. To have a good sleep, a person must be free from worry. These patients with COVID-19 should be informed about the disease and in terms of prevention, and if there are caregivers, they should be informed about how to behave in a new epidemic. Sleep is very effective on quality of life. A person must have a good sleep pattern to maintain a daily routine.

Thirty-eight of our patients (38%) had a history of cerebrovascular accident, and 16 of them (16%) were patients with hemiplegia. And they made up the majority of patients. Therefore, regardless of stroke types and stroke severity, more attention should be paid when contracting COVID-19, and considering that patients with a stroke have a higher prevalence of age, smoking, hypertension and cardiovascular disease, COVID-19 patients with a stroke history should be compared to those without a stroke history. It is stated that it is not surprising that patients experience worse clinical outcomes than others (Huang and Zhao, 2020). Therefore, health authorities need to identify high-risk groups based on patients' sociodemographic profiles in order to provide early psychological interventions. Anxiety, stress and sleep problems are well-known risk factors for cardiovascular disease. Second, as the prevalence of neuropsychiatric disorders increases in the context of a pandemic, the content of psychological interventions should be modified according to the needs of the general population.

Our study was limited in several ways. Since the study had a cross-sectional design, the data and analyses obtained from the study may not be sufficient to draw causal inferences. Since the participants were volunteers who participated in the survey, the study may have sample bias. The fact that it was performed on different disease groups will affect the level of psychological impact of the pandemic. However, it is also necessary to question whether patients with COVID-19 disease were hospitalized during this period, how many days they were hospitalized, and what effects they had afterward. Despite its limitations, we hope that the findings of this study will provide us with guidance on the psychological state and sleep status of patients during the pandemic period and will be more conducive to the management of patients with a history of stroke and MS who are at high risk for COVID-19.

CONCLUSION

It has been observed that the sleep quality of patients with neurological problems decreases, and the coronavirus anxiety level increases. However, it has been observed that the coronavirus anxiety level is higher in patients who have had COVID-19 than in those who have not. This will also negatively affect patients' compliance with treatment, participation and exercise. Determining patients' sleep quality and coronavirus anxiety levels will be useful in predicting their participation in treatment. Sleep affects a person's quality of life greatly. For this reason, it should be questioned whether the patient has COVID-19 in the future and appropriate approaches should be taken accordingly. And studies should be carried out to improve sleep quality. Additionally, studies should be conducted with larger participation and in which different parameters that may affect sleep are evaluated.

Acknowledgment

The authors would like to extend their sincere thanks to anyone who contributed to this study.

Conflict of Interest

The authors declare no potential conflicts of interest with respect to the research, authorship and/or publication of this article.

Author Contributions

Plan, design: TCA, FY; **Material, methods and data collection:** AY, ST; **Data analysis and comments:** AY, FY; **Writing and corrections:** TCA, FY, AY.

Funding

The authors declared that this study received no financial support.

Ethical considerations

Ethical approval of the study was given by the Pamukkale University Non-Interventional Clinical Research Ethics Committee (decision no:06, date:16/03/2021).

REFERENCES

Abzhandadze, T., Forsberg-Wärleby, G., Holmegaard L. Redfors, P., Jern, C., Blomstrand, C., et al. (2017). Life satisfaction in spouses of stroke survivors and control subjects: A 7-year follow-up of participants in the sahlgrenska academy study on ischaemic stroke. *Journal of Rehabilitation Medicine,* 49, 550–557.

Ağargün, M. Y., Kara, H., ve Anlar, O. (1996). Pittsburgh Uyku Kalitesi İndeksi'nin geçerliği

ve güvenirliği. *Türk Psikiyatri Dergisi*, 7, 107-111.

Archer, G., Kuh, D., Hotopf, M., Stafford, M., Richards, M. (2020). Association between lifetime affective symptoms and premature mortality. *JAMA Psychiatry*, 77, 806–813. https://doi.org/10.1001/jamapsychiatry.2020.0316.

Azizi, A., Khatiban, M., Mollai, Z., Mohammadi, Y. (2020). Effect of informational support on anxiety in family caregivers of patients with hemiplegic stroke. *Journal of Stroke Cerebrovasculer Disease*, *29*, 105020. https://doi.org/10.1016/j.jstrokecerebrovasdis.2020.105020.

Biçer, İ., Çakmak, C., Demir, H., & Kurt, M. E. (2020). Koronavirüs anksiyete ölçeği kısa formu: Türkçe geçerlik ve güvenirlik çalışması. *Anadolu Kliniği Tıp Bilimleri Dergisi*, *25*(Supplement 1), 216-225. https://doi.org/10.21673/anadoluklin.731092.

Brooks, S. K., Dunn, R., Amlôt, R., Rubin, G. J., Greenberg, N. A. (2018). Systematic, thematic review of social and occupational factors associated with psychological outcomes in healthcare employees during an infectious disease outbreak. *Journal of Occupational and Environmental Medicine*, 60(3), 248-57. https://doi.org/10.1097/JOM.0000000000001235.

Buysse, D. J., Reynolds, C. F., & Monk, T. H. (1989). The Pittsburgh Sleep Quality Index: a new instrument for psychiatric practice and research. *Psychiatry Research*, 28:193- 213

Caminero, A., & Bartolomé, M. (2011). Sleep disturbances in multiple sclerosis. *Journal of the Neurological Sciences*, *309*(1-2): 86-91.

Choi, E. P. H., Hui, B. P. H., & Wan, E. Y. F. (2020). Depression and anxiety in Hong Kong during COVID-19. *International Journal of Environmental Research and Public Health*, *17*(10), 3740.

Costa-Frossard, L., Moreno-Torres, I., Meca-Lallana, V., García-Domínguez J., de Estudio E. R. (2020). EMCAM (Multiple Sclerosis Autonomous Community of Madrid) document for the management of patients with multiple sclerosis during the SARS-CoV-2 pandemic. *Revue Neurologique*, *70*(9), 329-40. https://doi.org/10.33588/rn.7009.2020155.

Dai, L. L., Wang, X., Jiang, T. C., Li, P. F., Wang, Y., Wu, S. J., et al. (2020). Anxiety and depressive symptoms among COVID19 patients in Jianghan Fangcang Shelter Hospital in Wuhan, China. *Plos one* ,15(8), e0238416. https://doi.org/10.1371/journal.pone.0238416.

Garcia, R. (2017). Neurobiology of fear and specific phobias. *Learning & Memory*. 24(9), 462-471. https://doi.org/10.1101/lm.044115.116.

Guay, C., Auger, C., Demers, L., Mortenson, W. B., Miller, W. C., Gélinas-Bronsard, D., et al. (2017). Components and outcomes of internet-based interventions for caregivers of older adults: Systematic review. *Journal of Medical Internet Research*, *19*(9), e313. https://doi.org/10.2196/jmir.7896

Huang, Y., & Zhao, N. (2020). Generalized anxiety disorder, depressive symptoms and sleep quality during COVID-19 outbreak in China: a web-based cross-sectional survey. *Psychiatry Research*, 288, 112954. https://doi.org/10.1016/j.psychres.2020.112954.

İyigün, G., Angın, E., Kırmızıgil, B., Öksüz, S., Özdil, A., Malkoç, M. (2017). Üniversite öğrencilerinde uyku kalitesinin mental sağlık, fiziksel sağlık ve yaşam kalitesi ile ilişkisi. *Journal of Exercise Therapy and Rehabilitation*, *4*(3), 125-133.

Lee, S. A. (2020) Coronavirus Anxiety Scale: A brief mental health screener for COVID-19 related anxiety. *Death Studies 44*(7), 393-401. https://doi.org/10.1080/07481187.2020.1748481.

Ma, M., Dorstyn, D., Ward, L., Prentice, S. (2018). Alzheimers′ disease and caregiving: A meta-analytic review comparing the mental health of primary carers to controls. *Aging and Mental Health*, *22*, 1395–1405. https://doi.org/10.1080/13607863.2017.1370689.

Morin, C. M., Rodrigue, S., Ivers, H. (2003). Role of stress, arousal, and coping skills in primary insomnia. *Psychosomatic Medicine*, *65*(2), 259-67. https://doi.org/10.1097/01.PSY.0000030391.09558.A3.

Sateia, M. J. (2014). International classification of sleep disorders. *Chest*, *146*(5), 1387-94. https://doi.org/10.1378/chest.14-0970.

Shigemura, J., Ursano, R. J., Morganstein, J. C., Kurosawa, M., & Benedek, D. M. (2020). Public responses to the novel 2019 coronavirus (2019-nCoV) in Japan: Mental health consequences and target populations. *Psychiatry and Clinical Neurosciences*, *74*(4), 281. https://doi.org/10.1111/pcn.12988

Shin, L. M., & Liberzon, I. (2010). The neurocircuitry of fear, stress, and anxiety disorders. *Neuropsychopharmacology*, 35(1), 169-191. https://doi.org/10.1038/npp.2009.83

Reardon S. (2015). Ebola's mental-health wounds linger in Africa. *Nature*. 519: 13e4. https://doi.org/10.1038/519013a

Wang, C., Pan, R., Wan, X., Tan, Y., Xu, L., Ho, C. S., et al. (2020). Immediate Psychological Responses and Associated Factors during the Initial Stage of the 2019 Coronavirus Disease (COVID-19) Epidemic among the General Population in China.

International Journal of Environmental Research and Public Health, 17, 1729.

World Health Organisation. (2022). Coronavirus. https://www.who.int/health-topics/coronavirus. Erişim tarihi: 19 Ekim, 2022.

Yuan, S., Liao, Z., Huang, H., Jiang, B., Zhang, X., Wang, Y., et al. (2020). Comparison of the indicators of psychological stress in the population of Hubei Province and non-endemic provinces in China during two weeks during the coronavirus disease 2019 (COVID-19) outbreak in February 2020. *Medical Science Monitor* 26, e923767-1-e923767-10. https://doi.org/10.12659/MSM.923767.

Zhang, C., Yang, L., Liu, S., Ma, S., Wang, Y., Cai, Z., et al. (2020). Survey of insomnia and related social psychological factors among medical staff involved in the 2019 novel coronavirus disease outbreak. *Frontiers in Psychiatry*, 11, 306. https://doi.org/10.3389/fpsyt.2020.00306.

ORİJİNAL MAKALE / ORIGINAL ARTICLE
Balıkesir Sağlık Bilimleri Dergisi / BAUN Sağ Bil Derg
Balıkesir Health Sciences Journal / BAUN Health Sci J
ISSN: 2146-9601- e ISSN: 2147-2238
Doi: https://doi.org/10.53424/balikesirsbd.1383038

Knowledge Levels of Neonatal Intensive Care Unit Nurses Regarding Retinopathy and Examination Process

Semra KÖSE[1], Gizem KIVRAK[2]

[1] Necmettin Erbakan University, Faculty of Nursing, Department of Child Health and Disease Nursing
[2] Konya City Hospital, Oncology Education Nursing Unit

Geliş Tarihi / Received: *30.10.2023,* ***Kabul Tarihi / Accepted:*** *4.04.2024*

ABSTRACT

Aim: This study aimed to determine the knowledge levels of neonatal nurses in managing ROP (Retinopathy of Prematurity) and the examination process. **Materials and Methods:** The descriptive research model was conducted between August-September 2023. A total of 171 nurses who met the inclusion criteria were included in the study during the specified dates. Data were collected using the 'Nurse Profile Form' and 'The Form of Knowledge and Examination Process on ROP.' **Results:** The average age of the participating neonatal nurses was 34.26 ± 7.16 years. It was found that 74.3% of them had a bachelor's degree, 23.4% had been working in neonatal clinics for 7-10 years, 62% followed current publications related to neonatology, and 95.3% had participated in ROP examinations. Among the descriptive characteristics of the nurses, it was found that the knowledge levels of those with postgraduate education were higher than those with bachelor's degrees. The average score for Theoretical Information Related to Retinopathy was found to be 11.32±1.54, while the average score for The Examination Process (pre-examination, post-examination, and during examination) was 9.94 ± 1.53. Additionally, those who followed current publications related to neonatal intensive care had higher ROP knowledge levels than those who did not ($p < 0.05$). **Conclusion:** In the study, it was determined that neonatal nurses had a good level of knowledge regarding ROP and the examination process. According to the obtained data, it is recommended to support nurses with postgraduate opportunities, as well as to encourage participation in conferences and symposiums, in order to increase in-service training and ensure professional development in hospitals, due to the effectiveness of following education and current publications.
Keywords: Knowledge Level, Newborn, Nurse, Retinopathy.

Yenidoğan Yoğun Bakim Ünitesi Hemşirelerinin Retinopati ve Muayene Sürecine Yönelik Bilgi Düzeyleri

ÖZ

Amaç: Bu çalışmada yenidoğan hemşirelerinin ROP ve muayene sürecinin yönetilmesinde bilgi düzeylerinin belirlenmesi amaçlanmıştır. **Metot:** Tanımlayıcı araştırma modeli ile Ağustos-Eylül 2023 tarihleri arasında yapıldı. Belirtilen tarihler arasında araştırmaya dâhil edilme kriterlerine uyan toplam 171 hemşire ile çalışma tamamlandı. Veriler 'Hemşire Tanıtıcı Formu' ve 'ROP Bilgi ve Muayene Süreci Formu' ile toplandı. **Bulgular:** Araştırmaya katılan yenidoğan hemşirelerinin yaş ortalamalarının 34.26±7.16 olduğu, %74.3'ünün mezuniyetinin lisans olduğu, %23.4'ünün 7-10 yıldır yenidoğan kliniğinde çalıştığı, %62'sinin yenidoğan ile ilgili güncel yayınları takip ettiği ve %95.3'ünün ROP muayenesine katıldığı belirlendi. Hemşirelerin tanımlayıcı özelliklerinden eğitim durumu değişkeninde lisansüstü mezunu olanların ROP bilgi düzeyleri lisans mezunu olanlardan daha yüksek olduğu bulundu. ROP Bilgi ortalaması 11.32+1.54, ROP Muayene (İşem öncesi, sırası ve sonrası) ortalaması ise 9.94+1.53 olarak bulundu. Ayrıca yenidoğan yoğun bakım hemşireliği ile ilgili güncel yayınları takip edenlerin ROP bilgi düzeyleri etmeyenlerden daha yüksek olduğu bulundu ($p<0.05$). **Sonuç:** Çalışmada yenidoğan hemşirelerinin ROP ve muayene sürecine yönelik bilgi düzeylerinin iyi düzeyde olduğu belirlendi. Elde edilen verilere göre, eğitimin ve güncel yayınların takibinin etkili olmasından dolayı hastanelerde hizmet içi eğitimlerin artması ve mesleki gelişimin sağlanması için hemşirelere lisansüstü olanakların, kongre, sempozyum katılımlarının desteklenmesi önerilir.
Anahtar Kelimeler: Bilgi düzeyi**,** Yenidoğan, Hemşire, Retinopati,.

Sorumlu Yazar / Corresponding Author: Semra KÖSE, Necmettin Erbakan University, Faculty of Nursing, Konya/Türkiye.
E-mail: semraak_88@hotmail.com

Bu makaleye atıf yapmak için / Cite this article: Köse, S., & Kıvrak, G. (2024). Knowledge levels of neonatal intensive care unit nurses regarding retinopathy and examination process. *BAUN Health Sci J, 13*(2), 368-374. https://doi.org/10.53424/balikesirsbd.1383038

INTRODUCTION

Retinopathy of Prematurity (ROP) is a disease characterized by incomplete vascularization of the retina, the etiology and pathogenesis of which are not fully understood, and it results in visual impairment in premature and low birth weight infants (Sancak et. al, 2019; Taplak & Erdem, 2018). There is a proportional increase in the incidence and severity of ROP with decreasing gestational age and birth weight (Sancak et al., 2019). In recent years, due to the increased frequency of preterm births and scientific and technological advancements in neonatology, the survival period has extended up to the 23rd gestational week. However, this situation has increased the incidence of retinopathy (Bilgeç & Erol, 2018; Müstakim et al., 2017). In a multicenter study conducted in our country by the Turkish Neonatology Society, the frequency of ROP in very low birth weight preterm infants was found to be 42%, and the frequency of advanced-stage ROP was 11%. ROP was detected to occur in 6.1% of infants born at gestational weeks 33-35, with an advanced-stage ROP rate of 6 per thousand (Koç et al., 2021). ROP is a preventable cause of childhood blindness. Therefore, the examination and treatment of ROP are of great importance (Sankar et al., 2022). ROP examination can lead to changes in the respiratory pattern, cardiac arrhythmias, feeding intolerance, and pain in premature infants (Dolgun & Bozlak, 2017; Metreş, 2014). Newborn screening is a collaborative process involving multiple individuals and institutions, with midwives, nurses, obstetricians, and pediatricians in the maternity clinic forming the initial link in this chain. Ensuring that nurses and midwives responsible for screenings perform their roles accurately and timely regarding obtaining heel blood samples from all newborns, as well as screening for hearing, vision, and developmental hip dysplasia, will enhance the success of the screening process (Demir Acar & Alparslan, 2021; Fingerhut & Olgemöller, 2009; Lloyd-Puryear et al., 2006). Therefore, neonatologists, pediatricians, and nurses who care for preterm infants play an important role in reducing the frequency of ROP, potential complications, and mortality rates. They must have a good understanding of ROP pathophysiology, staging, risk factors, and appropriate care principles (Metreş, 2014). Neonatal nurses are healthcare professionals who provide primary care to premature infants and play a significant role in the prevention and management of ROP. Since ROP is a multifactorial disease, nursing care interventions targeting many risk factors can reduce the frequency of the disease (Sankar et al., 2022; Thuileiphy et al., 2021). The first goal of newborn screening programs is early diagnosis and intervention of congenital metabolic diseases with high rates. In this process, nurses should raise awareness in families by explaining to parents that screening tests are used to diagnose various diseases that can be treated or controlled, the importance of early diagnosis, the processes of affected babies, and the procedural steps, and should provide counseling on follow-up and guidance (Erdim & İnal, 2018). Therefore, the active use of nurses' clinical knowledge and skills, ensuring service management, providing counseling to parents, and taking on educational and advocacy roles contribute to a holistic care experience. In practice, neonatal nurses aim to improve the quality of care by controlling pain, monitoring oxygen saturation, ensuring infection control, maintaining thermoregulation, providing optimal nutrition, and delivering individualized developmental care services (Kalyan & Moxon, 2016).

While nurses play a significant role in reducing risk factors for retinopathy and managing the process, their knowledge and skills regarding ROP have not been adequately explored. This study aims to determine the knowledge levels of neonatal nurses in managing ROP and the examination process.

MATERIALS AND METHODS

Research type and time

This research was conducted with a descriptive research model between August and September 2023.

Population and sample of the study

The population of the study consisted of neonatal nurses working in Neonatal Intensive Care Units in Konya, and the sample comprised neonatal nurses who had internet access during the specified dates and voluntarily participated in the research. In Konya, there are 48 nurses in the City Hospital, a total of 105 nurses in two university hospitals, and 55 nurses in state hospitals. A total of 171 nurses who met the inclusion criteria (working in the Neonatal Intensive Care Unit, working for at least 3 months in the Neonatal Intensive Care Unit, and willing to participate in the study) were included in the study during the specified dates. A post-hoc power analysis was conducted using G-Power 3.1.9.7 to determine that the sample size was sufficient, and it was found that the study had an effect size of 0.5, with a power of 0.90 at a significance level of 0.05 within a 95% confidence interval.

Criteria for inclusion in the study

Working in the NICU,
Working in the NICU for at least 3 months,
Volunteering to participate in the study.

Data collection tools

Data were collected using the 'Nurse Profile Form' and the The Form of Knowledge and Examination Process on ROP,' both of which were created by the researcher and reviewed by experts.

Nurse Profile Form: This form, prepared by the researcher, consists of 9 questions that include personal and professional characteristics such as age, educational background, income status, years of experience in the profession, and years of experience in the Neonatal Intensive Care Unit (NICU). To restrict participation from individuals in other cities, a checkbox stating, 'I work in Konya' and 'I work in

another city' has been added to the first section of the form for filtering purposes, considering that the research is conducted only in Konya.

The Form of Knowledge and Examination Process on ROP: Since there was no measurement tool measuring the ROP knowledge level in the literature, research data was obtained with this information form. This form, prepared by the researcher in line with the literature (Finer & Leone, 2009; Koç et al., 2021; Sankar et al., 2022; Thuileiphy et al., 2021), consists of 26 questions covering topics such as risk factors for ROP, nursing care before, during, and after the examination. The theoretical information related to Retinopathy and the examination process is addressed in two categories. The Theoretical Information on Retinopathy consists of a total of 14 questions (1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 17, 19, 20, 21), while the Information on the Examination Process (pre-examination, post-examination, and during examination) consists of a total of 12 questions (11, 12, 13, 14, 15, 16, 18, 22, 23, 24, 25, 26). For the form, the opinions of 5 experts in the field of pediatric health and diseases nursing were received and finalized. The form includes "True" and "False" statements. Each correctly answered statement in the form was given 1 point and each incorrectly answered statement was given 0 point. Minimum 0 and maximum 26 points can be obtained from the form. The higher the scores obtained from the form, the higher the level of knowledge. Content validity agreement among experts was found to be 0.89. KR-20 internal consistency coefficient was found to be 0.71.

Research variables

Dependent variables: Knowledge level scores taken from The Form of Knowledge and Examination Process on ROP.

Independent variables: Demographic characteristics of neonatal nurses.

Data collection

The research was conducted with internet-accessible nurses working in the relevant hospitals during the specified dates. The researcher created an online survey link using Google Forms, which included the 'Nurse Profile Form' and The Form of Knowledge and Examination Process on ROP.' The Google Forms survey link was distributed to neonatal nurses working in Neonatal Intensive Care Units through a social media application. Using a snowball method, nurses were asked to share the survey link with other neonatal nurses in their surroundings and units in Konya.

Data analysis

The analysis of the research was carried out using the SSPS (Statistical Package for Social Sciences) for Windows 25.0 program. Statistical analyses, including descriptive statistics, means, independent t-tests, and ANOVA, were conducted for data evaluation. Significance was accepted at α=0.05 within a 95% confidence interval.

Ethical considerations

To conduct the research, approval was obtained from the Ethics Committee for Scientific Research in Health Sciences of a university (2023/483). Before commencing data collection in the research, nurses working in Neonatal Intensive Care Units were provided with information about the purpose and scope of the research, and their online consent was obtained. Nurses participating in the research were assured that their individual information would not be disclosed to others and would not be used elsewhere. The research adhered to the relevant ethical principles, including the 'Principle of Informed Consent,' 'Principle of Voluntariness,' and 'Principle of Privacy,' as the use of human subjects necessitates the protection of individual rights.

RESULTS

The distribution of data concerning the personal and professional characteristics of the nurses is presented in Table 1. The participants had an average age of 34.26±7.16, with 93.6% of them being female, 74.3% holding a bachelor's degree, 73.7% being married, 27.5% having 11-15 years of experience in the profession, 23.4% working in the neonatal clinic for 7-10 years, 35.1% obtaining neonatal intensive care nursing certification, 62% following current publications related to neonatology, and 95.3% participating in ROP examination.

Table 1. Distribution of data regarding nurses' personal and professional characteristics (n=171).

Descriptive Characteristics		($\bar{X}$±SS)	
Age		34.26±7.16	
		n	**%**
Gender	Female	160	93.6
	Male	11	6.4
Educational Level	High School/Associate Degree[a]	19	11.1
	Bachelor's Degree[b]	127	74.3
	Postgraduate Degree[c]	25	14.6
Marital Status	Married	126	73.7
	Single	45	26.3
Years of Experience in the Profession	1-3 years	20	11.7
	4-6 years	26	15.2
	7-10 years	35	20.5
	11-15 years	47	27.5
	16 years and above	43	25.1

Table 1. (continued) Distribution of data regarding nurses' personal and professional characteristics (n=171).

Descriptive Characteristics		n	%
Years of Experience in the Neonatal Clinic	1-3 years	39	22.8
	4-6 years	38	22.2
	7-10 years	40	23.4
	11-15 years	31	18.1
	16 years and above	23	13.5
Participation Status in Neonatal Intensive Care Nursing Certification Training	Yes	60	35.1
	No	111	64.9
Following Current Publications Related to Neonatal Intensive Care Nursing	Yes	106	62.0
	No	65	38.0
Participation in ROP Examination	Yes	163	95.3
	No	8	4.7

The nurses participating in the study were found to respond well to the definition of ROP (Correct answers 98.2%) and its risk factors (Correct answers 72.5%, 66.7%, 93.6%, etc.). Nurses demonstrated a good level of knowledge in topics related to nursing care before ROP examination (Correct answers 73.7%, 95.9%, etc.), during the examination (Correct answers 94.2%, 87.7%, 92.4%, etc.), and after the examination (Correct answers 88.9%, 77.8%, etc.).

Table 2. Distribution of responses given by nurses to The Form of Knowledge and Examination Process on ROP questions (n=171).

The Form of Knowledge and Examination Process on ROP Questions	Correct Respondents		Wrong Respondents	
	n	%	n	%
1. Retinopathy of Prematurity (ROP) is a disease characterized by incomplete vascularization of the retina, observed in premature and low birth weight infants. Its etiology and pathogenesis are not entirely understood, and it can lead to vision loss.	168	98.2	3	1.8
2. In developed countries, ROP is primarily a concern for preterm infants born before 32 weeks of gestation, while in developing countries, severe ROP has been reported to occur up to 34 weeks of gestation.	162	94.7	9	5.3
3. The risk of ROP increases as gestational age decreases.	124	72.5	47	27.5
4. Retinopathy is only observed in premature infants.	114	66.7	57	33.3
5. ROP is divided into 5 stages.	106	62	65	38
6. ROP examination can be performed by all ophthalmologists.	127	73.7	45	26.3
7.Hyperoxia/hypoxia, hypercapnia/hypocapnia, and sudden fluctuations in blood gases are risk factors for ROP.	160	93.6	11	6.4
8.The number of blood transfusions, exchange transfusions, and hyperglycemia/insulin use are not among the risk factors for ROP.	83	48.5	88	51.5
9.Initial examination for infants with a gestational age above 32 weeks should be performed when the postnatal 4 weeks are completed.	146	85.4	25	14.6
10.For infants with a gestational age below 25 weeks, the first examination should be conducted when the postnatal 6 weeks are completed, without waiting until 31 weeks for preterm infants.	139	81.3	32	18.7
11.Obtaining consent from parents is not necessary for ROP examination and follow-up.	126	73.7	45	26.3
12.Pupils should be dilated with 2.5% phenylephrine and 0.5% tropicamide, one drop of each, every 5 minutes, 2-3 times before the ROP examination procedure.	164	95.9	7	4.1
13. The ROP examination procedure induces physiological, behavioral, and hormonal changes in preterm infants.	114	66.7	57	33.3
14. The best time for pupil dilation is 45 to 60 minutes after the last drop.	146	85.4	25	14.6
15. The ROP examination is a painful procedure and a significant source of stress for preterm infants.	159	93	12	7
16. During and after the examination, providing touch, music, mother's milk, or oral sucrose is beneficial in reducing pain.	161	94.2	10	5.8
17. Premature infants do not feel pain.	165	96.5	6	3.5
18. The same eyelid speculum and sclera depressor can be used for every patient.	148	86.5	23	13.5
19. Breast milk does not affect the development of ROP or severe ROP in preterm infants.	114	66.7	57	33.3
20. The development of ROP increases according to the oxygen therapy and its duration.	168	98.2	3	1.8
21. Excessive oxygen administration leads to ROP in infants.	162	94.7	9	5.3
22. After the examination, the target oxygen saturation range should be 90-94% in premature babies who require oxygen.	152	88.9	19	11.1
23. The ROP examination procedure should be conducted in a monitored manner.	150	87.7	21	12.3
24. Sterilization of the examination equipment with isopropyl alcohol or chlorhexidine is sufficient.	89	52	82	48
25. Emergency resuscitation equipment should be readily available during ROP examinations, as there may be deterioration in the infants' vital signs.	158	92.4	13	7.6
26. Following the ROP procedure, the infant should be monitored in the incubator for 2 hours before discharge.	133	77.8	38	22.2

Nurses scored a minimum of 13 and a maximum of 25 on the Form of Knowledge and Examination Process on ROP, indicating that their ROP knowledge levels were at a good level (21.26±2.49), as shown in Table 3. In the section providing theoretical information on retinopathy, it was observed to receive a minimum of 8 and a maximum of 14, while in the section regarding the examination process, it was found to range from a minimum of 4 to a maximum of 12. The average score for Theoretical Information Related to Retinopathy was found to be 11.32 ± 1.54, while the average score for The Examination Process (pre-examination, post-examination, and during examination) was 9.94 ± 1.53.

Table 3. Mean scores of nurses' ROP knowledge.

	Minimum	Maximum	Mean	Standard deviation
The Form of Knowledge and Examination Process on ROP	13.00	25.00	21.26	2.49
The Theoretical Information Related to Retinopathy	8.00	14.00	11.32	1.54
The Examination Process (pre-examination, post-examination, and during examination	4.00	12.00	9.94	1.53

When the comparison of nurses' descriptive characteristics with the Form of Knowledge and Examination Process on ROP score was examined, variables such as gender, marital status, years of experience in the profession, years of working in the neonatal clinic, participation in neonatal intensive care nursing certification training, and participation in ROP examinations were not found to be statistically significant (p>0.05). However, variables related to education level and the follow-up of current publications in neonatal intensive care nursing were found to be significant (p<0.05). In terms of education level, postgraduate graduates had higher ROP knowledge levels than those with a bachelor's degree. Additionally, among the nurses participating in the study, those who followed current publications related to neonatal intensive care nursing had higher ROP knowledge levels compared to those who did not follow current publications (Table 4).

Table 4. Comparison of nurses' descriptive characteristics with the Form of Knowledge and Examination Process on ROP score.

Descriptive Characteristics		($\bar{X}$±SS)	Test and p
Gender	Female	21.30±2.44	t=0.743
	Male	20.72±3.19	p=0.459
Education Level	High School/Associate Degree[a]	20.68±2.51	F=3.817
	Bachelor's Degree[b]	21.11±2.56	**p=0.024**
	Postgraduate Degree[c]	22.48±1.71	**c>b**
Marital Status	Married	21.17±2.52	t=-0.827
	Single	21.53±2.42	p=0.410
Years of Experience in the Profession	1-3 years	21.85±2.75	
	4-6 years	21.34±2.89	F=0.545
	7-10 years	20.82±2.49	p=0.703
	11-15 years	21.27±2.61	
	16 years and above	21.30±1.99	
Years of Experience in the Neonatal Clinic	1-3 years	20.61±3.41	
	4-6 years	21.71±1.99	F=1.227
	7-10 years	21.10±2.41	p=0.301
	11-15 years	21.45±2.06	
	16 years and above	21.69±1.94	
Participation in NICU Nursing Certification Training	Yes	21.48±2.18	t=0.825
	No	21.15±2.65	p=0.411
Staying up to date with current publications in Neonatal Intensive Care Nursing	Yes	21.80±2.09	t=3.695
	No	20.40±2.84	**p=0.001**
Participation in ROP examination	Yes	21.26±2.44	t=0.022
	No	21.25±3.53	p=0.982

DISCUSSION

Neonatal nurses are the primary healthcare team members who spend the most time with premature infants. Due to their characteristics, the nursing role is of great importance in providing quality patient care (Metreş, 2014). The primary and most important responsibilities of nurses in ROP are to minimize or delay the occurrence of blindness, vision disorders, as well as family problems caused by low birth weight babies and premature births (Dolgun, 2017). Although there are limited studies on the subject, the data obtained were discussed in the literature.

In this study, which investigated the knowledge levels of nurses in managing ROP and the examination process, it was observed that nurses had a good level of ROP knowledge. In a descriptive study conducted by Thuileiphy and colleagues, the lack of knowledge among nurses about premature retinopathy, its

prevention, and management was examined, and it was concluded that the knowledge scores of nurses were weak or moderate (Thuileiphy et al., 2021). In another study, it was found that knowledge levels increased after a supportive educational program related to ROP (Sankar et al., 2022). The majority of the patients cared for are premature infants. Knowing ROP, which is one of the most important health problems of premature, is an indicator of the quality of care provided. In the study, nurses had a good level of knowledge about nursing care before, during, and after ROP examination. Nurses were found to have the necessary knowledge in areas such as adjusting the oxygen dose during care applications according to the gestational age and individual needs of the newborn, moisturizing the oxygen with sterile distilled water and administering it heated (31-34°), using pulse oximeters and monitors in oxygen concentration monitoring, and continuously monitoring and recording blood gases according to clinical protocols. Moreover, the importance of ensuring that the baby returns to its former comfort as soon as possible after the examination was emphasized in the literature (Finer & Leone, 2009; Metreş, 2014).

The education level and the follow-up of current publications affect the quality of care provided by nurses. Nurses with a postgraduate degree and those who follow publications related to neonatal nursing had higher ROP knowledge scores. In a study, it was observed that as the level of education increased, knowledge and skills improved (Hakmal et al., 2012). Giving oxygen to premature newborns without monitoring oxygen saturation (SPO2) and conducting uncontrolled oxygen administration is known to increase the risk of ROP development (Darlow & Husain, 2019; Srivatsa et al., 2021). In addition, it is observed that fluctuations in SPO2 values rather than low or high SPO2 values increase the risk of ROP development (Das et al., 2018). Therefore, monitoring oxygen targets is of great importance in preventing ROP-related blindness (Sankar et al., 2022). In this study, a high number of nurses reported the accuracy of information that sudden changes in blood gases and excessive oxygen affect ROP. Based on this information, the number of nurses who correctly answered the target oxygen saturation range for premature infants is high. The results have shown that the level of education is essential, as evidenced by the overall average score of the nurses, indicating that their knowledge levels are good. In the study, nurses who participated reported that ROP examination was a painful procedure for premature, and they felt pain to a high degree. The vast majority of nurses stated that the application of non-pharmacological methods for pain management is beneficial. In a qualitative study conducted to determine the knowledge level of neonatal nurses about pain management during ROP examination, neonatal nurses expressed that they observed that the neonate was exposed to severe pain during ROP examination (Metres et al., 2019). In the literature, it has been shown that nurses use pharmacological and non-pharmacological agents together and that individualized developmental care practices reduce the stress of the baby, minimize oxygen use, and lead to faster recovery after the procedure, normalizing physiological parameters (Olsson & Eriksson, 2011). Breast milk is an important source of nutrition for both term and premature in terms of growth and development (Thuileiphy et al., 2021). In this context, many scientific studies have supported the protective role of breastfeeding against the development of ROP in premature (Ginovart et al., 2016; Manzoni et al., 2013; Muneer et al., 2018). In the study, neonatal nurses correctly answered to a high extent that breast milk is protective against ROP, and the findings are consistent with the literature.

Limitations and strengths of the study

Conducting the research in one city in Turkey and online may be considered as limitations of the study. Scientific and technological advancements in healthcare have led to an increase in the number of premature births. Quality nursing care plays a critical role in managing health issues such as retinopathy in premature. A notable gap in the literature is the determination of neonatal nurses' knowledge levels regarding premature retinopathy. The aim of our study is to fill this gap. The strength of our research is that it fills the gap in the literature. This study can serve as a guide for planning basic neonatal care training for neonatal nurses and enhancing the quality of care, which is another strength of our research.

CONCLUSION

In this study, neonatal nurses demonstrated a good level of knowledge regarding ROP and the examination process. Educational background and their engagement in following current publications related to neonatal nursing were found to influence ROP knowledge. Based on these findings, it is recommended that neonatal intensive care nurses, who spend more time with premature infants in neonatal intensive care units, should be encouraged to participate in training to acquire the highest level of competence. They should perform the care of premature infants in accordance with evidence-based practices and stay updated on new technological developments.

Acknowledgement

The authors would like to extend their sincere thanks to anyone who contributed to this study.

Conflict of Interest

The authors declare no potential conflicts of interest with respect to the research, authorship and/or publication of this article.

Author Contributions

Plan, design: SK, GK; **Material, methods and data collection:** SK, GK; **Data analysis and comments:** SK; **Writing and corrections:** SK, GK.

Funding
None

Ethical Approval
Institution: Necmettin Erbakan University, Ethics Committee for Scientific Research in Health Sciences
Date: 05/07/2023
Approval no: 2023/483

REFERENCES

Bilgeç, G. H., & Erol N. (2018). Epidemiology, prevalence, and incidence of premature retinopathy. *Current Retina Journal*, 2 (1), 2 - 4.

Darlow, B. A., & Husain, S. (2019). Primary prevention of rop and the oxygen saturation targeting trials. *Seminars in Perinatology*, 43 (6), 333–340. https://doi.org/10.1053/J.SEMPERI.2019.05.004

Das, A., Mhanna, M., Sears, J., Houdek, J. W., Kumar, N., Gunzler, D., et al. (2018). Effect of fluctuation of oxygenation and time spent in the target range on retinopathy of prematurity in extremely low birth weight infants. *Journal of Neonatal-Perinatal Medicine*, 11 (3), 305–310. https://doi.org/10.3233/NPM-1757.

Demir Acar, M., & Alparslan, Ö. (2021). *Newborn Screening and Nurse's Roles.* Bayat M, editör. Neonatal Nursing. 1. Baskı. Ankara: Türkiye Klinikleri, 8-13.

Dolgun, G. (2017). Retinopathy of prematurity and nursing approaches. *Ege University Faculty of Nursing Journal*. 33 (1), 158-167.

Dolgun, G., & Bozlak, Ş. (2017). Effect of nonpharmacologic pain control during examination for retinopathy of prematurity. *Journal of Obstetric, Gynecologic & Neonatal Nursing*, 46 (5), 709–715. https://doi.org/10.1016/J.JOGN.2017.06.008

Erdim, L., & İnal, S. (2018). Taking samples and sending in newborn screening tests and responsibilities of nurses. *Journal of Health Science and Profession*, 5 (1), 102-106. https://doi.org/10.17681/hsp.323082

Finer, N., & Leone, T. (2009). The role of oxygen in health and disease-a series of reviews oxygen saturation monitoring for the preterm infant: the evidence basis for current practice. *Pediatric Research*, 65 (4), 375-380.

Fingerhut, R., & Olgemöller, B. (2009). Newborn screening for inborn errors of metabolism and endocrinopathies: an update. *Analytical and Bioanalytical Chemistry Research*, 393 (5), 1481-1497. https://doi.org/10.1007/s00216-008-2505-y.

Ginovart, G., Gich, I., & Verd, S. (2016). Human milk feeding protects very low-birth-weight infants from retinopathy of prematurity: A pre–post cohort analysis. *Journal of Maternal-Fetal and Neonatal Medicine*, 29 (23), 3790–3795. https://doi.org/10.3109/14767058.2016.1145648.

Hakmal, H., Karadağ, M., & Demir, C. (2012). Investigation of factors affecting the motivation levels of nurses: A study in gülhane military medical faculty training hospital. *Journal of Anatolia Nursing and Health Sciences*, 15(3), 181-187.

Kalyan, G., & Moxon, S. (2016). The role of neonatal nurse in the prevention of retinopathy of prematurity. *Community Eye Health Journal*, 53 (2), 143-151.

Koç, E., Yağmur, B.A., Özdek, Ş., & Ovalı, F. (2021). Turkish neonatal and turkish ophthalmology societies consensus guideline on the retinopathy of prematurity. *Turkish Archives of Pediatrics*, 53 (1), 151-160. https://doi.org/10.5152/TurkPediatriArs.2018.01815

Lloyd-Puryear, M.A., Tonniges, T., Van Dyck, P.C., Mann, M.Y., Brin, A., Johnson, K., et al. (2006). American academy of pediatrics newborn screening task force recommendations: How far have we come? *Pediatrics*, 117 (5), 194-211. https://doi.org/10.1542/peds.2005-2633B

Manzoni, P., Stolfi, I., Pedicino, R., Vagnarelli, F., Mosca, F., Pugni, L., et al. (2013). Human milk feeding prevents retinopathy of prematurity (ROP) in preterm VLBW neonates. *Early Human Development*, 89 (1), 64-68. https://doi.org/10.1016/S0378-3782(13)70019-7.

Metreş, Ö. (2014). Premature retinopathy from a nursing perspective. *Okmeydanı Medical Journal*, 30 (2), 63-67. https://doi.org/10.5222/otd.2014.063

Metres, O., Aykanat Girgin, B., & Gozen, D. (2019). What do neonatal nurses know and feel about pain management during retinopathy of prematurity examination: A qualitative research. *Florence Nightingale Journal of Nursing*, 27 (2), 133–142. https://doi.org/10.26650/FNJN18009

Muneer, A., Bari, A., Naveed, S., & Ali, A. S. (2018). Is human milk feeding protective for retinopathy of prematurity? *Pakistan Journal of Medical Sciences*, 34 (6), 1534–1538. https://doi.org/10.12669/pjms.346.15799

Müstakim, H., Şatırtav, G., Oltulu, R., Kerimoğlu, H., Özkağnıcı, A., & Altunhan, H. (2017). Results of screening and treatment for retinopathy of prematurity. *Selcuk Medicine Journal*, 33 (2), 26-28. https://doi.org/10.1109/5.771073.

Olsson, E., & Eriksson, M. (2011). Oral glucose for pain relief during eye examinations for retinopathy of prematurity. *Journal of Clinical Nursing*, 20 (7–8), 1054–1059. https://doi.org/10.1111/j.1365-2702.2010.03529.x

Sancak, S., Topçuoğlu, S., Çelik, G., Günay, M., & Karatekin, G. (2019). Evaluation of the frequency and risk factors of retinopathy of prematurity. *Zeynep Kamil Medical Bulletin, 50 (1), 63-68.* https://doi.org/10.16948/zktipb.474762

Sankar, B., Marakkar, R., & Varghese, S. (2022). Effectiveness of developmentally supportive education program on nursing knowledge of retinopathy of prematurity in neonatal intensive care unit. *Iranian Journal of Nursing and Midwifery Research*, 27 (1), 67–70. https://doi.org/10.4103/ijnmr.IJNMR_279_20

Srivatsa, B., Malcolm, K., Clark, R. H., & Kupke, K. G. (2021). Effect of a novel oxygen saturation targeting strategy on mortality, retinopathy. *The Journal of Pediatrics*, 234, 33-37e. https://doi.org/10.1016/j.jpeds.2021.03.007

Taplak, A.Ş., & Erdem, E. (2018). Pain management in retinopathy of prematurity examination. *Journal of Health Sciences*, 27 (2), 170-175.

Thuileiphy, T., Joshi, P., Dolma, Y., Paul, J., Joshi, M., Gudiya, et al. (2021). A descriptive survey on knowledge gap related to retinopathy of prematurity and its prevention and management among nurses in a tertiary care hospital. *Indian Journal of Ophthalmology*, 69 (8), 2122–2125. https://doi.org/10.4103/ijo.IJO_2950_20.

ORİJİNAL MAKALE / ORIGINAL ARTICLE
Balıkesir Sağlık Bilimleri Dergisi / BAUN Sağ Bil Derg
Balıkesir Health Sciences Journal / BAUN Health Sci J
ISSN: 2146-9601- e ISSN: 2147-2238
Doi: https://doi.org/10.53424/balikesirsbd.1416252

The Relationship of Lunar Cycles with Natal and Postnatal Processes in Newborn Infants

Hulusi Emre CEVIKER[1], Hilal AYDIN[2]

[1]Balikesir University, Faculty of Medicine, Department of Pediatrics
[2]Balikesir University, Faculty of Medicine, Department of Pediatric Neurology

Geliş Tarihi / Received: *08.04.2024,* ***Kabul Tarihi / Accepted:*** *17.05.2024*

ABSTRACT
Objective: The aim of this study was to determine the relationship between the lunar cycle and the pathological clinical findings (respiratory distress, seizures, metabolic disorders, etc.) that develop especially in the first 24-48 hours of neonate clients born in our hospital and/or admitted to the pediatric outpatient clinic. **Materials and Methods:** This retrospective study was conducted in Balıkesir University Medical Faculty Child Health and Diseases Clinic between 01 March 2022 and 01 June 2023. 997 newborn patients who were born in our clinic and/or admitted to the pediatric outpatient clinic were included in this retrospective study. The relationship between the lunar cycle and the clinical status of these patients was evaluated. The data were analyzed using the descriptive statistics, chi-square test and logistic regression analysis. **Results:** Pathological clinical findings in a newborn were seen in 10.3% of the cases, with hyperbilirubinemia 5.3% being the most common finding and respiratory distress 3.9% being the second most common. The most common lunar period with pathological clinical finding was the full moon with 26.2%, while the second most common was in the first quarter with 25.2% and again in the third quarter with the same rate, which was not statistically significant (p=0.584). **Conclusion:** The results of the present study suggest that there is no relationship betwixt the lunar cycle moreover the newborn patient's clinic status.
Keywords: Deliveries, Lunar Cycle, Newborn.

Ay Siklusların Yenidoğan Bebeklerdeki Natal ve Postnatal Süreçlerle İlişkisi

ÖZ
Amaç: Bu çalışmanın amacı, hastanemizde doğan ve/veya çocuk polikliniğine başvuran yenidoğan hastaların özellikle ilk 24-48 saat içinde gelişen patolojik klinik bulguların (solunum sıkıntısı, nöbetler, metabolik bozukluklar vb.) ile ay döngüsü arasındaki ilişkiyi belirlemektir. **Gereç ve Yöntem:** Bu retrospektif çalışma, 01 Mart 2022-01 Haziran 2023 tarihleri arasında Balıkesir Üniversitesi Tıp Fakültesi Çocuk Sağlığı ve Hastalıkları Kliniği'nde yapıldı. Kliniğimizde doğan ve/veya çocuk polikliniğine başvuran 997 yenidoğan hastası retrospektif olarak çalışmaya dahil edildi. Bu hastaların ay döngüsü ile klinik durumları arasındaki ilişki değerlendirildi. Veriler SPSS 22.0 programı kullanılarak tanımlayıcı istatistikler, ki-kare testi ve lojistik regresyon analizi kullanılarak analiz edilmiştir. **Bulgular**: Olguların %10.3'ünde patolojik klinik bulgular görülürken, en sık görülen bulgu hiperbilirubinemi %5.3 ve ikinci en sık olan ise %3.9 solunum sıkıntısı olarak görüldü. Patolojik klinik bulguların en sık görüldüğü ay dönemi %26,2 ile dolunay olurken , ikinci en sık %25.2 ile ilk dördün ve yine aynı oranda son dördün'dü ve istatistiksel olarak anlamlı değildi (p=0.584). **Sonuç:** Bu çalışmanın sonuçları, ay döngüsü ile yenidoğan hastaların klinik durumu arasında bir ilişki olmadığını göstermektedir.
Anahtar Kelimeler: Doğumlar, Ay Döngüsü, Yenidoğan.

Sorumlu Yazar / Corresponding Author: Hulusi Emre CEVIKER, Department of Pediatric, Balikesir University, Faculty of Medicine, 10145, Balikesir, TÜRKİYE
E-mail: emreceviker@hotmail.com

Bu makaleye atıf yapmak için / Cite this article: Ceviker, H. E. &. Aydın, H. (2024). The relationship of lunar cycles with natal and postnatal processes in newborn infants. *BAUN Health Sci J, 13*(2), 375-380. https://doi.org/10.53424/balikesirsbd.1416252

INTRODUCTION

The neonatal period is the first twenty-eight day period after birth. This is a challenging period in which the baby is trying to physiologically adapt himself to extrauterine life. The high incidence of neonatal mortality and morbidity once again shows the importance of this period. In the U.S.A. 2/3 of infant deaths in the first year after birth have been reported to be in the neonatal period (Behrman et al., 2004).

The phases of the moon refer to the situations that arise from the position of the moon against the sun and where one part is dark, and the other part is light. More specifically, the phases of the moon are related to the position of the moon relative to the stars and follow a cycle of repeated movements every 27 days, which is called the cycle of the moon. When we look at the phases of the moon, four formations are mentioned. These are: the new moon, the first quarter, the full moon, and the third quarter (Hinze et al., 1984). In some studies, in the literature, it has been seen that certain phases of lunar cycles have different effects on birth, including birth rates. The relationship of lunar phases with birth and especially with birth rate has been the focus of important research. Both in the past and more recently, many authors have investigated the possible influence of moon phases on the frequency and time of birth (Staboulidou et al., 2008).

The number of studies examining the effect of lunar cycles on childbirth is quite paltry. This study aims to investigate the relationship between natal (birth week, birth weight, mode of delivery) and postnatal characteristics [complications such as respiratory distress, seizures, metabolic disorders] of newborn babies born in our hospital with the lunar cycle.

MATERIALS AND METHODS

Study type

This study was conducted in Balıkesir University Medical Faculty Child Health and Diseases Clinic between 01 March 2022 and 01 June 2023.The files of the cases included in the study were retrospectively scanned demographic data (gender, birth height, body weight and head circumference), initial examination findings, interventions performed in the delivery room, follow-up results, and pathological clinical findings were recorded.

Study group

The clinical characteristics of nine hundred ninety-seven newborn babies born in the Balıkesir University Medical Faculty Child Health and Diseases Clinic and/or applying to the pediatric clinic in their natal and postnatal periods. Preterm (<35 weeks) and posterm (>42 weeks) birth history, <2000 g, systemic disease history (congenital malformation, genetic disease, metabolic disease, etc.) and missing file data were excluded from the study. The phases of the moon are related to the position of the moon relative to the stars and follow a cycle of repeated movements and correspond to the amount of the lunar surface reflecting the available light visible from Earth. “Time and Date” website data were obtained according to the exact moments of different moon phases in historical context. In accordance with the time of birth its relationship with the lunar cycle was determined according to the lunar calendar on the website. Likewise, the relationship between the pathological clinical findings of the newborn patient in the birth and postpartum period with the lunar cycle was determined according to the lunar calendar on the same website.

Statistical analysis

In the statistical analysis evaluation of the data obtained from the cases included in the study, the study data were analyzed on 'Statistical Package for Social Sciences (SPSS) version 22.0 software (SPSS Inc., Chicago, IL, USA). The variables were calculated as number (N), percentage (%), and mean ± standard deviation (SD). Chi-square test was used to compare the qualitative data of the cases that were not obtained by measurement between the groups. In all tests, p values <0.05 were considered statistically significant.

Ethical consideration

This study was approved by the Clinical Research Ethics Committee Balıkesir University Faculty of Medicine, (Decision No. 2023/118, Date: 23/08/2023).

RESULTS

Nine hundred ninety-seven neonatal cases were admitted in the research.52.4% (N=522) of the cases were male and 47.6% (N=475) were female. Only 10.7% (N=107) of births were with NSVD. Of the newborn infants, 22.7% (N=227) had preterm and 7.5% (N=75) had low birth weight. The relationship between the pathological clinical findings and the lunar cycle was also ascertained by considering the lunar calendar data on the “Time and Date” website. Pathological clinical outcomes were seen in 10.3% (N=103) of the cases; the most prevailing clinical finding was physiological hyperbilirubinemia (N=54, 5.3%), and the second most common finding was respiratory distress with transient tachypnea of newborn (N=39, 3.9%).

When the birth times of newborn babies are evaluated according to their lunar cycles; the most common birth was during the new moon period (N=287, 28.8%), it was valid both types of births (NSVD, 31 [3,7%]; C/S, 256 [25,7%]). and the least birth was in the third quarter (N=220, 22.1%). The demographic distinctive of the cases are shared in Table 1.

When the relationship between birth characteristics and lunar cycle was examined, it was found that all birth types (NSVD, C/S) were highest in the new moon period (N=27, 28.7%), babies born <2500 g and >4000 g were most common in the third quarter period, babies born between $35^{0/7}$- $40^{0/7}$ weeks (N=267, 26.7%) were most in the new moon period, and babies born at $40^{0/7}$-$42^{0/7}$ weeks were in the third quarter period at most (N=23, 31%). There was no statistically momentous

discrepancy between delivery type, birth weight and delivery weeks according to lunar cycles (p=0.409, p=0.737, and p=0.298, respectively). The most common pathological clinical findings rate for both birth types in the postnatal process was full moon (N=27, 26.2%), and the second most common was in the first quarter (N=26, 25.2%) and third quarter (N=26, 25.2%), which was not statistically momentous (p=0.584, respectively) (Table 2).

Table 1. Demographic Data.

	Lunar Cycle				
	New Moon	**First Quarter**	**Full Moon**	**Third Quarter**	***p***
Gender	**n (%)**	**n (%)**	**n (%)**	**n (%)**	
Female	133 (13.3%)	129 (12.9%)	115 (11.5%)	98 (9.8%)	0.454
Male	154 (15.4%)	121 (12.1%)	125 (12.5%)	122 (12.2%)	

Table 2. Birth data and pathological clinical finding according to lunar cycles.

	Lunar Cycle				
	New Moon	**First Quarter**	**Full Moon**	**Third Quarter**	**p**
Type of birth	**n (%)**	**n (%)**	**n (%)**	**n (%)**	
NSVD	31 (3.1%)	24 (2.4%)	22 (2.2%)	30 (3%)	0.409
C/S	256 (25.7%)	226 (22.7%)	218 (21.9%)	190 (19%)	
Birth weight	**n (%)**	**n (%)**	**n (%)**	**n (%)**	
2000-2500 g	18 (1.8%)	20 (2%)	70 (7%)	155 (15.5%)	0.737
2500-3000 g	88 (8.8%)	70 (7%)	74 (7.4%)	144 (14.4%)	
3000-4000 g	169 (16.9%)	155 (15.5%)	57 (5.7%)	136 (13.6%)	
>4000 g	12 (12%)	5 (0.5%)	88 (8.8%)	169 (16.9%)	
Pathological clinical finding	**n (%)**	**n (%)**	**n (%)**	**n (%)**	
Present	24 (2.4%)	26 (2.6%)	27 (2.7%)	26 (2.6%)	0.584
Absent	263 (26.4%)	224 (22.4%)	213 (21.4)	194 (19.5%)	

DISCUSSION

In this study, although there was no statistically significant difference in the characteristics of newborn babies in natal (mode of birth, birth week, birth weight) and postnatal processes according to their lunar cycles, it was determined that complications in the postnatal process were most common in the full moon period, and the features including risk factors for newborn babies (<2500 g, >4000 g, babies born at $40^{0/7}$-$42^{0/7}$ weeks) were detected at most in the third quarter period.

Studies assessing extraneous conditions on labor often rule out medically achieved births. A few inquiry include solely term birthing (Ghiandoni et al., 1998; Ochiai et al., 2012). Our study incorporated solely cases born between $35^{0/7}$ and $42^{0/7}$ weeks of gestation.

In addition to studies investigating the effects of innate phenomena alike as drizzle, temperature changes and barometric pressure on gravidity and delivery, there are limited studies investigating the effect of lunar cycles and birth (Cesario, 2002; Joshi et al., 1998; Mark et al., 1983; Morton-Pradhan et al., 2005; Nalepka et al., 1983). The different variables in the earth and the potential effects of the lunar cycle on human well-being have historically attracted the attention of a large number of researchers. Although no association has been shown in most studies, others have linked the lunar cycle to medical events such as cardiopulmonary resuscitation, fertility, acute coronary events and neuropsychiatric findings (Abell & Greenspan, 1979).

The possible influence of the moon on births has been explained in several ways. One study emphasized that serum sodium and serum lithium levels in rabbits varied reliant on the moon stage (Malek et al., 2011). Another study in rats showed that oxytocin degrees increased with blood pressure, which was linked to gravity and increased in the phases closest to the full moon (Stocker et al., 2004; Widjaja et al., 2015). Melatonin degrees may likewise alter with the phases of the moon and may affect births (Periti & Biagiotti, 1994). Melatonin levels decrease around the period of the full moon due to greater availability of light (Cajochen et al., 2013). Melatonin levels rise during pregnancy and decrease greatly during childbirth.

This is why a decrease in melatonin levels in the days closest to the full moon may be linked to a decrease in melatonin levels during childbirth (Olcese et al., 2013).

The relationship of lunar phases to birth, and in particular to the birth rate, has become the focus of important study, and a positive correlation has been reported between the onset of labor and a surpassing birthing amount, particularly in the course of the full moon period (Staboulidou et al., 2008). Many obstetric nurses have stated that the number of women who are in delivery and give birthing at the time of the full moon is higher. Danzl (1987) notes that in 1987, when 80% of nurses and 64% of doctors believed the moon had an effect. Another study also reported a statistically significant difference between the annual total spontaneous births that occurred during full moon periods and births that occurred during all other lunar phases (Laganà et al., 2014). However, there are studies indicating that lunar cycles have no effect on human issues, including automobile accidents, hospital admittances, surgery sequels, cancer survival indicendes, menstruation, births, birth complications, depression, violent behavior, suicides and homicides (Foster & Roenneberg, 2008). Criss and Marcum, in a 1968 study of 140,000 live infants, stated that lunar cycles had little effect on childbirth, and in this study, the authors reported a weak but definite relationship between light and menstrual cycle, negatively affecting ovulation during the lunar period when the light effect was low (Criss & Marcum, 1981). In addition to this idea, Wake and colleagues, in their study involving 1007 births, observed a significant increase in births where the Moon's gravitational influence on the Earth was less than 31.5 Newtons (Wake et al., 2010). In a study conducted by Abell and Greenspan on 11691 births involving a fifty one month cycle; it has been shown that there is no relationship between the birth rate and the phases of the moon (Abell & Greenspan, 1979). Another study showed that regardless of the type of birth, the lunar cycle did not affect the frequency of delivery (Bharati et al., 2012). In studies by Joshi et al. (1998), Periti et al. (1994), and Romero and Martinez (2004), it was stated that the number of births on full moon days was not statistically different from other days. In a study involving six million births in France, they found that a greater number of births occurred during the new moon and the first quarter (Guillon, et al., 1986). Lentz (2005) also found that there were more births during the full moon and new moon. In this study, when the relationship between birth characteristics (birth type, birth week, birth weight) and the lunar cycle was examined, although there was no statistically significant difference, it was seen that all birth types and babies born between $35^{0/7}$- 40 weeks were mostly in the new moon period.

Consideration of the Moon's influence on the tides has led to the belief for centuries that pregnant women can have an effect on amniotic fluid pressure, and consequently that sudden pressure change can result in premature membrane rupture. Lentz et al. (2005) investigated the synergistic relationship between barometric pressure and gravitational forces in relation to the physiology of pregnancy and concluded that neither size nor barometric pressure gradient had a significant effect on human pregnancy, while the gravitational effects of the new moon and full moon had no effect on birth rates. Staboulidou et al. (2008) noted that the lunar cycle had no effect on childbirth and neonatal pathological clinical findings. In contrast to the relationship between the lunar cycle and the pathological clinical findings seen after birth and afterbirth, it is emphasized in the literature that findings after some diseases are related to some lunar cycles. For example, it has been emphasized that spontaneous pneumothorax cases are most common one week before and after the new moon period, and cardiovascular mortality is more common between the first and third quarter (Sok et al., 2001; Strestik & Sitar, 1996).

In this study, although the pathological clinical findings of postnatal processes were not statistically significant with lunar cycles, the moon phase with the most frequent findings was the full moon.

Strengths of this study is to be retrospective and including a focused research. The lack of a neonatal care unit in our clinic, frequent cesarean births and the small number of births included in the study are the limitations of our study.

CONCLUSION

In our study, as in some previously published scientific studies, it was seen that certain phases of lunar cycles had different effects on natal and postnatal processes. Thus, recognizing that lunar cycles have a predictable effect on natal and postnatal periods will be useful in terms of the care and treatment of newborn babies. Guaranteeing the relationship of the pathological clinical findings seen with lunar cycles by statistical tests that cannot be properly explained by chance is important for the reproducibility and predictability of the moon's effect. It is obvious that more center-based studies involving a large number of cases from different regions are needed for long-term outcomes.

Acknowledgement

The authors would like to extend their sincere thanks to anyone who contributed to this study.

Conflicts of Interest

The authors declare that they have no conflict of interest.

Author Contributions

Plan, design: Aydin, H.; Ceviker, H.E. **Material, methods and data collection:** Aydin, H.; Ceviker, H.E.; **Data analysis and comments:** Aydin, H.;

Ceviker, H.E. **Writing and corrections:** Aydin, H.; Ceviker, H.E.

Funding
This research received no external funding.

Ethical consideration
This study was approved by the Clinical Research Ethics Committee Balıkesir University Faculty of Medicine, (Decision No. 2023/118, Date: 23/08/2023).

REFERENCES

Abell, G. O., & Greenspan, B. (1979) Human births and the phase of the moon. *The New England Journal Of Medicine*, 300(2), 96. https://doi.org/10.1056/nejm197901113000223.

Behrman, R. E., Kliegman, R. M., & Jenson HB. (2004) Nelson Textbook of Pediatrics.20th ed., W.B.Saunders Co,Philadelphia, 1-70.

Bharati, S., Sarkar, M., Haldar P. S., Jana, S., & Mandal, S. (2012) The effect of the lunar cycle on frequency of births: A retrospective observational study in Indian population. *Indian Journal of Public Health*. 56, 152–154.https://doi.org/10.4103/0019-557X.99913

Cajochen, C., Altanay-Ekici, S., Münch, M, Frey, S., Knoblauch, V., & Wirz-Justice, A. (2013). Evidence that the lunar cycle influences human sleep. *Current Biology*: CB23,1485–88. https://doi.org/10.1016/j.cub.2013.06.029

Cesario, S. K. (2002). The "Christmas Effect" and other biometeorologic influences on childbearing and the health of women. *Journal of Obstetric, Gynecologic, and Neonatal Nursing*: JOGNN, 31, 526–35.https://doi.org/10.1111/j.15526909.2002.tb00077.x

Criss, T. B., & Marcum, J.P. (1981). A lunar effect on fertility. *Social biology*, 28, 75–80. https://doi.org/10.1080/19485565.1981.9988443

Danzl, D.F. (1987). Lunacy. *Journal of Emergy Medical*, 5, 91-5.

Foster, R.G., & Roenneberg T. (2008). Human responses to the geophysical daily, annual and lunar cycles. *Current biology*: CB, 18, 784-94. https://doi.org/10.1016/j.cub.2008.07.003

Ghiandoni, G., Seclì, R., Rocchi, M.B., & Ugolini, G. (1998). Does lunar position influence the time of delivery? A statistical analysis. *European Journal of Obstetrics, Gynecology, and Reproductive Biology*, 77, 47–50. https://doi.org/10.1016/s0301-2115(97)00226-1

Guillon, P., Guillon, D., Lansac, J., Soutoul, J.H., Bertrand, P., & Hornecker JP. (1986) Naissances, fertilité, rythmes et cycle lunaire. Etude statistique sur 5,927,978 naissances [Births, fertility, rhythms and lunar cycle. A statistical study of 5,927,978 births]. *Journal de Gynecologie, Obstetrique et Biologie de la Reproduction*, 15, 265–71.

Hinze, J., Asce, A.M., & Roxo, J. (1984). Is injury occurrence related to lunar cycles? *Journal of Construction Engineering and Management*, 110, 409-19.

Joshi, R., Bharadwaj, A., Gallousis, S., & Matthews, R. (1998). Labor ward workload waxes and wanes with the lunar cycle, myth or reality? *Primary Care Update for Ob/Gyns*, 5, 184. https://doi.org/10.1016/s1068-07x(98)00100-0

Laganà, A.S., Burgio, M.A., Retto, G., Pizzo, A., Sturlese, E., Granese, R., Chiofalo, B., Ciacimino, L., & Triolo, O. (2014). Analysis of the influence of lunar cycle on the frequency of spontaneous deliveries: A single-centre retrospective study. *Kathmandu University Medical Journal* , 12, 233–37. https://doi.org/10.3126/kumj.v12i4.13726

Lentz, S.K. (2005). Changes in human gestation period due to variations in external environmental forces. *Pacific Journal of Science and Technology*, 6, 149-169.

