# BALIKESİR SAĞLIK BİLİMLERİ DERGİSİ

## BALIKESIR HEALTH SCIENCES JOURNAL


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

CİLT VOLUME 13 SAYI ISSUE 1

NİSAN APRIL 2024

## EDİTÖR KURULU / EDITORIAL BOARD

---

**YAZIM EDİTÖRÜ / WRITING EDITOR**



---

---


## 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.1233393

# Plantar Pain, Balance and Foot Functions in Individuals with Diabetes Mellitus

Mehmet DURAY [1], Nilüfer ÇETİŞLİ KORKMAZ [2], Buse KILINÇ [3], Semin Melahat FENKÇİ [4]

[1] Suleyman Demirel University, Faculty of Health Sciences, Department of Physiotherapy and Rehabilitation
[2] Pamukkale University, Faculty of Physical Therapy and Rehabilitation
[3] University of Health Sciences, Gulhane Institute of Health Sciences
[4] Pamukkale University, Faculty of Medicine, Department of Endocrinology and Metabolism

***Geliş Tarihi / Received:*** *12.01.23* ***Kabul Tarihi / Accepted:*** *29.07.23*

**ABSTRACT**

**Aim:** The aim of this study was to investigate the relationship between plantar pain, balance and foot function in Diabetes Mellitus (DM) patients with obese and non-obese. **Material and Methods:** Fifty-four patients were diagnosed as DM were included. Participants were seperated as non-obese (n=27) and obese (n=27). The balance abilities (dynamic and static balance) of participants were examined with the Portable Computerized Kinesthetic Ability Trainer (SportKAT-550). Pain, disability and function status of foot were assessed according to Foot Function Index (FFI) and Manchester Foot Pain and Disability Index (MFPDI). **Results:** FFI-Disability and MFPDI scores of the Non-Obese Group were significantly better than Obese Group. While there were no significant correlation between BMI and MFPDI, FFI-Activity Limitation and FFI-Disability scores in both groups ($p>0.05$), there was medium and positive significant correlation just between BMI and FFI-Pain in Non-Obese Group ($p<0.05$). FFI-Pain scores showed a positive and medium/high relationship with MFPDI, FFI-Activity Limitation and FFI-Disability scores in both groups ($p<0.05$). **Conclusion:** The increased BMI in obese individuals with DM is possible reason of increased plantar pain, which seems to be the primary cause of dysfunction of the foot. BMI has a direct negative effect on sufficiency and disability and an indirect effect on activity limitation and reduced participation rate in individuals with DM.

**Keywords:** Balance, Body Mass Index, Diabetes Mellitus, Function, Plantar Pain.

# Diabetes Mellitus Tanılı Bireylerde Plantar Ağrı, Denge ve Ayak Fonksiyonu

**ÖZ**

**Amaç:** Bu çalışmanın amacı obez ve obez olmayan Diabetes Mellitus (DM) hastalarında plantar ağrı, denge ve ayak fonksiyonu arasındaki ilişkiyi araştırmaktır. **Gereç ve Yöntem:** Elli dört DM'li hasta çalışmaya dahil edildi. Katılımcılar obez olmayan (n=27) ve obez olanlar (n=27) olarak ayrıldı. Katılımcıların denge yetenekleri (dinamik ve statik denge) Portatif Bilgisayarlı Kinestetik Denge Cihazı (SportKAT-550) ile değerlendirildi. Ayağın ağrı, yetersizlik ve fonksiyon durumu Ayak Fonksiyon İndeksi (AFİ) ve Manchester Ayak Ağrısı ve Dizabilite İndeksi (MAADİ) ile değerlendirildi. **Bulgular:** Obez Olmayan Grubun AFİ-Engellilik ve MFPDI skorları Obez Gruba göre anlamlı derecede daha iyiydi. BKİ ile MAADİ, AFİ-Aktivite Kısıtlılığı ve AFİ-Yetersizlik skorları arasında her iki grupta anlamlı bir korelasyon yok iken ($p>0.05$), obez olmayan grupta sadece AFİ-Ağrı ile BMI arasında orta ve pozitif anlamlı korelasyon vardı. AFİ-Ağrı skorları her iki grupta da MAADİ, AFİ-Aktivite Kısıtlılığı ve AFİ-Yetersizlik skorları ile pozitif ve orta/yüksek ilişki gösterdi ($p<0.05$). **Sonuç:** DM'si olan obez bireylerde artan BMI, ayağın disfonksiyonunun birincil nedeni olarak görünen artmış plantar ağrının olası nedenidir. BKİ'nin DM'li bireylerde yeterlilik ve yeti yitimi üzerinde doğrudan, aktivite kısıtlılığı ve katılım oranındaki azalma üzerinde dolaylı bir etkisi vardır.

**Anahtar Kelimeler:** Denge, Beden Kitle Indeksi, Diabetes Mellitus, Fonksiyon, Plantar Ağrı.

***Sorumlu Yazar / Corresponding Author:*** Buse Kılınç, University of Health Sciences, Gulhane Institute of Health Sciences, Ankara, Turkey, Phone: 0090 537 684 4415
***E-mail:*** busekilincfet@gmail.com

***Bu makaleye atıf yapmak için / Cite this article*:** Duray, M., Çetişli Korkmaz, N., Kılınç, B., & Fenkçi, S. M. (2024). Plantar Pain, Balance and Foot Functions in Individuals with Diabetes Mellitus, *BAUN Health Sci J, 13*(1), 1-10. *https://doi.org/10.53424/balikesirsbd.1233393*

## INTRODUCTION

About 425 million people are suffering from Diabetes Mellitus (DM) worldwide. The alterations secondary to DM, such as mitochondrial dysfunction and inadequate blood supply, may cause motor dysfunction (Nomura Kawae, Kataoka, & Ikeda, 2018). So, muscle strength and functionality are significantly decreased in patients with DM (Colberg et al., 2016). Because the amount of intramuscular non-contractile tissue increases, skeletal muscle mass and function are also decreased. This can lead to impaired balance and increased use of assistive devices, such as canes and walkers (Kera et al., 2018). The American Diabetes Association suggests that patients with DM should perform balance and flexibility exercises to prevent falls and improve functionality (Colberg et al., 2016). Reportedly, patients with DM have variable muscle force distribution, showing variability in all phases of walking (Gomes, Ackermann, Ferreira, Orselli, & Sacco, 2017). Besides, the distribution of pressures in the plantar area of the foot also varies among patients with DM (Matos, Mendes, Silva, & Sousa, 2018). High pressure in the plantar area of the foot is a common complication associated with DM (Matos et al., 2018). Both high pressure in the plantar area and the impairment of the structure of the foot cause plantar pain, which is a common complaint that can lead to disability. Prevalence of plantar pain increases up to 17-24% in individuals over 18 years of age, especially in middle aged patients (40-60 years) (Menz, Munteanu, Zammit, & Landorf, 2010; Rosenbaum, DiPreta, & Misener, 2014). Plantar pain risk factors are divided into intrinsic and extrinsic (environmental) factors. Intrinsic factors are individual characteristics such as increased body mass index (BMI), limited range of motion, step length, increased connective tissue thickness, like plantar fascia, and decreased calf muscle strength. The presence of intrinsic risk factors increases the possibility of injuries (Chatterton, Muller, & Roddy, 2015). One of main intrinsic factors is increased BMI indicating obesity. A comorbidity of DM and attracting more attention than DM, obesity is another important cause of plantar pain (Menz et al., 2010). Obese individuals are more probably to have increased foot pain than individuals have normal BMI (Tanamas et al., 2012). With increased weight, plantar pressure increases and plantar tissues remain under extreme load, causing pain (Menz et al., 2010). Obesity has powerfully association with not only foot pain but also disability (Tanamas et al., 2012). Because obesity causes biomechanical deformations in foot structure and increased plantar pressure, disability levels are higher in obese individuals (Tanamas et al., 2012). However, it seems that plantar pain and disability are related with each other in both obese and diabetic patients (Matos et al., 2018; Menz et al., 2010; Rosenbaum et al., 2014; Tanamas et al., 2012). Common foot structure and function disorders have been reported in individuals with plantar pain. Pain and related dysfunctions may lead to activity limitations, restrictions of participation to life, and increase risk of falls (Chatterton et al., 2015). Especially, diabetic foot lesions are a major cause of disability. Microangiopathic and macroangiopathic vascular diseases and neuropathy are the main causes of diabetic food lesions. Both the Achilles tendon and plantar fascia augment forefoot pressures and this is a risk for diabetic ulcerations. Metabolic disorders such as DM are known to change the mechanic properties and structure of tendons. Increased production contributes to increased plantar facial thickness. Advanced glycation end-products destroy the plantar fascia, which in turn increases the risk of plantar fasciitis (Giacomozzi, D'ambrogi, Uccioli, & Macellari, 2005). Another risk of plantar fasciitis is obesity. This study aimed to demonstrate the effect of weight and metabolic destruction in patients with DM. In general, the effects of DM and BMI on plantar pain have been studied before, separately. Although, to the best of our knowledge, no study has investigated the effects of obesity on plantar pain in DM patients in the literature, especially from the perspective of disability and activity limitation. Therefore, it is important to specify the changes on plantar pain and balance and to identify the secondary problems related with plantar pain in patients with DM who are vulnerable to dysfunction and pain. The aim of our study was to investigate the relationship between plantar pain, balance and foot function in Diabetes Mellitus (DM) patients with different BMI.

## MATERIALS AND METHODS

### Participants

This was designed as a cross-sectional and comparative study. The study was recorded to ClinicalTrials.gov (NCT04444375). Fifty four patients (33 females, 21 males) admitted to the Endocrinology and Metabolism Clinic and were diagnosed as DM were included (Figure 1). Inclusion criteria were no change in BMI by more than 10% for at least 3 months and having plantar pain and volunteering to participate in the study. DM patients who had musculoskeletal surgery for foot, diagnosis of diabetic neuropathy and had orthopedic, neurological and cardiovascular diseases, and hearing problems and vision that may cause balance disorder were excluded. As a result of the power analysis, we calculated that 90% power could be obtained with 95% confidence when at least 42 people were enrolled (at least 21 people for each group).

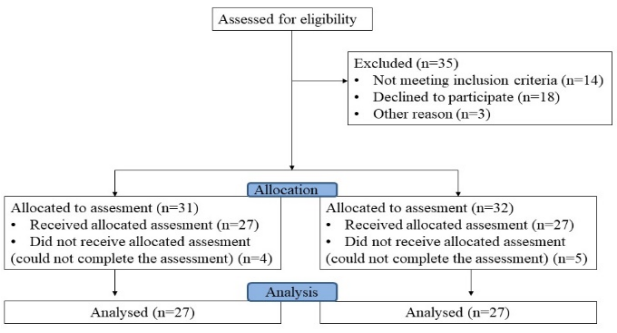


**Figure 1. A total of 54 patients with DM were analyzed, as described in the Consolidated Standards of Reporting Trials flowchart**

**Procedure**

Demographic characteristics including age, BMI, and medical history (disease duration, comorbidities, medication et al.) and balance, foot function, and disability status were assessed in Obese and Non-Obese Groups, according to BMI scores. The cut-off score was accepted as 30. Participants under 30 BMI score were grouped in the Non-Obese Group, while those with over 30 BMI score were included in the Obese Group. The Portable Computerized Kinesthetic Ability Trainer (SportKAT-550) (SportKAT, LLC 1497 Poinsettia Avenue Vista, CA 92081) was used to assess the dynamic and static balance of DM patients. Foot function, foot pain and disability were examined with the Foot Function Index (FFI) and the Manchester Foot Pain and Disability Index (MFPDI). The SportKAT-550 provides objective data that reflects the amount of weight put on the feet and postural sway. The patients were placed on a power platform and their ability to control the gravity center of the body, with small foot and ankle movements, was measured. The cross on the monitor screen represents the center of the movable platform and participants try to keep the cross mark in the center during the test for about 30 seconds. The pressure of the movable platform can be varied to modify the difficulty of the test. The patients were tested at a Postural Stability Index value of 10. As the time finishes, the device calculates a balance index score between 0 and 6000. The total score indicates balance performance (Figure 2) (Hansen, Dieckmann, Jensen, & Jakobsen, 2000). FFI consists of 23 items and evaluates activity limitation, disability and pain. The subscales of pain and limitation consist of 9 items each and subscale of activity limitation includes 5 items. In FFI, patients' pain levels are evaluated by visual analogue scale in 5 different situations. FFI- Pain severity is evaluated in 9 different categories in terms of different times of the day (morning and evening), maximum degree reached, standing and walking, use of insoles, and use of shoes. Higher scores indicate greater pain, disability, and activity limitation (Külünkoğlu, Firat, Yildiz, & Alkan, 2018). MFPDI was developed by Garrow et al. is used to assess foot pain and related disabilities in the last month. It is a well-established self-report scale. The index consists of 4 subscales including 9 questions for inadequacy, 5 for pain, 3 for concern, and 2 for difficulty. Each item is scored between 0-2. The total score is calculated by summing the scores from all items (Garrow et al., 2000). All assessments applied once.

**Figure 2. Balance test with SportKAT 550**

**Statistical analysis**

The statistical package SPSS 21.00 for Windows (SPSS Inc., Chicago, IL, USA) was used for statistical analysis. The Mann–Whitney U test was used for intergroup comparisons and the Spearman Correlation Analysis was used to detect the correlations between dependent variables. Level of significance was set at $p<0.05$.

**Ethical considerations**

Approval was obtained from the Ethics and Human Research Committee of Pamukkale University Hospital (60116787-020/71494). Written informed consent was obtained from all patients. The research was performed in accordance with the principles of the Declaration of Helsinki.

**RESULTS**

Mean age was 57.00±8.61 years in the Obese Group and 59.30±9.45 years in the Non-Obese Group ($z=-0.859$, $p=0.391$). Mean BMI was 26.53±2.32 kg/m$^2$ in the Non-Obese Group and 34.23±4.93 kg/m$^2$ in the Obese Group ($z=-6.012$, $p<0.001$). No differences were found between groups in terms of sex ($p=0.163$), marital status ($p=1.00$), insulin use ($p=1.00$), education status ($p=0.483$), or occupation ($p=0.296$) (Table 1).

Table 2 shows the comparisons of balance, FFI, and MFPDI scores between the groups. There were no differences between the groups in terms of static or dynamic balance scores. The Obese Group showed significantly higher FFI-Disability and MFPDI scores ($p=0.002$ and $p=0.047$, respectively), although FFI-Pain ($p=0.090$) and FFI-Activity Limitation ($p=0.12$) scores were similar between the groups. To understand the cause of insufficiency and difficulty in routine activities, the correlations between BMI, FFI's alt parameters and MFPDI were investigated in both groups, separately. Accordingly, BMI scores had a significant correlation only with FFI-Pain ($p=0.002$). BMI was not correlated with FFI-Activity Limitation, FFI-Disability, or MFPDI scores in the Non-obese group ($p=0.661$, $p=0.257$ and $p=0.205$, respectively). FFI-Pain scores were positively correlated with FFI-Activity Limitation, FFI-Disability and MFPDI scores in the Non-Obese Group ($p<0.001$, $p=0.001$ and $p<0.001$, respectively). FFI-Pain scores were positively correlated with FFI-Disability, FFI-Activity Limitation, and MFPDI scores in the Obese Group ($p<0.001$, $p<0.001$, and $p=0.006$, respectively). MFPDI scores were correlated with all FFI subscale scores in the Non-Obese Group ($p<0.001$). Besides, MFPDI scores were correlated with FFI-Activity Limitation, FFI-Disability and FFI-Pain in the Obese Group ($p<0.001$, $p=0.014$ and $p=0.006$, respectively) (Table 3). The data showed that the number of postural sways had no significant correlation with BMI in both groups. There were no statistically significant correlations in FFI-Disability, FFI-Pain, FFI-Activity Limitation, or MFPDI scores with dynamic and static postural sway measurements in the Non-Obese Group. Similarly, despite the insufficiency and difficulty, the number of postural sways was correlated only with FFP-

Pain and FFI-Disability scores in the Obese Group, except during the static single leg standing test (Table 4).

**Table 1. Baseline characteristics of the groups.**

| | | Non-obese Group n (%) | Obese Group n (%) | $\chi^2$ | p |
|---|---|---|---|---|---|
| **Gender** | Female | 14 (51.85) | 19 (70.37) | 1.948 | 0.163 |
| | Male | 13 (48.15) | 8 (29.63) | | |
| **Marital status** | Married | 23 (85.19) | 23 (85.19) | 0.000 | 1.000 |
| | Widow | 3 (11.11) | 3 (11.11) | | |
| | Single | 1 (3.70) | 1 (3.70) | | |
| **Insulin use** | Yes | 11 (40.74) | 11 (40.74) | 0.000 | 1.000 |
| | No | 16 (59.26) | 16 (59.26) | | |
| **Education status** | Primary School | 13 (48.15) | 15 (55.56) | 3.467 | 0.483 |
| | Secondary School | 3 (11.11) | 2 (7.41) | | |
| | High School | 9 (33.33) | 6 (22.22) | | |
| | University | 2 (7.41) | 4 (14.81) | | |
| **Occupation** | Housewife | 11 (40.74) | 12 (44.44) | 2.435 | 0.296 |
| | Retired | 10 (37.03) | 13 (48.15) | | |
| | Working | 6 (22.22) | 2 (7.41) | | |

$\chi^2$: chi squared test

**Table 2. Comparison of balance, FFI and MFPDI scores of non-obese and obese diabetes mellitus patients.**

| | | | | Non-Obese group (n=27) | Obese group (n=27) | z | p |
|---|---|---|---|---|---|---|---|
| **The Number of Postural** | **Static Balance** | **Eyes open** | **Double Leg** | 712.93±602.21 | 679.78±406.56 | -0.277 | 0.782 |
| | | | **R Single Leg** | 1250.88±1065.46 | 1261.35±693.66 | -1.007 | 0.314 |
| | | | **L Single Leg** | 979.12±696.69 | 1130.15±728.08 | -1.016 | 0.310 |
| | | **Eyes closed** | **Double Leg** | 1266.04±697.77 | 1488.24±795.76 | -0.999 | 0.318 |
| | | | **R Single Leg** | 1579.60±942.70 | 1565.95±759.67 | -0.640 | 0.522 |
| | | | **L Single Leg** | 1657.83±932.14 | 1881.68±1265.49 | -0.220 | 0.826 |
| | **Dynamic Balance** | **Clockwise** | | 2023.96±459.33 | 2139.67±542.09 | -0.554 | 0.580 |
| | | **Counter clockwise** | | 1894.04±352.394 | 2150.52±593.03 | -1.254 | 0.132 |
| **Mean Score** | **FFI** | **Pain** | | 36.44±31.75 | 54.88±40.59 | -1.697 | 0.090 |
| | | **Disability** | | 34.25±41.06 | 68.0±37.90 | -3.118 | **0.002**** |
| | | **Activity limitation** | | 9.25±13.14 | 11.29±10.31 | -1.555 | 0.120 |
| | **MFPDI** | | | 10.92±7.98 | 15.33±8.38 | -1.984 | **0.047*** |

**FFI:** Foot Function Index, **MFPDI:** Manchester Foot Pain and Disability Index, **R:** Right, **L:** Left, **z:** Mann-Whitney U test, *p<0.05, **p<0.001

**Table 3. Correlation between BMI, FFI and MFPDI scores of patients with diabetes mellitus.**

| | BMI | | FFI-P | | FFI-D | | FFI-A | | MFPDI | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Non-obese group** | **rho** | **p** | **rho** | **p** | **rho** | **p** | **rho** | **p** | **rho** | **p** |
| **BMI** | 1.0 | | 0.567 | **0.002**** | 0.226 | 0.257 | 0.088 | 0.661 | 0.252 | 0.205 |
| **FFI-P** | 0.567 | **0.002**** | 1.0 | | 0.615 | **0.001**** | 0.637 | **0.000**** | 0.698 | **0.000**** |
| **FFI-D** | 0.226 | 0.257 | 0.615 | **0.001**** | 1.000 | | 0.776 | **0.000**** | 0.630 | **0.000**** |
| **FFI-A** | 0.088 | 0.661 | 0.637 | **0.000**** | 0.776 | **0.000**** | 1.0 | | 0.708 | **0.000**** |
| **MFPDI** | 0.252 | 0.205 | 0.698 | **0.000**** | 0.630 | **0.000**** | 0.708 | **0.000**** | 1.0 | |
| **Obese group** | | | | | | | | | | |
| **BMI** | 1.0 | | 0.161 | 0.424 | 0.212 | 0.308 | 0.132 | 0.512 | 0.246 | 0.215 |
| **FFI-P** | 0.161 | 0.424 | 1.0 | | 0.686 | **0.000**** | 0.638 | **0.000**** | 0.513 | **0.006**** |
| **FFI-D** | 0.212 | 0.308 | 0.686 | **0.000**** | 1.0 | | 0.584 | **0.002**** | 0.486 | **0.014*** |
| **FFI-A** | 0.132 | 0.512 | 0.638 | **0.000**** | 0.584 | **0.002**** | 1.0 | | 0.712 | **0.000**** |
| **MFPDI** | 0.246 | 0.215 | 0.513 | **0.006*** | 0.486 | **0.014*** | 0.712 | **0.000**** | 1.0 | |

**BMI:** Body Mass Index, **FFI-P:** Foot Function Index-Pain Subscale, **FFI-D:** Foot Function Index-Disability Subscale, **FFI-A:** Foot Function Index-Activity Limitation Subscale, **MFPDI:** Manchester Foot Pain and Disability Index, **rho:**Spearman Correlation test, *p<0.05, **p≤0.005.

**Table 4. Correlation between postural sway, and BMI, FFI and MFPDI scores of patients with diabetes mellitus.**

| | | | | BMI | | FFI-P | | FFI-D | | FFI-A | | MFPDI | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Non-Obese Group** | | | | **rho** | **p** | **rho** | **p** | **rho** | **p** | **rho** | **p** | **rho** | **p** |
| **The Number of Postural Sway** | **Static Balance** | **Eyes open** | **Double** | 0.184 | 0.358 | -0.184 | 0.359 | 0.020 | 0.921 | -0.056 | 0.782 | -0.058 | 0.775 |
| | | | **R Single** | 0.071 | 0.729 | -0.199 | 0.331 | -0.233 | 0.253 | -0.258 | 0.203 | -0.017 | 0.934 |
| | | | **L Single** | 0.008 | 0.669 | -0.038 | 0.852 | 0.138 | 0.502 | 0.010 | 0.960 | 0.201 | 0.326 |
| | | **Eyes closed** | **Double** | 0.276 | 0.172 | -0.099 | 0.630 | 0.031 | 0.879 | -0.137 | 0.503 | 0.076 | 0.713 |
| | | | **R Single** | 0.287 | 0.164 | 0.083 | 0.693 | 0.170 | 0.416 | 0.064 | 0.762 | 0.136 | 0.517 |
| | | | **L Single** | -0.095 | 0.658 | 0.118 | 0.582 | 0.243 | 0.252 | 0.114 | 0.596 | 0.028 | 0.897 |
| | **Dynamic Balance** | **Clockwise** | | -0.126 | 0.532 | 0.031 | 0.877 | 0.014 | 0.946 | -0.061 | 0.763 | 0.053 | 0.793 |
| | | **Counter clockwise** | | -0.202 | 0.311 | 0.202 | 0.312 | 0.289 | 0.144 | 0.175 | 0.382 | 0.092 | 0.649 |
| **Obese Group** | | | | | | | | | | | | | |
| **The Number of Postural Sway** | **Static Balance** | **Eyes open** | **Double** | 0.171 | 0.394 | 0.141 | 0.483 | 0.013 | 0.953 | -0.047 | 0.814 | 0.187 | 0.351 |
| | | | **R Single** | -0.172 | 0.400 | 0.385 | 0.052 | 0.191 | 0.372 | -0.054 | 0.794 | -0.122 | 0.554 |
| | | | **L Single** | 0.080 | 0.699 | 0.345 | 0.084 | 0.425 | **0.038*** | 0.082 | 0.689 | -0.079 | 0.702 |
| | | **Eyes closed** | **Double** | 0.156 | 0.457 | -0.157 | 0.454 | 0.046 | 0.833 | -0.153 | 0.465 | 0.059 | 0.780 |
| | | | **R Single** | 0.282 | 0.243 | 0.521 | **0.022*** | 0.337 | 0.158 | 0.051 | 0.836 | 0.093 | 0.704 |
| | | | **L Single** | 0.053 | 0.830 | 0.276 | 0.253 | 0.087 | 0.724 | -0.107 | 0.662 | 0.036 | 0.884 |
| | **Dynamic Balance** | **Clockwise** | | -0.067 | 0.742 | 0.151 | 0.451 | 0.280 | 0.175 | -0.135 | 0.501 | 0.053 | 0.792 |
| | | **Counter clockwise** | | 0.045 | 0.825 | 0.355 | 0.069 | 0.306 | 0.138 | 0.162 | 0.402 | 0.247 | 0.214 |

**BMI:** Body Mass Index, **FFI-P:** Foot Function Index-Pain Subscale, **FFI-D:** Foot Function Index-Disability Subscale, **FFI-A:** Foot Function Index-Activity Limitation Subscale, **MFPDI:** Manchester Foot Pain and Disability Index. **R:** Right, **L:** Left, **rho:** Spearman Correlation test, *p<0.05.

## DISCUSSION

The major finding of the current study was that patients with DM had foot pain and pain-related disability whether they were obese or not. Also, BMI was related only with foot pain rather than insufficiency, disability, participation, or balance in non-obese individuals with DM. Besides, increased BMI caused a secondary negative effect on sufficiency, activity limitation, and participation. Previous studies suggest that DM related peripheral neuropathy contributes to the development of abnormal degenerative structure in diabetic plantar lesions. Here, diabetic neuropathy was not detected in any of the cases. However, it has been reported that plantar enthesopathy can be seen in the absence of diabetic neuropathy (Ursini et al., 2017). Individuals with DM have loss of protective sensation and decreased muscle strength, especially in lower extremity muscles. In patients with DM, insufficiency of movement in sensorimotor functions may result in a greater decrease in balance and postural control compared to healthy individuals (Lim, Kim, Noh, Yoo, & Moon, 2014). The sensorial flexibility and feedback of the foot in stance might be affected from the pathological stiffening of the ankle–foot complex and this may have a subsequent impact on postural balance in standing (Cheing, Chau, Kwan, Choi, & Zheng, 2013). In addition to balance problems that may occur due to DM, increased BMI may affect balance because of the increased mechanical load on the foot. Studies have investigated the relationship between obesity and nutrition in patients with DM (Ottum & Mistry, 2015; Singh, Barden, Mori, & Beilin, 2001), although the effect of obesity on balance has not been studied much. According to the findings of Frames et al., BMI≥30 is a significant risk factor for balance disorders (Frames et al., 2018). The increased stiffness of plantar soft tissue might make the feet more vulnerable to plantar pressure in stance, which possibly cause difficulties in maintaining balance and standing on different surfaces (Cheing et al., 2013). In our study, the non-obese group generally showed less oscillations in all balance tests, except static balance with eyes opened, double foot position and eyes closed, right single foot position (Table 2). Although increased BMI clearly increases postural oscillations and causes imbalance (Cheing et al., 2013), there was no statistically significant difference between the balance scores of the two groups from SportKAT-550. The duration of foot pain and obesity were not questioned in this study, which might have affected our results. We thought that the DM patients who participated in our study used to manage with obesity and plantar pain, so they found the appropriate balance strategies according to their situation. The other two causes for these findings could be because our study was performed in DM patients just with plantar pain. The presence of DM and plantar pain might have obscured the effects of obesity on balance. The obese group demonstrated a greater deficiency in terms of sufficiency and related disabilities. Difficulty in functional use of the foot may be due to structural degeneration of the foot simultaneously with increased BMI. Increased BMI and DM cause a decrease in the stiffness of plantar fascia during weight-bearing activities and an increase in the thickness of the plantar fascia. The increase in body mass could cause deformation in the mechanical features of the plantar fascia (Duffin, Lam, Kidd, Chan, & Donaghue, 2002; Taş, Bek, Ruhi Onur, & Korkusuz, 2017). So, changes in plantar tissue thickness can deteriorate normal foot mechanics and contribute to insufficiency with high energy demands and significantly higher plantar pressure during walking. Especially, obese people with DM are under risk for plantar pain (Mohammad, Chusid, Trepal, & Battaglia, 2015). This cross-sectional and comparative study showed that obesity caused a significant increase in FFI insufficiency and MFPDI scores. Increased peak plantar pressure are highly associated with risk for future diabetic foot pain and complications (Hazari et al., 2016). As stated in the literature, this survey also highlighted that people have increased difficulty in mobilization and transfer activities such as walking down stairs. However, we found that they did not cause loss of balance or activity limitation despite these difficulties. Even though they experienced difficult periods, they succeeded in continuing their daily life activities. Plantar pain was the main outcome measure in the present study, because it is one of the main reasons that cause DM patients to have insufficiency and difficulty in daily activities. According to intergroup comparisons, even though pain, postural sway, and activity limitation levels were similar, increased BMI affected sufficiency status and related disabilities. To provide homogeneity with regards to BMI, separation of participants into two groups had given us an opportunity to evaluate and interpret the main effects of plantar pain on insufficiency and difficulty in daily life activities using correlation analyses. In agreement with the literature (Mickle & Steele, 2015), the results of this study counter the controversial issue on how and when increased BMI leads to negative functional influences on foot and routine daily activities. The increase in peak plantar pressure due to higher ground reaction force and repetitive microtrauma are the most important etiological factors for the pathogenesis of diabetic foot syndrome (Hazari et al., 2016). This was also observed here and we concluded that increased body composition, especially when BMI is below 30, appears to cause an increase in plantar pain. The results suggest that pre-obesity weight gain causes plantar pain rapidly and sharply by lowering the pain threshold in diabetics, whereas post-obesity weight gain does not have a significant association with the characteristic of severe pain developed before obesity. Besides, FFI-Pain was significantly correlated with MFPDI, FFI-Activity Limitation and FFI-Disability in both groups with DM. These results reflect that even a very small change in the BMI of non-obese DM

individuals could cause an increase in plantar pain, leading to functional difficulties. Plantar pain is a difficult symptom to manage and frequently progresses to a chronic condition. In parallel with our findings, Barnes et al. reported no difference between acute and chronic plantar pain with regards to BMI (Barnes, Sullivan, Pappas, Adams, & Burns, 2017). Nevertheless, increased plantar pain associated with any cause increases the level of disability and activity limitation, reducing the rate of participation (Moes, 2019). So, the most important predictive and inhibitory factor for normal foot function following DM appears to be the severity of plantar pain, which we focused on in this study. However, decreasing this prevalence, performing screening, and providing treatment for plantar pain and overweight status in the DM population would require dramatic changes, such as comprehensively implemented population policies. Foot problems including pain and dysfunction and balance problems cause a risk of falling and may affect each other (Awale et al., 2017). A previous study showed that the functional limitations of elders with DM were different from those of healthy elders during different tasks. So, assessment of balance was advised to address foot problems and to maintain foot function, independence, and safety for elder patients with DM (Tsai et al., 2016). However, analgesic and functional interventions such as mobilization and massage to stimulate plantar mechanoreceptors have demonstrated positive effects on postural control and balance (Vaillant et al., 2009). We examined correlation between balance and foot problems between two groups according to BMI and determined that BMI was not correlated with balance. Correlation analysis in homogeneous groups formed for BMI provided an opportunity to examine the correlation between balance, plantar pain, sufficiency, disability, activity limitation, and participation. Our findings proposed that the association between static and dynamic balance and foot symptoms did not differ according to BMI in individuals with DM. DM individuals at high risk of plantar pain, whether obese or not, could be targeted with intensive efforts to prevent, delay, or revert plantar pain. There were some strengths and limitations that should be addressed concerning the current research. The main strengths of this study lie on the comparative and interdisciplinary design, objective measurement methods, and the findings that can guide other studies. Considering the limitations, the number of participants remains relatively small. Secondly, comparisons with an sex and age-matched healthy control group could be included in future studies. Thirdly, our study was planned as a cross-sectional research and conducted only on individuals with DM and plantar pain. The study could have been planned as a prospective research and include radiological measurements and laboratory data such as HbA1c. Finally, although patients with diabetic neuropathy or other comorbidities were excluded, variables such as medications or management of diabetes may not have been well controlled.

## CONCLUSION

The results of this study report that BMI has a direct negative effect on sufficiency and disability and an indirect effect on activity limitation and reduced participation rate in individuals with DM. Plantar pain shows to be the primary cause of functional limitations of the foot. Therefore, considering plantar pain, researchers and clinicians could plan a more goal-oriented rehabilitation and monitoring programs in managing the difficulties in functional problems of the foot in individuals with DM, especially for various daily activities. Further longitudinal studies with long-term follow-up including a healthy control group and DM patients without pain and normal BMI values are needed to explore the primary effects and contributions to causality of DM and obesity on balance, plantar pain, and foot function. Including radiological-based measurements will also increase objectivity.

The summary of this article was published as a paper at the 3rd International Health and Innovation Congress held online on 12.01.2021.

**Acknowledgement**

The authors thank all participants who participated in this work. Special thanks to physiotherapist Sevgi İNTİŞAH, Mehmet Akif SILAY and Hanife Nur YÜCEL for their kind assistance in collecting the data from participants. For the expenses of Sevgi İNTİŞAH, Mehmet Akif SILAY and Hanife Nur YÜCEL, a total of 2500 TL was received from TÜBİTAK-BIDEB - 2017/2 -1919B011703063.

**Conflict of Interest**

No potential conflict of interest relevant to this article was reported

**Author Contributions**

**Plan, design:** MD, NCK; **Material, methods and data collection:** MD, NCK, BK, SMF; **Data analysis and comments:** MD, NCK, BK; **Writing and corrections:** MD, NCK, BK, SMF.

**Funding**

This work was supported by the (TÜBİTAK-BIDEB-2017/2) under Grant (number 1919B011703063).

## REFERENCES

Awale, A., Hagedorn, T. J., Dufour, A. B., Menz, H. B., Casey, V. A., & Hannan, M. T. (2017). Foot function, foot pain, and falls in older adults: the Framingham foot study. *Gerontology,* 63(4), 318-324. https://doi.org/10.1159/000475710.

Barnes, A., Sullivan, J., Pappas, E., Adams, R., & Burns, J. (2017). Clinical and functional characteristics of people with chronic and recent-onset plantar heel pain *The Journal of Injury, Function and Rehabilitation*, 9(11), 1128-1134. https://doi.org/1 0.1016/j.pmrj.2017.04.009.

Chatterton, B. D., Muller, S., & Roddy, E. (2015). Epidemiology of posterior heel pain in the general population: Cross-sectional findings from the clinical assessment study of the foot. *Arthritis Care & Research,* 67(7), 996-1003. https:// doi.org/10.1002/acr.22546.

Cheing, G. L., Chau, R. M., Kwan, R. L., Choi, C. H., & Zheng, Y. P. (2013). Do the biomechanical properties of the ankle–foot complex influence postural control for people with Type 2 diabetes?. *Clinical Biomechanics,* 28(1), 88-92. https://doi.org/10.1016/j.clinbiomech.2012.09.001.

Colberg, S. R., Sigal, R. J., Yardley, J. E., Riddell, M. C., Dunstan, D. W., Dempsey, P. C., ... & Tate, D. F. (2016). Physical activity/exercise and diabetes: a position statement of the American Diabetes Association. *Diabetes Care*, 39(11), 2065-2079. https://doi.org/10.2337/dc16-1728.

Duffin, A. C., Lam, A., Kidd, R., Chan, A. K. F., & Donaghue, K. C. (2002). Ultrasonography of plantar soft tissues thickness in young people with diabetes. *Diabetic Medicine,* 19(12), 1009-1013. https://doi.org/10.10 46/j.1464-5491.2002.00850.x.

Frames, C. W., Soangra, R., Lockhart, T. E., Lach, J., Ha, D. S., Roberto, K. A., & Lieberman, A. (2018). Dynamical properties of postural control in obese community-dwelling older adults. *Sensors*, 18(6), 1692. https://doi.org/10.3390/s18061692.

Garrow, A. P., Papageorgiou, A. C., Silman, A. J., Thomas, E., Jayson, M. I., & Macfarlane, G. J. (2000). Development and validation of a questionnaire to assess disabling foot pain. *Pain,* 85(1-2), 107-113. https://doi.org/10.1016/S0304-3959(99)00263-8.

Giacomozzi, C., D'ambrogi, E., Uccioli, L., & Macellari, V. (2005). Does the thickening of Achilles tendon and plantar fascia contribute to the alteration of diabetic foot loading?. *Clinical Biomechanics*, 20(5), 532-539. https://doi.org/10.1016/j.clinbiomech.2005.01.011.

Gomes, A. A., Ackermann, M., Ferreira, J. P., Orselli, M. I. V., & Sacco, I. C. (2017). Muscle force distribution of the lower limbs during walking in diabetic individuals with and without polyneuropathy. *Journal Of Neuroengineering And Rehabilitation,* 14(1), 1-13. https://doi.org/10.1186/s12984-017-0327-x.

Hansen, M. S., Dieckmann, B., Jensen, K., & Jakobsen, B. W. (2000). The reliability of balance tests performed on the kinesthetic ability trainer (KAT 2000). *Knee Surgery, Sports Traumatology, Arthroscopy*, 8(3), 180-185. https://doi.org/10.1007/s001670050211.

Hazari, A., Maiya, A. G., Shivashankara, K. N., Agouris, I., Monteiro, A., Jadhav, R., ... & Mayya, S. S. (2016). Kinetics and kinematics of diabetic foot in type 2 diabetes mellitus with and without peripheral neuropathy: a systematic review and meta-analysis. *Springerplus,* 5(1), 1-19. https://doi.org/10.1186/s40 064-016-3405-9.

Kera, T., Kawai, H., Hirano, H., Kojima, M., Watanabe, Y., Fujiwara, Y., ... & Obuchi, S. (2018). Comparison of body composition and physical and cognitive function between older Japanese adults with no diabetes, prediabetes and diabetes: a cross-sectional study in community-dwelling Japanese older people. *Geriatrics & Gerontology International,* 18(7), 1031-1037. https://doi.org/10.1111/ggi.13301.

Külünkoğlu, B., Firat, N., Yildiz, N. T., & Alkan, A. (2018). Reliability and validity of the Turkish version of the Foot Function Index in patients with foot disorders. *Turkish Journal of Medical Sciences*, 48(3), 476-483. https://doi.org/10.3906/sag-1705-143.

Lim, K. B., Kim, D. J., Noh, J. H., Yoo, J., & Moon, J. W. (2014). Comparison of balance ability between patients with type 2 diabetes and with and without peripheral neuropathy. *Archives of Physical Medicine and Rehabilitation*, 6(3), 209-214. https://doi.org/10.1016/j.pmrj.2013.11.007.

Matos, M., Mendes, R., Silva, A. B., & Sousa, N. (2018). Physical activity and exercise on diabetic foot related outcomes: A systematic review. *Diabetes Research and Clinical Practice,* 139, 81-90. https://doi.org/10.1016/j.diabres.2018.02.020.

Menz, H. B., Munteanu, S. E., Zammit, G. V., & Landorf, K. B. (2010). Foot structure and function in older people with radiographic osteoarthritis of the medial midfoot. *Osteoarthritis and Cartilage*, 18(3), 317-322. https://doi.org/10.1016/j.joca.200 9.11.010.

Mickle, K. J., & Steele, J. R. (2015). Obese older adults suffer foot pain and foot-related functional limitation. *Gait & Posture*, 42(4), 442-447. https://doi.org/10.1016/j.gaitpost.2015.07.013.

Moes, J. (2019). Proper fitting shoes: reducing pain, increasing activity, and improving foot health among adults experiencing homelessness. *Public Health Nursing,* 36(3), 321-329. https://doi.org/10.1111/phn.12604.

Mohammad, R., Chusid, E., Trepal, M., & Battaglia, F. (2015). Severe chronic heel pain in a diabetic patient with plantar fasciitis successfully treated through transcranial direct current stimulation. *Journal of the American Podiatric Medical Association*, 105(2), 173-176. https://doi.org/10.7547/0003-0538-105.2.173.

Nomura, T., Kawae, T., Kataoka, H., & Ikeda, Y. (2018). Assessment of lower extremity muscle mass, muscle strength, and exercise therapy in elderly patients with diabetes mellitus. *Environmental Health and Preventive Medicine,* 23(1), 1-7. https://doi.org/10.1186/s12199-018-0710-7.

Ottum, M. S., & Mistry, A. M. (2015). Advanced glycation end-products: modifiable environmental factors profoundly mediate insulin resistance. *Journal of Clinical Biochemistry and Nutrition,* 57(1), 1-12. https://doi.org/10.3164/jcbn.15-3.

Rosenbaum, A. J., DiPreta, J. A., Misener, D. (2014). Plantar heel pain, *Medical Clinics of North America,* 98(2), 339-352. https://doi.org/10.1016/j.mcn a.2013.10.009. .

Singh, R. B. A. M., Barden, A., Mori, T., & Beilin, L. (2001). Advanced glycation end-products: a review. *Diabetologia,* 44(2), 129-146. https://doi.org/10.1 007/s001250051591.

Tanamas, S. K., Wluka, A. E., Berry, P., Menz, H. B., Strauss, B. J., Davies-Tuck, M., ... & Cicuttini, F. M. (2012). Relationship between obesity and foot pain and its association with fat mass, fat distribution, and muscle mass. *Arthritis Care & Research,* 64(2), 262-268. https://doi.org/10.1002/acr.20663.

Taş, S., Bek, N., Ruhi Onur, M., & Korkusuz, F. (2017). Effects of body mass index on mechanical properties of the plantar fascia and heel pad in asymptomatic participants. *Foot & Ankle International,* 38(7), 779-784. https://doi.org/ 10.1177/1071100717702463.

Tsai, Y. J., Yang, Y. C., Lu, F. H., Lee, P. Y., Lee, I. T., & Lin, S. I. (2016). Functional balance and its determinants in older people with diabetes. *PloS one,* 11(7), e0159339. https://doi.org/10.1371/journal.pone.0159339.

Ursini, F., Arturi, F., Nicolosi, K., Ammendolia, A., D'Angelo, S., Russo, E., ... & Grembiale, R. D. (2017). Plantar fascia enthesopathy is highly prevalent in diabetic patients without peripheral neuropathy and correlates with retinopathy and impaired kidney function. *PLoS One*, 12(3), e0174529. https://doi.org/10.1371/journal.pone.0174529.

Vaillant, J., Rouland, A., Martigné, P., Braujou, R., Nissen, M. J., Caillat-Miousse, J. L., ... & Juvin, R. (2009). Massage and mobilization of the feet and ankles in elderly adults: effect on clinical balance performance. *Manual Therapy,* 14(6), 661-664. https://doi.org/10.1016/j.math.2009.03.004

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.1255879

# Effects of Beverages on Microhardness of a New Restorative Material Coated with a Surface Sealant

Burak GUMUSTAS[1], Sinem BIRANT[2]

[1] Istanbul University-Cerrahpaşa, Faculty of Dentistry, Department of Restorative Dentistry
[2] Istanbul University-Cerrahpaşa, Faculty of Dentistry, Department of Pedodontics

***Geliş Tarihi / Received:*** 24.02.2023, ***Kabul Tarihi / Accepted:*** 18.07.2023

**ABSTRACT**

**Objective:** Many factors in the mouth affect the clinical lifetime of materials. Acids, enzymes, acidic properties of food and beverages formed in the plaque could change the physicochemical properties of restorative materials. The aim of the study is to examine the effect of acidic beverages on the microhardness of alkasites, and conventional glass ionomers, with changes in surface coating applications. **Materials and Methods:** Forty specimens in eight mm diameter and two mm thick discs were made with each Cention N and Ionofil U. Half of the specimens were covered with surface sealant. In each of the four subgroups: cola, orange juice, sparkling mineral water and distilled water, 10 discs were stored for 5 minutes, three times a day for a week. Microhardness measurements were made after they were kept in an acidic environment. **Results:** Acidic beverages significantly reduce the microhardness of restorative materials. The highest microhardness value was observed in the Cention N group with surface sealant. The lowest microhardness value was observed in the Ionofil restorative material group without sealant. **Conclusion:** The acidic agents tested (cola, orange juice, and sparkling mineral water) have an effect on the reduction of surface microhardness of restorative materials. For clinical decision-making, Cention N is the most suitable material for restorations in patients who are at high risk for erosive conditions.

**Keywords:** Glass Ionomer, hardness tests, food and beverages, dental sealants.

# İçeceklerin Yüzey Örtücüsü Uygulanmış Yeni Bir Restoratif Materyalin Mikrosertliği Üzerine Etkileri

**ÖZ**

**Amaç:** Ağızdaki birçok faktör, malzemelerin klinik ömrünü etkilemektedir. Asitler, enzimler, plakta oluşan yiyeceklerin ve içeceklerin asidik özellikleri restoratif malzemelerin fizikokimyasal özelliklerini değiştirebilmektedir. Çalışmanın amacı, asidik içeceklerin alkasitlerin mikrosertliği ve geleneksel cam iyonomerler üzerindeki etkisini, yüzey örtücü uygulamaları ile değişimlerinin incelenmesidir. **Gereç ve Yöntem:** Sekiz mm çapında ve iki mm kalınlığında disk şeklindeki kırk örnek Cention N ve Ionofil U ile hazırlandı. Örneklerin yarısı yüzey örtücü ile kaplandı. Kola, portakal suyu, maden suyu ve distile su olmak üzere dört alt grupta her birinde 10 disk olacak şekilde bir hafta boyunca günde üç kez 5 dakika saklandı. Mikro sertlik ölçümleri asidik bir ortamda tutulduktan sonra yapıldı. **Bulgular:** Asidik içecekler restoratif malzemelerin mikrosertliğini önemli ölçüde azaltmıştır. En yüksek mikrosertlik değeri, yüzey örtücüsü kullanılmış Cention N grubunda gözlenmiştir. En düşük mikrosertlik değeri, yüzey örtücüsü kullanılmayan İononofil U grubunda gözlenmiştir. **Sonuç:** Test edilen asidik ajanlar (Kola, portakal suyu ve köpüklü mineral suyu) restoratif malzemelerin yüzey mikrosertlikleri üzerinde azaltıcı bir etkiye sahiptir. Klinik kullanım açısından Cention N, eroziv koşullarda yüksek risk altında olan hastalarda restorasyonlar için en uygun materyaldir.

**Anahtar Kelimeler:** Cam iyonomer, sertlik testleri, yiyecek ve içecekler, dental örtücüler.

***Sorumlu Yazar / Corresponding Author:*** Sinem BIRANT, Istanbul University-Cerrahpaşa, Faculty of Dentistry, Department of Pedodontics, Istanbul, Turkey
***E-mail:*** sinembirant@iuc.edu.tr

***Bu makaleye atıf yapmak için / Cite this article:*** Gümüştaş, B. & Birant, S. (2024). Effects of Beverages on Microhardness of a New Restorative Material with Sealant. *BAUN Health Sci J,* 13(1), 11-17.
https://doi.org/10.53424/balikesirsbd.1255879

## INTRODUCTION

The physical properties of materials used in dentistry are continuously under development. Many factors in the mouth affect the clinical lifetime of materials. One of them is the changes in the physical properties of the materials caused by the acidic environment (Szczesio-Wlodarczyk et al., 2020). Acids, enzymes, and acidic properties of food and beverages formed in the plaque change the physicochemical properties of restorative materials by lowering the pH of the environment (Szczesio-Wlodarczyk et al., 2020).

Glass ionomer cements, which have been in use for a long time, are distinguished from other restoratives by their sensitivity to moisture, relatively low mechanical properties, and less translucency (Tan et al., 2015; Xie et al., 2000). With the introduction of high viscosity glass ionomers, it is aimed to overcome the disadvantages of the mechanical properties of the conventional glass ionomers (Shiozawa et al., 2014). However, the properties of dimensional stability and fluor release made the conventional glass ionomer restorative materials still in use frequently today (Baig & Fleming, 2015).

Recently a new material released in the market, named as alkasites, contains calcium fluorosilicate glass and barium-aluminum silicate glass powders and urethane dimethacrylate monomer and derivatives. It is placed in the subgroups of resin composites in classification (Francois et al., 2020). The material can reach its final hardness with chemical reaction, as well as with light (Fousiya et al., 2022). In an acidic environment, it releases ions such as calcium, hydroxide and fluoride, which will increase the ambient pH of the particles in the powder part (Kim, 2022). It has been known for a long time that consumption of foods or drinks may reduce the hardness of dental hard tissues. Acidic drinks can cause erosion in the hard tissues of the teeth due to the consumption of fresh fruits and the acids in their contents (Wongkhantee et al., 2006). Similarly, it also causes degradation and wear of restorative materials, but also affects the life of the material in the mouth (Yap et al., 2021). The degradation of restorative materials cannot be explained by abrasion alone. Chemical degradation also plays a role. In the mouth, material is intermittently or continuously exposed to sources that can cause chemical degradation, such as saliva, food and beverages (Wongkhantee et al., 2006). The aim of our research is to examine the effect of acidic beverages on the microhardness of alkasites, and conventional glass ionomers, with changes in surface coating applications. The hypothesis of our research is that beverages with low pH change the physical properties of bioactive restorative materials.

## MATERIALS AND METHODS

This in vitro study hold in November 2022, Istanbul University-Cerrahpaşa, Faculty of Dentistry. In order to examine the effect of two bioactive restorative materials of the same color, coated and uncoated, on the surface microhardness of the materials, 8 mm diameter and 2 mm thick samples were obtained in accordance with the recommendations of the manufacturers (Table 1). After the materials were placed in Teflon molds, they were closed with Mylar tape. After the overflowing part was removed, it was closed with a glass coverslip until its hardening was completed (Valo Grand, Ultradent, USA). The setting time of Ionofil U was 2.5 minutes, and the setting time of Cention N material was 4 minutes.

**Table 1. Materials used in the present study.**

| Product | Type of material | Composition | Manufacturer |
|---|---|---|---|
| ***Cention N*** | Alkasite | · UDMA<br>· DCP<br>· Aromatic aliphatic UDMA<br>· PEG-400 DMA<br>· Barium aluminium silicate glass<br>· Ytterbium trifluoride<br>· Isofiller<br>· Calcium fluorosilicate glass<br>· Calcium barium aluminium fluorosilicate glass | Ivoclar Vivadent, Schaan, Liechtenstein |
| ***Ionofil U*** | Glass Ionomer | Calcium-alumino-fluorosilicate glass, Polyacrylic acid, tartaric acid, water | Voco GmbH, Cuxhaven, Germany |
| ***EQUIA Forte Coat*** | Surface Sealant | Methyl methacrylate, camphorquinone | GC, Tokyo, Japan |

The sample size was calculated considering 95% power and a significance level of 0.05. The total sample size was calculated to be 28 (n : 7). Since the lowest sample size of each material was calculated as 7. 10 samples were prepared for each group, in this study. It was prepared as 80 samples of each material. The discs obtained were divided into two groups, each containing 40 samples from each material, surface sealant was applied to the surfaces of the samples in one group after the materials have completed their hardening period, and no other treatment was applied to the samples in the other group (Figure 1). Resin containing surface sealant material polymerized for 20 seconds using a light device (Valo Grand, Ultradent, USA). The hardening of the materials was stored at 37 °C in a humid environment for 24 hours. From the obtained groups, 4 subgroups were formed so that 10 discs would fall into each group. The samples in the first group were kept in cola (Coca Cola; The Coca-Cola Company, Istanbul, Turkey), the second group in orange juice (Cappy 100% Orange Juice, The Coca-Cola Company, Bursa, Turkey) the third group in sparkling

mineral water (Uludag Turkish Limited Co, Bursa, Turkey), and the fourth group in distilled water for 5 minutes three times a day for a week. All of the samples were kept in distilled water outside the acidic aging times (Tedesco et al.,2018).

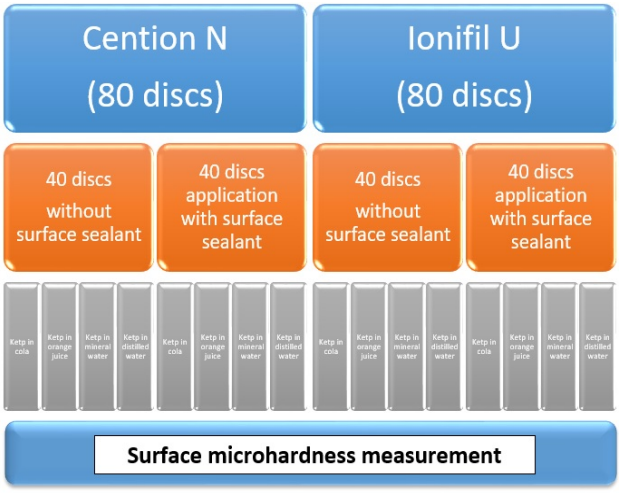


**Figure 1. Flowchart of the study**

**Surface microhardness measurements**

A microhardness testing machine (HMV-2; Shimadzu, Kyoto, Japan) was used to measure the Vickers hardness number (VHN) of each sample. Vickers microhardness levels were measured at 100g and 10 seconds. The value obtained by taking five measurements from each sample and taking the average of the values was included in the statistical analysis. Measurements were made after they were kept in an acidic environment for 7 days.

**Statistical analysis**

The normality of the results was checked with the Shapiro-Wilk test. The homogeneity was confirmed by the Levene test. The differences between the groups examined with the One-way ANOVA test were determined by the Tukey post hoc test. All analyzes were performed at an overall significance level of 0.05, using Statistical Package for Social Sciences (SPSS) 20 (IBM, Armonk, NY, USA).

**Ethics approval**

Our study is an in vitro microhardness analysis study. Ethical approval is not required.

**RESULTS**

The microhardness values of the study groups are shown in Table 2. The highest microhardness value was observed in the Cention N group with surface sealant. The lowest microhardness value after acidic aging was observed in the Ionofil U restorative material group without sealant. In the groups kept in different liquids, higher microhardness value was determined in the groups that were applied sealant compared to those without sealant. No statistically significant difference was observed between the microhardness values in the Cention N group, which was treated with a surface sealant kept in different beverages ($p>0.05$). Microhardness values were found to be statistically significantly lower in the Cention N group without surface sealant between the groups kept in cola and mineral water than in the groups kept in other solutions ($p<0.05$). There was no statistically significant difference between the microhardness values of Ionofil U groups, which were kept in different solutions with and without surface sealant ($p>0.05$). In the groups kept in distilled water, the Cention N group with application of surface sealant showed statistically the highest microhardness value ($p<0.05$), while the Ionofil U group without surface sealant showed the lowest microhardness value ($p<0.05$). In the groups kept in orange juice, the highest microhardness value was observed in Cention N group with surface sealant applied ($p<0.05$), while the lowest microhardness values were observed in Ionofil U groups with and without surface sealant ($p<0.05$). While the highest microhardness value was found in the Cention N group, which was with applied surface sealant, among the groups kept in colas ($p<0.05$), no significant difference was observed between the other groups ($p>0.05$).

In the groups kept in mineral water, the highest microhardness value was observed in the Cention N group with surface sealant applied, while the lowest microhardness values were determined in the Ionofil U groups with and without surface sealant.

**Table 2. Mean surface microhardness values of restorative materials after immersion in various storage media over a period of 7 days.**

| Restorative Material | Surface sealer | Distilled water | Orange juice | Cola | Mineral water | p |
|---|---|---|---|---|---|---|
| | | Mean±(SD) | Mean±(SD) | Mean±(SD) | Mean±(SD) | |
| ***Cention N*** | + | 62.53±(2.69)aA | 62.61±(2.20)aA | 60.81±(3.51)aA | 61.73±(1.65)aA | 0.610 |
| ***Cention N*** | - | 55.68±(2.19)aB | 52.15±(3.22)aB | 48.11±(2.23) bB | 50.38±(3.07)bB | 0.001 |
| ***Ionofil U*** | + | 47.45±(1.46)aC | 46.60±(1.94)aC | 45.68±(2.19)aB | 45.78±(1.25)aC | 0.297 |
| ***Ionofil U*** | - | 45.01±(2.03)aD | 43.76±(1.07)aC | 42.50±(1.06)aB | 43.01±(1.62)aC | 0.054 |
| **p** | | 0.000 | 0.000 | 0.000 | 0.000 | |

*One-way ANOVA, A statistically significant difference at 0.05 level of significance ($p<0.05$). **One-way ANOVA, Different uppercase letters mean statistically significant differences in column ($p<0.05$). Different lowercase letters mean statistically significant differences in lines ($p<0.05$).

**DISCUSSION**

The clinical life of composite resin or glass ionomer cements is highly dependent on the correct identification and evaluation of materials, as well as influencing the success of oral rehabilitation.

The surface hardness of a restorative material is an important parameter that affects the mechanical properties (Schulze et al., 2003). The surface hardness of the material is directly related to the abrasion, and the low surface hardness causes the surface roughness of the material to increase. In the clinic, this can lead to material discoloration, secondary caries, plaque accumulation, and susceptibility to gingival irritation (Baseren, 2004; Mandikos et al., 2001; Poggio et al., 2012). The aim of our study is to evaluate the effects of acidic beverages, which are frequently consumed in daily life, on the changes in the surface hardness of bioactive restorative materials, as well as the changes in the surface hardness of the material by surface sealants. The chemical composition of the material and the glass filler size are important factors for the surface hardness of restorative materials (Hamid et al., 2018). In this study, the restorative material, which is a new type and classified as alkasite, and the traditional glass ionomer restorative material used in the clinic were stored in an erosive acidic environment. In the current study, surface hardness decreased after the materials were exposed to an acidic environment. Conventional glass ionomer restorative material is more affected by the acidic environment compared to Cention N restorative material which reveals that fillers (calcium-alumino-fluorosilicate glass) contained in the material without resin matrix are more susceptible to deterioration.

Cention N material, which is included in the classification of composites with an alkaline property, was used as well as conventional glass ionomer cements (Donly & Liu, 2018). Commercial Cention N® contains three different glass compositions, including an inert barium alumino-boro-silicate glass, a calcium fluoro-alumino-silicate glass, and a reactive $SiO_2$-CaO-$CaF_2$-$Na_2O$ glass (Khalid et al., 2021). In vitro studies have shown that this restorative material contains a reactive glass that releases $Na^+$, $Ca^{2+}$, and $F^-$ ions, raising the pH, and showing apatite formation when immersed in artificial saliva (Donly & Liu, 2018).

It is known that cola and orange juice used in acidic aging have erosive potential in the clinic (Scaramucci et al., 2011; West et al., 1998). Cola contains phosphoric acid and its titration is low. Orange juice contains citric acid, which has a high titration and buffering capacity (Francisconi et al., 2008). Mineral waters contain a wide variety of mineral compositions. The presence of these ions may affect the dissolution balance of biological apatite in enamel and hydroxyapatite. It also suggests that it can create changes in the properties of the restorative material (Parry et al., 2001). Therefore, a mineral water that was available on the market, was used as another experimental group in addition to cola and orange juice in this study.

In addition, in previous studies evaluating the effect of erosive agents on the surface properties of materials, distilled water was used as a control group (Arafa et al., 2022; Culina et al., 2022; Hamouda, 2011; Tanweer et al., 2022). Ilday et al. used baseline measurements as a control group to evaluate the effects of acidic solutions on materials (Ilday et al., 2013). In this study, distilled water was used as the control group, since our primary aim was to determine the effects of acidic solutions on materials and to compare the differences between acidic beverages.

In previous studies, the exposure time of samples to acidic beverages was specified as 1, 3 and 4 weeks (Scribante et al.,2020; Tedesco et al., 2018). Considering previous studies, the pH cycle model used by Tedesco et al. was applied to the samples in this study (Tedesco et al., 2018).

It is stated that acidic beverages significantly reduce the hardness of restorative materials and resin modified glass ionomer cements show a greater loss of hardness than resin composites. It is thought that hydrophilic organic matrices experience more hydrolysis and the reduced hardness rates are due to hydrolysis. Corrosive wear begins with the absorption of water, which is accelerated by the low pH of the material and diffuses through the resin matrix, filler interfaces, pores, and other pathways. The rates of chemical degradation of different materials are mainly dependent on the hydrolytic stability of the resin matrix. Due to the very low water absorption of the resin matrix of the composites, they are more resistant to acidic wear than hydrophilic materials such as resin modified glass ionomer cements (Asmussen, 1984; Ferracane, 2006; Mohan, 2008; Prakki et al., 2005; Sarkar, 2000).

It has been shown that immersion of Ketac-S metal-reinforced glass ionomer cement, Fuji II LC resin modified glass ionomer cement, Valiant-PhD amalgam and Filtek Z250 resin composite, which is frequently used in the restoration of teeth with erosive conditions, in acidic agents can reduce the surface hardness (Hengtrakool et al., 2011). The decrease in the microhardness values of the materials may vary depending on the titratable acidity of the acidic agent, the composition of the material and the differences in the curing reaction (Tedesco et al., 2018). In addition, bioactive restorative materials may show additional fluoride release after immersion in acidic environments, which may cause the dissolution of matrix-forming components in the restorative material, resulting in decreases in their mechanical properties (Hengtrakool et al., 2011). In the present study, the surface hardness of conventional glass ionomer stored in an acidic environment was found to be lower than that of the other restorative material group. In addition, the lowest microhardness value was determined in the cola with the lowest pH value.

It has been reported that ion release is reduced in different sizes by coating the restorative materials with hydrophobic resin (Mazzaoui et al., 2000). It has been reported that resin-coated glass ionomer cements release 45-78% less fluoride than uncoated specimens, while adhesive coating reduces fluoride release by 91-96% in fluoride-releasing composites (Mazzaoui et al., 2000). In a study, it was reported that the adhesive coating creates

a barrier for fluoride and Ca ion release from restorative materials in an acidic environment (Gubler et al., 2022). Placing a protective coating on restorative materials can be beneficial in ensuring long-term clinical success in an acidic environment, especially with the abrasive effect of tooth brushing that occurs in class V restorations (Hamid et al., 2018). In the present study, the microhardness of two different bioactive materials in the adhesive coated and uncoated groups in three different acidic environments was compared. The microhardness values of the adhesive applied groups were higher. This suggests that the surface sealant contributes to the surface hardness by preventing ion release from the material. These findings are consistent with previous studies (Faraji et al., 2017; Fatima et al., 2013; Zoergiebel & Ilie, 2013).

**Limitations of study**

The limitation of the current study is that it is an in vitro study, as the performance and outcome of the restorative material differs from in vivo oral conditions. Unlike the performance of the restorative material in an in vitro study, the oral condition simulation of temperature and the buffering capacity of saliva cannot be sustained. Within the limitation of this study, the following findings were drawn:

- The acidic agents tested (cola, orange juice, and mineral water) have an effect on the reduction of surface microhardness of restorative materials.
- Cention N was more resistant to acid attacks and was better than traditional glass ionomer cement (Ionofil).
- Surface coating application positively affects the surface hardness of the material in an acidic environment.,
- For clinical decision-making, Cention N is the most suitable material among the materials tested in patients who are at high risk for erosive conditions

## CONCLUSIONS

The surface sealant application is not the only factor affecting the surface hardness of the restorative material. The chemical composition of the material and the glass filler size are also important factors. In addition, the mechanical properties of the material exposed to the acidic environment change depending on the pH of the acidic beverage.

**Acknowledgements**

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

## REFERENCES

Arafa, A., Filfilan, S. S., & Fansa, H. A. (2022). Erosive effect of beverages on surface hardness and ultra-structure of deciduous teeth enamel. *Pediatric Dental Journal*, 32(3), 186-192. https://doi.org/10.1016/j.pdj.2022.08.001

Asmussen, E. (1984). Softening of BISGMA-based polymers by ethanol and by organic acids of plaque. *European Journal of Oral Sciences*, 92(3), 257-261. https://doi.org/ 10.1111/j.1600-0722.1984.tb00889.x

Baig, M. S., & Fleming, G. J. (2015). Conventional glass-ionomer materials: A review of the developments in glass powder, polyacid liquid and the strategies of reinforcement. *Journal of Dentistry*, 43(8), 897-912. https://doi.org/10.1016/j.jdent.2015.04.004

Baseren, M. (2004). Surface roughness of nanofill and nanohybrid composite resin and ormocer-based tooth-colored restorative materials after several finishing and polishing procedures. *Journal of Biomaterials Applications,* 19(2), 121-134. https://doi.org/10.1177/088 5328204044011

Culina, M. Z., Rajic, V. B., Salinovic, I., Klaric, E., Markovic, L., & Ivaniševic, A. (2022). Influence of pH cycling on erosive wear and color stability of high-viscosity glass ionomer cements. *Materials*, *15*(3), 923.

Donly, K. J., & Liu, J. A. (2018). Dentin and enamel demineralization inhibition at restoration margins of Vitremer, Z 100 and Cention N. *American Journal of Dentistry, 31(3), 166-168.*

Faraji, F., Heshmat, H., & Banava, S. (2017). Effect of protective coating on microhardness of a new glass ionomer cement: Nanofilled coating versus unfilled resin. *Journal of Conservative Dentistry,* 20(4), 260. https:// doi.org/10.4103/JCD.JCD_83_16

Fatima, N., Abidi, S. Y. A., & Jat, S. A. (2013). Effectiveness of commonly available surface protecting agents in maintaining microhardness of two cements. *Journal of the College of Physicians and Surgeons Pakistan,* 23(5), 315-319.

Ferracane, J. L. (2006). Hygroscopic and hydrolytic effects in dental polymer networks. *Dental Materials*, 22(3), 211-222. https://doi.org/10.1016/j.dental.2005.05.005

Fousiya, K., Balagopal, V. R., Suresh, K. J., Kumaran, P., Xavier, A. M., & Menon, M. M. (2022). Comparative Evaluation of Compressive Strength and Flexural Strength of Self-cured Cention N with Dual-cured Cention N: An In Vitro Study. *International Journal of Clinical Pediatric Dentistry,* 15(2), 210-214.

Francisconi, L. F., Honório, H. M., Rios, D., Magalhães, A. C., Machado, M. D. A., & Buzalaf, M. A. R. (2008). Effect of erosive pH cycling on different restorative materials and on enamel restored with these materials. *Operative Dentistry,* 33(2), 203-208. https://doi.org/10.2341/07-77

Francois, P., Fouquet, V., Attal, J. P., & Dursun, E. (2020). Commercially available fluoride-releasing restorative materials: a review and a proposal for classification. *Materials,* 13(10), 2313. https://doi.org/10.3390/ma131 02313

Gubler, A., Attin, T., Tarle, Z., Tarle, A., Prskalo, K., & Tauböck, T. T. (2022). Effect of adhesive coating on calcium, phosphate, and fluoride release from experimental and commercial remineralizing dental restorative materials. *Scientific Reports,* 12(1), 1-17. | https://doi.org/10.1038/s41598-022-14544-9

Hamid, D. M. A., Mahmoud, G. M., El-Sharkawy, F. M., & Abou Auf, E. A. (2018). Effect of surface protection, staining beverages and aging on the color stability and hardness of recently introduced uncoated glass ionomer restorative material. *Future Dental Journal,* 4(2), 288-296. https://doi.org/10.1016/j.fdj.2018.05.004

Hamouda, I. M. (2011). Effects of various beverages on hardness, roughness, and solubility of esthetic restorative materials. *Journal of Esthetic and Restorative Dentistry,* 23(5), 315-322. https://doi.org/10.1111/j.1708-8240.2011.00453.x

Hengtrakool, C., Kukiattrakoon, B., & Kedjarune-Leggat, U. (2011). Effect of naturally acidic agents on microhardness and surface micromorphology of restorative materials. *European Journal of Dentistry,* 5(01), 089-100. https://doi.org/10.1055/s-0039-1698863

Ilday, N., Bayindir, Y. Z., & Erdem, V. (2010). Effect of three different acidic beverages on surface characteristics of composite resin restorative materials. Materials Research Innovations, 14(5), 385-391. https://doi.org/10.1179/143307510X12820854748917

Khalid, H., Aleesa, N., Grosjean, M., Hill, R., & Wong, F. (2021). Characterisation of a bioactive SiO2-CaO-CaF2-Na2O glass used in composites. *Dental Materials*, 37(1), 1-9. https://doi.org/10.1016/j.dental.2020.09.017

Kim, H. J. (2022). Comparative Evaluation of Bond Strength and Microleakage of Three Ion-Releasing Restorative Materials at Various pH *Levels. Applied Sciences,* 12(13), 6796. https://doi.org/10.3390/app12136796

Mandikos, M. N., McGivney, G. P., Davis, E., Bush, P. J., & Carter, J. M. (2001). A comparison of the wear resistance and hardness of indirect composite resins. *Journal of Prosthetic Dentistry,* 85(4), 386-395. https://doi.org/ 10.1067/mpr.2001.114267

Mazzaoui, S. A., Burrow, M. F., & Tyas, M. J. (2000). Fluoride release from glass ionomer cements and resin composites coated with a dentin adhesive. *Dental Materials,* 16(3), 166-171. https://doi.org/10.1016/S0109-5641(00)00003-8

Mohan, M., Shey, Z., Vaidyanathan, J., Vaidyanathan, T. K., Munisamy, S., & Janal, M. (2008). Color changes of restorative materials exposed in vitro to cola beverage. *Pediatric Dentistry,* 30(4), 309-316.