Malek, A., Ghezel, M., Ahmadiasl, N., Dastgiri, S., Jassur, D. M. Z., & Nayebi, A. M. (2011). Influence of moon phases of serum level of sodium and lithium: a quasi-experimental study on rabbits. *Biol Rhythm Res*, 42, 313–20.

Marks, J., Church, C. K., & Benrubi, G. (1983). Effects of barometric pressure and lunar phases on premature rupture of the membranes. *The Journal of Reproductive Medicine*, 28, 485–488.

Morton-Pradhan, S., Bay, R. C., & Coonrod, D. V. (2005). Birth rate and its correlation with the lunar cycle and specific atmospheric conditions. *American Journal of Obstetrics and Gynecology*, 192, 1970–1973. https://doi.org/10.1016/j.ajog.2005.02.066

Nalepka, C. D., Jones, S. L., & Jones, P. K. (1983). Time variations, births, and lunar association. *Issues in Comprehensive Pediatric Nursing*, 6, 81–89. https://doi.org/10.3109/01460868309057045

Ochiai, A. M., Gonçalves, F. L., Ambrizzi, T., Florentino, L. C., Wei, C. Y., Soares, A. V., De Araujo, N. M., & Gualda, D. M. (2012). Atmospheric conditions, lunar phases, and childbirth: a multivariate analysis. *International Journal of Biometeorology*, 56, 661–667. https://doi.org/10.1007/s00484-011-0465-y

Olcese, J., Lozier, S., & Paradise, C. (2013). Melatonin and the circadian timing of human parturition. *Reproductive Sciences (Thousand Oaks, Calif.)*, 20, 168–174. https://doi.org/10.1177/1933719112442244

Periti, E., & Biagiotti, R. (1994). Fasi lunari ed incidenza di parti spontanei. Nostra esperienza [Lunar phases and incidence of spontaneous deliveries. Our experience]. *Minerva Ginecologica*, 46, 429–433.

Romero Martínez, J., Guerrero Guijo, I., & Artura Serrano, A. (2004). Influye la Luna en el parto? [The moon and delivery]. *Rev Enferm*, 27, 7-12.

Sok, M., Mikulecky, M., & Erzen, J. (2001). Onset of spontaneous pneumothorax and the synodic lunar cycle. *Medical Hypotheses*, 57, 638–641. https://doi.org/10.1054/mehy.2001.1432

Staboulidou, I., Soergel, P., Vaske, B., & Hillemanns, P. (2008). The influence of lunar cycle on frequency of birth, birth complications, neonatal outcome and the gender: A retrospective analysis. *Acta Obstetricia et Gynecologica Scandinavica*. 87, 875–879. https://doi.org/10.1080/00016340802233090

Strestik, J., & Sitar, J. (1996). The influence of heliophysical and meteorological factors on sudden cardiovascular mortality. *Proceedings of 14th International Congress of Biometeorology, Ljubljana.* 166-173

Stocker, S. D., Schiltz, J. C., & Sved, A. F. (2004). Acute increases in arterial blood pressure do not reduce plasma vasopressin levels stimulated by angiotensin II or hyperosmolality in rats. *American Journal of Physiology. Regulatory, integrative and comparative*

physiology. 287, 127–137. https://doi.org/10.1152/ajpregu.00526.2003

Wake, R., Misugi, T., Shimada, K., & Yoshiyama, M. (2010). The effect of the gravitation of the moon on frequency of births. *Environmental Health Insights*. 4, 65–69. https://doi.org/10.4137/ehi.s5525

Widjaja, D., Vandeput, S., Van Huffel, S., & Aubert, A. E. (2015). Cardiovascular autonomic adaptation in lunar and martian gravity during parabolic flight. *European Journal of Applied Physiology*. 115, 1205–1218. https://doi.org/10.1007/s00421-015-3118-8

ORİJİNAL MAKALE / ORIGINAL ARTICLE
Balıkesir Sağlık Bilimleri Dergisi / BAUN Sağ Bil Derg
Balıkesir Health Sciences Journal / BAUN Health Sci J
ISSN: 2146-9601- e ISSN: 2147-2238
Doi: https://doi.org/10.53424/balikesirsbd.1341069

The Effects of Distance Education on Midwifery Students Before Clinical Practice in the Pandemic

Hatice ACAR BEKTAŞ [1], Gizem ÇITAK [1], Özgür ALPARSLAN [1]

[1] Tokat Gaziosmanpaşa University, Faculty of Health Sciences, Midwifery Department

Geliş Tarihi / Received: *10.08.2023,* ***Kabul Tarihi / Accepted:*** *15.04.2024*

ABSTRACT
Objective: This research was conducted to determine distance education's positive and negative effects on midwifery students before clinical practice. **Materials and Methods:** The population of this descriptive and cross-sectional study consisted of 194 students (106 first-year and 88 second-year students) studying in the first and second year of the Department of Midwifery, Faculty of Health Sciences of a state university in Turkey. The data collection form, which the researchers prepared by reviewing the literature, consists of 49 questions, including the participants' socio-demographic characteristics and views on distance education. **Results:** 72.9% of the participants stated that they disapproved of distance education, and approximately 30% stated that they did not have suitable living conditions for distance education. Participants also reported that the transition to distance education negatively affected the quality and participation rates of laboratory and clinical applications of the courses. The learning tools that students found most valuable during distance education were online lecture notes (83.9%), smartphones (81%), internet access (76.1%) and computers (72.5%). Students stated that they most frequently used the student information system (82.3%) and the university web page (77.9%) to be informed about educational changes, while they least frequently followed television news. **Conclusion:** In our study, it was determined that web-based distance education, which was used as an alternative solution in the pandemic, interrupted the practice education of midwifery students and negatively affected participation in classes.
Keywords: COVID-19, Distance Education, Midwifery.

Pandemide Klinik Uygulama Öncesi Uzaktan Eğitimin Ebelik Öğrencileri Üzerindeki Etkileri

ÖZ
Amaç: Bu araştırma, ebelik öğrencilerine uzaktan eğitimin klinik uygulama öncesi olumlu ve olumsuz etkilerini belirlemek amacıyla yapılmıştır. **Gereç ve yöntem:** Tanımlayıcı ve kesitsel tipteki bu araştırmanın evrenini Türkiye'de bir devlet üniversitesinin Sağlık Bilimleri Fakültesi Ebelik Bölümü birinci ve ikinci sınıfında öğrenim gören 106 birinci sınıf ve 88 ikinci sınıf olmak üzere toplam 194 öğrenci oluşturmuştur. Araştırmacılar tarafından literatür taranarak hazırlanan veri toplama formu, katılımcıların sosyo-demografik özellikleri ve uzaktan eğitime ilişkin görüşlerini içeren toplam 49 sorudan oluşmaktadır. **Bulgular:** Katılımcıların %72.9'u uzaktan eğitimi onaylamadığını ve yaklaşık %30'u uzaktan eğitim için uygun yaşam koşullarına sahip olmadıklarını belirtmişlerdir. Katılımcılar ayrıca uzaktan eğitime geçişin derslerin laboratuvar ve klinik uygulamalarının kalitesini ve katılım oranlarını olumsuz etkilediğini bildirmişlerdir. Öğrencilerin uzaktan eğitim sürecinde en değerli buldukları öğrenme araçları çevrimiçi ders notları (%83.9), akıllı telefonlar (%81), internet erişimi (%76.1) ve bilgisayarlardır (%72.5). Öğrenciler, eğitimle ilgili değişikliklerden haberdar olmak için en sık öğrenci bilgi sistemi (%82.3) ve üniversite web sayfasını (%77.9) kullandıklarını belirtirken, en az televizyon haberlerini takip ettiklerini ifade etmişlerdir. **Sonuç:** Çalışmamızda pandemide alternatif bir çözüm olarak kullanılan web tabanlı uzaktan eğitimin ebelik öğrencilerinin uygulama eğitimlerini sekteye uğrattığı ve derslere katılımı olumsuz etkilediği tespit edilmiştir.
Anahtar Kelimeler: COVID 19, Uzaktan Eğitim, Ebelik.

Sorumlu Yazar / Corresponding Author: Gizem ÇITAK, Tokat Gaziosmanpaşa University, Faculty of Health Sciences, Midwifery Department, Tokat, Türkiye.
E-mail: gizem.citak@gop.edu.tr

Bu makaleye atıf yapmak için / Cite this article: Acar Bektaş, H., Çıtak, G. & Alparslan, Ö. (2024). The effects of distance education on midwifery students before clinical practice ın the pandemic. *BAUN Health Sci J, 13*(2), 381-389. https://doi.org/10.53424/balikesirsbd.1341069

INTRODUCTION

With the pandemic, changes have been experienced in many areas, such as transportation, food, education, economy, health, etc. However, education has been most affected (Terkeş & Uçan Yamaç, 2021). First, the closure of schools and then the decision to switch to distance education disrupted education (Kurnaz & Serçemeli, 2020; Viner et al., 2020). Universities quickly adapted to these decisions through distance education centers and started education (Kurnaz & Serçemeli, 2020; Zhong et al., 2020). Academics, students, and parents involved in the education process have faced new experiences they have never experienced before (Zan & Zan, 2020). The process was managed with these changes that brought advantages and disadvantages. While some universities prefer to use online synchronous, some offline asynchronous, and some mixed methods as distance education methods, it is stated that the way the courses are taught is left to the instructor's own will in some units (Kurnaz & Serçemeli, 2020; Zan & Zan, 2020).

In midwifery education, both theory and practice should be carried out simultaneously. It is difficult to maintain this education with distance education, and alternative methods should be used. However, in this pandemic, where face-to-face education could not be provided, distance education had to be implemented quickly to manage the education process effectively (Brooks et al., 2020). Universities with good infrastructure and a previous online education system had no problems in the transition, but inexperienced universities struggled to skip the process. Not only in terms of universities, but students also faced many troublesome situations as they did not have the necessary equipment. Most institutions did not cancel clinical practices and tried to continue them during the pandemic. However, due to the increasing number of cases, a sudden closure decision was made during clinical internships (Ferrel & Rian, 2020).

A study conducted in the literature during the distance education period stated that students experienced stress in exams conducted remotely. The reasons for this were exam duration, navigation mode, and technical problems (Elsalem et al., 2020). In another study covering all midwifery students in Turkey, it was determined that 5% of the students experienced moderate and high levels of anxiety (Söğüt et al., 2020). In another study conducted in Peru on the subject, attention was drawn to the anxiety experienced by midwifery students in hospital studies. Among the reasons that strengthen anxiety, reasons such as insufficient protective equipment, economic problems, and anxiety about not being treated in case of illness due to lack of health insurance were listed (Rojas-Silva et al., 2020).

In Turkey, limited studies have been found in the literature on nursing and midwifery students' views on distance education. Addressing this knowledge gap is critical to understanding the effects of a global pandemic and to better prepare for similar major disruptions in student education and practice for a future where pandemics are inevitable (Dodds, 2019). Our study was conducted to determine the opinions and evaluations of first and second-year midwifery students regarding the positive and negative effects of distance education before clinical practice.

MATERIALS AND METHODS

Our distance education plans during the pandemic

All educational institutions had started to continue their education activities on distance education since the spring term of 2019-2020 when the COVID-19 pandemic emerged. In this process, as in all applied sciences, all clinical practices in midwifery education were postponed to the summer period when the transition to face-to-face education would occur. Clinical applications could not be carried out in the summer as the pandemic continued. In the spring term of the 2020-2021 academic year, educational activities continued on distance education again, and necessary plans were made in our institution for both first-year midwifery students and second-year students who had no clinical practice opportunity so that they could do clinical practice in the summer term (Table 1). BigBlueButton was used for distance education.

Study type

This is a cross-sectional study.

Time and place of the research

Data were collected in April 2021 at a Health Sciences Faculty Midwifery Department of a state university in Türkiye before distance learning students started clinical practice.

Population and sample of the research

The population of this study consisted of a total of 194 students (106 first-year and 88 second-year students) studying in the first and second years. No sample selection procedure was implemented. All of the students who accepted to participate in the study were included. The research was completed with 181 participants, including 99 first-year and 82 second-year students. Midwifery 3rd and 4th-grade students were not included in this research because they had previously performed clinical practice.

Data collection tools

The data collection form prepared by the researchers following a review of the literature consisted of questions about the socio-demographic characteristics of the participants (8 questions) and their views on distance education (40 questions) (McCutcheon et al., 2015; Shahrvini et al., 2021).

Collection of data

The researchers collected the data using online questionnaires created on Google Forms.

Data analysis

Study data were analyzed using the Statistical Package for Social Sciences (SPSS 22.0) software. Descriptive statistics and measurements (mean, standard deviation, minimum and maximum values, and percentiles) were used to evaluate the study's findings.

Table 1: Participants' teaching-learning process and data collection time.

	2019-2020			2020-2021		
Groups*	**Fall+Winter** (Sep-Oct-Nov-Dec-Jan)	**Winter+Spring** (Febr-Mar-Apr-May)	**Summer** (Jun-Jul-Aug)	**Fall+Winter** (Sep-Oct-Nov-Dec-Jan)	**Winter+Spring** (Febr-Mar-Apr-May)	**Summer** (Jun-Jul-Aug)
GROUP A (Second-year students)	Face-to-face education.	Face-to-face education in the first four weeks. Distance education is available in the second week of March.	Clinical practice was planned but could not be implemented.	Distance education.	Distance education.	Clinical practice was planned.
GROUP B (First-year students)	-	-	-	Distance education.	Distance education.	Clinical practice was planned.
Data collection	-	-	-	-	April 2021	-

Ethical considerations

Before starting the study, written permission was obtained from the Gaziosmanpaşa University Social and Human Research Ethics Committee (dated 09.04.2021 and 08.04) and the institution where the research will be conducted (26.02.2021-17369). The Declaration of Helsinki conducted the research, and informed consent was obtained from the students who agreed to participate.

RESULTS

According to the findings, 54.7% of the participants were first-year students, all single, and 63.5% were Anatolian high school graduates. 77.9% of the mothers and 54.1% of the fathers were primary and secondary school graduates. None of the students had a good income, 76.2% had extended families, and 71.3% lived in a city (Table 2).

Table 2: Participants' socio-demographic characteristics (n=181).

Participants' characteristics		**n (%)**
School year	1	99 (54.7)
	2	82 (45.3)
Marital status	Single	181 (100)
High school graduation	Anatolian	115 (63.5)
	Others	66 (36.5)
Mother's education	Elementary-middle school	141 (77.9)
	High school and above	40 (22.1)
Father's education	Elementary-middle school	98 (54.1)
	High school and above	83 (45.9)
Income status	Poor (Income<expenses)	47 (26)
	Middle (Income=expenses)	134 (74)
Place of residence	Village/Town	52 (28.7)
	City/Metropolis	129 (71.3)
Family type	Core	43 (23.8)
	Extended	138 (76.2)
Total		181 (100.0)

As seen in Table 3, 72.9% of the participants did not approve of distance education, and more than half thought they could not gain midwifery knowledge and skills through this system and that the excess number of students could create limitations. On the positive side, more than half of the participants (60.8%) reported that giving and receiving feedback between the learner and the instructor was easy in the distance education system (Table 3).

According to the participants, the distance education process positively affected the quality of the theoretical part of the courses and the exams and the rates of students' participation in them (42.3%-45.8% for quality and 40.9%-44.7% for participation, respectively) and negatively affected the quality of the laboratory and practice and the rates of students' participation in them (72.9%-75.7% for quality and 72.9%-72.4% for participation, respectively) (Table 4).

Table 3: **Participants' views about distance education (n=181).**

Statements about participants' views	**Answer**	**n (%)**
I approve of distance education in midwifery.	**Yes**	49 (27.1)
	No	132 (72.9)
I think I can gain midwifery knowledge and skills through activities based on listening in the distance education system.	**Yes**	73 (40.3)
	No	108 (59.7)
I think I can gain midwifery knowledge and skills through practice-based activities in the distance education system.	**Yes**	69 (38.1)
	No	112 (61.9)
Giving and receiving feedback between the learner and the teacher is easy in the distance education system.	**Yes**	110 (60.8)
	No	71 (39.2)
The excess number of students in the distance education system may create communication limitations.	**Yes**	110 (60.8)
	No	71 (39.2)
Total	**Yes**	181 (100)*
	No	

*: Yes+No

Table 4: The participants' views about the quality of the curriculum components of distance education and their participation in these components (n=181).

Quality of education and participation		**The theoretical part of the courses**		**The practical part of the courses**		**The laboratory part of the courses**		**Exams of courses**	
		Quality	**Participation**	**Quality**	**Participation**	**Quality**	**Participation**	**Quality**	**Participation**
Negative effect	**n (%)**	31 (17.1)	38 (21.0)	137 (75.7)	131 (72.4)	141 (77.9)	132 (72.9)	43 (23.8)	43 (23.8)
No effect	**n (%)**	73 (40.6)	69 (38.1)	23 (12.7)	27 (14.9)	24 (13.3)	34 (18.8)	55 (30.4)	57 (31.5)
Positive effect	**n (%)**	77 (42.3)	74 40.9)	21 (11.6)	23 (12.7)	16 (8.8)	15 (8.3)	83 (45.8)	81 (44.7)
Total	**n (%)**	181 (100)	181 (100)	181 (100)	181 (100)	181 (100)	181 (100)	181 (100)	181 (100)

Participants stated that the learning tools they found most valuable in the distance learning process were online lecture notes/presentations (83.9%), smartphones (81%), internet access (76.1%), and computers (72.5%). On the other hand, 24% of the participants stated that they never used tablets and did not find them valuable (Figure 1).

The distance education process cost students an additional 71.3%, and 29.3% of them stated that this cost was more than 500 TL. While 53.6% of the students stated that continuing education with the co-education model would be appropriate after the pandemic, 60.8% of them evaluated their distance education experience as negative.

Participants found the student information system (82.3%) and the university web page (77.9%), which were used to report changes in courses during the distance education process, to be the most effective methods (Figure 2).

It was determined that approximately 30% of the students did not have the living conditions, study environment, technology, and internet access required for distance learning (Figure 3).

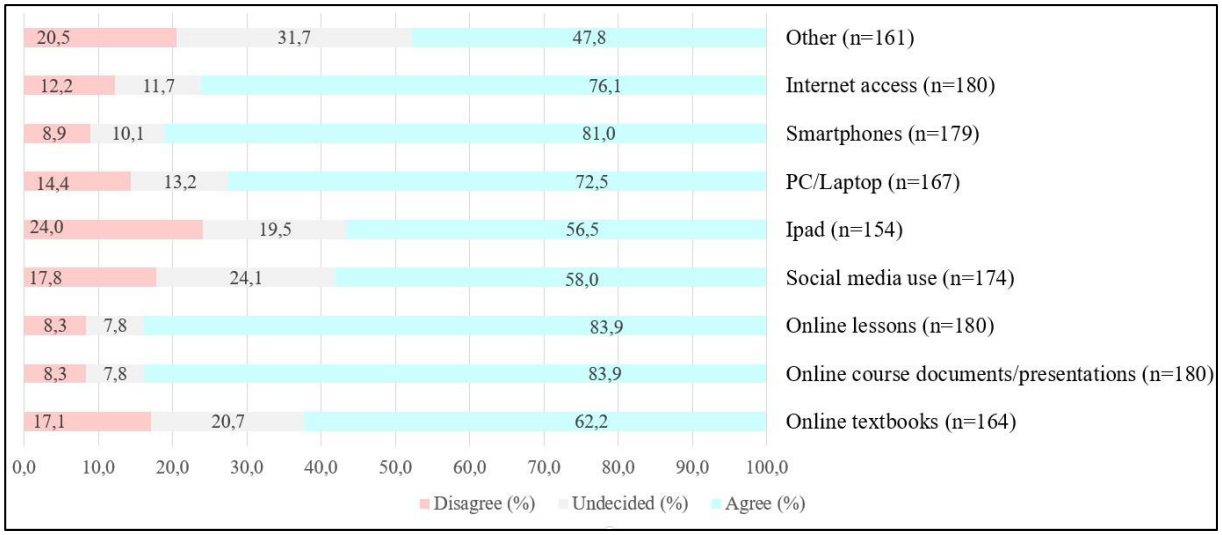


Figure 1: Participants' views about the value of the tools they used during the distance education process before starting clinical practice.

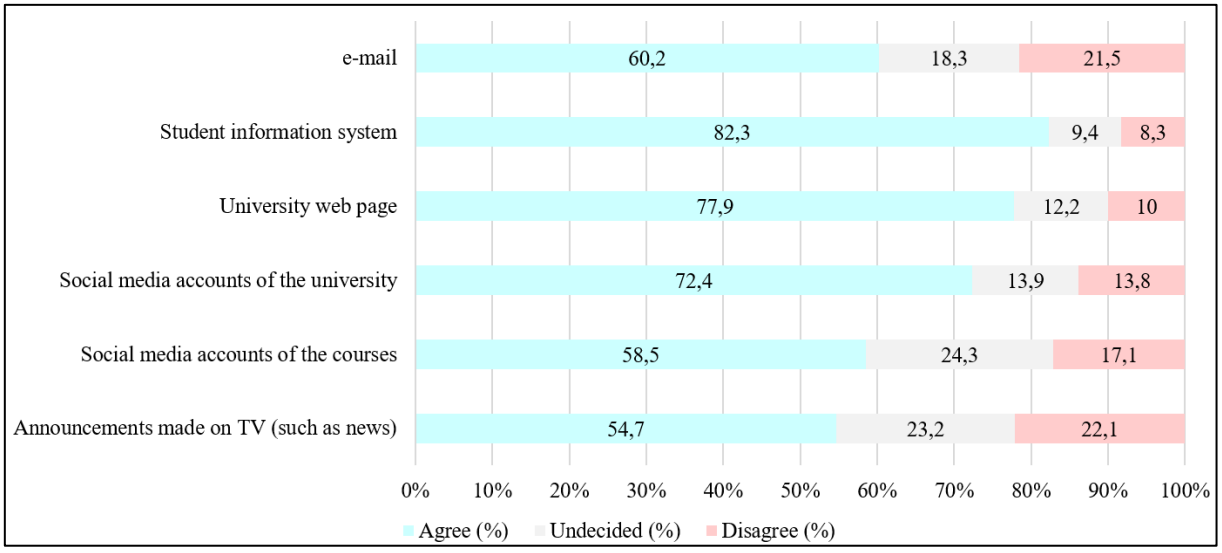


Figure 2. Opinions on the effectiveness of methods related to the reporting of changes in the distance education process

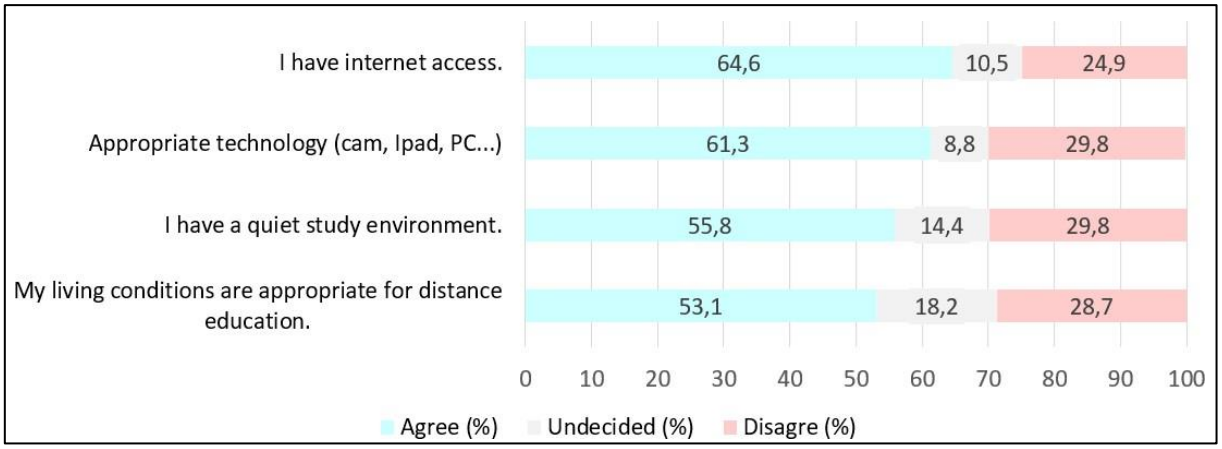


Figure 3. Current opportunities for students for distance education.

DISCUSSION

The COVID-19 pandemic has forced the education process worldwide to quickly switch to distance learning platforms (Rose, 2020). Not surprisingly, this has created great challenges for educators, students, and administrators (Ferrel & Ryan, 2020; Liang et al., 2020; Moszkowicz et al., 2020; Pather et al., 2020). The effects of COVID-19 on health education have been discussed in the literature (Rose, 2020; Sandhu & Wolf, 2020; Theoret & Ming, 2020; Goldhamer et al., 2020), but most of these studies do not show students' perspectives. In some of these studies, the preclinical experiences of students in the field of health (Pather et al., 2020; Moszkowicz et al., 2020; Gaur et al., 2020; Mukhtar et al., 2020; Sandhaus et al., 2020; Sani et al., 2020) have been evaluated, and a single curriculum component such as anatomy has been focused on others (Iwanaga et al., 2021; Longhurst et al., 2020; Moszkowicz et al., 2020; Pather et al., 2020).

According to our findings, most students stated that they did not approve of distance education and that the application and laboratory studies of the courses were insufficient. According to previous studies, it has been determined that students prefer distance education for the theoretical parts and face-to-face education for the practical and laboratory parts, and their satisfaction rates with distance education are low (Al-Balas et al. et al., 2020; Şahbaz, 2020; Shahrvini et al., 2021; Taye et al., 2022). However, some of the students also found distance education useful during the pandemic with advantages such as reduced travel time and associated travel costs, comfort in the home environment, and increased self-discipline (Oboskalova et al., 2021; Stevanović et al., 2021; Karadağ et al., 2021).

One of the striking findings of our study was that one-third of the participants stated that they did not have the living conditions, working environment, technology, and internet access necessary for distance learning. This situation negatively affected the participants' satisfaction with distance education. According to studies, students' views and satisfaction with distance education during the pandemic were affected by their access to computers and the internet and the facilities they had (Ince et al., 2020; Stevanović et al., 2021; Tayem et al., 2022).

Approximately half of the participants stated that the quality of the exams was positively affected by this process. The opportunity to access lecture notes and videos uploaded to the distance education system at any time and to listen to the recorded lectures repeatedly benefited the students, and their academic success grades increased. According to the studies, the GPAs of the students studying during the pandemic increased in general (Al-Balas et al., 2020; Oboskalova et al., 2021; Karadağ et al., 2021; Tayem et al., 2022). Some studies stated that satisfaction was low due to cheating behaviors in online exams and low exam quality (Cirakoğlu, Ozbay, 2022; Elsalem et al., 2021). Some of the challenges of distance education are exam security and assessment issues. According to the studies, it is as essential to make the systems more secure in terms of security vulnerability as it is to ensure that the assessment and evaluation activities are of a quality that will enable the assessment of the high-level thinking skills of 21st-century learners (Shahrvini et al., 2021; Baran, 2020).

CONCLUSIONS

Although the participants thought of distance learning as an advantage during the pandemic, they stated that

it was less effective when compared to face-to-face learning. Learning became entirely negative when they did not master technology and had difficulties accessing distance education platforms. Midwifery is an applied department, and education in this department cannot be carried out only through online courses; it needs to be reinforced with laboratory and hospital practices. However, under compulsory conditions such as pandemics, the Internet infrastructure should be strengthened, the training and adaptation of the teaching staff should be ensured, materials suitable for this process should be developed, and an effective e-learning environment should be created. In addition, it is thought that the development of e-learning as a support for formal education will benefit students and teachers.

Acknowledgment
The authors would like to sincerely thank anyone who contributed to this study.

Conflict of Interest
The author declares no potential conflicts of interest concerning this article's research, authorship, and/or publication.

Author Contributions
Plan, design: HAB, GÇ, ÖA; **Materials and Methods:** HAB, GÇ, ÖA; **Data analysis and interpretation:** HAB, GÇ; **Writing and corrections:** HAB, GÇ.

Funding
None

Ethical considerations
Before starting the study, written permission was obtained from the Gaziosmanpaşa University Social and Human Research Ethics Committee (dated 09.04.2021 and 08.04) and the institution where the research will be conducted (26.02.2021-17369). The Declaration of Helsinki conducted the research, and informed consent was obtained from the students who agreed to participate.

REFERENCES

Al-Balas, M., Al-Balas, H., Jaber, H., Obeidat, K., Al-Balas, H., Aborajooh, E., Al-Taher, R., & Al-Balas, B. (2020). Distance learning in clinical medical education amid COVID-19 pandemic in Jordan: current situation, challenges, and perspectives. *BMC Medical Education,* 20. https://doi.org/10.1186/s12909-020-02257-4.

Baran, H. (2020). Açık ve uzaktan eğitimde ölçme ve değerlendirme. Açıköğretim uygulamaları ve araştırmaları dergisi (AUAd); 6-1, 28-40.

Brooks, S.K., Smith, L.E., Webster, R.K., Weston, D., Woodl, L., Hall, I. (2020). The impact of unplanned school closure on children's social contact: Rapid evidence review. *Eurosurveillance, 25*(13), 1-10.

Cirakoglu, N., Ozbay, Y. (2022). Evaluation of Turkish undergraduate dental students' distance learning and online exam experience during the Covid-19 pandemic. *Nigerian Journal of Clinical Practice, 25*, 916 - 922. https://doi.org/10.4103/njcp.njcp_1949_21.

Dodds, W. (2019). Disease Now and Potential Future Pandemics, içinde: The World's Worst Problems. *Springer International Publishing*, Cham, ss. 31–44. https://doi.org/10.1007/978-3-030-30410-2_4

Elsalem, L., et al. (2020). Stress and Behavioral Changes with Remote E-Exams During the COVID-19 Pandemic: A Cross-Sectional Study Among Undergraduates Of Medical Sciences. Elsevier Public Health Emergency Collection. *Tıp ve Cerrahi Yıllık, 60:*271-9. url: https://www.sciencedirect.com/science/article/pii/S2049080120304131?via%3Dihub

Elsalem, L., Al-Azzam, N., Jum'ah, A., Obeidat, N. (2021). Remote E-exams during Covid-19 pandemic: A cross-sectional study of students' preferences and academic dishonesty in faculties of medical sciences. *Annals of Medicine and Surgery, 62*, 326 - 333. https://doi.org/10.1016/j.amsu.2021.01.054.

Ferrel, M.N., Ryan, J.J. (2020). The Impact of COVID-19 on Medical Education. *Cureus; 12*. https://doi.org/10.7759/CUREUS.7492.

Gaur, U., Majumde,r M.A.A., Sa, B., Sarkar, S., Williams, A., Singh, K. (2020). Challenges and opportunities of preclinical medical education: COVID-19 crisis and beyond. *SN Compr Clin Med; 22*:1–6.

Goldhamer, M.E.J., Pusic, MV., Co, JPT., Weinstein, DF. (2020). Can COVID catalyze an educational transformation? Competency-based advancement in a crisis. *NEngl J Med; 383*(11):1003–5.

Ince, E., Kabul, A., & Diler, I. (2020). Distance Education in Higher Education in the COVID-19 Pandemic Process: A Case of Isparta. *Applied Sciences University. 4*, 343-351. https://doi.org/10.46328/ijtes.v4i4.112.

Iwanaga, J., Loukas, M., Dumont, A.S., Tubbs, R.S. (2021). A review of anatomy education during and after the COVID-19 pandemic: Revisiting traditional and modern methods to achieve future innovation. *Clin. Anat; 34*, 108–114. https://doi.org/10.1002/ca.23655

Karadağ, E., Su, A., & Ergin-Kocaturk, H. (2021). Multi-level analyses of distance education capacity, faculty members' adaptation, and indicators of student satisfaction in higher education during COVID-19 pandemic. *International Journal of Educational Technology in Higher Education, 18.* https://doi.org/10.1186/s41239-021-00291-w.

Kurnaz, E., Serçemeli, M. (2020). COVID-19 pandemi döneminde akademisyenlerin uzaktan eğitim ve uzaktan muhasebe eğitimine yönelik bakış açıları üzerine bir araştırma. *Uluslararası Sosyal Bilimler Akademi Dergisi, 3*(3), 262-288.

Liang, Z.C., Ooi, S.B.S., Wang, W. (2020). Pandemics and Their Impact on Medical Training: Lessons From Singapore. *Journal of the Association of American Medical Colleges; 95,* 1359–1361. https://doi.org/10.1097/ACM.0000000000003441

Longhurst, G.J., Stone, D.M., Dulohery, K., Scully, D., Campbell, T., Smith, C.F. (2020). Strength, Weakness, Opportunity, Threat (SWOT) Analysis of the Adaptations to Anatomical Education in the United Kingdom and Republic of Ireland

McCutcheon, K., Lohan, M., Traynor, M., & Martin, D. (2015). A systematic review evaluating the impact of online or blended learning vs. face-to-face learning of clinical skills in undergraduate nurse education. *Journal of Advanced Nursing, 71*(2), 255–270. https://doi.org/10.1111/jan.12509

Montenegro-Rueda, M., Rosa, A., Sánchez-Serrano, J., & Fernández-Cerero, J. (2021). Assessment in Higher Education during the COVID-19 Pandemic: A Systematic Review. *Sustainability.* https://doi.org/10.3390/su131910509.

Moszkowicz, D., Duboc, H., Dubertret, C., Roux, D., Bretagnol, F. (2020). Daily medical education for confined students during coronavirus disease 2019 pandemic: A simple videoconference solution. *Clinical Anatomy; 33,* 927–928. https://doi.org/10.1002/CA.23601

Mukhtar, K., Javed, K., Arooj, M., Sethi, A. (2020). Advantages, Limitations, and recommendations for online learning during the COVID-19 pandemic era. *Pakistan Journal of Medical Sciences; 36*(COVID19-S4): S27–31.

Oboskalova, T., Kudryavtseva, E., & Koval, M. (2021). Research on the impact of distance learning during the COVID-19 pandemic on the lifestyle and quality of education of medical students. Experience of the obstetrics and gynecology department. *Ural Medical Journal.* https://doi.org/10.52420/2071-5943-2021-20-1-103-108.

Pather, N., Blyth, P., Chapman, J. A., Dayal, M. R., Flack, N. A. M. S., Fogg, Q. A., Green, R. A., Hulme, A. K., Johnson, I. P., Meyer, A. J., Morley, J. W., Shortland, P. J., Štrkalj, G., Štrkalj, M., Valter, K., Webb, A. L., Woodley, S. J., Lazarus, M. D. (2020). Forced Disruption of Anatomy Education in Australia and New Zealand: An Acute Response to the COVID-19 Pandemic. *Anatomical Sciences Education; 13,* 284–300. https://doi.org/10.1002/ASE.1968

Rojas-Silva J, et al. (2020). Hospital practice in COVID-19 times: perceptions of the midwifery interns in Peru. *The Preprint Server For Health Scıences,* url: https://www.medrxiv.org/content/10.1101/2020.06.05.20094482v1.full.pdf Erişim Tarihi:11.01.2024

Rose, S. (2020). Medical Student Education in the Time of COVID-19. JAMA 2020; 323, 2131–2132. https://doi.org/10.1001/JAMA.2020.5227

Şahbaz, A. (2020). Views and Evaluations of University Students about Distance Education During the COVID-19 Pandemic. Educational Process: *International Journal, 9,* 185–198. https://doi.org/10.22521/edupij.2020.93.5.

Sandhaus, Y., Kushnir, T., Ashkenazi, S. (2020). Electronic distance learning of preclinicalstudies during the COVID-19 pandemic: a preliminary study of medical student responses and potential future impact*The Israel Medical Association Journal; 8*(22):423–7.

Sandhu, P., Wolf, M. (2020). The impact of COVID-19 on the undergraduate medical curriculum. Med Educ Online. 2020; 25(1):1764740.

Sani, I., Hamza, Y., Chedid, Y., Amalendran, J., Hamza, N. (2020). Understanding the consequence of COVID-19 on undergraduate medical education: Medical students' perspective. *Ann Med Surg;58*:117–9.

Shahrvini, B., Baxter, S. L., Coffey, C. S., MacDonald, B. V., & Lander, L. (2021). Preclinical remote undergraduate medical education during the COVID-19 pandemic: a survey study. *BMC Medical Education, 21*(1), 13. https://doi.org/10.1186/s12909-020-02445-2

Söğüt, S., Dolu, İ., Cangöl, E. The relationship between COVID-19 knowledge levels and anxiety states of midwifery students during the outbreak: A cross- sectional web-based survey, *Perspectives in Psychiatric Care, 2020*;57(1):1–7. url: https://onlinelibrary.wiley.com/doi/epdf/10.1111/ppc.12555 Erişim Tarihi: 18.01.2024

Stevanović, A., Božić, R., & Radović, S. (2021). Higher education students' experiences and opinion about distance learning during the Covid-19 pandemic. *Journal of Computer Assisted Learning, 37,* 1682 - 1693. https://doi.org/10.1111/jcal.12613.

Tayem, Y., Almarabheh, A., Hamza, E., & Deifalla, A. (2022). Perceptions of Medical Students on Distance Learning During the COVID-19 Pandemic: A Cross-Sectional Study from Bahrain. *Advances in Medical Education and Practice, 13,* 345 - 354. https://doi.org/10.2147/AMEP.S357335.

Terkeş, N., Uçan Yamaç, S. (2021). Hemşirelik ve ebelik öğrencilerinin COVID-19 pandemi sürecindeki uzaktan eğitime yönelik görüş ve önerileri. *Ordu Üniversitesi Hemşirelik Çalışmaları Dergisi, 4*(2), 240-247. DOI:10.38108/ouhcd.858820.

Theoret, C., Ming, X. (2020). Our Education, Our Concerns: Medical StudentEducation Impact due to COVID-19. *Med Educ*14181.

Viner, R.M., Russell, S.J., Croker, H., Packer, J., Ward, J., Stansfield, C. (2020). School closure and management practices during coronavirus outbreaks including COVID-19: A rapid systematic review. *The Lancet Child & Adolescent Health, 4,* 397–404.

Wenrich, M.D., Jackson, M.B. Wolfhagen I, Ramsey PG, Scherpbier AJ. (2013). What arethe benefits of early patient contact? - a comparison of three preclinicalpatient contact settings. *BMC Med Educ. 13*:80.

Zan, N., Zan, B.U. (2020). Koronavirüs ile acil durumda eğitim: Türkiye'nin farklı bölgelerinden uzaktan eğitim sistemine dahil olan edebiyat fakültesi öğrencilerine genel bakış. *Electronic Turkish Studies, 15*(4), 1367–1394.

Zhong, B.L., Luo, W., Li, H.M., Zhang, Q., Liu, X.G., Li, W.T. (2020). Knowledge, attitudes, and practices towards COVID-19 among Chinese residents during the rapid rise period of the COVID-19 outbreak: A quick online cross-sectional survey. *International Journal of Biological Sciences, 16*(10), 1745–1752.

ORİJİNAL MAKALE / ORIGINAL ARTICLE
Balıkesir Sağlık Bilimleri Dergisi / BAUN Sağ Bil Derg
Balıkesir Health Sciences Journal / BAUN Health Sci J
ISSN: 2146-9601- e ISSN: 2147-2238
Doi: https://doi.org/10.53424/balikesirsbd.1461199

eNOS Expression in the Cerebellum of Dogs Naturally Infected with Canine Distemper Virus and Relationship with Apoptosis

Mehmet Önder KARAYİĞİT [1]

[1] Cukurova University, Faculty of Ceyhan Veterinary Medicine, Department of Pathology

Geliş Tarihi / Received: *29.03.2024,* ***Kabul Tarihi / Accepted:*** *17.04.2024*

ABSTRACT
Objective: In this study, the role of eNOS expression in the neuropathology of canine distemper disease was investigated. **Materials and Methods:** In the study, cerebellar tissues of 20 dogs brought for necropsy and diagnosed with distemper by histopathological and immunohistochemical methods were used. Cerebellum tissues from 7 dogs that died of other diseases in which the central nervous system was not affected were used as controls. All tissues were fixed in 10% buffered formalin solution for 48 h then washed thoroughly in tap water overnight. After dehydration in graded alcohols, cleared in xylene and embedded in paraffin. Paraffin blocks of cerebellum were cut at 5 µm and stained with hematoxylin and eosin (HE) and Immunohistochemistry (IHC) was performed according to the manufacturer's protocol. **Results:** Expression of eNOS and cells undergoing apoptosis in infected tissues were increased compared to control tissues. This difference was statistically significant. **Conclusion:** As a result, increased eNOS expression may be one of the factors that trigger apoptosis in neuropathology of canine distemper disease. However, further studies are needed for other effects that contribute to the neuropathology of the disease**.**
Keywords: Apoptosis, Distemper, Dog, eNOS.

Köpek Distemper Virus ile Doğal Enfekte Köpeklerin Serebellumunda eNOS Ekspresyonu ve Apopitoz ile İlişkisi

ÖZ

Amaç: Bu çalışmada köpek distemper hastalığının nöropatolojisinde eNOS ekspresyonunun rolü araştırıldı. **Gereç ve Yöntem:** Araştırmada nekropsi için getirilen ve histopatolojik ve immunohistokimyasal yöntemlerle distemper tanısı konan 20 köpeğin beyincik dokuları kullanıldı. Merkezi sinir sisteminin etkilenmediği diğer hastalıklardan ölen 7 köpeğin beyincik dokuları ise kontrol olarak kullanıldı. Tüm dokular %10'luk tamponlu formalin solüsyonunda 48 saat süreyle fikse edildikten sonra çeşme suyu altında bir gece yıkandı. Dereceli alkollerde dehidrasyondan sonra ksilende şeffaflaştırıldı ve parafine gömüldü. Parafin bloklardaki serebellum dokularından 5'er mikronluk kesitler alındı ve hematoksilen ve eozin (HE) ile boyandı ve üretici firmanın protokolüne göre immunohistokimya (IHC) yapıldı. **Bulgular:** Enfekte dokularda eNOS ekspresyonu ve apopitoza giden hücrelerin kontrol dokulara göre arttığı görüldü. Bu fark istatistiksel olarak anlamlıydı. **Sonuç:** Sonuç olarak artan eNOS ekspresyonu apoptozu tetikleyen faktörlerden biri olabilir. Ancak hastalığın nöropatolojisine katkıda bulunan diğer etkiler için daha fazla çalışmalara ihtiyaç vardır.
Anahtar Kelimeler: Apopitoz, Distemper, Köpek, eNOS.

Sorumlu Yazar / Corresponding Author: Mehmet Önder KARAYİĞİT, Cukurova University, Faculty of Ceyhan Veterinary Medicine, Department of Pathology, Adana, Turkiye.
E-mail: okarayigit@cu.edu.tr

Bu makaleye atıf yapmak için / Cite this article: Karayiğit, M.Ö. (2024). eNOS expression in the cerebellum of dogs naturally infected with canine distemper virus and relationship with apoptosis. *BAUN Health Sci J, 13*(2), 390-396. https://doi.org/10.53424/balikesirsbd.1461199

INTRODUCTION

Canine Distemper Virus (CDV) is a virus belongs to the morbillivirus genus from the paramyxoviridia family, as well as rinderpest and measles viruses (Norrby et al., 1992). CDV causes multifocal demyelination in the central nervous system in infected dogs (Graber et al., 1995). Clinical findings such as apathy, behavioral disorders, muscle atrophy, hyperesthesia, ataxia and seizures occur in infected animals. Histopathological findings of the disease include demyelination in the substantia alba of the cerebellum, gemistocytic astrocytes, and intranuclear and occasionally cytoplasmic inclusions in glial cells (Tipold et al., 1996).

Nitric oxide (NO) is a molecule synthesized from L-arginine by the enzyme nitric oxide synthase (NOS) (Stuehr, & Griffith, 1992). It acts as a neurotransmitter and is part of the signaling pathways between cerebral blood vessels, neurons and glial cells. Three isoforms of NOS have been identified. Endothelial NOS (eNOS), which balances vascular hemostasis (Heiss et al., 2015), neuronal NOS (nNOS), which affects neurological regulation and neuronal function and is mainly found in the nervous system (Zhou & Zhu, 2009), inducible NOS (iNOS) that is expressed in macrophages when there is a pathogenic condition for host defense (Cinelli et al., 2020). It has been confirmed that low levels of NO can have positive effects on the proliferation and survival of cells. However, it is known that high levels of NO trigger oxidative and nitrosative stress, which can cause pathological effects (Thomas et al., 2008).

Apoptosis is physiologically necessary for cell turnover and normal development. When exposed to excessive apoptosis, tissue damage occurs, however, in cases where apoptosis does not occur at a physiological level, pathological cellular growth occurs. (Kim et al., 1999). NO and its reaction products can either promote or prevent apoptosis in a multitude of settings. It has been reported that many cells, especially macrophages and central nervous system cells, undergo apoptosis in response to NO (Albina et al., 1993). To our knowledge, NO expression and its relationship with apoptosis in the neuropathology of distemper disease has not been reported. Therefore, in this study, we investigated the expression of eNOS and its relationship with apoptosis in the cerebellum of dogs with distemper.

MATERIALS AND METHODS

Tissue Samples

Twenty canine cerebellum tissues embedded in formalin-fixed paraffin blocks were used in the study. Tissue blocks from the archives of Cukurova University, Faculty of Ceyhan Veterinary Medicine, Department of Pathology were used in the study. Cerebellum tissues from 7 dogs that died of another disease and whose central nervous system was not affected were used as control. Infected and control tissues were fixed in buffered formaldehyde for 2 days, washed in tap water over night, then passed through a graded alcohol series and embedded in paraffin blocks. 5 µm sections from the tissues were taken on a slide with a microtome (Leica RM2125) and stained histopathologically with hematoxylin and eosin (HE), and immunohistochemically (IHC) with distemper and eNOS antibodies. In addition, staining was done with the TUNEL method to determine apoptosis and examined under a light microscope (Nikon YS 100).

Immunohistochemical Examinations

Immunohistochemical staining was performed using the routine streptoavidin-biotin peroxidase technique according to the manufacturer's recommendations. [Anti rabbit streptoavidin/biotin immunoperoxidase kit (Histostain-Plus Kits, California, USA)]. The selected 5 µm paraffin tissue sections were stained immunohistochemically in order to elucidate the expressions of anti-eNOS polyclonal antibody [Invitrogen PA3-031A, (diluted 1/250)] and anti-CDV monoclonal antibody (DV2-12) [Invitrogen, MA1-82327, (diluted 1/250)]. The red color reaction was enhanced using 3-amino-9-ethylcarbazole (AEC) (Zymed AEC RED substrate kit, ABD) as the chromogen. All sections were counterstained with Gill hematoxylin (HX71788774, Meck, USA) solution and then washed in water. Coverslips were applied with the water-based mounting medium (Shandon Immuno-mounting). In addition, all infected and control tissues were stained by the TUNEL method to determine apoptotic cells that undergo extensive DNA degradation during the late stages of apoptosis (In Situ Cell Death Detection Kit, Roche, Basel, Switzerland).

Evaluation of Immunostaining

Positive stained cells were measured by a camera system attached to the microscope (Leica CCD camera DFC420, Leica Microsystems Imaging Solutions, Ltd., Cambridge, UK). Five representative areas were randomly selected, and consecutive images were taken with a 20x objective. All eNOS and TUNEL stainings were measured using the same integrated optical density setting, and the ratio of stained area to total area was calculated using Leica QWin Plus v3. An investigator blinded to the identity of the sections quantified all sections.

Statistical Analysis

The obtained data were statistically analyzed using the Mann Whitney U test in the SPSS version 26 package program. The results were presented in the format of mean (median) ± standard deviation (SD). P-value of <0.05 was considered statistically significant **(**Table 1, Figure 1).

Ethical Considerations

Since this study used tissues archive our laboratory, ethics committee approval is not required. A document was received from the faculty ethics committee that the study does not require ethics committee approval (Date and Number of Document: 14/03/2024-32889)

RESULTS

Histopathological Findings

In histopathological examination, demyelination in substantia alba, gitter cells, gemistocytes and intranuclear inclusion bodies in astrocytes were detected in the cerebellum of infected animals (Figure 2).

Immunohistochemical Findings

In the immunohistochemical examination performed with CDV antibody, immunopositive CDV antigens were found in the cytoplasm and nucleus of glial cells and occasionally extracellular free antigens in the substantia alba (Figure 2). In eNOS immunohistochemical staining, intense eNOS expression was observed in vascular endothelium, glial cells and Purkinje neurons in infected animals compared to controls (P<0.001) (Figure 3).

Additionally, strong TUNEL positive staining was obtained in infected animals and this result was significiant compared to controls (P<0.001) (Figure 4).

Table 1. Immunohistochemical expression of eNOS and TUNEL staining.

	eNOS				TUNEL staining			
Groups	**n**	**Mean (Median)**	**SD**	**P**	**n**	**Mean (Median)**	**SD**	**P**
Healthy control	7	0.42 (0.00)	0.53	0.000	7	0.43 (0.00)	0.53	0.000
Canine Distemper	20	2.35 (2.00)***	0.59		20	2.00 (2.00)***	0.46	

***P<0.001 shows significance when comparing healthy control to CDV infection according to the **Mann-Whitney Test.**

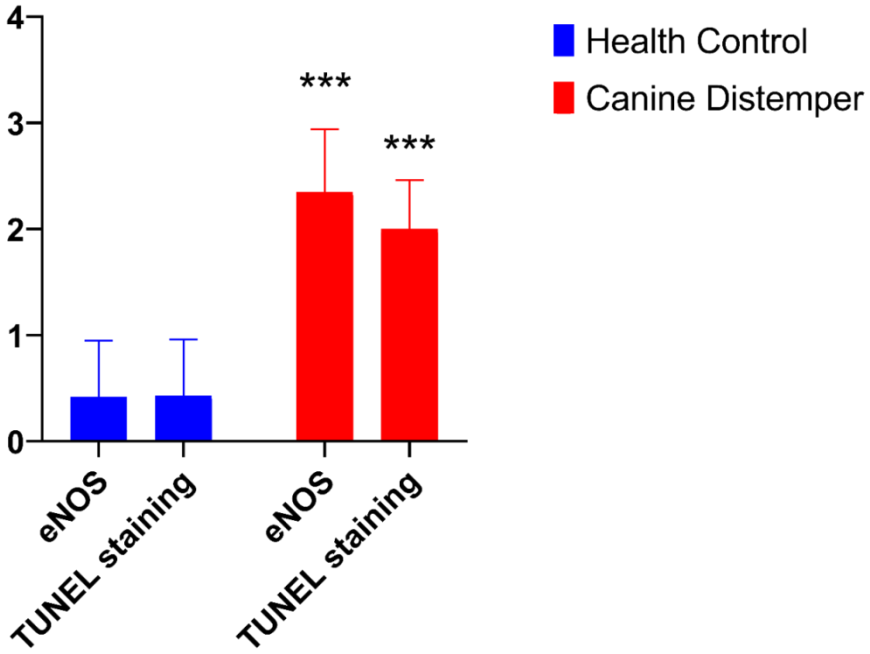


Figure 1. Comparison of eNOS expression and TUNEL staining intensity in control and CDV infection.

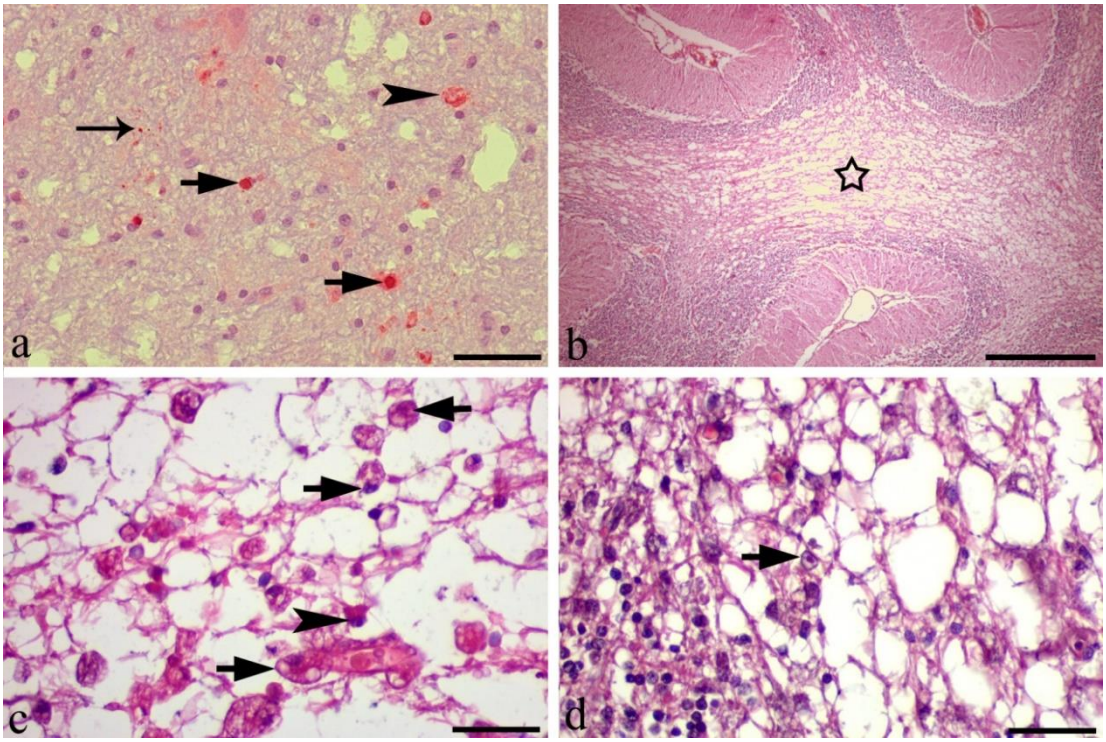


Figure 2. Immunohistochemical staining with CDV antibody and histopathology with HE stain in canine distemper. a) Nuclear (thick arrows) and cytoplasmic (arrowhead) CDV antigens in glial cells and extracellular (thin arrow) CDV antigens in the neuropil. Distemper, IHC, Bar: 25µm. b) Demyelination in the substantia alba of the cerebellum (star). Distemper, HE, Bar: 100µm**.** c) Gitter cells (arrows) and gemistocyte (arrowhead) in the substantia alba. Distemper, HE, Bar: 25µm**.** d) Intranuclear inclusion in astrocytes (arrow). Distemper, HE, Bar: 25µm**.**

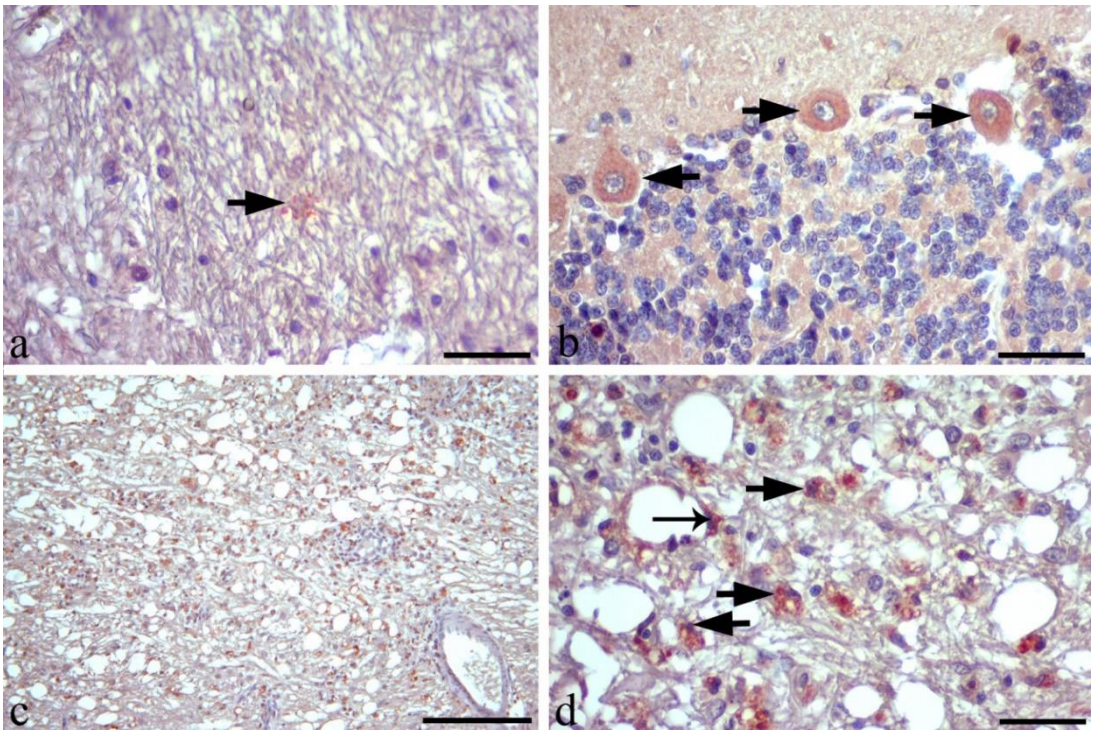


Figure 3. Immunohistochemical staining with eNOS antibody in canine distemper and control tissues. a) Weak eNOS immunoreactivity in control tissues (arrow). Control, IHC, Bar: 25µm. b) Strong eNOS expression in the Purkinje neurons (arrows). Distemper, IHC, Bar: 25µm**.** c) Strong eNOS expression in glial cells in the substantia alba. Distemper, IHC, Bar: 100µm**.** d) Intense eNOS expression in glial cells (thick arrows) and vascular endothelium (thin arrow). Distemper, IHC, Bar: 25µm**.**

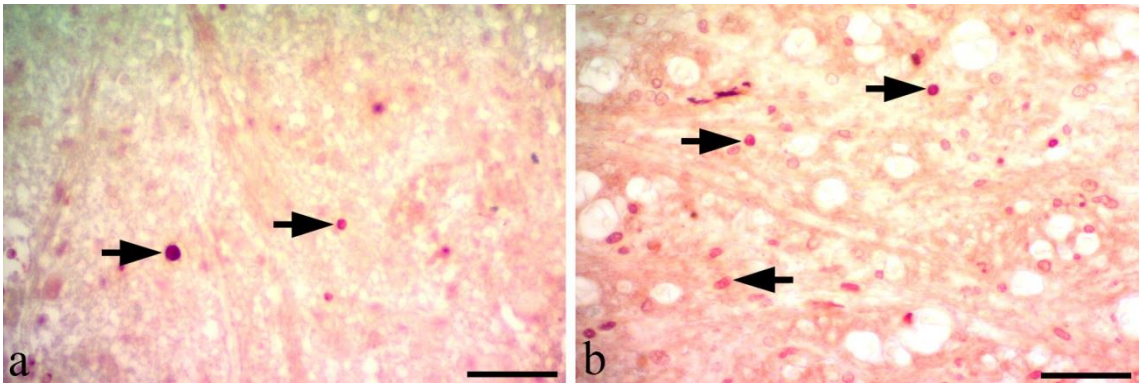


Figure 4. TUNEL staining in canine distemper and control tissues. a) Weak TUNEL staining in control tissues (arrows). Control, TUNEL, Bar: 25µm**.** b) Strong TUNEL staining in canine distemper infection (arrows). Distemper, TUNEL, Bar: 25µm**.**

DISCUSSION

Canine distemper is a highly contagious disease characterized by high mortality and morbidity. CDV causes severe immunosuppression and neurological findings in dogs and a model of the human disease multiple sclerosis, which is associated with demyelination (Vandevelde, & Zurbriggen, 2005). Neurodegeneration occurring in distemper disease is a subject of research. We suggest that there are many factors that trigger vascular lesions and inflammation in the cerebellum that have not yet been investigated. In our study, we investigated the contribution of eNOS in neurodegeneration and cellular destruction in distemper. NO plays a role in the regulation of various cellular functions (Nathan, 1992). NO is thought to be beneficial in many situations, such as preventing vascular thrombosis (Yao et al., 1992), inflammatory cell-mediated damage (Fridovich, 1983), and reperfusion injury (Kubes, 1993; Siegfried et al., 1992). Stimulation of NO may also cause adverse events such as hypotension (Moncada et al., 1991), inhibition of intermediate metabolism (Hibbs et al., 1988) and production of the strong oxidant peroxynitrite. Despite reports that overproduced NO in the presence of oxygen will lead to cytotoxic events, NO has also been reported to limit damage to target molecules or tissues during events associated with overproduction of reactive oxygen species, by often unidentified mechanisms (Kubes, 1993; Siegfried et al., 1992). When NO production exceeds physiological levels, it has a neurotoxic effect rather than a neuroprotective effect (Calabrese et al., 2007; Dawson et al., 1991; Boje, & Aroa, 1992). High levels of NO during inflammation suggest that it plays a critical role in regulating tissue destruction that occurs during oxidative stress (OS).

eNOS is one of three isoforms of NOS that produce NO (Stuehr, & Griffith, 1992). eNOS plays a role in maintaining and protecting microcirculation in the brain (Toda et al., 2009), preventing platelet accumulation, leukocyte adhesion and migration (Broos et al., 2011), and reducing smooth muscle proliferation (Toda et al., 2009). Disruption of eNOS inactivity is involved in many cellular mechanisms such as neuronal damage, subaortic hemorrhage, traumatic brain injury, and ischemic stroke (Srivastava et al., 2012). eNOS expressions increase in neurodegenerative disease (Cole et al., 2012; Karayiğit, 2018). It has been reported that the expression of eNOS in the brain increases in viral and bacterial neurodegenerative diseases (Dincel, & Kul, 2015; Karayigit, 2018). Previous studies have reported that eNOS plays a partially protective role by keeping the blood flow level high against ischemia that occurs after brain injury (Endres et al., 2004). We found no reports of immunohistochemical expression of eNOS and associated with apoptosis in cerebellum tissues of dogs with naturally infected with CDV. In this study, the relationship between eNOS expression and apoptosis in neuropathology of canine distemper disease was investigated. According to the results obtained from our study, higher levels of eNOS expression were obtained in the cerebellum of infective animals compared to controls ($P<0.001$). To our knowledge, this finding has not been demonstrated before in distemper disease. However, it is consistent with results from other reported viral and bacterial neurodegenerative diseases (Dincel, & Kul, 2015; Karayigit, 2018).

NO and OS cause apoptosis in central nervous system cells as well as other cells (Nicotera et al., 1995; Chandra et al., 2000; Dincel, & Kul, 2015; Karayiğit, 2018). Pathological levels of NO can cause loss of mitochondrial membrane potential, leading to apoptosis (Bonfoco et al., 1995; Brookes et al. 2000; Karayiğit, 2018). Similarly, OS damages mitochondrial DNA by disrupting the respiratory chain balance, which impairs Ca2+ homeostasis and the mitochondrial defense system by increasing membrane permeability (Annunziato et al., 2003; Bhat et al., 2015). It has been previously reported that glial cells in the cerebellum undergo apoptosis in distemper disease (Moro et al., 2003). Our most interesting finding was the strong eNOS expression and TUNEL staining in the cerebellum during infection. It has been suggested that mitochondrial damage is caused by OS of nitrosative origin, because the cells may have been exposed to high

levels of NO. Increased OS and NO in distemper may have triggered apoptosis. Certainly, the relationship between apoptosis and neuropathology in distemper disease is a complex process and involves unknown factors. There are many molecules that affect this process and a complex chain of neuropathological events that stimulate each other. However, according to the findings of our study and previous reports supporting our findings, increased eNOS expression in distemper infection may contribute to apoptosis and OS or NO induced mitochondrial DNA damage. Similar and more comprehensive studies on the subject will contribute to revealing other factors affecting neuropathology and cell death and further elucidating the pathogenesis.