Parry, J., Shaw, L., Arnaud, M. J., & Smith, A. J. (2001). Investigation of mineral waters and soft drinks in relation to dental erosion. *Journal of Oral Rehabilitation,* 28(8), 766-772. https://doi.org/10.1046/j.1365-2842.2001.0079 5.x

Poggio, C., Lombardini, M., Gaviati, S., & Chiesa, M. (2012). Evaluation of Vickers hardness and depth of cure of six composite resins photo-activated with different polymerization modes. *Journal of Conservative Dentistry*, 15(3), 237. https://doi.org/10.4103/0972-0707.97946

Prakki, A., Cilli, R., Mondelli, R. F. L., Kalachandra, S., & Pereira, J. C. (2005). Influence of pH environment on polymer based dental material properties. *Journal of Dentistry*, 33(2), 91-98. https://doi.org/10.1016/j.jdent. 2004.08.004

Sarkar, N. K. (2000). Internal corrosion in dental composite wear: its significance and simulation. *Journal of Biomedical Materials Research,* 53(4), 371-380. https://doi.org/10.1002/1097-4636(2000)53:4%3C371:: AID-JBM11%3E3.0.CO;2-N

Scaramucci, T., Hara, A. T., Zero, D. T., Ferreira, S. S., Aoki, I. V., & Sobral, M. A. P. (2011). Development of an orange juice surrogate for the study of dental erosion. *Brazilian Dental Journal*, 22, 473-478. https://doi. org/10.1590/S0103-64402011000600006

Schulze, K. A., Marshall, S. J., Gansky, S. A., & Marshall, G. W. (2003). Color stability and hardness in dental composites after accelerated aging. *Dental Materials,* 19(7), 612-619. https://doi.org/10.1016/S0109-5641(03) 00003-4

Scribante, A., Gallo, S., Scarantino, S., Dagna, A., Poggio, C., & Colombo, M. (2020). Exposure of biomimetic composite materials to acidic challenges: Influence on flexural resistance and elastic modulus. *Biomimetics,* 5, 56.

Shiozawa, M., Takahashi, H., & Iwasaki, N. (2014). Fluoride release and mechanical properties after 1-year water storage of recent restorative glass ionomer cements. *Clinical Oral Investigations,* 18, 1053-1060. https://doi. org/10.1007/s00784-013-1074-4

Szczesio-Wlodarczyk, A., Sokolowski, J., Kleczewska, J., & Bociong, K. (2020). Ageing of dental composites based on methacrylate resins-A critical review of the causes and method of assessment. *Polymers,* 12(4), 882. https://doi.org/10.3390/polym12040882

Tan, B. L., Yap, A. U. J., Ma, H. N. T., Chew, J., & Tan, W. J. (2015). Effect of beverages on color and translucency of new tooth-colored restoratives. *Operative Dentistry,* 40(2), E56-E65. https://doi.org/10.2341/149027-L

Tanweer, N., Qazi, F. U. R., Das, G., Bilgrami, A., Basha, S., Ahmed, N., et al. (2022). Effect of erosive agents on surface characteristics of nano-fluorapatite ceramic: An In-vitro study. *Molecules*, *27*(15), 4691.

Tedesco, T. K., Calvo, A. F., Yoshioka, L., Fukushima, K. A., Cesar, P. F., & Raggio, D. P. (2018). Does Acid Challenge Affect the Properties and Bond Stability of Restorative Materials on Primary Teeth?. *J Adhes Dent*, *20*(3), 223-31. https://doi.org/10.3290/j.jad. a40513

West, N. X., Maxwell, A., Hughes, J. A., Parker, D. M., Newcombe, R. G., & Addy, M. (1998). A method to measure clinical erosion: the effect of orange juice consumption on erosion of enamel. *Journal of Dentistry,* 26(4), 329-335. https://doi.org/10.1016/S0300-5712(97) 00025-0

Wongkhantee, S., Patanapiradej, V., Maneenut, C., & Tantbirojn, D. (2006). Effect of acidic food and drinks on surface hardness of enamel, dentine, and tooth-coloured filling materials. *Journal of Dentistry,* 34(3), 214-220. https://doi.org/10.1016/j.jdent.2005.06.003

Xie, D., Brantley, W. A., Culbertson, B. M., & Wang, G. (2000). Mechanical properties and microstructures of glass-ionomer cements. *Dental Materials,* 16(2), 129-138. https://doi.org/10.1016/S0109-5641(99)00093-7

Yap, A. U., Ong, J. E., & Yahya, N. A. (2021). Effect of resin coating on highly viscous glass ionomer cements: a dynamic analysis. *Journal of the Mechanical Behavior of Biomedical Materials,* 113, 104120. https://doi.org/ 10.1016/j.jmbbm.2020.104120

Zoergiebel, J., & Ilie, N. (2013). Evaluation of a conventional glass ionomer cement with new zinc formulation: effect of coating, aging and storage agents. *Clinical Oral Investigations*, 17, 619-626. https://doi.org/10.1007/s00 784-012-0733-1

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.1256569

# Detection of Orthorexia Nervosa with the Turkish Version of ONI in Dietitians: A Pilot Study

Seda KAYA [1], Zeynep UZDİL [2], Funda Pınar ÇAKIROĞLU [1]

[1] Ankara University, Faculty of Health Sciences, Department of Nutrition and Dietetics
[2] Ondokuz Mayıs University, Faculty of Health Sciences, Department of Nutrition and Dietetics

***Geliş Tarihi / Received:*** *25.02.2023* ***Kabul Tarihi / Accepted:*** *11.07.2023*

**ABSTRACT**
**Objective:** Orthorexia Nervosa (ON) is defined pathological condition in which righteous eating obsession. It is known that dietitians may be trend to ON in developing healthy eating habits as a result of nutrition education and dietetic practices. This study aimed to determine ON tendency and eating attitude with the Orthorexia Nervosa Inventory (ONI), which includes all diagnostic criteria, in dietitians in the risk group for ON. **Materials and Methods:** This cross-sectional study was carried out in December 2022 and February 2023 among 206 dietitians in Turkey. Participants completed questionnaire related to individual characteristics, ONI, and Eating Attitude Test-26 (EAT-26). **Results:** The mean score of ONI in dietitians was 37.5±9.7. The total score of ONI and the median value of all ONI sub-dimensions were statistically significantly higher in dietitians with abnormal eating behavior. There is a positive moderate relationship between the total score of EAT-26 and the total score of ONI ($r=0.502$, $p<0.01$). The total score of EAT-26 is positively correlated with ONI sub-dimensions and total score of ONI. On the other hand, this study does not support nutritional education's concerns that increased preoccupation with healthy eating may lead to disordered eating patterns. **Conclusion:** More longitudinal, prospective studies are needed to assess whether ON and eating disorders progress in dietitians. These studies are very important because dietitians also provide counseling to other people in the field of nutrition and affect their nutrition programs.
**Keywords:** Orthorexia nervosa, Eating disorders, Eating attitude, Dietetians, Nutritionists

# Diyetisyenlerde ONE'nin Türkçe Versiyonu ile Ortoreksiya Nervoza Tespiti: Pilot Bir Çalışma

**ÖZ**
**Amaç:** Ortoreksiya Nervoza (ON), sağlıklı yeme takıntısının olduğu patolojik bir durumdur. Diyetisyenlerin beslenme eğitimi ve diyetetik uygulamaları sonucunda sağlıklı beslenme alışkanlığı geliştirmede ON'a yönelebilecekleri bilinmektedir. Bu çalışma, ON için risk grubunda yer alan diyetisyenlerde tüm tanı ölçütlerini içeren Ortoreksiya Nervoza Envanteri (ONE) ile ON eğilimi ve yeme tutumunu belirlemeyi amaçlamıştır. **Gereç ve Yöntem:** Bu kesitsel çalışma, Aralık 2022 ve Şubat 2023 tarihlerinde Türkiye'deki 206 diyetisyen arasında gerçekleştirilmiştir. Katılımcılar; demografik özellikler, ONE ve Yeme Tutum Testi-26 (YTT-26) ile ilgili anketi doldurmuştur. **Bulgular:** Diyetisyenlerde ortalama ONE skoru 37.5±9.7 puandır. Anormal yeme davranışı olan diyetisyenlerde, ONE total puanı ve ONE alt boyutlarının medyan değeri istatistiksel olarak anlamlı derecede yüksektir. YTT-26 total puanı ile ONE total puanı arasında pozitif yönde orta düzeyde bir ilişki vardır ($r=0.502$, $p<0.01$). YTT-26 total puanı da ONE puanı ve ONE alt boyutları ile pozitif yönde ilişkilidir. Öte yandan, bu çalışma, beslenme eğitiminin sağlıklı beslenme ile artan meşguliyetin düzensiz yeme modellerine yol açabileceği yönündeki endişelerini desteklememektedir. **Sonuç:** Diyetisyenlerde ON ve yeme bozukluklarının ilerleyip ilerlemediğini değerlendirmek için ileriye dönük boylamsal çalışmalara ihtiyaç vardır. Diyetisyenler, insanlara beslenme alanında danışmanlık verdiği ve onların beslenme programlarını etkilediği için bu çalışmalar oldukça önemlidir.
**Anahtar Kelimeler:** Ortoreksiya nervoza, Yeme bozuklukları, Yeme tutumu, Diyetisyen, Beslenme uzmanı

***Sorumlu Yazar / Corresponding Author:*** Seda KAYA, Ankara University, Faculty of Health Sciences, Department of Nutrition and Dietetics, Ankara, Turkey
***E-mail:*** dyt.seda06@outlook.com

***Bu makaleye atıf yapmak için / Cite this article:*** Kaya, S., Uzdil, Z., & Cakıroglu, F.P. (2024). Detection of orthorexia nervosa with the Turkish version of ONI in dietitians: A pilot study. *BAUN Health Sci J, 13*(1), 18-24. https://doi.org/10.53424/balikesirsbd.1256569

## INTRODUCTION

Orthorexia nervosa (ON) was first described by Dr. Steven Bratman in 1997 as a pathological condition associated with strict adherence to righteous eating (Bratman, 1997). Individuals with ON prefer pure foods by removing food additives, colorants, excess fat, salt, and genetically modified foods from their diets (Koven & Abry, 2015; Sánchez & Rial, 2005). These individuals spend a lot of time planning, purchasing, and preparing menus using pure foods. They also avoid eating outside and with other people. Their constant preoccupation with their diet causes nutritional problems such as malnutrition and excessive weight loss (Oberle et al., 2017) and psychiatric disorders (Dunn & Bratman, 2016; Strahler et al., 2018).

Orthorexia nervosa has always been the subject of research since its definition. The diagnostic criteria and basic mechanisms are still controversial. There is no consensus among researchers on whether ON is an eating disorder or a type of obsessive-compulsive spectrum disorder (Kummer et al., 2008). Currently, ON is not included in the International Classification of Diseases (ICD-10) and the Diagnostic and Statistical Manual of Mental Disorders-5 (DSM-5) (Hyrnik et al., 2016). However, four consensus diagnostic criteria for ON have been proposed by some researchers in the latest research (Barthels et al., 2015; Dunn & Bratman, 2016; Moroze et al., 2015). The first criterion involves focusing on concerns about the quality and composition of meals. The second criterion includes impairments in physical, social, academic, occupational, and/or other areas of life due to obsessive preoccupations. The third criterion consists of the occurrence of this disorder independent of the worsening of symptoms of any psychotic disorder. The fourth criterion includes that this obsessive behavior is not related to religious beliefs or diagnosed food allergies or diseases requiring a special diet (Moroze et al., 2015). Various tools are available to assess ON, but the most widely used in the literature is ORTO-15 (Cena et al., 2019; Dunn & Bratman, 2016). The Bratman Orthorexia Test, the Duesseldorf Orthorexia Scale, and the Eating Habits Questionnaire are other scales developed to measure ON. None of these scales have an item evaluating the physical deterioration criteria. Considering all these criteria, Oberle et al. (2020) developed the Orthorexia Nervosa Inventory (ONI). Epidemiological studies for ON report a 6-89% prevalence due to these questionable tools (Dunn & Bratman, 2016). It has been determined that there is a higher tendency to ON in adolescents (Gkiouleka et al., 2022), individuals who do regular exercise (Malmborg et al., 2017), nutrition and dietetics department students, or dietitians (Abdullah, Al Hourani, & Alkhatib, 2020) compared to the general population. The tendency of dietitians to be high is due to the fact that they may feel pressure to develop healthy eating habits as a result of the nutrition education and dietetic practices they receive. And it has been reported that the ideology of thinness can lead to eating disorders such as the obsession with healthy eating (Mahn & Lordly, 2015). The high reporting rate of ON among dietitians may cause problems in the future as they counsel others on nutrition.

In this study, it was aimed to determine ON tendency and eating attitude with the ONI, which includes all diagnostic criteria, in dietitians in the risk group for ON.

## MATERIALS AND METHODS

### Study type

This cross-sectional study was conducted on dietitians living in Turkey between December 2022 and February 2023.

### Study group

Participants were invited to the study via the Turkish Dietitians Association mail group and social media groups for dietitians (WhatsApp, Instagram). Data from dietitians who accepted the study was collected through an online questionnaire created in Google Docs. Individuals who received at least four years of undergraduate education in nutrition and dietetics and could read and understand Turkish were included in the study. Pregnant and lactating women and individuals with any chronic disease (such as psychiatric diseases) diagnosed by a doctor were excluded from the study. A written consent form about the study was sent to the individuals, and their voluntary consent was obtained electronically. No compensation was provided for dietitians who completed the questionnaire. Open-ended questions were asked to validate that the answers were given by different dieticians.

### Dependent and independent variables

The dependent variable of this research is the orthorexia nervosa tendency. The independent variables are gender, marital status, Body Mass Index (BMI), educational status, eating attitude, and skipping meals.

### Procedures

Participants were asked to fill out a questionnaire for their sociodemographic characteristics and anthropometric measurements, and to complete the ONI, and Eating Attitude Test-26 (EAT-26). BMI was calculated with the formula body weight (kg)/height$^2$ (m$^2$) using body weight (kg) and height (m) data (WHO, 2010).

#### *Orthorexia Nervosa Inventory (ONI)*

Including four consensus diagnostic criteria by researchers, Oberle et al. (2020) developed a 24-item Orthorexia Nervosa Inventory (ONI). The Turkish validation of the ONI was carried out by Kaya et al. (2021). The scale consists of three sub-dimensions: “behaviors”, “impairments”, and “emotions” and is a 4-point Likert type. As the scale score increases, the tendency for ON also increases. The Cronbach alpha coefficient for this study was determined to be 0.918.

***Eating Attitude Test-26***

The Eating Attitude Test, consisting of 40 items, was developed by Garfinkel and Garner (1979) to determine eating attitude. Later, a short form of 26 items was developed by Garner et al., (1982) for the psychometric properties and practical use of the scale. It was adapted into Turkish by Ergüney-Okumuş and Sertel-Berk (2020). The scale is a six-point Likert type. A total score of 20 or above indicates deterioration in eating attitudes. The scale has three sub-dimensions (Preoccupation with eating, Restriction, and Social Pressure) and is a 6-point Likert type. The Cronbach alpha coefficient for this study was determined to be 0.913.

**Statistical analysis**

The Kolmogorov-Smirnov test is used to determine whether continuous data follow a normal distribution. Normal continuous data are reported as mean and standard deviation (SD); abnormal continuous data are reported as median (minimum, maximum). Categorical data are expressed as numbers (n) and percentages (%). The Mann-Whitney U test was performed between two nonparametric groups, and the Kruskal-Wallis test was performed between multiple groups. Pearson correlation was used to assess the association between variables. $p<0.05$ was considered statistically significant. Statistical analysis was performed using SPSS version 26 (IBM Corp., 2019).

**Ethical considerations**

In the conduct of this study, the principles of the guidelines in the Declaration of Helsinki. The Ondokuz Mayıs University Clinical Research Ethics Committee approved all procedures (Approved no: B.30.2.ODM.0.20.08/750).

## RESULTS

A total of 206 individuals, 196 women (95.1%) and 10 men (4.9%), aged between 20 and 58 years, participated in this study. The distribution of descriptive characteristics among individuals is given in Table 1.

The total score of ONI and the median value of all ONI sub-dimensions were statistically significantly higher in individuals with abnormal eating behavior (Table 2).

**Table 1. Sociodemographic characteristics of the sample**

| **Variables** | **n (%) or mean±SD** |
|---|---|
| **Age** (years) | 26.2±6.6 |
| **Gender** | |
| Male | 10(4.9) |
| Female | 196(95.1) |
| **Marital status** | |
| Single | 170(82.5) |
| Married | 36(17.5) |
| **Education** | |
| Bachelor's degree | 138(67.0) |
| Master's/doctorate degree | 68(33.0) |
| **Smoking status** | |
| Yes | 20(9.7) |
| No | 186(90.3) |
| **BMI (kg/m$^2$)** | 21.5±2.6 |
| Underweight (<18.5) | 13(6.3) |
| Normal (18.5-24.9) | 171(83.0) |
| Overweight (≥25.0) | 22(10.7) |
| **Physical activity status** | |
| Inactive or insufciently active | 56(27.2) |
| Lightly active | 107(51.9) |
| Moderate active | 40(19.4) |
| Highly active | 3(1.5) |
| **ONI** | 37.5±9.7 |
| **EAT-26** [median(min-max)] | 7(0-64) |

BMI: Body Mass Index, ONI: Orthorexia Nervosa Inventory, EAT-26: Eating Attitude Test-26

**Table 2. Distribution of orthorexia nervosa inventory scores by eating attitude disorder**

| Variables | Normal eating behavior [median(min-max)] | Abnormal eating behavior [median(min-max)] | p |
|---|---|---|---|
| ONI (Total) | 34(24.70) | 48(31.71) | **< 0.001*** |
| ONI Behaviors | 16(9.29) | 20(14.30) | **< 0.001*** |
| ONI Impairments | 10(10.29) | 15(10.30) | **< 0.001*** |
| ONI Emotions | 7(5.17) | 11(5.19) | **< 0.001*** |

*p<0.05, ONI: Orthorexia Nervosa Inventory, The distribution of the data is given as the median (minimum, maximum).

Eating attitude and ONI scores of individuals are similar according to gender, marital status, education level, smoking, and BMI (p>0.05) (Table 3). The EAT-26 median value scores of individuals who skipped breakfast and dinner were found to be higher than those who did not skip the median value (p<0.05).

**Table 3. The Relationship of individuals' descriptive characteristics, BMI, and meal skipping status with EAT-26 and ONI**

| Variables | ONI (Total) [median(min-max)] | p | EAT-26 ( Total) [median(min-max)] | p |
|---|---|---|---|---|
| **Gender** | | 0.616 | | 0.853 |
| Male | 39(24.68) | | 8.5(3.14) | |
| Female | 35(24.71) | | 7(0.64) | |
| **Marital status** | | 0.676 | | 0.876 |
| Single | 35(24.71) | | 7(0.64) | |
| Married | 35(24.68) | | 7(1.40) | |
| **Education level** | | 0.621 | | 0.653 |
| Bachelor's degree | 35(24.71) | | 7(0.64) | |
| Master's/doctorate degree | 35(24.70) | | 7(1.37) | |
| **BMI** | | 0.618 | | 0.592 |
| Underweight | 33(25.48) | | 8(1.25) | |
| Normal | 35(24.71) | | 7(0.64) | |
| Overweight | 36.5(24.70) | | 10(1.37) | |
| **Skipping breakfast** | | 0.581 | | **0.036*** |
| Yes | 34(28.71) | | 10(2.64) | |
| No | 35(24.70) | | 7(0.62) | |
| **Skipping lunch** | | 0.835 | | 0.564 |
| Yes | 36(24.68) | | 8(0.57) | |
| No | 35(24.71) | | 7(0.64) | |
| **Skipping dinner** | | 0.180 | | **0.032*** |
| Yes | 40(32.49) | | 25(1.64) | |
| No | 35(24.71) | | 7(0.62) | |
| **Skipping snacks** | | 0.618 | | 0.431 |
| Yes | 35(24.71) | | 7(0.40) | |
| No | 35(24.70) | | 7(0.64) | |

*p<0.05, BMI: Body Mass Index, ONI: Orthorexia Nervosa Inventory, EAT-26: Eating Attitude Test-26

There is a moderate positive relationship between the EAT-26 and the ONI (r=0.502, p<0.01) (Table 4). The total score of EAT-26 is positively correlated with ONI sub-dimensions and the total score of ONI. In addition, the total score of ONI is positively correlated with EAT-26 sub-dimensions. In this study, no relationship was found between BMI and scores of the EAT-26 and the ONI.

.

**Table 4. The relationship between ONI and EAT-2**

| | EAT-26 | EAT-1 | EAT-2 | EAT-3 | ONI-1 | ONI-2 | ONI-3 |
|---|---|---|---|---|---|---|---|
| ONI | 0.502** | 0.459** | 0.533** | 0.237** | | | |
| EAT-26 | | | | | 0.404** | 0.449** | 0.467** |
| EAT-1 | | | | | 0.308** | 0.414** | 0.520** |
| EAT-2 | | | | | 0.536** | 0.408** | 0.416** |
| EAT-3 | | | | | 0.202** | 0.257** | 0.141* |

*p<0.05, **p<0.01, ONI: Orthorexia Nervosa Inventory, ONI-1: ONI Behaviors sub-dimension, ONI-2: ONI Impairments sub-dimension, ONI-3: ONI Emotions sub-dimension, EAT-26: Eating Attitude Test-26, EAT-1: EAT-26 Preoccupation with eating sub-dimension, EAT-2: EAT-26 Restraint sub-dimension, EAT-3: EAT-26 Social pressure sub-dimension

## DISCUSSION

Orthorexia nervosa is a pathological condition in which eating healthy becomes an obsession, which has been extensively studied lately. It is also associated with the eating attitude of the obsession with healthy eating. In this study, it was aimed to determine the ON tendency and related factors among dietitians. To the best of our knowledge, this is the first study to address ON in dietitians with the newly developed ON scale among in the literature.

There are few studies examining ON among nutrition and dietetics students and dietitians. In these studies, the ORTO-15 scale was mostly used to detect ON (Dunn & Bratman, 2016). In a study of dietitians in the United States, the prevalence of ON was 49.5%. The mean ORTO-15 score for all participants in this study was 39.3±3.6 (Tremelling et al., 2017). In a study conducted with nutrition students and nutritionists in Jordan, the prevalence of ON was found to be between 31.8% and 72.0% (Abdullah et al., 2020). In a study using the Bratman Test for Orthorexia Nervosa in nutrition and dietetics students in Germany, the ON rate was determined to be 12.8% (Kinzl et al., 2006). The prevalence of ON was found to be 72.2%, and the mean score of ORTO-15 was 38.58±0.27 on nutrition and dietetics department students in Turkey (Çobanoğlu & Akman, 2021). In a study conducted in Ankara, Turkey, the ON rate was found to be 41.9% and the mean score of ORTO-15 was 39.7±3.7 (Asil & Sürücüoğlu, 2015). Among the limitations of these studies is that the cut-off score of the ORTO-15 scale differs in the studies. In addition, recent studies argue that the use of the cut-off score in the ORTO-15 scale is incorrect (Rogoza & Donini, 2022). Because the use of the cut-off score in the scales for ON, whose diagnostic criteria are not fully clear, is criticized. In our study, the mean score of ONI was found to be 37.5±9.7. Contrary to the ORTO-15 scale, the tendency of ON increases as the score increases in the evaluation of this scale. The cut-off point was not calculated in the assessment of this scale, but the cut-off point can be 72 points compared to other scales. (Oberle et al., 2020). In this study, the maximum ONI score was 71 points. This result shows that dietitians' comprehensive and detailed education on nutrition did not lead to an obsession with healthy eating, unlike other studies.

Studies have associated ON symptoms with eating disorders. Previous studies have found a relationship between ON and eating attitude (Agopyan et al., 2019; Asil & Sürücüoğlu, 2015; Tremelling et al., 2017). This study found a similar relationship between EAT-26 and ON. And the ONI sub-dimensions and EAT-26 sub-dimensions are also related. The relationship between ON and eating attitude shows that it is not only dependent on food (avoiding sugary and fatty foods, etc.) but also on self-worth (fear of getting fat) (Cooper & Fairburn, 2011; Pugh & Waller, 2016). Similarly, a Spanish study showed that the Eating Attitude Test (EAT-26) detects abnormal eating behaviors with four components: social pressure, preoccupation with food, purging behaviors, and food awareness, and then it can detect orthorexic behaviors (Rogoza, Brytek-Matera, & Garner, 2016). In addition, similar to other studies, it was found that those who skipped meals had impaired eating behaviors. Although in turn, dietary pathology may drive these behaviors and be responsible for these associations.

Previous studies have had mixed findings between BMI and ON. While some previous studies found a significant relationship between BMI and ON (Asil & Sürücüoğlu, 2015; Fidan et al., 2010; Oberle et al., 2017), some studies did not find a significant relationship (Abdullah et al., 2020; Agopyan et al., 2019; Aksoydan & Camci, 2009; Çobanoğlu & Akman, 2021). In this study, no relationship was found between ON and BMI. 83% of the participants in this study were in the normal BMI range. For this reason, it is thought that such a result was obtained by the participants.

### Limitations and strengths of the research

This study has several significant limitations. First, the study is a cross-sectional study of dietitians in Turkey only, and we have no indication as to whether the results can be generalized to different countries and different cultural contexts. The sample size and the number of male participants are small. Despite these limitations, this study also has important strengths. As far as we know, this is the first study in Turkey and the literature to investigate the prevalence of ON, especially among members of the nutrition field, with the newly developed ONI.

## CONCLUSIONS

The mean score of ONI in dietitians was 37.5±9.7. There is a positive and moderate relationship between the total score of the ONI and the EAT-26. And no relationship was found between ON and BMI. The most commonly used scale for the prevalence of ON in the literature is ORTO-15. This scale has been criticized for being the first developed, not meeting the consensus criteria defined by academicians, having different cut-off values, and having an inconsistent factor structure. In this study, the tendency for ON was determined by ONI, which is one of the recently developed scales including consensus diagnostic criteria. On the other hand, this study does not support nutritional education's concerns that increased preoccupation with healthy eating may lead to disordered eating patterns. More longitudinal, prospective studies are needed to assess whether orthorexia nervosa and eating disorders progress in dietitians. These studies are critical because dietitians also counsel other people in the field of nutrition and affect their nutrition programs.

**Acknowledgement**

The authors thank the dietitians who contributed to this study.

**Conflict of Interest**

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

**Author Contributions**

**Plan, design:** SK, ZU, FPÇ; **Material, methods and data collection:** SK, ZU; **Data analysis and comments:** SK, ZU; **Writing and corrections:** SK, ZU, FPÇ.

## REFERENCES

Abdullah, M. A., Al Hourani, H. M., & Alkhatib, B. (2020). Prevalence of orthorexia nervosa among nutrition students and nutritionists: Pilot study. *Clinical Nutrition ESPEN, 40*, 144-148. https://doi:10.1016/j.clnesp.2020.09.175

Agopyan, A., Kenger, E. B., Kermen, S., Ulker, M. T., Uzsoy, M. A., & Yetgin, M. K. (2019). The relationship between orthorexia nervosa and body composition in female students of the nutrition and dietetics department. *Eating and Weight Disorders-Studies on Anorexia, Bulimia and Obesity, 24*, 257-266. https://doi:10.1007/s40519-018-0565-3

Aksoydan, E., & Camci, N. (2009). Prevalence of orthorexia nervosa among Turkish performance artists. *Eating and Weight Disorders-Studies on Anorexia, Bulimia and Obesity, 14*(1), 33-37. https://doi:10.1007/bf03327792

Asil, E., & Sürücüoğlu, M. S. (2015). Orthorexia Nervosa in Turkish Dietitians. *Ecology of Food and Nutrition, 54*(4), 303-313. https://doi:10.1080/03670244.2014.987920

Barthels, F., Meyer, F., & Pietrowsky, R. (2015). Orthorexic eating behavior. A new type of disordered eating. *Ernahrungs Umschau, 62*(10), 156-161.

Bratman, S. (1997). Orthorexia essay. *URL: www. orthorexia. com/original-orthorexia-essay/Zugriff 16.03, 17*.

Cena, H., Barthels, F., Cuzzolaro, M., Bratman, S., Brytek-Matera, A., Dunn, T., . . . Donini, L. M. (2019). Definition and diagnostic criteria for orthorexia nervosa: a narrative review of the literature. *Eating and Weight Disorders-Studies on Anorexia, Bulimia and Obesity, 24*, 209-246. https://doi:10.1007/s40519-018-0606-y

Cooper, Z., & Fairburn, C. G. (2011). The evolution of "enhanced" cognitive behavior therapy for eating disorders: Learning from treatment nonresponse. *Cognitive and Behavioral Practice, 18*(3), 394-402. https://doi:10.1016/j.cbpra.2010.07.007

Çobanoğlu, Z., & Akman, M. (2021). Consideration of healthy eating obsession (orthorexia nervosa) for students educated in nutrition and dietetics department. *Journal of Pharmacy and Pharmacology, 9*, 35-43. https://doi:10.17265/2328-2150/2021.02.001

Dunn, T. M., & Bratman, S. (2016). On orthorexia nervosa: A review of the literature and proposed diagnostic criteria. *Eating Behaviors, 21*, 11-17. https://doi:10.1016/j.eatbeh.2015.12.006

Dunn, T. M., & Bratman, S. (2016). On orthorexia nervosa: A review of the literature and proposed diagnostic criteria. *Eating Behaviors, 21*, 11-17.

Ergüney-Okumuş, F. E., & Sertel-Berk, H. Ö. (2019). Yeme Tutum Testi Kısa Formunun (YTT-26) Üniversite Örnekleminde Türkçeye Uyarlanması ve Psikometrik Özelliklerinin Değerlendirilmesi. *Psikoloji Çalışmaları, 40*(1).

Fidan, T., Ertekin, V., Işikay, S., & Kirpinar, I. (2010). Prevalence of orthorexia among medical students in Erzurum, Turkey. *Comprehensive Psychiatry, 51*(1), 49-54. https://doi:10.1016/j.comppsych.2009.03.001

Garner, D. M., & Garfinkel, P. E. (1979). The Eating Attitudes Test: an index of the symptoms of anorexia nervosa. *Psychological Medicine, 9*(2), 273-279. https://doi:10.1017/s0033291700030762

Garner, D. M., Olmsted, M. P., Bohr, Y., & Garfinkel, P. E. (1982). The eating attitudes test: psychometric features and clinical correlates. *Psychological Medicine, 12*(4), 871-878. https://doi:10.1017/s0033291700049163

Gkiouleka, M., Stavraki, C., Sergentanis, T. N., & Vassilakou, T. (2022). Orthorexia nervosa in adolescents and young adults: a literature review. *Children (Basel), 9*(3). https://doi:10.3390/children9030365

Hyrnik, J., Janas-Kozik, M., Stochel, M., Jelonek, I., Siwiec, A., & Rybakowski, J. K. (2016). The assessment of orthorexia nervosa among 1899 Polish adolescents using the ORTO-15 questionnaire. *International Journal of Psychiatry in Clinical Practice, 20*(3), 199-203. https://doi:10.1080/13651501.2016.1197271

IBM SPSS statistics for windows, version 26.0. IBM Corp, Armonk, NY

Kaya, S., Uzdil, Z., & Çakıroğlu, F. P. (2022). Validation of the Turkish version of the Orthorexia Nervosa Inventory (ONI) in an adult population: its association with psychometric properties. *Eating and Weight Disorders-Studies on Anorexia, Bulimia and Obesity, 27*(2), 729-735. https://doi:10.1007/s40519-021-01199-0

Kinzl, J. F., Hauer, K., Traweger, C., & Kiefer, I. (2006). Orthorexia nervosa in dieticians. *Psychotherapy and Psychosomatics, 75*(6), 395-396. https://doi:10.1159/000095447

Koven, N. S., & Abry, A. W. (2015). The clinical basis of orthorexia nervosa: emerging perspectives. *Neuropsychiatric Disease and Treatment, 11*, 385-394. https://doi:10.2147/ndt.S61665

Kummer, A., Dias, F. M., & Teixeira, A. (2008). On the concept of orthorexia nervosa. *Scandinavian Journal of Medicine & Science in Sports, 18*(3), 395-396; author reply 397.

Mahn, H. M., & Lordly, D. (2015). A Review of Eating Disorders and Disordered Eating amongst Nutrition Students and Dietetic Professionals. *Canadian Journal of Dietetic Practice and Research, 76*(1), 38-43. https://doi:10.3148/cjdpr-2014-031

Malmborg, J., Bremander, A., Olsson, M. C., & Bergman, S. (2017). Health status, physical activity, and orthorexia nervosa: A comparison between exercise science students and business students. *Appetite, 109*, 137-143. https://doi:10.1016/j.appet.2016.11.028

Moroze, R. M., Dunn, T. M., Craig Holland, J., Yager, J., & Weintraub, P. (2015). Microthinking about micronutrients: a case of transition from obsessions about healthy eating to near-fatal "orthorexia nervosa" and proposed diagnostic criteria. *Psychosomatics, 56*(4), 397-403. https://doi:10.1016/j.psym.2014.03.003

Oberle, C. D., De Nadai, A. S., & Madrid, A. L. (2020). Orthorexia Nervosa Inventory (ONI): development and validation of a new measure of orthorexic symptomatology. *Eating and Weight Disorders-Studies on Anorexia, Bulimia and Obesity,* 26(2), 609-622. https://doi:10.1007/s40519-020-00896-6

Oberle, C. D., Samaghabadi, R. O., & Hughes, E. M. (2017). Orthorexia nervosa: Assessment and correlates with gender, BMI, and personality. *Appetite, 108*, 303-310. https://doi:10.1016/j.appet.2016.10.021

Rogoza, R., Brytek-Matera, A., & Garner, D. (2016). Analysis of the EAT-26 in a non-clinical sample. *Archives of Psychiatry and psychotherapy*, *18*(2), 54-58.

Rogoza, R., & Donini, L. M. (2021). Introducing ORTO-R: a revision of ORTO-15. *Eating and Weight Disorders-Studies on Anorexia, Bulimia and Obesity*, *26*(3), 887-895.

Pugh, M., & Waller, G. (2016). The anorexic voice and severity of eating pathology in anorexia nervosa. *international Journal of Eating Disorders, 49*(6), 622-625. https://doi:10.1002/eat.22499

Sánchez, F. G., & Rial, B. R. (2005). Orthorexia nervosa. A new eating behavior disorder. *Actas Espanolas de Psiquiatria, 33*(1), 66-68.

Strahler, J., Hermann, A., Walter, B., & Stark, R. (2018). Orthorexia nervosa: A behavioral complex or a psychological condition? *Journal of Behavioral Addictions, 7*(4), 1143-1156. https://doi:10.1556/2006.7.2018.129

Tremelling, K., Sandon, L., Vega, G. L., & McAdams, C. J. (2017). Orthorexia nervosa and eating disorder symptoms in registered dietitian nutritionists in the United States. *Journal of the Academy of Nutrition and Dietetics, 117*(10), 1612-1617. https://doi:10.1016/j.jand.2017.05.001

World Health Organization (WHO). Erişim linki: https://www.euro.who.int/en/health-topics/disease- prevention/nutrition/a-healthy-lifestyle/body-mass-index-bmi. (accessed February 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.1258421

# Identifying Methods Used to Avoid Insulin Injection Pain

Pınar TUNÇ TUNA[1], Enes GÜNHAN[2], Halil İbrahim TUNA[1], Birsel MOLU[1], Alev YILDIRIM KESKİN[1]

[1] Selcuk University, School of Health, Nursing Department
[2] Aksehir State Hospital, Internal Medicine

***Geliş Tarihi / Received:*** *02.03.2023,* ***Kabul Tarihi / Accepted:*** *01.08.2023*

**ABSTRACT**

**Objective:** The aim of the study is to determine the knowledge levels of diabetes mellitus patients about the disease and insulin use and their practices to prevent insulin injection pain. **Material and Methods:** Data were collected from 399 patients who administered insulin injections in the study. Patient Identification Form, Disease and Treatment Compliance Form, Morisky-8 Treatment Adherence Scale (MMAS-8), and Visual Analog Scale were used for data collection. **Results:** According to the findings of the study, it was determined that 16.6% of the patients made correct rotation while administering insulin injection It was determined that 46.4% of the patients preferred the painless area while injecting. However, it was determined that patients who applied insulin injection correctly had higher pain scores. It has been determined that patients with complications related to DM have higher adherence to treatment. **Conclusion:** Although the vast majority of patients reported that they came to regular check-ups; it was found that they did not rotate correctly while injecting insulin, nearly half of the patients preferred to inject into the painless area as a way of avoiding pain, and patients who did not rotate experienced low pain associated with the injection. In addition, patients were found to have low adherence to treatment.
**Keywords:** Pain, Insulin, Injections, Nursing Care.

# İnsülin Enjeksiyonu Ağrısından Kaçınmak İçin Kullanılan Yöntemlerin Belirlenmesi

**ÖZ**

**Amaç:** Bu çalışma diyabet hastalarının hastalık ve insülin kullanımı ile ilgili bilgi düzeylerini ve insülin enjeksiyon ağrısından korunmak için yaptıkları uygulamaları belirlemek amacıyla yapıldı. **Gereç ve Yöntem:** Çalışmada insülin enjeksiyonu yapan 399 hastadan veri toplandı. Veri toplama aracı olarak Hasta Tanıtım Formu, Hastalık ve Tedavi Uyum Formu, Morisky-8 Tedavi Uyum Ölçeği (MMAS-8) ve Görsel Analog Skalası kullanıldı. **Bulgular:** Çalışmanın bulgularına göre hastaların %16,6'ünün insülin enjeksiyonu uygularken doğru rotasyon yaptığı saptandı. Hastaların %46,4'ünün enjeksiyon yaparken ağrısız alanı tercih ettiği belirlendi. Bununla birlikte insülin enjeksiyonunu doğru uygulayan hastaların ağrı skorlarının daha yüksek olduğu belirlendi. DM'ye bağlı komplikasyonları olan hastaların tedaviye uyumunun daha yüksek olduğu saptandı. **Sonuç:** Hastaların büyük çoğunluğunun düzenli kontrollere geldiğini bildirmesine rağmen; insulin enjeksiyonu yaparken doğru rotasyon yapmadıkları, hastaların yarısına yakınının ağrıdan kaçınma yolu olarak ağrısız alana enjeksiyon yapmayı tercih ettikleri, rotasyon yapmayan hastaların enjeksiyona bağlı düşük ağrı yaşadıkları bulundu. Ek olarak hastaların tedaviye uyumlarının düşük olduğu bulundu.
**Anahtar Kelimeler:** Ağrı, İnsülin, Enjeksiyon, Hemşirelik Bakımı.

***Sorumlu Yazar / Corresponding Author:*** Pınar TUNÇ TUNA, Selcuk University, School of Health, Nursing Department, Konya, Türkiye
***E-mail:*** pinartunctuna@gmail.com

***Bu makaleye atıf yapmak için / Cite this article*** Tunc Tuna, P., Gunhan, E., Tuna, H. I., Molu, B., & Yıldırım Keskin, A. (2024). Identifying methods used to avoid insulin injection pain. *BAUN Health Sci J, 13*(1), 25-32. https://doi.org/10.53424/balikesirsbd.1258421

## INTRODUCTION

Diabetes mellitus is a chronic metabolic disorder requiring exogenous insulin therapy for approximately one-third of patients (Yoo & Kim, 2023). Insulin is a vital hormone that plays a crucial role in regulating blood glucose levels. It is produced by the pancreas, acts as an anabolic hormone, and has many effects on lipid, protein, and carbohydrate metabolism. Insulin helps move glucose from the bloodstream into cells where it can be used for energy production or stored as glycogen in the liver and muscles. Without enough insulin, glucose cannot enter cells effectively, leading to high blood sugar levels that are characteristic of diabetes mellitus. This chronic autoimmune disease results from the destruction of insulin-producing beta cells within the pancreatic islets of Langerhans (Aslan et al., 2023). As a result, individuals with diabetes have to be on insulin therapy. However, inappropriate use of this treatment method often leads to various complications such as pain, lipoatrophy, and lipohypertrophy (Gentile, Guarino, & Strollo, 2020). However, the administration of insulin injections is often accompanied by discomfort and pain, which leads to various difficulties in compliance with treatment. In particular, the experience of pain during insulin injections can significantly affect patients' adherence to treatment, leading to suboptimal disease management and reduced quality of life. Therefore, understanding the methods used by diabetic patients to alleviate injection pain and their subsequent adherence to treatment is crucial for optimizing patient care and outcomes (Lee, Ma, Lee, & Jung, 2018). Pain experienced during insulin injections is often a deterrent for patients, leading to a decrease in adherence to treatment and an increased risk of complications. Needle configuration (length, diameter, wall thickness, bevel type), injection technique (angle, pressure, velocity), drug formulation (pH, viscosity, drug concentration), drug dose (volume), injection site (abdomen, thigh, upper arm) and previous injection experiences contribute to pain intensity during injection (Zijlstra, Jahnke, Fischer, Kapitza, & Forst, 2018). These factors affect perceived pain intensity and may differ between individuals. As a result, patients may adopt a variety of strategies to relieve injection pain, as avoiding or reducing pain is their primary concern. Patients who are afraid of experiencing this pain can avoid pain pharmacologically and non-pharmacologically. Pharmacological methods may include the use of topical anesthetics such as lidocaine-based creams or patches to numb the injection site before insulin administration (Puthrl et al., 2022). Additionally, new needle technologies such as ultra-thin or shorter needles could be explored as potential options for reducing pain during injections.

Non-pharmacological methods cover a wider range of techniques and applications. Patients can use psychological interventions such as distraction techniques and deep breathing exercises to distract their attention from the pain associated with injections (Khan & Baig, 2022). Appropriate injection site selection, rotation, and preparation can also minimize discomfort (Zijlstra, Jahnke, Fischer, Kapitza, & Forst, 2018). In addition, patients can benefit from education and training in injection techniques, including appropriate needle insertion angles, speed, and depth, which can contribute to pain reduction. Cold application or heat therapy to the injection site before or after the injection may provide additional relief (El-Mahdi et al, 2023). Complementary and alternative therapies such as acupuncture or transcutaneous electrical nerve stimulation (TENS) may also be explored as potential adjunctive options (Ramadan Esmail Magor et al., 2023).

Among the current treatment options for diabetes management, insulin therapy plays a critical role, especially in patients with type 1 diabetes and advanced type 2 diabetes. However, successful management of diabetes through insulin therapy requires not only insulin administration but also consistent adherence to treatment regimens and lifestyle changes. An important factor that can significantly affect adherence to treatment in patients with diabetes using insulin is the experience of pain associated with insulin injections. Insulin administration, typically by subcutaneous injections, may be accompanied by pain, discomfort, and localized tissue reactions. This unpleasant sensory experience can lead to adverse psychological and physiological effects, potentially compromising patients' adherence to treatment and overall glycemic control. In a study, it was found that pain was the main difficulty in self-administration and compliance (da Costa AKG et al., 2023). In another study, insulin pain ranks first among the reasons for non-compliance with treatment (Kim, Shah, Buettner, 2022).

Despite the existence of guidelines and adherence programs for patients on insulin, non-compliance remains common. Doctors and diabetes nurses play an important role in educating patients about their condition and insulin administration techniques. However, patients often do not comply with these programs because of their desire to avoid injection-related pain (Lee et al., 2018). The desire to avoid injection pain is one of the main causes of non-compliance. Patients may hesitate to inject their insulin for fear of pain, which can lead to missed doses or irregular dosing schedules. This mismatch creates significant challenges in achieving optimal glycemic control and preventing diabetes-related complications. As a result, individuals resort to alternative practices, such as repeatedly injecting into areas that cause the least or no pain, as a way to reduce the discomfort associated with insulin injections (Kalra, Kumar, & Gupta, 2016; Spollett, Edelman, Mehner, Walter, & Penfornis, 2016). For a comprehensive understanding of this phenomenon, it is imperative to evaluate the knowledge level of diabetic patients regarding their disease and insulin therapy. In addition, investigating the specific methods that patients use to relieve

injection pain, such as site rotation or selective injection, can provide information about coping strategies. In addition, assessment of patient adherence, including regular insulin administration and adherence to recommended injection techniques, will shed light on overall adherence rates and potential barriers.

This study aims to investigate the methods used by diabetes patients using insulin to reduce injection pain and their compliance with their treatment regimens. By clarifying patients' knowledge levels, pain reduction strategies, and treatment adherence patterns, healthcare providers can develop tailored interventions and educational programs to address patients' concerns and improve treatment outcomes. Increasing patient engagement and satisfaction with insulin therapy can ultimately lead to better disease management and improved overall well-being for individuals with diabetes mellitus.

Research questions;

- Do diabetic patients using insulin rotate correctly when applying insulin?
- What are the methods used by diabetic patients using insulin to avoid the pain of insulin injections?
- Does the correct rotation status of diabetic patients using insulin and whether they experience complications related to their disease affect their pain and treatment compliance scores?

## MATERIALS AND METHODS

### Type of research

In this descriptive study.

### Place and time of research

The study was carried out with patients who were followed up in the internal medicine outpatient clinic of a secondary level state hospital between October 15, 2021 and April 15, 2022.

### Population/sample of the research

The sample population of the study was calculated according to the known sample calculation method. It was determined that there were 755 diabetes patients followed up from the outpatient clinic at the beginning and at least 255 people should be reached after the calculation made with a 95% confidence interval and a 5% margin of error. The research was completed with 399 participants.

### Inclusion criteria of research

Patients aged 18-65, diagnosed with diabetes mellitus at least 1 year ago, using insulin for at least one month, and having no communication problems, and no mental illnesses were included.

### Data collection tools

*Patient identification form:* This form was prepared by the researchers in line with the literature (Famulla et al., 2016; Hernar, Haltbakk, & Broström, 2017, Usach, Martinez, Festini, & Peris, 2019). It consists of two parts. First episode; consisted of 7 questions containing the descriptive characteristics of the participants, such as the patient's age, marital status, gender, and educational status. (Famulla et al., 2016; Usach, Martinez, Festini, & Peris, 2019). Second part; consists of 12 questions regarding the disease and treatment of the participants' disease, such as duration of illness, duration of insulin use, frequency of insulin use, insulin dose, HbA1C, insulin injection rotation status and frequency, presence of diabetes-related complications. (Hernar, Haltbakk, & Broström, 2017).

*Morisky-8 Treatment Adherence Scale (MMAS-8):* The scale used to determine the drug compliance of patients was developed by Donald Morisky et al. (1986) (Cronbach alpha: 0.61) (Morisky, Green, & Levine, 1986). It is an 8-item scale that evaluates patients' adherence to drug therapy based on their statements. The first 7 items in the scale are binary yes-no, and the last item is a 5-point Likert-type scale as 'never', 'seldom', 'sometimes', 'often', 'always'. The 5th item in the scale is reverse coded. For the first 7 items (after the 5th item is reverse coded), each 'no' answer is scored as 1 point and a 'yes' answer as 0 points. In question 8, 1 point is assigned for the 'always' answer and 0 for the 'never' answer. The highest 8 and the lowest 0 points can be obtained from the scale. The higher the score, the higher the fit. A score of 0-6 is considered low compliance, 6-8 points as moderate, and 8 points as full compliance (Aşılar, Gözüm, Çapık, & Morisky, 2014).

*VAS:* This scale was used to determine the patient's pain during insulin injections. Patients were asked to rate the pain they experienced while injecting insulin between 0 and 10. 0 points on a 10 cm ruler were defined as no pain and 10 points as the most severe pain. It has been reported that the VAS is more sensitive and reliable than other unidimensional scales in the measurement of pain severity (Delgado et al., 2018).

### Data collecting

Data were obtained from the patients who met the inclusion criteria and agreed to participate in the study in the waiting area of the internal medicine outpatient clinic. Data were collected by the same researcher. Data collection time for each patient is 10-15 minutes.

### Data analysis

Analyzes were performed in SPSS (IBM SPSS Statistics 23). In descriptive statistics, n, % was used. “Mann-Whitney U” test (Z-table value) and “Kruskal-Wallis H Test” test were used. The data were evaluated based on 0.05 significance levels.

### Ethical consideration

Permissions were obtained from the Local Ethics Committee (2021/22) and the institution where the research would be conducted (No. 16.12.2021/194210). In addition, verbal and written consent was obtained from the participants in the study.

## RESULTS

72.4 % of the participants were women, 92.2% were married, 76.2% were primary school graduates, and 44.1% used novarapid as insulin. It was determined that the mean age of the researchers was 54.04, the

duration of the disease was 9.44 years, and the average insulin dose used was 14.49 (Table 1).

**Table 1. Sociodemographic characteristics of patients using insulin and data on insulin use.**

| | | n | % |
|---|---|---|---|
| **Gender** | Woman | 289 | 72.4 |
| | Male | 110 | 27.6 |
| **Marital status** | Married | 368 | 92.2 |
| | Single | 31 | 7.8 |
| **Income status** | Income equals expense | 168 | 42.1 |
| | Income more than expenses | 92 | 23.1 |
| | Income less than expenses | 139 | 34.8 |
| **Educational status** | Primary education | 304 | 76.2 |
| | Secondary education | 93 | 23.3 |
| | Bachelor and above | 2 | 0.5 |
| **Family structure** | Lives alone | 59 | 14.8 |
| | Nuclear family | 315 | 78.9 |
| | Extended family | 25 | 6.3 |
| **Where they lives** | Town center | 127 | 31.8 |
| | Other | 272 | 68.2 |
| **Age** | 54.04 ± 8.20 (min: 26, max: 64) | | |
| **Disease duration (years)** | 9.44 ± 7.49 (min: 1, max:30) | | |
| **Insulin use (months)** | 6.49 ± 5.71 (min: 1, max:30) | | |
| **Frequency of insulin use (days)** | 2.51 ± 2.15 (min: 1, max: 20) | | |
| **Insulin dose** | 14.49 ± 4.99 (min: 1, max: 34) | | |
| **HbA1C** | 9.52 ± 1.96 (min: 5.90, max: 13.90) | | |

In Table 2, it was found that 83.7% of the patients participating in the study rotated during insulin injection, but 16.3% rotated during each injection. It was determined that 57.1% of the patients participating in the study experienced complications related to DM , 18% had a severe hypoglycemic period in the last year, and 90% of them regularly came to physician controls. It was determined that 46.4% of the patients injected into the painless area to avoid insulin pain, a small number of patients knew HemoglobinA1C (HbA1C) and its value, whereas 62.4% of them knew the organs affected by hyperglycemia. It was found that the patients experienced low pain due to insulin injection and their adherence to treatment was low (Table 2).

**Table 2. Sociodemographic characteristics and data on insulin uses.**

| | | **n** | **%** |
|---|---|---|---|
| **Rotation status** | Continuous rotation | 65 | 16.3 |
| | Day rotation | 164 | 41.1 |
| | Rare rotation | 170 | 42.6 |
| **DM complication status** | Yes | 228 | 57.1 |
| | No | 171 | 42.9 |
| **Regular attendance to physician check-ups** | Yes | 359 | 90.0 |
| | No | 40 | 10.0 |
| **Insulin methods used to avoid injection pain** | Injection into the painless area | 185 | 46.4 |
| | Cold application | 14 | 3.5 |
| | Hot application | 16 | 4.0 |
| | Using cream | 43 | 10.8 |
| | Do not rub the injection site | 24 | 6.0 |
| | Dose skipping | 37 | 9.3 |
| | Disrupting sugar tracking | 70 | 17.5 |
| | Using a short needle | 10 | 2.5 |

**Table 2. (Continue) Sociodemographic characteristics and data on insulin uses.**

| | | n | % |
|---|---|---|---|
| **The state of knowing HgA1C** | Yes | 76 | 19.0 |
| | No | 323 | 81.0 |
| **The state of knowing the HgA1C value** | Yes | 46 | 11.5 |
| | No | 353 | 88.5 |
| **state of knowing the organs affected in hyperglycemia** | Yes | 249 | 62.4 |
| | No | 150 | 37.6 |
| **VAS [( Mean ±SD)- Min – Max]** | | [(2.20±1.64) 0-7] | |
| **Morisky -8 Treatment Compliance [( Mean -SD) Min - Max )** | | [(3.39±1.68) 1-8] | |

In Table 3, it was determined that there was a difference between the way of rotation of the participants and their pain scores, and the pain scores of the patients who made each injection to a different region were higher. It was determined that patients with complications related to DM had higher adherence to treatment.

**Table 3. The relationship between some findings of patients using insulin and pain scores and treatment compliance scores.**

| | | Pain | Compliance with treatment |
|---|---|---|---|
| | | median [IQR] | median [IQR] |
| **How to rotate** | Each injection is to a different body area[a] | 3 [ 2-4 ] | 3 [ 3-4 ] |
| | Every other day rotation[b] | 2 [ 1-4 ] | 3 [ 2-4 ] |
| | Rare rotation[c] | 2 [ 1-3 ] | 3 [ 2-4 ] |
| Test * and *p* value | | **p<0.001** a=b>c | p = 0.47 |
| **Presence of DM complications** | Yes | 2 [ 0.25-3 ] | 4 [ 2-5 ] |
| | No | 2 [ 1-3 ] | 3 [ 2-3 ] |
| Test ** and *p* value | | p = 0.73 | **p <0.001** |

*Kruskal Wallis test, Bonferroni-corrected pairwise comparisons were made to determine which group caused the difference., **Mann Whitney U tests

## DISCUSSION

It was determined that almost half of the patients used rare rotations. In a study conducted in Turkey, it was reported that more than half of the patients did not rotate while injecting insulin (Aslan and Korkmaz, 2015). Similarly, in a multicenter study in Italy, it was found that most of the patients did not rotate while injecting insulin (Gentile et al., 2020). Current guidelines in the literature recommend continuous injection site rotation as part of the insulin injection technique (Danne et al., 2018). A recent study has similarly reported that continuous care and optimization of insulin injection techniques can help patients achieve better diabetes-related outcomes (Zhang, Shen, & Sun, 2022). The result of the research is similar to the literature. This suggests that there is a lack of information about the complications that may be caused by patients not rotating while administering the insulin injection. This shows that patients have difficulty managing their diabetes. It is thought that patients need nursing care.

In this study, it was found that more than half of the patients who participated in the study experienced complications related to diabetes. If proper rotation is not performed while injecting insulin, cutaneous problems, allergic reactions, lipoatrophy, lipohypertrophy, and subcutaneous amyloid deposits occur (Ansari et al., 2017). It has been reported that this may be one of the causes of unexplained blood glucose fluctuations by affecting the adequate absorption of insulin (Nagase et al., 2014; Famulla et al., 2016). It is thought that the reason why more than half of the patients participating in the study experience complications related to DM is the lack of proper rotation and low adherence to treatment.

When the methods used by the patients to avoid pain due to insulin injections were examined, it was found that the majority of the patients resorted to inaccurate methods to avoid pain. It was found that the most common method among these methods was to inject into the painless area. Conditions such as subcutaneous injection, needle characteristics, injection site, injected

drug volume, injection speed, drug osmolality, drug viscosity, and pH affect injection pain (Usach et al., 2019). It has been reported that continuous injection into the same area in patients using insulin causes lipohypertrophy. In the skin that thickens due to lipohypertrophy, the feeling of pain is further reduced (Gentile et al., 2020). In this study, the fact that most of the patients did not do the ratio correctly and injected into the painless area to avoid pain suggests that complications may have developed in the skin tissue due to the insulin injection in the patients.

When the pain scores of the patients participating in the study were compared, it was found that there was no difference between the pain scores of the patients who rotated in each injection and the patients who rotated every other day. However, patients who rarely rotate when injecting insulin have been found to experience the least pain. In this study, it was determined that the average injection pain intensity of our patients was low. In addition, to reduce the pain of patients; It was determined that they took incompatible actions such as injecting into the painless area, skipping insulin doses in order not to experience the pain of insulin injection, and delaying sugar monitoring. Gentile et al. (2020) reported that many diabetic patients with lipohypertrophy do not want to rotate to different areas because it is painless (Gentile et al., 2020). Frid et al. (2016) also had similar results (Frid, Hirsch, Menchior, Morel, & Strauss, 2016). This shows that patients constantly inject into the same area to avoid pain. The application will increase the risk of developing lipohypertorophia. Our research results show that more than half of the patients injecting into the painless area do not apply the rotation. Patients will likely face more complications due to this wrong application to avoid pain. This may be an indication that patients have problems in follow-up and care.

It was determined that there was no difference between the rotation status of the patients and their compliance with the treatment. This result shows that rotation does not affect treatment adherence. In this study, no difference was found between the injection pain severities of patients with DM complications, but it can be said that patients with DM complications were more likely to comply with treatment. The presence of DM complications reduces the quality of life of patients, and therefore, the comfort of patients is impaired due to reasons such as decreased vision, foot wounds, and increased blood pressure (Khunkaew, Fernandez, & Sim, 2019). It can be said that these complications increase the compliance of the patients to the treatment.

In this study, it was determined that the patients participating in the study had a low level of treatment adherence. In eastern Nigeria, it was reported that patients with type 2 diabetes had good drug compliance (Pascal et al., 2012). In a study conducted with adult patients with diabetes in the United Arab Emirates, it was found that most of the patients had a low level of treatment adherence (Al-Haj Mohd et al., 2015). The high level of HbA1C values of the patients also supports this finding. Our results support the literature (Fernandez-Lazaro et al., 2019). In another study conducted in Bangladesh, it was reported that patients with type 2 DM had low drug compliance (Islam et al., 2021). In a study in India, it was reported that the drug compliance of type 2 dm patients was high (Usman et al., 2023). In the literature, a common consensus could not be reached among studies investigating the level of adherence to treatment in patients with diabetes. This study is similar to the studies in the literature reporting that patients with diabetes have low drug compliance levels. In the unit where the study is carried out, patients come to regular doctor check-ups. However, regular check-ups are not made with diabetes nurses. This suggests that patients may reduce their treatment adherence.

*Limitations*

This research can only be generalized to the sample studied. The limitations of the study are that the injection site, which is defined as the least painful area by the patients, cannot be evaluated in terms of lipohypertrophy, and the study was conducted only in one center.

## CONCLUSION

In this study, it was determined that the patients did not rotate correctly while injecting insulin, and they performed inappropriate behaviors such as injecting into the painless area to avoid insulin pain, skipping the drug dose, and using the needle tip short.

The patients participating in the study stated that although they knew the HgA1C level, they did not know what it was for. On the other hand, they stated that they knew the organs were affected due to hyperglycemia.

It was found that more than half of the patients who participated in the study had complications related to DM, despite regular visits to their doctors.

It was determined that the pain levels of the patients who rotated regularly during insulin injection were higher than the others. Compliance with treatment was higher in patients who experienced complications related to DM.

It was found that the patients in the study had low adherence to treatment.

The fact that patients come to regular check-ups may suggest that they accept the DM disease. It can be concluded that patients are inadequate in receiving nursing care. It is recommended to inform the patients about the importance of the drugs used in DM disease and the application of insulin injection and to conduct regular interviews with the patients about how they inject insulin.

**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.

**Author Contributions**

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

**REFERENCES**


Al-Haj Mohd, M. M., Phung, H., Sun, J., & Morisky, D. E. (2015). The predictors to medication adherence among adults with diabetes in the United Arab Emirates. *Journal of Diabetes & Metabolic Disorders,* 15(30), 1-9. https://doi.org/10.1186/s40200-016-0254-6

Ansari, A. M., Osmani, L., Matsangos, A. E., & Li, Q. K. (2017). Current insight in the localized insulin-derived amyloidosis (LIDA): Clinico-pathological characteristics and differential diagnosis. *Pathology-Research and Practice, 213*(10), 1237-1241. https://doi.org/10.1016/j.prp.2017.08.013.

Aslan, I. & Korkmaz, M. (2015). Diabetes individuals insulin administration knowledge-skill content: Right and wrong. *Dokuz Eylul University Faculty of Nursing Electronic Journal, 8* (1), 18-26.

Aslan, E. O., Toygar, I., Feyizoğlu, G., Polat, S., & Aslan, F. E. (2023). Relationship between the insulin use and stigma in type 2 diabetes mellitus. *Primary Care Diabetes.* https://doi.org/10.1016/j.pcd.2023.05.002.

Asılar, R. H., Gozum, S., Capık, C., & Morisky, D. E. (2014). Reliability and validity of the Turkish form of the eight-item Morisky medication adherence scale in hypertensive patients. *Anatolian Journal of Cardiology/Anadolu Kardiyoloji Dergisi, 14*(8).

Da Costa, A. K. G., de Azevedo Pereira, J. V. G., Júnior, S. S. F., de Oliveira Costa, R. R., & Amorim, É. G. (2023). Difficulties presented by patients with diabetes in self-administration of insulin: Scoping review, *Rev Med Minas Gerais, 33*(33203), 1-12. https://doi.org/10.5935/2238-3182.2023e33203.

Danne, T., Phillip, M., Buckingham, B. A., Jarosz-Chobot, P., Saboo, B., Urakami, T., Codner, E. (2018). ISPAD Clinical Practice Consensus Guidelines 2018: Insulin treatment in children and adolescents with diabetes. *Pediatric diabetes,* 19, 115-135. https://doi.org/10.1111/pedi.12718.

Delgado, D. A., Lambert, B. S., Boutris, N., McCulloch, P. C., Robbins, A. B., Moreno, M. R., & Harris, J. D. (2018). Validation of digital visual analog scale pain scoring with a traditional paper-based visual analog scale in adults. Journal of the American Academy of Orthopaedic Surgeons. *Global Research & Reviews,* 2(3). https://doi.org/10.5435/JAAOSGlobal-D-17-00088.

EL-Mahdy, E. S. R., El-khedr, S. M., Elrifaey, S. M., & Elaraby, M. E. (2023). Effect of Shot Blockers versus Buzzy Bee Distractor on Relieving Pain and Anxiety Level during Insulin Injection among Children with Type I Diabetes. *Tanta Scientific Nursing Journal, 29*(2), 32-49.

Famulla, S., Hövelmann, U., Fischer, A., Coester, H.-V., Hermanski, L., Kaltheuner, M., Hirsch, L. (2016). Insulin injection into lipohypertrophic tissue: blunted and more variable insulin absorption and action and impaired postprandial glucose control. *Diabetes Care, 39*(9), 1486-1492. https://doi.org/10.2337/dc16-0610.

Fernandez-Lazaro, C. I., García-González, J. M., Adams, D. P., Fernandez-Lazaro, D., Mielgo-Ayuso, J., Caballero-Garcia, A., Miron-Canelo, J. A. (2019). Adherence to treatment and related factors among patients with chronic conditions in primary care: a cross-sectional study. *BMC family practice, 20*(1), 1-12. https://doi.org/10.1186/s12875-019-1019-3.

Frid, A. H., Hirsch, L. J., Menchior, A. R., Morel, D. R., & Strauss, K. W. (2016). Worldwide Injection Technique Questionnaire Study: Population Parameters and Injection Practices. *Mayo Clinic Proceedings, 91*(9), 1212-1223. https://doi.org/10.1016/j.mayocp.2016.06.011.

Gentile, S., Guarino, G., & Strollo, F. (2020). A cry of pain for painless insulin lipohypertrophy. *Journal of Dia-betes Research Reviews & Reports. 2*(1), 1-2.

Gentile, S., Guarino, G., Corte, T. D., Marino, G., Fusco, A., Corigliano, G., Colarusso, S., & Strollo, F. (2020). Insulin-induced skin lipohypertrophy in type 2 diabetes: A multicenter regional survey in Southern Italy. *Diabetes Therapy, 11*(2001), 2001-2017. https://doi.org/10.1007/s13300-020-00876-0.

Hernar, I., Haltbakk, J., & Broström, A. (2017). Differences in depression, treatment satisfaction and injection behaviour in adults with type 1 diabetes and different degrees of lipohypertrophy. *Journal of Clinical Nursing, 26*(23-24), 4583-4596. https://doi.org/10.1111/jocn.13801.

Islam, S. M. S., Islam, M. T., Uddin, R., Tansi, T., Talukder, S., Sarker, F., Mamun, K. A. A., Adibi, S., & Rawal, L. B. (2021). Factors associated with low medication adherence in patients with Type 2 diabetes mellitus attending a tertiary hospital in Bangladesh. *Lifestyle Medicine, 2*(4), 1-8. https://doi.org/10.1002/lim2.47.

Khan, M. K., & Baig, R. U. (2022). A Review on the management of gestational diabetes mellitus (GDM): pharmacological and non-pharmacological ınterventions. *Journal of Clinical and Nursing Research, 6*(4), 75-82. https://doi.org/10.26689/jcnr.v6i4.4164.

Kalra, S., Kumar, A., & Gupta, Y. (2016). Prevention of lipohypertrophy. JPMA. *The Journal of the Pakistan Medical Association, 66(*7), 910-911.

Khunkaew, S., Fernandez, R., & Sim, J. (2019). Health-related quality of life among adults living with diabetic foot ulcers: a meta-analysis. *Quality of Life Research, 28*(6), 1413-1427. https://doi.org/10.1007/s11136-018-2082-2.

Kim, H., Shah, K., & Buettner, C. (2022). Use of Patient-Reported Outcomes for Assessing Diabetes Outcomes. *Endocrinology and Metabolism Clinics, 51*(4), 781-793. https://doi.org/10.1016/j.ecl.2022.05.001.

Lee, G., Ma, Y., Lee, Y.-h., & Jung, H. (2018). Clinical evaluation of a low-pain long microneedle for subcutaneous insulin injection. *BioChip Journal, 12*(4), 309-316. https://doi.org/10.1007/s13206-018-2411-0.

Morisky, D. E., Green, L. W., & Levine, D. M. (1986). Concurrent and predictive validity of a self-reported measure of medication adherence. *Medical Care,* 67-74.

Nagase, T., Iwaya, K., Iwaki, Y., Kotake, F., Uchida, R., Oh-i, T., & Katsura, Y. (2014). Insulin-derived amyloidosis and poor glycemic control: A case series. *The American Journal of Medicine*, *127*(5), 450-454. https://doi.org/10.1016/j.amjmed.2013.10.029.

Pascal, I. G., Ofoedu, J. N., Uchenna, N. P., Nkwa, A. A., & Uchamma, G. U. E. (2012). Blood glucose control and medication adherence among adult type 2 diabetic Nigerians attending a primary care clinic in under-resourced environment of eastern Nigeria. *North American Journal of Medical Sciences, 4*(7), 310. https://doi.org/10.4103/1947-2714.98590.

PutrI, N. A. R., Harefa, D. Y., Sianturi, G. S., & Irawati, W. (2022). Potential use of insulin patch technology as transdermal drug delivery in efforts to treat diabetes mellitus. *Biotropika: Journal of Tropical Biology, 10*(3), 168-175. https://doi.org/10.21776/ub.biotropika.2022.010.03.02.

Ramadan Esmail Magor, N., Youssef El-Sheikh, O., Farouk Mohamed, M., & Mohamed Ahmed Ayed, M. (2023). Effect of Foot Reflexology Massage on Pain and Anxiety Levels regarding Insulin Injection among Diabetic Children. *Egyptian Journal of Health Care, 14(*1), 1297-1312. https://doi.org/10.21608/EJHC.2023.300280.

Spollett, G., Edelman, S. V., Mehner, P., Walter, C., & Penfornis, A. (2016). Improvement of insulin injection technique: examination of current issues and recommendations. *The Diabetes Educator,* 42(4), 379-394. https://doi.org/10.1177/0145721716648017.

Usach, I., Martinez, R., Festini, T., & Peris, J.-E. (2019). Subcutaneous injection of drugs: literature review of factors influencing pain sensation at the injection site. *Advances In Therapy*, *36*(11), 2986-2996. https://doi.org/10.1007/s12325-019-01101-6.

Usman, A., Yadav, R. R., Pagare, A., Ganguly, A., & Chakrabarti, R. (2023). Knowledge and awareness regarding diabetes and self-management among patients diagnosed with Type 2 diabetes mellitus–a preliminary surveillance study from a Tertiary Care Hospital. *Apollo Medicine, 20*(3), 181-191. https://doi.org/10.4103/am.am_176_22.

Yoo, J. H., & Kim, J. H. (2023). Advances in continuous glucose monitoring and integrated devices for management of diabetes with insulin-based therapy: improvement in glycemic control. *Diabetes & Metabolism Journal, 47*(1), 27-41. https://doi.org/10. 4093/dmj.2022. 0271.

Zhang, F.-Y., Shen, M., & Sun, L.-Q. (2022). Evaluation of clinical efficacy of continuous care with improved insulin injection techniques on patients with diabetes mellitus: a randomized controlled trial. *Journal of International Medical Research, 50*(6), 1-11. https://doi.org/10.1177/03000605221108047.

Zijlstra, E., Jahnke, J., Fischer, A., Kapitza, C., & Forst, T. (2018). Impact of injection speed, volume, and site on pain sensation. *Journal of Diabetes Science and Technology, 12*(1), 163-168. https://doi.org/10.1177/1932296817735121.

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.1276423

# Evaluation of Serum Magnesium Levels in Patients with the Diagnosis of Depressive Disorder Applied to a Psychiatry Clinic: A Retrospective Study

Sinan ALTUNÖZ[1], Hayriye BAYKAN[1], Özgür BAYKAN[2]

[1] Balikesir University, Faculty of Medicine, Department of Mental Health and Diseases
[2] Balikesir University, Faculty of Medicine, Department of Medical Biochemistry

***Geliş Tarihi / Received:*** *03.04.2023,* ***Kabul Tarihi / Accepted:*** *06.06.2023*

**ABSTRACT**
**Objective:** The role of magnesium in the pathophysiology of depression has increased the interest in magnesium. Therefore, in this study, we aimed to evaluate serum magnesium levels in patients diagnosed with depressive disorder who applied to the psychiatry outpatient clinic. **Materials and Methods:** The data of 1013 patients who were diagnosed with depressive disorder and whose serum magnesium levels were measured were included in the study by retrospectively scanning the data of the patients who had applied to the Psychiatry outpatient clinic of Balıkesir University Faculty of Medicine between July 2020 and July 2022. Since the serum glucose, GGT and creatinine values were above their reference ranges in 183 of 1013 patients included in the study, the data of these patients were excluded from the analysis. **Results:** Serum magnesium values of 12.9% of female and 9.1% of male patients were below the reference values (1.9-2.7 mg/dl). The mean (±SD) magnesium values of all patients, female and male patient groups were statistically significantly different from the population mean. (2.02±0.15 mg/dl, 2.01±0.16 mg/dl and 2.04±0.15 mg/dl ; P<0.001, P<0.001, and P<0.001, respectively). No statistically significant relationship was observed between magnesium levels and age of the patients. **Conclusion:** In our study, hypomagnesemia was observed in 11.9% of patients with a diagnosis of depressive disorder. For this reason, we thought that if hypomagnesemia is detected in patients followed up with depressive disorder, its replacement may be important as it may be effective in reducing depressive symptoms.
**Keywords:** Magnesium, Depression, Adjunctive therapy, Antidepressants.