CONCLUSION

As a result, in our study, eNOS expression and TUNEL positivity were found to be significant higher in CDV infection compared to control tissues. This suggests that increased eNOS expression in CDV infection may trigger apoptosis. Further research on this subject is needed to develop new treatment approaches.

Acknowledgement

I would like to thank Cukurova University Biotechnology Laboratory staff.

Conflict of Interest

The author declares no potential conflicts of interest with respect to the research, authorship and/or publication of this article.

Author Contributions

All stages of the study were carried out by the corresponding author.

Funding

This research was not supported financially.

Ethical Considerations

Since this study used tissues archive our laboratory, ethics committee approval is not required. A document was received from the faculty ethics committee that the study does not require ethics committee approval (Date and Number of Document: 14/03/2024-32889)

REFERENCES

Albina, J. E, Cui, S., Mateo, R. B., & Reichner, J. S. (1993). Nitric oxide-mediated apoptosis in murine peritoneal macrophages. *Journal of Immunolog*, 150: 5080–5085.

Annunziato, L, Amoroso, S., Pannaccione, A., Cataldi, M., Pignataro, G., D'Alessio, A., Sirabella, R., Secondo, A., Sibaud, L, & Direnzo, G.F. (2003). Apoptosis induced in neuronal cells by oxidative stress: role played by caspases and intracellular calcium ions. *Toxicology Letters*, 139:125–133. https//doi.org/10.1016/S0378-4274(02)00427-7.

Bhat, A. H., Dar, K. B., Anees, S., Zargar, M. A., Masood, A., Sofi, M.A., & Ganie, S.A. (2015). Oxidative stress, mitochondrial dysfu.nction and neurodegenerative diseases; a mechanistic insight. *Biomedicine and Pharmacotheraphy*. 74:101–110. https//doi.org/10.1016/j.biopha.2015.07.025.

Boje, K. M., & Aroa, P. K. (1992). Microglial-produced nitric oxide and reactive nitrogen oxides mediate neuronal cell death. *Brain Research, 587* (2), 250–256. https//doi.org/10.1016/0006-8993(92)91004-x.

Bonfoco, E., Krainc, D., Ankarcrona, M., Nicotera, P., & Lipton, S. A. (1995). Apoptosis and necrosis: two distinct events induced respectively, by mild and intense insults with N-methyl- D-aspartate or nitric oxide/superoxide in cortical cell cultures. *Proceedings of the National Academy of Sciences, 92*:7162–7166. https//doi.org/10.1073/pnas.92.16.7162.

Brookes, P. S., Salinas, E. P., Darley-Usmar, K., Eiserich, J. P., Freeman, B. A., Darley-Usmar, V. M., & Anderson, P. G. (2000). Concentration-dependent effects of nitric oxide on mitochondrial permeability transition and cytochrome crelease. *Journal of Biological Chemistry 7*:20474–20479. https//doi.org/10.1074/jbc. M001077200.

Broos, K., Feys, H. B., De Meyer, S. F., Vanhoorelbeke, K., & Deckmyn, H. (2011). Platelets at work in primary hemostasis. *Blood Reviews, 25*, 155–167. https//doi.org/10.1016/j.blre.2011.03.002.

Calabrese, V., Mancuso, C., Calvani, M., Rizzarelli, E., Butterfield, D.A., & Stella, A.M. (2007). Nitric oxide in the central nervous system: neuroprotection versus neurotoxicity. *Nature Reviews Neurosciences, 8*, 766–https//doi.org/10.1038/nrn2214.

Chandra, J., Samali, A., & Orrenius, S. (2000). Triggering and modulation of apoptosis by oxidative stress. Free Radical *Biology and Medicine, 29*:323–333. https//doi.org/10.1016/S0891-5849(00)00302-6.

Cinelli, M. A., Do, H. T., Miley, G. P., & Silverman, R. B. (2020). Inducible nitric oxide synthase: regulation, structure, and inhibition. *Medicinal Research Reviews, 40* (1), 158–189. https//doi.org/10.1002/med.21599.

Cole, C., Thomas, S., Filak, H., Henson, P. M., & Lenz, L. L. (2012). Nitric oxide increases susceptibility of Toll-like receptor-activated macrophages to spreading Listeria monocytogenes. *Immunity. 36*:807–820. https//doi.org/10.1016/j. immuni.2012.03.011.

Dawson, V. L., Dawson, T. M., London, E. D., Bredt, D. S., & Snyder, S. H. (1991). Nitric oxide mediates glutamate neurotoxicity in primary cultured cortical neurons. *Proceedings of the National Academy of Sciences. 88* (14), 6368–6371. https//doi.org/10.1073/pnas.88.14.6368.

Endres, M., Laufs, U., Liao, J. K., & Moskowitz, M. A. (2004). Targeting eNOS for stroke protection. *Trend in Neurosciences, 27:* 283–289. https//doi.org/10.1016/j.tins.2004.03.009.

Fridovich, I. (1983). Superoxide dismutases: regularities and irregularities. *The Harvey Lectures, 79*, 51-75.

Graber, H. U., Muller, C. F., Vandevelde, M, & Zurbriggen, A. (1995). Restricted infection of canine distemper virus leads to down-regulation of myelin gene transcription in cultured oligodendrocytes. *Acta Neuropathologica, 90*, 312–318. https//doi.org/10.1007/BF00296516.

Dincel, G., Ç., Kul, O. (2015). eNOS and iNOS trigger apoptosis in the brains of sheep and goats naturally infected with the border disease virüs. *Histology and Histopathology. 30*(10):1233-42. https//doi.org/10.14670/HH-11-621.

Heiss, C., Rodriguez-Mateos, A., & Kelm, M. (2015). Central role of eNOS in the maintenance of endothelial homeostasis. *Antioxidants and Redox Signaling. 22* (14), 1230–1242. https//doi.org/10.1089/ars.2014.6158.

Hibbs, J. B., Jr., Taintor, R. R., Vavrin, Z., & Rachlin, E. M. (1988) Nitric oxide: a cytotoxic activated macrophage effector molecule. *Biochemical and Biophysical Research Communications, 157*,87-94. https//doi.org/10.1016/s0006-291x(88)80015-9.

Karayiğit, M. Ö. (2018). Nitric oxide synthase expression in naturally ınfected sheep brain with Listeria monocytogenes and relationship with cell death. *Acta Scientiae Veterinariae, 46* (1617):1–7. https//doi.org/10.22456/1679–9216.88907.

Kim, Y. M., Bombeck, C. A., Billiar. T. R. (1999). Nitric Oxide as a Bifunctional Regulator of Apoptosis. *Circulation Research, 84*:253-256. https://doi.org/10.1161/01.res.84.3.253.

Kubes, I. (1993). Ischemia-reperfusion in feline small intestine: a role for nitric oxide. *American Physiological Society Journal. 264*(1), G143-9. https//doi.org/10.1152/ajpgi.1993.264.1.G143.

Moncada, S., Palmer, R. M. J., & Higgs, E. A. (1991) Nitric oxide: physiology, pathophysiology, and pharmacology *Pharmacological. Reviewes. 43*,109-142.

Moro, L., Martins, A. S., Alves, C. M., Santos, F. G. A., Del Puerto, H. L., & Vasconcelos, A. C. (2003). Apoptosis in the Cerebellum of Dogs with Distemper. *Journal of Veterinar Medicine*, 50, 221–225. https//doi.org/10.1046/j.1439-0450.2003.00657.x.

Nathan,. C., (1992). Nitric oxide as a secretory product of mammalian cells. *FASEB Journal, 6*(12):3051-64.

Nicotera, P., Bonfoco, E., & Brüne, B. (1995). Mechanisms for nitric oxide-induced cell death: involvement of apoptosis. *Advances in Neuroimmunology. 5*:411–420. https//doi.org/10.1016/0960-5428(95)00025-9.

Norrby, E., Kövamees, J., Blixenkrone-Möller, M., Sharma, B., & Orvell, C. (1992). Humanized animal viruses with special reference to the primate adaptation of morbillivirus. *Veterinary Microbiology, 33*, 275–286. doi: 10.1016/0378-1135(92)90055-x.

Siegfried, M. R., Carey, C., Ma, X. L., & Lefer, A. M. (1992). Beneficial effects of SPM-5185, a cysteine-containing NO donor in myocardial ischemia-reperfusion American Physiological Society Journal. Sep;263(3 Pt 2):H771-7. https//doi.org/10.1152/ajpheart.1992.263.3.H771.

Srivastava, K., Bath, & P. M., Bayraktutan, U. (2012). Current therapeutic strategies to mitigate the eNOS dysfunction in ischaemic stroke. *Cellular and Molecular Neurobiology. 32*, 319–336. https//doi.org/10.1007/s10571-011-9777-z.

Stuehr, D. J., & Griffith, O. W. (1992). Mammalian nitric oxide synthases. Advances in enzymology and related areas of molecular biology. 65, 287–346. https//doi.org/10.1093/eurheartj/ehr304.

Thomas, D. D., Ridnour, L. A., Isenberg, J. S., Flores-Santana, W., Switzer, C. H., Donzelli, S., & Ambs, S. (2008). The chemical biology of nitric oxide: implications in cellular signaling. *Free Radical Biology and Medicine. 45* (1), 18–31. https//doi.org/10.1016/j.freeradbiomed.2008.03.020.

Tipold, A., Jaggy, A., Zurbriggen, A., & Vandevelde, M. (1996). Neurological signs in canine distemper encephalomyelitis – a clinical study. European Journal of Companion Animal Practice. 6, 33–38.

Toda, N., Ayajiki, K., & Okamura, T. (2009). Cerebral blood flow regulation by nitric oxide: recent advances. *Pharmacological Reviews. 61*, 62–97. https//doi.org/10.1124/pr.108.000547.

Vandevelde, M., & Zurbriggen, A. (2005). Demyelination in canine distemper virus infection: a review. *Acta Neuropathologica, 109*: 56–68. https//doi.org/10.1007/s00401-004-0958-4.

Yao, S. K., Ober, J. C., Krishnaswami, A, Ferguson, J. J., Anderson, H. V., Golino, P., Buja, L. M., & Willerson, J. T. (1992). Endogenous nitric oxide protects against platelet aggregation and cyclic flow variations in stenosed and endothelium-injured arteries. *Circulation 86*, 1302-1309. https://doi.org/10.1161/01.CIR.86.4.1302.

Zhou, L., & Zhu, D. Y. (2009). Neuronal nitric oxide synthase: structure, subcellular localization, regulation, and clinical implications. *Nitric Oxide 20*(4), 223–230. https://doi.org/10.1016/j.niox.2009.03.001.

ORİJİNAL MAKALE / ORIGINAL ARTICLE

Balıkesir Sağlık Bilimleri Dergisi / BAUN Sağ Bil Derg
Balıkesir Health Sciences Journal / BAUN Health Sci J
ISSN: 2146-9601- e ISSN: 2147-2238
Doi: https://doi.org/10.53424/balikesirsbd.1435567

The Effect of Watching Video Method on Pain Level and Physiological Parameters During Vaccine Injection in Children: A Randomized Controlled Study

Kübra TOK[1], Dilek KONUK ŞENER[2]

[1] Sancaktepe Prof. Dr. Feriha Öz Emergency Hospital
[2] Duzce University, Faculty of Health Sciences, Department of Nursing

Geliş Tarihi / Received: *12.02.2024,* ***Kabul Tarihi / Accepted:*** *18.04.2024*

ABSTRACT

Objective: The study aimed to determine the effect of the watching video method applied to children during vaccine injection on pain level and physiologic parameters. **Materials and Methods:** The study was conducted as a randomized controlled experimental study. The study sample consisted of 60 children who agreed to participate due to the power analysis and met the inclusion criteria. The data was collected using the Personal Information Form, FLACC Pain Scale, and Physiological Parameter Assessment Form. **Results:** When the pain level of the children was evaluated, it was determined that the FLACC Pain Scale scores of the children in the watching video group during and after the procedure were significantly lower than the children in the control group ($p<0.001$). When the physiologic parameter results were examined, it was determined that the heart rate values of the children in the intervention group were significantly higher than those of the control group after the procedure ($p<0.05$), and the oxygen saturation values of the children in the control group decreased significantly after the procedure compared to before the procedure ($p<0.05$). **Conclusion:** It was observed that the watching video method applied to children as a distraction during vaccine injection effectively reduced the pain level. In line with these results, it is recommended to use the video distraction method in order to decrease the pain level and positively affect the oxygen saturation values of children receiving vaccine injection**s.**

Keywords: Children, Distraction, Pain, Vaccines, Video Recording.

Çocuklara Aşı Enjeksiyonu Sırasında Uygulanan Video İzletme Yönteminin Ağrı Düzeyi ve Fizyolojik Parametrelere Etkisi: Randomize Kontrollü Çalışma

ÖZ

Amaç: Araştırma, çocuklara aşı enjeksiyonu sırasında uygulanan video izletme yönteminin ağrı düzeyi ve fizyolojik parametrelere etkisini belirmek amacı ile yapılmıştır. **Gereç ve Yöntem:** Araştırma randomize kontrollü deneysel çalışmadır. Araştırmanın örneklemini, yapılan güç analizi sonucunda çalışmaya katılmayı kabul eden ve örnekleme alınma kriterlerini taşıyan toplam 60 çocuk oluşturmuştur. Verilerin toplanmasında Kişisel Bilgi Formu, FLACC Ağrı Ölçeği ve Fizyolojik Parametre Değerlendirme Formu kullanılmıştır. **Bulgular:** Çocukların ağrı düzeyi değerlendirildiğinde, video izleme grubundaki çocukların işlem sırasında ve işlem sonrasındaki FLACC Ağrı Ölçeği puanlarının kontrol grubundaki çocuklardan anlamlı derecede düşük olduğu belirlenmiştir ($p<0,001$). Fizyolojik parametre sonuçları incelendiğinde, girişim grubundaki çocukların işlem sonrası kalp tepe atımı değerlerinin kontrol grubuna göre anlamlı derecede fazla olduğu ($p<0,05$), kontrol grubundaki çocukların işlem sonrasında oksijen satürasyonu değerlerinin işlem öncesine göre anlamlı derecede azaldığı ($p<0,05$) bulunmuştur. **Sonuç:** Çocuklara aşı enjeksiyonu sırasında dikkati dağıtma yöntemi olarak uygulanan video izletme yönteminin hissedilen ağrı düzeyini azaltmada etkili olduğu görülmüştür. Bu sonuçlar doğrultusunda, aşı enjeksiyonu uygulanan çocukların ağrı düzeyinin azalması ve oksijen satürasyonu değerlerinin olumlu yönde etkilenmesi için, video izletme yöntemi kullanılması önerilmektedir.

Anahtar Kelimeler: Çocuklar, Dikkat Dağıtma, Ağrı, Aşılar, Video Kayıt.

Sorumlu Yazar / Corresponding Author: Dilek KONUK ŞENER, Duzce University, Faculty of Health Sciences, Department of Nursing, Duzce, Turkey
E-mail: dilekkonuk@duzce.edu.tr

Bu makaleye atıf yapmak için / Cite this article: Tok, K., & Konuk Şener, D. (2024). The effect of watching video method on pain level and physiological parameters during vaccine injection in children: A Randomized Controlled Study. *BAUN Health Sci J, 13(2), 397-405*. https://doi.org/10.53424/balikesirsbd.1435567

INTRODUCTION

Pain is defined as "an unpleasant sensory and emotional experience associated with, or resembling that associated with, actual or potential tissue damage" (IASP, 2020). McCaffery defined pain as "whatever the experiencing person says it is, existing whenever the experiencing person says it does" (McCaffery & Ferrell, 1997). Pain is a highly complex and personal experience with multiple influencing factors such as previous pain experience, culture, and social support network (Törüner & Büyükgönenç, 2015; Brand, 2022).

Throughout their developmental process, children are exposed to many invasive procedures in hospitals for reasons such as diagnosis, immunization, and treatment of diseases (Erdogan & Ozdemir, 2021). Children's experience of pain during these procedures has a negative impact on their lives (Güngör & Öztürk Şahin, 2021; Kudubeş et al., 2021). Childhood experiences of pain shape children's future pain responses. Effective and timely pain control during painful, invasive interventions to which children are exposed increases pain tolerance in subsequent interventions (Erdogan & Ozdemir, 2021).

Pain management is a professional and ethical responsibility. Inappropriate pain management leads to unexpected harmful consequences (Kudubeş et al., 2021). Pain causes changes in mental development in children and negatively affects growth (Güngör & Öztürk Şahin, 2021; Atak & Özyazıcıoğlu, 2021). It was determined that adults' fear of injection was caused by invasive interventions performed in childhood. Therefore, it is very important to make painful experiences in childhood less traumatic (Çalı, 2020; Erdogan & Ozdemir, 2021). For effective pain management in children, it is essential to use the nursing process to recognize, diagnose, and control pain with the active participation of all health professionals (Kudubeş et al., 2021; Törüner & Büyükgönenç, 2015).

Pharmacological and nonpharmacological or both methods can be used in pain management (Cobb & Cohen, 2009; Kudubeş et al., 2021). Nonpharmacological methods have benefits such as low cost, no side effects, and increased effects of analgesics or a reduced amount of their use (Kudubeş et al., 2021; Shen et al., 2022; Törüner & Büyükgönenç, 2015). The distraction method, which is one of the nonpharmacological methods, aims to focus on a stimulus other than pain during the procedure. This method controls pain by focusing on favorite things (Karakaya & Gözen, 2016; Kıran et al., 2013). When the literature is reviewed, it is stated that the most effective nonpharmacological pain reduction method in pediatric vaccine injections and the first seven years of life is "distraction" (Lobo & Umarani, 2013; Wang et al., 2008).

The distraction method is divided into two groups: active and passive. Active distraction encourages the child's participation in the activities during the procedures. Active techniques include singing songs, squeezing balls, balloon inflation, relaxation breathing, and playing with electronic devices (Abdelmoniem & Mahmoud, 2016; Kara & Bal Yılmaz, 2020). Health professionals use visual and auditory sources in passive distraction, and the child remains quiet. Passive distraction includes watching videos, listening to music, reading a book to the child, or telling him a story (Abdelmoniem & Mahmoud, 2016; Kara & Bal Yılmaz, 2020; Bayır & Günşen, 2017). Cartoons affect children's behavior, creativity, choices, learning skills, and success and contribute to lifelong learning. (Bayır & Günşen, 2017). Watching cartoon videos is a nonpharmacological method that is low-cost, does not require special preparation, can be easily applied, and can distract both visually and audibly. The literature supports the use of animated cartoon videos to relieve pain during invasive interventions. (Aşkan, 2022; Canbulat, Inal & Sönmezer, 2014).

When the literature is examined, it is seen that there is a limited number of studies investigating the effect of video watching method, which is one of the passive distraction methods, on pain and physiological parameters during vaccine injection. It is thought that the results of this study will contribute to reducing the pain and fear of the child, shorten the application time by facilitating the procedure, provide a scientific basis for nursing practices in clinical settings, and improve the quality of care by improving children's ability to cope with pain and fear. In this direction, the study was conducted to determine the effect of the watching video method applied to children during vaccine injection on pain level and physiological parameters.

Research Hypotheses

H0: The watching video method applied during vaccine injection in children has no effect on pain level and physiological parameter values

H1: The watching video method applied during vaccine injection in children reduces the level of pain.

H2: The watching video method applied during vaccine injection in children positively affects physiological parameter values.

MATERIALS AND METHODS

Study type

The study was conducted as a randomized controlled trial with a parallel design.

Study group

The population of the study consisted of 12-24-month-old children who applied to Kaynaşlı District State Hospital Family Medicine for vaccine injection between November 2019 and March 2020. Sample calculation was made with the G*power 3.1.9.2 package program. With an effect size of 0.9, a significance level of 0.05, and a power of 80%, the minimum number of participants per group was determined as 21 people. Considering the possibility of missing cases, it was decided to include 30 children in each group. The study sample consisted of 60 children who met the sampling criteria (Figure 1). The inclusion criteria for the children were determined as being aged between 12-24 months old, the gestational age was 38-42 weeks, there was no significant disease/chronic disease (visual-hearing problems, neurological diseases, physical problems), the children

had not taken any analgesic in the last three hours, the parents voluntarily agreed to participate in the study and gave written informed consent. The children included in the study were randomly assigned to the study groups by randomization method and divided into two groups. Randomization was done using the simple lottery method. While forming the groups, a lottery was drawn blindfolded by a nurse other than the research nurse, and the children were assigned to one of the study groups.

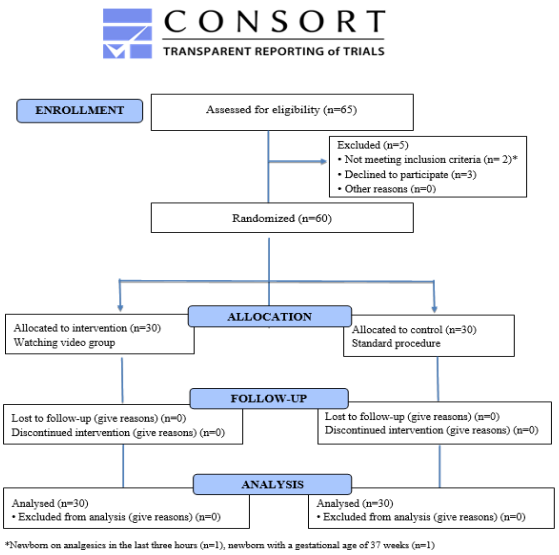


Figure 1. Consort diagram of the study

Data Collection Instruments

The study used the Personal Information Form, FLACC Pain Scale, and Physiological Measurement Form as data collection tools.

Introductory Information Form

The researchers developed the introductory information form after a literature review (Erbay, 2016; Güngör & Öztürk Şahin, 2021). This form consists of questions about family and children, including the child's age, gestational week, gender, height, weight, percentile value, name of vaccine, use of analgesic, significant disease and chronic disease status, and parent's age, educational level, socioeconomic status, place of residence, and family type.

FLACC Pain Scale

The scale was developed by Merkel et al. (1997) for use in acute pain, postoperative pain, and acute pain in intensive care for children aged 6 months to 5 years. It is a multi-purpose, simple, and consistent scale with a variety of uses. It is a pain scale that can be used safely in the assessment of pain and pain management during an interventional procedure (Okyay & Ayoğlu, 2018; Reisli 2018). It is a scale that was designed as the YBAAT pain scale in our country by Şenaylı et al. in 2006 and has proven its validity and reliability. Facial expression, leg movement, activity, cry, and consolability are each scored 0-2, for a total FLACC score of 0-10. A total score of 0 is considered calm, 1-3 as mild pain, 4-6 as moderate pain, and 7-10 as significant pain (Okyay & Ayoğlu, 2018; Reisli, 2018). In this study, the Cronbach alpha values of the scale were 0.854 before the procedure, 0.903 during the procedure, and 0.772 after the procedure.

Physiological Parameter Assessment Form

The form includes criteria for evaluating the children's physiological parameters (oxygen saturation, heart rate) before and after the procedure.

Data Collection

Before the study, the parents of the children were interviewed, given the necessary information, and asked to sign the informed consent forms. Since all children came to the vaccination with their mothers, interviews were conducted with mothers. The introductory information form for the parents and children was filled out during this interview. The researchers measured the weight and height of the children before the procedure.

The children's pain levels were evaluated three times, and physiologic parameters were evaluated twice. The first evaluation of pain was performed before the procedure, the second was performed during the procedure, and the third was performed after the completion of the procedure. The first evaluation of physiologic parameters was performed before the procedure, and the second evaluation was performed after the completion of the procedure. Children in the intervention group were shown an age-appropriate video (redfish). The children in the control group were only using standard vaccine injection procedures. Parents of the children were present during all steps of the procedure.

Data Analysis

Data were analyzed using the IBM SPSS Statistics 28 package program. In the study, descriptive statistics of continuous variables were presented with mean, standard deviation, median, minimum, and maximum values, and descriptive statistics of categorical variables were presented with numbers and percentages. Shapiro Wilk's test analyzed the normal distribution of the variables. When examining the differences between the groups, the Chi-Square test was used when examining the relationships between two independent categorical variables. Mann-Whitney U Analysis examined the differences between the two independent groups. Wilcoxon analyzed differences between two dependent numerical variables, and differences between more than two dependent numerical variables were analyzed by Friedman Analysis. The significance level was set at 0.05 (p-value) in statistical analyses.

Ethical Considerations

Written approval was obtained from the Düzce University Non-Interventional Health Research Ethics Committee to conduct the study (Decision No. 2019/117). Prior to the study, permission was obtained from the Düzce Governorship, Düzce Provincial Health Directorate, and Kaynaşlı District State Hospital. Parents were informed about the purpose of the study and the practices, and their verbal and written consents were obtained. The researchers followed the "principle of confidentiality" by explaining to the participants that their data would not be disclosed to others. The permission to use the FLACC Pain Scale was obtained from Dr. Yeşim Şenaylı, who conducted the validity and reliability study.

RESULTS

When the descriptive characteristics of the children according to the groups were compared, it was determined that there was no statistically significant difference between the groups in terms of age, gender, height, weight, percentile range, vaccination, use of analgesic in the last three hours, significant disease and variables (p>0.05) and that it was showed homogeneous distribution (Table 1). When the age, education level, employment status, economic status, residential area, and family type variables of the parents in the watching videos group and control group were compared in Table 2, it was determined that there was no statistically significant relationship between them (p>0.05) and that they were homogeneously distributed.

Table 1. Comparison of descriptive characteristics of children by groups.

	Watching Video (n=30)		Control (n=30)		Total (n=60)		χ2	p
	n	%	n	%	n	%		
Age	1.42±0.41		1.42±0.42		1.42±0.41			
12-18 month	14	46.7	14	46.7	28	46.7	0.000	1.000
18-24 month	16	53.3	16	53.3	32	53.3		
Gender								
Female	15	50.0	15	50.0	30	50.0	0.000	1.000
Male	15	50.0	15	50.0	30	50.0		
Height (cm)	79.40±5.56		80.57±5.72		79.98±5.63			
70-80 cm	18	60.0	17	56.7	35	58.3	0.069	0.793
81-91 cm	12	40.0	13	43.3	25	41.7		
Weight (g)	11,004±2,239.95		11,286.67±1,585.87		11,145.33±1,929.42			
3,300-11,000 g	14	46.7	13	43.3	27	45.0	0.067	0.795
11,001-15,100 g	16	53.3	17	56.7	33	55.0		
Weight percentile								
3-10	2	6.7	2	6.7	4	6.7		
10-25	4	13.3	4	13.3	8	13.3		
25-50	5	16.7	5	16.7	10	16.7	0.000	1.000
50-75	9	30.0	9	30.0	18	30.0		
75-90	5	16.7	5	16.7	10	16.7		
90-97	5	16.7	5	16.7	10	16.7		
Vaccination								
DaBT-İPA-Hib	8	26.7	8	26.7	16	26.7	0.000	1.000
Hep-A	8	26.7	8	26.7	16	26.7		
MMR	14	46.7	14	46.7	28	46.7		
Use of analgesic in the last three hours							-	-
Yes	0	0.0	0	0.0	0	0.0		
No	30	100.0	30	100.0	60	100.0		
Significant disease								
Yes	0	0.0	0	0.0	0	0.0	-	-
No	30	100.0	30	100.0	60	100.0		

Table 2. Comparison of descriptive characteristics of parents by groups (continued).

	Watching Video (n=30)		Control (n=30)		Total (n=60)		χ2	p
	n	%	n	%	n	%		
Age	30.60±5.61		29.57±5.67		30.08±5.62			
19-29	13	43.3	15	50.0	28	46.7	0.268	0.605
30-40	17	56.7	15	50.0	32	53.3		
Educational Level								
Illiterate	3	10.0	0	0.0	3	5.0		
Primary School	3	10.0	6	20.0	9	15.0		
Middle School	10	33.3	10	33.3	20	33.3	6.623	0.250
High School	8	26.7	9	30.0	17	28.3		
University	5	16.7	5	16.7	10	16.7		
Master's degree	1	3.3	0	0.0	1	1.7		
Employment Status								
Working	3	10.0	5	16.7	8	13.3	0.144	0.706
Not working	27	90.0	25	83.3	52	86.7		
Economic Status								
Income less than expenses	3	10.0	5	16.7	8	13.3	3.598	0.254
Income equals expense	27	90.0	23	76.7	50	83.3		
Income more than expenses	0	0.0	2	6.7	2	3.3		
Place of Residence								
District	20	66.7	21	70.0	41	68.3	0.077	0.781
Village	10	33.3	9	30.0	19	31.7		
Family Type								
Nuclear family	25	83.3	23	76.7	48	80.0	1.561	0.458
Extended family	5	16.7	6	20.0	11	18.3		
Parents separated	0	0.0	1	3.3	1	1.7		

When the FLACC Pain Scale scores of the children included in the study are examined in Table 3, no statistically significant difference exists between the children in the watching video group and the control group regarding FLACC Pain Scale scores before the procedure ($p>0.05$). At the same time, there is a statistically significant difference in FLACC Pain Scale scores during and after the procedure ($p<0.05$). Accordingly, the FLACC Pain Scale scores of the children in the watching video group during and after the procedure were significantly lower than those in the control group.

When the FLACC Pain Scale scores of the children included in the study measured at repeated times were examined in Table 3, it was determined that the pain scores of the children in the watching video group and control group during the procedure were significantly higher than the pain scores before and after the procedure. The difference between them was statistically significant ($p<0.05$).

Table 3. Comparison of FLACC scores according to groups and processing time.

FLACC	Watching Video (n=30)		Control (n=30)		Z	p
	Mean ±SS	Median (Min-Max)	Mean±SS	Median (Min-Max)		
Before procedure	1.73±1.87	1.0(0-5)	2.57±2.37	2.0(0-9)	-1.262	0.207
During procedure	6.20±3.20	7.0(0-10)	8.43±2.27	9.5(3-10)	-3.383	**0.000***
After procedure	1.43±1.50	1.0(0-4)	3.40±1.71	3.0(0-7)	-3.995	**0.000***
Fr; p	41.029; **0.000***		46.383; **0.000***			
Difference	During the procedure-Preprocedural During the procedure-Postprocedural		During the procedure-Preprocedural During the procedure-Postprocedural			

Z: Mann Whitney U, Fr: Friedman Analyses, *p<0.05

When the before-procedure and after-procedure heart rates of the children included in the study are compared in Table 4, there is no statistically significant difference between the children in the watching video group and the control group regarding the before-procedure heart rate (p>0.05). At the same time, there is a statistically significant difference in after-procedure heart rate (p<0.05). Accordingly, the after-procedure heart rate of the children in the watching video group was significantly higher than that of the children in the control group. When the children's heart rate in the watching video group and control group measured at repeated times were analyzed in Table 4, it was determined that the heart rate after the procedure was significantly higher than in both groups (p<0.05).

When the SPO2 values of the children included in the study before and after the procedure were compared, there was a statistically significant difference between the children in the watching video and control groups in terms of SPO2 values before the procedure (p<0.05). At the same time, there was no statistically significant difference in SPO2 values after the procedure (p>0.05). Accordingly, the SPO2 levels of the children in the control group before the procedure were significantly higher than the children in the video monitoring group. When the SPO2 values of the children included in the study measured at repeated times were examined, there was no statistically significant difference between the SPO2 values of the children in the watching video group before and after the procedure (p>0.05). At the same time, there was a statistically significant difference between the SPO2 values of the children in the control group before and after the procedure (p<0.05). Accordingly, the SPO2 levels of the children in the control group decreased significantly after the procedure compared to before.

Table 4. Comparison of physical parameter values according to groups and processing time.

	Watching Video (n=30)		Control (n=30)		Z[a]	p
	Mean±SS	Median (Min-Max)	Mean±SS	Median (Min-Max)		
Heart rate						
Before procedure	106.83±14.31	102.0(82-147)	102.30±6.78	102.0(90-120)	-0.589	0.556
After procedure	115.33±15.51	117.0(86-148)	107.83±8.35	108.0(90-122)	-1.964	**0.049***
Z[b];p	-3.992;**0.000***		-4.314;**0.000***			
SPO2						
Before procedure	96.07±1.11	96.0(95-99)	97.13±1.20	97.0(95-99)	-3.396	**0.000***
After procedure	96.03±0.93	96.0(95-99)	96.57±1.19	97.0(95-99)	-1.937	0.053
Z[b];p	-0.237;0.813		-2.568;**0.010***			

Z[a]: Mann-Whitney U, Z[b]: Wilcoxon Analizi, *p<0.05

DISCUSSION

This study aimed to determine the effect of the watching video method applied to children during vaccine injection on pain level and physiologic parameters. Children are exposed to many painful procedures throughout their developmental process (Erdogan & Ozdemir, 2021). Age, gender, developmental level, body mass index, genetic characteristics, temperament, past experiences, parental perspective on pain, parental reactions, social and cultural characteristics, socioeconomic status, parental feelings, and expectations affect the perception of pain and reactions to pain in children (Çalı, 2020; Güngör & Öztürk Şahin, 2021). When descriptive characteristics of the children and mothers included in the study and control groups were compared in the study, no statistically significant differences were found between the groups (p>0.05). This shows that children and mothers in the watching video and control groups are homogenous in terms of descriptive characteristics (Table 1-2). In the experimental studies, it is desired that the groups have similar descriptive characteristics and statistically insignificant differences between them. The similarity between the variables that may affect the study's outcome decreases bias and increases the reliability of the study. In this study, homogeneity was ensured between the groups, and the results of the research were not affected. When the literature is reviewed, it is seen that experimental studies conducted to evaluate pain in children are homogeneous between groups in terms of the same characteristics (Aşkan, 2022; Başkaya, 2019; Çalı, 2020; Güngör & Öztürk Şahin, 2021; Krishnegowda et al., 2023).

When the pain level of children before the procedure was examined in the study, there was no statistically significant difference between the groups regarding FLACC scores, and the groups were homogeneous (p>0.05, Table 3). The similarity of characteristics between groups increases the reliability of the study and reduces bias. In the study, when the pain levels of children were compared during and after the vaccine injection procedure, it was determined that the pain level of children in the watching video group was lower than the control group, and the difference between them was found to be statistically significant (p<0.05, Table 3). These findings show that the video method applied to the intervention group effectively drew children's attention in different directions and reduced pain. It is seen that the

findings obtained in the study are similar to the findings of other studies in the literature (Aşkan, 2022; Cerne et al., 2015; Cohen et al., 1997; Gates et al., 2020; Gökoğlu, 2020; Inan & Inal, 2019). Cerne et al. (2015) found that the mean pain score of the group shown a cartoon video during vaccine injection was significantly lower than that of the group that received vaccine injection with the standard technique. Cohen et al. (1997) found that the pain score of the group in which children received vaccine injection by watching videos was significantly lower than the group in which routine vaccine injection was performed. When the results of other studies in the literature were examined, no study was found that examined the effect of using the watching video method on pain during vaccine injection. However, it was observed that studies were reporting that the use of video method decreased the pain level in invasive procedures such as peripheral venipuncture and venous blood sampling in children (Aşkan, 2022; Erbay, 2016; Gates et al., 2020; Gökoğlu, 2020; Inan & Inal, 2019; Krishnegowda et al., 2023).

When the physiological parameter results of the children were examined, it was found that the heart rate values of the children in the watching video group were significantly higher than those of the control group after the procedure ($p<0.05$). The experience of pain in children is a stressful situation. The body shows some physiological changes as a stress response. These changes start with stimulation of the sympathetic nervous system and adrenal medulla. In response to stress, heart rate, blood pressure, and respiratory rate increase, and ventilation of the lungs decreases (Birnie et al., 2018; Brand, 2022). In this study, it is thought that the high peak heart rate of the children in the intervention group was due to the short duration of the method applied. In the literature, it is reported that it is challenging to detect physiological changes, indicating that the autonomic nervous system is stimulated in short-term interventions such as vaccine injection and blood sampling. Since the procedure is short, the changes return to normal rapidly, and physiological adaptation develops quickly (Miozzo et al., 2016). When the SPO2 values of the children included in the study measured at repeated times were examined, the SPO2 values of the children in the control group decreased significantly after the procedure compared to before the procedure ($p<0.05$). Accordingly, there was no significant decrease in the mean oxygen saturation of the children in the watching video group after the procedure. In contrast, the oxygen saturation levels of the children in the control group decreased significantly after the procedure (96.57±1.19) compared to before (97.13±1.20). The oxygen saturation levels of children in the control group, in which no intervention was applied, were negatively affected.

When the literature was examined, no study was found that examined the effect of using the watching video method on physiological parameters during vaccine injection. However, it was observed that there were studies examining the effect of the use of the watching video method on physiological parameters in invasive procedures such as peripheral venipuncture and venous blood sampling in children. When these studies were examined, it was seen that there were different study results. In the study by Erbay (2016), in which the effect of watching a cartoon video during peripheral venipuncture was examined, no significant difference was found between the watching video and control groups regarding heart rate and oxygen saturation. Gökoğlu (2020) examined the effect of watching cartoon videos and playing video games during invasive procedures (venipuncture/blood collection) in children. It was determined that the heart rate of the video game-playing group was significantly lower than the control group. However, there was no significant difference between the cartoon-watching, video game-playing, and control groups regarding oxygen saturation.

Watching cartoons is a nonpharmacological method that is used to distract both visually and audibly. It is low-cost, does not require special preparation, and is easy to apply. This study will significantly contribute to the literature due to its positive effect on pain levels and the lack of studies on the subject. Using video monitoring methods in interventional procedures such as vaccine injections to reduce children's pain levels will enable healthcare professionals to perform procedures safely. It will be beneficial in terms of patient safety.

Limitations

This research's limitations were that the sample was limited to children aged 12-24 months, and the findings cannot be generalized to children in other stages of development.

CONCLUSION

The study observed that watching videos as a distraction during vaccine injection was effective in reducing the level of pain. In line with these results, it is recommended to use this method to decrease the pain level and positively affect the oxygen saturation values of children receiving vaccine injections. In addition, parents need to be involved in the care of children in pain management.

Health professionals should use appropriate measurement tools to assess the children's pain status and regularly monitor physiological parameters. They should also receive the necessary training to learn about physiological and behavioral responses to pain. Besides, it is suggested that evidence-based studies be conducted evaluating the effectiveness of video methods in different age groups and different painful interventions.

Acknowledgment

This study was accepted as a master's thesis in the Department of Nursing of Düzce University Graduate Education Institute. The authors would like to extend their sincere thanks to anyone who contributed to it.

Conflict of Interest

The author declares no potential conflicts of interest concerning this article's research, authorship, and/or publication.

Author Contributions
Plan, design: KT, DKŞ; **Material, methods, and data collection:** KT, DKŞ; **Data analysis and comments:** KT, DKŞ; **Writing and corrections:** KT, DKŞ

Funding
This research did not receive any specific grant from public, commercial, or not-for-profit funding agencies.

Ethical Considerations
Written approval was obtained from the Düzce University Non-Interventional Health Research Ethics Committee to conduct the study (Decision No. 2019/117). Prior to the study, permission was obtained from the Düzce Governorship, Düzce Provincial Health Directorate, and Kaynaşlı District State Hospital. Parents were informed about the purpose of the study and the practices, and their verbal and written consents were obtained. The researchers followed the "principle of confidentiality" by explaining to the participants that their data would not be disclosed to others. The permission to use the FLACC Pain Scale was obtained from Dr. Yeşim Şenaylı, who conducted the validity and reliability study.

REFERENCES

Abdelmoniem, S. A., & Mahmoud, S. A. (2016). Comparative evaluation of passive, active, and passive-active distraction techniques on pain perception during local anesthesia administration in children. *Journal of Advanced Research*, *7*(3), 551-556. https://doi.org/10.1016/j.jare.2015.10.001

Aşkan G. (2022). The effect of cartoons and musical-animated toys on children's pain and fear level in the invasive procedure application. [master's thesis]. Ataturk University; Erzurum

Atak, M., ve Özyazıcıoğlu, N. (2021). The effect of different audio distraction methods on children's postoperative pain and anxiety. *Journal of PeriAnesthesia Nursing*, *36*(1), 75-80. https://doi.org/10.1016/j.jopan.2020.06.028

Başkaya, M. (2019). The effect of the cartoon shown to children before phlebotomy to prepare them to the procedure on their fear and pain. [master's thesis]. Eskişehir Osmangazi University; Eskişehir

Bayır, E., Günşen, G. (2017). Scientific analysis of cartoons which children watch the most in preschool period. *Trakya Journal of Education, 7*(2), 746-761.

Birnie, K. A., Noel, M., Chambers, C. T., Uman, L. S., & Parker, J. A. (2018). Psychological interventions for needle-related procedural pain and distress in children and adolescents. *Cochrane Database of Systematic Reviews, 10*(10): CD005179. https://doi.org/10.1002/14651858.CD 005179.pub4.

Brand, K. (2022). Pain assessment in children. *Anaesthesia & Intensive Care Medicine, 23*(5), 260-263.

Canbulat, N., Inal, S., & Sönmezer, H. (2014). Efficacy of distraction methods on procedural pain and anxiety by applying distraction cards and kaleidoscope in children. *Asian Nursing Research, 8*(1), 23-28. https://doi.org/10.1016/j.anr.2013.12.001.

Cerne, D., Sannino, L., & Petean, M. (2015). A randomised controlled trial examining the effectiveness of cartoons as a distraction technique. *Nursing Children and Young People,* 27(3), 28-33. https://doi.org/10.7748/ncyp.27.3.28.e534.

Cobb, J. E., & Cohen, L. L. (2009). A randomized controlled trial of the ShotBlocker for children's immunization distress. *The Clinical Journal of Pain*, *25*(9), 790–796. https://doi.org/10.1097/AJP.0b013e3181af1324

Cohen, L. L., Blount, R. L., & Panopoulos, G. (1997). Nurse coaching and cartoon distraction: An effective and practical intervention to reduce child, parent, and nurse distress during immunizations. *Journal of Pediatric Psychology*, *22*(3), 355–370. https://doi.org/10.1093/jpepsy/22.3.355

Çalı Ö. (2020). Determining the effect of atraumatic care package applied before, during and after the peripheral intravenous catheter intervention in preschool children on the child's pain level, emotional and physiological indicator. [master's thesis]. Yeditepe University; Istanbul.

Erbay, E. (2016). Effect of the distraction technique which is done during peripheral venous cannulation in the children on reducing pain. [master's thesis]. Bulent Ecevit University Institute of Health Sciences, Zonguldak

Erdogan, B., & Ozdemir, A. A. (2021). The effect of three different methods on venipuncture pain and anxiety in children: Distraction cards, virtual reality, and Buzzy®(randomized controlled trial). *Journal of Pediatric Nursing*, *58*, e54-e62. https://doi.org/10.1016/j.pedn.2021.01.001

Gates, M., Hartling, L., Shulhan-Kilroy, J., MacGregor, T., Guitard, S., Wingert, A., ... & Ali, S. (2020). Digital technology distraction for acute pain in children: a meta-analysis. *Pediatrics*, *145*(2).

Gökoğlu, A. (2020). The effects of active and passive distraction methods on pain, fear, and anxiety during the invasive procedure in children. [master's thesis]. İstanbul University Cerrahpasa, Institute of Graduate Studies, İstanbul

Güngör, T., Öztürk Şahin, Ö. (2021). Analysis of two nonpharmacological pain management methods for vaccine injection pain in infants: A randomized controlled trial. *Agri/Journal of the Turkish Society of Algology*, 33(1): 15-22. https://doi.org/10.14744/agri.2020.54289

IASP [Internet]. Announces Revised Definition of Pain. [Updated: 2020; Cited: 2023 Dec 25]. Available from:https://www.iasppain.org/publications/iaspnews/iasp-announces-revised-definition-of-pain/

Inan, G., & Inal, S. (2019). The impact of 3 different distraction techniques on the pain and anxiety levels of children during venipuncture. *The Clinical Journal of Pain, 35*(2), 140-147. https://doi.org/10.1097/AJP.0000000000000666.

Kara, R., & Bal Yılmaz, H. (2020). Examining the methods used to reduce the ınterventional pain by nurses in pediatric clinics. *HEAD*, *17*(2), 104-11. https://doi.org/10.5222/HEAD.2020.13334

Karakaya, A., & Gözen, D. (2016). The effect of distraction on pain level felt by school-age children during venipuncture procedure—Randomized controlled trial. *Pain Management Nursing*, *17*(1), 47-53. https://doi.org/10.1016/j.pmn.2015.08.005.

Kıran, B., Çalik, C., & Esenay, F. I. (2013). Therapeutic play: communication key with sick child. *Journal of Ankara Health Sciences*, *2*(1), 1-10. https://doi.org/10.1501/Asbd0000000038

Krishnegowda, M., Unki, P., Manuja, L. M., & Kerudi, M. P. (2023). Effectiveness of cartoon video as a distraction strategy on pain perception during venepuncture among children. *J Med Sci Res*, *11*(1), 42-46. http://dx.doi.org/10.17727/JMSR.2023/11-9

Kudubeş A. A., Bektaş İ, Bektaş M. (2021). Nursing role in children pain management. *J Educ Res Nurs, 18*(1):107-113. http://dx.doi.org/10.5152/jern. 2021.91489

Lobo, M. R., & Umarani, J. (2013). Cartoon distraction reduces venipuncture pain among preschoolers–a quasi-experimental study. *Medical Science, 2*(6):454-456.

McCaffrey, M., & Ferrell, B. R. (1997). Nurses' knowledge of pain assessment and management: How much progress have we made? *Journal of Pain and Symptom Management*, *14*(3), 175–188. https://doi.org/10.1016/S0885-3924(97)00170-X

Merkel, S. I., Voepel-Lewis, T., Shayevitz, J.R, Malviya, S. (1997). The FLACC: a behavioral scale for scoring postoperative pain in young children. *Pediatr Nurs, 23*(3):293-7.

Miozzo, A. P., Stein, C., Bozzetto, C. B., & Plentz, R. D. M. (2016). Massage therapy reduces pain and anxiety after cardiac surgery: A systematic review and meta-analysis of randomized clinical trials. *Clinical Trials and Regulatory Science in Cardiology*, *23*, 1-8. https://doi.org/10.1016/j.ctrsc.2016.11.003

Okyay, R. D., & Ayoğlu, H. (2018). Postoperative pain management in children. *Pediatric Practice and Research, 6*(2), 16-25. https://doi.org/10.21765/pprjournal.414257

.

Reisli, R. (2018). Assessment of pain in childhood. Pain, 1, 1–11.

Shen, Q., Huang, Z., Leng, H., Luo, X., & Zheng, X. (2022). Efficacy and safety of nonpharmacological interventions for neonatal pain: An overview of systematic reviews. *BMJ Open*, *12*(9), e062296. https://doi.org/10.1136/bmjopen-2022-062296

Şenaylı, Y., Özkan, F., Şenaylı, A., Bıçakçı, Ü. (2006). Evaluation of postoperative pain in children with FLACC pain scale in Turkish translation. *Turkiye Klinikleri J Anest Reanim*, *4*:1-4.

Törüner, E.K., Büyükgönenç, L. (2015). Çocuklarda ağrı yönetimi. İçinde: Çocuk sağlığı temel hemşirelik yaklaşımları. Amasya: Göktuğ Yayıncılık; s:146-170.

Wang, Z. X., Sun, L. H., & Chen, A. P. (2008). The efficacy of nonpharmacological methods of pain management in school-age children receiving venepuncture in a paediatric department: a randomized controlled trial of audiovisual distraction and routine psychological intervention. *Swiss Medical Weekly*, *138*(39-40), 579-584. https://doi.org/10.4414/smw.2008. 12224

ORİJİNAL MAKALE / ORIGINAL ARTICLE

Balıkesir Sağlık Bilimleri Dergisi / BAUN Sağ Bil Derg
Balıkesir Health Sciences Journal / BAUN Health Sci J
ISSN: 2146-9601- e ISSN: 2147-2238
Doi: https://doi.org/10.53424/balikesirsbd.1425967

The Investigation of the Impact of Walking Football on Selected Physical Fitness Parameters and Geriatric Depression in Elderly Male Individuals

Ülküm ERDOĞAN YÜCE[1], Özcan SAYGIN[2]

[1] Marmaris İlçe Milli Eğitim Müdürlüğü
[2] Muğla Sıtkı Koçman Üniversitesi, Spor Bilimleri Fakültesi

Geliş Tarihi / Received: *26.01.2024,* ***Kabul Tarihi / Accepted:*** *21.04.2024*

ABSTRACT

Objective: This study was conducted in order to examine the effect of walking football on selected physical fitness parameters and geriatric depression in elderly male individuals. **Materials and Methods:** The study consisted of a pre-post test experimental study and included the students of Marmaris Refresher University (TAU) and the individuals living in Marmaris that were selected by random sampling. The participants, 17 of whom were in the control group and 17 of whom were in the experimental group, were administered the Senior Fitness Test (SFT) protocols consisted of "chair-stand" test, "8-foot up-and-go" test and "Chair Sit-And- Reach" test as well as the "Geriatric Depression Scale" was implemented. While walking football training was given to the experimental group for 8 weeks, two days a week, no practice was conducted with the control group. **Findings:** The average age of the individuals participating in the study is 69±5.61. It was determined that the data was normally distributed, and the para-metric tests were applied. There were the significant differences ($p<0.01$) between the pre-post test results of the experimental group participants in the "chair-stand" test, "8-foot up-and-go" test and "Chair Sit-And- Reach" test and geriatric depression scale, and no differences were observed in the pre-post test measurement results of all variables of the control group. According to Pearson correlation analysis, the "chair-stand" variable had a positive relationship with the "8-foot up-and-go" test, the "Chair Sit-And-Reach" test, and geriatric depression and the age of the participants. It was observed that the "8-foot up-and-and-go" variable has a positive relationship with geriatric depression. **Conclusion:** As a result, it can be stated that walking football has a positive effect on elderly men physically and psychologically.

Key Words: Geriatrics, Depression, Physical Fitness, Walking, Football.

Yaşlı Erkek Bireylerde Yürüyüş Futbolunun Seçilmiş Fiziksel Uygunluk Parametreleri ve Geriatrik Depresyona Etkisinin İncelenmesi

Özet

Amaç: Bu çalışma, yürüyüş futbolunun yaşlı erkek bireylerde seçilmiş fiziksel uygunluk parametreleri ve geriatrik depresyona etkisini incelemek amacı ile yapılmıştır. **Gereç ve Yöntem:** Araştırma, deneysel bir çalışma olup Marmaris Tazelenme Üniversitesi öğrencileri ve Marmaris'te yaşayan tesadüfi örneklem yolu ile seçilen bireyleri kapsamaktadır. 17'si kontrol, 17'si deney grubu olan katılımcılara, Senior Fitness Test (SFT) protokolündeki "sandalyede otur-kalk, 8 adım kalk yürü testi ve sandalyede otur-uzan" testleri ve ayrıca "Geriatrik Depresyon Ölçeği" uygulanmıştır. Deney grubu ile 8 hafta, haftada iki gün yürüyüş futbolu çalışması uygulanırken, kontrol grubu ile çalışma yapılmamıştır. **Bulgular:** Çalışmaya katılan bireylerin yaş ortalaması 69±5.61' dir. Veriler normal dağılımda olup parametrik testler uygulanmıştır. Deney grubunun sandalyede otur-kalk, 8 adım kalk-yürü, sandalyede otur-uzan ve geriatrik depresyon ölçeği ön-son test sonuçları arasında anlamlı bir farklılık bulunmuş olup ($p<0.01$), kontrol grubunun tüm değişkenleri ön-son test ölçüm sonuçlarında bir farklılık görülmemiştir. Pearson korelasyon analizine göre; sandalyede otur-kalk değişkeninin 8 adım yürü testi, otur-uzan testi ve geriatrik depresyon ve katılımcıların yaşı ile olumlu bir ilişkisi olduğu; 8 adım yürü değişkeninin geriatrik depresyon ile olumlu ilişkisi bulunduğu görülmüştür. **Sonuç:** Sonuç olarak yürüyüş futbolunun yaşlı erkek bireylere fiziksel ve psikolojik açıdan olumlu etki ettiği söylenebilir.

Anahtar Kelimeler: Geriatri, Depresyon, Fiziksel Uygunluk, Yürüyüş, Futbol.

Sorumlu Yazar / Corresponding Author: Ülküm ERDOĞAN YÜCE, Marmaris İlçe Milli Eğitim Müdürlüğü, Muğla, Türkiye
E-mail: ulkumyuce48@gmail.com

Bu makaleye atıf yapmak için / Cite this article: Erdoğan-Yüce, Ü., & Saygın, Ö. (2024). Investigation of the effect of walking football on selected physical fitness parameters and geriatric depression in elderly male individuals. *BAUN Health Sci J, 13*(2), 406-412. https://doi.org/10.53424/balikesirsbd.1425967

INTRODUCTION

The definition of old age by the World Health Organization (WHO, 2021), as the decrease in the individual's capacity to adapt to the environment, it has been stated that middle age covers the age range of 45-59, old age is 60-74, advanced old age is 75-89, and oldest old age is 90 and over. Old age which manifests itself as slowing down and decreasing efficiency in all systems that continue until the end of human life, is a process that is difficult to control (Sarı, 2013).

All people in the World have the right to have a healthy life, but this desire affected significantly by the living environment, environmental conditions and the factors such as exposure to health-related risks (such as air pollution or violence) and limited access to necessary services (i.e. health and social care); however, the number and the rate of people aged 60 and over is increasing rapidly. While the studies show that the population aged 60 and over was 1 billion in 2019, it is estimated that this number will increase to 1.4 billion in 2030 and 2.1 billion in 2050. This increase has occurred at an unprecedented pace and moreover is expected to accelerate further in the coming years, especially in developing countries. In 2018, WHO made a new classification considering the aging of the population and redefined the age periods as adolescence between the ages of 0-17, youth between the ages of 18-65, middle age between the ages of 66-79, and old age between the ages of 80-99 (WHO, 2015). With a different perspective, the United Nations Department of Economic and Social Affairs accepts the age of 60 as the starting limit of old age (UN-DESA, 2017). As a consequence, it has been stated that it is urgent to accelerate the works to make the World suitable for the elderly in terms of health and social care, transportation, housing and urban planning. Old age is a phase where many things change in individuals' lives, longing for the past increases, losses occur in social life, and conflicts with younger generations occur. Individuals may experience changes in their emotional state of being owing to these particular changes and differences. Social support received from family members and friends plays an active role for coping with the negativities brought by old age (Arslan, 2019). This situation which constitutes the theme of our study, is that walking football, an alternative and different sport, aims to provide men with both the excitement of a new endeavor and to be healthy in terms of physical and physiological parameters, away from inactivity in a social environment.

Especially in our country, considering that activity decreases for individuals aged 65 and above, which coincides with the retirement period, walking football seems to be a good alternative to encourage this age group to move.

Walking football is a sport played under special rules so that older people can easily practice it. In walking football, volunteers cannot run and are only allowed to walk throughout the match, provided that one foot touches the ground at all times (Knapik, Meredith, Jones, Suek, Young, Evans, 1985). While playing this sport, no physical contact or interference between players is allowed to prevent injuries, and the ball should not be above head height. The intensity of this sport tends to vary widely, from low to high, depending on the duration of each match session and the age of the participants (Zainudin, Salle, & Aziz, 2021). This activity is a safe aerobic exercise as it is an activity that allows individuals who play football to remain active as they get older, and allows those who have no football experience to play without their lack of skills and knowledge restricting them (White, McInerney, Young, Elston, Dogramaci, Fitzsimons, Bennie, 2021). The fact that it is played on a field that is smaller than a standard football field and is close to a basketball court reduces the severity and intensity of the activity. According to the "Rating of Perceived Exertion Scale" (RPE), which determines the intensity of the activity according to the degree of strain on the body, it is thought that this aerobic exercise, which will make each participant breathe faster and sweat after 10 minutes, without any disruption in their speech, will have positive effects on the lower extremity strength and flexibility, agility, dynamic balance and geriatric depression of elderly male individuals in our country.

MATERIALS AND METHODS

Study type

This is a study lasting a total of 55 minutes, consisting of a 20-minute warm-up, 10-minute first period, a 5-minute rest break, followed by a 10-minute second period, and 10-minute stretching and breathing exercises performed at the end of the activity, applied to the experimental group for 8 weeks. April-May were preferred so that the volunteer individuals participating in the study would not be adversely affected by weather conditions owing to their ages, and in order that the program could continue steadily. The data was collected face to face by the researcher, and Marmaris Armutalan Cultural Center and astroturf field were used as the data collection place. As of March 30, 2023, participants were contacted, necessary information was shared and consent forms were signed. A pre-test was administered to all participants on April 3, 2023, and after the 8-week walking football activity of the experimental group, the study was terminated by giving a post-test to all participants on May 30, 2023.

Study group

The population of the study consists of male individuals aged 60 and over living in Marmaris, the sample consists of voluntary participants from Marmaris Tazelenme Üniversitesi (Marmaris Refreshment University, TAU) students, and male individuals aged 60 and over in Marmaris district selected by random sampling method. The literature was examined in detail, and using the reference study obtained (Kammoun et al. 2022), the standardized effect size was calculated from the mean and standard deviation values of similar applications. G-power calculation was administered for the study with an effect size of 1.06. Accordingly, it was determined that the study should be conducted with 17 volunteer participants in two groups (experimental and control),

with an alpha of 0.05, as well as an effect size of 1.06, and a power of the test of 0.85.

Dependent and independent variables

In the study, the independent variables are the walking football program and time, while "chair-stand" test, "8-foot up-and-go" test and "Chair Sit-and-Reach" test and "geriatric depression Scale" in the Senior Fitness Test (PFT) protocol can be specified as dependent variables.

Data collection tools

Height and Body Weight:

The body weights of the volunteer individuals participating in the study were measured using measurement tools with a precision of 0.01 kg and heights with a precision of 0.01 cm (Zorba and Saygın, 2013).

Chair-Stand Test:

For this test given to determine leg strength, a straight-backed chair with a sitting height of 43.18cm (12-inch), without armrests, and a Casio HS-5 M brand stopwatch were used. The individual was asked to sit in the middle of the chair with his back upright, his feet on the ground, and his arms crossed in front of his chest (with right hand on the left shoulder, left hand on the right shoulder); while the individual was in this position, the test started with the command of "go!" and they did "full stand" as much as they could for 30 seconds, the number of "full stands" performed by the subject during 30 seconds constituted the subject's score. In order to perform the test safely, the back of the chair was leaned against the wall. Each subject was both demonstrated and instructed how to do the test, and after making sure that each subject understood how to do the test by making 2-3 trials, the test started (Rikli and Jones, 2001).

8-Foot Up-And-Go Test:

This test is a test to determine agility and dynamic balance. A straight-backed, armless chair with a sitting height of 43.18cm (17 in), a Tera 3m/13mm steel tape measure made in China, a cone, a Casio HS-5 M brand 1/10sec precision stopwatch, and a distance of 2.44cm were used during the test. In order to perform the test safely, the back of the chair was leaned against the wall. The cone placed 2.44 cm forward from the front edge of the chair was 1.5 m. The back was left blank. The participant was seated in the middle of the chair and his back was allowed to lean back. With both hands on their knees and their feet fully on the ground, they were asked to turn around the cone 2.44 cm away with the "start" command, reach the chair again, and sit back as soon as possible. The moment they started to move, the stopwatch was started, and the moment he finished the distance and sat back on the chair, the stopwatch was stopped. The score time was recorded in 1/10 of a second. The participant was asked to perform this test once as a trial, and twice with the stopwatch running, and the best time was recorded as the score (Rikli and Jones, 2001).

Chair Sit-and-Reach Test:

For this test, which is used especially to determine the flexibility of the hamstring muscle group, an armless, straight-backed chair with a sitting height of 43.18 cm and a ruler of 46 cm length were used. The participant was seated in a chair leaning against a wall or a solid place, with the junction of the thigh and hip bones in front of the chair seat. The participant was allowed to extend one foot forward, in full extension, with the heel touching the ground and the foot approximately 90 degrees neutral, as they wish (right or left), while they were seated with the other foot towards the end of the chair, with the knee flexed at approximately 90 degrees and the sole of the foot flat on the floor. The participant was asked to sit and reach their toe, without pushing the pain limit, in a position with their hands on top of each other and their middle fingers in line, by extending their body forward with both hands, without bending their extended knee. If the tips of the fingers do not touch the tips of the feet, the distance between them is in centimeters (-); zero (0) if the fingertips of the middle hand touch the tip of the foot; if the tip of the finger exceeds the tip of the foot, the distance passed by the tip of the middle finger is taken in a (+) value in centimeters, and recorded on the score sheet (Rikli and Jones, 2001).

Geriatric Depression Scale-Short Form (GDS):

It is a scale consisting of 15 questions and was developed by Burke et al. in 1991 (Burke et al. 1991). The participant was asked 15 Yes/No questions, taking into account their situation within the last week. Each question was scored out of 1 point according to its nature, and the total score was calculated. Scores from 0 to 4 indicate “no depressive symptoms”, scores from 5 to 8 indicate “mild depressive symptoms”, while scores from 9 to 11 indicate “moderate depressive symptoms”, and scores of 12 and above indicate “severe depressive symptoms”. The Turkish reliability and validity study of the scale was conducted by Durmaz et al. in 2018 (Durmaz et al. 2018).

Procedures

Before starting the study, the participants were asked to obtain a health report from their family doctor, writing the following statement in: "There is no harm in terms of health in doing the Walking Football activity." This study was carried out in April-May when the weather conditions were suitable, it was an efficient factor in the stable participation of the experimental group in the program. Before beginning the program, the experimental and the control group participants were given the "Chair-Stand", "8-Foot Up-And-Go" and "Chair Sit-And-Reach" tests in the Senior Fitness Test (SFT) protocol as a pre-test. “Geriatric Depression Scale” was applied as well. Afterwards, only the experimental group was given warm-up exercises to ensure they were physically ready, and two teams consisting of 5 athletes played walking football in 10-minute periods with 5 minutes of rest in between. In accordance with the Rating of Perceived Exertion Scale (RPE), the study was carefully carried out at an intensity that would accelerate the breathing of each participant without disrupting their

speech. In the walking football practice, utmost care was taken to ensure that the ball did not exceed the height level, that the athletes did not jump and that one foot was always in contact with the ground, that the athletes were not close enough to interfere with each other and that they did not run, ensuring that they only walked.
While acting in accordance with the rules, elderly men were supported to have a happy time in a social environment and to continue this practice with pleasure which is also beneficial for their physical fitness. At the end of the practice, stretching was done and the study ended with a breathing exercise. For post-test measurement at the end of 8 weeks, the "Chair-Stand", "8-Foot Up-And-Go" and "Chair Sit-And-Reach" tests in the Senior Fitness Test (SFT) protocol, as well as the "Geriatric Depression Scale" were applied. During the studies conducted with the experimental group, no application was administered to the control group.

Statistical analysis

Data analysis was done in SPSS (Version 20). Shapiro-Wilk was used to determine whether the data showed normal distribution, while independent t-tests were used for intergroup comparisons, and paired t-tests or their non-parametric equivalents were used for pre-posttest comparisons. The relationship between variables was evaluated with Pearson correlation or its nonparametric equivalent, and Type 1 error was accepted as $p<0.05$.

Ethical considerations

Muğla Sıtkı Koçman University, Medicine and Health Sciences Ethics Committee-2 (Sports-Health) Decision: Decision number: 2023/230016 /54

RESULTS

Table 1 includes descriptive analyses.

Table 1. Descriptive information.

n	Min.–Max.	Mean±SD
Age (34)	60–83	69±5.61
Height (34)	1.58–1.88	1.71±0.068
Body weight (34)	65–102	80.7±0.083

SD=Standard deviation.

Considering Table 2, it is seen that the variables show normal distribution according to the Shapiro-Wilk test results of the experimental and control groups.