# Bir Psikiyatri Kliniğine Başvuran Depresif Bozukluk Tanısıyla Başvuran Hastalarda Serum Magnezyum Düzeylerinin Değerlendirilmesi: Retrospektif Bir Çalışma

**ÖZ**
**Amaç:** Magnezyumun depresyon patofizyolojisindeki rolü, magnezyuma olan ilgiyi artırmıştır. Ancak literatürde depresyonda magnezyum düzeylerinin azalıp azalmadığına ilişkin çelişkili sonuçlar bildirilmektedir. Bu nedenle bu çalışmada psikiyatri polikliniğine başvuran depresif bozukluk tanılı hastalarda serum magnezyum düzeylerinin değerlendirmesi amaçlanmıştır. **Gereç ve Yöntem:** Temmuz 2020-Temmuz 2022 tarihleri arasında Balıkesir Üniversitesi Tıp Fakültesi Psikiyatri polikliniğine başvuran hastaların verileri retrospektif olarak taranarak depresif bozukluk tanısı konulan ve serum magnezyum düzeyleri ölçülen 1013 hastanın verisi geriye dönük taranarak çalışmaya dahil edildi. Çalışmaya alınan 1013 hastanın 183'ünde serum glukoz, GGT ve kreatinin değerleri referans değerlerinin üzerinde olduğu için analiz dışı bırakıldı. **Bulgular:** Kadın hastaların %12.9'unun, erkek hastaların %9,1'inin serum magnezyum değerleri referans değerlerin (1,9-2,7 mg/dl) altındaydı. Tüm hasta, kadın ve erkek hasta grubu ortalama (±SD) magnezyum değerleri, toplum ortalamasına göre istatistiksel olarak anlamlı derecede farklıydı (2.02±0.15 mg/dl, 2.01±0.16 mg/dl ve 2.04±0.15 mg/dl ve P<0.001, P<0.001 ve sırasıyla P<0.001). Kadın ve erkek hastaların ortalama (±SS) yaşları sırasıyla 43.77(±15.43) ve 43.05 (±17.75) olarak bulundu. Magnezyum düzeyleri ile hastaların yaşı arasında istatistiksel olarak anlamlı bir ilişki gözlenmedi. **Sonuç:** Çalışmamızda depresif bozukluk tanılı hastaların %11.9'unda hipomagnezemi görülmüştür. Bu nedenle depresif bozukluk ile izlenen hastalarda hipomagnezemi saptanırsa depresif belirtilerin azaltılmasında etkili olabileceğinden replasmanının önemli olabileceğini düşünülmüştür.
**Anahtar Kelimeler:** Magnezyum, Depresyon, Adjuvan Terapi, Antidepresanlar.

***Sorumlu Yazar / Corresponding Author:*** Sinan ALTUNÖZ, Balikesir University, Faculty of Medicine, Department of Mental Health and Diseases, Balikesir, Türkiye
***E-mail:*** sinanaltunoz03@gmail.com

***Bu makaleye atıf yapmak için / Cite this article:*** Altunöz, S., Baykan, H., & Baykan, Ö. (2024). Evaluation of serum magnesium levels in patients with the diagnosis of depressive disorder applied to a psychiatry clinic: a retrospective study. *BAUN Health Sci J, 13*(1), 33-39. https://doi.org/10.53424/balikesirsbd.1276423

## INTRODUCTION

Depressive disorders are very common and costly disorders that are associated with reduced functioning and quality of life, medical comorbidity, and mortality. The global prevalence of depressive disorders has been reported to reach 268.2 million people worldwide (Vos et al., 2017). The neurobiological basis of depression is dysfunction in monoaminergic neurotransmission, particularly serotonergic dysregulation. Since the 1950s, the monoamine theory and selective serotonin reuptake inhibitors (SSRIs) and serotonin norepinephrine reuptake inhibitors (SNRIs) have influenced the development of antidepressant treatments (Morrissette & Stahl, 2014). The limitations of explaining and treating depression with the monoamine hypothesis, and the findings of a rapid antidepressant response to ketamine in patients with resistance to antidepressant therapy have shed light on the development of new antidepressant compounds and adjunctive therapy strategies (Berman et al., 2000).

Many different types of antidepressant drugs are currently available in the research and development of depression treatments and have been shown to be effective in randomized trials (Cipriani et al., 2018). Despite this fact, patients may find it difficult to find safe, tolerable, fast, effective and inexpensive treatment. At the same time, treatments such as antidepressant medications and psychotherapies can take weeks to take effect and often fail to completely relieve symptom. (Jorm, Patten, Brugha & Mojtabai, 2017).

Depressive disorders are currently one of the largest health expenditure categories, due to patients who are resistant to current treatments. Therefore, alternative treatment strategies gain importance. Among the alternative treatment strategies, ketamine is a possibly fast-acting compound used mainly in treatment-resistant cases. Initially used as an anesthetic and sedative agent, this drug has an antidepressant effect that occurs within hours and lasts for several days (Andrade et al., 2017).

Presumably, the functional results of ketamine and magnesium treatment show similarities. After administration of magnesium to mice, similar to the effects of ketamine, BDNF (Human Brain-Derived Neurotrophic Factor) expression increased in the brain of mice and synaptic sprouting occurred in their prefrontal cortex (Abumaria et al., 2011). Both ketamine and magnesium cause similar changes, such as increased expression of eukaryotic elongation factor- 2 and BDNF and exert similar effects on slow-wave sleep in humans (Duncan et al., 2012). Magnesium is the fourth most abundant mineral in the human body (Jorm, Patten, Brugha & Mojtabai, 2017), and it regulates various biochemical reactions in the body, including protein synthesis, muscular force, nervous impulse, and neuromuscular transmission, signal transduction, blood sugar and blood pressure, and vitamin D production. It is a cofactor in more than 1,000 enzyme systems and is required for the structural function of proteins, nucleic acids or mitochondria (Gröber, Schmidt & Kisters, 2015).

Magnesium is also an endogenous N-methyl D-aspartate receptor (NMDAR) antagonist (Castiglioni, Cazzaniga, Albisetti & Maier, 2013) and has anti-inflammatory properties that are closely related to depression, so magnesium deficiency in the brain can lead to excitotoxicity and the production of Reactive Oxygen Species (ROS) (Kim, Na & Myint, 2016).

Magnesium controls the HPA (hypothalamus-pituitary-adrenal) axis by reducing the release of adrenocorticotropic hormone (ACTH) and regulating ACTH sensitivity. Thus, magnesium can prevent the hyperactivation of the HPA axis seen in patients with depressive disorder (Wang, Um, Dickerman & Liu, 2018). Again, the effect of magnesium on the glutamatergic system has been compared to that of the glutamatergic regulator ketamine, which has fast-acting antidepressant effects (Górska et al., 2019). The ketamine-like effects of magnesium and the antidepressant properties of ketamine have increased attention to magnesium. At the same time, the relationship between magnesium and psychiatric diseases has attracted the attention of researchers, since magnesium has important functions in the central nervous system and can be easily measured in the blood.

Many studies have observed a relationship between depression and magnesium levels, but there are confusing results about the underlying functional mechanism of this relationship (Cubała, Landowski, Szyszko & Czarnowski, 2014).

Therefore, in our study, we aimed to evaluate serum magnesium levels in patients diagnosed with depressive disorder who applied to the psychiatry outpatient clinic. Our hypothesis is that patients followed up with depressive disorder have lower serum magnesium levels than the population average. Thus, we aimed to better understand the role of serum magnesium levels in the possible pathophysiology of depression and to present it as a treatment option in depression.

## MATERIALS AND METHODS

In this research study, the data of patients with a diagnosis of depressive disorder (ICD-10; F32- F32,9) were scanned, and the data of 1013 patients whose serum magnesium levels were checked retrospectively through the hospital information management system were included in the study.

The first measured magnesium levels at the admissions of the patients were taken into account and among this patient group, the data of the patients whose serum creatinine, GGT and glucose levels were outside the reference range due to systemic diseases that could affect the serum magnesium levels, and those with a history of malabsorptive diseases (eg, Crohn's disease,

ulcerative colitis, celiac disease, etc.) were excluded from the study.

**Statistical analysis**

The data were recorded in the Microsoft Excel 2016 program and SPSS 25.0 package program through the hospital information management system, and statistical analyzes were carried out through these programs. The distribution of the data was evaluated using appropriate statistical methods (Kolmogorov-Smirnov or Shapiro-Wilk tests) and visual graphics (histogram etc.). Student's t test or Mann- Whitney U test was used in the comparison of both groups, taking into account the distribution of the data. The chi-square test was used in the analysis of categorical data. In order to determine the relationship between the data, the Pearson correlation test was used for normally distributed data, and the Spearman correlation test was used for the evaluation of data that did not show normal distribution. $P<0.05$ was accepted as the level of statistical significance**.**

**Ethical considerations**

Before starting the study, ethical approval (decision no. 2022/81) was obtained from Balikesir University Health Sciences Non-Interventional Research Ethics Committee on 08.16. 2022.

**RESULTS**

Within the scope of this study, serum magnesium levels of the patients diagnosed with depressive disorder who applied to the psychiatry clinic were examined. Thus, the possible relationship between serum magnesium levels and age, gender and population mean magnesium levels was evaluated.

Systemic diseases (diabetes mellitus, alcoholism, acute-chronic, renal failure) that could potentially affect serum magnesium levels were scanned in a total of 1013 patients included in the study, and 183 patients whose serum glucose, GGT and creatinine values were above the reference ranges were excluded from the study. (Figure 1).

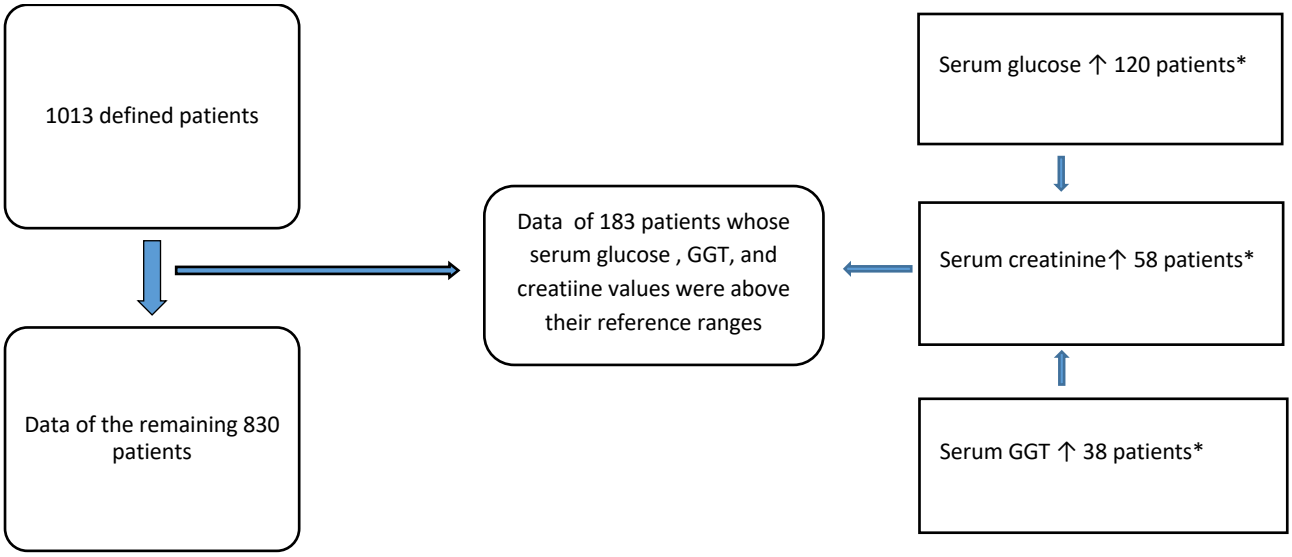


**Figure 1. Patient group.**

*Among 1013 patients included in the study, both serum glucose and creatinine values of 11; both serum glucose values and GGT values of 11 and both serum creatinine and GGT values of 3 patients were above the reference ranges. The remaining 830 patients consisted of 611 (73.6%) female, and 219 (26.3%) male cases. The mean (±SD) ages of female (43.77±15.43), male (43.05±17.75), and the whole patient groups (43.58±16.07) were as indicated (Table 1).

**Table 1. Descriptive statistics.**

| | Female (N=611) | Male (N=219) | Total (N=830) |
|---|---|---|---|
| **Gender** | 73.6% | 26.3% | 100% |
| **Age (Mean±SD) (years)** | 43.77±15.43 | 43.05±17.75 | 43.58±16.07 |
| **Mg+2(Mean±SD) (mg/dl)** | 2.01±0.16 | 2.04±0.15 | 2.02±0.15 |

**Table 2. Magnesium average statistics.**

| Beckman Coulter;1.9-2.7 mg/dl(2.3 mg/dl) | >2.3 mg/dl | <2.3 mg/dl |
|---|---|---|
| **Female** | 87.1% | 12.9% |
| **Male** | 90.9% | 9.1% |
| **Total** | 88.1% | 11.9% |

The population average value of magnesium was taken as 2.3 mg/dl according to the data of the manufacturer (Beckman Coulter; 1.9-2.7 mg/dl). The mean (±SD) value of magnesium in the total patient group was 2.02±0.15 mg/dl, with a statistically significant difference when compared with the population mean. (P<0.001).

The mean (±SD) values of magnesium in the female and male patient groups were 2.01±0.16 mg/dl and 2.04±0.15 mg/dl, respectively, with a statistically significant difference when compared with the population mean. (P<0.001, P<0.001). Serum magnesium values were below their reference ranges in 11.9% of all, 12.9% of female and 9.1% of male patient groups. (Table 2) Any statistically significant correlation could not be found between magnesium levels and age according to Pearson correlation analysis. (r=-0.19, P=0.589)

## DISCUSSION

In this retrospective study, 830 adult patients with measured serum magnesium levels who applied to the psychiatry clinic and were followed up with a diagnosis of known depressive disorder were examined by considering factors such as age, gender and underlying systemic diseases.

To summarize our results, when magnesium values of the patients followed up for depressive disorder in our study were evaluated based on the population magnesium average data of the manufacturer of the laboratory device used in the study; we observed that the serum magnesium values of 11.9% of the total patient group, 12.9% of the female and 9.1% of the male patient groups were below the reference values. When the mean (±SD) magnesium values of the total patient, female and male patient groups were compared with the population mean, a statistically significant difference was found between them. Any statistically significant relationship was not observed between magnesium levels and age according to Pearson correlation analysis.

Nutrients, including vitamins, minerals, fatty acids, and essential amino acids, affect neurological hormonal, neurotransmitter, and signaling pathways that modulate brain function, including cognitive functions and mood (Lang et al., 2015).

In rodent studies, magnesium deficiency has been shown to cause depression-like behavior (Singewald et al., 2004). Similarly, it has been observed that the administration of magnesium in addition to antidepressants in rodents can augment the beneficial effects of antidepressants (Poleszak et al., 2007).

A randomized controlled trial by Tarleton et al. with 126 adult participants demonstrates the antidepressive properties of magnesium and its potential use as an additive to antidepressant therapy. Chronic magnesium supplementation appears to improve depressive disorder symptoms even without a prior diagnosis of magnesium deficiency (Tarleton et al., 2017). In studies and case reports cited in the literature, the relationship between low serum magnesium levels of the patients followed up with depressive disorder and the possible antidepressant effects of magnesium has been emphasized (George & Karen, 2006).

Contrarily, some studies have associated patients with depressive disorder with high magnesium levels (Misztak, Opoka & Topór-Mądry, 2015). In a study of 53 patients with depression followed up without medication, Widmer et al. had divided patients into three groups according to the severity of the depression and compared them with 48 healthy volunteers and found that patients with moderate and high levels of depression had higher erythrocyte magnesium and also plasma Mg levels than patients with low depression or controls (Widmer et al., 1995). In a former study, Widmer et al. had observed that patients with a diagnosis of depressive disorder followed up without medication had higher erythrocyte and plasma magnesium than controls (Widmer et al., 1992). In the light of this information, although magnesium measurement methods seem to affect the results of the studies, the important functions of magnesium and the fact that hypomagnesemia is associated with a hyperexcitable state raises the question of whether high magnesium levels may have been found as a response to the possible negative effects of hypomagnesemia in untreated depressive disorder patients.

Since most of the magnesium is found inside cells or in bone it is difficult to assess serum magnesium levels. The most common and valuable test in clinical medicine for the rapid assessment of changes in magnesium levels is to measure serum magnesium concentration. However, serum magnesium levels do not correlate sufficiently with total body magnesium levels, or concentrations in certain tissues (Ismail & Ismail, 2010).

Bone is the most important reservoir for magnesium (approximately 60% of total body magnesium). Magnesium deficiency affects bone directly by reducing bone stiffness, increasing osteoclasts and reducing osteoblasts and indirectly by interfering with PTH and vit D synthesis with resultant aggravation of inflammation/oxidative stress and subsequent bone loss. Studies have shown that compared to healthy controls, osteoporotic patients have lower serum magnesium levels (Mederle et al., 2018). However, in our study any statistically significant relationship was not observed between magnesium levels and age according to Pearson correlation analysis. Consistent with the literature data, in our study the female patient group was more closely associated with hypomagnesemia relative to the male patient group.

Depression is an important health problem in elderly patients and nutritional factors seem to predispose to the development of depression (Chrzastek, Guligowska, Sobczuk & Kostka, 2022). Considering that hypomagnesemia will increase the severity of depressive symptoms with the contribution of the osteoporotic process, it is important to develop optimal dietary recommendations and perform magnesium replacement, especially in the elderly female population with depressive symptoms.

In the light of studies, it is predicted that enhancing the therapeutic efficacy of antidepressant drugs with various supplements such as magnesium targeting nutritional and physiological factors can increase their effectiveness. Although nutritional factors seem to be largely overlooked as potential pharmacological tools for the treatment of depressive disorders, both behavioral changes and mood improvement can be achieved by making up dietary deficiencies.

In a randomized placebo-controlled study of 60 adult participants, Rajizadeh et al. had revealed a decrease in depressive symptoms of the patients with magnesium deficiency (Rajizadeh, Mozaffari-Khosravi, Yassini-Ardakani & Dehghani, 2017). Similarly, Afsharfar et al. had observed a significant change in Beck depression scales but without any significant change in BDNF levels after treatment with magnesium replacement received by participants with depressive complaints (Afsharfar et al., 2021).

While magnesium supplementation appears to have antidepressive effects, at least in rodents and some human populations, high doses of magnesium supplementation can have a variety of side effects, so proper dosing conveys a critical importance. People need to consume magnesium regularly to prevent magnesium deficiency. However, since the recommended daily amount of magnesium varies, it is difficult to accurately determine exactly what the optimum daily intake should be (Song et al., 2005).

Magnesium supplementation is generally well tolerated, but it can occasionally cause gastrointestinal symptoms such as diarrhea, nausea and vomiting. Overdose of intravenous magnesium can cause thirst, hypotension, drowsiness, muscle weakness, respiratory depression, cardiac arrhythmia, coma, and death. Caution should be exercised in patients with renal impairment (Gröber, Schmidt & Kisters, 2015).

**Study limitations**

Due to the retrospective nature of our study, the patients could not be classified according to the severity of their depressive symptoms. Likewise, most patients included in the study were under at least one antidepressant treatment and the effect of drug use on magnesium levels could not be excluded.

## CONCLUSION

Conditions that can lead to hypomagnesemia include alcoholism, uncontrolled diabetes, malabsorption (eg, Crohn's disease, ulcerative colitis, celiac disease, short bowel syndrome, Whipple's disease), endocrine causes (eg, chronic kidney failure, dialysis, Gitelman syndrome), and medications including antibiotics, chemotherapeutic agents, diuretics and proton pump inhibitors (Gröber, 2006).

In our study, the data of 1013 patients were scanned in terms of diabetes, alcoholism and renal failure, and the data of 183 patients were excluded from the study because their serum glucose, GGT and creatinine values were above the reference ranges and the presence of possible causes that could lead to hypomagnesemia.

In conclusion, although contradictory results regarding serum magnesium levels of patients with depressive disorder have been reported in the literature, in our study magnesium deficiency was observed in 11.9% of the patients with depressive disorder, and in accordance with our hypothesis, the mean(±SD) serum magnesium levels of the patients with depressive disorder were statistically significantly different from the population average. The incidence of hypomagnesemia in the general population has been reported to range between 2% and 15% (Gragossian et al., 2022). This information suggests the presence of a close relationship between low serum magnesium levels and also asserts that magnesium deficiency has an important place in the pathophysiology of depression. As of the results of this research study, measurement of serum magnesium levels in patients followed up with a diagnosis of depressive disorder and appropriate supplementation in case of detection of hypomagnesemia is important as it may be effective in reducing depressive symptoms and we thought that our study may contribute to the literature regarding this issue. It is predicted that studies where the clinical course of depressive patients with hypomagnesemia are followed up after magnesium supplementation with reduction of confounding factors to a lowest level will give a better idea about this issue.

**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:** CC; **Material, methods and data collection:**CC, KS; **Data analysis and comments:** CC, KS; **Writing and corrections:**CC, KS.

**REFERENCES**

Abumaria, N., Yin, B., Zhang, L., Li, X. Y., Chen, T., Descalzi, G., et al. (2011). Effects of elevation of brain magnesium on fear conditioning, fear extinction, and synaptic plasticity in the infralimbic prefrontal cortex and lateral amygdala. *The Journal of neuroscience : the official journal of the Society for Neuroscience, 31*(42), 14871–14881. https://doi.org/10.1523/JNEUROSCI.3782-11.2011

Afsharfar, M., Shahraki, M., Shakiba, M., Asbaghi, O., & Dashipour, A. (2021). The effects of magnesium supplementation on serum level of brain derived neurotrophic factor (BDNF) and depression status in patients with depression. *Clinical nutrition ESPEN, 42*, 381–386. https://doi.org/10.1016/j.clnesp.2020.12.022

Andrade C. (2017). Ketamine for Depression, 1: Clinical Summary of Issues Related to Efficacy, Adverse Effects, and Mechanism of Action. *The Journal of clinical psychiatry, 78*(4), e415–e419. https://doi.org/10.4088/JCP.17f11567

Chrzastek, Z., Guligowska, A., Sobczuk, P., & Kostka, T. (2023). Dietary factors, risk of developing depression, and severity of its symptoms in older adults-A narrative review of current knowledge. *Nutrition (Burbank, Los Angeles County, Calif.), 106*, 111892. https://doi.org/10.1016/j.nut.2022.111892

Cipriani, A., Furukawa, T. A., Salanti, G., Chaimani, A., Atkinson, L. Z., Ogawa, Y., et al. (2018). Comparative efficacy and acceptability of 21 antidepressant drugs for the acute treatment of adults with major depressive disorder: a systematic review and network meta-analysis. *Lancet (London, England), 391*(10128), 1357–1366. https://doi.org/10.1016/S0140-6736(17)32802-7

Cubała, W. J., Landowski, J., Szyszko, M., & Czarnowski, W. (2013). Magnesium in drug-naïve patients with a short-duration, first episode of major depressive disorder: impact on psychopathological features. *Magnesium research, 26*(4), 192–198. https://doi.org/10.1684/mrh.2014.0355

Eby, G. A., & Eby, K. L. (2006). Rapid recovery from major depression using magnesium treatment. *Medical hypotheses, 67*(2), 362–370. https://doi.org/10.1016/j.mehy.2006.01.047

Górska N., Sáupski J., Szaáach ŁP., Wáodarczyk A., Szarmach J., Jakuszkowiak-Wojten K., et al. (2019). Magnesium and ketamine in the treatment of depression. *Psychiatr. danubina 31*(Suppl. 3) 549–553.

Gragossian, A., Bashir, K., Bhutta, B. S., & Friede, R. (2022). Hypomagnesemia. *In StatPearls*. StatPearls Publishing.

Gröber, U., Schmidt, J., & Kisters, K. (2015). Magnesium in Prevention and Therapy. *Nutrients, 7*(9), 8199–8226. https://doi.org/10.3390/nu7095388

Gröber U. (2006). Interaktionen zwischen Arzneimitteln und Mikronährstoffen [Interactions between drugs and micronutrients]. *Medizinische monatsschrift fur pharmazeuten, 29*(1), 26–35.

Ismail, Y., Ismail, A. A., & Ismail, A. A. (2010). The underestimated problem of using serum magnesium measurements to exclude magnesium deficiency in adults; a health warning is needed for "normal" results. *Clinical chemistry and laboratory medicine, 48*(3), 323–327. https://doi.org/10.1515/CCLM.2010.077

Jorm AF, Patten SB, Brugha TS, Mojtabai R. (2017). Has increased provision of treatment reduced the prevalence of common mental disorders? Review of the evidence from four countries. *World Psychiatry*, 16:90–99.

Kim YK, Na KS, Myint AM. (2016). The role of pro-inflammatory cytokines in neuroinflammation, neurogenesis and the neuroendocrine system in major depression. *Progress in neuro-psychopharmacology & biological psychiatry*, 64:277–284.

Lang, U. E., Beglinger, C., Schweinfurth, N., Walter, M., & Borgwardt, S. (2015). Nutritional aspects of depression. *Cellular physiology and biochemistry : international journal of experimental cellular physiology, biochemistry, and pharmacology, 37*(3), 1029–1043. https://doi.org/10.1159/000430229

Mederle, O. A., Balas, M., Ioanoviciu, S. D., Gurban, C. V., Tudor, A., & Borza, C. (2018). Correlations between bone turnover markers, serum magnesium and bone mass density in postmenopausal osteoporosis. *Clinical interventions in aging, 13*, 1383–1389. https://doi.org/10.2147/CIA.S170111

Misztak P, Opoka W, Topór-Mądry R. (2015). The serum concentration of magnesium as a potential state marker in patients with diagnosis of bipolar disorder. *Psychiatria polska, 49*: 1277- 87.

Morrissette, D. A., & Stahl, S. M. (2014). Modulating the serotonin system in the treatment of major depressive disorder. *CNS spectrums*, 19 Suppl 1, 57–68. https://doi.org/10.1017/S1092852914000613

Poleszak, E., Wlaź, P., Kedzierska, E., Nieoczym, D., Wróbel, A., Fidecka, S., et al. (2007). NMDA/glutamate mechanism of antidepressant-like action of magnesium in forced swim test in mice. *Pharmacology, biochemistry, and behavior*, *88*(2), 158–164. https://doi.org/10.1016/j.pbb.2007.07.018

Berman, R. M., Cappiello, A., Anand, A., Oren, D. A., Heninger, G. R., Charney, D. S., et al. (2000). Antidepressant effects of ketamine in depressed patients. *Biological psychiatry, 47*(4), 351–354. https://doi.org/10.1016/s0006-3223(99)00230-9

Rajizadeh, A., Mozaffari-Khosravi, H., Yassini-Ardakani, M., & Dehghani, A. (2017). Effect of magnesium supplementation on depression status in depressed patients with magnesium deficiency: A randomized, double-blind, placebo-controlled trial. *Nutrition (Burbank, Los Angeles County, Calif.)*, 35, 56–60. https://doi.org/10.1016/j.nut.2016.10.014

Singewald N., Sinner C., Hetzenauer A., Sartori S. B., Murck H. (2004). Magnesium-deficient diet alters depression- and anxiety-related behavior in mice – influence of desipramine and Hypericum perforatum extract. *Neuropharmacology 47* 1189–1197. 10.1016/j.neuropharm.2004.08.010.

Song, Y., Ridker, P. M., Manson, J. E., Cook, N. R., Buring, J. E., & Liu, S. (2005). Magnesium intake, C-reactive protein, and the prevalence of metabolic syndrome in middle-aged and older U.S. women. *Diabetes care, 28*(6), 1438–1444. https://doi.org/10.2337/diacare.28.6.1438

Tarleton, E. K., Littenberg, B., MacLean, C. D., Kennedy, A. G., & Daley, C. (2017). Role of magnesium supplementation in the treatment of depression: A randomized clinical trial. *PloS one, 12*(6), e0180067. https://doi.org/10.1371/journal.pone.0180067

Vos T., Abajobir A. A., Abbafati C., Abbas K. M., Abate K. H., Abd-Allah F., et al. (2017). Global, regional, and national incidence, prevalence, and years lived with disability for 328 diseases and injuries for 195 countries, 1990-2016: a systematic analysis for the Global Burden of Disease Study 2016. *Lancet 390* 1211–1259.

Duncan, W. C., Sarasso, S., Ferrarelli, F., Selter, J., Riedner, B. A., Hejazi, N. S., et al. (2013). Concomitant BDNF and sleep slow wave changes indicate ketamine-induced plasticity in major depressive disorder. *The international journal of neuropsychopharmacology, 16*(2), 301–311. https://doi.org/10.1017/S1461145712000545

Wang J., Um P., Dickerman B. A., Liu J. (2018). Zinc, magnesium, selenium and depression: a review of the evidence, potential mechanisms and implications. *Nutrients* 10:584. 10.3390/nu10050584

Widmer, J., Bovier, P., Karege, F., Raffin, Y., Hilleret, H., Gaillard, J. M., et al. (1992). Evolution of blood magnesium, sodium and potassium in depressed patients followed for three months. *Neuropsychobiology, 26*(4), 173–179. https://doi.org/10.1159/000118914

Widmer J, Henrotte JG, Raffin Y, Bovier P, Hilleret H, Gaillard JM. (1995). Relationship between erythrocyte magnesium, plasma electrolytes and cortisol, and intensity of symptoms in major depressed patients. J *Affectiv Disorder 34*(3), 201–209. https://doi.org/10.1016/0165-0327(95)00018-i

**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.1284998

# Retrospective Comparison of Percutaneous Forceps Dilatation Tracheostomy and Conventional Surgical Tracheostomy

Serkan UÇKUN[1], Hafize Fisun DEMİR[1], Fatih UGÜN[1], Nazan KOCAOĞLU[1], Özlem SAĞIR[1], Ahmet KÖROĞLU[1]

[1] Balikesir University, Faculty of Medicine, Department of Anesthesiology and Reanimation

***Geliş Tarihi / Received:*** *26.04.2023,* ***Kabul Tarihi / Accepted:*** *06.08.2023*

**ABSTRACT**

**Objective:** We aimed to retrospectively evaluate the early complications of conventional surgical and percutaneous forceps dilatation tracheostomies in intensive care patients. **Materials and Methods:** Electronic records of ICU patients hospitalized in our unit between 2019 and 2022 were retrospectively scanned. Demographic data, the tracheostomy tecnique and early complications related to the procedure were recorded. **Results:** A total of 64 patients underwent a tracheostomy in our ICU. 34 (53.2%) patients underwent conventional surgical tracheostomy (CST) and 30 (46.8 %) patients underwent percutaneous forceps dilatation tracheostomy (PFDT). The mean age of the patients was 73.30±14.45 y, and 29 (45.31%) patients were male. The mean length of intubation before the procedure was 19.36±7.76 days, it was significantly longer in the CST group (21.74±9.34 days) compared to the PFDT group (16.67±7.31 days) (p=0.02). Early complications occured in 7 patients (20.58%) in the CST, and in 5 patients (16.66%) in the PFDT group. **Conclusion:** We believe that in the rate of early complications of PFDT is similar to CST.

**Keywords:** Intensive Care, Percutaneous Tracheostomy, Complications.

# Perkütan Forseps Dilatasyon Trakeostomi ve Konvansiyonel Cerrahi Trakeostominin Retrospektif Karşılaştırılması

**ÖZ**

**Amaç:** Yoğun bakım hastalarında retrospektif olarak, konvansiyonel cerrahi ve perkütan forseps dilatasyon trakeostomilerinin erken dönem komplikasyonlarını değerlendirmeyi amaçladık. **Gereç ve Yöntem:** 2019-2022 yılları arasında ünitemizde yatan yoğun bakım hastalarının elektronik kayıtları retrospektif olarak tarandı. Demografik veriler, trakeostomi tekniği ve işleme ilişkin erken komplikasyonlar kaydedildi. **Bulgular:** Yoğun bakım ünitemizde toplam 64 hastaya trakeostomi açıldı. 34 (%53.2) hastaya konvansiyonel cerrahi trakeostomi (KCT) ve 30 (%46.8) hastaya perkütan forseps dilatasyon trakeostomi (PFDT) uygulandı. Hastaların yaş ortalaması 73.30±14.45 idi ve 29 (%45.31) hasta erkekti. İşlem öncesi ortalama entübasyon süresi 19.36±7.76 gün olup, KCT grubunda (21.74±9.34 gün) PFDT grubuna göre (16.67±7.31 gün) anlamlı olarak daha uzundu (p=0.02). KCT'de, 7 hastada (%20.58) PFDT grubunda 5 hastada (%16.66) erken komplikasyon gelişti. **Sonuç:** PFDT'nin erken komplikasyon oranlarının KCT'ye yakın olduğunu düşünüyoruz.

**Anahtar Kelimeler:** Yoğun Bakım, Perkütan Trakeostomi, Komplikasyonlar.

***Sorumlu Yazar / Corresponding Author:*** Serkan UÇKUN, Balikesir University, Faculty of Medicine, Department of Anesthesiology and Reanimation, Balikesir, Turkey
***E-mail:*** serkan.uckun@balikesir.edu.tr

***Bu makaleye atıf yapmak için / Cite this article:*** Uckun, S., Demir, H. F., Ugun, F., Kocaoglu, N., Sagir, O., & Koroglu, A. (2024). Retrospective comparison of percutaneous forceps dilatation tracheostomy and conventional surgical tracheostomy. *BAUN Health Sci J, 13*(1), 40-44. https://doi.org/10.53424/balikesirsbd.1284998

## INTRODUCTION

Tracheostomy should be considered for patients with respiratory failure who need long-term mechanical ventilation (over ten days) in the intensive care unit (ICU) (Hosokawa et al., 2015). Tracheostomy is preferred due to its advantages such as reducing the need for sedation and facilitating weaning from the ventilator (Delaney et al., 2006; Hosokawa et al., 2015). In addition, it has been reported to improve patient comfort, oral nutrition, hygiene and communication (Bösel, 2014). Apart from these, it is preferred to overcome upper airway obstruction (including vocal cord paralysis), and for neurological disorders which require airway protection.