Table 2. Normal distribution analysis of experimental and control groups with Shapiro-Wilk test.

Variables	Group	Statistical	p
Chair-Stand Test	Experimental	0.940	0.315
	Control	0.923	0.165
8 foot Up-and-Go Test	Experimental	0.957	0.584
	Control	0.923	0.165
Chair Sit-and-Reach Test	Experimental	0.957	0.584
	Control	0.975	0.895
GDS Pre-test total	Experimental	0.902	0.720
	Control	0.918	0.135

Table 3. Experimental and control group pre-test independent t-test result.

Variables	Expmental Group X̄±S	Control Group X̄±S	t	p
Chair-Stand Test	10.52±2.67	10.23±1.75	0.380	0.707
8 foot Up-and-Go Test	8.30±1.42	8.77±1.93	-0.806	0.427
Chair Sit-and-Reach Test	15.05±12.6	12.23±8.79	-0.756	0.456
GDS Pre-test total	4.70±1.99	3.76 ±1.88	0.566	0.167

Considering Table 3, it appears that there were no significant differences between the pre-test independent t-test results of the participants in the experimental and control groups, and Chair-Stand Test, 8-Foot Up-and-Go Test, Chair Sit-and-Reach Test, Geriatric Depression Scale, pre-test total and the pre-test measurements ($p>0.05$).
As Table 4 was evaluated, a significant differences ($p<0.01$) were found between the paired t-test results, pre-test and post-test Chair-Stand Test, 8-Foot Up-and-Go test, Chair Sit-and-Reach test, Geriatric Depression Scale score averages of the participants in the experimental group.
Considering Table 5, it was seen that there were no significant differences ($p>0.05$) between the paired t-test results of the participants in the control group, the pre-test and post-test Chair-Stand Test, 8-Foot Up-and-Go test, Chair Sit-and-Reach test, Geriatric Depression Scale mean scores of the participants in the control group($p>0.05$).

Table 4. Experimental group pre-post test paired t-test results (n:17).

Variables	Pre-test (X̄±S)	Post-test (X̄±S)	t	p
Chair-Stand Test	10.52±2.67	12.17±2.83	-3.45	**0.003***
8 foot Up-and Go Test	8.30±1.42	6.60±1.07	4.79	**0.000****
Chair Sit and Reach Test	-15.05±12.65	-9.00±11.74	-4.44	**0.000****
GDS	4.70±1.99	0.00±0.00	9.73	**0.000****

*p<0.05 **p<0.01

Table 5. Control group pre-post test paired t-test results (n:17).

Variables	Pre-test (X̄±S)	Post-test (X̄±S)	t	p
Sit-Stand Test	10.23±1.75	10.00±1.45	0.940	0.361
8 foot Up-and Go Test	8.77±1.93	9.12±1.78	-2.94	0.009
Chair Sit and Reach Test	-12.23±8.79	-15.05 ±7.46	1.82	0.087
GDS	3.76±1.88	5.17±1.94	-6.68	0.000

*p<0.05 **p<0.01

Table 6. Pearson correlation analysis results between parameters.

	M	SD	1	2	3	4	5	6	7
Sit-Stand Test	11.0882	2.4786	1						
8 foot Up-and Go Test	7.9685	2.0025	-0.585**	1					
Chair Sit and Reach Test	-12.0294	10.1667	0.492**	-0.604**	1				
GDSÖ	2.5882	2.9554	-0.487**	0.713**	-0.297	1			
Age	69.1105	5.6186	0.392**	-0.143	0.085	-0.084	1		
Height	1.7194	0.0685	-0.053	0.047	0.13	0.087	0.339	1	
Body Weight	80.7882	8.3333	0.007	0.006	-0.044	-0.086	0.275	0.500**	1

*p<0.05 **p<0.01 Pearson correlation test

Table 6 demonstrates the correlation analyzes between the variables. A positive correlation was found between the Chair-Stand variable and the 8-Foot Up-and-Go test, Chair Sit-and-Reach test, Geriatric Depression Scale and age variable. A negative correlation was detected between the 8-Foot Up-and-Go test variable and the Chair Sit-and-Reach test, while a positive correlation was found with the Geriatric Depression Scale. Moreover, a positive correlation was found between height and body weight.

DISCUSSION

Although it is known that sports contribute to health and comfortable living, it has been observed that participation in active sports decreases in older ages. Eventhough it is not fully understood why some elderly people do not continue to do sports, for some, sports play an important role in later ages and are thought to contribute to improved health and well-being (Stenner, 2020). Physical activity and exercise are critical in preventing cardiovascular diseases, diabetes, stroke, osteoporosis and some types of cancer that occur with aging, as well as falls that can lead to serious injuries or even death. Because activity contributes greatly to maintaining independence and improving the quality of life in the elderly (Özmen and Contarlı, 2023).

Physical activity has many benefits in terms of physical, psychological and social health. The studies have shown that lack of physical activity constitutes a major risk factor for health problems in aging adults. Hence, as a primary means of prevention from chronic diseases, it is necessary to identify appropriate physical activity options for aging adults and encourage them to be more physically active (Penedo, 2005).

Global trends show that physical activity levels decrease with advancing age (Hallal et al., 2012). It was stated that lack of physical activity constitutes a major risk factor for health problems in aging adults.

Walking football appears to be an important way to involve adults in sports and make them active while they are alive (Sivaramakrishnan, 2023). The purpose of walking football studies, which cause positive improvements in the health of adult men and women, is to direct them to physical activity (Hunt et al., 2014). Physical activity has various benefits in terms of physical, psychological and social health. Accordingly, a significant difference was found between the pre-test and post-test measurements of selected PFT measurements and GDS measurements of volunteer participants of the 8-week walking football protocol applied in the study, while no change was observed in the pre-post test measurement results of the control group. It is seen that walking football, which is beneficial for the development of skills as well as the self-confidence of playing football (Taylor and Pringle, 2022), is important in providing older adults with the opportunity to move. Sivaramakrishnan et al. (2023)'s study provides insight into the complex interaction of adults' intentions to participate in walking sports related to the personal psychosocial program and environmental determinants. In their study, Harper et al. (2019) aimed to profile physical, physiological and biomechanical responses, and stated that the long-term positive benefits of walking football, especially in terms of bone health, cardiovascular fitness, social and mental health, should be clarified.

The scarcity of experimental studies comparing the older adult population with the control group increases the importance of this study. Due to the benefits of this sport which will allow older individuals to be active, need to be revealed through more studies.

Recently it has been focused on maintaining stable and long-term participation in sports with walking football, a sport adapted from football, with the aim of improving health and well-being, especially (McEwan et al. 2015).

It has been reported that this sport, which is a slow type of football, can be done safely due to the low incidence of traumatic events.

Arnold et al. (2015) did not observe any change in blood lactate level in the 12-week walking football study, while they found non-significant differences in the medium effect in terms of decrease in body mass, increase in lean body mass and decrease in body mass index. Harper et al. (2019) concluded in their study that walking football is a moderate to vigorous intensity activity, and that more studies are needed on its long-term benefits in terms of bone health, cardiovascular fitness and social mental health. Madsen et al. (2021) concluded that walking football for elderly men and women causes higher heart rate, and more speed and distance due to the nature of the work compared to just walking. Carthy et al. (2017) reported that in their study when volunteers engage in physical activity, they have the opportunity to move more, and socialization increases. Heil, Newton, and Salle (2023) stated that walking football applied in a research group consisting of Southeast Asian women was of sufficient intensity to create positive changes in both cardiovascular and metabolic condition. Again, in the study conducted by Krustrup et al. (2018), the effects of walking football on women's fitness and health were evaluated.

In another study conducted to evaluate walking football in middle-aged and elderly male individuals, promising results were found on body composition, aerobic condition and blood pressure (BP) (Barbosa et al. 2020), and this is parallel to our study. Because when the pre-post test measurements of the experimental group were compared, the significant differences were found in lower extremity strength and flexibility, agility and dynamic balance tests. Furthermore, Taylor and Pringle (2022) stated that in their study playing walking football is effective in improving skills as well as providing distraction, success and confidence.

Despite the fact that the studies on walking football are not common in our country, older adults are encouraged to be active by walking. Because it appears to be the easiest, cheapest and safest way to increase fitness in the elderly is walking (Soygüden, 2015). Song and Doris (2019), concluded that group-based, 16-week moderate-intensity aerobic walking exercises improved cognitive functions, and had positive effects on depressive mood and low sleep quality in individuals who aged 60 and over with mild cognitive impairment and revealed that the importance of walking sports in this study. The positive difference in geriatric depression measurement results in the pre-post test measurements of the experimental group of our study suggests that this sport is an important option for activity in elderly male individuals.

CONCLUSION

As a result, in our study, it was observed that there was a significant difference ($p<0.01$) between the Chair Sit-and-Reach, chair-stand, 8-foot up-and-go and Geriatric Depression Scale pre-post test results of the volunteer participants in the experimental group, and that there was no difference in the pre-post test measurement results of all variables in the control group participants. According to Pearson correlation analysis, it was observed that the chair-stand variable had a positive relationship with 8-foot up-and-go, Chair Sit-and-Reach Test and Geriatric Depression and the age of the participants, and that the 8-foot up-and-go variable has a positive relationship with geriatric depression. Therefore, it can be said that walking football has a positive effect on elderly men both physically and psychologically. It is a matter of curiosity what kind of differences the walking football exercises planned for older female individuals will cause in terms of physical and psychological aspects, and this can be expressed as a suggestion of the study.

Acknowledgement

The authors would like to extend their sincere thanks to anyone who contributed to this study.

Conflict of Interest

The authordeclare no potential conflicts of interest with respect to the research, authorship and/or publication of this article.

Author Contributions

Plan, design: ÜEY, ÖS. **Material, methods and data collection:** ÜEY. **Data analysis and comments:** ÜEY. **Writing and corrections:** ÜEY, ÖS.

Funding

None

Ethical considerations

Muğla Sıtkı Koçman University, Medicine and Health Sciences Ethics Committee-2 (Sports-Health) Decision: Decision number: 2023/230016 /54

REFERENCES

Arnold, J. T., Bruce-Low, S., & Sammut, L. (2015). The impact of 12 weeks walking football on health and fitness in males over 50 years of age. *British Medical Journal, Open Sport & Exercise Medicine*, *1*(1), bmjsem-2015.https://doi.org/10.1136/bmjsem-2015-000048

Arslan S. (2019). Yaşlılarda meydana gelen fizyolojik psikolojik ve sosyolojik değişiklikler. İçinde: Aylaz R. (editör). Yaşlı sağlığı ve hemşirelik bakım.Malatya, İnönü Üniversitesi Yayınevi, 65-84.https://doi.org/10.38108/ouhcd.752133

Barbosa, A., Brito, J., Costa, J., Figueiredo, P., Seabra, A., & Mendes, R. (2020). Feasibility and safety of a walking football program in middle-aged and older men with type 2 diabetes. *Progress in Cardiovascular Diseases*, *63*(6), 786-791. https://doi.org/10.1016/j.pcad.2020.06.014

Burke W. J., Roccaforte W. H., & Wengel S. P. (1991).The short form of the Geriatric Depression Scale: a comparison with the 30-item form. *Journal Geriatr Psychiatry Neurology*, 4, 173–8. https://doi.org/10.1177/089198879100400310

Carthy, A., Byrne, J., & Barrie, J. (2017). A Whole New Ballgame: Does participating in a walking football club lead to increased levels of social engagement? Conference Papers. *Research Centre for Psychology Education and*

Emotional Intelligence. https://doi.org/10.13140/RG.2.2.33514.82884

Durmaz, B., Soysal, P., Ellidokuz, H., & Isik, A. T. (2018). Validity and reliability of geriatric depression scale-15 (short form) in Turkish older adults. *Northern Clinics of Istanbul*, *5*(3), 216–220. https://doi.org/10.14744/nci.2017.85047

Eastman, J. K., & Iyer, R. (2004). The elderly's uses and attitudes towards the Internet. *Journal of Consumer Marketing*, *21* (3), 208-220. http://dx.doi.org/10.1108/07363760410534759

DSÖ. (2021).Ageing and health. World health organization. https://www.who.int/newsroom/factsheets/detail/ageing-and-health Date of access:12.04.2023

DSÖ. (2015). World report on ageing and health:World healthorganization. https://www.who.int/publications/i/item/978924156504. Date of access: 23.05.2023

Hallal P. C., Andersen L. B., Bull F.C., Guthold R, Haskell W, & Ekelund U. (2012). Global physical activity levels: surveillance progress, pitfalls, and prospects. *Lancet*. *380*(9838): 247-257. https://doi.org/10.1016/s0140-6736(12)60646-1

Harper, L. D., Field, A., Corr, L. D., & Naughton, R. J. (2019). The physiological, physical, and biomechanical demands of walking football: Implications for exercise prescription and future research in older adults. *Journal of Aging and Physical Activity*, *28*(3), 478-488. https://doi.org/10.1123/japa.2019-0330

Hunt, K., Wyke, S., Gray, CM., Anderson, A.S., Brady, A., Bunn, C., Donnan, PT., Fenwick, E., Grieve, E., Leishman, J., Miller, E., Mutrie, N., Rauchhaus, P., White, A., & Treweek, S. (2014). A gender-sensitised weight loss and healthy living programme for overweight and obese men delivered by Scottish Premier League football clubs (FFIT): A pragmatic randomised controlled. Open Access article distributed under the terms of CC BY-NC-ND. by *Elsevier* Ltd. https://doi.org/10.1016/s0140-6736(13)62420-4

Knapik, J. J., Meredith, CN., Jones, BH., Suek, L., Young, VR., & Evans, WJ. (1985). Influence of fasting on carbohydrate and fat metabolism during rest and exercise in men. *Journal Applied Physiology*. https://doi.org/10.1152/jappl.1988.64.5.1923

Krustrup, P., Williams, C. A., Mohr, M., Hansen, P. R., Helge, E. W., Elbe, A. M., & Brito, J. (2018). The "football is medicine" platform-scientific evidence, large-scale implementation of evidence-based concepts and future perspectives. *Scandinavian Journal of Medicine & Science in Sports*, *28*, 3-7. https://doi.org/10.1111/sms.13220

Madsen, M., Krustrup, P., & Larsen, M. N. (2021). Exercise intensity during walking football for men and women aged 60+ in comparison to traditional small-sided football–a pilot study. *Managing Sport and Leisure*, *26*(4), 259-267. http://dx.doi.org/10.1080/23750472.2020.1762508

McBain, T., & Broom, D. (2022). O2-8 Effects of a 12-week walking football intervention on cardiovascular disease risk factors in an older adult population: a randomised controlled trial in the UK, *European Journal of Public Health*, Volume 32, Issue Supplement_2, September, ckac094.016. https://doi.org/10.1093%2Feurpub%2Fckac094.016

McEwan, G., Buchan, D., Cowan, D., Arthur, R., Sanderson, M., & Macrae, E. (2019). Recruiting older men to walking football: A pilot feasibility study. *Explore*, 15(3), 206-214. https://doi.org/10.1016/j.explore.2018.12.001

Özmen, T., & Contarlı., N. (2023). Yaşlılarda Fiziksel Aktivite ve Sağlık. *Unika Sağlık Bilimleri Dergisi*. *3*(1), 452-459.

Rikli, R. E., & Jones, C. J. (2001). *Senior fitness test manual*. Champaign, IL: Human Kinetics.

Salle, D. D. A., Newton, R. U., & Heil, D. P. (2023). The Walking Cadence Threshold Associated With A Moderate Metabolic Intensity During Competitive Walking Football: 2554. *Medicine & Science in Sports & Exercise*, *55*(9S), 844-844. http://dx.doi.org/10.1249/01.mss.0000987784.30473.42

Sarı E. (2013). Edirne Merkezinde Ev Ortamında Yaşayan 65 Yaş ve Üstü Yaşlılarda Yaşam Kalitesi. Sağlık Bilimleri Enstitüsü, Hemşirelik Anabilim Dalı. Yüksek Lisans Tezi. Trakya Üniversitesi.

Sivaramakrishnan, H., Quested, E., Cheval, B., Thøgersen-Ntoumani, C., Gucciardi, D. F., & Ntoumanis, N. (2023). Predictors of intentions of adults over 35 years to participate in walking sport programs: A social-ecological mixed-methods approach. *Scandinavian Journal of Medicine & Science in Sports*, *33*(8), 1412–1430. https://doi.org/10.1111/sms.14368

Song, D., & Doris, S. F. (2019). Effects of a moderate-intensity aerobic exercise programme on the cognitivefunction and quality of life of community-dwelling elderly people with mild cognitive impairment: Arandomised controlled trial. *International Journal Nursing Studies*, *93*, 97-105. https://doi.org/10.1016/j.ijnurstu.2019.02.019

Soygüden, A., & Cerit, E. (2015). Yaşlılar İçin Egzersiz Uygulamalarının Önemi, *Hitit Üniversitesi Sosyal Bilimler Enstitüsü Dergisi.* *8*(1), 197-224. https://doi.org/10.17218/husbed.58321

Stenner, B. J., Buckley, J. D., & Mosewich, A. D. (2020). Reasons why older adults play sport: A systematic review. *Journal of Sport and Health Science*, *9*(6), 530–541. https://doi.org/10.1016/j.jshs.2019.11.003

Taylor, D., & Pringle, A. (2022). Investigating the effect of walking football on the mental and social wellbeing of Men. *Soccer & Society*, *23*(7), 805-820. https://doi.org/10.1080/14660970.2021.1967933

UN-DESA. (2017). World population aging 2017 – Highlights (ST/ESA/SER.A/397) (P. D. Department of Economic and Social Affairs, Trans.): United Nations.

Penedo, F. J., & Dahn, JR. (2005). Exercise and well-being: a review of mental and physical health benefits associated with physical activity. *Curr Opin Psychiatry*. *18*(2): 189-193. https://doi.org/10.1097/00001504-200503000-00013

Zainudin, S. B., Salle, D. D. A., & Aziz, A. R. (2022). Walking Football During Ramadan Fasting for Cardiometabolic and Psychological Health Benefits to the Physically Challenged and Aged Populations. *Frontiers in Nutrition*, *8*, 779863. https://doi.org/10.3389/fnut.2021.779863

White, R. L., McInerney, A., Young, C., Elston, R., Dogramaci, S. N., Fitzsimons, L., & Bennie, A. (2021). Understanding Participant Experiences of Walking Football in Australia. Western Sydney University. Penrith, N.S.W. https://hdl.handle.net/1959.7/uws:63005

Zorba, E., & Saygın, Ö. (2009). *Physical activity and physical fitness.* Inceler offset.

ORİJİNAL MAKALE / ORIGINAL ARTICLE

Balıkesir Sağlık Bilimleri Dergisi / BAUN Sağ Bil Derg
Balıkesir Health Sciences Journal / BAUN Health Sci J
ISSN: 2146-9601- e ISSN: 2147-2238
Doi: https://doi.org/10.53424/balikesirsbd.1397634

Attitudes of Nurses Working in Private Hospitals About Evidence-Based Practices and Affecting Factors

Emre YANIKKEREM [1], İlknur ŞEN [2]

[1] Manisa Celal Bayar University, Faculty of Health Sciences, Department of Obstetrics and Gynecology Nursing
[2] Private Sekiz Eylül Hospital

Geliş Tarihi / Received: *30.11.2023,* ***Kabul Tarihi / Accepted:*** *06.05.2024*

ABSTRACT

Objective: The aim of the study was to determine the attitudes of nurses working in private hospitals about evidence-based practice and the affecting factors. **Materials and Methods:** The universe of the study consisted of nurses working in 10 private hospitals in the city center of Manisa, Türkiye (n=460). The data were collected from 214 nurses by visiting hospitals between 20 October 2022 and 20 December 2022 through face-to-face interviews. The nurses' introductory characteristics questionnaire and the Attitude towards Evidence Based Nursing Questionnaire were used in this study. The attitude towards Evidence-Based Nursing Questionnaire consists of 15 items and three sub-dimensions as follows: beliefs and expectations towards evidence-based nursing, the intention of conduct towards evidence-based nursing, and feelings towards evidence-based nursing. **Results**: It was stated that 73.8% of the nurses knew the concept of evidence-based nursing and 68.2% applied evidence-based practices in their clinic. The mean score of the Attitudes towards Evidence-Based Nursing Questionnaire was found to be 61.5±8.8 (min=30 max=75). The total mean score of the Attitudes towards Evidence-Based Nursing Questionnaire was found to be statistically significantly higher in nurses working in service, who followed the current nursing literature, who knew the concept of evidence-based nursing, who applied evidence-based practices in their clinics and who knew the literature review. **Conclusion**: It is very important to determine the factors affecting the knowledge, attitudes and behaviors of nurses towards evidence-based practice and to organize training programs in this direction in terms of professional development and increasing the quality of health care.

Keywords: Attitude, Evidence-based Nursing, Evidence-based Practice.

Özel Hastanelerde Çalışan Hemşirelerin Kanıta Dayalı Uygulamalar Hakkında Tutumları ve Etkileyen Faktörlerin Belirlenmesi

ÖZ

Amaç: Araştırmanın amacı özel hastanelerde çalışan hemşirelerin kanıta dayalı uygulamaya ilişkin tutumlarını ve etkileyen faktörleri belirlemektir. **Gereç ve Yöntem:** Araştırmanın evrenini Manisa ili merkezinde bulunan 10 özel hastanede çalışan hemşireler (n=460) oluşturmuştur. Veriler 20 Ekim 2022 ile 20 Aralık 2022 tarihleri arasında hastane ziyaretleri yapılarak 214 hemşireden yüz yüze görüşme yoluyla toplanmıştır. Bu çalışmada hemşirelerin tanıtıcı özellikleri anketi ve Kanıta Dayalı Hemşirelik Tutum Anketi kullanılmıştır. Kanıta Dayalı Hemşireliğe Yönelik Tutum Anketi, 15 maddeden ve kanıta dayalı hemşireliğe yönelik inanç ve beklentiler, kanıta dayalı hemşireliğe yönelik davranış niyeti ve kanıta dayalı hemşireliğe yönelik duygular olmak üzere üç alt boyuttan oluşmaktadır. **Bulgular:** Hemşirelerin %73,8'i kanıta dayalı hemşirelik kavramını bilmekte ve %68,2'si kliniğinde kanıta dayalı uygulamaları uygulamaktadır. Kanıta Dayalı Hemşirelik Tutum Ölçeği puan ortalaması 61,5±8,8 (min=30 maks=75) olarak belirlenmiştir. Kanıta Dayalı Hemşirelik Tutum Anketi toplam puan ortalaması serviste çalışan, güncel hemşirelik literatürünü takip eden, kanıta dayalı hemşirelik kavramını bilen, kanıta dayalı hemşirelik uygulamalarını kendi kliniklerinde uygulayan ve literatür taramasını bilen hemşirelerde istatistiksel olarak anlamlı olarak yüksek bulunmuştur. **Sonuç:** Hemşirelerin kanıta dayalı uygulamaya yönelik bilgi, tutum ve davranışlarını etkileyen faktörlerin belirlenmesi ve bu doğrultuda eğitim programlarının düzenlenmesi mesleki gelişim ve sağlık hizmetinin kalitesinin artırılması açısından oldukça önemlidir.

Anahtar Kelimeler: Tutum, Kanıta dayalı hemşirelik, Kanıta dayalı uygulama.

Sorumlu Yazar / Corresponding Author: Emre YANIKKEREM, Manisa Celal Bayar Üniversitesi, Sağlık Bilimleri Fakültesi, Uncubozköy Sağlık Yerleşkesi, Manisa, Türkiye
E-mail: emrenurse@hotmail.com

Bu makaleye atıf yapmak için / Cite this article: Yanıkkerem, E., & Şen, İ. (2024). Attitudes of nurses working in private hospitals about evidence-based practices and affecting factors. *BAUN Health Sci J, 13*(2), 413-425. https://doi.org/10.53424/balikesirsbd.1397634

INTRODUCTION

Evidence-based practice (EBP) is both a goal and an approach that is defined as practices where the best evidence from systematic research is combined with clinical expertise (Baran, Atasoy & Şahin, 2020; Chen, Wu, Zhou, Li, & Zhao, 2020; Shayan, Kiwanuka & Nakaye, 2019). Evidence-based nursing (EBN) is a problem-solving approach that includes seeking the best and up-to-date evidence available, and taking into account the needs and preferences of the patient while evaluating with clinical expertise (Ayhan et al., 2015; Baran et al., 2020; Yılmaz, Düzgün & Dikmen, 2019). The basic principle behind this approach is to give care not traditionally or intuitively, but with high quality, and in line with evidence (Arslan & Çelen, 2018). The purpose of EBP is to manage information, reduce costs, and optimize patient care. In the literature, it has been observed that EBP reduces healthcare costs and length of stay, eliminates unnecessary or ineffective practices, improves patient outcomes with standardized care, and increases the quality of care and nurse satisfaction (Baran et al., 2020; Doğan, Cin, Demirağ & Uçan, 2021; Kavlak, Öz & Özen 2022).

The fact that nurses base their care practices on evidence not only provides quality nursing care but also plays an important role in the development of nurses' problem-solving and decision-making skills (Kavlak et al., 2022). The professional practice of nursing is possible with the interpretation of scientific knowledge and its use in practice. It is an important requirement that professional nurses perform their practices according to the best evidence based on research results (Baran et al., 2020). For this reason, it is very important for nurses to gain the habit of using evidence in practice, to have a culture of basing their practices on scientific knowledge, and to develop skills in critically evaluating research. As it is known, EBP is a life-long process and requires continuous research and education. For this reason, it is necessary to increase the knowledge and skills of nurses in this field and to reduce the obstacles experienced in developing EBN practices.

Although the concept of EBN is an important issue in the health system, it is still not known enough by many nurses today. Many countries have undertaken different structural arrangements and roles to support EBN, which is the most effective way to bridge the gap between theory and practice in the nursing discipline for preparing students for the realities of the clinical setting (Saifan et al., 2021). It has been determined that, with the increase of the nursing profession to the undergraduate level, with the introduction of EBN as a course in universities, the level of nursing students' literature review and belief in EBN has increased (Şen & Yurt, 2021). It is important for nurses to participate in scientific studies in their professional lives and to improve their research and statistical knowledge (Doğan et al., 2021). Although the nurses' responsibility to perform EBP is defined in the Nursing Regulation in our country as "Nurses plan, implement, evaluate and supervise nursing care based on evidence", it has been stated that EBN cannot be applied easily and the use of evidence in the clinical decision-making process is insufficient (Arslan & Çeçen, 2018; Ayhan et al., 2015) and that EBN progress in a very complex and slow process insufficient (Ayhan et al., 2015). For this reason, it is emphasized that it is important to determine the thoughts, attitudes, and behaviors of nurses related to EBN to develop strategies for the use of EBN (Ayhan et al., 2015; Baltacı & Deniz, 2019).

In recent years, the importance of EBN has increased in studies. The main reasons for this increase are the rate of medical errors in patient care, the increase in patients' information demands, and the decrease in trust in health professionals (Alperen & Şahin, 2022). A systematic review stated that the knowledge, skills, attitudes, and beliefs of health workers about EBP were between medium and high. However, few reviews have emphasized that EBP competencies have an impact on changes in care processes or patient outcomes (Saunders, Gallagher-Ford & Vehviläinen-Julkunen, 2019). A systematic review with 16 articles (n=8,409) to evaluate barriers to EBP among nurses in low- and middle-income countries between 2000 and 2018 stated that barriers related to the institution were insufficient resources, limited access to information, inadequate staff and lack of institutional support; barriers of interdisciplinary were lack of communication between academic and clinical practice environment, inconsistency between nursing education and practice, lack of teamwork and negative image of the society regarding the nursing profession; nurse-related barriers were perceived limitations in the scope of nurses' practice, time, knowledge of EBP and individual-related barriers (Shayan et al., 2019).

Most of the studies evaluating EBP in nurses in our country were conducted on nurses who worked in public, state, and university hospitals. Although there were studies determined that nurses had high attitudes about EBN (Alperen & Şahin, 2022; Aslan & Gürdap, 2021; Kılıç, Öcal & Uslukılıç, 2022), other studies determined that nurses did not have enough information about EBN (Yılmaz et al., 2018) and the attitudes towards EBN were moderate (Baran et al., 2020; Doğan et al., 2021, Menekli & Korkmaz, 2021; Merih, Potur & Esencan, 2017; Yanmış & Özcan, 2022; Yıldırım & Yıldız, 2020). It was emphasized in the studies that the knowledge of nurses increased after the training given about EBN (Baran, Atasoy & Şahin, 2020), developing different training methods to improve their attitudes was important (Yıldırım & Yıldız, 2020), and that EBN should be included in in-service training programs (Şen & Yurt, 2021). In addition, it has been stated in the studies that nurses' competence in creating evidence, doing research to use evidence, and benefiting from research results

was weak (Alperen & Şahin, 2022). In the studies, it was found that female nurses (Alperen & Şahin, 2022), nurses who received undergraduate education (Aygün & Yıldırım, 2021; Chen et al., 2020; Köstekli, Çelik & Karahan, 2020), who spent their lives mostly in urban areas (Aygün & Yıldırım, 2021), who love their profession (Doğan et al., 2019), those who attend scientific meetings with research (Doğan et al., 2019), those who were members of professional associations (Aygün & Yıldırım, 2021), those who followed professional publications (Aygün & Yıldırım, 2021; Doğan et al., 2019), nurses trained in EBP (Yılmaz, Kaya & Akansel, 2020) and who made research (Doğan et al., 2021) were found to have better attitudes towards EBN.

In our country, there was one study on nurses working in public and private hospitals (Aygün & Yıldırım, 2021), and one study conducted only in private hospitals carried out in Istanbul, and it was determined that nurses' attitudes towards EBP were positively high and age, years of employment, education, participation in scientific meetings, hearing the concept of EBP and the presence of a written protocol in the clinic affected the attitude towards EBP (Kavlak et al., 2022). It was thought that the findings of this study are important in terms of determining the attitudes of nurses working in private hospitals and the factors affecting it and contributing to the literature.

MATERIALS AND METHODS

Study type

This cross-sectional study aimed to determine the attitudes of Turkish nurses working in private hospitals in a province and the factors affecting it.

Study group

The universe of the study consisted of nurses working in 10 private hospitals located in the city center of Manisa, in the west of Türkiye (n=460). The minimum sample of the study was determined 209 nurses with a 95% confidence interval and 5% standard deviation using the universe-known formula with the Epi Info program, and 214 nurses were reached at the time of data collection. Nurses who volunteered to participate in the study were included.

Hypotheses of the study

H1: There is a difference between the descriptive characteristics of nurses and the total and sub-dimension mean scores of the Attitude towards Evidence-Based Nursing Questionnaire.

Dependent and independent variables

The independent variables of this research were the nurse's age, education status, working year, gender, clinic where nurses work, marital status, having a child, knowledge of foreign language, status of following the current nursing literature, awareness of EBN, status of taking EBN course at the school, receiving EBN education in the institution, participating in scientific meetings on EBN, knowing the literature review, reading research articles, participation of scientific research and scientific meetings, being a member of a professional association and implementation EBN in the clinic where they work. Total and sub-dimension mean scores of the Attitude towards Evidence-Based Nursing Questionnaire were the dependent variables of the study.

Data collection tools

In this study, the characteristics of nurses' questionnaire and Attitude toward Evidence Based Nursing Questionnaire were used. The nurses' characteristics questionnaire consists of questions containing the independent variables of the research. Attitude towards Evidence Based Nursing Questionnaire was developed by Ruzafa-Martinez et al. (2011), and its Turkish validity and reliability were made by Ayhan, Kocaman, and Bektaş (Ayhan et al., 2015). This scale consists of 15 items and three sub-dimensions. Eight of the items contain positive (items 1, 2, 5, 7, 9, 11, 13, and 14) and seven items contain negative statements (3, 4, 6, 8, 10, 12, and 15). The scale is in a five-point Likert type (1=I strongly disagree, 2=I do not agree, 3=I somewhat agree, 4=I agree, 5=I completely agree) and items with negative statements are coded by reversing. A minimum score of 15 and a maximum score of 75 are obtained from the scale. There is no cut-off point in the scale, and a high score from the scale indicates a positive attitude towards EBN. The first sub-dimension of the scale is "beliefs and expectations towards EBN" and this dimension includes items related to nurses' beliefs and expectations about the benefits of EBN in clinical studies (1, 2, 7, 9, 11, 13, 14). The “Intention of conduct towards EBN” sub-dimension includes nurses' behaviors or intentions to perform EBN; it includes items on perceived barriers, workload, and using the time allocated for education for EBN (3, 5, 6, 12). The sub-dimension "Feelings towards EBN” includes the importance given to EBN, its benefits in clinical practice, and items related to nurses' feelings about the subject (4, 8, 10, 15). The Cronbach alpha value of this scale in this study was found to be 0.875.

Data collection method

Data were collected by visiting hospitals between 20 October 2022 and 20 December 2022 using face-to-face interviews. The mean time for data collection from nurses was approximately 30 minutes.

Statistical analysis

In the research, descriptive features were analyzed using numbers, percentages, and mean. Since the data showed normal distribution as a result of the Kolmogorov-Smirnov test, the relationship between dependent and independent variables was evaluated using parametric tests (t-test and ANOVA).

Ethical considerations

The use of the Attitude towards Evidence Based Nursing Questionnaire in the study was obtained from Ayhan, who made the validity and reliability of the scale. Ethical approval of the study was received from Manisa Celal Bayar University Faculty of Medicine

Health Sciences Ethics Committee (Date: 12.10.2022 Number: E-20478486-050.04.04-405879). Written permission from private hospitals in Manisa province and written informed consent were obtained from the nurses in the study.

RESULTS

Characteristics of nurses

The mean age of the nurses in the study was 26.6 ± 5.5 (min= 20, max=56). Of the nurses, 58.9% were 25 years old and under, 14.1% were bachelor's degrees, 89.3% were women, 56.1% were single and 25.7% had children. Of the nurses, 41.6% have worked in the intensive care unit and 41.1% in the service. The mean working year of nurses was 6.3±5.4 (min= 1, max= 38), 53.7% of the participants worked for 1-5 years, and 31.3% for 6-10 years (Table 1).

Table 1. Characteristics of nurses.

Characteristics of nurses	Number	%
The age group of nurses		
25 years and under	126	58.9
26 years and older	88	41.1
Educational status of nurses		
Health vocational high school	126	58.9
Associate degree	57	26.6
Bachelor's degree	31	14.1
Gender of nurses		
Female	191	89.3
Male	23	10.7
The department where nurses work		
Service	88	41.1
Intensive care	89	41.6
Emergency	18	8.4
Operating room	19	8.9
Working year		
1-5 year	115	53.7
6-10 year	67	31.3
11 years and above	32	15.0
Marital status		
Married	94	43.9
Single	120	56.1
Status of having children		
Yes	55	25.7
No	159	74.3
Total	214	100.0

Awareness of nurses on evidence-based nursing

The rate of nurses who were aware of the concept of EBN was 73.8% and 52.8% of the nurses stated that they took EBN courses at the school they graduated from. Of the participants, 53.7% received EBN training in the institution where they work, about a quarter (26.6%) stated that they attended at least scientific meetings on the subject of EBN and 68.2% applied EBP in their clinic.

When asked about barriers in EBN, the majority of the nurses (70.0%) did not give an answer, 7.0% and 4.7% of the nurses stated that they lack knowledge/ education and 5.6% had long working hours, respectively.

In the study, 50.9% of the participants stated that they had little knowledge of foreign languages, 60.7% of the nurses did not know how to search the literature, 52.3% of them did not follow the current nursing literature, 25.2% of them rarely read research articles, and 18.7% of them did scientific research (Table 2).

Table 2. Nurses' knowledge of evidence-based nursing, research, and literature review.

Characteristics	Sayı	%	Characteristics	Sayı	%
Knowing the concept of EBN			**Knowledge of literature search**		
Yes	158	73.8	Yes	84	39.3
No	56	26.2	No	130	60.7
Taking the EBN course at the graduate school			**Following the current literature on nursing**		
Yes	113	52.8	Yes	102	47.7
No	101	47.2	No	112	52.3
Receiving EBN training in the institution			**Doing scientific research**		
Yes	115	53.7	Yes	40	18.7
No	101	46.3	No	174	81.3
Attending a scientific meeting on the subject of EBN			**Status of reading research paper**		
Yes	57	26.6	No	54	25.2
No	157	73.4	Rarely	99	46.3
Implementation of EBN in the clinic where worked			Sometimes	55	25.7
Yes	146	68.2	Often	6	2.8
No	68	31.8	**Having scientific publication**		
Barriers to using EBP in nursing			Yes	10	13.6
Unanswered	154	72.0	No	185	86.4
Lack of information	15	7.0	**Attendance at scientific meetings**		
Lack of education	10	4.7	Yes	29	13.6
Long working hours	12	5.6	No	185	86.4
The institution does not support EBP	5	2.3	**Becoming a member of a professional association**		
Insufficient staff	3	1.4	Yes	16	7.5
All	15	7.0	No	198	92.5
Knowledge of the foreign language			**Total**	214	100.0
No	51	23.8			
Little	109	50.9			
Medium	48	22.4			
Good	6	2.8			

The relationship between characteristics of nurses and sub-dimensions and total scores of the Attitude towards Evidence-Based Nursing Questionnaire

In the study, the mean score of the Attitudes towards Evidence-Based Nursing Questionnaire was found to be 61.5±8.8 (min=30 max=75). The mean score of the sub-dimensions of the scale was 28.9±4.7 (10-35) for beliefs and expectations towards EBN, 15.9±2.7 for EBP intention, and 10.7±3.0 (4-20) for feelings about EBN (Data not shown in the table).

The total mean score of the Attitudes towards Evidence-Based Nursing Questionnaire was found to be statistically significantly higher in nurses working in service compared to those working in intensive care, operating rooms, and emergency departments (p=0.045). Evidence-based practice intention sub-dimension mean score was statistically significantly higher in nurses with bachelor's degrees (17.0±2.3) compared to nurses with associate degrees (15.7±2.6) and health vocational high school (15.7±2.9) (p=0.046). The mean EBP intention score of the nurses working in the service was found to be statistically significantly higher than the nurses working in other clinics (p=0.028) (Table 3).

The Relationship between Nurses' Knowledge of Evidence-Based Nursing and Sub-Dimensions and Total Scores of the Attitude towards Evidence-Based Nursing Questionnaire

In this study, the total score of the Evidence-Based Attitude Scale towards Nursing Questionnaire was 64.4±7.7 in nurses who followed the current nursing literature and 59.3±9.1 in those who did not, and a statistically significant difference was found

between the mean scores of the two groups (p= 0.000). The mean score in the three sub-dimensions of the scale was statistically significantly higher in nurses who followed the current nursing literature compared to those who did not.

The total mean score for the Attitude towards Evidence Based Nursing Questionnaire (p=0.001), beliefs and expectations towards EBN (p=0.003), and EBP intention (p=0.002) sub-dimension mean score was found to be statistically significantly higher among the nurses who knew the concept of EBN compared to the nurses who did not. The mean total score of the scale was 63.4±8.4 in nurses who stated that they applied EBP in their clinics, and 58.3±8.8 in those who did not (p=0.000). It was determined that the mean score of the three sub-dimensions of the scale was statistically significantly higher in nurses who applied EBP in their clinic, compared to those who did not (Table 4).

The relationship between nurses' knowledge of research and literature review and sub-dimensions and total scores of the Attitude towards Evidence Based Nursing Questionnaire

In the study, nurses who knew the literature review (63.9±7.8) had a statistically significant higher mean total score on the scale than the nurses who did not know (60.4±9.2) (p=0.004). The mean score of the three sub-dimensions of the scale was found to be higher in nurses who knew how to search the literature compared to those who did not. The mean score of EBP intention sub-dimensions was statistically significantly higher in nurses who had published scientific papers (16.7±2.5) compared to those who did not (15.7±2.7) (p=0.037), nurses who participated in scientific meetings (16.9±2.4) than the nurses who did not participate (15.8±2.7) (p=0.043) (Table 4).

DISCUSSION

In this study, the factors affecting the attitudes of nurses working in private hospitals about EBP were examined. In the study, the majority of nurses (89.3%) were female, 14.1% had a bachelor's degree, 41.6% worked in intensive care, and the mean age and working year were 26.6 and 6.3, respectively. Similar to the findings of this study, the majority of the participants in the studies conducted in our country were women, and the rates were 88.9% for Gümüşhane (Doğan et al., 2021), 89.1% for Fethiye (Aygün & Yıldırım, 2021), and 82.6% for Istanbul (Kavlak et al., 2022). The rate of nurses having a bachelor's degree in studies, which was higher than this study, was 53.3% in Istanbul (Kavlak et al., 2022), 38% in Fethiye (Aygün & Yıldırım, 2021), and 34.3% in Gümüşhane (Doğan et al., 2021).

In the study, it was determined that more than half of the nurses (60.7%) did not know how to search the literature, and one-fourth of the nurses (25.2%) rarely read research articles. Similar to the results of this study, 63.1% of the nurses in Türkiye did not know how to search for literature (Menekli & Korkmaz, 2021), 55.9% did not know how to reach the evidence (Yılmaz et al., 2018) and 4.8% only used Google academy (Baran et al., 2020). In our country, 21.6% of nurses in a university hospital stated that they had read a research article on nursing (Doğan et al., 2021). In a study in Oman, it was determined that 83% of nurses were moderately successful in searching for resources on the Internet, and only 36% had sufficient search skills using databases (Ammouri et al., 2014). As seen from the research findings, it may be beneficial for nurses to obtain information about literature review both during their education periods and in post-graduate in-service training.

In the current study, only 18.7% of the nurses made scientific research and 13.6% scientific publications. In the study, the participation rate of nurses in scientific meetings was low, and the finding was similar to other research results (Baltacı & Deniz, 2019; Doğan et al., 2021; Kuuppelomäki & Tuomi, 2003; Şen & Yurt, 2021). In some studies conducted in our country, it was determined that the rate of participation in scientific meetings was 62.5% (Daştan & Hintistan, 2018) and 70.3% (Aydın, Adıgüzel & Topal, 2015).

As can be seen from the results of the study, further development of nurses' research direction is important in terms of using EBP in care. This difference may be due to the fact that the research was conducted in different regions, and the Covid 19 epidemic and the economic burden of scientific meetings on the budget in recent years may have led to less participation in scientific meetings.

Nurses need to have the knowledge and develop positive attitudes to reflect EBP in their care processes. In this study, nearly three-quarters of the nurses (73.8%) stated that they knew the concept of EBP, approximately half (52.8%) had received EBP training from the institution they graduated from and 53.7% from the institution they worked at, approximately one fourth (26.6%) attended a scientific meeting related to EBP. Less than the findings of this study, 64.4% of nurses (Alperen & Şahin, 2022) and 55.2% of nurses in recent studies in our country stated that they knew the concept of EBP (Kavlak et al., 2022).

Table 3. The relationship between characteristics of nurses and sub-dimensions and total scores of the Attitude Towards Evidence-Based Nursing Questionnaire.

Characteristics of nurses			Sub-dimensions of the scale					
	The total score on the questionnaire		Beliefs and expectations towards EBN		The intention of EBP		The feeling of EBN	
	Mean±sd	Test	Mean±sd	Test	Mean±sd	Test	Mean±sd	Test
The age group of nurses								
25 years and under	61.1±9.1	t=-1.392 p=0.165	28.4±4.9	t=-1.791 p=0.075	15.8±2.8	t=-0.770 p=0.442	16.9±3.2	t=-0.587 p=0.558
26 years and older	62.8±8.4		29.6±4.4		16.1±2.5		17.1±2.7	
Educational status of nurses								
Health vocational high school	61.6±8.8	F=1.231 p=0.294	29.0±4.5	F=0.572 p=0.565	15.7±2.9	F=3.129 **p=0.046**	16.8±3.1	F=0.969 p=0.381
Associate degree	61.1±8.9		28.3±5.2		15.7±2.6		17.0±2.9	
Bachelor's degree	64.0±8.1		29.4±5.0		17.0±2.3		17.6±2.6	
Gender of nurses								
Female	61.9±8.7	t=0.680 p=0.498	28.9±4.7	t=0.280 p=0.780	16.0±2.7	t=1.076 p=0.283	17.0±3.0	t=0.590 p=0.556
Male	60.6±9.6		28.6±4.9		15.4±2.7		16.6±3.2	
The department where nurses work								
Service	63.3±7.9	F=2.721 **p=0.045**	29.5±4.4	F=1.366 p=0.254	16.3±2.3	F=3.104 **p=0.028**	17.4±2.4	F=2.264 p=0.082
Intensive care	61.7±8.6		28.7±4.7		16.0±2.9		16.9±3.3	
Emergency	58.6±11.8		27.7±5.5		15.1±3.0		15.7±3.8	
Operating room	58.2±9.7		27.6±5.3		14.5±3.0		16.1±3.1	
Working year								
1-5 year	61.4±9.7	F=0.435 p=0.648	28.3±5.4	F=2.092 p=0.126	16.0±2.8	F=0.342 p=0.711	17.1±3.1	F=0.713 p=0.492
6-10 year	62.6±7.7		29.6±3.7		15.9±2.7		17.0±3.1	
11 years and above	61.4±7.6		29.5±4.1		15.6±2.3		16.4±2.5	
Marital status								
Married	61.7±9.0	t=-0.145 p=0.885	29.1±4.4	t=0.504 p=0.615	15.8±2.8	t=-0.383 p=0.702	16.8±3.0	t=-0.873 p=0.384
Single	61.8±8.7		28.7±5.0		16.0±2.7		17.1±3.0	
Status of having children								
Yes	62.7±8.3	t=0.902 p=0.368	29.6±4.3	t=1.234 p=0.218	16.0±2.5	t=0.137 p=0.891	17.2±2.7	t=0.588 p=0.557
No	61.4±9.0		28.6±4.9		15.9±2.8		16.9±3.1	

Table 4. The relationship between nurses' knowledge of evidence-based nursing, research and literature review and the sub-dimensions and total scores of the Attitude towards Evidence Based Nursing Questionnaire.

Characteristics	The total score on the questionnaire		Sub-dimensions of the questionnaire					
			Beliefs and expectations towards EBN		The intention of EBP		The feeling of EBN	
Knowledge of the foreign language	Mean±sd	Test	Mean±sd	Test	Mean±sd	Test	Mean±sd	Test
No	59.8±9.6	F=1.218 p=0.304	28.1±5.4	F=0.831 p=0.478	15.2±2.8	F=1.448 p=0.230	16.5±3.4	F=1.198 p=0.311
Little	62.7±8.8		29.2±4.8		16.1±2.6		17.3±2.9	
Medium	61.6±7.9		28.7±3.8		16.2±2.9		16.8±2.7	
Good	62.7±8.1		30.3±4.4		16.2±1.7		16.2±3.4	
Following the current literature on nursing								
Yes	64.4±7.7	t=4.375 p=**0.000**	30.4±3.6	t=4.692 p=**0.000**	16.6±2.6	t=-3.322 p=**0.001**	17.5±3.1	t=2.410 p=**0.017**
No	59.3±9.1		27.5±5.2		15.4±2.7		16.5±2.9	
Knowing the concept of EBN								
Yes	63.0±7.9	t=3.526 p=**0.001**	29.5±4.3	t=3.045 p=**0.003**	16.2±2.6	t=2.598 p=**0.010**	17.3±2.9	t=3.153 p=**0.002**
No	58.3±10.3		27.3±5.5		15.1±2.8		15.9±3.2	
Taking the EBN course at the graduate school								
Yes	62.4±8.5	t=1.079 p=0.282	29.2±4.6	t=0.980 p=0.328	16.0±2.8	t=0.657 p=0.512	17.2±3.1	t=1.038 p=0.301
No	61.1±9.2		28.5±4.8		15.8±2.6		16.7±2.9	
Receiving EBN training in the institution								
Yes	62.6±8.4	t=1.591 p=0.113	29.4±4.5	t=1.635 p=0.104	16.0±2.8	t=0.513 p=0.608	17.3±3.0	t=1.643 p=0.102
No	60.7±9.2		28.3±4.9		15.8±2.6		16.6±3.0	
Attending a scientific meeting on the subject of EBN								
Yes	62.1±9.4	t=0.357 p=0.722	29.0±5.4	t=0.211 p=0.833	16.2±3.0	t=0.773 p=0.440	17.0±3.3	t=0.020 p=0.984
No	61.6±8.6		28.8±4.5		15.8±2.6		17.0±2.9	
Implementation of EBN in the clinic where worked								
Yes	63.4±8.4	t=4.010 p=**0.000**	29.6±4.4	t=3.583 p=**0.000**	16.3±2.7	t=3.080 p=**0.002**	17.4±2.9	t=3.256 p=**0.001**
No	58.3±8.8		27.2±4.9		15.1±2.6		16.0±3.1	

Table 4. (Continued) The relationship between nurses' knowledge of evidence-based nursing, research and literature review and the sub-dimensions and total scores of the Attitude towards Evidence Based Nursing Questionnaire.

Characteristics	**Total score on the questionnaire**		**Sub-dimensions of the questionnaire**					
			Beliefs and expectations towards EBN		**The intention of EBP**		**The feeling of EBN**	
	Mean±sd	Test	Mean±sd	Test	Mean±sd	Test	Mean±sd	Test
Knowledge of literature search								
Yes	63.9±7.8	t=2.909 p=**0.004**	29.8±4.1	t=2.215 p=**0.028**	16.6±2.5	t=3.045 p=**0.003**	17.6±2.9	t=2.285 p=**0.023**
No	60.4±9.2		28.3±5.0		15.5±2.8		16.6±3.0	
Status of reading research paper								
No	59.1±8.8	F=2.450 p=0.065	27.6±5.0	F=1.885 p=0.133	15.3±2.6	F=1.965 p=0.120	16.2±2.9	F=2.685 p=**0.048**
Rarely	62.4±8.3		29.4±4.2		15.9±2.7		17.1±3.1	
Sometimes	63.2±9.1		29.1±5.1		16.6±2.7		17.6±2.7	
Often	61.2±11.8		29.3±4.9		16.3±3.3		15.6±4.3	
Doing scientific research								
Yes	62.4±8.5	t=0.498 p=0.619	28.5±5.1	t=-0.511 p=0.610	16.7±2.5	t=2.105 p=**0.037**	17.1±2.7	t=0.389 p=0.697
No	61.6±8.9		29.0±4.6		15.7±2.7		16.9±3.1	
Having scientific publication								
Yes	60.9±10.3	t=-0.311 p=0.756	27.9±6.9	t=-0.664 p=0.507	16.6±2.7	t=0.814 p=0.417	16.4±3.0	t=-0.601 p=0.549
No	61.8±8.8		28.9±4.6		15.9±2.7		17.0±3.0	
Attendance at scientific meetings								
Yes	64.0±7.4	t=1.460 p=0.146	29.9±3.6	t=1.263 p=0.208	16.9±2.4	t=2.033 p=**0.043**	17.2±2.5	t=0.479 p=0.632
No	61.4±9.0		28.7±4.9		15.8±2.7		16.9±3.1	
Becoming a member of a professional association								
Yes	64.8±7.8	t=1.448 p=0.149	31.0±3.4	t=1.889 p=0.060	16.8±2.5	t=1.375 p=0.170	17.0±2.8	t=0.058 p=0.954
No	61.5±8.9		28.7±4.8		15.9±2.7		17.0±3.0	

t=Independent sample-test F=One-way ANOVA

In studies, the rate of nurses receiving training on EBP was found to be 57.1% (Doğan et al., 2021), and 38.0% (Şen & Yurt, 2021). In previous studies, the participation rate of nurses in scientific meetings varied between 20.9% and 81.5%, and these studies emphasized the importance of including EBP in in-service training programs (Doğan et al., 2021; Menekli & Korkmaz, 2021; Şen & Yurt, 2021; Yılmaz et al., 2018).

Nurses need to have the knowledge and develop positive attitudes to reflect EBP in their care processes. In this study, nearly three-quarters of the nurses (73.8%) stated that they knew the concept of EBP, approximately half (52.8%) had received EBP training from the institution they graduated from and 53.7% from the institution they worked at, approximately one fourth (26.6%) attended a scientific meeting related to EBP. Less than the findings of this study, 64.4% of nurses (Alperen & Şahin, 2022) and 55.2% of nurses in recent studies in our country stated that they knew the concept of EBP (Kavlak et al., 2022). In studies, the rate of nurses receiving training on EBP was found to be 57.1% (Doğan et al., 2021), and 38.0% (Şen & Yurt, 2021). In previous studies, the participation rate of nurses in scientific meetings varied between 20.9% and 81.5%, and these studies emphasized the importance of including EBP in in-service training programs (Doğan et al., 2021; Menekli & Korkmaz, 2021; Şen & Yurt, 2021; Yılmaz et al., 2018).

In this study, nearly half of the nurses (50.9%) stated that they had low knowledge of foreign languages and did not follow the current nursing literature (52.3%). Consistent with the findings of this study, 50.5% of the nurses in our country stated that their knowledge of foreign languages was low (Baran et al., 2020) and 52.2% did not follow the current nursing literature (Aygün & Yıldırım, 2021). As it is known, foreign language knowledge is extremely important in obtaining information about EBN by following the current literature, especially in the field of health, and it is necessary for institutions providing nursing education to present this awareness and information to their students.

In the study, 68.2% of the participants stated that they provided evidence-based care in the clinic they worked at. Similarly, the rate of providing care with EBP in the clinic where nurses work in our country was 71.4% (Doğan et al., 2021) and 73.7% (Yanmış & Özcan, 2022).

In the present study, the total mean score of the scale was found 61.5, and similar to the findings of this study, it was found to be 61.5 for nurses working in a public hospital (Doğan et al., 2021), and 65.0 for nurses working at a private hospital in our country (Kavlak et al ., 2022). Lower than the findings of this study, in some studies in our country the mean score of the scale was 58.2±7.9 in Ankara (Baran et al., 2020), 57.7±7.9 in Ağrı (Yıldırım & Yıldız, 2020), 43.5±3.1 in Şanlıurfa (Menekli & Korkmaz, 2021) and 58.2±8.8 in Yozgat (Kılıç et al., 2022). In a study, it was determined that midwives and nurses working in postpartum care clinics training and research hospital used EBP at a moderate level (Merih et al., 2017). Different from our study, it was found a study that nurses' EBP attitudes were negative (Breimaier, Halfens & Lohrmann, 2011).

As it is known, it is important for professional development to determine the factors that affect nurses' knowledge, attitudes, and behaviors toward EBP (Baltacı & Deniz, 2019). Most of the studies evaluating EBP in nurses in Türkiye were conducted with nurses working in public, state, and university hospitals. Similar to the previous study (Daştan & Hintistan, 2018), in this study, it was determined that the gender, marital status and age groups of the nurses did not affect their attitudes toward EBP, and the mean score of the EBP intention sub-dimension was found to be statistically significantly higher in nurses with undergraduate degrees and working in the service. Unlike the results of this study, it was stated in a study that female nurses had a statistically significantly more positive attitude toward EBP than male nurses (Alperen & Şahin, 2022). In a study conducted in a training and research hospital in our country, no statistically significant difference was found between the education level, department, and nurses' EBP attitudes, and this finding differs from our study (Alperen & Şahin, 2022). When international studies were reviewed, in a study conducted with nurses (n=472) working in university hospitals in Japan, EBP proficiency was found to be higher in those who had research experience, received training on this subject, had advanced practice certificate (specialist nurses/certified nurses), and had more working experience (Tomotaki, Fukahori & Sakai, 2020). As can be seen from the research findings, the increase in the education level of nurses also increases the EBP intention. For this reason, it was thought that it is important to provide training to nurses on EBP.

In this study, nurses' attitudes toward EBP were found to be positive. Those who received training on EBP and stated that they have used EBP in their clinical practice have a more positive attitude towards EBP. The findings were similar to the results of other studies (Breimaier et al., 2011; Kuuppelomäki & Tuomi, 2003). This finding can be explained by the increase in the knowledge and awareness of nurses who received training on EBP and actively use EBP as a result of the training they received.

In the current study, the mean score of the total and three sub-dimensions of the scale was found to be statistically significantly higher in nurses who knew the concept of EBP, worked in the clinic, stated that they applied EBP in their clinic, knew the literature review, and followed the current nursing literature. In a study in our country, it was stated that the attitudes of those who received training on EBP and who used

EBP in their clinical practice were more positive attitude (Doğan et al., 2021).

In the study, the mean score of the EBP intention sub-dimension was found to be statistically significantly higher in nurses who graduated with a bachelor's degree, worked in the service, made scientific publications, and participated in scientific meetings compared to other groups. In a study conducted with nurses working in a university hospital, it was found that there was a significant relationship between nurses' love of their profession, attending scientific meetings with papers, following professional publications, and doing research, and their attitudes towards EBP (Doğan et al., 2021). It has been determined that nurses with undergraduate education who worked in a research and application center and the surgical units of a state hospital in the Western Black Sea Region in our country gave more correct answers to the subject of EBP related to patient transfer to the operating room (Köstekli, Çelik & Karahan, 2020). In Fethiye, Turkey, it was found that among nurses working in public and private hospitals, those with undergraduate degrees, those who have spent their lives in urban areas, those who read professional publications, and those who were members of professional associations had higher attitudes towards EBP (Aygün & Yıldırım, 2021).

In the current study, perceived barriers to using EBP in nursing were also examined, and nurses stated long working hours (5.6%), lack of knowledge (7.0%), and education (4.7%) as barriers. In a systematic review, barriers with EBP were classified as institutional, interdisciplinary, and nurse-related barriers (Shayan et al., 2019). In a study with knowledge of Chinese nurse managers about EBP and the influencing factors, it has been determined that the educational status of nurses, their professional title, EBP training status, and the institutional culture of EBP were the factors affecting it (Chen et al., 2020). In a training and research hospital in Ankara, Turkey, lack of staff (60.0%), insufficient environment and materials (33.3%), lack of time (58.1%), workload (87.6%), lack of information (60.0%), lack of institutional support (48.6%), lack of access to research (20.0%), lack of knowledge about scientific research methods (50.5%), foreign language deficiency (61.0%), and not being a decision maker in the clinic (43.8%) were identified as barriers to EBP (Baran et al., 2020). In the literature, it has been stated that the biggest barriers to EBP were the lack of time (Alperen & Şahin, 2022; Dalheim, Harthug, Nilsen, & Nortvedt, 2012; Yılmaz et al., 2018) and the inability to find and manage research evidence at a sufficient level in nurses (Dalheim et al., 2012). Other barriers such as language barriers, inability to access, interpret and use research findings, and lack of knowledge about EBP have also been reported (Ammouri et al., 2014). It was emphasized that nurses have four individual barriers in EBP. These barriers were lack of knowledge, lack of skills, awareness, and professionalism regarding the use of EBP, lack of behavior and experience in using EBP, and language barrier (Alatawi et al., 2020). As it is known, EBN practices are important in improving the quality of patient care. It is important for nursing education institutions to include more EBN in their course curricula and to create this awareness in students and to encourage employees by developing strategies to reduce the barriers experienced by institution managers in contributing to the improvement of patient care quality.

Limitation of the study

Since this research was conducted in private hospitals located in a province in Turkey, the findings cannot be generalized to Turkey.

CONCLUSION

In the study, nurses who worked in service, who followed the current nursing literature, who knew the concept of EBN, who applied EBP in their clinics, and who knew the literature review had more positive attitudes toward EBN. It is very important to determine the factors affecting the knowledge, attitudes, and behaviors of nurses towards EBP and to organize training programs in this direction in terms of professional development and increasing the quality of health care.

Acknowledgements

The authors would like to thank the nurses who participated in the study.

Conflict of Interest

The authors declare no conflict interest.

Author Contributions

Plan and design: EY, İŞ; **Material, methods and data collection:** İŞ; **Data analysis and comments**: EY, İŞ; **Drafting of the article;** EY, İŞ; **Writing and corrections:** EY.

Funding

The authors declare that this study received no financial support.

Ethical considerations

The use of the Attitude towards Evidence Based Nursing Questionnaire in the study was obtained from Ayhan, who made the validity and reliability of the scale. Ethical approval of the study was received from Manisa Celal Bayar University Faculty of Medicine Health Sciences Ethics Committee (Date: 12.10.2022 Number: E-20478486-050.04.04-405879). Written permission from private hospitals in Manisa province and written informed consent were obtained from the nurses in the study.

REFERENCES

Alatawi, M., Aljuhani, E., Alsufiany, F., Aleid, K., Rawah, R., Aljanabi, S., & Banakhar, M. (2020). Barriers to implementing evidence-based practice in the

nursing profession: A literature review. *American Journal of Nursing Science*, *9*(1), 35-42. https://doi.org/10.11648/j.ajns.20200901.16

Alperen, A., & Şahin O. A. (2022). Investigation of nurses' knowledge and attitudes about evidence-based nursing: a descriptive and cross-sectional study. *Turkiye Klinikleri Journal of Nursing Sciences*, *14*(1), 149-159. https://doi.org/10.5336/nurses.2021-82436

Ammouri, A. A., Raddaha, A. A., Dsouza, P., Geethakrishnan, R., Noronha, J. A., Obeidat, A. A., & Shakman, L. (2014). Evidence-based practice: knowledge, attitudes, practice and perceived barriers among nurses in Oman. *Sultan Qaboos University Medical Journal*, *14*(4), e537-545.

Arslan, F. T., & Çelen, R. (2018). Determination of the attitudes among nursing students towards evidence-based nursing. *Journal of Continuing Medical Education*, *27*(2), 99-106.

Aslan, H. & Gürdap, Z. (2021). Nurses' attitudes towards evidence-based nursing and their knowledge levels to prevent infection associated with the peripheral venous catheter. *The Journal of Turkish Family Physician*, *12*(2), 84-98. https://doi.org/10.15511/tjtfp.21.00284

Aydın, Y., Adıgüzel, A., & Topal, E. A. (2015). Ebe ve hemşirelerin bilimsel çalışmalara yönelik tutumlarının belirlenmesi (Determining the attitudes of midwives and nurses towards scientific studies). *Journal of Human Rhythm*, *1*(4), 168-175.

Aygün, Ö., & Yıldırım, M. (2021). Determining the attitudes of nurses towards evidence-based practices. *Izmir Democracy University Health Sciences Journal*, *4*(3), 327-338. https://doi.org/10.52538/iduhes.1033115

Ayhan, Y., Kocaman, G., & Bektaş, M. (2015). The validity and reliability of attitude towards evidence based nursing questionnaire for Turkish. *Hemşirelikte Araştırma Geliştirme Dergisi*, *17*(2/3), 21-35.

Baltacı, N., & Deniz, H. T. (2019). Evaluation of students' research anxiety and use of information technologies and attitudes towards evidence-based nursing. *Journal of Samsun Health Sciences*, *4*(2), 60-68.

Baran, G. K., Atasoy, S., & Şahin, S. (2020). Evaluation of awareness and attitudes of nurses towards evidence-based nursing practices. *Manisa Celal Bayar University Journal of Institute of Health Science*, *7*(3), 352-359. https://doi.org/10.34087/cbusbed.699410

Breimaier, H. E., Halfens, R. J., & Lohrmann, C. (2011). Nurses' wishes, knowledge, attitudes and perceived barriers on implementing research findings into practice among graduate nurses in Austria. *Journal of Clinical Nursing*, *20* (11-12), 1744-1756. https://doi.org/10.1111/j.1365-2702.2010.03491.x

Chen, L., Wu, Y., Zhou, C., Li, X., & Zhao, H. (2020). Value, knowledge and implementation on evidence-based practice among nurse managers in China: a regional cross-sectional survey. *Journal of Nursing Management*, *28*,139-147. https://doi.org/10.1111/jonm.12907

Dalheim, A., Harthug, S., Nilsen, R. M., & Nortvedt, M. W. (2012). Factors influencing the development of evidence-based practice among nurses: a self-report survey. *BMC Health Services Research*, *12*, 367. https://doi.org/10.1186/1472-6963-12-367

Daştan, B., & Hintistan, S. (2018). Determination of the attitudes of nurses working in internal clinics for evidence-based nursing: rural region example. *Ordu University Journal of Nursing Studies*, *1*(1), 1-9.