In conventional surgical tracheostomy (CST), the surgeon makes an incision (tracheotomy) below the anterior part of the neck at the midline. After passing the skin, connective tissues and muscle structures, the second and third tracheal cartilages are reached. The tracheostomy cannula is placed following this line. In recent years, the percutaneous dilatation tracheostomy (PDT); which can be performed safely at the bedside; gained popularity (Hashimoto et al., 2014). With this technique, the trachea is reached with the help of a punction needle. After the insertion of a guidewire through the needle the tracheostomy cannula is placed into the trachea. The skin, tissues and trachea are dilated with one or multipl dilatators according to the method. Studies in the literature report that PDT is easier, safer and more advantageous in terms of complications compared to surgical tracheostomy (Cabrini et al.,2012; Higgins & Punthake, 2007).

Numerous studies have compared different PDT techniques with each other or with CST. Many methods have been described previously, but Ciaglia et al. (1985) and Griggs et al. (1990) are the most frequently used. The Griggs method; which is found to be easier and safer than standard tracheostomy techniques, facilitates the procedure by using a forceps. Thereby described as percutaneous forceps dilatation tracheostomy (PFDT) (Griggs et al.,1990). In addition, it has been shown that the complication rate of PDT is low with the Griggs technique (Cicek et al., 2007). For this reason, we prefer to perform PFDT with the Griggs technique in our ICU.

The aim of our study was to compare the early complication rates between PFDT and CST tracheostomy.

## MATERIALS AND METHODS

### Study type

In this retrospective study, the files of patients admitted to the intensive care unit of our university hospital between 2019-2022 were scanned.

### Procedures

Patients who underwent tracheostomies were identified and patient data was further evaluated. The reasons for hospitalization, death or discharge status were recorded.

The inclusion criteria of the patients were determined as being older than 18 years of age, not having had a tracheostomy before, and being hospitalized in the intensive care unit for 72 hours or more. The exclusion criteria of the patients were determined as tracheostomy opening during admission to the intensive care unit and lack of patient data. Demographic data, length of intubation (in days), tracheostomy technique (surgical or percutaneous), application site, laboratory values before the procedure and location of the procedure (ICU or operating theatre) were collected. Complications during and in the early period after the procedure were evaluated. Complications during the procedure were determined as airway loss, hypoxemia and cardiopulmonary arrest. Complications in the early period after the procedure were determined as minor bleeding, major bleeding, subcutaneous emphysema, pneumothorax, malposition of the cannula and cartilage damage. Blood leakage from the stoma or through the cannula which could be treated without surgical intervention was defined as minor bleeding, if surgical intervention was necessary it was defined as major bleeding.

### Statistical analysis

In this study, statistical analyzes were performed with NCSS (Number Cruncher Statistical System) 2007 Statistical Software (Utah, USA) package program. Distribution of variables was examined with the Shapiro-Wilk normality test. The independent t-test was used to compare the normally distributed variables between paired groups. Mann-Whitney U test was used for comparison of not normally distributed pairwise groups. Chi square test was used for the comparison of qualitative data. P values under 0.05 were regarded as statistically significant.

### Ethical considerations

After the approval of the Balıkesir University Faculty of Medicine Clinical Research Ethics Committee, the files of the patients who were administered to the ICU of our University hospital between 2019-2022 were scanned (Approval no: 2023/16).

## RESULTS

Files of 659 patients, who were admitted to the ICU between 2019-2022, were evaluated. 64 patient who underwent tracheostomy with PFDT or CST were included. Those who underwent PFDT were classified as Group P, and those who underwent CST were classified as Group C. There was no difference between groups in means of age and gender (Table 1). ($p>0.05$)

The reasons for admission to the ICU are listed in Table 2. The mean length of intubation before the procedure was 19.36±7.76 days, it was significantly longer in the CST group (21.74±9.34 days) compared to the PFDT group (16.67±7.31 days) ($p=0.02$).

Conventional surgical tracheostomies were performed under general anesthesia by otolaryngologists in the operating room.

**Table 1. The distribution of mean age and gender of the patients.**

| | | All Patients (n:64) | | Group P (n:30) | | Group C (n:34) | | p |
|---|---|---|---|---|---|---|---|---|
| **Age** | | 73.30±14.45 | | 76.6±9.47 | | 70.38±17.35 | | 0.086 |
| **Gender** | **Male** | 29 | 45.31% | 12 | 40.00% | 17 | 50.00% | 0.423 |
| | **Female** | 35 | 54.69% | 18 | 60.00% | 17 | 50.00% | |

The percutaneous method was applied by anesthetists at the bedside in the intensive care unit using a tracheostomy tube kit (SCW, Shenzhen, P.R. China). All patients were orotracheal intubated and mechanically ventilated during the procedures. Bronchoscopy was not used during the procedure. All patients received standart monitorisation including electrocardiography, pulse oxymetry and invasive/noninvasive blood pressure measurements. Patients in both groups received anesthesia with propofol, fentanyl and rocuronium. Platelet count, activated partial thromboplastin time and prothrombin time values were within normal limits in all patients. Laboratory values were not different between groups. (p>0.05)

There was no statistically difference between minor and major bleeding between the groups respectively. Among the early complications no statistically significant difference was observed between the two groups in terms of malposition and emphysema (p=1, p=0.998) (Table 3)

In our study, 2 patients discharged from the intensive care unit were decannulated, 12 patients were discharged at home with mechanical ventilator.

None of the patients in both groups died due to complications during or after the procedure. Fifty cases (23 in group P, 27 in group C) died due to their underlying pathologies. There was no difference between the two groups in terms of mortality.

## DISCUSSION

We found that PFDT was similar to conventional surgical tracheostomy in terms of early complication rate. Although percutaneous tracheostomy is an easy method, the incidence of peroperative complications and death may be high when performed by inexperienced people (Crofts et al.,1995; Hutchinson & Mitchell, 1991). Patients may die in the early period because of serious complications such as subcutaneous emphysema and esophageal rupture as a result of a pseudo-transition formation (Memmedova et al. 2022). Perioperative complications, particularly cardiorespiratory arrest and death, are higher than surgical tracheostomy, but these reports are old and primarily relate to tracheostomies in patients not in the intensive care unit (Friedman, 1996).

There are also studies in which percutaneous tracheostomy was performed with the Griggs method and no cardiorespiratory arrest and perioperative death were reported in any patient (Ersoy et al., 2012; Seker et al., 2017). In our study, cardiorespiratory arrest and perioperative death were not observed. In our study 50 patients died because of underlying conditions.

**Table 2. Indications for ICU admission.**

| Diagnoses at Hospitalization | Group P (n:30) | | Group C (n:34) | | p |
|---|---|---|---|---|---|
| **Sepsis** | 3 | 10.00% | 4 | 11.76% | 0.812 |
| **Cancer** | 1 | 3.33% | 1 | 2.94% | 0.928 |
| **CHF** | 5 | 16.67% | 7 | 20.59% | 0.936 |
| **Neuromuscular diseases** | 2 | 6.67% | 0 | 0.00% | 0.481 |
| **CPR** | 6 | 20.00% | 3 | 8.82% | 0.359 |
| **Pulmonary** | 1 | 3.33% | 5 | 14.71% | 0,259 |
| **Neurological** | 12 | 40.00% | 11 | 32.35% | 0.707 |
| **Multi-trauma** | 0 | 0.00% | 3 | 8.82% | 0.241 |

CHF: Chronic Heart Failure, PCA: Post Cardiorespiratory Arrest

Gysin et al. studied 140 patients undergoing percutaneous and surgical tracheostomies, with 70 patients in each group, and reported minor complications like bleeding, difficulty in cannula insertion, pseudo-transition formation and subcutaneous emphysema in 11% of the patients in the surgical group and in 37% in the percutaneous group (Gysin, 1999). In percutaneous tracheostomy, usually 50-100 mL blood loss leaking from the stoma is observed (VanHeurn et al., 1996). Minor bleeding may occur in prolonged procedures and can often be

**Table 3. Early complications.**

| Early complications | | All Patient Group (n:64) | | Group P (n:30) | | Group C (n:34) | | p |
|---|---|---|---|---|---|---|---|---|
| | None | 52 | 81.25% | 25 | 83.33% | 27 | 79.41% | - |
| | Minör bleeding | 6 | 9.38% | 4 | 13.33% | 2 | 5.88% | 0.665 |
| | Major bleeding | 3 | 4.69% | 0 | 0.00% | 3 | 8.82% | 0.242 |
| | Malposition | 2 | 3.13% | 1 | 3.33% | 1 | 2.94% | 1 |
| | Emphysema | 1 | 1.56% | 0 | 0.00% | 1 | 2.94% | 0.998 |

controlled with compression, but ligation may be required in major bleeding (Petros & Engelmann, 1997). In our study, major bleeding requiering surgical intervention was observed in 3 patients in the CST group only. Minor bleeding was Patients can be decannulated by closing the stoma after percutaneous tracheostomy, which is an important step to save the tracheostomy patient from mechanical ventilation (Singh et al., 2017). Or, as in the study of Marchese et al., the patient can be discharged with a mechanical ventilator at home with a tracheostomy with or without a mechanical ventilator at home. (175 patients) (Marchese et al., 2010). In our study, 2 patients were decannulated, one patient had CST and one patient had tracheostomy with PFDT technique. 12 patients were discharged with home ventilator.

Retrospective study design, the small number of patients, unability to present long-term complication rates due to the lack of data are the limitations of this study. Also the tracheostomy procedures were only performed with CST between 2019-2021 because the tracheostomy tube kit was not available this is another limitation.

We attribute the longer mean intubation time before conventional surgical tracheostomy to the operating room preparation process and the intensity of the operating room work schedule.

## CONCLUSION

As a result of our study, we thought that the early complication rates of PFDT were similar to CST.

**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:** SU; HFD, FU, NK, OS, AK **Material, methods and data collection:** HFD, FU, NK, OS, AK; SU **Data analysis and comments:** SU, HFD, FU, NK, OS, AK **Writing and corrections:** SU; HFD, FU, NK, OS, AK.

## REFERENCES

Bösel, J. (2014). Tracheostomy in stroke patients. *Current Treatment Options in Neurology, 16*(1), 274. https://doi.org/10.1007/s11940-013-0274-1.

Cabrini, L., Monti, G., Landoni, G., Biondi-Zoccai, G., Boroli, F., Mamo, D., Plumari, V. P., Colombo, S., & Zangrillo, A. (2012). Percutaneous tracheostomy, a systematic review. *Acta Anaesthesiologica Scandinavica, 56,* 270-81. https://doi.org/10.1111/j.1399-6576.2011.02592.x.

Cicek, M., Gedik, E., Yücel, A., Köroglu, A., & Ersoy, M.O. (2007). Our conclusions at percutaneous tracheostomy performed with Griggs Technique. *Journal of Inonu University Medical Faculty, 14*(1), 17-20.

Crofts, S.L., Alzeer, A., McGuire, G.P.,Wong, D.T., & Charles D. (1995). A comparison of percutaneous and operative tracheostomies in intensive care patients. *Canadian Journal of Anaesthesia, 42,* 775-79. https://doi.org/10.1007/BF03011175.

Delaney, A., Bagshaw, S.M., & Nalos, M. (2006). Percutaneous dilatational tracheostomy versus surgical tracheostomy in critically ill patients: a systematic review and meta-analysis. *Critical Care, 10*(2), R55. https://doi.org/10.1186/cc4887.

Ersoy, A., Ali, A., Ünlü, N., Kara, D,. & Turgut, N. (2012). 53 Percutaneous tracheostomy cases performed with Griggs Method. *European Archives Of Medical Research, 28*(3), 134-137. https://doi.org/10.5222/otd.2012.134.

Friedman, Y. (1996). Indications, timing, techniques and complications of tracheostomy in the critically ill patient. *Current Opinion in Critical Care, 2*(1), 47-53.

Griggs, W.M., Worthley, L.I.G., Gilligan, J.E., Thomas, P.D., & Myburg, J.A.(1990). A simple percutaneous tracheostomy technique. *Surgery, Gynecology and Obstetrics, 170*, 543-5.

Gysin, C. (1999). Percutaneous versus surgical tracheostomy: a double-blind randomized trial. *Annals of Surgery, 230*, 708-14. https:// doi: 10.1097/00000658-199911000-00014.

Hashimoto, D.A., Axtell, A.L., & Auchincloss H. G. (2014). Percutaneous tracheostomy. *The New England Journal of Medicine*, *383*, 20. https://doi.org/10.1056/NEJMvcm2014884.

Higgins, K. M., & Punthake, X. (2007). Meta-analysis comparison of open versus percutaneous tracheostomy. *Laryngoscope*, *117*, 447-54. https://doi.org/10.1097/01.mlg.0000251585.31778.c9.

Hosokawa, K., Nishimura, M., Egi, M., & Vincent J. L. (2015). Timing of tracheotomy in ICU patients: a systematic re view of randomized controlled trials. *Critical Care*, *19*, 424. https://doi.org/10.1186/s13054-015-1138-8.

Hutchinson, R.C., & Mitchell, R. D. (1991). Life-threatening complications from percutaneous dilatational tracheostomy. *Critical Care Medicine*, *19*, 118-20. https://doi.org/10.1097/00003246-199101000-00027.

Marchese, S., Corrado, S., Scala, R., Corrao, S., & Ambrosino, N. (2010). Tracheostomy in patients with long-term mechanical ventilation: A survey. *Respiratory Medicine, 104*(5), 749-53. https://doi.org/10.1016/j.rmed.2010.01.003.

Memmedova, F., Akarsu, F.G., Mehdiyev, Z., Aykaç, Ö., Pınarbaşlı, M.Ö., Gürbüz, M.K., & Özdemir, A.Ö.(2022). Evaluation of percutaneous and surgical tracheostomy results in neurocritical care unit. *Turkish Journal Neurology*, *28*, 31-37. https://doi.org/10.4274/tnd.2022.77200.

Seker, Y. T., Tülübaş, E. K., Hergünsel, O., & Çukurova, Z. (2017). Evaluation of late term complications dilatation tracheostomy of intensive care unit. *Medical Journal of Bakırköy, 13*(4), 170-74. https://doi.org/10.5350/BTDMJB.20170110061719.

Singh, R.K., Saran, S., & Baronia, A.K. (2017). The practice of tracheostomy decannulation—a systematic review. *Journal of Intensive Care, 5*, 38. https://doi.org/10.1186/s40560-017-0234-z.

Petros, S., & Engelmann, L. (1997). Percutaneous dilational tracheostomy in a medical ICU. *Intensive Care Medicine*, *23*, 630-4. https://doi.org/10.1007/s001340050385.

VanHeurn, L.W., VanGeffen, G.J., & Brink, P.R. (1996). Clinical experience with percutaneous dilational tracheostomy: Report of 150 cases. *The European Journal of Surgery*, *162*, 531-5.

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.1339642

# Determination of Efficacies of Thyme and Eucalyptus Oils and Oxalic Acid to Combat Varroosis in Honey Bees

Mehmet OZUICLI [1], Ahmet Onur GIRISGIN [2], Ihsan KISADERE [3], Ozkan DEMIRBAS [4]
Yasin BAYKALIR [5]

[1] Balıkesir University, Faculty of Veterinary Medicine, Department of Parasitology,
[2] Bursa Uludag University, Faculty of Veterinary Medicine, Department of Parasitology,
[3] Balıkesir University, Faculty of Veterinary Medicine, Department of Physiology,
[4] Balıkesir University, Faculty of Science and Literature, Department of Chemistry,
[5] Balıkesir University, Faculty of Veterinary Medicine, Department of Biostatistics

***Geliş Tarihi / Received:*** *08.08.23,* ***Kabul Tarihi / Accepted:*** *06.10.23*

**ABSTRACT**
**Objective:** The subject of our study is to determine the efficacies of the natural products such as thyme oil, eucalyptus oil, and oxalic acid against *Varroa destructor* ectoparasite, which is widely observed in honey bee (*Apis mellifera* L.) colonies both in our country and worldwide **Materials and Methods:** The study was designed as five groups and these groups were separated into Group 1 (oxalic acid), Group 2 (thyme), Group 3 (eucalyptus), Group 4 (positive control), and Group 5 (negative control). Seven honey bee colonies were included in each group. The first, second, and third groups were designed as the treatment groups and the last two groups were kept as positive and negative control groups. Each group consisted of seven hives. In the treatment groups; oxalic acid was dissolved in glycerin, and thyme and eucalyptus oils were dissolved in ethyl alcohol and absorbed into special towels. Two pieces of special towels per beehive were placed on to the frames in the beehives. The treatments applied weekly for three weeks during September. The treatment efficiencies calculated with the Henderson-Tilton formula and the General Linear Model procedure determined the statistical differences between the oxalic acid, thyme oil, and eucalyptus oil treatment groups. **Results:** The treatment efficiencies determined as 91.74%, 82.25%, and 79.2% in oxalic acid, thyme oil, and eucalyptus oil treatment groups, respectively. **Conclusion:** The findings revealed that completely natural herbal extracts and oxalic acid can be used instead of synthetic chemical drugs against *Varroosis*. Toxication and unnatural deaths were not observed in honey bees throughout the trials.
**Keywords:** Varroosis, Oxalic acid, Thyme, Eucalyptus.

# Kekik ve Ökaliptus Yağları ile Okzalik Asidin Bal Arılarında Varroosis Mücadelesindeki Etkinliklerinin Belirlenmesi

**ÖZ**
**Amaç:** Çalışmamızın amacı, bal arısı (*Apis mellifera* L.) kolonilerinde hem ülkemizde, hem de Dünyada yaygın olarak gözlemlenen *Varroa destructor* ektoparazitine karşı doğal ürünler olan timol ve ökaliptus yağları ile okzalik asidin etkinliklerini belirlemektir. **Gereç ve Yöntem:** Çalışma, beş gruptan oluşmuştur ve bu gruplar; Grup 1 (okzalik asit), Grup 2 (kekik), Grup 3 (okaliptus), Grup 4 (pozitif kontrol) ve Grup 5 (negatif kontrol) olarak isimlendirilmiştir. Her gruba, yedi adet bal arısı kolonisi dâhil edilmiştir. Birinci, ikinci ve üçüncü gruplar tedavi gruplarını ve son iki grup da pozitif ve negatif kontrol gruplarını oluşturacak şekilde tasarlanmıştır. Tedavi gruplarında; okzalik asit gliserinde, kekik ve ökaliptus yağları etil alkolde çözdürülerek özel havlulara emdirilmiştir. Havlular, kovanlardaki çerçevelerin üzerine konulmuş ve her kovana ikişer adet yerleştirilmiştir. Tedaviler, Eylül ayında haftada bir olmak üzere, toplamda üç kez uygulanmıştır. Tedavi etkinlikleri ise Henderson-Tilton formülü ile hesaplanmış olup okzalik asit, kekik ve ökaliptus yağları tedavi grupları arasındaki istatistiksel fark, Genel Lineer Model prosedürü ile tespit edilmiştir. **Bulgular:** Tedavi etkinlikleri; okzalik asit, kekik ve ökaliptus yağları tedavi gruplarında sırasıyla %91.74 %82.25 ve %79.2 olarak tespit edilmiştir. **Sonuç:** Elde edilen bulgular, Varroosis'e karşı sentetik kimyasal ilaçlar yerine, tamamen doğal bitkisel ekstraktların ve okzalik asitin kullanılabileceğini ortaya koymuştur. Saha denemeleri boyunca, bal arılarında toksikasyon belirtileri ya da doğal olmayan ölümler gözlenmemiştir.
**Anahtar Kelimeler:** Varroosis, Okzalik asit, Kekik, Ökaliptus.

***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., Girisgin, A. O., Kisadere, I., Demirbas, O., & Baykalir, Y.. (2024). Determination of the efficacy of thymol, eucalyptus and oxalic acid in the control of varroosis in honey bees. *BAUN Health Sci J, 13*(1), 45-50. https://doi.org/10.53424/balikesirsbd.1339642

## INTRODUCTION

*Varroa destructor* is one of the most frequently observed ectoparasites in honey bees worldwide (McMenamin&Genersch, 2015). It transports many viral agents like Deformed Wing Virus (DWV), Israeli Acute Paralysis Virus (IAPV), Acute Bee Paralysis Virus (ABPV) and Black Queen Cell Virus (BQCV) (Durand et al., 2023). Colonies with an untreated *Varroa* burden cannot survive over two years. *Varroosis*-infected colonies produce less honey than treated colonies (Emsen et al., 2014).

In terms of treatment, synthetic chemicals were thought to be the best in controlling *Varroa* for many years and the most important of these chemicals are pyrethroids and organophosphates (Calderone et al, 1994). The various studies have revealed that the resistance against these chemicals has developed in *V. destructor* over time. In addition, the excessive use of these chemicals has revealed the residue problem in bee products, especially honey and beeswax. Therefore, the use of organic acids, essential oils, and their derivatives,which are natural compounds are in rise (Bahreini et al., 2004).

Oxalic acid is generally used in honey bees against *Varroosis* by evaporating and trickling methods (Charriere&Imdorf, 2002). The activities vary by location, season, and mostly on the presence or absence of brood. Oxalic acid should be used in broodless conditions without side effects (Rademacher & Harz, 2006). Another way to reduce *Varroa* mites is essential oils. Among natural compounds, essential oils are the most important compounds used instead of chemical compounds against *Varroa*. The studies have shown that using essential oil against *V. destructor* causes less stress in honey bees than using organic acids (Conti et al., 2020).

Thymol (2-isopropyl-5-methylphenol) is a monoterpenoid phenol in thyme essential oil with significant acaricid activity. It causes the death of *Varroa* agent by binding to octopamine and gamma butyric acid receptors in the central nervous system (Escobar et al., 2020).

Eucalyptus essential oil finds extensive use in pharmaceuticals, perfumery, and industry (Hanoğlu et al., 2022). It has a repellent effect against insects and has also been known for its antifungal, antibacterial, and antiseptic properties for centuries (Chandel et al., 2021).

Essential oils have promising efficacy in *invitro* studies but most of their usage has not been tested in field areas. Therefore, the researchers have been trying to find the most effective oil components against *Varroa* mites. This study was designed to determine the activities of organic products like thyme oil, eucalyptus oil, and oxalic acid against *Varroa* in naturally-infested honey bee colonies.

## MATERIALS AND METHODS

### Study area

This study was carried out in Balıkesir Province in September 2022. Balıkesir is located in the Southern part of the Marmara Region of Türkiye (39º40'N-26º28'E).

### Honey bee information

The local hybrid bee breeds (*Apis mellifera* L.) were studied. The queen bees in all hives were one year old. During the period of the study, honey bee colonies averaged between 30,000 and 35,000 individuals. Before the study, the honey bee's owner confirmed that no chemical or plant extract was used to treat any pathogens.

### Field experiment and detection of *Varroa* mites

There were 50 hives in the apiary where the study was carried out. First, 50 hives were examined regarding *Varroosis* positivity/negativity using the powdered sugar method. Approximately 300–350 worker honey bees from the brood combs were brushed into 900 ml *Varroa* tester jars where the circular middle part of the caps was removed and replaced with a 3.1 mm sieve. Then, about two tablespoons (15 g) of powdered sugar was added through a sieve. The jars were rolled to distribute the sugar evenly over the bees. One minute later, the jar and honey bees were shaken vigorously for about 4 minutes on a white paper plate and the displaced *Varroa* were counted (Dietemann et al., 2013). *Varroa* tester jar and *Varroa* mites are shown in Figure 1 and Figure 2, respectively. Pollen drawers were cleaned before each trial and covered with white paper to count the *Varroa* mites that fell in each application.

**Figure 1. Varroa monitoring with tester jars.**

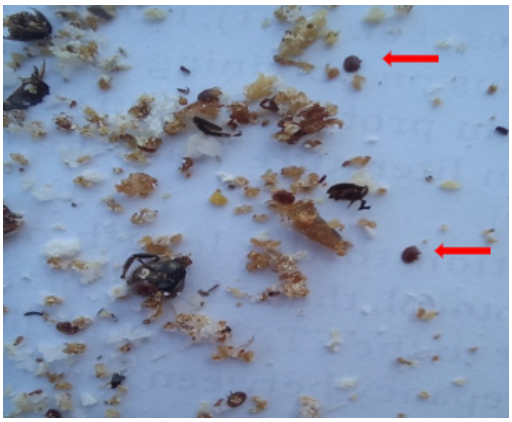

**Figure 2. Varroa mitess are shown in red arrow.**

**Preparation of essential oils and oxalic acid**

The information about the thyme oil (Yeşilvadi Botanical Products, Türkiye); 100% purity, active ingredients: p-cymene (8.25%), γ-terpinene (31.35%) and thymol (48.50%), linear formula: 2-[$(CH_3)$2CH]$C_6H_3$-5-$(CH_3)$OH, molecular weight: 150.20 g/mol. Eucalyptus oil (Yeşilvadi Botanical Products, Türkiye); 100% purity, active ingredients: eucalyptol (50.22%), α-pinene (24.78%), p-cymene (9%), and β-cymene (9.24%), linear formula: $C_{10}H_{18}O$| ID 2758, molecular weight: 153.20 g/mol. Oxalic acid dihydrate; linear formula: $(COOH)_2 \cdot 2H_2O$, CAS number: 6153-56-6, molecular weight: 126.07. Seventy-two grams of oxalic acid (Sigma–Aldrich®) was dissolved in 30 ml of water at 60–70°C and then mixed with 78 ml of glycerin. Twelve pieces of paper towels were dipped in to the solution and left for 30 minutes. Each towel absorbs approximately 6 g of oxalic acid and 6.5 ml of glycerine. Two towels in each hive were placed on to the frames. Thirty-six ml of thyme oil were dissolved in 21 ml of ethanol, then 75 ml of water at 60–70°C and 78 ml of glycerin were added, respectively. Two towels in each hive are placed on to the frames. On the other hand, eucalyptus oil was prepared and applied like thyme oil (Sabahi et al., 2020).

**Treatment and control groups**

Thirty-five honey bee colonies in Langstroth-type hives consisting of six to seven frames were divided into five homogeneous groups. The treatments were applied weekly for three weeks during the fall season. The treatments were administered on days 0, 7, and 14. In each application, two towels were placed on to the frames in each hive. The towels used were changed every week and replaced with new ones. Powdered sugar counts were applied at day 0 (before treatment), day 7, day 14, and day 21 (post-treatment) for the determination of *Varroa* loads in honey bee colonies. Also, the dead mites that had dropped onto the pollen drawers were counted on the 1st, 3rd, 7th, 14th, and 21st days. As in the treatment groups, powdered sugar counts were performed on days 0, 7, 14, and 21 in the positive and negative control groups, and in addition, *Varroa* agents that fell into the pollen drawer were counted on days 1, 3, 7, 14, and 21 (Girisgin and Aydin, 2010).

**Determination and comparison of treatment efficacy**

The therapeutic efficacy of organic compounds was determined by the Henderson-Tilton formula shown below (Girisgin and Aydin, 2010).

$$\text{Corrected \%} = \left(1 - \frac{\text{n in Co before treatment x n in T after treatment}}{\text{n in Co after treatment x n in T before treatment}}\right) \text{x } 100$$

Where n= mite population, T= treated, Co= control

**Statistical analysis**

Statistical analyses of the study were performed in the IBM SPSS20 package program. In order to evaluate the effects of the factors used on different days together, the General Linear Model procedure was followed and interactive analysis of variance was applied by considering the 2×2 (Agent × Days) factorial experiment scheme. The statistical significance was considered when $P \leq 0.05$ (Collins et al., 2009).

**Ethical considerations**

Insect studies do not require ethics committee approval according to Türkiye's related law.

**RESULTS**

Thirty-five of 50 (70%) honey bee colonies were found to be positive and 15 of them (30%) were negative in terms of *Varroosis* by powdered sugar method. The hives with a negative test result do not mean that they are free of *Varroa*, but only that there is not enough mite load on the adult bee. Therefore, the treatment groups were selected with positive hives. Three hives were separated as treatment groups, a total of 21 hives out of 35 *Varroosis*-positive hives (60%). Seven of the remaining 14 *Varroosis*-positive hives formed the positive control group of the study. Seven out of 15 *Varroosis*-negative hives were selected as the negative group of the study considering their clinical status. Powdered sugar counts were applied at day 0 (before treatment), day 7, day 14, and day 21 (post-treatment) for the determination of *Varroa* loads in honey bee colonies and results are given in (Table 1).

*Varroa* count reduction was compared on days 0-7, 0-14, and 0-21. The maximum reduction was found between days 0–21 in the treatment groups. The decrease in a load of *Varroa* in oxalic acid, thyme oil and eucalyptus oil treatment groups on days 0–7 was 43.79%, 17.53% and 18.16%, respectively. The decrease in a load of *Varroa* in oxalic acid, thyme oil and eucalyptus oil treatment groups on days 0–14 was 68.21%, 45.67%, and 36.72%, respectively. The decrease in the load of *Varroa* in oxalic acid, thyme oil and eucalyptus oil treatment groups on days 0–21 was 84.88%, 67.53%, and 61.87%, respectively (Table 1).

The efficacies of natural compounds were calculated by applying the Henderson-Tilton formula to the results of the counts on days 0 and 21 and the treatment efficacies are given in Table 2. Table 2 shows the treatment efficacies were found in oxalic acid, thyme oil, and eucalyptus oil treatment groups at 91.74%, 82.25%, and 79.2%, respectively.

**Table 1. Mite counts by powdered sugar method according to days in treatment and control groups.**

| Hive No | Oxalic Acid | | | | Thyme Oil | | | | Eucalyptus Oil | | | | **Positive Control Group** | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | D.0 V.L | D.7 V.L | D.14 V.L | D.21 V.L | D.0 V.L | D.7 V.L | D.14 V.L | D.21 V.L | D.0 V.L | D.7 V.L | D.14 V.L | D.21 V.L | D.0 V.L | D.7 V.L | D.14 V.L | D.21 V.L |
| 1 | 45 | 30 | 20 | 8 | 40 | 35 | 28 | 20 | 50 | 42 | 30 | 25 | 56 | 67 | 78 | 89 |
| 2 | 55 | 30 | 15 | 7 | 50 | 38 | 25 | 18 | 52 | 43 | 35 | 27 | 34 | 45 | 67 | 78 |
| 3 | 67 | 37 | 20 | 10 | 62 | 47 | 30 | 20 | 64 | 51 | 40 | 30 | 45 | 59 | 80 | 67 |
| 4 | 78 | 40 | 20 | 6 | 70 | 52 | 35 | 25 | 73 | 55 | 39 | 21 | 56 | 78 | 79 | 89 |
| 5 | 89 | 45 | 25 | 12 | 80 | 59 | 38 | 25 | 85 | 67 | 55 | 35 | 34 | 56 | 78 | 90 |
| 6 | 90 | 50 | 26 | 15 | 85 | 70 | 45 | 20 | 87 | 74 | 58 | 28 | 56 | 78 | 81 | 80 |
| 7 | 92 | 58 | 38 | 20 | 75 | 80 | 50 | 22 | 90 | 78 | 60 | 25 | 35 | 75 | 82 | 85 |
| **T.** | **516** | **290** | **164** | **78** | **462** | **381** | **251** | **150** | **501** | **410** | **317** | **191** | **316** | **458** | **545** | **578** |
| Days | Treatment groups' % efficacies determined according to the days | | | | | | | | | | | | | | | |
| 0-7 | Oxalic Acid VCR=43.79 | | | | | | | | Thyme Oil VCR=17.53 | | | | Eucalyptus Oil VCR=18.16 | | | |
| 0-14 | Oxalic Acid VCR=68.21 | | | | | | | | Thyme Oil VCR=45.67 | | | | Eucalyptus Oil VCR=36.72 | | | |
| 0-21 | Oxalic Acid VCR=84.88 | | | | | | | | Thyme Oil VCR=67.53 | | | | Eucalyptus Oil VCR=61.87 | | | |
| Hive No | Negative Group Count Results | | | | | | | | | | | | | | | |
| 1 | D.0 V.L | | D.7 V.L | | D.14 V.L | | D.21 V.L | | | | | | | | | |
| 2 | 0 | | 2 | | 5 | | 12 | | | | | | | | | |
| 3 | 0 | | 3 | | 8 | | 23 | | | | | | | | | |
| 4 | 0 | | 4 | | 12 | | 34 | | | | | | | | | |
| 5 | 0 | | 7 | | 34 | | 45 | | | | | | | | | |
| 6 | 0 | | 12 | | 45 | | 56 | | | | | | | | | |
| 7 | 0 | | 23 | | 55 | | 67 | | | | | | | | | |

D.0=Day 0, D.7=Day 7, D.14=Day 14, D.21=Day 21, V.L=Varroa Load, T.=Total, VCR=Varroa Count Reduction

**Table 2. The Treatment efficacies according to days 0 and 21.**

| Days | Oxalic Acid *Varroa* Loads | VCR % | Thyme Oil *Varroa* Loads | VCR % | Eucalyptus Oil *Varroa* Loads | VCR % |
|---|---|---|---|---|---|---|
| Day 0 | 516 | 91.74 | 462 | 82.25 | 501 | 79.2 |
| Day 21 | 78 | | 150 | | 191 | |

It was determined that the percentage change in the number of *Varroa* in the pollen drawer increased from day 1 to day 21 in all treatment groups. In the pairwise comparison of day 1 with the other days, the percentage increase in the number of *Varroa* falling into the pollen drawer among the treatment groups was found the highest in the oxalic acid treatment group (153.01%). As a comparison of 1–3 days, percentage change in the number of *Varroa* in the pollen drawer of oxalic acid, thyme oil, and eucalyptus oil groups were found as 55.42%, 15.62%, 14.63%, respectively. This rate was determined as 60.24%, 31.25%, and 32.92% in the oxalic acid, thyme oil, and eucalyptus oil treatment groups between day 1 and day 7, respectively. This ratio was found to be 125.90%, 58.33%, and 54.43% in oxalic acid, thyme oil, and eucalyptus oil treatment groups between day 1 and day 14, and 153.01%, 81.25%, and 76.82% in the oxalic acid, thyme oil, and eucalyptus oil treatment groups on day 1 and day 21, respectively.

The statistical differences were determined between the agents used to control *Varroosis* and the days ($P<0.001$).

According to the powdered sugar count results, the highest *Varroa* load was determined in the positive control group (67.38), followed by eucalyptus oil (48.53), thyme oil (42.38), oxalic acid (35.00) and negative control group (18.63), respectively. The difference between days was statistically significant (P<0.001). According to the powdered sugar count results from the beginning of the study to day 21, infestation with *Varroa* gradually decreased. The interactions between the agents used in the treatment and the days were also found to be statistically significant (P<0.001). While the average number of *Varroa* was 70.67 in the group using oxalic acid at the beginning of the study (day 0), this number decreased to 9.67 at the end of the study (day 21). The average number of *Varroa* decreased from 64.50 to 21.33 in the thyme oil group and from 68.50 to 27.67 in the eucalyptus oil group. The average number of *Varroa* gradually increased in the positive and negative control groups.