Doğan, E. S., Cin A., Demirağ H., & Uçan, M. F. (2021). Investigation of nurses' attitudes toward evidence-based nursing practices. *International Anatolian Social Sciences Journal*, *5*(2), 612-622. https://doi.org/10.47525/ulasbid.879094

Kavlak, T., Öz, S., & Özen, N. (2022). Analysing of nurses' attitudes towards evidence-based practices and affecting factors: a descriptive study. *Turkiye Klinikleri Journal of Nursing Sciences*, *14*(2), 279-287. https://doi.org/10.5336/nurses.2021-84508

Kılıç, M., Öcal N. Ü., & Uslukılıç, G. (2022). The effect of nursing professional satisfaction and teamwork attitude on evidence-based nursing attitude: a multivariate analysis. *Turkiye Klinikleri Journal of Nursing Sciences*, *14*(2), 434-444. https://doi.org/10.5336/nurses.2021-84661

Köstekli, S., Çelik, S., & Karahan, E. (2020). Cerrahi birimlerde çalışan hemşirelerin ameliyathaneye hasta transferi konusundaki kanıta dayalı bilgi düzeyleri (Evidence based knowledge levels of nurses working in surgical units on patient transfer of the operating room). *Health Academy Kastamonu*, *5*(1), 52-64. https://doi.org/10.25279/sak.580761

Kuuppelomäki, M., & Tuomi, J. (2003). Finnish nurses' views on their research activities. *Journal of Clinical Nursing*, *12*(4), 589-600. https://doi.org/10.1046/j.1365-2702.2003.00756.x

Menekli, T., & Korkmaz, M. (2021). Dâhiliye hemşirelerinin kanıta dayalı hemşireliğe yönelik tutumları (Internal medicine nurses' attitudes towards evidence-based nursing). *E-Journal of Dokuz Eylul University Nursing Faculty*, *14*(1), 38-47. https://doi.org/10.46483/deuhfed.782131

Merih, Y. D., Potur, D. Ç. & Esencan, T. Y. (2017). Doğum sonu kliniklerinde çalışan ebe ve hemşireler kanıta dayalı uygulamaların neresinde? (Where can we find postpartum clinic midwives and nurses in the context of evidence based practice?). *Journal of Health and Nursing Management*, *1*(4), 8-14. https://doi.org/10.5222/SHYD.2017.008

Shayan, S. J., Kiwanuka, F., & Nakaye, Z. (2019). Barriers associated with evidence-based practice among nurses in low-and middle-income countries: A systematic review. *Worldviews on Evidence-Based Nursing*, *16*(1), 12-20. https://doi.org/10.1111/wvn.12337

Saunders, H., Gallagher-Ford, L. & Vehviläinen-Julkunen, K. (2019). Practicing health care professionals' evidence-based practice competencies: an overview of systematic reviews. *Worldviews on Evidence-Based Nursing*, *16*(3), 176-185. https://doi.org/10.1111/wvn.12363

Saifan, A., Devadas, B., Daradkeh, F., Abdel-Fattah, H., Aljabery, M., & Michael, L. M. (2021). Solutions to bridge the theory-practice gap in nursing education in the UAE: a qualitative study. *BMC Medical Education*, *21*, 490. https://doi.org/10.1186/s12909-021-02919-x

Şen, E. Ş., & Yurt, S. (2021). Hemşirelerin kanıta dayalı uygulamalara yönelik tutumlarının belirlenmesi (Determining the attitudes of nurses towards

evidence-based practices). *E-Journal of Dokuz Eylul University Nursing Faculty*, *14*(2), 102-107. https://doi.org/10.46483/deuhfed.737729

Tomotaki, A. İ., Fukahori, H., & Sakai, I. (2020). Exploring sociodemographic factors related to practice, attitude, knowledge, and skills concerning evidence-based practice in clinical nursing. *Japan Journal of Nursing Science*, *17*(1), e12260. https://doi.org/10.1111/jjns.12260

Yanmış, S., & Özcan, Ş. (2022). Dahiliye kliniklerindeki hemşirelerin yenilikçi özelliklerinin ve kanit temelli hemşireliğe ilişkin tutumlarının belirlenmesi (Determination of innovative characteristics and attitudes towards evidence-based nursing in internal medicine clinics). *Hacettepe Journal of Health Administration*, *25*(2), 319-334.

Yıldırım, M. S., & Yıldız, E. (2020). Hemşirelerin kanıta dayalı hemşireliğe yönelik tutumlarının belirlenmesi (The determination of attitude towards evidence based nursing of nurses). *Journal of Nursing Science*, *3*(2), 24-29.

Yılmaz, D., Düzgün, F., & Dikmen, Y. (2019). Hemşirelerin kanıta dayalı hemşireliğe yönelik tutumlarının incelenmesi (An investigation into nurses' attitudes towards evidence-based nursing). *Acıbadem University Health Sciences Journal*, *10*(4), 713-719.

Yılmaz, İ., Kaya, E. G., & Akansel, N. (2020). Ameliyathane hemşirelerinin kanıta dayalı uygulamalar hakkındaki bilgileri (Operating room nurses' knowledge on evidence-based practices). *Journal of Health Sciences of Adıyaman University*, *6*(1), 84-92. https://doi.org/10.30569.adiyamansaglik.662217

Yılmaz, E., Çeçen, D., Aslan, A., Kara, H., Toğaç, H. K., & Mutlu, S. (2018). Cerrahi kliniklerde çalışan hemşirelerin kanıta dayalı hemşireliğe yönelik tutumları ve araştırma kullanımında algıladıkları engeller (Attitudes towards evidence-based nursing and perceptions of obstacles in using research of nurses working in surgical clinics). *Journal of Education and Research in Nursing*, *15*(4), 235-241. https://doi.org/10.5222/HEAD.2018.235

ORİJİNAL MAKALE / ORIGINAL ARTICLE

Balıkesir Sağlık Bilimleri Dergisi / BAUN Sağ Bil Derg
Balıkesir Health Sciences Journal / BAUN Health Sci J
ISSN: 2146-9601- e ISSN: 2147-2238
Doi: https://doi.org/10.53424/balikesirsbd.1375363

A Comparative Analysis of Occupational Accidents among Health Workers Before and During the COVID-19 Pandemic

Yasemin ASLAN [1], Dilara ARSLAN [1], Sinem GÜLER [2]

[1] Bandırma Onyedi Eylül University, Faculty of Health Sciences, Health Management Department
[2] Bahcesehir University, Medical Park Goztepe Hospital, Occupational Health and Safety

Geliş Tarihi / Received: *13.10.2023,* ***Kabul Tarihi / Accepted:*** *13.05.2024*

ABSTRACT

Objective: The study aimed to evaluate the occupational accidents in pre-pandemic and during the COVID-19 pandemic within hospital. **Materials and Methods:** This descriptive case series study consists of occupational accidents in a university hospital between June 11th, 2018, and December 31st, 2021. Sample selection was not made and the entire population was taken into consideration. The data was obtained from the records of the Occupational Safety and Health Department of the hospital. Descriptive statistics and the SPSS program version 25.0 were used to analyze the data. **Results:** While the occupational group with the highest number of occupational accidents in the pre-pandemic period was cleaning personnel (34.8%), it was determined that the most occupational accidents were seen in nurses (37.5%) during the pandemic. A statistically significant difference was detected between pre- and during-pandemic occupational accidents and the variables of age and working hours ($p<0.05$). The occupational accidents' types were mostly sharp-stab injuries (43.6%–44.4%) and musculoskeletal injuries (22.7%–15%) pre-pandemic period and during the pandemic, respectively. The superiority of the staff who have had occupational accidents were women and the 20–29 age group. **Conclusion:** It is recommended that health policymakers and hospital administrators determine strategies to reduce occupational accidents among health workers.
Keywords: COVID-19, Health Workers, Hospital, Occupational Accident.

Hastane Çalışanlarının COVID -19 Öncesi ve COVID -19 Süreci İş Kazalarının Karşılaştırılması

ÖZ

Amaç: Bu çalışmada hastane çalışanlarının COVID-19 öncesi ve COVID-19 süreci iş kazalarının karşılaştırılması amaçlanmıştır. **Gereç ve Yöntem:** Tanımlayıcı olgu serisi türündeki bu çalışma bir üniversite hastanesinde 11 Haziran 2018 ile 31 Aralık 2021 tarihleri arasında meydana gelen iş kazalarını kapsamaktadır. Çalışmada örneklem seçimine gidilmemiş ve evrenin tamamı değerlendirmeye alınmıştır. Veriler hastanenin İş Sağlığı ve Güvenliği Birimi kayıtlarından elde edilmiştir. Verilerin analizinde tanımlayıcı istatistiklerden ve SPSS programından faydalanılmıştır. **Bulgular:** Pandemi öncesi dönemde iş kazalarının en fazla görüldüğü meslek grubu temizlik personeli iken (%34,8) pandemi döneminde iş kazalarının en fazla hemşirelerde görüldüğü (%37,5) tespit edilmiştir. Pandemi öncesi ve pandemi sırasında yaşanan iş kazaları ile yaş ve çalışma saati değişkenleri arasında istatistiksel olarak anlamlı fark tespit edilmiştir ($p<0,05$). Pandemi öncesi ve pandemi süreci iş kazalarının en fazla kesici alet yaralanmaları (%43,6-%44,4) ve kas-iskelet sistemi yaralanmaları (%22,7-%15) nedeniyle yaşandığı görülmüştür. İş kazası geçiren çalışanların çoğunluğunu kadınların ve 20-29 yaş grubunun oluşturduğu tespit edilmiştir. **Sonuç:** Sağlık politika yapıcıların ve hastane yöneticilerinin, sağlık çalışanlarının maruz kaldığı iş kazalarını azaltmaya yönelik stratejiler belirlemesi önerilmektedir.
Anahtar Kelimeler: COVID-19, Sağlık Çalışanı, Hastane, İş Kazası.

Sorumlu Yazar / Corresponding Author: Yasemin ASLAN, Bandırma Onyedi Eylül University, Faculty of Health Sciences, Health Management Department, 10200, Bandırma, Balıkesir, Türkiye
E-mail: yaseminaslan@bandirma.edu.tr

Bu makaleye atıf yapmak için / Cite this article: Aslan, Y., Arslan, D., & Güler, S. (2024). A comparative analysis of occupational accidents among health workers before and during the covıd-19 pandemic. *BAUN Health Sci J, 13*(2), 426-433. https://doi.org/10.53424/balikesirsbd.1375363

INTRODUCTION

Occupational accidents are one of the critical public health problems, especially in middle- and low-income countries. An occupational accident is defined as "*an unexpected and unplanned occurrence, including acts of violence, arising out of or in connection with work, which results in one or more workers incurring a personal injury, disease, or death*" in the sixteenth conference of labor statisticians at international level (Raheem & Hinze, 2014). According to the World Health Organization (WHO) and the International Labour Organization (ILO), approximately two million workers die each year from occupation-related causes. In addition, occupational accidents cause negative effects on household incomes, reduce productivity, and place an additional burden on health systems (World Health Organization & International Labour Organization, 2021). Furthermore, it was stated that the expectancy of a healthy life of individuals decreased by 3.5 years in one of every thousand employees owing to occupational accidents (Varacallo & Knoblauch, 2022).

Hospitals are an important subsystem of healthcare. It has been stated that the hospital working environment is a complex and potentially dangerous place for health workers (dos Santos Santiago Ribeiro & de Cassia de Marchi Barcellos Dalri, 2021). The threats and risks faced by health workers in hospitals can be classified as physical, biological, chemical, ergonomic, psychosocial, and safety-related (which consists of risks related to falls and bumps, sharp injuries, contact with extreme-temperature objects, electricity, fire, and explosion) hazards (Saia et al., 2010). Studies show that the numbers of occupational accidents in growing countries are generally greater than in developed ones due to inadequate staffing, lack of experience, safety equipment, and training programs, long working hours, and inadequate standardized cautions (Saia et al., 2010; Kakizaki et al., 2011; Markovic-Denic et al., 2015). Recently, one of the risk factors for health workers has been the COVID-19 outbreak.

The COVID-19 virus first appeared in China at the end of 2019 and soon spread worldwide and was announced as a pandemic by WHO (Lee & Kim, 2021). It has been stated that health workers are more vulnerable to occupational injuries during the pandemic (Baek et al., 2021). In a study assessing the pandemic's effects on the statistics of occupational accidents in Turkey belong to 2020, the number of occupational accidents was found to be reduced in 2020 compared to 2018 and 2019, but there was no decrease in the frequency and severity of occupational accidents (Çalış, 2022). Along with the increasing patient burden in this period, the risk of transmission of the disease, the problems in providing personal protective equipment, and the increase in the burden on the health systems have created an important source of stress for the staff. In the study conducted in South Korea, to determine the occupational groups with high risk for COVID-19, it is highlighted that health workers are among the high-risk occupational groups, and it is suggested for governments to take precautions to prevent COVID-19 in these areas and protect vulnerable groups (Lee & Kim, 2021).

The study aimed to evaluate occupational accidents in pre-pandemic and during the COVID-19 pandemic within hospital.

Research questions

- Is there a difference between pre-pandemic and pandemic-period occupational accidents?
- Do pre-pandemic and pandemic-period accidents differ according to the occupational group?
- Is there a difference between the types of occupational accidents before and during the pandemic?
- What is the severity of occupational accidents before and during the pandemic?

MATERIALS AND METHODS

Study type

This is a descriptive case series study.

Study group

The population of study involved occupational accidents between June 11th, 2018, and December 31st, 2021. In the study, no sample selection was made. The entire population was considered, and, tried to be reached.

Inclusion criteria

The data obtained for the 21-months between the dates of June 11, 2018, and March 11, 2020, has been evaluated as pre-pandemic period data. Also, the data obtained for another 21-months between the dates of 12 March 2020, when a patient was diagnosed with COVID-19 in Turkey for the first time, and 31 December 2021 has been evaluated as pandemic period data.

Exclusion criteria

Occupational accidents that did not meet the inclusion criteria were excluded.

Data collection tools

The data has been obtained via the records of the Occupational Health and Safety Department.

Statistical analysis

Descriptive statistics, Microsoft Excel PivotTable reports, and Statistical Package for Social Sciences for Windows 25.0 (IBM Corp.; Armonk, NY, USA) were used to analyze the data. Standard deviation (SD), frequency, percentage, and mean value calculations were used to describe the socio-demographic characteristics, and continuous and categorical variables. The chi-square test was practiced to determine the relationship between pre-pandemic and pandemic variables. In the analyses carried out, '$p<0.05$' was accepted as the statistical significance threshold. The Classification of the Labor and Social Security Ministry -General Directorate of Labor and information in the related literature have been used to classify the types and results of occupational accidents (Ministry of Labour

and Social Security, General Directorate of Labour, 2022; Akgün, 2015; Uçak, 2009).

Ethical considerations

This study was approved by the Committee of Bandırma Onyedi Eylül University Health Sciences Non-Interventional Research Ethics (Date: 09.05.2022 Issue No: 2022-5/51). Institutional permission was obtained. At all stages of the study, research and publication ethics and the Declaration of Helsinki were followed.

RESULTS

In the hospital where the study was conducted, the average number of the health workers in the pre-pandemic period was calculated as 986, and during the pandemic was calculated as 937. Table 1 represents the sociodemographic characteristics of the participants. Accordingly, 71.8% of the staff who had an occupational accident pre-pandemic and 70.6% of the staff who were exposed to occupational accident during the pandemic were women.

Table 1. Sociodemographic characteristics of individuals who faced occupational accident(s) (n=341).

Sociodemographic characteristics of the individuals	Pre-pandemic n=181		During pandemic n=160	
Gender	**n**	**%**	**n**	**%**
Male	51	28.2	47	29.4
Female	130	71.8	113	70.6
Age Group				
20-29	66	36.5	79	49.4
30-39	40	22.1	41	25.6
40-49	54	29.8	25	15.6
50 +	21	11.6	15	9.4
Occupational Group				
Cleaning staff	63	34.8	37	23.1
Nurse	57	31.5	60	37.5
Technician	22	12.2	19	11.9
Administrative staff	12	6.6	7	4.4
Kitchen Staff	7	3.9	10	6.3
Porter	7	3.9	2	1.3
Physician	3	1.7	3	1.9
Electrical-mechanical technicians	3	1.7	5	3.1
Biologist	2	1.1	1	0.6
Security personal	2	1.1	0	0.0
Auxiliary staff	2	1.1	15	9.4
Biomedical technician	1	0.6	1	0.6
Total	**181**	**100.0**	**160**	**100.0**

In the study, 34.8% of the staff who were exposed to occupational accident in pre-pandemic period were cleaning staff and 31.5% were nurses. These numbers are 37.5% (nurses) and 23.1% (cleaning staff) during the pandemic period.

Evaluation of the Table 2 shows the types of occupational accidents. Accordingly, 43.6% of the pre-pandemic occupational accidents were sharp injuries and 22.7% by musculoskeletal injuries. On the other hand, 44.4% of the occupational accidents during the pandemic period were sharp-stab injuries and 15% were musculoskeletal injuries.

Table 2. Types of occupational accidents (n=341).

Types of occupational accident	Pre-pandemic		During pandemic	
	n	%	n	%
Sharp-stab injuries	79	43.6	71	44.4
Musculoskeletal injuries	41	22.7	24	15.0
People falling	26	14.4	22	13.8
Exposure to chemicals and meds	13	7.2	12	7.5
High-temperature exposure	7	3.9	3	1.9
Exposure to blood-body fluids	5	2.8	10	6.3
Accidents caused by equipment and machinery	3	1.7	2	1.3
Others	7	3.9	16	10.0
Total	**181**	**100.0**	**160**	**100.0**

It was found that 81.8% of pre-pandemic occupational accidents and 75.6% of pandemic-period accidents occurred during the day shift (08:00-18:00) (Table 3). It was detected that the majority of the occupational accidents experienced before the pandemic and during the pandemic period did not result in any lost workday(s) with the ratio of 83.4 and 83.8% respectively. Also, the majority of the occupational accidents that have occurred resulted in injury for both time periods (100%-99.4%) (Table 3).

Table 1. The time period in which the accident occurred, the lost workday, and the result of the accident (n=341).

Time period of the accident	Pre-pandemic		During pandemic	
	n	%	n	%
Day shift (08:00-18:00)	148	81.8	121	75.6
Night shift (18:00-08:00)	33	18.2	39	24.4
Lost workday(s)				
No lost workday(s)	151	83.4	134	83.8
1-5 days	18	9.9	19	11.9
6-10 days	10	5.5	3	1.9
11+ days	2	1.1	4	2.5
Result of the accident				
Injury	181	100.0	159	99.4
Amputation	0	0.0	0	0.0
Death	0	0	1	0.6
Total	**181**	**100.0**	**160**	**100.0**

A statistically significant difference between the variable of gender for the pre-pandemic and pandemic time periods was not found within the scope of this analysis (Table 4). However, there was a statistically significant difference when the ages of individuals exposed to occupational accidents and pre-pandemic and during-pandemic periods were compared. During the pandemic, it has been determined that the occupational accident rates of health workers aged 40-49 and 50+ have decreased. Furthermore, a statistically significant difference was also found between the working shifts and the pre-pandemic and during pandemic. It has been observed that occupational accidents tend to occur more on the night shift during the pandemic.

Table 2. Significance values between pre- and during-pandemic variables using the Chi-square test.

Variables		Pre-pandemic		During pandemic		Total		χ2 test, P
		n	%	n	%	n	%	
Gender	Male	52	52.5	47	47.5	99	29.0	0.495
	Female	129	53.3	113	46.7	242	71.0	
	Total	181	53.1	160	46.9	341	100.0	
Age	20-29	66	45.5	79	54.5	145	42.5	**0.007**
	30-39	39	48.8	41	51.2	80	23.5	
	40-49	55	68.8	25	31.3	80	23.5	
	50+	21	58.3	15	41.7	36	10.6	
	Total	181	53.1	160	46.9	341	100.0	
Working period	Day shift	148	55.8	117	44.2	265	77.7	**0.037**
	Night shift	33	43.4	43	56.6	76	22.3	
	Total	**181**	**53.1**	**160**	**46.9**	**341**	**100.0**	
Statistical significance threshold=p< 0.05 ; χ2=Chi-Square test								

DISCUSSION

This study aimed to evaluate the occupational accidents that occurred in a university hospital before and during the pandemic. It was stated that the majority of the employees who had pre-pandemic and pandemic period occupational accidents were women (Table 1). Diktas et al. (2021) determined that 60.2% of the hospital workers who had occupational accidents before the pandemic and 63.1% during the pandemic were women, in line with our findings. In a study where Markovic-Denic et al. (2015) evaluated healthcare professionals' exposure to body fluids and blood, it was determined that 74.9% of the participants were women. In another research studied in Brazil, 86.3% of employees who had occupational accidents were women (dos Santos Santiago Ribeiro & de Cassia de Marchi Barcellos Dalri, 2021). It can be interpreted as a normal situation that the injuries are more common in women since the health sector is a female-dominant sector. In this study, it is indicated that there was no significant difference between gender and occupational accidents pre-pandemic and during the pandemic.

In the study, it was found that the majority of individuals who had an occupational accident before and during the pandemic were in the 20–29 age group. In terms of the age of those exposed to occupational accidents pre- and during the pandemic, a statistically significant difference was found. It has been observed that the occupational accident rates of employees aged 40-49 and staff aged 50+ have decreased during the pandemic. In the study of Diktas et al. (2021), healthcare workers' blood and body fluids exposure, needlepoint, needlestick injuries, and pre- and during pandemic were statistically different depending on their age group. The highest exposure before the pandemic was between the ages of 30 and 40, and during the pandemic period, it was seen above the age of 40. In a study conducted in Korea, the negatory impact of COVID-19 on the increasing rate of occupational accidents was found to increase as the sample group of the study age. While the increase rate for the youngest group (15.29) decreases by 4.6%, it was observed that the oldest group's (over 50 years old) decrease was 8.2% (Baek et al., 2021). In another study conducted in Turkey, it was found that most of the injuries caused by occupational accidents occurred with individuals aged between 31-40. Both pre- and during the pandemic, the age distribution of the patients was statistically significant ($p<0.001$ for each). However, it has been observed that the pandemic's effect wasn't statistically significant on this distribution (Demir et al., 2023). This may be due to the fact that more remote or part-time work opportunities are given to the older age group, as they are at high risk during the pandemic. In addition, since healthcare is considered to be a sector in which the younger age group whose experience level is lower than the older age group is predominantly involved in Turkey, it is expected that occupational accidents are more common in those with younger age.

In this study, pre-pandemic, the cleaning staff (34.8%), nurses (31.5%), and technicians (12.2%) were the employees who had occupational accidents the most, and during the pandemic, nurses (37.5%), cleaning personnel (23.1%), and technicians (11.9%) were detected to be among the most injured. Studies have shown that nurses have the profession with the highest incidence of injury. Nurses, who represent one of the largest groups of the hospital workforce and take part in patient care uninterruptedly, are the employees who suffer the most from unsafe conditions and are most exposed to occupational risk factors (dos Santos Santiago Ribeiro & de Cassia de Marchi Barcellos Dalri, 2021; Bekele et al., 2015; Nouetchognou et al., 2016). In research studied in Brazil, it was observed that 82.3% of the employees experiencing an occupational accident were nurses and 12.3% were cleaning staff (dos Santos Santiago Ribeiro & de Cassia de Marchi Barcellos Dalri, 2021). In the study of Diktas et al. (2021) carried out in Turkey, 16.8% of the injured before the pandemic were physicians, 53.6% were nurses; 50.2% of those injured by an

occupational accident during the pandemic were nurses; and 33.6% were cleaning staff. In another study conducted in a teaching hospital in Turkey, the rate of occupational accidents was statistically and significantly lower in physicians than in nurses (Engin, 2014). The fact that nurses and technicians are the most affected occupational groups by occupational accidents may be caused by patient density in the university hospital and the overworked due to the complex duties and tasks that require specialization. In this study, it was stated that the rate of occupational accidents during the pandemic among the cleaning staff was lower than before the pandemic. That situation might be seen as a result of the training of the cleaning staff in compliance with the guides prepared by the COVID-19 Scientific Committee in the Ministry of Health and the cleaning instructions prepared by the hospitals' infection control committee, paying attention to the use of personal protection equipment and all phases of cleaning procedures due to the COVID-19 pandemic.

It was observed that 43.6% of pre-pandemic occupational accidents and 44.4% of during pandemic occupational accidents were sharp-stab injuries. Studies show that the mostly occurred occupational accidents among healthcare workers are needlestick and sharp tool injuries (Markovic-Denic et al., 2015; Bekele et al., 2015; Engin, 2014; Gorman et al., 2014; Lu et al., 2020; Phillips, 2016). A study conducted in Korea indicated that COVID-19 reduced occupational accidents. It was emphasized that government policies are important during the pandemic period to reduce occupational accidents and that attention should be focused on areas where working conditions cannot be changed during the pandemic and where there is a possible increase in workload due to COVID-19 (Baek et al., 2021). In a study evaluating health workers' exposure situation to bodily fluids and blood pre- and during the pandemic in Turkey, it was determined that the exposure decreased during the pandemic, but there was no significant difference in terms of exposure to bodily fluids and blood pre- and during the pandemic. In the same study, it was determined that while the rate of needle tip injury was 81.2% before the pandemic, this rate was 91.4% during pandemic. Also, the rate of injury with a sharp tool was 8.9% pre-pandemic and 2.4% during pandemic (Diktas et al., 2021). Delaying elective interventions other than emergency healthcare procedures during the pandemic might have an impact of this result. In addition, it is thought that additional attention may have been paid to the use of personal protective equipment due to the contamination risk during the pandemic, in terms of exposure to bodily fluids and blood. Some studies show the opposite of our study findings. According to Demir et al.'s research (2023), occupational accidents in the health sector increased from 7% pre-pandemic to 11.2% during the pandemic. In the same study, it was determined that the number of needlestick injuries increased from 13 to 17 in the pre-pandemic period, and the number of splashes of objects/samples of the patient into the eye increased from 6 to 19 during the pandemic. It has been stated that this may be due to the workload during the pandemic (Demir et al., 2023). In this study, it was stated that the type and the rate of accidents pre-pandemic and during the pandemic was not significantly differed. The results of the study show that, in line with the literature findings, most occupational accidents occur as sharp injuries and musculoskeletal injuries. The organization of well-designed education and awareness programs by the hospital infection control committee and by the Ministry of Health of the Republic of Turkey at the beginning and during the COVID-19 pandemic has been highly advantageous in reducing risky occupational exposure. In order to prevent and reduce such injuries and accidents among hospital workers, it is important to have and use an adequate number and variety of personal protective equipment; to use safe medical equipment; to employ experienced personnel in high-risk units; to regularly train employees on personal protection equipment and body mechanics; and also, to conduct workforce analysis regularly.

In our study, it was found that the majority of occupational accidents pre-pandemic and during the pandemic resulted in injuries. While no accident that ended up with amputation was encountered in both periods, it was determined that one fatal occupational accident occurred during the pandemic. Celik et al. (2013) stated that 83.9% of the employees who had an occupational accident were discharged after their first medical care in the emergency service, and 16.1% were hospitalized and treated. According to Demir et al.'s study (2023), 93.1% of those who experienced occupational accidents were released the same day after receiving treatments from the emergency department, while 6.9% required hospitalization. Although hospitals contain many dangers and risks, they are institutions where the incidence of mortal or permanent physical damage is low due to the nature of the work done.

In our study, it was found that in the pre- and during pandemic, occupational accidents mostly occurred between 08:00 and 18:00, which is the day shift (81.8%-75.6%). A statistically significant difference was found when the working period was compared with the pre-pandemic and pandemic periods. It has been observed that occupational accidents are proportionally higher on the night shift during the pandemic. In the study of Demir et al. (2023) 61.2% of the pre-pandemic cases occurred at 08:01-16:00 and 34.4% of these occurred at 04:01-12:00, in line with the results of our study. Similarly, during the pandemic period, 64.7% of the cases occurred at 08:01-16:00 and 30.8% of cases occurred at 04:01-12:00. 64.1% of the occupational accidents occurred between the hours of 08:00 and 16:00, according to Celik et al.'s study (2013). In the study of Sayhan et al. (2013) it was observed that 62.1% of the employees who had an occupational accident were exposed between the hours of 08:00-16:00 and 37.9% between 16:00-08:00. In the study of Markovic-Denic et al. (2015), 50.5% of the individuals who had an occupational accident stated that they worked in all shifts, 38.3% only in the morning shift, 9.3% in the day shift, and 1.9% only in the night shift.

The fact is that pre-pandemic and during pandemic occupational accidents occur more often during the day shift. It is thought that the reason for this situation may be due to the planned patient hospitalizations, patient visits and examinations, surgical interventions, patient care and consultations being carried out predominantly between these hours. Since the hours of patient mobility, workload, and chaos are the highest in hospitals, it can be considered normal to experience accidents at this time. During this time, to reduce occupational accidents; it is important to distribute the workload proportionally among the hospital staff, to standardize the processes related to patient care, to make assignments within the scope of specializations, and to provide training to the employees accordingly.

In our study, 83.4% of the pre-pandemic occupational accidents did not cause any lost workday(s), 9.9% of the cases had 1-5 days of loss; and 83.8% of the occupational accidents that occurred during the pandemic period did not cause any lost workday(s). It was determined that 11.9% of those during the pandemic caused 1-5 working days of loss. No statistically significant difference was found between the lost workday(s) and the pre-pandemic and pandemic in the occupational accident cases included in the study. In addition, it was detected that the total lost workday(s) caused by occupational accidents pre-pandemic was 159 days, and the total lost workday(s) caused by occupational accidents during the pandemic was 169 days. A limited number of studies have been found in the health sector in this regard. In a study conducted in Brazil between January 2017 and July 2019, it was found that 71.2% of the health professionals who were exposed to occupational accidents were unharmed and did not lose any workdays. In the same study, it was determined that 73 injured employees lost a total of 183 working days, the average number of days off for employees who had an accident was 8.71 days, and only one employee had 15 days or more off days (dos Santos Santiago Ribeiro & de Cassia de Marchi Barcellos Dalri, 2021). It has been stated that it is important for health policymakers and administrators of healthcare institutions to create strategies for improving the working conditions of healthcare professionals and increase their commitment to universal precautions in order to prevent occupational accidents (Bekele et al., 2015).

Limitations of the study

The dataset of this research was obtained from one single hospital, and was limited to the accidents that has been reported. Another limitation of the study is that the pre-pandemic and during-pandemic periods are limited to 21 months when making comparisons. Also, there is not enough information regarding the workload of the health workers and other exposures that they might have had pre- and during pandemic. For this reason, the biggest limitation of our study is that variables other than the pandemic that would affect the occupational accident processes cannot be evaluated.

CONCLUSION

It was observed that occupational accidents were mostly seen in nurses during the pandemic, while they were mostly seen in cleaning staff before the pandemic. Moreover, no difference between the types of occupational accidents pre-pandemic and during the pandemic was detected. Health policymakers and hospital administrators should determine strategies to decrease occupational accidents among health workers.

It is recommended to determine the occupational health and safety policies at national and institutional level and to form it as a document that is reachable by every worker, to ensure that there is sufficient number of protective equipment in institutions and that workers are trained to use them, to regularly report occupational accidents, and to carry out improvement studies. In addition, it may be beneficial to develop control mechanisms to ensure that the system is operated effectively and in compliance with legal regulations, to allocate sufficient resources for process improvement and to focus on scientific studies on this field more.

Acknowledgement

The authors would like to thank the health institution in this study for sharing data.

Conflict of Interest

The author declare no potential conflicts of interest with respect to the research, authorship and/or publication of this article.

Author Contributions

Plan, design: YA, DA, SG; **Material, methods and data collection:** YA, SG; **Data analysis and comments:** YA, DA, SG; **Writing and corrections:** YA, DA, SG.

Funding

The authors declared that this study has received no financial support.

Ethical considerations

This study was approved by the Committee of Bandırma Onyedi Eylül University Health Sciences Non-Interventional Research Ethics (Date: 09.05.2022 Issue No: 2022-5/51). Institutional permission was obtained. At all stages of the study, research and publication ethics and the Declaration of Helsinki were followed.

REFERENCES

Akgün, S. (2015). Work accidents in health sector. *Health Care Academician Journal, 2*, 67.

Baek, E. M., Kim, W. Y., & Kwon, Y. J. (2021). The impact of COVID-19 pandemic on workplace accidents in Korea. *International Journal of Environmental Health Research, 18*(16), 8407. https://doi.org/10.3390/ijerph18168407

Bekele, T., Gebremariam, A., Kaso, M., & Ahmed K. (2015). Factors associated with occupational needle stick and sharps injuries among hospital healthcare workers in bale zone, Southeast Ethiopia. *PLoS ONE, 10*(10), 1-11. https://doi.org/10.1371/journal.pone.0140382

Çalış, S. (2022). Evaluation of the reflection of the COVID-19

Pandemic on Turkey 2020 occupational accidents statistics. *International Journal of Occupational Safety and Health*, *5*(1), 23-32. https://doi.org/10.38213/ohsacademy.1093781

Celik, K., Yilmaz, F., Kavalci, C., Ozlem, M., Demir, A., Durdu, T., Sonmez, B. M. Yilmaz, M. S., Karakilic, M. E., Arslan, E. D., & Yel, C. (2013). Occupational injury patterns of Turkey. *World Journal of Emergency Surgery*, *8*, 1-6. https://doi.org/10.1186/1749-7922-8-57

Demir, U., Asirdizer, M., Kartal, E., Etli, Y., & Hekimoglu, Y. (2023). An investigation of the effect of the COVID-19 (SARS-CoV-2) pandemic on occupational accidents (Tokat-Turkey). *Archives of Environmental & Occupational Health*, *78*(1), 28-37. https://doi.org/10.1080/19338244.2022.2059751

Diktas, H., Oncul, A., Tahtasakal, C. A., Sevgi, D. Y., Kaya, O., Cimenci, N., Uzun, N., & Dokmetas, I. (2021). What were the changes during the COVID-19 pandemic era concerning occupational risks among health care workers? *Journal of Infectious and Public Health*, *14*(10), 1334-1339. https://doi.org/10.1016/j.jiph.2021.06.006

dos Santos Santiago Ribeiro, B. M., & de Cassia de Marchi Barcellos Dalri, R. (2021). Missed work due to occupational accidents among personnel at a hospital in Paraná. *Revista Brasileira de Medicina do Trabalho, 19*(3), 1-7. https://doi.org/10.47626/1679-4435-2021-607

Engin, D. Ö. (2014). Occupational exposures among healthcare workers: A teaching hospital sample. *Journal of Microbiology and Infectious Diseases*, *4*(2), 64-68. https://doi.org/10.5799/ahinjs.02.2014.02.0129

Gorman, T., Dropkin, J., Kamen, J., Nimbalkar, S., Zuckerman, N., Lowe, T., Szeinuk, J., Milek, D., Piligian, G., & Freund, A. (2014). Controlling health hazards to hospital workers: A reference guide. *New Solutions*, *23*, 1-167. http://dx.doi.org/10.2190/NS.23.Suppl

Kakizaki, M., Ikeda, N., Ali, M., Enkhtuya, B., Tsolmon, M., Shibuya, K., & Kuroiwa, C. (2011). Needlestick and sharps injuries among health care workers at public tertiary hospitals in an urban community in Mongolia. *BMC Research Notes*, *4*, 184. https://doi.org/10.1186/1756-0500-4-184

Lee, J., & Kim, M. (2021). Estimation of the number of working population at high-risk of COVID-19 infection in Korea. *Epidemiology and Health*, 42, 1-11. https://doi.org/10.4178/epih.e2020051

Lu, S., Ren, S., Xu, Y., Lai, J., Hu, J., Lu, J., Huang, M., Ma, X., Chen, J., & Hu, S. (2020). China legislates against violence to medical workers. *The Lancet Psychiatry*, *7*(3), e9. https://doi.org/10.1016/S2215-0366(20)30005-5

Markovic-Denic, L., Maksimovic, N., Marusic, V., Vucicevic, J., Ostric, I., & Djuric, D. (2015). Occupational exposure to blood and body fluids among health-care workers in Serbia. *Medical Principles and Practice*, *24*, 36–41. https://doi.org/10.1159/000368234

Ministry of Labour and Social Security, General Directorate of Labour. (2022). *2020 labour statistics.*https://www.csgb.gov.tr/media/87443/calisma_hayati-istatistikleri_2020.pdf.

Nouetchognou, J. S., Ateudjieu, J., Jemea, B., & Mbanya, D. (2016). Accidental exposures to blood and body fluids among health care workers in a Referral Hospital of Cameroon. *BMC Research Notes*, 9, 1-6. https://doi.org/10.1186/s13104-016-1923-8

Phillips, J. P. (2016). Workplace violence against health care workers in the United States. *New England Journal of Medicine*, *374*(17), 1661-1669. https://doi.org/10.1056/NEJMra1501998

Raheem, A. A., & Hinze, J. W. (2014). Disparity between construction safety standards: A global analysis. *Safety Science*, *70*, 276-287. https://doi.org/10.1016/j.ssci.2014.06.012

Saia, M., Hofmann, F., Sharman, J., Abiteboul, D., Campins, M., Burkowitz, J., Choe, Y., & Kavanagh, S. (2010). Needlestick injuries:Incidence and cost in the United States, United Kingdom, Germany, France, Italy, and Spain. *Biomedicine International*, *1*(2), 41-49.

Sayhan, M. B., Sayhan, E. S., Yemenici, S., & Oguz, S. (2013). Occupational injuries admitted to the emergency department. *Journal of the Pakistan Medical Association*, *63*(2), 179-184.

Uçak, A. (2009). *Evaluation of occupational injuries that health employess exposed to and declaration of them*. Master's Thesis, Afyonkarahisar Kocatepe University Institute of Health Sciences Department of Surgical Diseases Nursing. https://tez.yok.gov.tr/UlusalTezMerkezi/tezSorguSonucYeni.jsp

Varacallo, M., & Knoblauch, D. K. (2022). Occupational injuries and workers' compensation management strategies. Treasure Island (FL): StatPearls Publishing.

World Health Organization and International Labour Organization (WHO-ILO). (2021). *WHO/ILO joint estimates of the work-related burden of disease and injury, 2000–2016. Global monitoring report*. https://www.who.int/publications-detail-redirect/9789240034945.

ORİJİNAL MAKALE / ORIGINAL ARTICLE
Balıkesir Sağlık Bilimleri Dergisi / BAUN Sağ Bil Derg
Balıkesir Health Sciences Journal / BAUN Health Sci J
ISSN: 2146-9601- e ISSN: 2147-2238
Doi: https://doi.org/10.53424/balikesirsbd.1469416

The Enzyme Histochemistry of Eimeria-Infected Lambs

Mehmet ÖZÜİÇLİ[1], İhsan KISADERE[2], Mehmet Faruk AYDIN[3]

[1] Balıkesir University, Faculty of Veterinary Medicine, Department of Parasitology
[2] Balıkesir University, Faculty of Veterinary Medicine, Department of Physiology
[3] Balıkesir University, Faculty of Veterinary Medicine, Department of Histology and Embryology

Geliş Tarihi / Received: *16.04.2024,* ***Kabul Tarihi / Accepted:*** *20.05.2024*

ABSTRACT
Objective: We aimed to investigate the effects of *Eimeria* infection on ANAE-positive lymphocyte percentages of lambs in the present study. **Materials and Methods:** For this purpose, fecal samples were taken from 200 animals into sterile containers on day 0. *Eimeria* positivity was detected in lambs according to the Fulleborn saturated saline method. Besides, oocyst load was detected by using the Mc. Master method in lambs. Forty of 200 lambs (*n*=40) aged approximately 60-75 days from a farm where Merino sheep were raised were included in this study. Experimental groups were established as *Eimeria*-positive male lambs (*n* =10), *Eimeria*-negative male lambs (*n*=10), *Eimeria*-positive female lambs (*n* =10), *Eimeria*-negative female lambs (*n*=10). Blood samples were collected to determine ANAE-positive lymphocyte percentages in lambs. **Results:** Results of the present study show that *Eimeria* positivity was detected in 10 male and 10 female lambs according to the Fulleborn saturated saline method. According to the Mc. Master method, oocyst load was determined between 10.000-15.000 in male and female positive lambs. *Eimeria*-positive male and female lambs had the greatest ANAE-positive lymphocyte percentages in our study ($p < 0.05$). Conversely, the lowest ANAE-positive lymphocyte percentages were found in *Eimeria*-negative female lambs, which were not statistically different from male lambs in the present study. It was the first report according to the detection of ANAE-positive lymphocyte percentages in *Eimeria*-infected lambs. **Conclusion:** In conclusion, ANAE-positive lymphocyte percentages can be affected by *Eimeria* positivity and oocyst load (between 10.000-15.000) both in male and also female lambs.
Keywords: Eimeria, ANAE positivity, Lymphocyte, Lambs.

Eimeria ile Enfekte Kuzuların Enzim Histokimyası

ÖZ
Amaç: Bu çalışmada, *Eimeria* enfeksiyonunun kuzularda ANAE-pozitif lenfosit oranları üzerine etkilerini araştırmayı amaçladık. **Gereç ve Yöntem:** Bu amaçla 200 hayvandan 0. günde steril kaplara dışkı örnekleri alındı. Kuzularda Fulleborn doymuş salin yöntemine göre *Eimeria* pozitifliği tespit edildi. Ayrıca Mc. Master yöntemi kullanılarak ookist yükü tespit edildi. Merinos ırkı koyun yetiştirilen bir çiftlikten ortalama 60-75 günlük 200 kuzudan 40'ı (n=40) bu çalışmaya dahil edilmiştir. Deney grupları, pozitiflik veya negatiflik durumuna göre *Eimeria* pozitif erkek kuzular (*n*=10), *Eimeria* negatif erkek kuzular (*n*=10), *Eimeria* pozitif dişi kuzular (*n* = 10), *Eimeria* negatif dişi kuzular (*n*=10) olarak oluşturuldu. Kuzularda ANAE-pozitif lenfosit oranlarını belirlemek için kan örnekleri de toplandı. **Bulgular:** Bu çalışmanın sonuçları, Fulleborn doymuş salin yöntemine göre 10 erkek ve 10 dişi kuzuda *Eimeria* pozitifliğinin tespit edildiğini gösterdi. Mc. Master metoduna göre erkek ve dişi pozitif kuzularda ookist yükü 10.000-15.000 arasında belirlendi. Negatif hayvanlarda *Eimeria* ookistlerine rastlanmadı. *Eimeria* pozitif erkek ve dişi kuzular çalışmamızda en yüksek ANAE pozitif lenfosit oranlarına sahipti ($p < 0.05$). Tersine, bu çalışmada en düşük ANAE-pozitif lenfosit oranları *Eimeria* negatif dişi kuzularda bulundu ve bunlar istatistiksel olarak erkek kuzulardan farklı değildi. Çalışmamız *Eimeria* ile enfekte kuzularda ANAE pozitif lenfosit oranlarının tespitine yönelik yapılan ilk rapordur. **Sonuç:** ANAE-pozitif lenfosit oranları hem erkek hem de dişi kuzularda *Eimeria* pozitifliğinden ve ookist yükünden (10.000-15.000 arası) etkilenebilmektedir.
Anahtar Kelimeler: Eimeria, ANAE pozitifliği, Lenfosit, Kuzular.

Sorumlu Yazar / Corresponding Author: Mehmet ÖZÜİÇLİ, Balikesir University, Faculty of Veterinary Medicine, Department of Parasitology, Balikesir, Türkiye
E-mail: mehmet.ozuicli@balikesir.edu.tr

Bu makaleye atıf yapmak için / Cite this article: Ozuicli, M., Kisadere, I., & Aydin, M. F. (2024). The enzyme histochemistry of eimeria-infected lambs. *BAUN Health Sci J, 13*(2), 434-440. https://doi.org/10.53424/balikesirsbd.1469416

INTRODUCTION

Sheep are considered a type of potential livestock that is commonly raised in various parts of the world to generate meat and wool. Historically, the sheep industry has played an important role in the global economy. This industry still faces challenges, with parasitic infections being one of the reasons for a reduction in sheep production performance. Coccidiosis is one of these disorders that causes significant economic losses due to both clinical (diarrhea) and subclinical sickness (Martins et al., 2020a).

Eimeria infection is one of the most serious protozoal illnesses affecting several animal species. The condition, which occurs primarily in young ruminants, causes a reduction in productivity and severe economic losses through clinical infections (Filipenko & Soroka, 2023). In previous studies on this topic, there are many *Eimeria* species were detected in sheep. *E. crandallis*, *E. marsica*, *E. ovinoidalis*, *E. pallida*, *E. faurei*, *E. weybridgensis*, *E. granulosa*, *E. parva*, *E. intricata*, *E. ahsata*, and *E. ovina* (syn. *E. bakuensis*) can be given as a sample of these agents (Trejo-Huitrón et al., 2020). According to literature studies, the *E. ovinoidalis* and *E. crandallis* species are more closely associated with the disease than other disease-causing species. The first target of infection agents is intestinal cells. Disease agents are transmitted to young animals through the oral intake of sporulated *Eimeria* oocysts under appropriate humidity and temperature conditions (Alcala-Canto et al., 2020). The exogenous stage of development takes place in the external environment and necessitates the following factors: temperature, humidity, and oxygen. Additional research indicates that the ideal temperature for sporulation is 20-25 °C. The time required to sporulate to the infective stage differs amongst coccidia species and is useful for identification. Oocysts can sporulate under optimal conditions of oxygen, humidity, and temperature. Infection generally occurs when young animals consume food and water which were contaminated with feces. In addition, contamination has also been detected by licking feathers and wool-contaminated feces. Clinical signs are generally not obvious in young lambs infected with *Eimeria*. However, some animals may experience some degree of loss of appetite, weight loss, and growth retardation (Martins et al., 2020a).

Eimeria agents proliferate and develop in enterocytes, which are intestine-specific cells. This phenomenon of proliferation and development not only causes villous atrophy but also causes malabsorption in lambs (Martins et al., 2020b). Due to diarrhea, fecal stains or excessive pollution may occur in the anal areas of young animals. As the clinical prognosis in livestock worsens, copious watery diarrhea with blood streaks may occur in young lambs (Keeton & Navarre, 2017). Severe dehydration caused by diarrhea in animals can be fatal if left untreated. The subclinical course of this disease, which primarily affects young animals, and the non-specificity of clinical cases are two aspects that make identification challenging. Clinical signs, coprological exams, animal management, age, and climatic conditions should all be considered when making a diagnosis (Carneiro et al., 2022).

The fight against *Eimeria* in sheep is carried out by adding coccidiostatics to the feed, strictly adhering to hygiene and disinfection rules. In lambs, minor mesenteric lymphadenomegaly, widespread proliferative enteritis, and mucosal thickening in the small and large intestines are observed at necropsy. Histopathological examination showed widespread proliferative enteritis as well as the appearance of intracellular coccidia at different stages of development. At the same time, treatment is ineffective in cases where severe clinical signs are observed in *Eimeria* infections in sheep; However, the use of various coccidiostats, especially toltrazuril, diclazuril, and sulfaquinoxaline, in the early stages of infection alleviates clinical findings. However, parasite resistance to treatment with chemical substances is increasing today (Olmos et al., 2020). Moreover, it has been determined that *Eimeria* infection also affects many hematological and biochemical parameters in living things in previous studies. In these studies, the decrease in erythrocytic count (RBC) and hemoglobin (Hb) concentration, as well as leukocytosis, eosinophilia, and neutrophilia, are notable (Elitok, 2020).

Alpha-naphthyl acetate esterase (ANAE) is a lysosomal enzyme predominantly generated by mononuclear leukocytes. It has been found primarily in mature, immunocompetent T cells in peripheral blood (Donmez & Sur, 2008). It has been proposed that ANAE is engaged in a variety of biochemical processes, including antigen endocytosis/degradation and the cytotoxic effects of activated T lymphocytes. ANAE expression is utilized to detect T cells, B lymphocytes, and monocytes in the peripheral blood smears of living beings (Donmez, Kisadere, & Kadiralieva, 2016). Neutrophils are exposed to sporozoites in *Eimeria* species that infect higher mammals, particularly during the cell invasion process. This presents a significant chance for the innate immune system to eradicate or lessen the infection early on, as evidenced by various species, including goats and cattle (Ruiz et al., 2014). Less is known about monocytes' function, however, there is evidence that they can cause *E. bovis* macro schizonts to degenerate both in vivo and in vitro (Hughes, Speer, Kyle, & Dubey, 1987). It has been demonstrated that both cell populations activate extracellular traps in response to various ruminant *Eimeria* stages or antigens. Conversely, numerous investigations have validated the significant function of T lymphocytes in combating *Eimeria* spp. Specifically, in animals challenged with *E. bovis*, a T-

cell-mediated immune response has been linked to a decreased excretion of oocysts, with CD4+ and CD8+ cells being the key populations involved. Lastly, it has been reported that eosinophils play a significant role in the innate and acquired responses to infections with the protozoan Apicomplexa (Pérez et al., 2016). Due to a scarcity of studies on the cellular immune response to *Eimeria* spp., we aimed to assess the impact of *Eimeria* infection on ANAE-positive lymphocyte percentages in lambs in this study.

MATERIALS AND METHODS

Animals

On day 0, 200 animals had their feces collected and placed in sterile containers. The fecal samples were promptly transported to the laboratory. The animals were selected for positive groups using the Fulleborn saturated saline method (Połozowski, Zawadzki, & Nowak, 2006). A sheep farm in Edremit/Balıkesir, Türkiye, used 40 out of 200 lambs, with an average age of 60-75 days. The experimental groups were *Eimeria* positive male lambs (n = 10), *Eimeria* negative male lambs (n = 10), *Eimeria*-positive female lambs (n = 10), and *Eimeria*-negative female lambs (n = 10) based on positivity or negativity. Feeds were provided ad libitum before fecal and blood sample collection. The lambs' feeds are changed based on their daily demands. The lambs were fed with alfalfa hay as roughage together with the mixed feed. Lambs had free access to water and shade.

Determination of the *Eimeria* positivity and oocyst load

Fecal samples (approximately ~ 5 grams) were collected from the rectum of 200 lambs into sterile carrier bags. Then, they were transferred to the parasitology laboratory for the analysis. The Fulleborn saturated saline method was used to determine *Eimeria* positivity in lambs. Some of the lambs had specific Eimeriosis symptoms including diarrhea, weight loss, and less daily feed consumption. These animals did not receive any anti-coccidial or coccidiostat treatment before the administration. According to the Mc. Master method, oocyst load was determined in lambs (Gokbulut et al., 2016).

Percentage of ANAE positive-lymphocytes

Blood samples were drawn from lambs' jugular veins with a needle and transferred to heparinized tubes. Each sample yielded two blood smears, which were air-dried at 20 °C. To detect ANAE activity, materials were fixed for three minutes at -10°C in a 1:1 glutaraldehyde: acetone solution with a pH of 4.8. To prevent crystallization, samples were air-dried at 20°C and incubated with a solution made by gradually dissolving 20 mg of α-naphthyl-acetate substrate (N-8505; Sigma, Steinheim, Germany) in 0.8 ml acetone (Merck, Darmstadt, Germany) drop by drop. The solution had a pH of 5.0. After mixing 2.4 ml of 4% sodium nitrite (S-3421; Merck) and 2.4 ml of pararosanilin (P-3750; Merck) solution (1 g pararosanilin, 20 ml distilled water, 5 ml concentrated HCl) for two minutes, a hexazotized pararosanilin solution was created. The combination was then promptly added to a buffered phosphate solution, totaling 4.8 ml. After adding 1 N NaOH to reduce the pH of the incubation solution to 5.8, it was filtered. The resulting solution was used to incubate the smears for two hours at 37 °C. Following three distilled water rinses, the smears were counterstained for ten minutes with 1% methyl green (Merck) in 0.1 M acetate buffer (pH 4.2) (Maiti, Saini, & Sharma, 1990). Cells with 1 to 5 reddish brown cytoplasmic patches were recognized as ANAE positive, whereas all other lymphocytes were negative. Each specimen was examined using a light microscope (Leica DM 2500; Leica Microsystems, GmbH, Wetzlar, Germany) (Aydin, Celik, & Sur, 2012). Two hundred lymphocytes were counted for each specimen, and the percentage of lymphocytes stained with ANAE was detected, as shown in Figure 1-3.

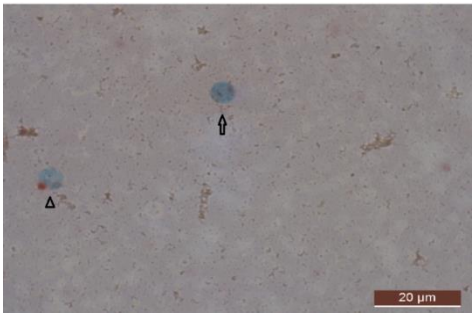


Figure 1. ANAE demonstration in lambs. Arrow: ANAE negative lymphocyte. Arrowhead: ANAE positive lymphocyte.

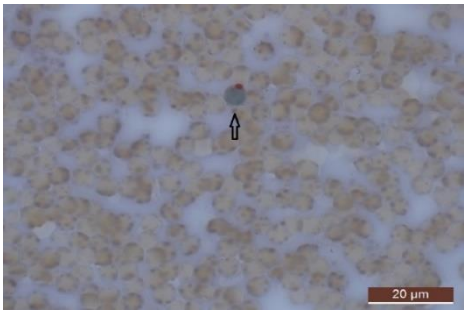


Figure 2. ANAE demonstration in lambs. Arrow: ANAE positive lymphocyte.

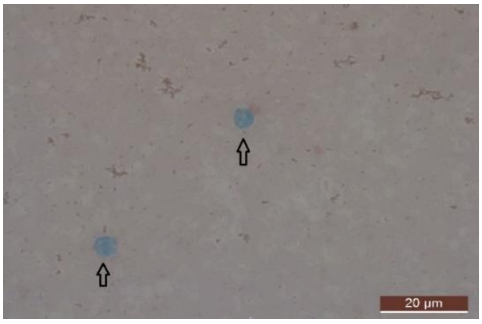


Figure 3. ANAE demonstration in lambs. Arrows: ANAE negative lymphocytes.

Statistical analysis

The SPSS 22.0 program (SPSS, Inc, Chicago, IL) was used to examine differences between and within groups using the independent samples T-test and variance (ANOVA), followed by Duncan's test. P-values below 0.05 were considered significant.

Ethics

The Balıkesir University Animal Care Committee gave its approval for the experimental applications (Reference Number: 2021/10-3).

RESULTS

Eimeria positivity and oocyst load

Eimeria positivity was detected in 10 male and 10 female lambs according to the Fulleborn saturated saline method. According to the Mc. Master method, oocyst load was found between 10.000-15.000 in male and female positive lambs. No *Eimeria* oocysts were found in negative animals.

Percentage of ANAE positive lymphocytes

Eimeria-positive male and female lambs had the greatest ANAE-positive lymphocyte ratios in our study ($p < 0.05$). Conversely, the lowest ANAE-positive lymphocyte ratios were found in *Eimeria*-negative female lambs, which were not statistically different from male lambs in the present study, shown in Table 1.

Table 1. Percentage of ANAE-positive lymphocytes in the experimental groups.

Experimental Groups	*n*	ANAE positivity (%) Mean±SE
Eimeria Positive Female Lambs	10	48.20±0.41**a**
Eimeria Negative Female Lambs	10	45.90±0.84**b**
Eimeria Positive Male Lambs	10	49.50±0.34**a**
Eimeria Negative Male Lambs	10	46.00±0.44**b**

[a-b]Values within a column with no common superscripts are different, $p < 0.05$

DISCUSSION

Changes in hematological parameters recorded with Eimeriosis generally included a reduction in RBCs and lymphocyte count (lymphocytopenia) as well as Hb levels**.** Furthermore, the condition is associated with leukocytosis, eosinophilia, and neutrophilia (Ghanem & Abd el-raof, 2005). Leukocytosis is the result of the body's general reaction, or inflammatory reaction, to the parasites that typically penetrate the small intestines and severely harm animals' digestive systems, particularly in lambs and also calves (Taubert, Hermosilla, Sühwold, & Zahner 2008). The lymphocytopenia may be linked to lymphocyte depletion and atrophy in follicles of the ileal Peyer's patch caused by infection (Matos et al., 2018). On the other hand, previous studies on the subject have found that parasite infestation also causes important changes in lymphocyte numbers and percentages. ANAE enzyme activity is commonly used to identify T cells, B lymphocytes, and monocytes in the circulation (Donmez, Kısadere, & Undag, 2019). The total leucocyte count and granulocyte percentage were significantly enhanced in slightly infected lambs. Besides, lymphocyte percentages were determined the highest in case of heavy *Eimeria* infections by the same researchers, interestingly (Abdulmageed & Mohamed, 2022). On the other hand, a sharp decrease in lymphocyte infection in the blood of *Eimeria*-infected lambs compared to non-infected animals was recorded (31.6% in lymphocytes and 12.4% in monocytes) (Filipenko & Soroka, 2023). Significant elevation of WBCs and also percentages of neutrophils along with a significant reduction in lymphocyte percentages were observed in lambs infected with *Eimeria* (Abdel-Saeed & Salem, 2019). On day 28 after infection with *E. ahsata*, the infected group had a higher mean number of lymphocytes and neutrophils than the control group (Baberi, Razmi, Karimi, Nourani, & Azizi, 2021). In another study, healthy and infected with *Eimeria* lambs had different hematological parameters as follows; WBC: 9.231 ± 3.79.3/µL and 13.707 ± 5.62.8/µL, lymphocytes: 55.8 ± 1.27/mL and 43 ± 1.46 /µL, neutrophils: 30.6 ± 0.76/mL and 40.6 ± 2.25 /µL, monocytes: 0.9 ± 0.10/µL and 2.2 ± 0.30/µL, eosinophils: 1.9 ± 0.27/µL and 5.2 ± 0.64/µL, basophils: 0.3 ± 0.05/µL and 0.3 ± 0.07/mL, respectively (Al-dujaily & Al-mialy, 2017). They also informed that infected lambs had leukocytosis with a significant increase in neutrophils and eosinophils. In a previous study, a significant decrease in lymphocyte percentages, while a significant increase in WBCs in sheep infected with intestinal protozoa (*Eimeria*, *Cryptosporidium*) and nematodes were found (Aziz & Mahmoud, 2022). Using diverse animal breeds, ages, rations, parasite loads, and *Eimeria* species could all be contributing factors to disparate outcomes. In addition, we intended to investigate the characteristics of variable circulatory cell responses during experimental

coccidiosis in goats. In this mentioned study, blood samples were collected by the researchers at 0, 3, 7, 14, 17, 21, 24, 28, and 35 days post-infection. Results of the study showed that the percentage of circulatory neutrophils increased from 7 to 24 days. Unlike neutrophils, lymphocytes decreased significantly from 7 to 24 days. In addition, a study was carried out to determine the effects of *Eimeria* species on hematological parameters in calves with coccidiosis. The study found a considerable reduction in the average number of lymphocytes and eosinophils compared to healthy animals. On the other hand, there was a significant increase in the average total leukocyte and neutrophil count (Rakhshandehroo et al., 2013). The lymphocyte percentages were found to be 52.10 ± 4.00 and 38.30 ± 5.00 for the control group animals and the infected group, respectively (Elitok, 2020). Researchers investigated the metaphylactic effect of minerals on immunological, hematological, biochemical, and antioxidant responses, weight gain, and coccidiosis reduction in newborn lambs. Results of the above-mentioned study showed that decreased lymphocyte counts due to *Eimeria* infection significantly increased over time in treated lambs (Cazarotto et al., 2018). A previous study evaluated the reaction of age-related appearance to the cleaner with *Eimeria ninakohlyakimovae* in their capricorns. These researchers observed that all age groups (1-5 days old) exhibited a major local immune-inflammatory response with significant increases in eosinophils, lymphocytes, neutrophils, spherical leukocytes, and mast cells. Furthermore, lymphocytes increased significantly more in the challenged groups; This confirms the role of the T response process in the data obtained against *Eimeria* infection in ruminants (Matos et al., 2018). In our study, ANAE-positive lymphocyte percentages were found higher in *Eimeria* positive male and also female lambs than *Eimeria* negative in both male and female lambs. Besides, the lowest ANAE-positive lymphocyte percentages were found in *Eimeria*-negative female lambs. In the literature, we could not find any information about the influences of *Eimeria* infection on ANAE-positive lymphocyte ratios in lambs. It was the first report according to the detection of ANAE-positive lymphocyte percentages in *Eimeria*-infected lambs. It was reported that the establishment of protection against challenge infections is largely dependent on the highly specific cellular immune responses against *E. bovis* (Taubert et al., 2008). However, detailed assessments of cellular immune responses in animals with clinical coccidiosis are unusual. There have been few data on calves' cellular immune responses to *E. bovis* infection. There were conflicting findings about the timing of the T cell response during primary infection. Previously, multiple researchers established that exposure to a specific antigen stimulated lymphocyte growth. During primary infection, peripheral CD4+ and CD8+ T cell subpopulations increased, whereas the proportion of γδ-TCR+ T cells remained stable (Hermosilla, Bürger, & Zahner, 1999). Furthermore, after a first infection, gut lymph nodes had higher levels of IL-2 gene transcripts but not IL-4 gene transcripts. In comparison, immunological animals' peripheral blood mononuclear cells (PBMC) and antigen-dependent T cell line/clone were unable to increase IL-2 production following stimulation with *E. bovis* oocyst antigen (Hughes, Thomas, & Speer, 1988). Nonetheless, few cytokine studies that cover the length of primary or challenge *E. bovis* and other *Eimeria* infections.

CONCLUSION

In conclusion, *Eimeria* positivity and oocyst load (between 10.000 and 15.000) affect ANAE-positive lymphocyte percentages in both male and female lambs. As a result, future scientific research on this topic will be useful in explaining the aforementioned major relationships.

Acknowledgement

The authors sincerely thank everyone who made a contribution to this research.

Conflict of Interest

With regard to the research, writing, and/or publication of this work, the author disclaims any potential conflicts of interest.

Author Contributions

Plan, design: MO, IK; **Material, methods, and data collection:** MO, IK, MFA; **Data analysis and comments:** IK; **Writing and corrections:** MO, IK, MFA.

Funding

None

Ethics

The University of Balıkesir Animal Care Committee gave its approval for the experimental applications (Reference Number: 2021/10-3).

REFERENCES

Abdel-Saeed, H., & Salem, N. Y. (2019). Clinical, hematologic, sero-biochemical and IgE response in lambs with diarrhea caused by Eimeria. *International Journal of Veterinary Science, 8*(1), 10-13.