The numbers of daily average *Varroas* falling into the pollen drawer were found to be 39.80 in the oxalic acid, 17.27 in thyme oil, 14.53 in eucalyptus oil, 3.20 in positive control, and 0.97 in negative control groups, respectively. While the average number of *Varroa* falling in the pollen drawer was 22 in the oxalic acid group on day 0, this number increased to 56 at the end of the study (day 21). Similarly, from 12.17 to 23.17 in the thyme oil group; increased from 10.33 to 19.50 in the eucalyptus oil group. Both the main effects (P<0.001) and interactions between administration and days (P=0.001) were statistically significant.

## DISCUSSION

The papers suggest that both essential oils and oxalic acid have potential as control agenta against *Varroosis* in honey bees. Hýbl (2021) found that several essential oils, including manuka, peppermint, oregano, litsea, and cinnamon, were effective against *Varroa* mites and safe for honey bee workers under laboratory conditions. Umpiérrez (2010) reviewed the literature on essential oils with anti-*Varroa* activity and suggested that they are good candidates for safer control. Adjlane (2020) found that two doses of oxalic acid were effective for controlling Varroa mites, and that the effectiveness of oxalic acid is directly linked to the presence of brood at the time of the intervention. Adjlane (2016) found that oxalic acid treatment was effective for controlling *Varroa* mites, but that the dose of 100 g oxalic acid caused a weakening of honey bee colonies. In the study in which oxalic acid and thymol were tested in honey bee colonies, the oxalic acid application method was the same as ours. Two towels were placed on to the frames in each hive and the treatment efficiency was determined as 78.7±3.9% (Sabahi et al., 2020), while 91.74% success was achieved in our field studies with the same method. Also, 92.4±3.2% success was achieved in the thymol absorbing method (Sabahi et al., 2020), while 82.25% success was achieved in our field studies with the same method. Overall, the papers suggest that oxalic acid and plant essential oils are effective options for controlling *Varroosis* in honey bee colonies, but that proper dosing and timing are important factors to consider.

Although the total mite reduction in the positive control seems to be higher than in the control groups, there is a significant difference compared to the first days of treatment. The increase at the end of the third week is thought to be due to the decrease in the number of brood in the hive and similar results have been obtained in another study (Girişgin and Aydın, 2010).

In our study, the highest treatment efficacy against *Varroosis* was found in the oxalic acid treatment group. Some factors such as environmental, self-cleaning properties, essential oil ingredients or population, may lead to this difference.

## CONCLUSION

The results of our study suggest that thyme, eucalyptus, and oxalic acid could play an important role in the integrated management of Varroosis in honey bee colonies. Considering the increases in powder count, at least two treatments per year should be applied during the early first and late autumn periods to prevent Varroosis infestations. The possibility of using these natural agents in *Varroa* control in apiaries warrants further investigations.

**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 concerning for to the research, authorship, and/or publication of this article.

**Author Contributions**

**Plan, design:** MO; **Material, methods, and data collection:** IK, OD; **Data analysis and comments:** YB; **Writing and corrections:** AOG.

## REFERENCES

Adjlane, N., Tarek, E., & Haddad, N.J. (2016). Evaluation of oxalic acid treatments against the mite *Varroa destructor* and secondary effects on honey bees *Apis mellifera*. *Journal of Arthropod-Borne Diseases*, *10*, 501 - 509.

Adjlane, N., Smaoui, R., & Haddad, N.J. (2020). Study of the efficacy of oxalic acid and Thymovar (thymol) against the parasitic mite of the honey bee, *Varroa destructor*. *Egyptian Academic Journal of Biological Sciences*, *13*, 87-94. https://doi.org/10.21608/eajbsa.2020.120604

Bahreini, R., Tahmasebi, G. H., Nowzari, J., & Talebi, M. (2004). A study of the efficacy of formic acid in controlling *Varroa destructor* and its correlation with temperature in Iran. *Journal of Apicultural Research,* *43*(4), 158-161. https://doi.org/10.1080/00218839.2004.11101129.

Calderone, N. W., Shimanuki, H., & Allen-Wardell, G. (1994). An in vitro evaluation of botanical compounds for the control of the honeybee pathogens *Bacillus larvae* and *Ascosphaera apis*, and the secondary invader *B. alvei*. *Journal of Essential Oil Research, 6*(3), 279-287. https://doi.org/10.1080/10412905.1994.9698376.

Chandel, R. K., Nebapure, S. M., Sharma, M., Subramanian, S., Srivastava, C., & Khurana, S. M. (2021). Insecticidal and repellent activities of eucalyptus oil against lesser grain borer Rhyzopertha dominica (Fabricius). *Journal of Microbiology, Biotechnology and Food Sciences,* 525-529. https://doi.org/10.15414/jmbfs.2019/20.9.3.525529

Charriere, J. D., & Imdorf, A. (2002). Oxalic acid treatment by trickling against Varroa destructor: recommendations for use in central Europe and under temperate climate conditions. *Bee World, 83*(2), 51-60. https://doi.org/10.1080/0005772X.2002.11099541.

Collins, L. M., Dziak, J. J., & Li, R. (2009). Design of experiments with multiple independent variables: A resource management perspective on complete and reduced factorial designs. *Psychological Methods*, *14*, 202-224. https://doi.org/10.1037/a0015826

Conti, B., Bocchino, R., Cosci, F., Ascrizzi, R., Flamini, G., & Bedini, S. (2020). Essential oils against Varroa destructor: A soft way to fight the parasitic mite of Apis mellifera. *Journal of Apicultural Research, 59*(5), 774-782. https://doi.org/10.1080/00218839.2020.1790790

Dietemann, V., Nazzi, F., Martin, S. J., Anderson, D. L., Locke, B., Delaplane, K. S., et al. (2013). Standard methods for varroa research. *Journal of apicultural research*, *52*(1), 1-54. https://doi.org/10.3896/IBRA.1. 52.1.09.

Durand T, Bonjour-Dalmon A, Dubois E. (2023). Viral co-infections and antiviral immunity in honey bees. *Viruses*. *15*(5), 1217. https://doi.org/10.3390/v15051217

Emsen, B., Guzman-Novoa, E., & Kelly, P. G. (2014). Honey production of honey bee (Hymenoptera: Apidae) colonies with high and low Varroa destructor (Acari: Varroidae) infestation rates in eastern Canada. *The Canadian Entomologist, 146*(2), 236-240. https://doi.org/10.4039/tce.2013.68.

Escobar, A., Perez, M., Romanelli, G., & Blustein, G. (2020). Thymol bioactivity: A review focusing on practical applications. *Arabian Journal of Chemistry, 13*(12), 9243-9269. https://doi.org/10.1016/j.arabjc.2020.11.009.

Girişgin, A. O., & Aydın, L. (2010). Efficacies of formic, oxalic and lactic acids against Varroa destructor in naturally infested honeybee (Apis mellifera L.) colonies in Turkey. *Kafkas Üniversitesi Veteriner Fakültesi Dergisi*, *16*(6), 941-945.

Hanoğlu, D. Y., Hanoğlu, A., Adediran, S. B., Baser, K. H. C., & Özkum Yavuz, D. (2022). The essential oil compositions of two Eucalyptus sp. (*E. camaldulensis* D ehnh. and *E. torquata* L uehm.) naturalized to Cyprus. *Journal of Essential Oil Research,* 1-7. https://doi.org/10.1080/10412905.2022.2147592.

Hýbl, M., Bohatá, A., Rádsetoulalová, I., Kopecký, M., Hoštičková, I., Vaníčková, A., & Mráz, P. (2021). Evaluating the efficacy of 30 different essential oils against *Varroa destructor* and honey bee workers (*Apis mellifera*). *Insects*, *12*(11). https://doi.org/10.3390/ insects12111045

McMenamin, A. J., & Genersch, E. (2015). Honey bee colony losses and associated viruses. *Current Opinion in Insect Science, 8*, 121-129. https://doi.org/10.1016/j.cois. 2015.01.015.

Rademacher, E., & Harz, M. (2006). Oxalic acid for the control of varroosis in honey bee colonies–a review. *Apidologie, 37*(1), 98-120. https://doi.org/10. 1051/apido:2005063.

Sabahi, Q., Morfin, N., Emsen, B., Gashout, H. A., Kelly, P. G., Otto, S., et al. (2020). Evaluation of Dry and Wet Formulations of Oxalic Acid, Thymol, and Oregano Oil for Varroa Mite (Acari: Varroidae) Control in Honey Bee (Hymenoptera: Apidae) Colonies. *Journal of Economic Entomology, 113*(6), 2588–2594. https:// doi.org/10.1093/jee/toaa218.

Umpiérrez, M.L., Santos, E., González, A., & Rossini, C. (2011). Plant essential oils as potential control agents of varroatosis. *Phytochemistry Reviews*, *10*, 227-244. https://doi.org/10.1007/s11101-010-9182-0

**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.1342119

# Relationship between Health Literacy, Self-Efficacy, Health Perception and Perceived Service Quality in Patients with Chronic Disease

Cennet ÇİRİŞ YILDIZ[1], Dilek YILDIRIM[1], Tansu BİRİNCİ[2], Duygu DOKUMACI[3]

[1] Istanbul Aydin University, Faculty of Health Sciences, Department of Nursing
[2] Istanbul Medeniyet University, Faculty of Health Sciences, Department of Physiotherapy and Rehabilitation
[3] İstanbul Sabahattin Zaim University, Faculty of Health Sciences, Department of Nursing

***Geliş Tarihi / Received:*** *12.08.2023,* ***Kabul Tarihi / Accepted:*** *09.11.2023*

**ABSTRACT**

**Objective:** The present study aimed to investigate the relationship between health literacy, self-efficacy, health perception, and perceived service quality in patients with chronic diseases who applied to primary healthcare services. **Materials and Methods:** Seven hundred and eighty-two (495 female, mean age; 55.39±18.39 years) participants with chronic diseases were included. Health literacy and health perception were evaluated using Turkish Health Literacy Scale-32 (THLS-32), and Health Perception Scale (HPS), respectively. Self-Efficacy Scale on Chronic Diseases (SESCD) was used to assess self-efficiency level and SERVPERF scale was assess the perceived service quality. **Results:** There were significant relationships between THLS-32, age, SERVPERF, and SESCD ($p<0.05$). HPS was significantly correlated with age, the number of chronic diseases, and SERVPERF ($p<0.05$). THLS-32, HPS, age, and the number of chronic diseases explained a significant amount of variance in all subscales of SESCD ($p<0.05$), describing 9.7% to 16.5% of the adjusted $R^2$. Health literacy, health perception, age, and the number of chronic diseases explained a significant amount of variance in all subscales of SERVPERF ($p<0.05$), describing 4.4% to 8.1% of the adjusted $R^2$. **Conclusion:** This study found that health literacy, age, and the number of chronic diseases were predictors of self-efficacy; in addition, health literacy, health perception, age, and the number of chronic diseases were predictors of perceived service quality in patients with chronic diseases. Age and number of chronic diseases are non-modifiable factors for the level of self-efficacy and perceived service quality whereas health literacy can be improved.

**Keywords:** Health Literacy, Health Perception, Primary Care, Self-Efficacy, Service Quality.

# Kronik Hastalığı olan Hastalarda Sağlık Okuryazarlığı, Öz-Etkililik, Sağlık Algısı ve Algılanan Hizmet Kalitesi İlişki

**ÖZ**

**Amaç:** Bu çalışmada birinci basamak sağlık hizmetlerine başvuran kronik hastalığı olan hastalarda sağlık okuryazarlığı, öz-etkililik, sağlık algısı ve algılanan hizmet kalitesi arasındaki ilişkinin belirlenmesi amaçlanmıştır. **Gereç ve Yöntem:** Çalışmaya kronik hastalığı olan 782 (495 kadın, ortalama yaş; 55,39±18,39) katılımcı dâhil edildi. Sağlık okuryazarlığı ve sağlık algısı sırasıyla Türkiye Sağlık Okuryazarlığı Ölçeği (TSOY-32) ve Sağlık Algısı Ölçeği (SAÖ) kullanılarak değerlendirilmiştir. Öz-etkililik düzeyini değerlendirmek için Kronik Hastalıklarda Öz-Etkililik Ölçeği (KHÖEÖ), algılanan hizmet kalitesini değerlendirmek için SERVPERF ölçeği kullanıldı. **Bulgular:** TSOY-32, yaş, SERVPERF ve KHÖEÖ arasında anlamlı ilişki vardı ($p<0,05$). SAÖ, yaş, kronik hastalık sayısı ve SERVPERF ile anlamlı korelasyon gösterdi ($p<0,05$). TSOY-32, SAÖ, yaş ve kronik hastalık sayısı, düzeltilmiş $R^2$'nin %9,7 ile %16,5'ini tanımlayarak KHÖEÖ'nin tüm alt ölçeklerinde önemli miktarda varyansı açıklamıştır ($p<0,05$). Sağlık okuryazarlığı, sağlık algısı, yaş ve kronik hastalık sayısı, düzeltilmiş $R^2$'nin %4,4 ile %8,1'ini tanımlayarak SERVPERF'in tüm alt ölçeklerinde önemli miktarda varyansı açıkladı ($p<0,05$). **Sonuç:** Bu çalışmada, kronik hastalığı olan hastalarda sağlık okuryazarlığı, yaş ve kronik hastalık sayısının öz-etkililiğin prediktörleri; sağlık okuryazarlığı, sağlık algısı, yaş ve kronik hastalık sayısının algılanan hizmet kalitesinin prediktörleri olduğu bulundu. Yaş ve kronik hastalık sayısı, öz-etkililik düzeyi ve algılanan hizmet kalitesi için değiştirilemez faktörlerken, sağlık okuryazarlığı geliştirilebilir bir faktördür.

**Anahtar Kelimeler:** Sağlık Okuryazarlığı, Sağlık Algısı, Birinci Basamak, Öz Etkililik, Hizmet Kalitesi.

***Sorumlu Yazar / Corresponding Author:*** Tansu BİRİNCİ, Istanbul Medeniyet University, Faculty of Health Sciences, Department of Physiotherapy and Rehabilitation, Istanbul, Türkiye.
***E-mail:*** tansubirinci@hotmail.com

***Bu makaleye atıf yapmak için / Cite this article:*** Çiriş Yıldız, C., Yıldırım, D., Birinci, T., & Dokumacı, D. (2024). Relationship between health literacy, self-efficacy, health perception and perceived service quality in patients with chronic disease. *BAUN Health Sci J,* 13(1), 51-59. https://doi.org/10.53424/balikesirsbd.1342119

## INTRODUCTION

Health literacy, defined as "the degree to which individuals can obtain, process and understand basic health information and services needed to make appropriate health decisions", plays an important role in the self-management of chronic diseases (Ratzan & Parker 2006; Mackey, Doody, Werner, & Fullen, 2016). Inadequate health literacy results in difficulties in comprehension of health information, limited knowledge of diseases, and lower medication adherence (Huang, Pecanac, & Shiyanbola, 2020; Schönfeld, Pfisterer-Heise, & Bergelt, 2021). Low health literacy contributes to poor health, high risk of mortality, insufficient and ineffective use of healthcare, increased hospitalization, increased costs, and health disparities (Berkman, Sheridan, Donahue, Halpern, & Crotty, 2011). Besides, the management of chronic diseases becomes much more difficult in case of low health literacy accompanied by cognitive changes occurring as a result of aging (Mahmoodi, Hassanzadeh, & Rahimi, 2021).

Patients with a chronic disease, no matter the type, needs some skills to manage the disease (Anekwe & Rahkovsky, 2018). Self-efficacy and self-perceived health are closely associated with coping with chronic conditions and successful self-management of these conditions (Ebrahimi Belil, Alhani, Ebadi, & Kazemnejad, 2018; Peters, Potter, Kelly, & Fitzpatrick, 2019). Self-efficacy is a mediator between knowledge and self-care (Wu, Hsieh, Lin, & Tsai, 2016); higher levels of health literacy might lead to positive behavior in acting on health-related information. On the other hand, Paul et al. (2016) pointed out that there is a strong association between self-perceived health and satisfaction with healthcare services (Paul, Hakobyan, & Valtonen, 2016). Previous studies pointed out that higher levels of health literacy resulted in higher levels of trust in physicians and the healthcare system (Rodríguez et al., 2013; White, Osborn, Gebretsadik, Kripalani, & Rothman, 2013). A recent systematic review extended the findings further and concluded that patients having low health literacy perceive that the health care system is not cooperative, while patients with a high level of health literacy have high expectations about the quality, which the health care system might not be able to provide (Bertram, Brandt, Hansen, & Svendsen, 2021).

Collaboration and co-responsibility between healthcare professionals and patients with chronic diseases are vital for primary healthcare services (Comino et al., 2012). Therefore, identifying the link between health literacy, self-efficacy, health perception and perceived service quality in primary care patients with chronic disease may foster an understanding of how literacy skills in health are influenced by patient-related factors and which interventions should be performed. The present study aimed to investigate the relationship between health literacy, self-efficacy, health perception, and perceived service quality, and the effect of these concepts on each other in patients with chronic diseases who applied to primary healthcare service.

## MATERIALS AND METHODS

### Study type

This cross-sectional study was conducted in the family health center located in Istanbul, between October 2021 to November 2021.

### Study group

Participants with chronic disease, who received health services at a family health center located in Istanbul were recruited. The eligibility criteria were as follows: (1) aged over 18 years; (2) having at least one chronic disease diagnosed by a physician; (3) ability to read and write in Turkish; (4) able to follow simple instructions; (5) no pathology in visual ability and hearing; and (6) voluntary participation in the study. The exclusion criteria were as follows: (1) having any communication problem that might affect the evaluation process, (2) being on medication such as sedatives and hypnotics, antidepressants, and benzodiazepines, (3) being a health professional, and (4) not having internet access, computer, or smartphone.

The sample size was calculated by using G*Power 3.1.9.2 sample size calculation program. The calculations were based on a small effect size ($\rho$|=0.1), an alpha level of 0.05, a 95% confidence interval, and the desired power of 80%. These parameters generate a sample size of at least 782 participants. Therefore, total of 800 participants were invited to study.

Data collection was carried out via an e-survey due to the COVID-19 pandemic. The online survey had an introductory page explaining the purpose of the research, the identity and affiliations of the researchers, details of what participation would entail, and confirmation of ethical approval by the ethics committee. All participants answered "yes" to the question, "Do you agree to participate in the survey?" Thus, all participants have provided voluntary consent to participate.

### Procedures

Identifying information about the participants such as age, sex, education, number of chronic diseases, social security, working status, and satisfaction level of the patient in healthcare was investigated.

Turkish Health Literacy Scale-32 (THLS-32) is a scale used to assess health literacy level and is based on the conceptual framework developed by European Health Literacy Consortium. It consists of 32 items, two subscales (treatment and service, protection from diseases, and improvement of health), and four information processes related to decision-making and applications in health (access, understanding, making a decision, and using/applying). Total score ranges from 0 to 50, higher scores indicate better health literacy (Okyay, Abacıgil, & Harlak, 2016; Sørensen et al., 2015).

Health Perception Scale (HPS) is a 15-items and 4-dimensions (control of center, self-awareness, certainty, and importance of health) scale used to assess health perception level. It is a five-point Likert-type scale. Six items of the scale are positive and 9 items are negative expressions. Total score ranges from 15 to 75, higher scores indicate better health perception (Diamond, Becker, Arenson, Chambers, & Rosenthal, 2007, Kadioglu & Yildiz, 2012).

Self-Efficacy Scale on Chronic Diseases (SESCD) is a 30-items scale used to assess self-efficiency levels in patients with chronic disease. The scale consists of ten subscales. The average score of a subscale is obtained by summing up the scores the participant gets from each item in that subscale and by dividing the number of items in the subscale. The subscale score below 7 indicates that strategies and problem-solving are necessary to be reevaluated to prevent failure, but a score of 7 or above indicates that the self-efficacy level about the disease is high and the patient can manage the situation (Ceyhan & Ünsal 2017; Lorig, Stewart, Ritter, González, Laurent, & Lynch, 1996).

The SERVPERF Scale is a 15-items and 5-dimensions (tangibles, reliability, responsiveness, assurance, and empathy) scale used to assess the perceived service quality. It is a five-point Likert-type scale. Each subscale score can be calculated separately, and the total score is the sum of subscale scores. The average score of a subscale is obtained by summing up the scores the individual gets from each item in that subscale and by dividing the number of items in the subscale. Higher scores indicate higher service quality perception (Cronin & Taylor 1992; Akdere, Top, & Tekingündüz, 2018).

**Statistical analysis**

Statistical Package for Social Science (SPSS) version 21.0 for Windows software (SPSS, Inc., Chicago, IL, USA) was used for all statistical analyses. The Kolmogorov–Smirnov test was used to assess the distribution of data. The level of significance considered was $p<0.05$. Descriptive statistics, including frequency, the percentage for nominal variables, and mean and standard deviation for continuous variables were calculated. Spearman correlation analysis was used to explore the relationship between THLS-32, HPS, SESCD, and SERVPERF in patients with chronic diseases. Standard linear regression analyses were conducted to identify factors contributing to self-efficacy and perceived service quality.

**Ethical considerations**

Ethical approval was obtained from the İstanbul Kent University Health Sciences Research and Publication Ethical Board (Date: 28.09.2021, Number: 2021-07) and conducted in conformity with the Declaration of Helsinki. Verbal and written explanations were provided to participants about the study, and each provided informed consent. Permissions for use the scales were obtained before starting study.

## RESULTS

Eight hundred participants with chronic diseases were screened for possible inclusion. Eighteen participants were excluded for various reasons; 782 (495 female, mean age; 55.39±18.39 years) participants with chronic diseases were included in the study. The sociodemographic and health-related data of participants are shown in Table 1. A total of 702 participants have one chronic disease, 72 participants have two chronic diseases and 8 participants have three chronic diseases. The most common three chronic diseases are cardiovascular diseases, metabolic diseases, and respiratory diseases among the participants. The SESCD subscales scores were lower than 7 points, except for coping with asthma and managing depression/control subscales (Table 1).

**Table 1. Sociodemographic data and health-related characteristics of participants (n=782).**

| Parameters | | n (%) |
|---|---|---|
| **Age (years), mean±SD [min-max]** | | 55.39±18.39 [20-92] |
| **Sex** | Female | 495 (63.3) |
| | Male | 287 (36.7) |
| **Education (years), mean±SD [min-max]** | | 9.79±4.79 [5-22] |
| **Marriage status** | Single | 135 (17.3) |
| | Married | 535 (68.4) |
| | Widow | 110 (14.1) |
| | Divorce | 2 (0.2) |
| **Number of chronic diseases, mean±SD [min-max]** | | 1.11±0.34 [1-3] |
| **Social security** | Absent | 199 (25.4) |
| | Social security institution | 455 (58.2) |
| | Retirement fund | 110 (14.1) |
| | Social security organization for artisans and the self-employed | 18 (2.3) |
| **Working status** | Yes | 421 (53.8) |
| | No | 211 (27) |
| | Retired | 150 (19.2) |
| **Patient satisfaction in healthcare, mean±SD [min-max]** | | 7.55±1.42 [2-10] |
| **THLS-32, mean±SD [min-max]** | | 29.61±6.32[10-49] |

**Table 1. (Continue) Sociodemographic data and health-related characteristics of participants (n=782).**

| Parameters | | n (%) |
|---|---|---|
| **HPS, mean±SD [min-max]** | | 39.82±3.63 [31-60] |
| **SESCD, mean±SD [min-max]** | Doing sports regularly | 6.96±1.82 [1-10] |
| | Getting information about the disease | 6.92±1.83 [1-10] |
| | Getting help from society, family and friends | 6.99±1.69 [1-10] |
| | Communication with doctor | 6.99±1.64 [1-10] |
| | General disease management | 6.99±1.61 [1-10] |
| | Doing housework | 6.93±1.66 [1-10] |
| | Social/ recreation activities | 6.96±1.63 [1-10] |
| | Coping with the symptoms | 6.99±1.61 [1-10] |
| | Coping with asthma | 7.01±1.78 [1-10] |
| | Managing depression/control | 7.00±1.60 [1-10] |
| **SERVPERF, mean±SD [min-max]** | Tangibles | 3.66±0.79 [1-5] |
| | Reliability | 3.73±0.68 [1-5] |
| | Responsiveness | 3.70±0.65 [1-5] |
| | Assurance | 3.69±0.70 [1-5] |
| | Empathy | 3.73±0.67 [1-5] |

HPS: Health Perception Scale, SESCD: Self-Efficacy Scale on Chronic Diseases, THLS-32: Turkish Health Literacy Scale-32. Data are expressed as mean±standard deviation [minimum-maximum] and number (percentage).

**Table 2. The relationship between health literacy, health perception, perceived service quality, and self-efficacy of participants (n=782).**

| Variables | Age | Number of chronic diseases | THLS-32 | HPS | Tangibles | Reliability | Responsiveness | Assurance | Empathy |
|---|---|---|---|---|---|---|---|---|---|
| **THLS-32** | -0.30 (0.001)** | -0.03 (0.37) | 1 | -0.06 (0.06) | 0.19 (0.001)** | 0.22 (0.001)** | 0.27 (0.001)** | 0.27 (0.001)** | 0.19 (0.001)** |
| **HPS** | 0.08 (0.02)* | 0.11 (0.002)** | -0.06 (0.06) | 1 | -0.19 (0.001)** | -0.10 (0.003)** | -0.16 (0.001)** | -0.13 (0.001)** | -0.17 (0.001)** |
| **SERVPERF** | | | | | | | | | |
| Tangibles | -0.14 (0.001)** | 0.11 (0.002)** | 0.19 (0.001)** | -0.19 (0.001)** | 1 | 0.50 (0.001)** | 0.43 (0.001)** | 0.43 (0.001)** | 0.41 (0.001)** |
| Reliability | -0.06 (0.10) | -0.008 (0.82) | 0.22 (0.001)** | -0.10 (0.003)** | 0.50 (0.001)** | 1 | 0.60 (0.001)** | 0.45 (0.001)** | 0.43 (0.001)** |
| Responsiveness | -0.05 (0.10) | 0.04 (0.19) | 0.27 (0.001)** | -0.16 (0.001)** | 0.43 (0.001)** | 0.60 (0.001)** | 1 | 0.57 (0.001)** | 0.45 (0.001)** |
| Assurance | -0.06 (0.06) | -0.02 (0.49) | 0.27 (0.001)** | -0.13 (0.001)** | 0.43 (0.001)** | 0.45 (0.001)** | 0.57 (0.001)** | 1 | 0.60 (0.001)** |
| Empathy | -0.10 (0.007)** | -0.05 (0.15) | 0.19 (0.001)** | -0.17 (0.001)** | 0.41 (0.001)** | 0.43 (0.001)** | 0.45 (0.001)** | 0.60 (0.001)** | 1 |
| **SESCD** | | | | | | | | | |
| Doing sports regularly | -0.30 (0.001)** | 0.10 (0.003)** | 0.28 (0.001)** | -0.04 (0.25) | -0.22 (0.001)** | -0.08 (0.01)* | -0.04 (0.22) | -0.11 (0.002)** | -0.16 (0.001)** |
| Getting information about the disease | -0.36 (0.001)** | -0.11 (0.003)** | 0.31 (0.001)** | -0.03 (0.36) | -0.12 (0.001)** | -0.03 (0.37) | 0.008 (0.82) | -0.04 (0.17) | -0.10 (0.003)** |
| Getting help from society, family and friends | -0.34 (0.001)** | -0.11 (0.001)** | 0.27 (0.001)** | 0.002 (0.96) | -0.17 (0.001)** | -0.06 (0.08) | -0.05 (0.12) | -0.06 (0.06) | -0.11 (0.001)** |
| Communication with doctor | -0.32 (0.001)** | -0.10 (0.005)** | 0.28 (0.001)** | 0.01 (0.60) | -0.20 (0.001)** | -0.07 (0.01)* | -0.04 (0.21) | -0.06 (0.06) | -0.15 (0.001)** |
| General disease management | -0.31 (0.001)** | 0.10 (0.003)** | 0.27 (0.001)** | -0.03 (0.39) | -0.19 (0.001)** | -0.04 (0.21) | -0.03 (0.38) | -0.06 (0.06) | -0.14 (0.001)** |
| Doing housework | -0.29 (0.001)** | -0.06 (0.05) | 0.23 (0.001)** | -0.01 (0.76) | -0.18 (0.001)** | -0.05 (0.14) | -0.01 (0.76) | -0.06 (0.06) | -0.12 (0.001)** |
| Social/ recreation activities | -0.30 (0.001)** | 0.10 (0.003)** | 0.23 (0.001)** | -0.006 (0.86) | -0.20 (0.001)** | -0.06 (0.07) | -0.05 (0.12) | -0.10 (0.003)** | -0.15 (0.001)** |
| Coping with the symptoms | -0.31 (0.001)** | -0.11 (0.002)** | 0.25 (0.001)** | -0.02 (0.57) | -0.20 (0.001)** | -0.05 (0.12) | -0.03 (0.27) | -0.10 (0.003)** | -0.15 (0.001)** |
| Coping with asthma | -0.28 (0.001)** | -0.08 (0.02)* | 0.24 (0.001)** | -0.01 (0.65) | -0.18 (0.001)** | -0.05 (0.10) | -0.04 (0.21) | -0.09 (0.007)** | -0.12 (0.001)** |
| Managing depression/control | -0.30 (0.001)** | -0.08 (0.02)* | 0.24 (0.001)** | -0.004 (0.91) | -0.20 (0.001)** | -0.03 (0.27) | -0.03 (0.35) | -0.09 (0.007)** | -0.15 (0.001)** |

HPS: Health Perception Scale, SESCD: Self-Efficacy Scale on Chronic Diseases, THLS-32: Turkish Health Literacy Scale-32. Spearman correlation test **p<0.01; *p<0.05. Data are expressed as rho(p).

There were significant relationships between health literacy, age, perceived service quality, and chronic disease self-efficacy. In addition, health perception was significantly correlated with age, the number of chronic diseases, and perceived service quality ($p<0.05$). The only tangibles and empathy subscales of the SERVPERF scale were significantly correlated with health literacy, health perception, and all components of the Self-efficacy Scale for Chronic Diseases ($p<0.05$) (Table 2).

**Table 3. Multivariable linear regression analyses of predictors of the self-efficacy.**

| Models | Standardized Coefficients B | Standard Error | Non-standardized Coefficients Beta | t | ANOVA P | F | p | Adjusted $R^2$ |
|---|---|---|---|---|---|---|---|---|
| (Constant)→ F1 | 9.487 | 0.775 | | 12.242 | 0.000** | | | |
| THLS-32→ F1 | 0.050 | 0.010 | 0175 | 5.013 | 0.000** | | | |
| HPS → F1 | -0.061 | 0.017 | -0.121 | -3.644 | 0.000** | 35.715 | 0.000** | 0.155 |
| Age → F1 | -0.027 | 0.004 | -0.272 | -7.419 | 0.000** | | | |
| Number of Chronic Diseases→ F1 | -0.093 | 0.184 | -0.018 | -0.505 | 0.614 | | | |
| (Constant) → F2 | 8.115 | 0.777 | | 10.445 | 0.000** | | | |
| THLS-32→ F2 | 0.056 | 0.010 | 0.192 | 5.545 | 0.000** | | | |
| HPS → F2 | -0.028 | 0.017 | -0.056 | -1.688 | 0.092 | 38.421 | 0.000** | 0.165 |
| Age→ F2 | -0.029 | 0.004 | -0.290 | -7.973 | 0.000** | | | |
| Number of Chronic Diseases→ F2 | -0.100 | 0.184 | -0.019 | -0.545 | 0.586 | | | |
| (Constant) → F3 | 7.689 | 0.718 | | 10.702 | 0.000** | | | |
| THLS-32→ F3 | 0.045 | 0.009 | 0.169 | 4.836 | 0.000** | | | |
| HPS → F3 | -0.010 | 0.015 | -0.022 | -0.674 | 0.501 | 36.363 | 0.000** | 0.158 |
| Age→ F3 | -0.028 | 0.003 | -0.306 | -8.362 | 0.000** | | | |
| Number of Chronic Diseases→ F3 | -0.047 | 0.170 | -0.010 | -0.276 | 0.783 | | | |
| (Constant) → F4 | 6.916 | 0.698 | | 9.911 | 0.000** | | | |
| THLS-32→ F4 | 0.051 | 0.009 | 0.198 | 5.668 | 0.000** | | | |
| HPS → F4 | 0.003 | 0.015 | 0.006 | 0.184 | 0.854 | 35.650 | 0.000** | 0.155 |
| Age→ F4 | -0.024 | 0.003 | -0.271 | -7.394 | 0.000** | | | |
| Number of Chronic Diseases→ F4 | -0.186 | 0.165 | -0.039 | -1.125 | 0.261 | | | |
| (Constant)→ F5 | 8.236 | 0.689 | | 11.957 | 0.000** | | | |
| THLS-32→ F5 | 0.046 | 0.009 | 0.182 | 5.176 | 0.000** | | | |
| HPS → F5 | -0.032 | 0.015 | -0.071 | -2.129 | 0.034* | 33.178 | 0.000** | 0.146 |
| Age→ F5 | -0.024 | 0.003 | -0.272 | -7.388 | 0.000** | | | |
| Number of Chronic Diseases→ F5 | -0.027 | 0.163 | -0.006 | -0.167 | 0.868 | | | |
| (Constant)→ F6 | 8.046 | 0.731 | | 11.001 | 0.000** | | | |
| THLS-32→ F6 | 0.033 | 0.009 | 0.126 | 3.507 | 0.000** | | | |
| HPS → F6 | -0.024 | 0.016 | -0.053 | -1.536 | 0.125 | 20.930 | 0.000** | 0.097 |
| Age→ F6 | -0.022 | 0.003 | -0.247 | -6.516 | 0.000** | | | |
| Number of Chronic Diseases→ F6 | 0.093 | 0.173 | 0.019 | 0.536 | 0.592 | | | |
| (Constant)→ F7 | 8.092 | 0.711 | | 11.380 | 0.000** | | | |
| THLS-32→ F7 | 0.034 | 0.009 | 0.133 | 3.725 | 0.000** | | | |
| HPS → F7 | -0.018 | 0.015 | -0.040 | -1.164 | 0.245 | 25.466 | 0.000** | 0.116 |
| Age→ F7 | -0.023 | 0.003 | -0.261 | -6.969 | 0.000** | | | |
| Number of Chronic Diseases→ F7 | -0.132 | 0.169 | -0.028 | -0.783 | 0.434 | | | |
| (Constant) → F8 | 8.401 | 0.695 | | 12.089 | 0.000** | | | |
| THLS-32→ F8 | 0.035 | 0.009 | 0.139 | 3.922 | 0.000** | | | |
| HPS → F8 | -0.025 | 0.015 | -0.056 | -1.649 | 0.099 | 29.256 | 0.000** | 0.131 |
| Age→ F8 | -0.025 | 0.003 | -0.280 | -7.540 | 0.000** | | | |
| Number of Chronic Diseases→ F8 | -0.096 | 0.165 | -0.021 | -0.585 | 0.559 | | | |
| (Constant) → F9 | 8.967 | 0.781 | | 11.484 | 0.000** | | | |
| THLS-32→ F9 | 0.035 | 0.010 | 0.123 | 3.440 | 0.001** | | | |
| HPS → F9 | -0.040 | 0.017 | -0.082 | -2.405 | 0.016* | 23.126 | 0.000** | 0.107 |
| Age→ F9 | -0.024 | 0.004 | -0.250 | -6.646 | 0.000** | | | |
| Number of Chronic Diseases→ F9 | -0.024 | 0.185 | -0.005 | -0.132 | 0.895 | | | |
| (Constant)→ F10 | 8.010 | 0.698 | | 11.472 | 0.000** | | | |
| THLS-32→ F10 | 0,035 | 0.009 | 0.140 | 3.901 | 0.000** | | | |
| HPS → F10 | -0,020 | 0.015 | -0.045 | -1.328 | 0.185 | 24.603 | 0.000** | 0.113 |
| Age→ F10 | -0,023 | 0.003 | -0.259 | -6.903 | 0.000** | | | |
| Number of Chronic Diseases→F10 | -0,001 | 0.166 | 0.000 | -0.008 | 0.994 | | | |

**p<0.01; *p<0.05.

F1: Doing sports regularly; F2: Getting information about the disease; F3: Getting help from society, family and friends; F4: Communication with doctor; F5: General disease management; F6: Doing housework; F7: Social/ recreational activities; F8: Coping with the symptoms; F9: Coping with asthma; F10: Managing depression/control.