Abdulmageed, Z. M., & Mohamed, A. E. (2022). Effect of Eimeria infection on hematology and biochemistry of sheep at Sohag Governorate, Egypt. *Journal of Applied Veterinary Sciences, 7*(2), 66-72. https://doi.org/10.21608/javs.2022.123302.1130

Alcala-Canto, Y., Figueroa-Castillo, J. A., Ibarra-Velarde, F., Vera-Montenegro, Y., & Cervantes-Valencia, M. E. (2020). First database of the spatial distribution of Eimeria species of cattle, sheep and goats in Mexico. *Parasitology Research*, 119, 1057-1074. https://doi.org/10.1007/s00436-019-06548-8

Al-dujaily, A. H., & Al-mialy, A. J. (2017). Clinical and hemato-biochemical studies in Awassi lambs infected with coccidiosis. *Kufa Journal for Veterinary Medical Sciences*, *8*(1), 1-7. https://doi.org/10.36326/kjvs/2017/v8i14322

Aydin, M. F., Celik, I., & Sur, E. (2012). Investigation of α-naphthyl acetate esterase and acid phosphatase in the peripheral blood leukocytes of greyhounds. *Biotechnic and Histochemistry*, 87, 265–272. https://doi.org/10.3109/10520295.2011.639717

Aziz, S. J., & Mahmoud, O. I. (2022). Measurement of hematological and biochemical parameters in sheep infected with intestinal protozoa and helminthes. *Tikrit Journal of Pure Science*, 26(1), 8-11. http://dx.doi.org/10.25130/tjps.26.2021.002

Baberi, N. A. S., Razmi, G., Karimi, I., Nourani, H., & Azizi, H. (2021). Evaluation of parasitological, hematological and biochemical parameters in experimental infection of lamb with Eimeria ahsata. *Iranian Journal of Veterinary Clinical Sciences*, *14*(1), 79-87.

Carneiro, P. G., Sasse, J. P., Silva, A. C. D. S., Seixas, M., Paschoal, A. T. P., Minutti, A. F., … & Garcia, J. L. (2022). Prevalence and risk factors of *Eimeria* spp. natural infection in sheep from Northern Paraná, Brazil. *Brasilian Journal of Veterinary Parasitology*, *31*(1), e017421. https://doi.org/10.1590/S1984-29612022004

Cazarotto, C. J., Boito, J. P., Gebert, R. R., Reis, J. H., Machado, G., Bottari, N. B., & Da Silva, A. S. (2018). Metaphylactic effect of minerals on immunological and antioxidant responses, weight gain and minimization of coccidiosis of newborn lambs. *Research in Veterinary Science*, 121, 46-52. https://doi.org/10.1016/j.rvsc.2018.09.003

Donmez, H. H., & Sur, E. (2008). Hematology and enzyme histochemistry of the peripheral blood leucocytes in rock partridges (Alectoris graeca). *Poultry Science*, 87, 56-60. https://doi.org/10.3382/ps.2007-00328

Donmez, N., Donmez, H. H., Kisadere, I., Kadiralieva, N. (2016). Some hematological values and alpha-naphthyl acetate esterase (ANAE)-positive lymphocyte ratios in Jaydara sheep. *Journal of Advanced Veterinary and Animal Research*, *3*(1), 8-12. http://doi.org/10.5455/javar.2016.c124

Donmez, H. H., Donmez, N., Kısadere, I., & Undag, I. (2019). Protective effect of quercetin on some hematological parameters in rats exposed to cadmium. *Biotechnic and Histochemistry*, 94, 381-386. https://doi.org/10.1080/10520295.2019.1574027

Elitok, B. (2020). Epidemiology of coccidiosis and effects of the infection on some clinical and hematological examination findings in calves. *Journal of Istanbul Veterinary Sciences*, *4*(1), 21-25. http://doi.org/10.30704/http-www-jivs-net.671228

Filipenko, O. V., & Soroka, N. M. (2023). Hematological and biochemical indicators of lambs' blood after the use of chemotherapeutic agents for spontaneous eimeriosis. *Regulatory Mechanisms in Biosystems*, *14*(4), 595-600. https://doi.org/10.15421/022386

Ghanem, M. M., & Abd el-raof, Y. M. (2005). Clinical and haemato-biochemical studies on lamb coccidiosis and changes following amprolium and sulphadimthoxine therapy. *Benha Veterinary Medical Journal*, *16*(2), 286-99.

Gokbulut, C., Ozuicli, M., Aksit, D., Aksoz, E., Korkut, O., Yalcinkaya, M., & Cirak, V. Y. (2016). Comparative plasma and milk dispositions, faecal excretion and efficacy of per os ivermectin and pour-on eprinomectin in horses. *Journal of Veterinary Pharmacology and Therapeutics*, *39*(6), 584-591. https://doi.org/10.1111/jvp.12308

Hermosilla, C., Bürger, H. J., & Zahner, H. (1999). T cell responses in calves to a primary Eimeria bovis infection: phenotypical and functional changes. *Veterinary Parasitology*, *84*(1-2), 49-64. https://doi.org/10.1016/S0304-4017(99)00075-8

Hughes, H. P., Thomas, K. R., & Speer, C. A. (1988). Antigen-specific lymphocyte transformation induced by oocyst antigens of Eimeria bovis. *Infection and Immunity*, *56*(6), 1518-1525. https://doi.org/10.1128/iai.56.6.1518-1525.1988

Hughes, H. P., Speer, C. A., Kyle, J. E., & Dubey, J. P. (1987). Activation of murine macrophages and a bovine monocyte cell line by bovine lymphokines to kill the intracellular pathogens Eimeria bovis and Toxoplasma gondii. *Infection and Immunity*, 55, 784–791. https://doi.org/10.1128/iai.55.3.784-791.1987

Keeton, S.T.N., & Navarre, C. B. (2017). Coccidiosis in large and small ruminants. *Veterinary Clinics: Food Animal Practice*, *34* (1): 201-208. https://doi.org/10.1016/j.cvfa.2017.10.009

Kisadere, İ., Kadyralieva, N., Sur, E., Dönmez, N., & Oruç, E. (2016). Some physiological, hematological values and ANAE-positive lymphocyte rations of domestic donkeys (Equus asinus) in Kyrgyzstan. *Journal of Kafkas Üniversitesi Veterinerlik Fakültesi Dergisi*, 23, 165-168. https://doi.org/10.9775/kvfd.2016.15784

Maiti, N. K., Saini S. S., & Sharma S. N. (1990). Histochemical studies on chicken peripheral blood lymphocytes. *Veterinary Research Communication*, 14, 207-210.

Martins, N. S., Motta, S. P. D., Santos, C. C., Moreira, A. S., Farias, N. A., & Ruas, J. L. (2020a). Eimeria spp. infection in lambs from southern Brazil. *Pesquisa Veterinária Brasileira*, 40, 871-874. https://doi.org/0.1590/1678-5150-PVB-6745

Martins, N. S., Motta, S. P., Santos, C. C., Moreira, A. S., & Farias, N. A. R. (2020b). Eimeriosis in cattle and sheep: an invisible enemy. *Brazilian Journal of Development*, *6* (4), 19421-19434. https://doi.org/10.34117/bjdv6n4-201

Matos, L., Muñoz, M. C., Molina, J. M., Rodríguez, F., Pérez, D., López, A. M., & Ruiz, A. (2018). Age-related immune response to experimental infection with Eimeria ninakohlyakimovae in goat kids. *Research in Veterinary Science*, 118, 155-163. https://doi.org/10.1016/j.rvsc.2018.02.004

Olmos, L. H., Caro, L. C., Avellaneda-Cáceres, A., Medina, D. M., Sandoval, V., Aguirre, D. H., & Micheloud, J. F. (2020). First record of clinical coccidiosis (Eimeria ovinoidalis) in adult sheep from northwestern Argentina. *Veterinary Parasitology: Regional Studies and Reports*, 21,

100429. https://doi.org/10.1016/j.vprsr.2020.100429

Pérez, D., Muñoz, M. C., Molina, J. M., Muñoz-Caro, T., Silva, L. M. R., Taubert, A., ... & Ruiz, A. (2016). Eimeria ninakohlyakimovae induces NADPH oxidase-dependent monocyte extracellular trap formation and upregulates IL-12 and TNF-α, IL-6 and CCL2 gene transcription. *Veterinary Parasitology*, 227, 143-150. https://doi.org/10.1016/j.vetpar.2016.07.028

Połozowski, A., Zawadzki, W., & Nowak, M. (2006). Comparison of two fecal flotation techniques for diagnostic of internal parasites infections in swine and dogs. *Electronic Journal of Polish Agricultural Universities*, 9, 39.

Rakhshandehroo, E., Nazifi, S., Razavi, S. M., Ghane, M., & Alavi, A. M. (2013). Caprine coccidiosis: the effects of induced infection on certain blood parameters. *Veterinarski Arhiv*, *83*(6), 623-631.

Ruiz, A., Muñoz, M. C., Molina, J. M., Hermosilla, C., Andrada, M., Lara, P., ... & Taubert, A. (2014). Immunization with Eimeria ninakohlyakimovae-live attenuated oocysts protect goat kids from clinical coccidiosis. *Veterinary Parasitology*, *199*(1-2), 8-17. https://doi.org/10.1016/j.vetpar.2013.09.032

Taubert, A., Hermosilla, C., Sühwold, A., & Zahner, H. (2008). Antigen-induced cytokine production in lymphocytes of Eimeria bovis primary and challenge infected calves. *Veterinary Immunology and Immunopathology*, *126*(3-4), 309-320. https://doi.org/10.1016/j.vetimm.2008.09.003

Trejo-Huitrón, G., Bautista-Gómez, L. G., Martínez-Castañeda, J. S., Romero-Núñez, C., Trejo-Castro, L., & Espinosa-Ayala, E. (2020). Morphological characterization and first molecular identification of the eleven Eimeria species that infect sheep from Mexico. *Parasitology Research*, 119, 115-122. https://doi.org/10.1007/s00436-019-06477-6 .

ORİJİNAL MAKALE / ORIGINAL ARTICLE

Balıkesir Sağlık Bilimleri Dergisi / BAUN Sağ Bil Derg
Balıkesir Health Sciences Journal / BAUN Health Sci J
ISSN: 2146-9601- e ISSN: 2147-2238
Doi: https://doi.org/10.53424/balikesirsbd.1360012

Investigation of the Relationship between the Patience Levels and Personality Traits of Nursing Students

Elif ÖZDAL[1] Burcu ARKAN[2]

[1]Bursa Uludag University, Institute of Health Sciences, Department of Nursing
[2]Bursa Uludag University, Faculty of Health Sciences, Department of Psychiatric Nursing

Geliş Tarihi / Received: *13.09.2023,* ***Kabul Tarihi / Accepted:*** *21.05.2024*

ABSTRACT

Objective: This study was conducted descriptively to examine the correlation between the patience levels and personality characteristics of nursing students. **Materials and Methods**: The study was carried out with 420 nursing students in the 2019 - 2020 academic year. The data was collected by using the 'Socio - demographic Data Collection Form', 'Patience Scale' and 'Adjective - Based Personality Test'. For statistical evaluation of the data; descriptive statistics, Shapiro - Wilk test, Kruskal Wallis test and Spearman's Correlation coefficient analysis were used. **Results:** The students' Patience Scale score average was 35.24 ± 6.11. In the comparison of the Patience Scale subscales and total score according to grades, no statistically significant differences were found ($p > 0.05$). There was a significant difference between the Patience Scale and averages of Adjective - Based Personality Test score. It was determined that students with personality characteristics such as extroversion, openness to experience, tender - mindedness and responsibility would have higher interpersonal patience, patience in life difficulties and general patience, whereas students with neurotic personality characteristics would have lower patience in daily life, interpersonal patience, patience in life difficulties and general patience. **Conclusion:** It was seen that there was a significant differentiation between the Patience Scale and averages of Adjective - Based Personality Test score.

Keywords: Patience, Personality, Personality Characteristics, Nursing, Student.

Hemşirelik Öğrencilerinin Sabır Düzeyleri ve Kişilik Özellikleri Arasındaki İlişkinin İncelenmesi

ÖZ

Amaç: Bu araştırma hemşirelik öğrencilerinin sabır düzeyleri ve kişilik özellikleri arasındaki ilişkiyi incelemek amacıyla tanımlayıcı olarak yapılmıştır. **Gereç ve Yöntem:** Araştırma, Bursa Uludağ Üniversitesi Sağlık Bilimleri Fakültesi'nde 2019 - 2020 döneminde öğrenim gören 420 hemşirelik öğrencisi ile yapılmıştır. Araştırma verileri 'Sosyo - demografik Veri Toplama Formu', 'Sabır Ölçeği' ve 'Sıfatlara Dayalı Kişilik Testi' kullanılarak toplanmıştır. Verilerin değerlendirilmesinde; tanımlayıcı istatistikler, Shapiro - Wilk testi Kruskal Wallis testi ve Spearman Korelasyon katsayısı analizi yapılmıştır. **Bulgular:** Öğrencilerin Sabır Ölçeği puan ortalaması 35,24 ± 6,11'dir. Sabır Ölçeği'nin alt boyutlarının ve toplam puanının sınıflara göre karşılaştırılmasında istatistiksel olarak anlamlı farklılık bulunmamıştır ($p > ,05$). Sabır Ölçeği ile Sıfatlara Dayalı Kişilik Testi puan ortalamaları arasında anlamlı bir farklılaşma olduğu görülmüştür. Dışa dönüklük, deneyime açıklık, yumuşak başlılık, sorumluluk kişilik özelliklerine sahip öğrencilerde kişilerarası sabrın, yaşam zorluklarında sabrın ve genel sabrın artacağı; nevrotizm kişilik özelliğine sahip öğrencilerde ise gündelik yaşamda sabrın, kişilerarası sabrın, yaşam zorluklarında sabrın ve genel sabrın azalacağı saptanmıştır. **Sonuç:** Sabır Ölçeği ile Sıfatlara Dayalı Kişilik Testi puan ortalamaları arasında anlamlı bir farklılaşma olduğu görülmüştür.

Anahtar Kelimeler: Sabır, Kişilik, Kişilik Özellikleri, Hemşirelik, Öğrenci.

Sorumlu Yazar / Corresponding Author: Burcu ARKAN, Bursa Uludag University, Faculty of Health Sciences, Psychiatric Nursing Department, Bursa, Turkiye
E-mail: arkanburcu@yahoo.com

Bu makaleye atıf yapmak için / Cite this article: Özdal, E., & Arkan, B. (2024). Investigation of the relationship between the patience levels and personality traits of faculty of health sciences students. *BAUN Health Sci J, 13*(2), 441-450. https://doi.org/10.53424/balikesirsbd.1360012

INTRODUCTION

Certain prominent attitudes and properties in the healthcare professional and patient communication are as follows: "Being concerned, understanding feelings, showing empathy, collaborating, being patient, being smiling and kind, showing respect, being fair, increasing patient's sense of trust, establishing a healthy communication, maintaining control, reducing tension, reducing prejudice, healthcare professional's image". Healthcare professionals with these properties indicate the quality-of-care services (Özkaplan, 2009; Topçuoğlu, 2013). As is evident here, patience and patient behaviors are crucial in the communication to be established due to sensitive mood of patients.

Nurses should not only have effective communication skills for patients, but also encourage them to control and direct their emotions. In addition, they need clear information on how to use communication effectively in working environments. Therefore, they should primarily realize their own feelings and deficiencies. In other words, they should recognize their personality traits (Radcliffe, 2009; Thompson, 2009; Wink, 2009; Özkan,2011).

As in all occupational groups, knowing the impact of personality traits within nursing profession on the profession increases the performance displayed in patient care and the quality of care implemented. One cannot just ignore the impact of factors such as nurse's emotions, thoughts, attitudes, behaviors, desires and needs on institutional performance (Doğanlı & Demirci, 2014; Gözel et al., 2017). Nurses' personality traits are one of the important factors affecting their viewpoint of events in the face of a crisis or a problem and their perception related to solutions (McAllister, 2003; Hökelekli, 2013).

The correlation between patience and personality helps to evaluate patience and understand the importance of personal differences (Tangney et al., 2004). Also, conducted studies have determined that there is a correlation between various factors of patience and personality traits. For example, there is a moderately positive correlation between long-term patience, short-term patience and compatibility. There is a positive correlation between interpersonal patience and compatibility and a negative correlation between responsibility, neuroticism (emotional balance) and patience. There is a moderate correlation between interpersonal patience and openness to experience and a weak correlation between long-term patience, short-term patience and openness to experience (Schnitker, 2012). Another study found that people with type A personality traits have a lower level of patience and perseverance, while people with type B personality traits are more temperate and ready for sudden incidents and display patience behavior (Tarhan, 2011). Eliüşük and Arslan (2017) stated that the correlation between patience and various personality factors contributed to determining patience. Thus, patience level and personality traits are important factors affecting service delivery in nursing profession (Eliüşük & Arslan, 2017)

In the field of psychology, the studies on patience are not adequate in number. The concept of patience which is discussed in the limited number of studies is associated with properties such as well - being and learned potency which expresses the person's sense of coping with life difficulties (Connor, 2006). Examining the national and international studies, there is a great deficiency in studies handling the concept of patience, except conceptual studies (Schnitker & Emmons, 2007). In this sector which has intense stress, sorrow and a compelling working environment to which healthcare professionals are exposed to patience and psychological resilience have an undeniable importance. There is a need for raising awareness on this noteworthy matter and making up the deficiencies with more studies. This study will make a contribution to the limited number of studies on patience in the literature.

Examining the studies conducted in the international literature and in Türkiye, the studies on patience and personality traits are not adequate (Khormaie et al., 2014; Aghababaei & Tabik, 2015; Eliüşük & Arslan, 2017; Ghorbani & Khormaie, 2019). In Türkiye, the studies carried out with nurses on patience have been conducted since 2020 (Süzen & Çevik, 2020). Although there are studies carried out with nurses on the correlation between patience and burnout, professionalism and compassion variables, there are no studies evaluating the correlation between personality traits and patience level. As a result of these studies, the correlation between patience and burnout levels indicated that nurses' burnout level decreased as their patience level increased. Moreover correlation between professionalism, compassion, and patience revealed that nurses' compassion and tendency to patience increased as their professionalism increased (Süzen & Çevik, 2020).

The study was conducted to evaluate the correlation between patience level and personality traits of the Faculty of Health Sciences students. The study will contribute to the relevant limited literature by evaluating the correlation between personality traits and patience level of students who are nurse candidates, and to reveal dominant personality traits and patience level of nursing student, and the correlation between these two variables. In addition, the study will contribute to studies aiming to reveal the importance of personality traits and patience level for nursing care and realizing and developing the positive aspects that already exist. Encouraging students who have higher patience level and appropriate personality traits for the profession to choose these departments and developing their patience level via the lectures to be given, will make positive contributions to nursing services.

MATERIALS AND METHODS

Study type

The study was conducted in a cross - sectional and descriptive style to examine the correlation between patience level and personality traits of students at the Faculty of Health Sciences. The data were collected

between 10.01.2020 - 28.02.2020 in Bursa Uludag University, Faculty of Health Sciences Department of Nursing.

Study group

The universe of the study comprised n=771 nursing students from grade one (n=172), grade two (n=194), grade three (n=168) and grade four (n=237) in Bursa Uludag University, Faculty of Health Sciences Department of Nursing. Without using any sampling methods, the sample of the study comprised 420 (54.47% 1:107, 2:110, 3:130, 4:73) nursing students from the target population, who agreed to take part in the study and completed the study forms after being informed about the study. Since twelve students (1.55%) who took part in the study did not answer some of the questions in the data forms, they were not included in the study.

In examining the correlation between patience level and personality traits of the nursing students, the effect size was 0.8, significance level $\alpha = .05$ and the sample size for 80% power was 411.

Inclusion Criterias

- Being enrolled in the school
- Volunteering to participate in the study
- Completed the study forms

After informing the students who agreed to take part in the study about the study and receiving their oral consent, the researcher distributed survey forms to them and asked them to answer the questions. A particular attention was paid to the time spent completing the survey forms not to affect the course hours of the students. The researcher informed the students that all of the data would be used for scientific research and their answers would never affect their course grades. It took mostly 15 minutes for the students to answer the questions. When the students were done with answering the questions in the survey forms, the forms were evaluated.

Dependent and independent variables

The independent variables of this research are personality traits and socio demographic characteristics. The dependent variable is patience level.

Procedures

In the study "The Socio - demographic Data Collection Form" was used as data collection tool; "the Patience Scale" was used to evaluate patience level of the students; and "the Adjective - Based Personality Test (ABPT)" was used to evaluate their personality traits.

The Socio - demographic Data Collection Form: This form has 14 open - ended and closed - ended questions evaluating participants' gender, age, school of graduation, grade, socio - economic condition, accommodation, number of siblings, number of family members, state of choosing the department willingly, present employment, place lived longest and parents' educational background and employment.

The Patience Scale: Developed by Schnitker & Emmons (2007), the Patience Scale was adapted into Turkish by Eliüşük and Arslan in 2016. The Patience Scale tests how much the person can be patient with difficulties he/she may encounter via self - evaluation. The scale has eleven items and three subscales and likert type. There are three items in the "patience in daily life" subscale, five items in the "interpersonal patience" subscale and three items in the "patience in life difficulties" subscale. In the Patience Scale the lowest and highest possible scores to be obtained from the "patience in daily life" subscale are 3 and 15; the lowest and highest possible scores to be obtained from the "interpersonal patience" subscale are 5 and 25; and the lowest and highest possible scores to be obtained from the "patience in life difficulties" subscale are 3 and 15, respectively. The lowest and highest possible scores to be obtained from the total scale are 11 and 55, respectively. Higher score obtained from the Patience Scale indicates a higher tendency to patience. The Turkish adaptation study was performed on students receiving education in Department of English Teaching. For language validity of the scale reciprocal translations were applied to the students. Positive and significant correlations were found between the scores obtained from the English and Turkish forums ("$r = 0.95$, $p < 0.001$; $r = 0.95$, $p < 0.001$"). A confirmatory factor analysis proved that the scale had three subscales. In the total item correlation, a correlation over 0.40 was found in all scale items. Item factor loads varied from 0.50 to 0.84. The Cronbach's Alpha internal consistency coefficient for the Patience Scale was 0.82 (Süzen & Çevik, 2020). According to the result obtained from our study; the Cronbach's Alpha internal consistency coefficient for the Patience Scale was 0.79.

The Adjective - Based Personality Test: The original version of "the Adjective - Based Personality Test", which was developed by Bacanli et al. (2009) in line with the Five - Factor Personality theory, has five subscales and a total of 40 items. There are; (i) seven items in the neuroticism subscale, (ii) nine items in the extroversion subscale, (iii) eight items in the openness to development subscale, (iv) nine items in the adaptation subscale and (v) seven items in the responsibility subscale. Çeliköz and Sır (2016) examined construct validity as the basic validity study for "the Adjective - Based Personality Test". 13 items in the data collection tool which was originally prepared as 40 items were excluded from the review because their factor loads came out to be lower and latent variables were associated with error covariances as a result of the confirmatory factor analysis conducted and the scale was degraded to 27 items. Then a reliability study was conducted for the remaining items. Since the Cronbach's Alpha reliability coefficient for the total scale was .85 and the test split half reliability value was 0.83, the scale was highly reliable. According to the reliability test performed on the subscales; the "neuroticism" subscale had the lowest internal consistency coefficient with 0.77 Cronbach's Alpha coefficient and 0.70 split half value. General structure of the scale has 27 items and five factors. The "neuroticism" subscale has five items, "extroversion" subscale has six items, "openness to development"

subscale has five items, "adaptation" subscale has five items and "responsibility" subscale has six items. In the scale the adjectives in the two opposite poles are given reciprocally and participants mark the most appropriate adjective. The options are graded from 1 to 7. The lowest and highest possible scores to be obtained from the scale are 27 and 189, respectively. The lowest and highest possible scores to be obtained from the "neuroticism" subscale are 5 and 35; the lowest and highest possible scores to be obtained from the "extroversion" subscale are 6 and 42; the lowest and highest possible scores to be obtained from the "openness to development" subscale are 5 and 35; the lowest and highest possible scores to be obtained from the "adaptation" subscale are 5 and 35; and the lowest and highest possible scores to be obtained from the "responsibility" subscale are 6 and 42, respectively. Higher score obtained from the scale indicates that the traits of people in the relevant subscale are dominant (Çeliköz & Sır, 2016). According to the result obtained from the study; the Cronbach's Alpha internal consistency coefficient for the Adjective - Based Personality Test was 0.82.

Statistical analysis

The statistical analysis of the data was conducted in the IBM SPSS 23.0 (IBM Corp. Released 2015. IBM SPSS Statistics for Windows, Version 23.0. Armonk, NY: IBM Corp.) statistics package program. For quantitative data the descriptive statistics were indicated as mean ± standard deviation and median (minimum - maximum) and for qualitative data the descriptive statistics were indicated as frequency and percentage. Whether the data was normally distributed was examined via the Shapiro - Wilk test. For the data which was not normally distributed the Kruskal Wallis test was performed. Correlations between the variables were examined via the Spearman's Rank Correlation Coefficient. The significance level was established to be $\alpha = 0.05$.

Ethical considerations

Approval for the study was received from University Health Sciences Research and Publication Ethics Committee (IRB number: 2019/13 - 03). Approval was given by the administration of the Health Science Faculty where the study was conducted. The students who were included in the study were informed that the data received from them before applying the survey forms would only be used for this study rather than any other purpose on condition that their names would not be used. Then, oral and written informed consent was received from the students, and they were made complete the survey forms. For the data collection process, written informed consents of the students were used.

RESULTS

The students who were included in the study were between the ages of 17 and 42, and their mean age was 20.69 ± 2.33 years. Of the students, 30.9% were from grade three. 81.2% of the students in the study were female. Of the students who took part in the study, 68.4% were Anatolian - science high school graduate, and 68.9% had chosen the nursing department willingly (Table 1). The students who took part in the study had three siblings and five family members on average. Of the students 31.1% lived in a house with their family, 74.2% stated that they had middle income and 88.8% were unemployed at present. 54% of the students stated that the place they lived longest was a metropolis. Concerning parents' employment, 73.8% of the students stated that only their father was employed (Table 1).

The Patience Scale total score average of the students who took part in the study was 35.24 ± 6.11. Descriptive statistics of the Patience Scale subscales were 8.1 ± 2.05 for the patience in daily life subscale, 16.21 ± 3.26 for the interpersonal patience subscale and 10.87 ± 2.51 for the patience in life difficulties subscale (Table 2).

The minimum and maximum scores to be obtained from the scale are given in a parenthesis. The comparison of the Patience Scale subscale scores and total score according to grades showed no statistically significant difference ($p=0.840$, $p=0.587$, $p=0.854$, $p=0.371$). The students from four different grades had similar scores of patience in daily life, interpersonal patience, patience in life difficulties and total scale score (Table 3).

Examining the correlation between the Patience Scale subscale scores and total score and the Adjective - Based Personality Test subscales, a reverse and weakly significant correlation was found between neuroticism and the Patience Scale total score ($r = - 0.42$; $p < 0.001$) and the patience in daily life ($r = - 0.20$; $p < 0.001$), interpersonal patience ($r = - 0.44$; $p < 0.001$) and patience in life difficulties ($r = - 0.32$; $p <0.001$) subscales. No significant correlation was found outside patience in daily life and the neuroticism subscale of the Adjective - Based Personality Test ($p > 0.050$). A positive and weakly significant correlation was found between the interpersonal patience subscale and the extroversion ($r = 0.14$; $p = 0.006$), openness to experience ($r = 0.15$; $p = 0.003$), tender - mindedness ($r = 0.27$; $p < 0.001$) and responsibility subscales of the Adjective - Based Personality Test ($r = 0.18$; $p < 0.001$). A positive and weakly significant correlation was found between the patience in life difficulties subscale and the extroversion ($r = 0.19$; $p < 0.001$), openness to experience ($r = 0.18$; $p < 0.001$), tender - mindedness ($r = 0.28$; $p < 0.001$) and responsibility ($r = 0.30$; $p < 0.001$) subscales. A positive and weakly significant correlation was found between the Patience Scale total score and the extroversion ($r = 0.16$; $p = 0.002$), openness to experience ($r = 0.15$; $p = 0.003$), tender - mindedness ($r = 0.29$; $p < .001$) and responsibility ($r = 0.24$; $p < 0.001$) subscale scores (Table 4).

Table 1. Sociodemographic characteristics of the study group (n=420).

Variables		n (%)
Grade	1	107 (25.5)
	2	110 (26.2)
	3	130 (30.9)
	4	73 (17.4)
Age (Mean±SD)		20.69±2.33 (17-42)
Gender	Male	79 (18.8)
	Female	341 (81.2)
Number of Siblings (Mean±SD)		3.10±1.67
Number of Family Members (Mean±SD)		4.95±1.67
High School of Graduation	Regular high school	41 (9.8)
	Vocational high school	91 (21.8)
	Anatolian-science high school	286 (68.4)
State of Choosing the Department Willingly	Yes	288 (68.9)
	No	130 (31.1)
Current Accommodation	House with family	130 (31.1)
	House with friends	92 (22.01)
	State dormitory	103 (24.64)
	Private dormitory	93 (22.25)
Income Status	Bad	35 (8.4)
	Middle	311 (74.2)
	Good	73 (17.4)
Current Employment	Employed	35 (8.3)
	Unemployed	372 (88.8)
	Part-time employed	12 (2.9)
Place Lived Longest	Village	49 (11.7)
	District	144 (34.3)
	Metropolis	227 (54.0)
Father's Educational Background	Illiterate	10 (2.4)
	Primary school	120 (28.7)
	Secondary school	85 (20.3)
	High school	140 (33.5)
	University	63 (15.1)
Mother's Educational Background	Illiterate	33 (7.9)
	Primary school	211 (50.2)
	Secondary school	78 (18.6)
	High school	80 (19.0)
	University	18 (4.3)
Parents' Employment	Only father employed	298 (73.8)
	Only mother employed	24 (5.9)
	Both parents employed	82 (20.3)

Table 2. Descriptive statistics of the Patience Scale subscale scores and total score.

	Mean	SD	Minimum	Maximum
Patience in daily life	8.11	2.05	3.00	15.00
Interpersonal patience	16.21	3.26	5.00	25.00
Patience in life difficulties	10.87	2.51	3.00	15.00
Total	35.24	6.11	13.00	53.00

Results of the comparison of students' scores for the SCAS with regard to sociodemographic variables are given in Table 3. No significant difference was found between the mean scores for spiritual care awareness with respect to their year of study (p=0.979). Statistically, there was a significant difference between the mean scores for spiritual care awareness according to the students' ages (p=0.002). A significant difference was found between the spiritual care awareness levels of students in the 18-23 age group and the spiritual care awareness levels of students in the 24-29 age group. The spiritual care awareness of the 18-23 age group was higher. A significant difference was found between the mean scores for spiritual care awareness according to gender (p <0.001). Levels of spiritual care awareness were lower for male students. A statistically significant difference was found between the mean spiritual care awareness scores according to the type of high school that students graduated from (p=0.001). Compared to other high school types, the spiritual care awareness levels of students who had graduated from a general high school was found to be lower. Statistically, there was no significant difference between the means scores for spiritual care awareness according to their voluntary selection of the department they were studying in (p=0.397). When the students' places of residence were examined, no significant difference was found between the mean scores for spiritual care awareness(p=0.966). Statistically, there was no significant difference between the means scores for spiritual care awareness with respect to students' income status (p=0.352). There was no significant difference between the mean scores for spiritual care awareness according to their current employment status (p=0.487). There was no significant difference between the mean scores for spiritual care awareness according to the longest place of residence (p=0.314). Statistically, there was no significant difference between the mean scores for spiritual care awareness according to the educational status of their fathers (p=0.405). Similarly, there was no significant difference between the mean scores for spiritual care awareness according to the educational status of their mothers (p=0.051). There was no significant difference between the mean scores for spiritual care awareness according to the employment status of their parents (p=0.920). Statistically, there was no significant difference between the mean scores for spiritual care awareness with respect to whether they had had training about spiritual care (p=0.911).

Table 3. Comparison of the Patience Scale subscale scores and total score according to grades.

	Grade				Test Value* ($\chi 2$)	p value
	Grade One	Grade Two	Grade Three	Grade Four		
Patience in daily life (3-15)	7.98±1.72	8.14±2.21	8.18±2.18	8.15±2.06	0.84	0.840
Interpersonal patience (5-25)	15.95±3.22	16.52±3.15	16.28±3.12	16.04±3.73	1.93	0.587
Patience in life difficulties (3-15)	10.8±2.38	11.05±2.27	10.76±2.70	10.92±2.73	0.78	0.854
Total (11-55)	34.67±5.52	35.81±6.16	35.22±6.19	35.26±6.72	3.14	0.371

*The Kruskal Wallis test was used.

Table 4. Correlation between the Patience Scale subscale scores and total score and the Adjective-Based Personality Test subscales.

		Neuroticism	Extroversion	Openness to Experience	Tender-mindedness	Responsibility
Patience in daily life	**r**	**-0.202**	0.005	-0.030	0.038	0,056
	p	**<0.001**	0.923	0.552	0.443	0.263
Interpersonal patience	**r**	**-0.436**	**0.138**	**0.147**	**0.274**	**0.176**
	p	**<0.001**	**0.006**	**0.003**	**<0.001**	**<0.001**
Patience in life difficulties	**r**	**-0.316**	**0.194**	**0.177**	**0.275**	**0.298**
	p	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**<0.001**
Total	**r**	**-0.424**	**0.156**	**0.147**	**0.285**	**0.238**
	p	**<0.001**	**0.002**	**0.003**	**<0.001**	**<0.001**

*The Spearman's Rank Correlation Coefficient was used.

DISCUSSION

This section discussed findings concerning the socio - demographic characteristics, patience traits and five - factor personality traits of the nursing students.

The Patience Scale total score and subscale score averages of the students were examined. According to these findings, their score average was 8.11 ± 2.05 for the "patience in daily life" subscale, 16.21 ± 3.26 for the "interpersonal patience" subscale, 10.87 ± 2.51 for the "patience in life difficulties" subscale and 35.24 ± 6.11 for the total Patience Scale. Examining the scores to be obtained from the Patience Scale, 3 - 15 points can be obtained from the "patience in daily life" subscale, 5 - 25 points from the "interpersonal patience" subscale, 3 - 15 points from the "patience in life difficulties" subscale and 11 - 55 points in total. The total score obtained from our study is above the total score average to be obtained from the Patience Scale. Examining the subscale scores and total score average of the Patience Scale, a study conducted by Suzen and Cevik (2020) with 156 nurses, found 8.99 ± 2.08 for the "patience in daily life" subscale, 17.89 ± 2.73 for the "interpersonal patience" subscale, 11.79 ± 1.97 for the "patience in life difficulties" subscale and 44.74 ± 7.35 for the total scale. A study conducted by Gokcen et al. (2020) with 522 undergraduate students, found the Patience Scale total score average to be 36.09 ± 6.02. One of the necessary attitudes and behaviors to provide an effective communication between patients and healthcare professionals is to be patient, friendly, concerned, and thoughtful when listening to the problems of patients. Owing to these approaches nurses will be able to establish an effective communication with patients. Also, it is crucial to listen to patients seriously and patiently without interrupting them when they tell about their problems or complaints (Başol, 2018). A study conducted on sick people and nurses found that the most important concept that sick people need is patience and tolerance (Rooeintan, 2019). Therefore, empathy skills, patience behaviors, positive personality traits and collaborative attitudes of healthcare professionals are among important factors increasing the quality-of-care service.

The comparison of the Patience Scale subscale scores and total score according to grades showed no statistically significant difference. In contradistinction to our findings in this current study, a study conducted by Gül & Çeliköz (2018) with 322 students in Suleyman Demirel University Faculty of Literature to examine patience level according to grades, found that grade two students had higher patience scores than grade three students. In our study the students from four different grades had similar scores of patience in daily life, interpersonal patience, patience in life difficulties and total scale score, which shows that the students had similar patience levels and their patience levels did not vary according to grades. In our study there was no difference between the Patience Scale and grade variable in the findings obtained, which may be associated with the fact that the students had close mean age ranges, received education under similar conditions, had similar cultural characteristics and the study had certain limitations. In addition, fact that there was no significant difference in any dimension of patience may make us think that there was no difference in patience levels according to grades because the students had taken basic classes and practiced compulsory lessons.

Examining the correlation between the Patience Scale subscale scores and total score and the Adjective - Based Personality Test subscales, a reverse and weakly significant correlation was found between neuroticism and the Patience Scale subscale scores and total score. No significant correlation was found outside patience in daily life and neuroticism. A positive and weakly significant correlation was found between interpersonal patience, patience in life difficulties and total score and

the extroversion, openness to experience, tender - mindedness and responsibility subscales of the Adjective - Based Personality Test. From this point of view, it was concluded that students with "neuroticism" personality trait would have less patience in daily life, interpersonal patience, patience in life difficulties and general patience, while students with "extroversion", "openness to experience", "tender - mindedness" and "responsibility" personality traits would have more interpersonal patience, patience in life difficulties and general patience. A study conducted by Eliusuk (2014) examining the correlation between patience level and five - factor personality traits of 1166 university students, found that there was a positively significant correlation between the patience subscales and tender - mindedness, openness to experience and responsibility and a negatively significant correlation with emotional imbalance (neuroticism). A study conducted by Schnitker & Emmons (2007) with 324 undergraduate psychology students on patience and five - factor personality theory, found that there was a positively high correlation between patience and adaptation, responsibility, extroversion, and openness to experience and a negatively low correlation with emotional imbalance (neuroticism). A study conducted by Aghababaei & Tabik (2015) with 252 students in Iran Tehran University, examined the correlation between patience level and personality traits of the students. As a result, the study found a positive correlation between patience and adaptation, responsibility, extroversion, and openness to experience and a negative correlation with neuroticism. A study conducted by Ghorbani and Khormaie in 2019 included a total of 440 students from Şiraz University departments of educational sciences and psychology, basic sciences, technic and engineering, literature, Islamic thoughts, and social sciences. The study examined the correlation between patience and personality traits. According to the study there is a positive correlation between the five big personality factors and patience. Also, the study concluded that personality traits and patience may develop wisdom in students.

Although these studies seem to support our findings, some studies have showed that there are differences in the correlations between patience and personality traits. In a study conducted by Schnitker (2012) with 389 undergraduate students in California University, according to the result of the correlation between patience and personality traits; there was a moderately positive correlation between long - short - term patience and adaptation and a strongly positive correlation between interpersonal patience and adaptation. Also, there was a negative correlation between responsibility, emotional imbalance and the three subscales of patience; a moderate correlation between interpersonal patience and openness to experience; and a weak correlation between long - short - term patience and openness to experience. In addition, the correlation between extroversion and patience types was not statistically significant.

According to the findings of our study, it is expected for people with extroversion personality trait to have a higher level of tolerance to people because they have an active relationship with the environment, think positively and have better human relations. Since people who are open to experience have an ability for multidimensional thinking and have no trouble with adapting to changing conditions, it is possible to say that they will be solution - oriented in the problems they may face and will not lose hope. People with higher adaptation levels have positive traits such as establishing effective communication and being kind and sensitive. It is expected for people with these traits to cope with the negativities and problems they may face with patience. Self - control trait of people who have responsibility trait will prevent them from being impatient or hasty and allow them to lead a more balanced life. Based on the traits, it is possible to state that people who are extrovert, open to experience and have higher responsibility and adaptation levels have higher patience level. People with higher neuroticism levels will likely have lower patience level due to having higher negative aspects such as aggression, selfishness, and hostility, because these people will display a rebellious and aggressive attitude toward the difficulties they may face. Thus, in this personality trait it does not seem possible to cope with problems. Based on our study we can evaluate people who are extrovert, open to experience, easy going and have responsibility as patient people.

Limitations and strengths of the research

There were limitations to this the study. First, it was performed only in one region of Turkiye, using convenience sample methods focused on adolescent self-reporting, and not using a longitudinal study method. Therefore, the results of this study can only be generalized to the studied sample.

CONCLUSION

As a consequence, the average of Patience Scale total score in the nursing students was 35.24 ± 6.11. There was no statistically significant difference in the comparison of the Patience Scale subscale scores and total score according to grades. Furthermore, the students from four different grades had similar scores of patience in daily life, interpersonal patience, patience in life difficulties and total scale score.

There was a reverse correlation between the Patience Scale and subscale scores of the students and neuroticism. Also, there was a positive and weakly significant correlation between interpersonal patience, patience in life difficulties and total score and the extroversion, openness to experience, tender - mindedness and responsibility subscales of the Adjective - Based Personality Test.

In line with the results obtained from this current study the following recommendations could be made:

• A course with the title of Patience should be included in the curriculum for nursing students and this course

should stress the importance of patience for the profession and how to cope with occupational problems with patience via examples.
• Considering that personality traits affect the patience level, support programs aimed at increasing positive personality traits could be included in the educational process. Thus, the patience level will increase.
• It is important that the occupational guidance services of students who are about to choose a university, be conducted more attentively. Thus, students should be encouraged to choose an occupation according to their personality traits, necessary seminars should be organized for students to know nursing profession accurately and different members of profession should be invited to seminars to answer the questions of students and allow the students to reach all knowledge related to occupations.
• Patience and personality traits in nursing profession should be discussed in detail. The findings obtained could be used in further studies.
• Performing this study on a greater number of nursing students or nurses and conveying the generalization concerning the study results to a larger target population, will provide more information about the concept of patience.

Acknowledgements
We thank all of our students who participated in the study.

Conflict of Interest
There is no conflict of interest among the authors. The authors received no financial support for the research, authorship, and/or publication of this article.

Author Contributions
Plan, design: EÖ, BA; **Material, methods and data collection:** EÖ, BA; **Data analysis and comments:** EÖ, BA; **Writing and corrections:** EÖ, BA

Funding
No funding

Ethical Approval
Institution: University Health Sciences Research and Publication Ethics Committee
Date: 25.12.2019
Approval no: 2019/13 - 03

REFERENCES
Aghababaei, N., & Tabik, M. T. (2015). Patience and mental health in Iranian students. *Iranian Journal of Psychiatry and Behavioral Sciences*, 9(3), 1-4. https://doi.org/10.17795/ijpbs-1252

Bacanlı, H., İlhan, T., & Aslan, S. (2009). Beş faktör kuramına dayalı bir kişilik ölçeğinin geliştirilmesi: sıfatlara dayalı kişilik testi (SDKT). *Türk Eğitim Bilimleri Dergisi,* 7(2), 261-279.

Başol, E. (2018). Hasta ile sağlık çalışanları (doktor ve hemşire) arasındaki iletişim sorunları ve çözüm önerileri. International Anatolia Academic *Online Journal Social Sciences Journal*, 4 (1), 76-93.

Connor, K. M. (2006). Assesment of resilience in aftermath of trauma. *Journal of Clinical Psychiatry*, 67(2), 46-49.

Çeliköz, N., & Sır, N. Ş. (2016). Sıfatlara dayalı kişilik testi (SDKT): Geçerlik güvenirlik çalışması. *Eğitim ve Öğretim Araştırmaları Dergisi,* 5(2), 118-131.

Doğanlı, B., & Demirci, Ç. (2014). Sağlık kuruluşu çalışanlarının (hemşire) motivasyonlarını belirleyici faktörler üzerine bir araştırma. *Yönetim ve Ekonomi Dergisi*, 21 (1), 47-60. https://doi.org/10.18657/yecbu.49076

Eliüşük, A., & Arslan, Ç. (2016). Sabır ölçeğinin Türkçe'ye uyarlanması. *Değerler Eğitimi Dergisi,* 14 (31), 67-86.

Eliüşük, B. A., & Arslan, C. (2017). Investigation of patience tendency levels in terms of self-determination, self-compassion and personality features. *Universal Journal of Educational Research,* 5 (9), 1632-1645. https://doi.org/10.13189/ujer.2017.050921

Ghorbani, R., & Khormaie, F. (2019). Relationship between big five personality traits and virtue of wisdom: the mediating role of patience. *Health, Spirituality and Medical Ethics,* 6 (1), 11-17.

Gökçen, G., Arslan, C., & Tras, Z. (2020). Examining the relationship between patience, emotion regulation difficulty and cognitive flexibility. *Online Submission*, 7 (7), 131-152. https://doi.org/10.46827/ejes.v7i7.3160

Gözel, G., Atmaca, G. D., & Durat, G. (2017). Hemşirelerin kişilik özellikleri ve iş performansları arasındaki ilişkinin değerlendirilmesi. *Kocaeli Üniversitesi Sağlık Bilimleri Dergisi*, 3 (1), 11-16. https://doi.org/10.30934/kusbed.359177

Gül, Y. E., & Çeliköz, N. (2018). Üniversite öğrencilerinin sabır eğilim düzeylerinin incelenmesi. *Manas Sosyal Araştırmalar Dergisi,* 7 (3), 77-87.

Hökelekli, H. (2013). *Psikoloji, din ve eğitim yönüyle insanî değerler* (1st ed., pp.117). İstanbul: Dem Yayınevi.

Khormaie, F., Farmani, A., & Soltani, E. (2014). Investigating the prediction role of patience as a moral construct and personality characteristics in the hopelessness of university students. *Journal of Medical Ethics*, 8 (28), 167-199.

McAllister, M. (2003). Doing practice differently: solution focused nursing. *Journal of Advanced Nursing*, 41 (6), 529-535. https://doi.org/10.1046/j.1365-2648.2003.02564.x

Özkan, Z. (2011). *Sağlıkta iletişimin gücü*, (1st ed., pp.180-184). İstanbul: Optimist.

Özkaplan, N. (2009). Duygusal emek ve kadın işi/erkek işi. *Çalışma ve Toplum,* 2 (21), 15-23. Accessed date: https://calismatoplum.org/makale/duygusal-emek-ve-kadin-isi-erkek-isi (10.10.2020).

Radcliffe, M. (2009). Nursing degrees must be built on communication. *Nursing Times*, 105 (21), 28.

Rooeintan, M., Khademi, M., Toulabi, T., Nabavi, F. H., & Gorji, M. (2019). Explaining postdischarge care needs of cancer patients: a qualitative study. *Indian Journal of Palliative Care*, 25(1), 110-118.

Schnitker, S. A. (2012). An examination of patience and well-being. *Journal of Positive Psychology*,7 (4), 263-280.

Schnitker, S. A., & Emmons, R. A. (2007). Patience as a virtue: Religious and psiychological perspectives. *Studies in Religion / Sciences Religieuses*, 18, 177-207. https://doi.org/10.1163/ej.9789004158511.i-301.69

Süzen, H., & Çevik, K. (2020). Relationship between nurses' professional values and compassion and patience levels.

Turkiye Klinikleri Journal of Nursing Sciencesi, 12 (4), 528-35 https://doi.org/10.5336/nurses.2020-74896

Tangney, J. P., Baumeister, R. F., & Boone, A. L. (2004). High self-control predicts good adjustment, less pathology, better grades, and interpersonal success. *Journal of Personality*, 72 (2), 271-322. https://doi.org/10.1111/j.0022-3506.2004.00263.x

Tarhan, N. (2011). *Duyguların psikolojisi* (10th., ed. pp. 123). İstanbul: Timaş Yayınları.

Thompson, P. A. (2009). Creating leaders for the future. *The American Iournal of Nursing*, 109 (11):50-52. https://doi.org/10.1097/01.NAJ.0000362023.70375.77

Topçuoğlu, R. A. (2013). Sosyal haklar piyasalaşır mı? Çocuk hakları ve kadın emeğinin kesişiminde Türkiye'de kreşler. V. Sosyal Haklar Uluslararası Sempozyumu; 31 Ekim / 1-2 Kasım, Bursa.

Wink, D. (2009). Communication tools. *Nurse Educator*, 34 (5), 189-191. https://doi.org/10.1097/NNE.0b013e3181b2b432

ORİJİNAL MAKALE / ORIGINAL ARTICLE

Balıkesir Sağlık Bilimleri Dergisi / BAUN Sağ Bil Derg
Balıkesir Health Sciences Journal / BAUN Health Sci J
ISSN: 2146-9601- e ISSN: 2147-2238
Doi: https://doi.org/10.53424/balikesirsbd.1452014

Comparison of Bilateral Laminectomy with Unilateral Approach and Open Bilateral Laminectomy in Lumbar Spinal Stenosis

Utku ADİLAY [1], Salim KATAR [1], Adil Can KARAOĞLU [1], Bülent GÜÇLÜ [2]

[1] Balikesir University, School of Medicine, Department of Neurosurgery
[2] Kartal Dr. Lutfi Kirdar Research and Training Hospital

Geliş Tarihi / Received: *15.03.2024*, ***Kabul Tarihi / Accepted:*** *22.05.2024*

ABSTRACT

Objectives: Lumbar spinal stenosis (LSS) is a frequent situation requiring decompression surgery, but there are different surgical approaches. The goal of this study was to compare the results of bilateral decompressive laminectomy via unilateral approach (BDLUA) and open bilateral decompressive laminectomy (OBDL) for single-level LSS. **Materials and Methods**: A retrospective study of 198 successive patients who had an operation for single-level LSS between October 2016 and May 2023 was performed. Eighty patients underwent BDLUA, while 118 patients underwent open OBDL. Visual Analog Scale (VAS) scores and walking times were noted preoperatively and 6 months postoperatively in all patients. Operative time, operative complications, hospital stay, operative blood loss, and iatrogenic spondylolisthesis rates at follow-up were also measured. **Results:** The mean age of the patients included in the study was 62.38±12.5 years. There was no statistically significant difference in VAS scores, walking times, duration of surgery, operative complications, and iatrogenic spondylolisthesis rates between the patients in the study who underwent BDLUA and the patients in the study who underwent OBDL ($p>0.05$). However, total blood loss during the surgical procedure and length of hospitalization were significantly shorter in patients who underwent BDLUA than those who underwent OBDL ($p<0.05$). **Conclusion:** Patients treated with a BDLUA and open OBDL had similar results regarding operative complications, VAS scores, operation time, and iatrogenic spondylolisthesis rates at follow-up. However, the duration of hospitalization and the quantity of intraoperative blood loss were significantly shorter in patients treated with the unilateral approach.

Keywords: Lumbar Laminectomy, Spinal Stenosis, Unilateral Approach.

Lomber Spinal Stenozda Tek Taraflı Yaklaşımla Bilateral Laminektomi ile Açık Bilateral Laminektominin Karşılaştırılması

ÖZ

Amaç: Lomber spinal kanal darlığı (LSKD), dekompresyon cerrahisi gerektiren sık görülen bir durumdur, ancak tedavide farklı cerrahi yaklaşımlar vardır. Bu çalışmanın amacı, tek seviyeli LSKD için tek taraflı yaklaşımla iki taraflı dekompresif lomber laminektomi (TYİDL) açık iki taraflı dekompresif lomber laminektominin (AiDL) sonuçlarını karşılaştırmaktır. **Gereç ve Yöntem:** Ekim 2016 ile Mayıs 2023 arasında tek seviyeli LSS için operasyon geçiren 198 ardışık hasta retrospektif olarak değerlendirildi. Seksen hastaya TYİDL, 118 hastaya AiDL uygulandı. Tüm hastalarda ameliyat öncesi ve 6 ay sonrasında Visual Analog Skala (VAS) skorları ve yürüme süreleri kaydedildi. Operasyon süresi, operasyon komplikasyonları, hastanede kalış süresi, operasyon sırasındaki kan kaybı ve iatrojenik spondilolistezis oranları ölçüldü. **Bulgular:** Çalışmaya dahil edilen hastaların yaş ortalaması 62.38±12.5 yıldı. TYİDL ve AiDL geçiren hastalar arasında VAS skorları, yürüme süreleri, ameliyat süreleri, ameliyat komplikasyonları ve takiplerinde iatrojenik spondilolistezis açısından istatistiksel olarak anlamlı bir fark yoktu ($p>0.05$). Ancak, TYİDL geçiren hastalarda operasyon sırasındaki toplam kan kaybı ve hastanede kalış süresi, AİDL geçiren hastalara göre anlamlı olarak daha kısaydı ($p<0.05$). **Sonuç:** TYİDL ve AİDL uygulanan hastalar, operasyon komplikasyonları, VAS skorları, operasyon süresi ve takipteki iatrojenik spondilolistezis oranları açısından benzer sonuçlar gösterdi. Ancak, hastanede kalış süresi ve operasyon sırasındaki kan kaybı miktarı, TYİDL uygulanan hastalarda anlamlı olarak daha kısaydı.

Anahtar Kelimeler: Lomber Laminektomi, Spinal Dar Kanal, Tek Taraflı Yaklaşım.

Sorumlu Yazar / Corresponding Author: Utku ADİLAY, Balikesir University, School of Medicine, Department of Neurosurgery, Balikesir, Türkiye
E-mail: utkuadilay@hotmail.com

Bu makaleye atıf yapmak için / Cite this article: Adilay, U., Katar, S., Karaoğlu, A.C., & Güçlü, B. (2024). Comparison of bilateral laminectomy with unilateral approach and open bilateral laminectomy in lumbar spinal stenosis. *BAUN Health Sci J, 13*(2), 451-456. https://doi.org/10.53424/balikesirsbd.1452014

INTRODUCTION

Lumbar spinal stenosis (LSS) is a common pathology that usually requires spine surgery in patients in the older age group of the population. Approximately half of patients diagnosed with symptomatic LSS have sensory or motor impairments (Katz et al., 1995). Usual symptoms include lower back pain, sensory deficits, leg pain, sphincter defects, and muscle weakness. Neurogenic claudication, characterized by a significant reduction in the ability to walk, is a typical manifestation of LSS and is the main reason for medical intervention (Szpalski & Gunzburg, 2003; Porter, 1996). LSS is caused by a narrowing of the diameter of the spinal canal, the diameter of the nerve root canals, and the diameter of the intervertebral neural foramen due to the progressive growth of bone and connective tissue elements surrounding the spinal canal. This can lead to neurogenic or vascular spinal canal content compression at one or more levels. The narrowing can be categorized as central (affecting the spinal canal diameter and dural sac), foraminal (affecting the spinal foraminal diameters), or lateral (affecting the lateral recess diameter).

Furthermore, LSS pathology is not only a structural process but also has a component of dynamic forces, as extension of the spine in the vertical axis and loading in the vertical axis can cause narrowing of the central and lateral canals (Schönström et al., 1989). There is no clarity in the current literature regarding the surgical approach to LSS, mainly whether fusion should be performed in addition to decompression. Some studies recommend fusion with lumbar decompression for LSS (Herkowitz & Kurz, 1991; Malmivaara et al., 2007). There are various techniques for surgical decompression in cases without fusion, each with different results. Our study aimed to compare the results of bilateral decompressive lumbar laminectomy via unilateral approach and open bilateral lumbar laminectomy for single level lumbar spinal stenosis.

MATERIALS AND METHODS

In this retrospective study, 198 consecutive patients who were diagnosed with single-level LSS and treated with decompressive surgery between October 2016 and May 2023 at the Clinic of Neurosurgery of Balikesir University Hospital were included. The main symptoms in the preoperative period were neurogenic claudication, leg pain, low back pain, or a combination of these symptoms. The mean duration from the onset of preoperative symptoms was 5±1.38 years. All patients in the study received a nonsteroidal anti-inflammatory or other analgesic agent preoperatively, and 122 patients underwent physical therapy.

The admittance criteria for this study were as follows: neurogenic claudication characterized by pain in the leg or limitation of walking or standing in an upright position, exercise intolerance, failure of conservative treatment methods, and compressive single-level central stenosis (central canal width < 12 mm in the sagittal axis) or lateral recess stenosis (width < 3 mm) by magnetic resonance imaging (MRI) or computed tomography. The rejection criteria for cases were as follows: isthmic spondylolisthesis, previous spine surgery at the same level, patients with congenital spinal stenosis with a central sagittal diameter of the bone canal < 8 mm due to the presence of short pedicles, motion instability determined by dynamic radiography studies with sagittal axis width > 3 mm vertebral translation and angulation greater than 10°, patients with multilevel spinal stenosis, and patients diagnosed with cauda equina syndrome.

Radiologic examination criteria were used to select the surgical approach. If it was determined that the patient's symptoms were caused by a single level, surgery was initiated. Surgery aimed to completely relieve the pressure in the spinal canal at the pathology level and in the nerve root canals at the same level. Patients were intubated and operated under general anesthesia. After anesthesia, the patients were placed on the surgery table in the prone posture. The operative level was localized using fluoroscopic guidance. After a midline skin incision was made at the affected level, the ligaments and paravertebral muscle tissues were dissected from the spinous processes using both blunt dissection and cautery, and the paravertebral muscles were dissected over the laminae using fine bone scraper gauze. Unilateral dissection was performed in cases of bilateral decompressive lumbar laminectomy with a unilateral approach, and bilateral dissection was performed in cases of open bilateral lumbar laminectomy.

Unilateral laminectomy using a surgical microscope was performed in cases of bilateral decompressive lumbar laminectomy. The most symptomatic side was identified, and a fascial incision was made on that side. If symptoms were not lateralized, the left-sided approach benefitted a right-handed surgeon. The paraspinal muscles were lifted off the spinous process and lamina through subperiosteal dissection. The surgical field was then prepared for the operating microscope. The ipsilateral cephalad lamina was partially removed using Kerrison rongeurs or a high-speed drill. A less extensive laminotomy was also performed on the caudal lamina. The ipsilateral ligamentum flavum was resected entirely using a Kerrison rongeur. Partial resection of the medial facet joint was then carried out. The compressed nerve root was located and decompressed by widening the foraminal space. Following the decompression on the ipsilateral side, the microscope was angled medially, and the patient was tilted contralaterally to improve the image of the contralateral nerve root. The base of the inferior surface of the contralateral lamina, spinous process, and the contralateral ligamentum flavum were removed using Kerrison rongeurs and high-speed milling for complete decompression of the contralateral nerve root and dura.

On the other hand, bilateral open bilateral lumbar laminectomy was performed, and bilateral laminae,

ligament flavum and spinous process were completely removed. In pathologically stenotic distances, total laminectomy was performed in addition to wide foraminotomies using a combination of high-speed air drills, bone rongeurs, and diamond burs. Both surgical techniques aimed to preserve the facet joints over the spinal roots and to create sufficient space for the nerve roots. No patient underwent discectomy or fusion. Bleeding was controlled by ensuring complete relaxation of the nerve roots. Muscles, skin, and fascia were closed with separate sutures.

A total of 80 patients underwent bilateral decompressive lumbar laminectomy via unilateral approach, while 118 patients underwent open bilateral lumbar laminectomy. Clinical evaluations were performed 6 months before and after surgical treatment. After inclusion in the study, the minimum follow-up period was 6 months. Visual Analog Scale (VAS) scores and walking time of all patients were recorded before and 6 months after surgery. VAS scores ranged from 0 (no complaint of pain) to 100 (worst possible pain complaint) units (Wewers & Lowe, 1990). Walking time is measured by the time the patient walks on level ground without stopping. Operation time, length of hospital stay, operative complications, operative blood loss, and iatrogenic spondylolisthesis rates at follow-up were also recorded for all patients.

Statistical analysis

The collected data was entered and analyzed using SPSS software version 26 (SPSS 26.0 IBM Corporation, Armonk, New York, USA). Statistical evaluation was performed using nonparametric tests, especially the Mann-Whitney U test and the chi-square test, to compare the differences. A p-value below 0.05 was considered statistically significant.

Ethical considerations

The whole study was carried out by the Declaration of Helsinki [1964]. All patients were informed verbally and in writing about the surgical treatment of lumbar spinal stenosis and signed informed consent forms. This study was approved by the Clinical Research Ethics Committee Balıkesir University Faculty of Medicine, (Decision No. 2023/164, Date: 22/11/2023).

RESULTS

A total of 198 female and male patients (96 female patients and 102 male patients) were included in this study. Operative and demographic details are shown in Table 1. The average age of the cases included in the study was 63.41±12.4 years. The mean duration of complaints before surgical treatment was 4±1.13 years. The average follow-up period after surgical treatment was 41.7±13.8 months. Decompressive surgery was performed on the L1 level lamina in five patients, L2 level lamina in 11 patients, L3 level lamina in 45 patients, L4 level lamina in 87 patients, and L5 level lamina in 50 patients.

In patients who underwent BDLUA, the mean VAS (Visual Analog Scale) score was 62.06±4.48 before surgical treatment, while this score decreased significantly to 26.81±4.74 after surgical treatment. Similarly, in patients who underwent OBDL, while the mean VAS score was 61.12±4.85 before surgical treatment, this value decreased significantly to 23.06±7.50 after surgical treatment. There was no significant difference between the VAS scores pre- and post-surgical treatment between both groups (p =0.21).

Table 1. Demographic and surgical data of all patients.

Variables	Findings
Age	63.41±12.4 years
Sex	102 male, 96 female
Duration of Symptoms	4±1.13 year
Follow up duration	41.7±13.8 months
Decompressed level	
L1-2	2.5% (5/198)
L2-3	5.5% (11/198)
L3-4	23% (45/198)
L4-5	44% (87/198)
L5-S1	25% (50/198)

The mean walking time of patients who underwent BDLUA increased from 21±3.4 minutes before surgical treatment to 58±4.8 minutes after surgical treatment. Similarly, in a study of patients who underwent OBDL, the mean walking time increased from 19±3.2 minutes before surgical treatment to 56±5.3 minutes after surgical treatment. There was no statistically significant difference between the two groups when walking time pre and post-surgical treatment was evaluated (p=0.33).

The average surgery time of cases who underwent BDLUA was 117±19.4 minutes, while the average surgery time of patients who underwent OBDL was 112±17.2 minutes. When the two groups were evaluated, there was no statistically significant difference between operation time for cases who underwent BDLUA and OBDL (p=0.085).

Complications (one hematoma, two infections, two deep vein thrombosis, and four dural injuries) were observed after surgical treatment in 9 patients who underwent BDLUA. Similarly, complications were observed in 13 patients who underwent OBDL (two hematomas, three infections, two increased transient motor deficits, one deep vein thrombosis, and five dural tears). There was no statistically significant difference between the two groups when complications after surgical treatment were evaluated (p=0.098).

Four patients who underwent BDLUA and who were followed up at 6 months postoperatively required fusion operation due to postoperative spondylolisthesis. Similarly, five patients who underwent OBDL required fusion operation for the same reason. The rates of spondylolisthesis after surgical treatment were similar between both groups, and there was no statistically significant difference (p=0.099).

The average hospital stay of the cases in the study who underwent BDLUA was 1.54±0.44 days, while the

average hospital stay of the patients who underwent OBDL was 3.72±1.02 days. There was a statistically significant difference between the two groups (p=0.032).

The mean blood waste was 78.3±23.4 ml in patients who underwent BDLUA and 183.7±72.4 ml in patients who underwent OBDL. When blood loss was evaluated, there was a statistically significant difference between the two groups (p=0.024) (Table 2).

Table 2. The comparison of the VAS score, walking times, complication, iatrogenic spondylolisthesis hospital stay, blood loss, and operation time in bilateral decompressive lumbar laminectomy with unilateral approach (BDLUA) and open bilateral lumbar laminectomy (OBDL) patients.

Variables	BDLUA Group n=(80)		OBDL Group n=(118)		
	Preoperative	Postoperative	Preoperative	Postoperative	p
VAS Score	62.06±4.48	26.81±4.74	61.12±4.85	23.06±7.50	0.21
Walking Times	21±3.4min	58±4.8min	19±3.2min	56±5.3min	0.33
Complication		9		13	0.098
İatrogenic Spondylolisthesis		4		5	0.099
Hospital Stay		1.54±0.44day		3.72±1.02day	0.032*
Blood Loss		78.3±23.4ml		183.7±72.4ml	0.024*
Operation Time		117±19.4min		112±17.2 min	0.085

***p < 0.05, statistically significant**

DISCUSSION

Although non-surgical treatments such as transforaminal steroid injection are used in the treatment of lumbar spinal stenosis (Weinstein et al., 2010), previous research has consistently shown that surgery is more effective than non-operative care for patients with LSS (Weinstein et al., 2008; Deyo et al., 2010). Over the years, various surgical techniques have been used, including BDLUA and OBDL.

OBDL involves removing the spinous process, interspinous ligament, and supraspinous ligament, which provides a large working area and good visibility. However, this procedure may lead to postoperative instability (Borshchenko et al., 2019). On the other hand, some authors agree that the BDLUA requires less muscle splitting and preserves the midline tissues, reducing postoperative discomfort and maintaining the stability of the lumbar spine (Papavero et al., 2009; Çavuşoğlu et al., 2007b). Maintaining the average power balance of the lumbar spine while achieving adequate decompression is a challenge in LSS surgery. Extensive facetectomy combined with extensive laminectomy may provide adequate decompression but may compromise mechanical stability and lead to iatrogenic instability. However, our study found no significant difference in the incidence of iatrogenic spondylolisthesis between the BDLUA and OBDL groups, suggesting that both techniques can decompress without compromising stability.

Previous research has demonstrated that a BDLUA can improve VAS scores, with the mean follow-up ranging from 7 months to 5.4 years (Çavuşoğlu et al., 2007a; Costa et al., 2007). In a study by Liu et al., the two-year follow-up results revealed no significant difference in VAS scores for leg pain between the two groups at 6 and 12 months (Liu et al., 2013). Similarly, we found no statistically significant difference between the two groups in improving visual analog scale (VAS) scores measuring leg pain intensity. This suggests that both techniques are equally effective in relieving pain.

The assessment of walking time plays a crucial role in the clinical evaluation of patients with LSS. Neurogenic claudication can worsen over time and cause severe disability and reduced quality of life. In a literature review comparing the outcomes of posterior decompression techniques, no significant difference was found between BDLUA and OBDL regarding walking durations (Overdevest et al., 2015). Our study was also consistent with the literature in this regard. The mean walking time of patients who underwent BDLUA was increased from 21±3.4 minutes before surgery to 58±4.8 minutes after surgery. Similarly, in the study of patients who underwent OBDL, the mean walking time increased from 19±3.2 minutes before surgery to 56±5.3 minutes after surgery. There was no statistically significant difference between the two groups when walking times before and after surgical treatment were evaluated (p > 0.05).

Length of hospital stays and delayed recovery can lead to more postoperative problems, such as blood clots, infections, heart and lung issues, blood clots in the lungs, bowel obstruction, and long-term narcotic use. These problems can also increase the cost of care (Armin et al., 2008; Jayarao & Chin, 2010; Khoo & Fessler, 2002). In a study by Mobbs et al., patients in the BDLUA group have significantly shorter average mobilization time and average postoperative hospital stay duration than those in the OBDL group (Mobbs et al., 2014). Similarly, we found that patients who underwent BDLUA had significantly shorter hospital

stays than those who underwent OBDL. This suggests that the unilateral approach may lead to faster recovery and reduced healthcare costs.

Blood loss during surgery is another important consideration, as significant blood loss may require transfusion and can have complications. Previous studies have shown that BDLUA has less intraoperative blood loss than OBDL (Kayalar et al., 2019; Yaman et al., 2015). This study found that patients with BDLUA experienced significantly lower blood loss than those who underwent OBDL. This indicates that the unilateral approach may be a safer option with reduced blood loss and potential transfusion requirements.

Complications are a critical factor to consider in any surgical procedure, and dural tears are commonly reported in surgeries for lumbar spinal stenosis. A recent systematic review conducted by Fourney et al. (2010) indicates that the current literature does not support the notion that less invasive lumbar surgery for posterior lumbar decompression reduces the incidence of complications, such as reoperation, dural tears, cerebrospinal fluid leaks, nerve injuries, and infections when compared to open techniques. In our study, 4 cases of durotomy were observed in the group that underwent BDLUA, while 5 cases of durotomy were observed in the group that underwent OBDL, which were primarily repaired. However, 3 patients who had a durotomy had previously received lumbar epidural steroid injections, which may have caused the dura to adhere to the flavum above it. This could be due to multiple attempts to locate the epidural space, which increases the risk of epidural scarring and fibrosis. Therefore, when evaluating patients for spinal decompression surgery, the surgeon should check for a history of previous epidural steroid injections and be extra cautious when removing the flavum from the dura. Our study found no significant difference in the incidence of dural tears between the two groups. Moreover, the two techniques had similar complications, such as infection, hematoma, deep vein thrombosis, and temporary motor deficit.

One of the potential drawbacks of BDLUA is that it may require a significant amount of time to become proficient due to its challenging learning curve (Parikh et al., 2008). Operation time is essential in neurosurgical practice, as longer surgical times can increase costs and potentially lead to more complications. However, our study showed no significant difference in surgery time rates between cases treated with BDLUA and those treated with OBDL techniques. This may be attributed to the fact that the procedures in this study were performed by a single surgeon with advanced experience using both BDLUA and OBDL techniques, thus resulting in a shorter learning curve for BDLUA.

Limitations of study

There are several limitations to our research. Firstly, our study only included a few patients from a single center. Secondly, the indications for the surgical technique were limited to lumbar spinal stenosis. Further research with more extended follow-up periods and larger sample sets is required to confirm the current findings.

CONCLUSION

In conclusion, our study shows that both bilateral decompressive lumbar laminectomy via unilateral approach and open bilateral lumbar laminectomy are effective surgical techniques for LSS. Patients treated with a BDLUA and OBDL had similar results regarding operative complications, VAS scores, walking time, operation time, and iatrogenic spondylolisthesis rates at follow-up. However, the duration of hospitalization and the quantity of intraoperative blood waste were significantly shorter in patients treated with the unilateral approach. Surgeons should consider these factors when choosing the most appropriate technique for each patient.

Acknowledgment

The authors would like to thank everyone who contributed to this study.

Conflict of Interest

The author declares no potential conflicts of interest concerning this article's research, authorship, and/or publication.

Author Contributions

Plan, design: UA, BG; **Material, methods and data collection:**UA, SK; **Data analysis and comments:** UA, BG, SK, ACK ; **Writing and corrections:**UA, ACK.

Funding

No funding

Ethical Approval

Institution: Balikesir University Ethics Committee
Date: 22.11.2023
Approval no: 2023/164

REFERENCES

Armin, S. S., Holly, L. T., & Khoo, L. T. (2008). Minimally invasive decompression for lumbar stenosis and disc herniation. *Neurosurgical Focus*, *25*(2), E11. https://doi.org/10.3171/FOC/2008/25/8/E11

Borshchenko, I., Gulzatyan, A., Kartavykh, R., & Grin, A. (2019). How I do it: bilateral lumbar spinal canal microsurgical decompression via unilateral approach. *Acta Neurochirurgica*, *161*, 2375-2380. https://doi.org/10.1007/s00701-019-04059-0

Costa, F., Sassi, M., Cardia, A., Ortolina, A., De Santis, A., Luccarell, G., et al. (2007). Degenerative lumbar spinal stenosis: analysis of results in a series of 374 patients treated with unilateral laminotomy for bilateral microdecompression. *Journal of Neurosurgery: Spine*, *7*(6), 579-586. https://doi.org/10.3171/SPI-07/12/579

Çavuşoğlu, H., Kaya, R. A., Türkmenoglu, O. N., Tuncer, C., Colak, I., & Aydın, Y. (2007). Midterm outcome after unilateral approach for bilateral decompression of lumbar spinal stenosis: 5-year prospective study. *European Spine Journal*, *16*, 2133-2142. https://doi.org/10.1007/s00586-007-0471-2

Çavuşoğlu, H., Türkmenoğlu, O., Kaya, R. A., Tuncer, C., Çolak, İ., Şahin, Y., et al. (2007). Efficacy of

unilateral laminectomy for bilateral decompression in lumbar spinal stenosis. *Turkish Neurosurgery*, *17*(2). https://doi.org/10.1007/s00586-007-0471-2

Deyo, R. A., Mirza, S. K., Martin, B. I., Kreuter, W., Goodman, D. C., & Jarvik, J. G. (2010). Trends, major medical complications, and charges associated with surgery for lumbar spinal stenosis in older adults. *Jama*, *303*(13), 1259-1265. https://doi.org/10.1001/jama.2010.338

Fourney, D. R., Dettori, J. R., Norvell, D. C., & Dekutoski, M. B. (2010). Does minimal access tubular-assisted spine surgery increase or decrease complications in spinal decompression or fusion? *Spine*, *35*(9S), S57-S65. https://doi.org/10.1097/BRS.0b013e3181d82bb8

Herkowitz, H. N., & Kurz, L. T. (1991). Degenerative lumbar spondylolisthesis with spinal stenosis. A prospective study comparing decompression with decompression and intertransverse process arthrodesis. *The Journal of Bone and Joint Surgery*, *73*(6), 802–808. https://doi.org/10.2106/00004623-199173060-00002

Jayarao, M., & Chin, L. S. (2010). Results after lumbar decompression with and without discectomy: comparison of the transspinous and conventional approaches. *Operative Neurosurgery*, *66*(3), ons152-ons160. https://doi.org/10.1227/01.NEU.0000365826.15986.40

Katz, J. N., Dalgas, M., Stucki, G., Katz, N. P., Bayley, J., Fossel, A. H., et al. (1995). Degenerative lumbar spinal stenosis Diagnostic value of the history and physical examination. *Arthritis & Rheumatism: Official Journal of the American College of Rheumatology*, *38*(9), 1236-1241. https://doi.org/10.1002/art.1780380910

Kayalar, A. E., Onen, M. R., Gerilmez, A., & Naderi, S. (2019). A simple cost-effectiveness analysis of bilateral decompression via unilateral approach versus instrumented total laminectomy and fusion for lumbar spinal stenosis. *Turkish Neurosurgery*, *29*(5), 643-650. https://doi.org/10.5137/1019-5149.JTN.24318-18.1

Khoo, L. T., & Fessler, R. G. (2002). Microendoscopic decompressive laminotomy for the treatment of lumbar stenosis. *Neurosurgery*, *51*(5), S2-146. https://doi.org/10.1227/01.NEU.0000031220.75770.29

Liu, X., Yuan, S., & Tian, Y. (2013). Modified unilateral laminotomy for bilateral decompression for lumbar spinal stenosis. *Spine*, *38*(12), E732-E737. https://doi.org/10.1097/BRS.0b013e31828fc84c

Malmivaara, A., Slätis, P., Heliövaara, M., Sainio, P., Kinnunen, H., Kankare, et al. (2007). Surgical or non-operative treatment for lumbar spinal stenosis?: a randomized controlled trial. https://doi.org/10.1097/01.brs.0000251014.81875.6d

Mobbs, R. J., Li, J., Sivabalan, P., Raley, D., & Rao, P. J. (2014). Outcomes after decompressive laminectomy for lumbar spinal stenosis: comparison between minimally invasive unilateral laminectomy for bilateral decompression and open laminectomy. *Journal of Neurosurgery: Spine*, *21*(2), 179-186. https://doi.org/10.3171/2014.4.SPINE13420

Overdevest, G. M., Jacobs, W., Vleggeert-Lankamp, C., Thomé, C., Gunzburg, R., & Peul, W. (2015). Effectiveness of posterior decompression techniques compared with conventional laminectomy for lumbar stenosis. *Cochrane database of systematic reviews*, (3). https://doi.org/10.1002/14651858.CD010036.pub2

Papavero, L., Thiel, M., Fritzsche, E., Kunze, C., Westphal, M., & Kothe, R. (2009). Lumbar spinal stenosis: prognostic factors for bilateral microsurgical decompression using a unilateral approach. *Operative Neurosurgery*, *65*(suppl_6), ons182-ons187. https://doi.org/10.1227/01.NEU.0000341906.65696.08

Parikh, K., Tomasino, A., Knopman, J., Boockvar, J., & Härtl, R. (2008). Operative results and learning curve: microscope-assisted tubular microsurgery for 1-and 2-level discectomies and laminectomies. *Neurosurgical Focus*, *25*(2), E14. https://doi.org/10.3171/FOC/2008/25/8/E14

Porter, R. W. (1996). Spinal stenosis and neurogenic claudication. *Spine*, *21*(17), 2046-2052. https://doi.org/10.1097/00007632-199609010-00024

Schönström, N., Lindahl, S., Willén, J., & Hansson, T. (1989). Dynamic changes in the dimensions of the lumbar spinal canal: an experimental study in vitro. *Journal of Orthopaedic Research*, *7*(1), 115-121. https://doi.org/10.1002/jor.1100070116

Szpalski, M., & Gunzburg, R. (2003). Lumbar spinal stenosis in the elderly: an overview. *European Spine Journal*, *12*(Suppl 2), S170-S175. https://doi.org/10.1007/s00586-003-0612-1

Weinstein, J. N., Tosteson, T. D., Lurie, J. D., Tosteson, A., Blood, E., Herkowitz, H., et al. (2008). Surgical versus non-surgical therapy for lumbar spinal stenosis. *New England Journal of Medicine*, *358*, 794-810. https://doi.org/10.1056/NEJMoa0707136

Weinstein, J. N., Tosteson, T. D., Lurie, J. D., Tosteson, A., Blood, E., Herkowitz, H., et al. (2010). Surgical versus non-operative treatment for lumbar spinal stenosis four-year results of the Spine Patient Outcomes Research Trial (SPORT). *Spine*, *35*(14), 1329. https://doi.org/10.1097/BRS.0b013e3181e0f04d

Wewers, M. E., & Lowe, N. K. (1990). A critical review of visual analogue scales in the measurement of clinical phenomena. *Research in Nursing & Health*, *13*(4), 227-236 https://doi.org/10.1002/nur.4770130405

Yaman, O., Ozdemir, N., Dagli, A. T., Erdem, A. C. A. R., Dalbayrak, S., & Temiz, C. (2015). A comparison of bilateral decompression via unilateral approach and classic laminectomy in patients with lumbar spinal stenosis: a retrospective clinical study. *Turkish Neurosurgery*, *25*(2). https://doi.org/10.5137/1019-5149.JTN.8710-13.1

ORİJİNAL MAKALE / ORIGINAL ARTICLE
Balıkesir Sağlık Bilimleri Dergisi / BAUN Sağ Bil Derg
Balıkesir Health Sciences Journal / BAUN Health Sci J
ISSN: 2146-9601- e ISSN: 2147-2238
Doi: https://doi.org/10.53424/balikesirsbd.1323034

The Relationship Between Attitudes Towards Sexuality and Anxiety During Pregnancy

Bihter AKIN[1], Bilgesu ÇELİK[2]

[1] Selçuk University, Faculty of Health Sciences, Department of Midwifery
[2] Cappadocia University, Faculty of Health Sciences, Department of Midwifery

Geliş Tarihi / Received: *05.07.2023,* ***Kabul Tarihi / Accepted:*** *24.05.2024*

ABSTRACT
Objective: The study was carried out to determine the relationship between attitude towards sexuality and anxiety during pregnancy. **Materials and Methods:** The study sample consisted of voluntary pregnant women throughout Turkey who participated in the online survey and met the specified criteria. This relationship-seeking and descriptive study was conducted online with 268 pregnant women between November 2022 and March 2023. In this context, the random sampling method was used. The survey form prepared by the researchers, the Pregnancy Sexuality Attitude Scale and the Pregnancy-Related Anxiety Scale were used in the study. **Results:** It was found that the attitudes of pregnant women towards sexuality during pregnancy were moderately positive and they had moderate anxiety. It was determined that there is a negative relationship between positive beliefs about sexuality during pregnancy and approval of sexuality during pregnancy and the anxiety level of pregnant women, and a positive relationship between anxiety about sexual intercourse during pregnancy and anxiety level ($p<0.05$). **Conclusion:** The findings of the study show that there is a relationship between the attitude towards sexuality during pregnancy and anxiety about pregnancy. All health professionals, especially midwives working in primary health care institutions, should include the issue of sexuality in pregnancy follow-up.
Keywords: Pregnancy, Sexuality, Anxiety.

Gebelikte Anksiyete ile Cinselliğe Yönelik Tutum Arasındaki İlişki

ÖZ
Amaç: Çalışma gebelik döneminde cinselliğe karşı tutum ile anksiyete arasındaki ilişkiyi belirlemek amacıyla gerçekleştirilmiştir. **Gereç ve Yöntem:** Araştırmanın örneklemini Türkiye genelinde çevrimiçi ankete katılan ve belirlenen kriterlere uygun gönüllü gebeler oluşturmuştur. İlişki arayıcı ve tanımlayıcı tipte yapılmış bu çalışma, Kasım 2022-Mart 2023 tarihleri arasında çevrimiçi olarak 268 gebe ile yürütülmüştür. Bu kapsamda kolayda örnekleme yöntemi kullanılmıştır. Araştırmada araştırmacıların oluşturduğu anket formu, Gebelikte Cinselliğe Karşı Tutum Ölçeği ve Gebelikle İlişkili Anksiyete Ölçeği kullanılmıştır**. Bulgular**: Gebelerin gebelikte cinselliğe karşı tutumlarının orta düzeyde olumlu olduğu ve orta düzeyde anksiyeteye sahip oldukları bulunmuştur. Gebelikte cinselliğe yönelik inançların olumlu olması ve gebelikte cinselliği onaylama ile gebelerin anksiyete düzeyi arasında negatif, gebelikte cinsel birleşmeye yönelik kaygı ile anksiyete düzeyi arasında pozitif bir ilişki olduğu belirlenmiştir ($p<0.05$). **Sonuç:** Araştırmadan elde edilen bulgular, gebelikte cinselliğe karşı tutum ile gebeliğe ilişkin anksiyete arasında ilişki olduğunu göstermektedir. Birinci basamak sağlık kuruluşlarında görev alan ebeler başta olmak üzere tüm sağlık profesyonelleri gebelik izlemlerinde cinsellik konusuna yer verilmelidir.
Anahtar Kelimeler: Gebelik, Cinsellik, Anksiyete.

Sorumlu Yazar / Corresponding Author: Bihter AKIN, Selçuk University, Faculty of Health Sciences, Department of Midwifery, Konya, Türkiye
E-mail: bihterakin@yahoo.com

Bu makaleye atıf yapmak için / Cite this article: Akın, B., & Çelik, B. (2024). The relationship between attitudes towards sexuality and anxiety during pregnancy. *BAUN Health Sci J, 13*(2), 457-464. https://doi.org/10.53424/balikesirsbd.1323034

INTRODUCTION

Pregnancy is one of the most important turning points in a woman's life. Pregnancy is a physical and psychological challenge for both the mother and the father-to-be (Aksoy et al., 2019). During this time, there are social, psychological and physiological changes in women's lives (Khalesi et al., 2018; Çevik & Yanıkkerem, 2020). These changes cause different psychological reactions in pregnant women (Baran et al., 2020; Arali & Öztürk, 2022). Although pregnancy is welcomed with joy by women, it is sometimes seen as an anxious process (Arslan & Okçu, 2019). Sexual life is subject to fluctuations due to the psychological changes during pregnancy (Güney & Bal, 2023; Oche et al., 2020). However, sexuality is influenced by many factors in addition to sexual activity, living environment, beliefs and attitudes (Güney & Bal, 2023; Aksoy et al., 2019).

According to the World Health Organization, it is described as a fundamental aspect of being human (World Health Organization, 2022). Furthermore, sexuality encompasses gender identities, roles, sexual orientation, eroticism, pleasure and reproduction (World Health Organization, 2022). Sexual attitudes related to sexuality are shaped by the environment, laws, traditions, social value judgments, social status and religious beliefs in which people live (Evangelista et al., 2019). Sexual attitudes are closely linked to sexual interest (Evangelista et al., 2019).

Anxiety is another factor that influences attitudes towards sexuality, especially during pregnancy (Phan et al.,. 2021). It has been found that as anxiety increases, women adopt an avoidant attitude towards sexuality during pregnancy (Güney & Bal, 2023; Oche et al., 2023; Phan et al., 2021; Branecka-Woźniak et al., 2020). This situation has been shown to have a negative impact on couples' sex lives (Branecka-Woźniak et al., 2020; Bilge et al., 2021). However, no study was found in the literature on the relationship between attitudes towards sexuality during pregnancy and anxiety. The study was conducted to determine the relationship between attitudes towards sexuality and anxiety during pregnancy.

MATERIALS AND METHODS

Study type

The research is relational and descriptive, and the population of the research consists of all women who were pregnant between November 2022 and March 2023.

Study group

Random sampling method, one of the non-probability sampling methods, was used to select the sample. In the non-probability sampling method, sample selection is based on the researcher's preferences or certain characteristics of the population rather than a specific plan or random selections. The researcher selected the sample to be representative of the population. The study was announced to all pregnant women throughout Türkiye and volunteers were encouraged to participate. The sample size was calculated using the G*Power 3.1.7 program to 268 pregnant women with a power of 80% within a deviation of 2 points from the known value (30.53± 6.49) (Duman et al., 2021). The minimum number of pregnant women expected to be reached in the study was 268, and the study was terminated when this number was reached. All women who consented to the online survey between the indicated dates, were open to communication, literate, pregnant for the first time, at least 18 years of age, healthy with a single fetus, pregnant women who had no psychiatric illness, and volunteered to participate in the study were included.

Data collection tools

Personal information form

The questionnaire form was created by the researchers by scanning the literature and consists of 12 questions about socio-demographic characteristics, obstetric characteristics and sexual experiences (Sezer et al., 2021; Kurt and Aslan, 2020). The survey was created online. Link: https://docs.google.com/forms/d/e/1FAIpQLSca1bqXTFMghJLMPVUjceUNtHEcNLlF5YdGaf6ouwX4sWcNtw/viewform?pli=1

And shared through the researchers' social media accounts (Facebook, Instagram, Whatsapp). Before the online survey was launched, a checkbox was set up for women to give consent to participate in the study, and after consent was given, questions were accessed

Attitude Scale Towards Sexuality During Pregnancy

This scale, developed by Sezer et al. in 2021, has been accepted as a valid and reliable tool consisting of 34 items and 3 sub-dimensions for determining the attitudes of pregnant women and their spouses towards sexuality (Sezer et al., 2021). The subdimension "beliefs and values regarding sexuality during pregnancy" consists of 10 items (3, 4, 8, 9, 12, 13, 16, 17, 19, 29); the subdimension "fear of sexual intercourse during pregnancy" consists of 9 items (7, 10, 15, 18, 22, 25, 26, 27, 30); The subdimension "affirmation of sexuality during pregnancy" consists of 15 items (1, 2, 5, 6, 11, 14, 20, 21, 23, 24, 28, 31, 32, 33, 34). Positive statements were scored as "disagree at all"="1", "disagree"="2", "agree moderately"="3", "agree"=4, and "agree fully"=5, while negative statements; disagree at all"="5", "disagree"="4", "agree moderately"="3", "agree"="2", and "agree fully"=" It is scored as 1". The scores that can be taken from the sub-dimension "Fear of sexual composition during pregnancy" are in the range of 9-45 points, "Beliefs and values regarding sexuality during pregnancy" and the score that can be obtained from the sub-dimension "Affirmation of sexuality during pregnancy" are in the range of 15-75 points. With the total "Scale of attitudes towards sexuality during pregnancy" you can score a minimum of 34 and a maximum of 170 points. The higher the total score of the "Attitude Scale Towards Sexuality During Pregnancy", the more positive it is, and the lower the total score decreases, the more

negative the attitude towards sexuality during pregnancy.

Pregnancy-Related Anxiety Scale (PrAS)

The Turkish reliability and validity study of the scale, which was developed by Brunton et al. in 2018, was conducted by Kurt and Aslan in 2020, reducing the number of items from 33 to 31, developing a scale with 9 subdimensions as a result the Turkish validity and reliability studies (Kurt and Aslan, 2020). Subdimensions of the scale; "Worries About Childbirth" (items 1. 2. 3. 4. 5. and 6.), "Attitudes Towards Childbirth" (Items 11, 12 and 13), "Body Image Anxiety" (7. 8. 9 and Article 10) "Concern About Motherhood" (Articles 14, 15 and 16), "Acceptance of Pregnancy" (Articles 17, 18 and 19), "Attitudes toward health care workers" (Articles 23, 24 and 25)), "Anxiety Indicators" (Articles 20, 21 and 22), "Avoidance" (Articles 26, 27 and 28) and "Fear of The Baby" (Articles 29, 30 and 31). The scale includes a 4-point Likert type assessment consisting of "Never: 1", "Sometimes: 2", "Mostly: 3", "Very often: 4" options. The lowest was found to be 31 and the highest 124 points across the scale. The items indicated in parentheses in the scale (11, 12, 13, 17, 18, 19, 23, 24, and 25) are scored in reverse order. After the 9 reverse-scored items are translated, each sub-dimension is scored on its own, and the sum of the scores of all items in the score gives the "total scale score". As the score on the total scale increases, the level of pregnancy anxiety increases linearly. The Cronbach's alpha of the scale in the original study was reported as 0.92. In this study, the Cronbach's alpha value of the PrAS was calculated to be 0.89 (Kurt & Arslan, 2020)

Dependent and independent variables

The independent variables of this research are age, education, working status, husband age, spouse's employment status, smoking status, social security status, income perception and emotions about the upcoming birth, number of pregnancies, pregnancy trimesters, thinking that pregnancy affects sex life. The dependent variable is pregnancy related anxiety and attitudes towards sexuality.

Statistical analysis

Analysis of the data obtained from the study was performed using the Statistical Package for Social Science 25 (SPSS 25.0) program on the computer. Since the data did not have a normal distribution, the Kruskall Wallis test and the Mann Whitney U test were used for the analysis. The relationship between attitudes toward sexuality during pregnancy and pregnancy-related anxiety was determined by Pearson correlation analysis.

Ethical considerations

Permission for the study was obtained from the Non-Invasive Research Ethics Committee of the Faculty of Health Sciences, Selcuk University. The pregnant women who agreed to participate in the study were informed about the study. They were informed that they had the right to withdraw from the study at any time during the study, and the informed consent form was forwarded to the participants and they were promised that their information would be kept confidential.

RESULTS

The mean age of the women participating in the study was 28.15±2.46 (min:20-max:40) and the mean gestational week was 32.95±3.72. The mean score of the scale of women's attitude toward sexuality during pregnancy was 86.72±14.11, and since the highest score that can be obtained on the scale is 170, it shows that the women have a moderately positive attitude toward sexuality during pregnancy (Table 1). The mean value of the inventory of pregnancy-related anxiety (PRAS) was 69.40±11.25, considering that the highest value that can be obtained with this scale is 124, it can be said that the women's pregnancy anxiety is moderate (Table 2).

Table 1. Women's attitudes towards sexuality in pregnancy scale sub-dimension and total mean scores.

Variables	Mean ±SS	Min-Max
Beliefs and Values Related to Sexuality in Pregnancy Sub-Dimension Score	18.59±7.45	9-45
Anxiety Regarding Sexual Mating During Pregnancy Sub-Dimension Score	20.96±7.54	9-45
Sub-Dimensional Score of Confirming Sexuality in Pregnancy	47.12±10.66	15-73
Attitudes Towards Sexuality During Pregnancy Scale Total Score	86.72±14.11	34-130

Table 2. Women's pregnancy-related anxiety scale (PRAS) sub-dimension and total mean scores.

Variables	Mean ±SS	Min-Max
Birth-Related Concerns	14.76±4.52	6-24
Attitudes Towards Birth	7.27±2.21	3-12
Body Image Anxiety	6.51±2.53	4-16
Worrying About Motherhood	5.07±2.00	3-12
Acceptance Of Pregnancy	4.99±2.40	3-12
Attitudes towards Health Personnel	8.52±2.92	3-12
Concern İndicators	6.10±2.29	3-12
Avoidance	5.17±2.50	3-12
Concerns Regarding the Baby	5.44±2.34	3-12
Scale Total Score	69.40±11.25	30-144

Table 3. The relationship between sociodemographic and obstetric characteristics of pregnant women, and Attitudes towards Sexuality in Pregnancy Scale and PRAS.

Variables		n	%	Attitudes towards Sexuality in Pregnancy Scale Mean ±Ss	Pregnancy-Related Anxiety Scale Mean ±Ss
Age	**18-30 years old** **31-45 years old** **P****	180 88	67 33	87.82±14.07 (88) 85.51±13.98 (86) 0.27	70.58±11.39 (71) 67.75±10.04 (66) 0.023
Education	**Primary education** **High school** **University** **P***	97 82 87	36 30 34	85.20±15.88 (86) 88.56±14.65 (88) 87.82±10.62 (87) 0.429	66.04±10.94 (66) 72.10±9.61 (72) 71.60±11.33 (71) 0.001
Working status	**Not working** **Working** **P****	182 86	68 32	86.40±14.60 (88) 90.11±13.63 (91) 0.782	68.56±10.81 (68) 73.94±9.18 (75) 0.010
Husband Age	**18-30 years old** **31-45 years old** **P****	140 128	52 48	88.55±14.12 (88) 85.34±13.84 (86) 0.080	71.07±11.69 (71) 68.00±9.97 (67) 0.049
Husband's Working Status	**Yes** **No** **P****	250 18	93 7	87.93±11.54 (85) 87.00±14.22 (88) 0.813	65.40±10.39 (63) 69.92±11.01 (70) 0.057
Smoking status	**Yes** **No** **P****	21 247	7 93	85.80±15.44 (86) 87.19±13.98 (88) 0.582	70.75±9.27 (70) 69.48±11.16 (69) 0.806
Social security status	**Yes** **No** **P****	207 61	77 23	87.62±13.54 (88) 85.03±15.72 (88) 0.556	69.83±10.66 (69) 68.98±12.26 (69) 0.538
Perception of Income	**Bad** **Middle** **Good** **P***	42 212 14	15 79 6	85.02±17.14 (88) 87.04±13.31 (87) 95.40±12.62 (96) 0.146	65.75±13.76 (66) 70.28±10.20 (70) 72.90±11.23 (74) 0.115
Number of Pregnancies	**1** **2** **≥3** **P***	110 90 68	41 33 26	87.58±12.40 (88) 87.36±15.35 (90) 85.78±14.89 (86) 0.354	71.13±11.12 (71) 69.00±10.56 (69) 68.09±11.30 (67) 0.272
Pregnancy trimesters	**1. Trimester** **2. Trimester** **3. Trimester** **P***	39 69 160	14 25 61	85.34±16.57 (88) 83.68±13.88 (86) 88.91±13.29 (88) 0.072	67.28±10.49 (68) 69.56±11.25 (70) 70.19±11.01 (70) 0.795

Table 3. (Continue). The relationship between sociodemographic and obstetric characteristics of pregnant women, and Attitudes towards Sexuality in Pregnancy Scale and PRAS.

Thinking that pregnancy affects sex life	**Yes** **No** **P****	109 159	40 60	87.82±12.62 (87) 86.54±14.95 (88) 0.611	70.69±10.98 (69) 68.94±11.01 (70) 0.380
Emotions about the upcoming birth	**Positive** **Negative** **Complicated** **P***	154 7 107	57 2 41	95.00±14.45 (90) 86.10±14.65 (87) 88.06±13.03 (88) 0.227	67.89±9.20 (67) 83.20±25.83 (76) 71.54±11.71 (72) 0.007

Table 4. Correlation coefficients of attitudes towards sexuality in pregnancy scale sub-dimension and total scores, and PRAS sub-dimension and total score.

PRAS Sub-Dimensions	**PRAS 1. Sub-Dimension**	**PRAS 2. Sub-Dimension**	**PRAS 3. Sub-Dimension**	**PRAS 4. Sub-Dimension**	**PRAS 5. Sub-Dimension**	**PRAS 6. Sub-Dimension**	**PRAS 7. Sub-Dimension**	**PRAS 8. Sub-Dimension**	**PRAS 9. Sub-Dimension**	**PRAS Total**
Attitudes towards Sexuality in Pregnancy Scale 1. Sub- Dimensions	-0.153	-0.238	-0.075	-0.156	-0.172	-0.191	-0.219	-0.186	-0.711	-0.163
p	**0.013**	**0.000**	0.226	**0.010**	**0.005**	**0.002**	**0.000**	**0.002**	**0.000**	**0.008**
Attitudes towards Sexuality in Pregnancy Scale 2. Sub- Dimensions	0.242	0.168	0.124	0.224.	0.066	0.255	0.238	0.175	0.360	0.259
p	**0.000**	**0.006**	**0.044**	**0.000**	0.284	**0.000**	**0.000**	**0.004**	**0.000**	**0.000**
Attitudes towards Sexuality in Pregnancy Scale 3. Sub- Dimensions	-0.033	-0.289	-0.071	-0.022	-0.369	-0.075	-0.0.65	-0.055	-0.639	-0.173
p	0.590	**0.000**	0.251	0.726	**0.000**	0.228	0.296	0.379	**0.000**	**0.005**
Attitudes towards Sexuality in Pregnancy Scale Total Score	-0.253	-0.005	-0.153	-0.217	-0.160	-0.288	-0.193	-0.153	-0.398	-0.360
p	**0.000**	0.933	**0.013**	**0.000**	**0.010**	**0.000**	**0.002**	**0.013**	**0.000**	**0.000**

PRAS 1st sub-dimension: **Birth-Related Fears,** PRAS 2nd sub-dimension: **Attitudes Regarding Childbirth**, PRAS 3rd sub-dimension: **Body Image Anxiety**, PRAS sub-dimension 4:**Maternity Anxiety,** PRAS 5th subdimension: **Acceptance Of Pregnancy**, PRAS 6th subdimension: **Attitudes Toward Health Care Workers**, PRAS 7th subdimension: **Indicators Of Anxiety**, PRAS 8. sub-dimension: **Avoidance Behaviour**, PRAS 9th subdimension: **Concern About The İnfant**, Attitudes toward sexuality during pregnancy scale Subdimension 1: **Beliefs And Values Regarding Sexuality During Pregnancy**, Attitude scale toward sexuality during pregnancy 2nd subdimension: gender anxiety during pregnancy, Attitude scale towards sexuality during pregnancySubdimension 3**: Affirmation Of Sexuality During Pregnancy**

Table 3 shows the association between the sociodemographic and obstetric characteristics of pregnant women and Attitude Scale Towards Sexuality During Pregnancy and PRAS. It was found that there was no association between women's attitudes toward sexuality during pregnancy and their sociodemographic characteristics. In examining the association between pregnancy anxiety and sociodemographic characteristics, women in the 18-30 age group were compared to the other groups, women with high school diplomas compared to women with elementary and high school diplomas, women with spouses between the ages of 18-30 compared to women who are not employed, and women who have negative view of the upcoming birth were compared to the others. Anxiety levels are found to be higher than those experiencing complex emotions.

Table 4 shows the correlation coefficients for the Attitude Scale Towards Sexuality During Pregnancy subdimension and total score and for the PRAS subdimension and total score. A negative significant correlation was found between the 1st subdimension (beliefs and values regarding sexuality in pregnancy) of the Attitude Scale Towards Sexuality During Pregnancy and all other subdimensions except the 3rd subdimension of the pregnancy-related anxiety scale and the total score. It is observed that the level of anxiety decreases when attitudes about beliefs and values regarding sexuality in pregnancy are positive. It was found that with the increase in the 2nd subdimension of the Fear of Pregnancy Scale (fear of sexual coitus during pregnancy), all subdimensions and total scores of the Fear of Pregnancy Scale increased, with the exception of the 5th subdimension. This shows us that as the fear of sexual intercourse during pregnancy increases, the level of anxiety also increases. Attitudes toward sexuality in pregnancy Scale 3rd subdimension (affirmation of sexuality in pregnancy) PRAS It was found that there was a negative relationship between attitudes toward childbirth, acceptance of pregnancy, worries about the baby, and total anxiety score. It was found that there is a negative significant relationship between the total score of the Attitudes toward Sexuality in Pregnancy scale and all other sub-dimensions except the 2nd sub-dimension PRAS and the total score.

DISCUSSION

The data obtained from this study shed light on the sexual attitudes and fears of expectant mothers during pregnancy. In our study, it was found that expectant mothers' attitudes towards sexuality during pregnancy were moderately positive. However, women were found to have an avoidant attitudes towards sexuality because of the increase in discomfort and dyspareunia and because they do not perceive sexual intercourse as safe during pregnancy (Güney & Bal, 2023; Phan et al., 2021). In addition, studies have shown that sexual life during pregnancy between couples is negatively affected (Mutlu & Güleroğlu, 2023; Uğurlu et al., 2023; Özgan Çelikel & Bulut, 2019). It is assumed that the level of education, sociocultural characteristics and the week of pregnancy of the pregnant women influence this situation (Özçoban & Dilcen, 2022; Gümüşay et al., 2021; Özgan Çelikel & Bulut 2019; Oche et al, 2020). However, in our study, sociodemographic characteristics and gestational week had no effect on attitudes towards sexuality during pregnancy. And although the women experienced a decrease in sexual desire, they continued to have sexual intercourse to satisfy their partners (Özgan Çelikel & Bulut 2019; Oche et al., 2020).

It has been found that there is a relationship between changes in sex life and anxiety in pregnant women (Güney & Bal, 2023). In our study, it was found that there is a relationship between age, sociodemographic characteristics, thoughts about impending labor and anxiety. In studies similar to our study, there is a close association between sociodemographic characteristics and anxiety (Effati-Daryani et al., 2021; Bilge et al., 2021). In particular, socioeconomic status can increase anxiety (Effati-Daryani et al., 2021). Another factor that influences anxiety is the interruption of sex life (Effati-Daryani et al., 2021).

The study found that the quality of sex life increases marital satisfaction and reduces anxiety (Effati-Daryani et al., 2021). However, in the study conducted by Hajnasiri et al. it was found that pregnancy trimesters were not affected by anxiety depending on sex life (Hajnasiri et al., 2018). In our study, it was found that the anxiety of pregnant women was at a moderate level. Another important finding of the study is that there is a negative relationship between positive beliefs about sexuality during pregnancy and approval of sexuality during pregnancy and anxiety levels of pregnant women and a positive relationship between anxiety about sexual intercourse during pregnancy and anxiety levels. Similar to our study, the literature states that decreased sexual desire and fear of sexual intercourse increase the level of anxiety (Güney & Bal, 2023; Demir et al., 2023).

In a study conducted by Özçoban and Dilcen, it was found that most couples consider sexual intercourse during pregnancy to be safe (Özçoban & Dilcen, 2022). In another study, although a relationship was found between the perception of body image and sexual functions of pregnant women, in contrast, a healthy sexual life was found in their spouses due to a positive body image (Gümüşay & Erbil, 2021). As in our country, in both Muslim countries and some non-Muslim countries, sexuality between spouses is not discussed and is seen taboo (Özçoban & Dilcen, 2022; Zhang et al., 2021; Effati-Daryani et al., 2021; Phan et al., 2021). However, studies have found that conversations about sexuality between spouses, access to correct information in the pre-conceptual phase, marital harmony between couples and attitudes

towards sexuality during pregnancy reduce anxiety by positively influencing it (Özçoban & Dilcen, 2022; Effati-Daryani et al., 2021; Bilge et al., 2021).

Limitations of the Research

The data obtained in the research is limited to the information provided by the expectant mothers.

CONCLUSION

The results of the study show that there is an association between attitudes toward sexuality during pregnancy and fear of pregnancy. Among health professionals, especially midwives working in primary health care facilities on this issue, the topic of sexuality should be included in pregnancy examinations. Studies should be conducted to reduce the fears of expectant mothers regarding sexuality and pregnancy-related fears in the areas of misinformation, sexual life during pregnancy, and psychology of pregnancy. Pregnancy-related fears should be identified, especially among expectant mothers. It is foreseeable that pregnant women and future generations will develop healthy sexual behavior by ensuring that they have sufficient knowledge and materials about sexual life during pregnancy. In addition, further studies are needed to determine the attitudes of expectant mothers toward sexuality during pregnancy in our country.

Acknowledgement

The authors would like to extend their sincere thanks to anyone who contributed to this study.

Conflict of Interest

The author declares no potential conflicts of interest with respect to the research, authorship and/or publication of this article.

Funding

None.

Author Contributions

Plan, tasarım: BA; **Gereç, yöntem ve veri toplama**: BA, BÇ; **Analiz ve yorum**: BA, BÇ; **Yazım ve eleştirel değerlendirme:** BA.

Ethical Approval

Institution: Selcuk University Ethics Committee
Date: 03.11.2022
Approval no: 2022/1093

REFERENCES

Aksoy, A., Yılmaz, D. V., & Yılmaz, M. (2019). Gebelikte cinsel yaşantıyı neler etkiler?. *Adnan Menderes Üniversitesi Sağlık Bilimleri Fakültesi Dergisi*, *3*(1), 45-53.

Arali, M., & Öztürk, S. (2022). Gebelik öncesi beden kitle indeksinin prenatal bağlanma ve anksiyete düzeyine etkisi: tanımlayıcı ve ilişki arayıcı bir çalışma. Türkiye *Klinikleri Sağlık Bilimleri Dergisi*, (1): 104-11. https://doi.org/10.5336/Healthsci.2021-82961

Arslan, S., Okçu, G., Coşkun, A. M., Temiz, F. (2019). Kadınların gebeliği algılama durumu ve bunu etkileyen faktörler. *Sağlık Bilimleri ve Meslekleri Dergisi*, *6*(1), 179-192. https://doi.org/10.17681/Hsp.432333

Aslantekin, F., & Yalnız Dilcen, H. (2022). The effect of pregnancy process on marital adjustment and sexuality / gebelik sürecinin evlilik uyumuna ve cinselliğe etkisi. *Turkish Journal of Family Medicine and Primary Care*, *16*. 639-649. https://doi.org/10.21763/tjfmpc.1015918

Baran, G. K., Şahin, S., Öztaş, D., Demir, P., & Desticioğlu, R. (2020). Gebelerin algılanan stres düzeylerinin ve stres nedenlerinin değerlendirilmesi. *Cukurova Medical Journal*, *45*(1), 170-180. https://doi.org/10.17826/Cumj.633534

Bilge, Ç., Mecdi Kaydırak, M., Öner, Ö. & Balkaya, N. A. (2021). Gebelikte cinsel işlev ve cinsel memnuniyetin değerlendirilmesi. *İnönü Üniversitesi Sağlık Hizmetleri Meslek Yüksek Okulu Dergisi*, *9* (2), 684-693. https://doi.org/10.33715/inonusaglik.820979

Branecka-Woźniak, D., Wójcik, A., Błażejewska-Jaśkowiak, J., & Kurzawa, R. (2020). Sexual and life satisfaction of pregnant women. *International Journal of Environmental Research and Public Health*, *17*(16), 5894. https://doi.org/10.3390/ijerph17165894

Çevik, E., & Yanıkkerem, E. (2020). The factors affecting self-esteem, depression and body image of pregnant women in a state hospital in Turkey. *JPMA. The Journal of the Pakistan Medical Association*, *70*(7), 1159-1164. https://doi.org/10.5455/JPMA.19892

Demir, O., Sal, H., Ozalp, M., Adas, M. B., Aran, T., & Osmanagaoglu, M. A. (2023). Examination of the change in sexual functions and anxiety as the pregnancy progresses and the effect of nulliparity on this change. *Northern Clinics of Istanbul*, *10*(4), 514–520. https://doi.org/10.14744/Nci.2022.85226

Duman, M., Yüksekol, Ö. D., & Ozan, Y. D. (2021). Preeklampsili gebelerde gebelikle ilişkili anksiyetenin prenatal bağlanmaya etkisi. *Jinekoloji-Obstetrik ve Neonatoloji Tıp Dergisi*, *18*(3), 907-915. https://doi.org/10.38136/Jgon.795735

Effati-Daryani, F., Jahanfar, S., Mohammadi, A., Zarei, S., & Mirghafourvand, M. (2021). The relationship between sexual function and mental health in Iranian pregnant women during the COVID-19 pandemic. BMC Pregnancy and Childbirth, 21(1), 327. https://doi.org/10.1186/s12884-021-03812-7

Evangelista, A. R., Moreira, A. C. A., Freitas, C. A. S. L., Val, D. R. do, Diniz, J. L., & Azevedo, S. G. V. (2019). Sexualidade de idosos: conhecimento/atitude de enfermeiros da Estratégia Saúde da Família. *Revista Da Escola de Enfermagem Da* USP, 53. https://doi.org/10.1590/s1980-220x2018018103482

Gümüşay M., Erbil N., Demirbağ C. B., (2021). Investigation of sexual function and body image of pregnant women and sexual function of their partners. *Sexual and Relationship Therapy*, https://doi.org/10.1080/14681994.2021.1883580

Güney, E., & Bal, Z. (2023). Gebelerin, cinsel yaşam ve cinselliğe karşı tutumlarının değerlendirilmesi. *Androloji Bülteni, 25*(1), 18-26. https://doi.org/10.24898/tandro.2023.27167

Hajnasiri, H., Aslanbeygi, N., Moafi, F., Mafi, M., & Bajalan, Z. (2018). Investigating the Relationship between Sexual Function and Mental Health in Pregnant Females. *Iranian Journal of Psychiatric Nursing 6* (2):33-40. http://dx.doi.org/10.21859/ijpn-06024

Khalesi, Z. B., Bokaie, M., & Attari, S. M. (2018). Effect of pregnancy on sexual function of couples. *African Health Sciences, 18*(2), 227-234. https://doi.org/10.4314/Ahs.V18i2.5

Kurt, G., & Arslan, H. (2020). Turkish version of the pregnancy-related anxiety scale: a psychometric study. *Perspectives in Psychiatric Care, 1*–10. https://doi.org/10.1111/Ppc.12537

Oche, O. M., Abdullahi, Z., Tunau, K., Ango, J. T., Yahaya, M., & Raji, I. A. (2020). Sexual activities of pregnant women attending antenatal clinic of a tertiary hospital in north-west nigeria. *The Pan African Medical Journal, 37,* 140. https://doi.org/10.11604/Pamj.2020.37.140.25471

Mutlu, E. N. Ç., & Güleroğlu, F. T. (2023). Effect of pregnancy symptoms on the sexual quality of life. *Revista Da Associacao Medica Brasileira* (1992), 69(8), E20230111. https://doi.org/10.1590/1806-9282.20230111

Özçoban, F. A., & Dilcen, H. Y. (2022). The effect of pregnancy process on marital adjustment and sexuality. *Turkish Journal of Family Medicine and Primary Care, 16*(4), 639-649. https://doi.org/10.21763/Tjfmpc.1015918

Özgan Çelikel, Ö., & Bulut, S. (2019). Evaluation of the relationship between sexual functions and depressive symptoms among pregnant patients during the second trimester. *Archives of Gynecology and Obstetrics, 300(*6), 1813–1819. https://doi.org/10.1007/S00404-019-05367-7

Phan, T. C., Hoang, L. B., Tran, T. K., Pham, T. T. T., Bui, A. V., Dao, H. T., Ngo, T. V., & Tran, C. D. (2021). Fear-related reasons for avoiding sexual ıntercourse in early pregnancy: a cross-sectional study. *Sexual Medicine, 9*(6), 100430. https://doi.org/10.1016/J.Esxm.2021.100430

Ryan, J. H., Young, A., Musara, P., Reddy, K., Macagna, N., Guma, V., Seyama, L., Piper, J., Van Der Straten, A., & Mtn- 041/Mamma Study Team (2022). Sexual attitudes, beliefs, practices, and hıv risk during pregnancy and post-delivery: a qualitative study in Malawi, South Africa, Uganda, and Zimbabwe. *AIDS and Behavior, 26*(3), 996–1005. https://doi.org/10.1007/S10461-021-03454-Y

Uğurlu Karakaş, G., Uğurlu, M., & Çayköylü A. (2020). Prevalence of female sexual dysfunction and associated demographic factors in turkey: a meta-analysis and meta-regression study. *International Journal of Sexual Health, 32*(4), 1–18. https://doi.org/10.1080/19317611.2020.1819503

Sezer, N. Y., & Şentürk Erenel, A. (2021). Development of an attitude scale toward sexuality during pregnancy. *Journal of Sex & Marital Therapy, 47(*5), 492-507. https://doi.org/10.1080/0092623x.2021.1911892

World Health Organization. (2022). Redefining sexual health for benefits throughout life. World Health Organization. https://www.who.int/news/item/11-02-2022-redefining-sexual-health-for-benefits-throughout-life

Zhang, Q., Shen, M., Zheng, Y., Jiao, S., Gao, S., Wang, X., Zou, L., & Shen, M. (2021). Sexual function in chinese women from pregnancy to postpartum: a multicenter longitudinal prospective study. Bmc *Pregnancy and Childbirth, 21*(1), 65. https://doi.org/10.1186/S12884-021-03546-6

ORİJİNAL MAKALE / ORIGINAL ARTICLE
Balıkesir Sağlık Bilimleri Dergisi / BAUN Sağ Bil Derg
Balıkesir Health Sciences Journal / BAUN Health Sci J
ISSN: 2146-9601- e ISSN: 2147-2238
Doi: https://doi.org/10.53424/balikesirsbd.1357062

The Impact of Mothers' Postnatal Sense of Security on Their Breastfeeding Self-Efficacy on Postpartum Depression

Hatice Gül ÖZTAŞ [1], Gülnaz ERDİ [1], Emine AKSÜT AKÇAY [1]

[1] Kahramanmaraş Sütçü İmam University, Faculty of Health Sciences, Department of Midwifery

Geliş Tarihi / Received: *08.09.2023,* ***Kabul Tarihi / Accepted:*** *28.05.2024*

ABSTRACT

Objective: This research was conducted in order to determine the effect of the mother's sense of security at the end of childbirth on both breastfeeding self-efficacy and postpartum depression in the mother. **Method:** The analytical-cross-sectional research was carried out on 340 puerperas admitted to a public hospital in the south of Turkey. The data for this study were collected using the puerperal women information sheet (PWIS), the Mothers' Postnatal Sense of Security Scale (MPSSS), the Edinburgh Postnatal Depression Scale (EPDS), and the Breastfeeding Self-Efficacy Scale-Short Form (BSES-SF). **Results:** It was determined that the average age of the participants was 27.92 ± 5.12, 40.2% of the educational status was bachelor's degree and above, 71.1% of them were not working. The mean scale scores of the mothers were 47.86 ± 10.36 for MPSSS, 53.69 ± 11.23 for BSES-SF, and 8.79 ± 5.67 for EPDS. The sub-scale scores for MPSSS were as follows: Empowering behaviors: 16.75 ± 5.10, General well-being: 11.18 ± 3.49, Affinity Within the Family: 11.82 ± 3.40, and Breastfeeding: 8.11 ± 2.53. Empowering behaviors scores were found to be moderately positively correlated with Affinity Within the Family, Breastfeeding, and BSES-SF scores (p = 0,001). Additionally, General Well-Being scores showed a statistically significant moderate positive correlation with Affinity Within the Family, MPSSS, and EPDS scores (p = 0,001). **Conclusion:** The results revealed that mothers' higher postnatal sense of security positively affects their breastfeeding self-efficacy and reduces the risk of postpartum depression. It may be recommended that midwives/nurses identify the factors affecting the mother's postpartum sense of security and develop practices to increase the feeling of security.

Keywords: Postpartum, Depression, Breastfeeding, Self Efficacy, Sense of Security.

Annenin Doğum Sonu Güvenlik Hissinin Emzirme Öz Yeterliliğine ve Postpartum Depresyon Düzeyine Etkisi

ÖZ

Amaç: Bu araştırma, annenin doğum sonu güvenlik hissinin emzirme öz yeterliliğine ve postpartum depresyon düzeyine etkisini belirlemek amacıyla gerçekleştirilmiştir. **Yöntem:** Analitik-kesitsel türde planlanan araştırma Türkiye'nin güneyinde, bir kamu hastanesine başvuran 340 lohusa üzerinde yürütülmüştür. Veriler, Kişisel Tanıtım Formu, Annelerin Doğum Sonu Güvenlik Hisleri Ölçeği (ADSGHÖ), Edinburgh Doğum Sonrası Depresyon (EDSDÖ) ve Emzirme Öz-Yeterlilik Ölçeği (EÖYÖ) kullanılarak toplanmıştır. **Bulgular:** Katılımcıların yaş ortalamasının 27.92 ± 5.12, eğitim durumunun % 40.2' sinin lisans ve üstü mezunu olduğu, % 71.1'inin çalışmadığı belirlenmiştir. Annelerin ADSGHÖ ölçek puanı ortalaması 47.86 ± 10.36, EÖY ölçek puanı ortalaması 53.69 ± 11.23, EPDÖ ölçek puanı ortalaması 8.79 ± 5.67 olduğu, ADSGHÖ ölçeği alt boyutları; Güçlendirici Davranış 16.75 ± 5.10, Genel İyilik 11.18 ± 3.49, Aileye Bağlılık 11.82 ± 3.40, Emzirme 8.11 ± 2.53 olarak bulunmuştur. Güçlendirici davranış puanı ile aileye bağlılık, emzirme ve EÖY puanı arasında pozitif yönde orta düzeyde istatistiksel olarak anlamlı ilişki saptanmıştır (p = 0,001). Genel iyilik puanı ile aileye bağlılık, ADSGHÖ, ve EPDÖ puanı arasında pozitif yönde orta düzeyde istatistiksel olarak anlamlı ilişki belirlenmiştir (p = 0,001). **Sonuçlar:** Annenin doğumu sonu güvenlik hissi arttıkça, emzirme öz yeterlilik duygusu pozitif yönde etkilendiği ve doğum sonu postpartum deprasyon riskini azalttığı belirlenmiştir. Ebe/hemşirelerin, annenin doğum sonu güvenlik hissini etkileyen faktörleri belirlemesi ve güvenlik hissini artırmaya yönelik uygulamaları geliştirmesi önerilebilir.

Anahtar Kelimeler: Doğum Sonrası, Depresyon, Emzirme, Öz Yeterlilik, Güvenlik Hissi

Sorumlu Yazar / Corresponding Author: Hatice Gül ÖZTAŞ, Kahramanmaraş Sütçü İmam University, Faculty of Health Sciences, Department of Midwifery, Kahramanmaraş, Türkiye
E-mail: h.gul_akbaba@hotmail.com

Bu makaleye atıf yapmak için / Cite this article: Öztaş, H. G., Erdi, G,. & Aksüt Akçay, E. (2024). The impact of mothers' postnatal sense of security on their breastfeeding self-efficacy on postpartum depression. *BAUN Health Sci J, 13*(2), 465-472. https://doi.org/10.53424/balikesirsbd.1357062

INTRODUCTION

The postpartum period is a critical phase characterized by significant changes for all family members. Increased workload and higher levels of stress among mothers should be evaluated and employing the obtained results, they should be provided with proper management skills to better manage this period (Sırlı, 2020). Mothers who acquire skills to manage the postpartum period feel safer and, as a result, can establish stronger communication with their babies and family members. Furthermore, being supported by family members, mothers feel peaceful, happy, and safe, which enables them to build more positive relationships with others (Sırlı, 2020; Taşkın 2016). Mothers' postnatal sense of security has become a prominent topic of discussion in recent times (Aksoy Derya, Erdemoğlu, Özşahin & Karakayalı, 2019). From a personal standpoint, safety is acknowledged as a fundamental human need that must be fulfilled to guarantee a high quality of life. When mothers go through the journey of parenthood, they encounter physical and psychosocial changes that are often accompanied by feelings of uncertainty and insecurity. To effectively support the safety needs of mothers, it is crucial to comprehend how they express and interpret their feelings of safety (Werner Bierwisch, Pinkert, Niessen, Metzing & Hellmers, 2018). However, very few studies were carried out about the topic (Baykal & Karakoç, 2021; Aksoy Derya et al., 2019).

The sense of security is deemed crucial for postpartum mothers as it plays a significant role in the continuation of breastfeeding (Sırlı, 2020). Both local and global health organizations recommend initiating breastfeeding within the first half hour after birth, exclusively providing newborn babies with breast milk in the initial six months, with continuing breastfeeding during a minimum of two years alongside the introduction of complementary foods (Alb, Theall, Jacobs, & Bales, 2017). Breastfeeding is important in terms of health and sustainable development goals (Duman & Gölbaşı, 2022). Perception of breastfeeding self-efficacy represents mothers' efforts to breastfeed her baby, her emotional preparedness for breastfeeding, and her thoughts regarding breastfeeding. In other words, it reflects the mother's ability to overcome potential challenges encountered during breastfeeding. However, the stress and emotional turmoil that often accompany the experience of being a first-time mother can impede the continuation of successful breastfeeding (İnce et al., 2017). A low sense of security among postpartum mothers is associated with an elevated risk of postpartum depression and an increased likelihood of experiencing disruptions in the bond between the mother and baby (Schaming & Wendland, 2023). When a mother feels secure, the bond between them tends to be healthier, stronger, and established at an earlier stage. This factor plays a crucial role in the continued practice of breastfeeding (Palmer, Carlsson, Brunt, & Nystrom, 2014).

During the 6-week postpartum period, mothers experience significant physiological and psychological changes (Aslan & Ege, 2016). Postpartum depression (PPD) is a psychiatric disorder that typically emerges within the second to sixth week following childbirth (Mikšić, Uglešić, Jakab, Holik, Milostić Srb, & Degmečić, 2020). Mothers who experience PPD are more likely to discontinue breastfeeding earlier compared to those who do not have depression (Woldeyohannes et al., 2021). Breastfeeding has a positive psychological impact on mothers, as it enhances their overall well-being, self-efficacy, and strengthens their bond with their babies (Gila Diaz, Carrillo, López de Pablo, Arribas & Ramiro-Cortijo, 2020). Moreover, studies have reported that postpartum depression (PPD) occurs less frequently in breastfeeding women. Breastfeeding has been associated with reduced neuroendocrine stress responses, which contribute to the protection of the mother's psychological well-being (Mikšić et al., 2020). Hence, the support provided by midwives and health professionals is very important to protect the mental health and psychological well-being of postpartum mothers (Coxon, et al., 2020; Matvienko Sika, Meedya & Ravaldi, 2020; Viaux, Maurice, Cohen & Jouannic, 2020).

An insufficient sense of security during the early postpartum period can contribute to heightened mental distress, such as anxiety and depression (Schaming & Wendland, 2023; Persson & Kvist, 2014). According to a previous report, the sense of security was found to be negatively associated with the postpartum period. Therefore, increasing the sense of security among mothers would be a significant intervention in reducing the risk of depression. Additionally, the perception of a mother's sense of security is considered a determinant of PPD (Baykal & Karakoç 2021). Persson & Kvist (2014) conducted a study that examined the relationship between the mothers' feelings of security, as well as postpartum anxiety and depression. Their findings revealed moderate negative correlations between feelings of security and both postpartum anxiety and depression (Persson & Kvist, 2014).

To our knowledge, there has been no prior investigation into the impact of mothers' sense of security on both self-efficacy and postpartum depression within a single study. Hence, the goal of this research is to reveal the effect of mothers' feelings of security on self-efficacy and postpartum depression.

MATERIALS AND METHODS

Research design

An analytical cross-sectional study was designed.

Place and time

The study was carried out in the puerperal ward of a state hospital in southern Turkiye between March and June 2023.

Sample

For calculating sample size, G*Power 3.1.9.7 software was employed (Faul, Erdfelder, Lang and Buchner, 2007). To estimate the sample size, the medium effect size suggested by Cohen (1988) was considered. The effect size was found to be f = 0.25, with a confidence interval of 80% (Polit & Beck, 2017), and the margin of error was calculated as 5%. Based on the calculations, the recommended sample size for the study was found to be 310 women. However, to account for potential data loss (estimated at 10%), the sample size was decided as 340. Consequently, the sample for the study comprised 340 puerperal women who willingly agreed to participate and met the inclusion criteria. The selection of puerperal women from the target population was conducted using the improbable accidental sampling method.

Data collection tools

Puerperal women information sheet (PWIS)

This sheet was developed by the researchers referred to the literature for the purpose of data collection on the demographic characteristic and obstetric history of the participants (Aksoy Derya et al., 2019; Persson & Kvist, 2014).

Mothers' postnatal sense of security scale (MPSSS)

The scale was prepared by Persson and Kvist 2007. The instrument comprises 18 items assessed using a 4-point Likert-type scale (1 = strongly disagree, 2 = agree somewhat, 3 = agree quite a lot, 4 = strongly agree). The validity and reliability studies for the Turkish translation of the MPSSS were carried out by Geçkil et al. (2016). The scale has four dimensions namely, a perception of empowering behavior from midwives/nurses, a sense of general well-being, a perception that breastfeeding was manageable, and a feeling of affinity within the family. Items 7, 8, 9, and 11 were reverse-coded. The instrument allows for scores ranging from a minimum of 18 to a maximum of 72. Higher scores indicate a higher sense of security. The Cronbach's alpha of the total scale was found to be 0.84 (Geçkil, Koçak, Aslan & Ege, 2016). In the current research, Cronbach's alpha was computed to be 0.90.

The Edinburgh Postnatal Depression Scale (EPDS)

This tool was prepared by Cox (1987) to measure postnatal depression. The validity of the Turkish translation of the EPDS was carried out by Engindeniz et al. (1996). The scale comprises 10 items. The participants mark their choices on a 4-point Likert-type scale varying from 0 to 3. The total scale score is derived by summing the scores of all the items, resulting in a range of 0 to 30. Postnatal depression risk increases as the scale score increases (Arslan, 2012). The Cronbach's alpha of EPDS was 0.79. However, Cronbach's alpha was found to be 0.90 in the current study.

The breastfeeding self-efficacy scale-short form (BSES-SF)

The Breastfeeding Self-Efficacy Scale-Short Form was prepared by Dennis and Faux (1999) as a tool to assess breastfeeding self-efficacy. The scale was later revised and condensed to include 14 items (Dennis, 2003). This tool is rated on a 5-point Likert scale. Scale scores range from 14 to 70. Breastfeeding self-efficacy increases as the scale score increases (Dennis, 2003). The Breastfeeding Self-Efficacy Scale-Short Form was adapted to the Turkish language by Aluş Tokat et al. (2010). They reported the Cronbach's alpha of the scale as 0.86 (Aluş Tokat, Okumus & Dennis, 2010). In the current study, it was computed as 0.95.

Data collection

The data of this study were collected over two stages. In the first stage, the participants responded to the PWIS and MPSSS in a face-to-face manner at the specified institution, with researchers present. The data collection took place at a convenient time for the mothers and their babies and lasted about 15-20 minutes. In the second stage, EPDS and BSES-SF were transferred to Google Forms. Starting from the 10th day after giving birth, the participant mothers filled out the EPDS and BSES-SF online using Google Forms.

Analysis of the data

The data analysis performed on SPSS (IBM Statistical Package Program) v 25. Descriptive statistics were presented as numbers, percentages, means, standard deviations, medians, and min/max values. T-test was conducted for two-group comparisons with normally-distributed data. Conversely, Mann-Whitney U tests were conducted for data that did not follow a normal distribution. The statistical significance level employed in the analysis was established at p = 0.001. In the analysis of the relations between the variables, Spearman's rank correlation coefficient was employed since the normal distribution was not achieved.

Ethical considerations

This study adhered to the principles of the Helsinki Declaration. Before the study, approval was received from the Ethics Committee of Non-Interventional Researches of Kahramanmaraş Sütçü İmam University Health Practice and Research Hospital (Protocol no: 2023/03). Participants were briefed on the study's objectives, the voluntary nature of participation, and their consent was obtained through both written and verbal means.

RESULTS

Participants' sociodemographic characteristics are given in Table 1. Participants' mean age was 27.92 ± 5.12 years, 40.2% had an undergraduate or higher education, 71.1% were unemployed, 39.3% had spouses with an undergraduate or higher education,

94.8% had spouses employed, 57.8% reported an income matching their expenses, and 89.9% belonged to a nuclear family.

She distribution of the participants' pregnancy and fertility characteristics is shown in Table 2. Of the women, 74.3% had a planned pregnancy, 67.9% had no health problems during pregnancy, 55.8% received regular prenatal care during their last pregnancy, 45% had a normal delivery, 63.3% received training about the postpartum period, 88.4% received support from their family during the postpartum period, 92.5% reported having good communication with their spouses after birth, 83.5% had a postnatal baby weight of 2500 g and above, 55.2% had a female baby. In addition, the mean number of pregnancies was found to be 2.20 ± 1.41.

Table 1. Participants' sociodemographic characteristics (n = 346).

Characteristics		
	Mean ± sd	**Min – Max**
Age	27.92 ± 5.12	18 - 43
Spouse age	3.17 ± 5.57	21 – 55
Educational Status	**n**	**%**
Primary education	50	14.50
Secondary school	71	20.50
High school	86	24.90
Undergraduate or higher education	139	40.20
		Working Status
Yes	100	28.90
No	246	71.10
Spouse Education Status		
Primary education	32	9.20
Secondary school	67	19.40
High school	111	32.10
Bachelor's degree or higher	136	39.30
		Spouse Working Status
Yes	328	94.80
No	18	5.20
		Income Level
Income more than expense	51	14.70
Income is equal to expense	200	57.80
Income less than expenses	95	27.50
		Family Structure
Nuclear family	311	89.90
Extended family	35	10.10

Sd: standard deviation, Min-Max: minimum and maximum score, respectively

Table 2. Distribution of pregnancy and fertility characteristics of the participants (n = 346).

Variables	**n**	**(%)**
Planned pregnancy		
Yes	257	74.30
No	89	25.70
Having a health problem in the last pregnancy		
Yes	111	32.10
No	235	67.90
Receiving regular antenatal care in last pregnancy		
Yes	153	44.20
No	193	55.80
Last delivery type		
Normal delivery	155	45
Cesarean delivery	201	55
Getting postpartum education		
Yes	127	36.70
No	219	63.30

Table 2. (Continue) Distribution of pregnancy and fertility characteristics of the participants (n = 346).

Receiving support from the family during the postpartum period		
Yes	306	88.40
No	40	11.60
Postpartum communication with spouse		
Good	320	92.50
Bad	26	7.50
Birth weight		
Less than 2500 grams	57	16.50
2500 grams and above	289	83.50
Baby Gender		
Girl	191	55.20
Boy	155	44.80
	Mean ± sd	**Min – Max**
Number of pregnancies	2.20 ± 1.41	0 – 8
The number of living children	1.97 ± 1.28	0 – 9

Sd: standard deviation, M: Median, Min-Max: minimum and maximum score, respectively.

Descriptive statistics for the MPSSS, EPDS, and BSES-SF are presented in Table 3. The mean scale scores were 47.86 ± 10.36 for MPSSS, 53.69 ± 11.23 for BSES-SF, and 8.79 ± 5.67 for EPDS. The sub-scale scores for the MPSSS were as follows: Empowering behaviors: 16.75 ± 5.10, General well-being: 11.18 ± 3.49, Affinity Within the Family: 11.82 ± 3.4, and Breastfeeding: 8.11 ± 2.53.

Table 3. Descriptive statistics for the MPSSS, EPDS, and BSES-SF.

Variables	**Mean ± sd**	**Min/Max**	**Cronbach's α**
Empowering Behaviors	16.75 ± 5.10	5 - 24	0.94
General Well-Being	11.18 ± 3.49	5 - 20	0.70
Affinity Within the Family	11.82 ± 3.40	4 - 16	0.94
Breastfeeding	8.11 ± 2.53	3 - 12	0.78
MPSSS	47.86 ± 10.36	18 - 72	0.90
BSES-SF	53.69 ± 11.23	14 - 70	0.95
EPDS	8.79 ± 5.67	1 - 27	0.90

Sd: standard deviation, M: Median. Min/max: minimum and maximum score, respectively.

The findings regarding the correlation analysis for MPSSS, EPDS, and BSES-SF are presented in Table 4. Empowering behaviors were found to be moderately positively correlated with Affinity Within the Family, Breastfeeding, and BSES-SF scores (p = 0.001).

A significant strong and positive relationship was observed between Empowering Behaviors and MPSSS scores (p = 0.001). However, a weak negative correlation was observed between Empowering Behaviors and EPDS scores (p = 0.001).

Furthermore, General Well-Being scores were found to be moderately positively correlated with Affinity Within the Family, MPSSS, and EPDS scores (p = 0,001). Additionally, Affinity Within the Family scores were moderately positively correlated with Breastfeeding and BSES-SF scores (p = 0,001). Additionally, a strong and positive significant correlation was identified between Affinity Within the Family and MPSSS scores (p = 0,001).

A strong significant positive correlation was observed between Breastfeeding and MPSSS scores (p = 0.001). Furthermore, it was determined that Breastfeeding scores moderately positively correlated with BSES-SF and EPDS scores (p = 0,001). It was observed that a significant moderate and positive correlation exists between MPSSS and BSES-SF scores (p = 0.001). On the other hand, a significant moderate and negative correlation was identified between BSES-SF and EPDS scores (p = 0.001).

Table 4. Correlation analysis for MPSSS, BSES-SF, and EPDS.

Points	Value	Empowering behavior	General well-being	Affinity within the family	Breastfeeding	MPSSS	BSES-SF	EPDS
Empowering behavior	R		0,092	***0,420***	***0,616***	***0,818***	***0,369***	***-0,250***
	P		0,086	***0,001****	***0,001****	***0,001****	***0,001****	***0,001****
General well-being	R			***0,277***	0,058	***0,452***	0,014	***0,346***
	P			***0,001****	0,282	***0,001****	0,801	***0,001****
Affinity within the family	R				***0,489***	***0,748***	***0,359***	-0,060
	P				***0,001****	***0,001****	***0,001****	0,265
Breastfeeding	R					***0,720***	***0,345***	***-0,359***
	P					***0,001****	***0,001****	***0,001****
MPSSS	R						***0,383***	-0,200
	P						***0,001****	0,063
BSES-SF	R							***-0,278***
	P							***0,001****

r; spearman rank correlation coefficient, * indicates significant relationship between the variables.

DISCUSSION

This study was carried out to identify the impact of mothers' postnatal sense of security on their breastfeeding self-efficacy and postnatal depression. The obtained results are believed to make a valuable contribution to the literature by revealing the impact of mothers' postnatal sense of security on breastfeeding self-efficacy and postnatal depression, which are two important factors for both maternal and newborn health.

The assessment of mothers' postnatal sense of security and its subdimensions is crucial for ensuring the provision of high-quality support and care to them (Geçkil et al., 2016). The achievable total score for MPSSS ranges from 18 to 72. In the current study, the mean MPSSS score was found to be 47.86 ± 10.36 indicating a good level of sense of security. Similar findings were reported in prior studies (Koçak et al., 2021; Velagic, Mahmutovic, and Brankovic, 2019). However, several reports found a higher postnatal sense of security scores (Aksoy Derya et al., 2019; Geçkil et al., 2016). The discrepancy in the results can be attributed to the postnatal care and support received by the participants after childbirth. Despite finding a good level of sense of security in this study, it can still be considered lower than the expected or desired level. For this reason, it is believed that enhancing spouse and family support for mothers, as well as improving the quality of midwifery care during the postpartum period, is important. By improving midwifery care, the healthcare services provided to mothers in hospitals can be enhanced, thereby promoting a greater sense of safety for mothers during the postpartum period.

Supporting mothers with behaviors that promote self-efficacy in the postpartum period can contribute to an increased sense of postnatal security (Kumral, 2021; Geçkil et al., 2016). Among the subdimensions of MPSSS, the highest mean score was observed in Empowering Behaviors, with a mean of 16.75 ± 5.10 Similarly, in the previous studies, the highest mean score was observed in the Empowering Behaviors dimension (Baykal & Karakoç, 2021; Escribano, Oliver-Roig, Cano-Climent, Richart-Martínez, Persson and Juliá-Sanchis, 2020). Supporting mothers with empowering behaviors of health professionals, especially midwives, would contribute to their sense of security.

The EPDS scores were found to be moderately positively correlated with the "Affinity Within the Family" and "General Well-Being" dimensions of the MPSSS (p = 0,001). Literature findings indicated that disrupted general well-being would result in an increased risk for postpartum depression (Baykal & Karakoç, 2021; Akbari, Rahmatinejad, Shater, Vahedian & Khalajinia, 2020;). On the other hand, some previous studies reported that increased affinity within the family reduces the risk for postpartum depression and facilitates the mother's adaptation process to baby care (Zheng Sun, Aili, Yang & Gao, 2022; Baykal and Karakoç, 2021). Negative emotions such as inadequate postnatal sense of security, anxiety, and depression increase the risk of mental health disorders. Furthermore, anxiety and depression can be indicators of sense of insecurity (Schaming & Wendland, 2023). Considering these studies, it is possible to argue that mothers with a higher sense of security might have lower depression risk (Escribano et al., 2020).

Breastfeeding self-efficacy is related to mothers' sense of efficacy emotions regarding breastfeeding their infants. Mothers' breastfeeding self-efficacy also represents their knowledge and skills about breastfeeding (He & Namprom, 2022). The results of this study revealed a significant moderate positive relationship between MPSSS and BSES-SF scores. Consistent with this result, some studies reported that mothers with a higher postnatal sense of security exhibit higher breastfeeding self-efficacy (Kumral, 2021; Erol 2020). It is possible that the increase in postpartum social support provided by midwives, nurses, and family relatives to mothers contributes to an enhanced sense of security among mothers. This, in turn, may increase their breastfeeding self-efficacy (He & Namprom,

2022). Moreover, a strong positive significant relationship was observed between breastfeeding and MPSSS total scores. This result indicates that mothers' sense of security is associated with breastfeeding.

Limitations of the Research

Since the research is cross-sectional and conducted in a single center. It may not be generalizable to all postpartum mothers.

CONCLUSION

This study examined the impact of mothers' postnatal sense of security on their breastfeeding self-efficacy and postpartum depression. The results showed that women had a sufficient level of postnatal sense of security and as their postnatal sense of security scores increase, their breastfeeding self-efficacy increased and reduces the level of postpartum depression. This study yielded significant findings that highlight the impact of the postnatal sense of security on breastfeeding self-efficacy and postpartum depression, which are two factors that play crucial roles in the health of both mothers and newborns during the postpartum period. Accordingly, interventions to increase mothers' postnatal sense of security should focus on improving midwifery care services. As the primary healthcare professionals responsible for delivery services, midwives should demonstrate empowering behaviors that enhance the self-confidence of mothers. They should also provide appropriate care to address the health needs of mothers during the postpartum period. In addition, it is important to encourage fathers and other family members to participate in training programs about the postpartum period and increase their awareness of this subject. There is a need for national and international studies that include fathers with larger sample sizes to obtain more insights into the postnatal sense of security.

Acknowledgements

We would like to thank all women for their participation. This article was presented as an oral presentation at the 9th International 13th National Midwifery Student Congress.

Conflict of Interest

The authors declare no conflict interest.

Author Contributions

Plan, design: HGÖ**.,** GE., EAA**.; Material, methods and data collection:** HGÖ., GE., EAA.; **Data analysis and comments:** HGÖ., GE., EAA.; **Writing and corrections:** HGÖ., GE., EAA.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Ethical considerations

This study adhered to the principles of the Helsinki Declaration. Before the study, approval was received from the Ethics Committee of Non-Interventional Researches of Kahramanmaraş Sütçü İmam University Health Practice and Research Hospital (Protocol no: 2023/03). Participants were briefed on the study's objectives, the voluntary nature of participation, and their consent was obtained through both written and verbal means.

REFERENCES

Akbari, V., Rahmatinejad, P., Shater M.M., Vahedian M., Khalajinia, Z.(2020). Investigation of the relationship between perceived social support and spiritual well-being and postpartum depression. *Journal of Education and Health Promotion, 9*(1):174.

Aksoy Derya, Y., Erdemoğlu, Ç., Özşahin, Z. Karakayalı, Ç. (2019). The effect of mother's perception of birth on postpartum security. *Journal of Midwifery and Health Sciences, 2* (3), 88-95.

Alb. C.H., Theall, K, Jacob, M.B., Bales, A. (2017) Awareness of united states' law for nursing mothers among employers in New Orleans, Louisiana. *Women's Health Issues, 27*(1), 14-20. https://doi.org/10.1016/j.whi.2016.10.009

Aluş Tokat, M., Okumus, H., Dennis, C.L. (2010) Translation and psychometric assessment of the breast-feeding self effi cacy scale short form among pregnant and postnatal women in Turkey. *Midwifery , 26*(1):101-108.

Arslan, D. (2012). Determination of the risk of postpartum depression and related factors. Master's thesis, T.C. Mersin University Institute of Health Sciences, Department of Midwifery, Mersin.

Aslan, Y., Ege, E. (2016). Association of mothers with breastfeeding self-efficacy and risk of depression. *Journal of Human Sciences, 13*(2), 3160.

Baykal, S., Karakoç, A. (2021). The relationship between susceptibility to depression and the level of security in the postpartum period. *Journal of Health Sciences and Management, 1*(3), 101-107.

Cohen, J. (1988). Statistical power analysis for the behavioral sciences, 2nd ed. Hillsdale, NJ: Erlbaum

Coxon, K., Turienzo C.F., Kweekel L., Goodarzi B., Brigante L., Simon A., Lanau M.M. (2020). The impact of the coronavirus (COVID-19) pandemic on maternity care in Europe. *Midwifery,88,*102779. https://doi.org/10.1016/j.midw.2020.102779

Dennis, C.L Faux, S. (1999). Development and psychometric testing of the breastfeeding self-efficacy scale. *Research in Nursing Health, 22*(5), 399-409.

Dennis, C.L. (2003). Breastfeeding self efficacy scale: psychometric assessment of the short form. *Journal of Obstetric, Gynecologic and Neonatal Nursing, 32,* 734–743.

Duman, F.N. Gölbaşı, Z., (2022). Investigation of the Effect of Breastfeeding Education on Mothers' Breastfeeding Self-Efficacy Level in Turkey. *TJFMPC, 16*(1): 140-150.

Engindeniz, A.N., Küey, L., Kültür, S. (1996). Turkish form of Edinburgh postpartum depression scale validity and reliability study. Spring symposiums 1st book, Psychiatric Association Publications, Ankara, 51-52.

Erol, D.D. (2020). The effect of mothers' breastfeeding self-efficacy level on breastfeeding continuity. Üsküdar University, Institute of Health Sciences, Master's thesis, Istanbul.

Escribano, S., Oliver-Roig, A., Cano-Climent, A., Richart-Martínez, M., Persson, E.K., Juliá-Sanchis, R. (2020). The Spanish version of the Mothers' Postnatal Sense of Security Scale: Psychometric properties and predictive utility. *Research in Nursing & Health, 43*(6), 651-661. https://doi.org/10.1002/nur.22071

Faul, F., Erdfelder, E., Lang, A. G., Buchner, A. (2007). G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods, 39*(2), 175–191

Geçkil, E., Koçak V, Altuntuğ K., Ege E. (2016) Postpartum Sense of Security Scale. *Anatolian Journal of Nursing and Health Sciences, 19*(4):233-42.

Gila-Díaz, A., Carrillo, G. H., López de Pablo, Á. L., Arribas, S. M., Ramiro-Cortijo, D. (2020). Association between Maternal Postpartum Depression, Stress, Optimism, and Breastfeeding Pattern in the First Six Months. *International Journal of Environmental Research and Public Health, 17*(19), 7153. https://doi.org/10.3390/ijerph17197153

He, J., Yimyam, S., Namprom, N. (2022). Breastfeeding self-efficacy, social support, and breastfeeding among Chinese mothers with late preterm infants. *Journal of Neonatal Nursing, 28*(1), 21-25. https://doi.org/10.1016/j.jnn.2021.07.005

İnce, T., Aktaş, G., Aktepe, N., Aydın, A. (2017). Evaluation of mothers' breastfeeding self-efficacy and characteristics affecting breastfeeding success. *Journal of Dr. Behcet Uz Children's Hospital, 7*(3). https://doi.org/10.5222/buchd.2017.183

Koçak V., Altuntuğ, K., Emel, E. (2021). Evaluation of mothers' self-efficacy and postpartum security feelings. *Journal of Midwifery and Health Sciences, 4*(1), 34-44. https://doi.org/10.1016/j.wombi.2017.12.00

Kumral, S. (2021). The effect of perceived spousal support and sense of security on breastfeeding self-efficacy of women in the postpartum period (Master's thesis, Istinye University/Health Sciences Institute). https://doi.org/10.1089/bfm.2019.0106

Matvienko-Sikar K., Meedya S., Ravaldi C. (2020) Perinatal mental health during the COVID-19 pandemic. *Women Birth. 33*(4):309–310. https://doi.org/10.1016/j.wombi.2020.04.006

Mikšić, Š., Uglešić, B., Jakab, J., Holik, D., Milostić Srb, A., Degmečić, D. (2020). Positive Effect of Breastfeeding on Child Development, Anxiety, and Postpartum Depression. *International Journal of Environmental Research and Public Health, 17*(8), 2725. https://doi.org/10.3390/ijerph17082725

Palmer, L., Carlsson, G., Brunt, D. Nystrom, M. (2014). Existential vulnerability can be evoked by severe difficulties with initial breastfeeding: A lifeworld hermeneutical single case study for research on complex breastfeeding phenomena. *Breastfeeding Review, 22*(3), 21-32.

Persson E.K. Dykes A.K. (2007): Parents Postnatal Sense of Security Development of the PPSS Instrument. *Scand J Caring,* (1):118-25. https://doi:10.1016/j.midw.2007.08.001

Persson E.K., Kvist L.J. (2014) Postnatal sense of security, anxiety and risk for postnatal depression. *J Womens Health, Issues Care 3*. 2014;3:2.

Polit, D.F., Beck, C.T. (2017). Nursing research: Generating and assessing evidence for nursing practice (10th ed.). Philadelphia, PA: Lippincott Williams & Wilkins

Schaming, C., Wendland, J. (2023). Postnatal mental health during the COVID-19 pandemic: Impact on mothers' postnatal sense of security and on mother-to-infant bonding. Midwifery, 117, 103557. https://doi.org/10.1016/j.midw.2022.103557

Sırlı, B. (2020) Postpartum security feelings of primiparous mothers and related factors (Doctoral dissertation, Necmettin Erbakan University.

Taşkın L. (2016) Obstetrics and Gynecology Nursing, Extended XIII. Edition, Academician Medical Bookstore, Ankara, 534-70.

Velagic, M., Mahmutovic, J., Brankovic, S. (2019). Development of mother's postnatal sense of security. *Materia Socio-medica, 31*(4), 277. https://doi.org/0.5455/msm.2019.31.277-281

Viaux S., Maurice P., Cohen D., Jouannic J.M. (2020) Giving birth under lockdown during the COVID-19 epidemic. *Journal of Gynecol. Obstet. Hum. Reprod.49*(6). https://doi.org10.1016/j.jogoh.2020.101785

Werner-Bierwisch, T., Pinkert, C., Niessen, K., Metzing, S., Hellmers, C. (2018). Mothers' and fathers' sense of security in the context of pregnancy, childbirth and the postnatal period: an integrative literature review. *BMC Pregnancy and Childbirth, 18*(1), 473. https://doi.org/10.1186/s12884-018-2096-3

Woldeyohannes, D., Tekalegn, Y., Sahiledengle, B., Ermias, D., Ejajo, T., Mwanri, L. (2021). Effect of postpartum depression on exclusive breast-feeding practices in sub-Saharan Africa countries: a systematic review and meta-analysis. *BMC Pregnancy and Childbirth, 21*(1), 113. https://doi.org/10.1186/s12884-020-03535-1

Zheng, J., Sun, K., Aili, S., Yang, X., Gao, L. (2022). Predictors of postpartum depression among Chinese mothers and fathers in the early postnatal period: A cross-sectional study. *Midwifery, 105*, 103233. https://doi.org/10.1016/j

DERLEME / REVIEW
Balıkesir Sağlık Bilimleri Dergisi / BAUN Sağ Bil Derg
Balıkesir Health Sciences Journal / BAUN Health Sci J
ISSN: 2146-9601- e ISSN: 2147-2238
Doi: https://doi.org/10.53424/balikesirsbd.1380804

Telerehabilitation in Orthopedic Injuries Common in Athletes

Dilan DEMİRTAS KARAOBA [1], Busra CANDIRI [1], Burcu TALU [1]

[1] Inonu University, Faculty of Health Sciences, Physiotherapy and Rehabilitation Department

Geliş Tarihi / Received: *26.10.2023,* ***Kabul Tarihi / Accepted:*** *06.05.2024*

ABSTRACT

Sports injuries are frequently seen and this causes significant cost increase. Rehabilitation approaches have an important place in the treatment of sports injuries. Various rehabilitation methods have been applied to the athletes. Increasing technological developments today have also found a place in the field of rehabilitation. Increasing technology enables remote rehabilitation and increases participation in rehabilitation. Technology-based rehabilitation methods such as telerehabilitation have been applied in various populations, but studies on the use of telerehabilitation in athletes are very limited. Therefore, in this review, we aimed to summarize the literature on the telerehabilitation approach in orthopedic injuries with a high incidence in athletes.

Keywords: Sports, Athletic Injuries, Rehabilitation, Telerehabilitation.

Sporcularda Sık Görülen Ortopedik Yaralanmalarda Telerehabilitasyon

ÖZ

Spor yaralanmaları sıklıkla görülmekte ve bu durum ciddi maliyet artışlarına neden olmaktadır. Spor yaralanmalarının tedavisinde rehabilitasyon yaklaşımları önemli bir yere sahiptir. Sporculara çeşitli rehabilitasyon yöntemleri uygulanmıştır. Günümüzde artan teknolojik gelişmeler rehabilitasyon alanında da kendine yer bulmuştur. Artan teknoloji uzaktan rehabilitasyona olanak sağlamakta ve rehabilitasyona katılımı artırmaktadır. Telerehabilitasyon gibi teknolojiye dayalı rehabilitasyon yöntemleri çeşitli popülasyonlarda uygulanmıştır ancak telerehabilitasyonun sporcularda kullanımına ilişkin çalışmalar oldukça sınırlıdır. Bu nedenle bu derlemede sporcularda görülme sıklığı yüksek olan ortopedik yaralanmalarda telerehabilitasyon yaklaşımına ilişkin literatürü özetlemeyi amaçladık.

Anahtar Kelimeler: Spor, Atletik Yaralanmalar, Rehabilitasyon, Telerehabilitasyon.

Sorumlu Yazar / Corresponding Author: Busra CANDIRI, Inonu University, Faculty of Health Sciences, Physiotherapy and Rehabilitation Department, Malatya, Türkiye
E-mail: busracandiri@gmail.com

Bu makaleye atıf yapmak için / Cite this article: Demirtas Karaoba, D., Candırı, B., & Talu, B (2024). Telerehabilitation in orthopedic injuries common in athletes. *BAUN Health Sci J, 13*(2), 473-481. https://doi.org/10.53424/balikesirsbd.1380804

INTRODUCTION

Participation in sports is a preventive health strategy that plays an important role against obesity and comorbidities (Tuakli-Wosornu et al., 2018). Despite the protective aspect of sports, it is an important paradox that it causes an increase in the risk of injury (Bahr & Holme, 2003). In addition, despite the positive effect on health costs, thanks to the increased level of physical activity due to sports activities, there is an increase in costs with the increase in injuries (Carlson, Fulton, Pratt, Yang, & Adams, 2015; Ryan, Pracht, & Orban, 2019). Sports-specific musculoskeletal injuries negatively affect sports performance and participation in competitions and cause negative results in terms of career. In a study examining 33 sports branches included in the 2020 Tokyo Olympics, it had been reported that especially muscle and tendon strains and ligament sprains are the most common musculoskeletal injuries. The highest incidence of injury had been seen in athletics, football and karate (Gimigliano et al., 2021). In a recent study, it has been stated that amateur and professional adolescent athletes were most frequently injured due to football. Pathologically, it was recorded that lumbar muscle strains, ankle sprains and fractures were the most common, and regionally, knee, shoulder and ankle injuries were the most common (Prieto-González et al., 2021). Sprains and strains are also common injuries for disabled athletes. In addition, upper extremity injuries are more common in disabled athletes than lower extremity injuries (Tuakli-Wosornu et al., 2018). While age and gender are unchangeable risk factors for sports injuries, strength, flexibility, balance, lack of warm-up exercises, inadequacy of sports facilities and lack of trainers are other factors (Bahr & Holme, 2003; Prieto-González et al., 2021). Rehabilitation approaches after injuries are based on a complex structure. It includes mechanical stimuli such as massage, warming agents, hydrotherapy, electrotherapy and functional activities (Hoffmann & Making, 2020). However, telerehabilitation using technology has come to the fore for the continuation of rehabilitation in sports injuries, especially during the pandemic period. It has been shown that telerehabilitation performed by physiotherapists during the pandemic period causes athletes to be psychologically well (Speranza, Bolzan, Roi, & Vitali, 2021). As an important advantage of telerehabilitation, it has been reported that it causes a 29% reduction in costs compared to traditional rehabilitation (Pastora-Bernal, Martín-Valero, & Barón-López, 2018). However, since telerehabilitation is developing, studies in the literature specific to athletes are scarce as far as we know. Therefore, this review, it is aimed to summarize the results of the telerehabilitation method in musculoskeletal injuries that can be seen in athletes and to pave the way for the literature in terms of the use of telerehabilitation in sports-related rehabilitation programs.

Telerehabilitation

Telerehabilitation, which is a sub-branch of telehealth, is defined as rehabilitation services offered within the framework of certain protocols to facilitate access to rehabilitation services and improve the level of independence of patients through information and communication technologies (Gregory, Alexander, & Satinsky, 2011). It refers to the services provided by rehabilitation specialists including physiotherapists, occupational therapists, language and speech therapists (Wakeford, Wittman, White, & Schmeler, 2005). Telerehabilitation has several advantages and disadvantages. Telerehabilitation, which facilitates rapid access to rehabilitation services in geographically distant communities and in disabled patients, allows information exchange between caregivers and health personnel. The advantages of telerehabilitation can be counted as saving time and resources, reaching more patients, continuation of rehabilitation under pandemic conditions, and reducing the length of hospitalization and hospital stay (CEYLAN; Seron et al., 2021).

Various physiotherapy applications require manual techniques and equipment. Since this cannot be achieved through telerehabilitation, the therapeutic effect of the treatment is reduced, which is one of its major disadvantages. In addition, technical errors, internet infrastructure problems, and difficulties in ensuring patient privacy are other disadvantages of telerehabilitation applications (Richmond et al., 2017; Russell, 2009).

Telerehabilitation methods

Telerehabilitation applications are delivered remotely, synchronously and asynchronously, through image-based video conferencing systems, sensor technologies, and augmented virtual reality systems with or without patient feedback (Russell, 2007).

Image-based telerehabilitation applications are sent to patients with exercise protocols, video format, or are carried out by video conferencing method (Kemp, Coburn, Jones, & Crossley, 2018). It has been shown in the literature that image-based telerehabilitation applications can be used in patient follow-up and that it is the most effective method used by physiotherapists during treatments (Russell, 2007). In addition, it has been shown that preparing exercise videos with the wrong method rather than just preparing exercise videos with the right method is as effective as individual teaching in information communication (Berkoff et al., 2016). In a study, it was shown that video-based intervention is less costly and more effective than face-to-face intervention (Park & Song, 2017).

Sensor-based technologies are based on collecting motion data with sensors such as gyroscopes and accelerometers. Vital functions such as blood oxygen content, blood pressure and electrocardiogram can

also be monitored through sensors (Peretti, Amenta, Tayebati, Nittari, & Mahdi, 2017). In a study, a rehabilitation system that is compatible with smartphones with gyroscope, accelerometer and magnetic field sensors, allowing patients to exercise remotely, was mentioned (Ongvisatepaiboon, Chan, & Vanijja, 2015).

Virtual reality-based telerehabilitation applications are applied through virtual environments created by the computer in three dimensions so that the patient can perform the desired movements and create appropriate motor responses. Virtual frames can be provided with computer screens, virtual reality glasses and haptic feedback devices (Holden, 2005) (Table 1).

Table 1. Telerehabilitation methods.

Telerehabilitation Methods - Image based telerehabilitation applications - Sensor-based technologies - Virtual reality based telerehabilitation applications	
Upper Extremity Injuries and Telerehabilitation - Rotator Cuff Pathologies - Fractures - Elbow Pathologies (Lateral epicondylitis etc) - Hand and Finger Injuries (fracture, contusion and sprain etc)	**Lower Extremity Injuries and Telerehabilitation** - Anterior Cruciate Ligament Injuries - Meniscus Injuries - Achilles Pathologies - Patellofemoral Pain Syndrome - Ankle Disorders (fracture and sprain etc)

Upper extremity injuries and telerehabilitation

Upper extremity injuries are common in sports such as tennis, volleyball and handball. Especially shoulder injuries have a higher frequency among all sports injuries. Rotator cuff injuries, impingement syndrome, scapular dyskinesia, instabilities, joint and tendon injuries, and elbow tendinopathies are among the most common pathologies (da Silva, 2010).

Telerehabilitation in rotator cuff pathologies

Rotator cuff injuries are an important problem that causes pain and loss of function affecting sports performance in almost all sports branches. Treatment of rotator cuff pathologies is divided into conservative or surgical (Weiss, Wang, Hendel, Buzzerio, & Rodeo, 2018). However, research on the effects of telerehabilitation is limited. One study has examined the benefits of telerehabilitation on pain and functionality in patients with partial tears in one of the supraspinatus, infraspinatus, and subscapularis muscles. The first part of the platform, which has 2 parts, consisted of videos with exercise applications and the other part consisted of informative videos about care. Significant improvement in pain and functional measures was demonstrated after 6 months of treatment (Macías-Hernández et al., 2016). In another study, the feasibility of the telerehabilitation method was investigated with an internet-based and 3-arm pilot study method in patients with shoulder pain due to rotator cuff pathology. While one of the groups received information training only about the rotator cuff muscles and risks, the other group received exercise training in addition to the information. In addition to information and exercise training, the last group received telerehabilitation with a video conference method once a week under the control of a physiotherapist. As a result, higher compliance has been observed in the telerehabilitation group compared to the other groups (Malliaras et al., 2020). In the study conducted by Greiner et al., the effects of combining strengthening and stabilization training with the telehealth method after rotator cuff and labrum repair surgery were investigated. The method included remote monitoring of the exercise program given for the acute period after surgery by specialists. As a result, a significant decrease in the pain and stiffness of the patients and high satisfaction with the treatment were reported. (Greiner et al., 2022).

Upper extremity fractures and telerehabilitation

It has been reported that shoulder and elbow fractures are very common, especially in athletes engaged in upper-extremity sports (Burnier, Barlow, & Sanchez-Sotelo, 2019). In a study, the effect of telerehabilitation after surgical treatment of elbow fracture was investigated. While the experimental group received 1-2 sessions of face-to-face rehabilitation and 1-2 sessions of home telerehabilitation per week, the control group has been received 3-4 sessions of face-to-face rehabilitation per week. The telerehabilitation method consisted of a game to perform the flexion/extension movement by using the feedback system with the help

of electro-optical sensors. It was observed that there has no difference between the groups in terms of joint range of motion and hand functions after the treatment, and there was a significant improvement in both groups. The satisfaction of the telerehabilitation group was better than the control group (Mayer, Portnoy, Palti, & Levanon, 2021). In another study, the effect of traditional rehabilitation and telerehabilitation after distal radius fracture were compared. After the treatments, both treatments have been shown significant improvement in terms of functionality, range of motion, quality of life and pain. In addition, no significant difference has been observed between the groups (Pech-Argüelles et al., 2023).

Elbow pathologies

The increase in overhead movements causes an increase in elbow injuries. Lateral epicondylitis pathology is frequently seen in those involved in upper extremity sports (Field & Savoie, 1998). İnal et al. have integrated joint preservation techniques into the telerehabilitation system for patients with lateral epicondylitis in their study. One of the groups took only home-based protection and ergonomics approaches. In addition, the other group received support for telephone-assisted remote ergonomic protection. As a result of the study, significant improvements in pain and function have been recorded in the group that received additional telerehabilitation support compared to the other group. In addition, in this study, it was shown that the knowledge of the patients on joint protection techniques improved significantly (İnal & Tunçer, 2022). In a study on elbow tendinopathies, exercise, cognitive behavioral therapy and education have been combined with telerehabilitation. Thanks to the motion sensitivity of the sensors placed on the chest, arms and forearms of the patients, feedback has been provided to the patients in the form of audio-video cues via remote monitoring. In the results of the study reported a decrease in pain, disability and use of painkillers. In addition, patients' thoughts of having surgery have also decreased significantly (Janela et al., 2022).

Hand and finger injuries

Traumatic injuries such as hand fracture, contusion and sprain are common in almost all sports (Rettig, 1998). In a multicenter study, the effect of the digital rehabilitation method on traumatic injuries of the hand and finger has been investigated. One of the groups have been received a home exercise program based on telerehabilitation with the help of a touch tablet application, and the other group received a home exercise program given on paper. In addition, standard face-to-face rehabilitation has been applied to both groups. The telerehabilitation group has been shown a greater reduction in pain, function, and grip strength measurements compared to the other group. In addition, it has been reported that the participants' need for face-to-face physiotherapy was significantly less than the control group (Suero-Pineda et al., 2023b) . In a study involving a large population of painful wrist conditions, a completely remote system has been designed that provides feedback to the patient, thanks to motion and camera-based sensors. Basically, the patient population consisted largely of cases of carpal tunnel syndrome, tenosynovitis, tendinopathy, chronic non-specific wrist pain, osteoarthritis, sprains, and fractures. As a result, a significant improvement has been demonstrated in parameters related to pain, function, fear avoidance behaviors, analgesic use, and mental health compared to pre-treatment (Costa et al., 2022). After traumatic injuries to the bone and soft tissue of the hand, a mobile application was used that allows exercising on a mobile application-based platform. The app looked like a game with finger specific exercises. The control group has been received only a traditional home program. In addition to the improvement in functionality in the experimental group compared to the control group, there has been also a significant decrease in face-to-face rehabilitation sessions and consultations (Suero-Pineda et al., 2023a).

Lower extremity injuries and telerehabilitation

Lower extremity injury is common in the athletic population and the knee is the most commonly injured joint. In addition, patella-femoral pain has been reported as the most common application in sports-specific physiotherapy applications (Taunton et al., 2002). Höher et al. investigated the effectiveness of a sensor-based telerehabilitation system after knee surgery. Participants received telerehabilitation at home with the Orthelligent rehabilitation system. This system consists of instructions for exercises and functional tests, an inertial motion sensor and software to be downloaded to smartphones. Ortheligent offers stage-specific exercises in the rehabilitation process for hip, knee and foot ailments. In the study, the sensor functions as an objective measurement tool and is attached to the lower part of the leg, just below the head of the tibia. It has been observed that the system used by 604 people can measure the correct values during the rehabilitation process. It has been observed that the patients who have the application in the home environment exercise more than the patients who only receive physiotherapy or exercise is recommended. Additionally, physiotherapists used sensor data and medical practice to decide what type of exercise a patient should do (Höher et al., 2023).

Anterior cruciate ligament injuries

In one study, patients were contacted through a web-based questionnaire in order to understand the opinions of patients who had undergone anterior cruciate ligament (ACL) surgery and rehabilitation regarding the use of telerehabilitation, and to explore their experiences and views on the acceptability of telerehabilitation. Of 96 patients, 74 (77%) reported that they were not at all familiar with telerehabilitation, approximately 25% perceived the

difficulties of using telerehabilitation at home and said that they preferred using telerehabilitation at different stages of care. Participants' priorities for the telerehabilitation intervention included its use as an adjunct to physical therapy rather than as a replacement, with content available for each phase of care, particularly return to sports. In addition, the participants emphasized that the intervention should be personalized for them (Dunphy & Gardner, 2020). A recent study investigated the effect of a home-based rehabilitative knee brace system on functional outcomes in postoperative rehabilitation after ACL reconstruction. In the study, in which 15 patients were followed for 6 months, KNEESUP Compact consisted of home-based rehabilitation, knee brace with motion tracking, the 'KNEESUP Care' mobile application containing an individualized rehabilitation program and a web portal. Feedback about the rehabilitation status of the patients, the completion of their daily programs and their health status were stored and followed on the web server over the internet. The results showed that with a home-based rehabilitative knee brace system after ACL reconstruction, patients were able to maintain knee muscle strength and achieve similar or better knee range of motion six months post-surgery (Hong et al., 2022). In the study conducted to evaluate the acceptability of rehabilitation after ACL reconstruction, participants were asked to use TRACK with face-to-face physical therapy for 16 weeks. The results showed that the use of TRACK in addition to face-to-face physiotherapy is an acceptable modality for ACL rehabilitation (Dunphy, Hamilton, Spasić, & Button, 2017). TRACK has provided a web-based platform for personalized exercise programs that includes videos, detailed instructions and progress logs for individual exercises, a health information section, and a contact option that allows the patient to email a physical therapist for additional support (Dunphy et al., 2017). Dinvar et al. used the Kinect for Windows sensor (MS Kinect) to measure the accuracy of the exercises to be done for ACL injury to provide convenience to patients who could not go to physical therapy centers. It has been reported that patients whose images were taken with the MS Kinect can correctly perform the prescribed physical therapy exercises (Dinvar, Çubukcu, & Yüzgeç, 2017). Stride length asymmetry associated with reduced speed and walking ability occurs in patients with anterior cruciate ligament reconstruction (Hadizadeh, Amri, Roohi, & Mohafez, 2016). A gait training system with real-time auditory biofeedback has been developed for telerehabilitation in patients with walking difficulties. This system consists of walking aid with electronic device and a shoe section with 5 mm infrared LEDs. It provided auditory feedback to the patient during walking by providing evaluation through the infrared camera and microcontroller, and was transmitted to the physiotherapists remotely. It has been shown that this system can be useful to provide cost-effective and easy-to-use gait training for home rehabilitation in the absence of therapists but under their remote supervision (Wisitwekin, Pongmala, Suputtitada, & Somboon, 2017).

Meniscus injuries

A study comparing conventional and home-based virtual rehabilitation after surgical repair of medial meniscus root tears included 43 patients. Home self-rehabilitation included training patients to perform straight leg raises, range of motion, and patellar mobilization exercises. After discharge, the physiotherapist helped ensure that instructions were followed with virtual training and virtual follow-up. Virtual postoperative follow-ups were scheduled weekly until week 6 or until 90' flexion and full weight bearing were achieved. Results showed that rehabilitation at home after meniscus root repair improved patients' function at two-year follow-up, but the improvement was less (Tahami et al., 2022). In a randomized controlled study to compare the effectiveness of tele-rehabilitation and face-to-face rehabilitation on functional outcomes after arthroscopic meniscectomy, function and pain score were evaluated at baseline, postoperative 3rd, 6th, and 12th month time points. There was no significant difference between the two groups in the results up to 6 months (Hurley et al., 2022). In another study that compared the effects of telerehabilitation and face-to-face rehabilitation on functional outcomes and satisfaction after arthroscopic meniscectomy, IKDC scores and satisfaction measures were collected at baseline and at 3 months postoperatively. It has been shown that there is no difference compared to traditional face-to-face rehabilitation in terms of functional outcomes up to 3 months, but patient satisfaction is less in the telerehabilitation group (Mojica et al., 2023).

Achilles pathologies

A telerehabilitation protocol was developed to monitor the participants on a weekly basis in a pilot study to investigate the effectiveness of different load intensities and calf loading protocols under tension in Achilles tendinopathy rehabilitation. Exercises were supervised by a physiotherapist for 12 weeks using zoom via a video conference session. The positive effects of the method have been reported in terms of providing real-time feedback by the physiotherapist (Hasani, Haines, Munteanu, Vicenzino, & Malliaras, 2020). Calf exercises, which are important for Achilles tendinopathy and ruptures, are given, but how accurately they are performed is not followed. In a study to evaluate the suitability of calf exercise via videoconferencing, it has been shown that this method can be used to assist in the evaluation and management of people with Achilles Tendinopathy (Whale et al., 2023). In a study comparing the effectiveness of face-to-face physiotherapy, telehealth and hybrid rehabilitation for movement-related pain in individuals with chronic Achilles

tendinopathy, clinically significant reductions in movement-related pain from baseline to 8 weeks were observed in all 3 groups. No lower pain outcomes were seen in tendon loading training delivered via Hybrid and Telehealth (A. A. Post et al., 2023). In another study, the effect of telehealth on pain, function and psychological outcomes in Achilles tendinopathy during the COVID-19 pandemic was investigated. 66 participants were divided into groups for 8 weeks to receive face-to-face physiotherapy, telehealth, and both. At the end of 8 weeks, no significant difference was found between the 3 groups in terms of any evaluation parameter (A. Post et al., 2022).

Patellofemoral pain syndrome

In a recent study, 61 patients with patellofemoral pain syndrome (PFPS) were divided into 2 groups to compare muscle strength, muscle activation time, and self-reported results between telerehabilitation and supervised rehabilitation. While the supervised rehabilitation group went to the hospital and did the exercises in the presence of a physiotherapist, the tele-rehabilitation group was given training about the exercise program once, and a brochure with pictures and videos of the exercise program was distributed. The physiotherapist followed the telerehabilitation training three times a week through text messages and phone calls or, if necessary, video calls, for exercise progress, maintaining daily activities. It was shown that there was no significant difference between the groups in terms of muscle strength, muscle activation time, or patient-reported results of involved knees, and the rates of change. These results imply that telerehabilitation may be as effective as supervised rehabilitation in improving functional outcomes in female patients with PFPS (Lee, Shin, Lee, Son, & Jang, 2023). Another study compared the effectiveness of a supervised online group exercise program and a home program on symptoms associated with patellofemoral pain syndrome. It was found that participation in the online supervised exercise group caused a greater reduction in pain and fear of movement during activity and a greater increase in the quality of life mental health sub-dimension compared to the home exercise group (Arslan & Gültekin, 2023). Using patient-reported results, Albornoz Cabello et al compared the effect of tele-rehabilitation managed by physical therapists and the use of informative exercise brochures in patients with PFAS. It has been shown that the improvement in pain severity was higher in the telerehabilitation group managed by physiotherapists compared to the informative brochure group (Albornoz-Cabello et al., 2021). A study protocol was prepared to evaluate the effectiveness of exercise therapy combined with self-myofascial release (SMFR) techniques on pain, function and balance through telerehabilitation in patients with PFPS. Patients in the experimental group (SMFR+exercise) received weekly videos via WhatsApp, Telegram or other social platforms. Then, the physiotherapist made a video call with the participant to evaluate whether the exercises were done correctly. These individuals were asked to perform hip and knee exercises three times a week and SMFR exercises on two of the three days. Participants in the Control Group (Exercise Therapy) will receive only a therapeutic exercise program through telerehabilitation, similar to the experimental group. The results of the study were thought to provide evidence of its effectiveness on pain, function and balance in patients with PFPS through telerehabilitation (Hariri, Abolahrari-Shirazi, & Abbasi).

Ankle disorders

It has been shown that Tele-Wobble can offer effective and cost-effective rehabilitation at home for patients with ankle disorders. Tele-Wobble offers fun training for rehabilitation and provides the clinician with the ability to remotely monitor a patient's progress by examining some key performance parameters captured during training. Includes hardware and software elements that are simple to install in a home environment suitable for use by people of all ages (Karime, Al-Osman, Alja'am, Gueaieb, & El Saddik, 2012). Rutgers Ankle Rehabilitation System (RARS) has been used in individuals with ankle sprains or fractures (Deutsch, Latonio, Burdea, & Boian, 2001; Girone, Burdea, Bouzit, Popescu, & Deutsch, 2000). RARS consists of local hardware and software components as well as a remote monitoring subsystem. There is a small parallel kinematic robot where the patient places his foot. Remote monitoring is via computer. Designed for use while sitting for individuals with lower extremity dysfunction that impairs functional mobility (Whitworth et al., 2003). The potential of the telerehabilitation-mediated robot was investigated by wearing an ankle robot at home. In this telerehabilitation system, the software consists of three components: the patient-related database, the user interface, and a virtual reality-based exercise library developed especially for ankle rehabilitation (Jamwal, Hussain, Mir-Nasiri, Ghayesh, & Xie, 2018). A foot-attached physical interface was developed in another telerehabilitation-based study that allows cost-effective home rehabilitation for ankle rehabilitation. The physical interface was connected to the computer via Bluetooth connection and provided feedback to the patient while performing dorsiflexion, plantarflexion, eversion and inversion exercises. The application showed the movement, time, repetitions and goals to be achieved in that session so that the user can see his performance. The obtained values were averaged and stored in the database, allowing the physiotherapist to compare and give feedback. The results have shown that it provides better service by providing feedback on the angular position of the foot during rehabilitation (Gómez-Espinosa, Espinosa-Castillo,

& Valdés-Aguirre, 2018). Correia et al presented the results of a completely remote and digitally guided rehabilitation program for acute ankle sprains. The exercise sessions were performed at home by the patient using the biofeedback device provided by SWORD Health. Clinically significant improvements in pain and function outcomes have been achieved (Correia et al., 2021).

CONCLUSION

Telerehabilitation is a rehabilitation practice that has become more popular, especially after the pandemic. Although it is inexpensive and useful, telerehabilitation has been shown to have limited application in orthopedic injuries occurring in athletes. As a result of the literature research, positive effects have been shown in the upper extremity, especially in cases of rotator cuff injuries, fractures, elbow pathologies such as lateral epicondylitis, fractures of the hands and fingers, sprains and contusions. In the lower extremity, beneficial effects of telerehabilitation have been reported in the anterior cruciate ligament, meniscus and achilles tendon injuries, patellofemoral pain syndrome and ankle sprain pathologies.

Acknowledgement
None.

Conflict of Interest
The author declare no potential conflicts of interest with respect to the research, authorship and/or publication of this article.

Author Contributions
Plan, design: DDK, BC, BT; **Material, methods and data collection:** DDK, BC; **Data analysis and comments:** DDK, BC, BT; **Writing and corrections:** DDK, BC, BT.

Funding
None

REFERENCES

Albornoz-Cabello, M., Barrios-Quinta, C. J., Barrios-Quinta, A. M., Escobio-Prieto, I., Cardero-Durán, M. d. l. A., & Espejo-Antunez, L. (2021). Effectiveness of tele-prescription of therapeutic physical exercise in patellofemoral pain syndrome during the COVID-19 pandemic. *International Journal of Environmental Research and Public Health, 18*(3), 1048.

Arslan, T., & Gültekin, M. Z. (2023). The effect of a supervised online group exercise program on symptoms associated with patellofemoral pain syndrome in women. *Technol Health Care, 31*(2), 771-782. doi:10.3233/thc-220533

Bahr, R., & Holme, I. (2003). Risk factors for sports injuries a methodological approach. *British Journal of Sports Medicine, 37*(5), 384. doi:10.1136/bjsm.37.5.384

Berkoff, D. J., Krishnamurthy, K., Hopp, J., Stanley, L., Spores, K., & Braunreiter, D. (2016). Corrected error video versus a physical therapist instructed home exercise program: accuracy of performing therapeutic shoulder exercises. *International Journal of Sports Physical Therapy, 11*(5), 757.

Burnier, M., Barlow, J. D., & Sanchez-Sotelo, J. (2019). Shoulder and Elbow Fractures in Athletes. *Curr Rev Musculoskelet Med, 12*(1), 13-23. doi:10.1007/s12178-019-09530-0

Carlson, S. A., Fulton, J. E., Pratt, M., Yang, Z., & Adams, E. K. (2015). Inadequate physical activity and health care expenditures in the United States. Prog *Cardiovasc Dis, 57*(4), 315-323. doi:10.1016/j.pcad.2014.08.002

CEYLAN, A. COVID-19 Süreci ve Fizyoterapide Telerehabilitasyon Uygulamaları: Derleme. *Adnan Menderes Üniversitesi Sağlık Bilimleri Fakültesi Dergisi, 5*(3), 617-627.

Correia, F. D., Molinos, M., Neves, C., Janela, D., Carvalho, D., Luis, S., . . . Bento, V. (2021). Digital rehabilitation for acute ankle sprains: prospective longitudinal cohort study. *JMIR rehabilitation and assistive technologies, 8*(3), e31247.

Costa, F., Janela, D., Molinos, M., Moulder, R. G., Lains, J., Francisco, G. E., . . . Correia, F. D. (2022). Digital rehabilitation for hand and wrist pain: a single-arm prospective longitudinal cohort study. *Pain Rep, 7*(5), e1026. doi:10.1097/pr9.0000000000001026

da Silva, R. T. (2010). Sports injurıes of the upper limbs. *Rev Bras Ortop, 45*(2), 122-131. doi:10.1016/s2255-4971(15)30280-9

Deutsch, J. E., Latonio, J., Burdea, G., & Boian, R. (2001). Rehabilitation of musculoskeletal injuries using the Rutgers ankle haptic interface: three case reports. Paper presented at the proceedings of EuroHaptics.

Dinvar, Y., Çubukcu, B., & Yüzgeç, U. (2017). MS kinect based tracking application for knee anterior cruciate ligament physical therapy. Paper presented at the 2017 International Conference on Computer Science and Engineering (UBMK).

Dunphy, E., & Gardner, E. C. (2020). Telerehabilitation to Address the Rehabilitation Gap in Anterior Cruciate Ligament Care: Survey of Patients. *JMIR Form Res, 4*(9), e19296. doi:10.2196/19296

Dunphy, E., Hamilton, F. L., Spasić, I., & Button, K. (2017). Acceptability of a digital health intervention alongside physiotherapy to support patients following anterior cruciate ligament reconstruction. *BMC Musculoskelet Disord, 18*(1), 471. doi:10.1186/s12891-017-1846-0

Field, L. D., & Savoie, F. H. (1998). Common Elbow Injuries in Sport. *Sports Medicine, 26*(3), 193-205. doi:10.2165/00007256-199826030-00005

Gimigliano, F., Resmini, G., Moretti, A., Aulicino, M., Gargiulo, F., Gimigliano, A., . . . Iolascon, G. (2021). Epidemiology of Musculoskeletal Injuries in Adult Athletes: A Scoping Review. *Medicina (Kaunas), 57*(10). doi:10.3390/medicina57101118

Girone, M., Burdea, G., Bouzit, M., Popescu, V., & Deutsch, J. (2000). Orthopedic rehabilitation using the "Rutgers ankle" interface. Paper

presented at the Medicine Meets Virtual Reality 2000.

Gómez-Espinosa, A., Espinosa-Castillo, N., & Valdés-Aguirre, B. (2018). Foot-mounted inertial measurement units-based device for ankle rehabilitation. *Applied Sciences, 8*(11), 2032.

Gregory, P., Alexander, J., & Satinsky, J. (2011). Clinical telerehabilitation: applications for physiatrists. PM&R, 3(7), 647-656.

Greiner, J. J., Drain, N. P., Lesniak, B. P., Lin, A., Musahl, V., Irrgang, J. J., & Popchak, A. J. (2022). Self-Reported Outcomes in Early Postoperative Management After Shoulder Surgery Using a Home-Based Strengthening and Stabilization System With *Telehealth*. *Sports Health*, 19417381221116319. doi:10.1177/19417381221116319

Hadizadeh, M., Amri, S., Roohi, S., & Mohafez, H. (2016). Assessment of gait symmetry improvements in national athletes after anterior cruciate ligament reconstruction during rehabilitation. *International journal of sports medicine, 37*(12), 997-1002.

Hariri, S. A., Abolahrari-Shirazi, S., & Abbasi, L. (2023). Effects of Exercise Therapy Plus Quadriceps, Gluteus Medius and Quadratus Lumborum Muscles Self-myofascial Release on Pain, Function, and Balance in Patients with Patellofemoral Pain Syndrome through Telerehabilitation: A Study Protocol for a Randomized Clinical Trial. *Journal of Rehabilitation Sciences & Research*, *10(*2), 93-99. doi: 10.30476/jrsr.2023.98264.1355

Hasani, F., Haines, T. P., Munteanu, S. E., Vicenzino, B., & Malliaras, P. (2020). Efficacy of different load intensity and time-under-tension calf loading protocols for Achilles tendinopathy (the LOADIT trial): protocol for a randomised pilot study. *Pilot Feasibility Stud, 6*, 99. doi:10.1186/s40814-020-00639-5

Hoffmann, H. (2020). Rehabilitation of Sports Injuries. In Injury and Health Risk Management in Sports: A Guide to Decision Making (pp. 81-90). Berlin, Heidelberg: Springer Berlin Heidelberg.Holden,

Hong, C. K., Liu, Z. W., Hsu, K. L., Kuan, F. C., Yang, J. F., & Su, W. R. (2022). A novel home-based rehabilitative knee brace system is a viable option for postoperative rehabilitation after anterior cruciate ligament reconstruction: a report of 15 cases. *J Exp Orthop, 9*(1), 96. doi:10.1186/s40634-022-00538-z

Höher, J., Lischke, B., Petersen, W., Mengis, N., Niederer, D., Stein, T., . . . Schmidt-Lucke, C. (2023). Sensor-based telerehabilitation system increases patient adherence after knee surgery. *PLOS Digital Health, 2*(2), e0000175.

Hurley, E., Vasavada, K., Lin, C., Gonzalez-Lomas, G., Alaia, M., Strauss, E., . . . Mojica, E. (2022). Poster 236: There is No Difference in Early Functional Outcomes for Patients Undergoing Tele-Rehabilitation versus Standard in Office Rehab after Arthroscopic Meniscectomy: A Randomized Controlled Trial. Orthopaedic *Journal of Sports Medicine, 10*(7_suppl5), 2325967121S2325900797.

İnal, Ö., & Tunçer, B. (2022). Telephone-based joint protection education in lateral epicondylitis: A randomized controlled trial. *Work, 72*, 1421-1428. doi:10.3233/WOR-211002

Jamwal, P. K., Hussain, S., Mir-Nasiri, N., Ghayesh, M. H., & Xie, S. Q. (2018). Tele-rehabilitation using in-house wearable ankle rehabilitation robot. *Assistive Technology, 30*(1), 24-33.

Janela, D., Costa, F., Molinos, M., Moulder, R. G., Lains, J., Bento, V., . . . Correia, F. D. (2022). Digital Rehabilitation for Elbow Pain Musculoskeletal Conditions: A Prospective Longitudinal Cohort Study. *International Journal of Environmental Research and Public Health, 19*(15). doi:10.3390/ijerph19159198

Karime, A., Al-Osman, H., Alja'am, J. M., Gueaieb, W., & El Saddik, A. (2012). Tele-Wobble: A telerehabilitation wobble board for lower extremity therapy. *IEEE Transactions on Instrumentation and Measurement, 61*(7), 1816-1824.

Kemp, J. L., Coburn, S. L., Jones, D. M., & Crossley, K. M. (2018). The physiotherapy for femoroacetabular impingement rehabilitation study (physioFIRST): a pilot randomized controlled trial. *journal of Orthopaedic & Sports Physical Therapy, 48*(4), 307-315.

Lee, J. H., Shin, K. H., Lee, G. B., Son, S., & Jang, K. M. (2023). Comparison of Functional Outcomes between Supervised Rehabilitation and Telerehabilitation in Female Patients with Patellofemoral Pain Syndrome during the COVID-19 Pandemic. *Int J Environ Res Public Health, 20*(3). doi:10.3390/ijerph20032233

Macías-Hernández, S. I., Vásquez-Sotelo, D. S., Ferruzca-Navarro, M. V., Badillo Sánchez, S. H., Gutiérrez-Martínez, J., Núñez-Gaona, M. A., . . . Morones-Alba, J. D. (2016). Proposal and Evaluation of a Telerehabilitation Platform Designed for Patients With Partial Rotator Cuff Tears: A Preliminary Study. *Ann Rehabil Med, 40*(4), 710-717. doi:10.5535/arm.2016.40.4.710

Malliaras, P., Cridland, K., Hopmans, R., Ashton, S., Littlewood, C., Page, R., . . . Haines, T. (2020). Internet and Telerehabilitation-Delivered Management of Rotator Cuff-Related Shoulder Pain (INTEL Trial): Randomized Controlled Pilot and Feasibility Trial. *JMIR Mhealth Uhealth, 8*(11), e24311. doi:10.2196/24311

Mayer, N., Portnoy, S., Palti, R., & Levanon, Y. (2021). The Efficacy of Tele-Rehabilitation Program for Improving Upper Limb Function among Adults Following Elbow Fractures: A Pilot Study. *Applied Sciences, 11*(4). doi:10.3390/app11041708

Mojica, E. S., Vasavada, K., Hurley, E. T., Lin, C. C., Buzin, S., Gonzalez-Lomas, G., . . . Campbell, K. A. (2023). Despite Equivalent Clinical Outcomes, Patients Report Less Satisfaction With Telerehabilitation Versus Standard In-Office Rehabilitation After Arthroscopic Meniscectomy: A Randomized Controlled Trial. Arthroscopy, *Sports Medicine, and Rehabilitation, 5*(2), e395-e401.

Ongvisatepaiboon, K., Chan, J. H., & Vanijja, V. (2015). Smartphone-based tele-rehabilitation system for frozen shoulder using a machine learning approach. Paper presented at the 2015 IEEE

Symposium Series on Computational Intelligence.

Park, K. H., & Song, M. R. (2017). Development of a web exercise video for patients with shoulder problems. *Computers, Informatics, Nursing, 35*(5), 255.

Pastora-Bernal, J. M., Martín-Valero, R., & Barón-López, F. J. (2018). Cost analysis of telerehabilitation after arthroscopic subacromial decompression. *J Telemed Telecare, 24*(8), 553-559. doi:10.1177/1357633x17723367

Pech-Argüelles, R. C., Miranda-Ortiz, Y. J., Velázquez-Hernández, H. E., Domínguez-Cordero, R., Ruiz-PachecoJuan, C., Figueroa-García, J., & Rojano-Mejía, D. (2023). [Tele-rehabilitation program in patients with distal radius fracture: a controlled clinical trial].. doi:10.24875/ciru.22000328

Peretti, A., Amenta, F., Tayebati, S. K., Nittari, G., & Mahdi, S. S. (2017). Telerehabilitation: review of the state-of-the-art and areas of application. *JMIR Rehabilitation and Assistive Technologies, 4*(2), e7511.

Post, A., Rio, E. K., Sluka, K. A., Moseley, G. L., Bayman, E., Hall, M., . . . Dao, M. (2022). Effectiveness of Telehealth for Achilles Tendinopathy on Pain, Function, and Pain-Related Psychological Outcomes During COVID-19. *The Journal of Pain, 23*(5), 48.

Post, A. A., Rio, E. K., Sluka, K. A., Moseley, G. L., Bayman, E. O., Hall, M. M., . . . Chimenti, R. L. (2023). Efficacy of Telehealth for Movement-Evoked Pain in People With Chronic Achilles Tendinopathy: A Noninferiority Analysis. *Phys Ther, 103*(3). doi:10.1093/ptj/pzac171

Prieto-González, P., Martínez-Castillo, J. L., Fernández-Galván, L. M., Casado, A., Soporki, S., & Sánchez-Infante, J. (2021). Epidemiology of Sports-Related Injuries and Associated Risk Factors in Adolescent Athletes: An Injury Surveillance. *Int J Environ Res Public Health, 18*(9). doi:10.3390/ijerph18094857

Rettig, A. C. (1998). Epidemıology of Hand and Wrist Injurıes in Sports. *Clinics in Sports Medicine, 17*(3), 401-406. doi:https://doi.org/10.1016/S0278-5919(05)70092-2

Richmond, T., Peterson, C., Cason, J., Billings, M., Terrell, E. A., Lee, A. C. W., . . . Cohn, E. R. (2017). American Telemedicine Association's principles for delivering telerehabilitation services. *International Journal of Telerehabilitation, 9*(2), 63.

Russell, T. G. (2007). Physical rehabilitation using telemedicine. *Journal of Telemedicine and Telecare, 13*(5), 217-220.

Russell, T. G. (2009). Telerehabilitation: a coming of age. Australian Journal of Physiotherapy, 55(1), 5-6.

Ryan, J. L., Pracht, E. E., & Orban, B. L. (2019). Inpatient and emergency department costs from sports injuries among youth aged 5-18 years. *BMJ Open Sport Exercise Medicine 5*(1), e000491. doi:10.1136/bmjsem-2018-000491

Seron, P., Oliveros, M.-J., Gutierrez-Arias, R., Fuentes-Aspe, R., Torres-Castro, R. C., Merino-Osorio, C., . . . Solano, R. (2021). Effectiveness of telerehabilitation in physical therapy: a rapid overview. *Physical Therapy, 101*(6), pzab053.

Speranza, E., Bolzan, V., Roi, G. S., & Vitali, F. (2021). Impact of telerehabilitation after sports injuries on psychological outcomes during the Covid-19 pandemic. *Med. Dello Sport, 74*, 657-671.

Suero-Pineda, A., Oliva-Pascual-Vaca, Á., Durán, M. R.-P., Sánchez-Laulhé, P. R., García-Frasquet, M. Á., & Blanquero, J. (2023a). Effectiveness of a Telerehabilitation Evidence-Based Tablet App for Rehabilitation in Traumatic Bone and Soft Tissue Injuries of the Hand, Wrist, and Fingers. Archives of Physical *Medicine and Rehabilitation, 104*(6), 932-941. doi:10.1016/j.apmr.2023.01.016

Suero-Pineda, A., Oliva-Pascual-Vaca, Á., Durán, M. R.-P., Sánchez-Laulhé, P. R., García-Frasquet, M. Á., & Blanquero, J. (2023b). Effectiveness of a telerehabilitation tablet app in combination with face-to-face physiotherapy for people with wrist, hand or finger injuries: A pragmatic multicentre clinical trial. *Journal of Telemedicine and Telecare*, 1357633X231172245. doi:10.1177/1357633X231172245

Tahami, M., Vaziri, A. S., Tahmasebi, M. N., Ahmadi, M. A., Akbarzadeh, A., & Vosoughi, F. (2022). The functional impact of home-based self-rehabilitation following arthroscopic meniscus root repair. *BMC Musculoskelet Disord, 23*(1), 753. doi:10.1186/s12891-022-05662-6

Taunton, J. E., Ryan, M. B., Clement, D., McKenzie, D. C., Lloyd-Smith, D., & Zumbo, B. (2002). A retrospective case-control analysis of 2002 running injuries. *British Journal of Sports Medicine, 36*(2), 95-101.

Tuakli-Wosornu, Y. A., Mashkovskiy, E., Ottesen, T., Gentry, M., Jensen, D., & Webborn, N. (2018). Acute and Chronic Musculoskeletal Injury in Para Sport: A Critical Review. *Phys Med Rehabil Clin N Am, 29*(2), 205-243. doi:10.1016/j.pmr.2018.01.014

Wakeford, L., Wittman, P. P., White, M. W., & Schmeler, M. R. (2005). Telerehabilitation position paper. AJOT: *American Journal of Occupational Therapy, 59*(6), 656-661.

Weiss, L. J., Wang, D., Hendel, M., Buzzerio, P., & Rodeo, S. A. (2018). Management of Rotator Cuff Injuries in the Elite Athlete. *Curr Rev Musculoskelet Med, 11*(1), 102-112. doi:10.1007/s12178-018-9464-5

Whale, R., Hasani, F., Haines, T., Munteanu, S. E., Ellis, K., Patel, S., . . . Malliaras, P. (2023). Assessing calf exercise fidelity among people with Achilles tendinopathy using videos recorded via Zoom®: an observational study. *Disabil Rehabil*, 1-8. doi:10.1080/09638288.2023.2174604

Whitworth, E., Lewis, J. A., Boian, R., Tremaine, M., Burdea, G., & Deutsch, J. E. (2003). Formative evaluation of a virtual reality telerehabilitation system for the lower extremity. Paper presented at the Proceedings of the 2nd International Workshop on Virtual Rehabilitation (IWVR2003), Piscataway, NJ, USA.

Wisitwekin, A., Pongmala, C., Suputtitada, A., & Somboon, P. (2017). Development of gait training system with realtime auditory biofeedback for telerehabilitation. Paper presented at the 2017 International Electrical Engineering Congress.