The multivariable linear regression models predicting performance in all subscales of the Chronic Diseases Self-Efficacy Scale were statistically significant ($p<0.05$), describing 9.7% to 16.5% of the adjusted $R^2$. Health literacy, health perception, age, and the number of chronic diseases were independent variables in doing sports regularly, general disease management, and coping with asthma models (Table 3).

In addition, health literacy, age, and the number of chronic diseases were independent variables in getting information about the disease, getting help from society, family and friends, communicating with the doctor, doing housework, social/ recreation activities, coping with the symptoms, and managing depression/control models (Table 3).

The multivariable linear regression models predicting performance in all subscales of the SERVPERF scale were statistically significant ($p<0.05$), describing 4.4% to 8.1% of the adjusted $R^2$. Health literacy, health perception, age, and the number of chronic diseases were independent variables in doing sports regularly, general disease management, and coping with asthma models. In addition, health literacy and health perception were independent variables in the tangibles, reliability, responsiveness, assurance, and empathy models (Table 4).

**Table 4. Multivariable linear regression analyses of predictors of the perceived service quality.**

| Models | Non-Standardized Coefficients | | Standardized Coefficients | | | ANOVA | | |
|---|---|---|---|---|---|---|---|---|
| | B | Standard Error | Beta | t | P | F | p | Adjusted $R^2$ |
| (Constant) → Tangibles | 5.054 | 0.355 | | 14.237 | 0.000** | 13.378 | 0.000 | 0.065 |
| THLS-32→ Tangibles | 0.015 | 0.005 | 0.121 | 3.303 | 0.001** | | | |
| HPS→ Tangibles | -0.039 | 0.008 | -0.180 | -5.146 | 0.000** | | | |
| Age → Tangibles | -0.003 | 0.002 | -0.072 | -1.864 | 0.063 | | | |
| Number of Chronic Diseases→ Tangibles | -0.093 | 0.084 | -0.041 | -1.107 | 0.269 | | | |
| (Constant) → Reliability | 4.356 | 0.311 | | 14.017 | 0.000** | 8.841 | 0.000** | 0.044 |
| THLS-32→ Reliability | 0.016 | 0.004 | 0.148 | 3.987 | 0.000** | | | |
| HPS → Reliability | -0.027 | 0.007 | -0.140 | -3.962 | 0.000** | | | |
| Age→ Reliability | 0.000 | 0.001 | -0.007 | -0.179 | 0.858 | | | |
| Number of Chronic Diseases → Reliability | -0.024 | 0.074 | -0.012 | -0.323 | 0.746 | | | |
| (Constant) → Responsiveness | 4.585 | 0.290 | | 15.811 | 0.000** | 17.117 | 0.000** | 0.081 |
| THLS-32→ Responsiveness | 0.019 | 0.004 | 0.184 | 5.068 | 0.000** | | | |
| HPS → Responsiveness | -0.039 | 0.006 | -0.214 | -6.187 | 0.000** | | | |
| Age→ Responsiveness | 0.000 | 0.001 | -0.006 | -0.145 | 0.885 | | | |
| Number of Chronic Diseases → Responsiveness | 0.098 | 0.069 | 0.052 | 1.422 | 0.156 | | | |
| (Constant) → Assurance | 4.495 | 0.315 | | 14.289 | 0.000** | 15.003 | 0.000** | 0.072 |
| THLS-32→ Assurance | 0.021 | 0,004 | 0.184 | 5.041 | 0.000** | | | |
| HPS → Assurance | -0.037 | 0.007 | -0.190 | -5.452 | 0.000** | | | |
| Age→ Assurance | 0.000 | 0.001 | -0.013 | -0.327 | 0.744 | | | |
| Number of Chronic Diseases → Assurance | 0.082 | 0.075 | 0.041 | 1.105 | 0.270 | | | |
| (Constant) → Empathy | 5.064 | 0.299 | | 16.941 | 0.000** | 15.097 | 0.000** | 0.072 |
| THLS-32→ Empathy | 0.013 | 0.004 | 0.126 | 3.437 | 0.001** | | | |
| HPS → Empathy | -0.042 | 0.006 | -0.227 | -6.509 | 0.000** | | | |
| Age→ Empathy | -0.001 | 0.001 | -0.039 | -1.005 | 0.315 | | | |
| Number of Chronic Diseases → Empathy | 0.019 | 0.071 | 0.010 | 0.267 | 0.790 | | | |

**p<0.01, *p<0.05

## DISCUSSION

The present study aimed to investigate the relationship between health literacy, self-efficacy, health perception, and perceived service quality, and the effect of these concepts on each other in patients with chronic diseases who applied to primary healthcare service. The findings showed that health literacy was related to age, perceived service quality, and chronic disease self-efficacy in patients with chronic diseases. Health literacy, age, and the number of chronic diseases were independent variables of self-efficacy, while health literacy, health perception, age, and the number of chronic diseases were independent variables of perceived service quality.

Patients with chronic diseases are expected to gradually be able to manage their health. This is because it was determined that the probability of individuals with inadequate health literacy being hospitalized was much higher compared to individuals with adequate health literacy (Fan, Yang, & Zhang, 2021) and that there was a relationship between limited health literacy and mortality rates in the older adults (Bostock & Steptoe 2012). Associations with higher rates of limited health literacy included older age, lower educational level, lower income, perceived poor health, and lack of access to the Internet (Protheroe et al., 2017). In addition, the most disadvantaged groups were women and older people (≥40 years of age) because of their lower levels of education in the Turkish population (Bilgel, Sarkut, Bilgel, & Ozcakir, 2017). Age and gender are non-modifiable risk factors, but

personalized patient education might engage, encourage, and empower patients in participating in their health care and leading to better outcomes in older adults (Bhattad & Pacifico 2022). Non-written visual materials might be considered as a temporary solution to improve health literacy in populations with low literacy.

Self-efficacy is a mediator between knowledge and self-care (Wu et al., 2016). Present findings showed that age, the number of chronic diseases, health literacy, and health perception were effective on self-efficacy and explained its 9.7% to 16.5%. Individuals with low self-efficacy are continuously faced with problems, while those with high self-efficacy focus on improving health-related intentions and behaviors (Sheeran et al., 2016). However, patients with high self-efficacy usually have a desire to translate health knowledge into health-related outcomes (Bandura, 2004; Sheeran et al., 2016). A recent study pointed out that self-efficacy in patients with chronic conditions can be improved by enhancing traditional education and boosting self-efficacy; thus leading to an increase in treatment adherence (Farley, 2020). Therefore, patients, especially older patients with several chronic diseases should be taught to use effective methods to increase their self-efficacy, and their self-confidence should be supported.

A high level of trust in the health care system and service quality were important for most patients (Gilson, 2006). Present findings showed that health literacy, health perception, age, and the number of chronic diseases were effective on perceived service quality and explained its 4.4% to 8.1%. In addition, it was determined that the services provided by primary healthcare service met the patient expectations at a moderate level in the present study. While the lowest level of perceived service quality was found in tangibles (physical entities), the highest level of perceived service quality was determined in the reliability and empathy dimensions. Existing literature mostly reported that a positive association between the level of health literacy and the level of trust in the healthcare system has been shown (Brennan et al., 2013; Rodríguez et al., 2013; White et al. 2013). However, high literacy and low literacy have different challenges. Having low health literacy can lead to the perception that the health system is not cooperative while having low health literacy can lead to high expectations about service quality, which the healthcare system cannot meet (Bertram et al., 2021). As a result of both, the perceived service quality might be negatively affected. Therefore, the service quality provided in primary healthcare service should be evaluated together with the health literacy level of patients and the results should be used as a data source in all kinds of planning in health services.

This study has some limitations that should be highlighted. First, this study has a cross-sectional study design that resulted in the identification of several associations between variables, although it was not possible to determine the causal relationships. Second, other factors that can affect self-efficacy and perceived service quality, such as type of chronic disease, sex, and socioeconomic status were not taken into account. Finally, all participants in this study were patients with chronic disease in primary care; therefore, the generalization of our results is limited. A future study evaluating the relationship between health literacy, self-efficacy, health perception, and perceived service quality in different patient populations is necessary.

## CONCLUSION

This study found that age, the number of chronic diseases, health literacy, health perception, self-efficacy, and perceived service quality were associated. Health literacy, age, and the number of chronic diseases were predictors of self-efficacy; in addition, health literacy, health perception, age, and the number of chronic diseases were predictors of perceived service quality in patients with chronic diseases. Age and the number of chronic diseases are non-modifiable factors for the level of self-efficacy and perceived service quality whereas health literacy can be improved. Therefore, the level of health literacy should be closely monitored in older patients with several chronic diseases patients and effective methods and strategies should be taught to increase their self-efficacy via a multidisciplinary approach

**Acknowledgment**

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

**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:** CÇY, DY, TB; **Material, methods, and data collection:** CÇY, DY, TB, DD; **Data analysis and comments:** CÇY, DY, TB, DD; **Writing and corrections:** CÇY, DY, TB, DD.

## REFERENCES

Akdere, M., Top, M., & Tekingündüz, S. (2018). Examining patient perceptions of service quality in Turkish hospitals: The SERVPERF model. *Total Quality Management & Business Excellence*, *31*(4), 342-352. https://doi.org/10.1080/14783363.2018.1427501

Anekwe, T. D., & Rahkovsky, I. (2018). Self-management: a comprehensive approach to management of chronic conditions. *American Journal of Public Health*, *108*(S6), S430-S436. https://doi.org/10.2105/AJPH.2014.302041

Bandura A. (2004). Health promotion by social cognitive means. *Health Education & Behavior*, *31*(2), 143–164. https://doi.org/10.1177/1090198104263660

Berkman, N. D., Sheridan, S. L., Donahue, K. E., Halpern, D. J., & Crotty, K. (2011). Low health literacy and health outcomes: an updated systematic review. *Annals of Internal Medicine, 155*(2), 97-107. https://doi.org/10.7326/0003-4819-155-2-201107190-00005

Bertram, M., Brandt, U. S., Hansen, R. K., & Svendsen, G. T. (2021). Does higher health literacy lead to higher trust in public hospitals*?*. *International Journal for Equity in Health*, *20*, 1-15. https://doi.org/10.1186/s12939-021-01528-w

Bhattad, P. B., & Pacifico, L. (2022). Empowering Patients: Promoting Patient Education and Health Literacy. *Cureus*, *14*(7), e27336. https://doi.org/10.7759/cureus.27336

Bilgel, N., Sarkut, P., Bilgel, H., & Ozcakir, A. (2017). Functional health literacy in a group of Turkish patients: A pilot study. *Cogent Social Sciences*, *3*, 1287832. https://doi.org/10.1080/23311886.2017.1287832

Bostock, S., & Steptoe, A. (2012). Association between low functional health literacy and mortality in older adults: longitudinal cohort study. *BMJ*, *344*, e1602. https://doi.org/10.1136/bmj.e1602

Brennan, N., Barnes, R., Calnan, M., Corrigan, O., Dieppe, P., & Entwistle, V. (2013). Trust in the health-care provider–patient relationship: a systematic mapping review of the evidence base. International *Journal for Quality in Health Care, 25*(6), 682-688. https://doi.org/10.1093/intqhc/mzt063

Ceyhan, Y. Ş., ve Ünsal, A. (2017). The Validity and Reliability Study of Self-Efficacy Scale on the People with Chronic Diseases. *Hemşirelikte Araştırma ve Geliştirme Dergisi, 19*(2), 1-13.

Comino, E. J., Davies, G. P., Krastev, Y., Haas, M., Christl, B., Furler, J., Raymont, A., & Harris, M. F. (2012). A systematic review of interventions to enhance access to best practice primary health care for chronic disease management, prevention and episodic care. *BMC Health Services Research*, *12*, 415. https://doi.org/10.1186/1472-6963/12/415

Cronin, J. J., & Taylor, S. A. (1992). Measuring service quality: a reexamination and extension. *Journal of Marketing, 56*(3), 55-68. https://doi.org/10.1177/002224299205600304

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. https://doi.org/10.1002/jcop.20164

Ebrahimi Belil, F., Alhani, F., Ebadi, A., & Kazemnejad, A. (2018). Self-efficacy of people with chronic conditions: A qualitative directed content analysis. *Journal of Clinical Medicine, 7*(11), 411. https://doi.org/10.3390/jcm7110411

Fan, Z. Y., Yang, Y., & Zhang, F. (2021). Association between health literacy and mortality: a systematic review and meta-analysis. *Archives of Public Health, 79*, 119. https://doi.org/10.1186/s13690-021-00648-7

Farley H. (2020). Promoting self-efficacy in patients with chronic disease beyond traditional education: A literature review. *Nursing Open*, *7*, 30–41.https://doi.org/10.1002/nop2.382

Gilson L. (2006). Trust in health care: theoretical perspectives and research needs. *Journal of Health Organization and Management*, *20*(5), 359–375. https://doi.org/10.1108/14777260610701768

Huang, Y. M., Pecanac, K. E., & Shiyanbola, O. O. (2020). "Why am I not taking medications?" Barriers and facilitators of diabetes medication adherence across different health literacy levels. *Qualitative Health Research, 30*(14), 2331-2342. https://doi.org/10.1177/10497323209452

Kadioglu, H., & Yildiz, A. (2012). Saglik Algisi Ölçegi'nin Türkçe Çevriminin Geçerlilik ve Güvenilirligi/Validity and Reliability of Turkish Version of Perception of Health Scale. *Turkiye Klinikleri Journal of Medical Sciences, 32*(1), 47-53. https://doi:10.5336/medsci.2010-21761

Lorig, K., Stewart, A., Ritter, P., González, V., Laurent, D., & Lynch, J. (1996). *Outcome measures for health education and other health care interventions.* Thousand Oaks, CA: Sage Publications, p. 41-45.

Mackey, L. M., Doody, C., Werner, E. L., & Fullen, B. (2016). Self-management skills in chronic disease management: what role does health literacy have?. *Medical Decision Making, 36*(6), 741-759. https://doi.org/10.1177/0272989X16638330

Mahmoodi, R., Hassanzadeh, A., & Rahimi, M. (2021). Health literacy and its dimensions in elderly people in Farsan city, Iran. *Journal of Education and Health Promotion*, *10*, 362. https://doi.org/10.4103/jehp.jehp_149_21

Okyay, P, Abacıgil F., & Harlak, H. (2016) Türkiye Sağlik Okuryazarliği Ölçeği-32. Okyay P., Abacigil, F. *Türkiye Sağlık Okuryazarlığı Ölçekleri Güvenilirlik ve Geçerlilik Çalışması* içinde (43-61). T.C. Health Ministry 2016

Paul, P., Hakobyan, M., & Valtonen, H. (2016). The association between self-perceived health status and satisfaction with healthcare services: Evidence from Armenia. *BMC Health Services Research*, *16*, 67. https://doi.org/10.1186/s12913-016-1309-6

Peters, M., Potter, C. M., Kelly, L., & Fitzpatrick, R. (2019). Self-efficacy and health-related quality of life: a cross-sectional study of primary care patients with multi-morbidity. *Health and Quality of Life Outcomes*, *17*, 37. https://doi.org/10.1186/s12955-019-1103-3

Protheroe, J., Whittle, R., Bartlam, B., Estacio, E. V., Clark, L., & Kurth, J. (2017). Health literacy, associated lifestyle and demographic factors in adult population of an English city: a cross-sectional survey. *Health Expectations, 20*, 112-119. https://doi.org/10.1111/hex.12440

Ratzan, S. C., & Parker, R. M. (2006). Health literacy—identification and response. *Journal of Health Communication*, *11*, 713-715. https://doi.org/10.1080/10810730601031090

Rodríguez, V., Andrade, A. D., García-Retamero, R., Anam, R., Rodríguez, R., Lisigurski, M., ... & Ruiz, J. G. (2013). Health literacy, numeracy, and graphical literacy among veterans in primary care and their effect on shared decision making and trust in physicians. *Journal of Health Communication, 18*, 273-289. https://doi.org/10.1080/10810730.2013.829137

Schönfeld, M. S., Pfisterer-Heise, S., & Bergelt, C. (2021). Self-reported health literacy and medication adherence in older adults: a systematic review. *BMJ Open*, *11*, e056307. https://doi.org/10.1136/bmjopen-2021-056307

Sheeran, P., Maki, A., Montanaro, E., Avishai-Yitshak, A., Bryan, A., Klein, W. M., Miles, E., & Rothman, A. J. (2016). The impact of changing attitudes, norms, and self-efficacy on health-related intentions and behavior: A meta-analysis. *Health Psychology*, *35*(11), 1178–1188. https://doi.org/10.1037/hea0000387

Sørensen, K., Pelikan, J. M., Röthlin, F., Ganahl, K., Slonska, Z., Doyle, G., Fullam, J., Kondilis, B., Agrafiotis, D., Uiters, E., Falcon, M., Mensing, M., Tchamov, K., van den Broucke, S., Brand, H., & HLS-EU Consortium (2015). Health literacy in Europe: comparative results of the European health literacy survey (HLS-EU). *European Journal of Public Health, 25*(6), 1053-1058. https://doi.org/10.1093/eurpub/ckv043

White, R. O., Osborn, C. Y., Gebretsadik, T., Kripalani, S., & Rothman, R. L. (2013). Health literacy, physician trust, and diabetes-related self-care activities in Hispanics with limited resources. *Journal of Health Care for the Poor and Underserved*, *24*(4), 1756–1768. https://doi.org/10.1353/hpu.2013.0177

Wu, S. F. V., Hsieh, N. C., Lin, L. J., & Tsai, J. M. (2016). Prediction of self-care behaviour on the basis of knowledge about chronic kidney disease using self-efficacy as a mediator. *Journal of Clinical Nursing*, *25*(17-18), 2609-2618. https://doi.org/10.1111/jocn.13305

**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.1354175

# Turkish Validity and Reliability of the Marx Activity Rating Scale (MARS) for Patients with Knee Problems

Elif Tugce CİL[1], Ebru AKBUĞA KOÇ[1] Yağmur BARLAS[1], Helin Su ARKUN[1], Gülce Şevval BAĞCIBAŞI[1], Gökhan MERİÇ[2]

[1] Yeditepe University, Faculty of Health Science, Physiotherapy and Rehabilitation Department,
[2] Yeditepe University Hospitals, Department of Orthopedics and Traumatology

***Geliş Tarihi / Received:*** *02.09.2023* ***Kabul Tarihi / Accepted:*** *23.11.2023*

**ABSTRACT**

**Objective**: The Marx Activity Rating Scale (MARS) is a recently developed in English to assess patients' who have knee problems activity level. However, there is no Turkish validation for it. **Materials and Methods:** MARS was translated into Turkish language according to the recommended stages by Beaton et al. 100 Patients (mean age, 30.9 ± 10.5) with various types of the knee problems were included. Each participant completed the MARS twice at fourteen day intervals to determine the test-retest reliability using the interrater correlation coefficient and Cronbach's alpha evaluating internal-consistency. Spearman's "rank correlation" coefficient was done to measure construct validity between the MARS, the EUROQoL General Quality of Life Scale (EQ-5D), the International Knee Documentation Committee (IKDC) Scale. **Results**: A total of 100 patients (37 females, 63 males) completed the Turkish-language MARS. The reliability of the test-retest was 0.9, with Cronbach's alpha of 0.8 at the initial and 0.7 for the retest. High correlations were found between the IKDC and MARS (r =0.2). MARS also strongly correlated with the EQ5D-VAS component score (r =0.2). Floor or ceiling effects were not found for the overall MARS score. **Conclusion:** In conclusion, the MARS was found to be valid and reliable. It is considered to be a preferable scale for patients with knee problems.

**Keywords:** Validity and Reliability, Knee, Activity, Daily Living, MARS.

# Diz Problemi Olan Hastalar İçin Marx Aktivite Değerlendirme Ölçeğinin (MADÖ) Türkçe Geçerlik ve Güvenirliği

**ÖZ**

**Amaç:** Marx Aktivite Değerlendirme Ölçeği (MADÖ), diz problemi olan hastaların aktivite düzeyini değerlendirmek için yakın zamanda geliştirilmiş bir araçtır. Ancak, İngilizce olarak geliştirilmiş bu ölçeğin Türk popülasyonunda validasyonu yapılmamıştır. **Gereç ve Yöntem:** MADÖ, Beaton ve arkadaşları tarafından önerilen aşamalara göre Türkçe'ye çevrilmiştir. 100 Çeşitli diz problemleri olan hastalar (ortalama yaş, 30.9 ± 10.5) çalışmaya dahil edilmiştir. Her katılımcı MADÖ'yü on dört gün arayla iki kez doldurmuş ve test-tekrar test güvenirliğini belirlemek için değerlendiriciler arası korelasyon katsayısı ve iç tutarlılığı değerlendiren Cronbach's alpha kullanılmıştır. MADÖ, EUROQoL Genel Yaşam Kalitesi Ölçeği (EQ-5D) ve Uluslararası Diz Dokümantasyon Komitesi (IKDC) Ölçeği arasındaki yapı geçerliliğini ölçmek için Spearman'ın sıralama korelasyon katsayısı kullanılmıştır. **Bulgular:** Toplam 100 hasta (37 kadın, 63 erkek) Türkçe MADÖ'yü doldurdu. Test-tekrar testin güvenirliği 0.9 olup, Cronbach alfa değeri başlangıç için 0.8 ve tekrar test için 0.782'dir. IKDC ve MADÖ arasında yüksek korelasyon bulunmuştur (r =0.2). MADÖ ayrıca EQ5D-VAS bileşen skoru ile de güçlü bir korelasyon göstermiştir (r =0.2). Genel MADÖ skoru için taban veya tavan etkisi bulunmamıştır. **Sonuç:** Sonuç olarak MADÖ'nün geçerli ve güvenir olduğu bulunmuştur. Diz problemi olan hastalar için tercih edilebilir bir ölçek olduğu düşünülmektedir.

**Anahtar Kelimeler:** Geçerlik ve Güvenirlik, Diz, Aktivite, Günlük Yaşam, MADÖ.

***Sorumlu Yazar / Corresponding Author:*** Elif Tugce CIL, Yeditepe University, Faculty of Health Sciences, Department of Physiotherapy and Rehabilitation, Istanbul, Turkey
***E-mail:*** tugce.cill@gmail.com

***Bu makaleye atıf yapmak için / Cite this article:*** Çil, E.T., Akbuğa Koç, E., Barlas, Y., Arkun, H.S., Bağcıbaşı, G.Ş & Meriç, G. (2024). Turkish Validity and Reliability of the Marx Activity Rating Scale (MARS) for Patients with Knee Problems. *BAUN Health Sci J,* 13(1), 60-66.
https://doi.org/10.53424/balikesirsbd.1354175

## INTRODUCTION

The knee joint is susceptible to many acute and chronic injuries involving the bone, meniscus, articular cartilage, tendons, and ligaments. These injuries often occur during sports activities, as noted in various academic sources (Grainger and Hopper, 2010; Patel and Villalobos, 2017). Given that the knee joint transmits substantial forces, acute traumatic injuries can occur, particularly in sports that involve bending movements and sudden changes in direction.( da Silva and Pereira, 2017). On the other hand, recurrent chronic injuries may develop due to overuse, particularly in sports that involve running and jumping (Grainger et al., 2010; Alonso et al., 2014; Aicale, Tarantino and Maffulli 2018)

Knee disorders are frequently accompanied by limitations in activity and participation at various levels. These activity restrictions may manifest as difficulties with climbing stairs, running, hopping, descending, cutting, and turning. Similarly, participation restrictions mean the inability to participate in sports that involve a high degree of knee joint motion, as noted in various academic research. (Hewett and Webster, 2019; Inderhaug, Lindanger, Mølster, Strand and Solheim, 2019; Doyle-Baker et al.,2019).

Numerous instruments have been developed to evaluate sports activity levels or participation following knee injuries. These outcome rating scales are critical for assessing the effectiveness of treatment methods, such as surgical intervention and rehabilitation, for individuals with knee injuries. Consequently, utilizing these instruments is essential for accurately measuring the outcomes of interventions and ensuring that patients receive appropriate and effective care (Lysholm and Tegner, 2007; Marx, 2003; Inderhaug et al., 2019).

Several measures of knee function are commonly used in clinical practice, including the IKDC, Lysholm knee and Knee Injury and Osteoarthritis Outcome Score (KOOS), Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC), Kujala Anterior Knee Pain Scale, and MARS, as cited in various academic sources (Celik, Coşkunsu, and Kılıçoğlu, 2013; Dereli, Kuru and Yaliman, 2010; jupiter, Koh, Parikh and Stein, 2019; Kuriyama, Nakamura and Nishitani, 2023).

MARS is a newly designed scoring scale which can be used for most individuals with knee injuries. This scale varies from previous activity measures in that it assess physical function components common to different sports activities rather than engagement in specific sports. As a result, patients can be more appropriately compared by analyzing the types of a particular physical activity, such as jogging, jumping or running. This outcome measure is critical for accurately measuring intervention success and improving overall treatment for people with knee problems (Jones, Marx, Stump, Warren and Wickiewicz, 2001; Harner, Herzka, Irrgang and Zelle, 2005).

MARS is a grading scale that assesses the patients' activity levels with knee disorders (cartilage, ligament, meniscus, or patellofemoral problem e.g.). Patients are asked to evaluate their highest activity levels from the previous 12 months by eliminating other factors such as recent injuries, or surgery. MARS allows the patient's total general activity level to be correctly monitored. This scale is important for determining the effective rehabilitation and prevention strategies for individuals with knee injuries (Marx et al., 2001).

In current literature reported that MARS is a valid and reliable tool for assessing patients' ability to do sports-related activities. The scale has been translated into many languages to provide suitable and objective assessment way for patients with knee problems activity levels. In addition, this scale gives oppurtinity strengthen the scientific validity of clinical investigations in this area. However, according to our knowledge, studies on the reliability, validity and translation of MARS in Turkey have yet to be undertaken (Marx et al., 2001; Cameron et al., 2015; Ageberg, Flosadottir and Roos, 2017; Goharpey et al., 2011; Faur et al., 2020). Therefore, this research aims to translate MARS into Turkish language and examine its validity and reliability for patients who have knee problems. The results of current study will contribute to the patients' activity level information on the assessment and treatment of knee injuries by providing significant insights into the suitability of MARS for usage in Turkey.

## MATERIALS AND METHODS

### Study type

This validity and reliability study was conducted through face-to-face interviews with patients by researchers (three different researchers; YB, HAS, GSB) from private physiotherapy clinic between December 2022 and February 2023.

### Study group

The sample size of the study was calculated using the program named G*Power 3.1.9.2; a power analysis was performed by taking the effect size of similar studies previously published in the literature as reference (Faur et al., 2020)d=0.30 (medium effect size), α=0.05, Power =0.95, and according to the results, the number of participants planned to participate in the study was determined as one hundred.

One hundred six patients with knee problems were enrolled on the Physiotherapy Clinic between December 2022 and February 2023. (1) being 18 years or older; (2) patients with a diagnosis of knee pathology: meniscal and traumatic ligament injury, fractures, patellofemoral joint pain, and mild osteoarthritis (3) do not receive any intervention between the test-retest periods were the inclusion criterias while (1) lack of understanding of the Turkish language; (2) having cognitive impairment (3) multiple ligament injuries, large osteochondral fractures, significant focal cartilage defects requiring surgery, malignancy, and advanced osteoarthritis (4) were the exclusion criterias.

### Dependent and independent variables

The MARS evaluates four activity items: running, deceleration, cutting and pivoting. It has a 5-point scale referring to the frequency of performing these activities in the past 12 months, with a higher score meaning more

frequent participation. The independent variables of this research is time while the dependent variables are Pearson's correlation coefficient, and ICC.

**Procedures**

First of all, the participants were asked to fill in the socio-demographic form. While this form collected information such as age, height, weight, gender, it also questioned whether they practiced sports and if so, which sport they were interested in. Afterwards, participants were requested to fill the Turkish interlingual rendition of the MARS, the previously validated Turkish version of the IKDC (Coşkunsu, Çelik, Ergönül, Irrgang and Kılıçoğlu, 2014) is a 10-item validated questionnaire that evaluates symptoms, functional limitations and athletic performence for different types of the knee problems, including ligament, meniscus, cartilage, and patellofemoral discomfort. Each item is rated, with 0 being the lowest level of function and increasing scores denoting higher levels (10) of function (Anderson et al., 2010) and EUROQoL (Kahyaoğlu Süt and Ünsar, 2011), the research society of Western European Quality of Life developed this instrument for assessing the patient's health in 1987. The scale is divided into two sections. The first is the daily health profile, which includes five sub-divisions: usual activities, movement, self-care, pain and anxiety. The second item is the visual analogue scale (VAS), in which participants rate their actual health condition on a scale (0 to 100). There is a favourable increase in health perception when the VAS score rises (Balestroni and Bertolotti, 2012).

From these items an index can be done with values predetermined for the target population (country), as well as quality-adjusted life years and disability-adjusted life years.

Our study used health Measurement Instruments checklist (COSMIN) for selecting to realize consensus-based validity assessment (Alonso et al., 2010).

MARS was translated into Turkish and culturally adapted according to the recommended stages by Beaton et al. (Beaton, Bombardier, Ferraz and Guillemin, 2000). Two native speakers, a physiotherapist and a translator without any medical background, independently translated the original scale into Turkish in the first stage. The bilingual person reviewed translations in the second stage. Thirdly, two native speakers of English who speaks and understands Turkish well translated the MARS Turkish translation into English. Before confirming the Turkish translation of MARS, four translators made comparision of the English re-translation with the original Turkish translation. Following versions of this scale are compared with the original translation, and a standard version was created from these agreements. The scale was then administered to patients, and a pilot study was done with 20 patients who were selected from all participants.

**Statistical analysis**

Spearman's correlation coefficient was done for evaluating construct validity. A correlation coefficient was considered as good if it is between 0.4 to 0.6, very good if it is between 0.6-0.8 and excellent if it is greater than 0.8. The floor and ceiling effects presence determined content validity f more than 15% of patients scored minimum or maximum. Cronbach's alpha coefficient tested the internal consistency of the MARS scale at the initial and second implementation. A Cronbach alpha rate of more than 0.7 shows a high degree for internal consistency. To measure the test-retest reliability of the MARS, the intraclass correlation coefficient (ICC) was used and, 100 patients filled the scale 14 days after the initial evaluation. If the ICC is higher than 0.9, it is considered excellent, between 0.7 and 0.9 it is considered good, and greater than 0.7 it is considered fair. Spearman's correlation coefficient assessed the reproducibility of the questionnaire (Suciu, et al., 2020). Furthermore, SPSS 22 version were used for statistical analyses. For testing normality of all datas, Kolmogorov-Smirnov test was applied and $p \leq 0.05$ was the significance level.

**Ethical considerations**

Patients included in the study were referred to the physiotherapy clinic by orthopaedics. Before participants were recruited for an assessment, they provided written informed consent, which the ethical committee at the Faculty of Health Sciences of Marmara University had approved (IRB study protocol:118).

## RESULTS

We selected 106 suitable patients with knee complaints from a physiotherapy clinic between December 2022 and February 2023. The MARS required approximately 3 minutes to complete. The pilot study was conducted with 20 patients (seven females, 13 males; mean age, 35.0 ± 12.5 years). During our study period, six subjects were excluded due to the incompleteness of the retest assessment. Therefore, in total, 100 patients (mean age, 30.9 ± 10.5; range, 19–59 years) with various types of knee disorders were involved in this study.

37.0 % of the participants were female and meniscus tear was found to be the pathology with the highest percentage (33.0%) among knee problems. Among the sports activities in which individuals participated, basketbal had the highest percentage of sports, while running and rowing had the lowest (24%, 2% and 2% respectively) **(Table 1).**

**Validity**

The correlation coefficient between the MARS and IKDC score was 0.2 which is significant, excellent results (p=0.01). The highest correlation was found between EQ5D-VAS and IKDC (Spearman's r = 0.6, p =0.00), respectively. The correlation was identified between EQ5D-VAS and the MARS as r = 0.2, p =0.00), Table 2).There were no floor or ceiling effects for the overall MARS rating, with 9% of patients reports the lowest (0) and 4% the greatest score (16), respectively.

**Reliability**

Table 3 showed the inter-item correlation matrix of the two evaluations. The MARS showed a high reliability score. At the first completion of the scale, Cronbach's alpha was calculated as 0.8. For the retest, Cronbach's

alpha was found as 0.7. The intraclass correlation coefficient (ICC) was used to measure the test-retest reliability of the MARS assessment form. The ICC was found as 0.9 (95% CI 0.8–0.9, Table 3).

**Table 1. Demographic characteristics of the study group (n=100).**

| Variables | Number |
|---|---|
| **Age (years, mean ± SD)** | 30.9±10.46 |
| **Gender n(%)** | |
| Female | 37 (37.0) |
| Male | 63 (63.0) |
| **Diagnosis n (%)** | |
| ACL injury | 20 (20.0) |
| Meniscus tear | 33 (33.0) |
| ACL and meniscus injury | 7 (7.0) |
| MCL injury | 6 (6.0) |
| Cartilage damage | 8 (8.0) |
| Fracture | 1 (1.0) |
| Patellofemoral pain syndrome | 19 (19.0) |
| Osteoarthritis | 20 (20.0) |
| **Sport activity involvement n (%)** | |
| Swimming | 8 (8.0) |
| Running | 2 (2.0) |
| Pilates | 8 (8.0) |
| Futbol | 15 (15.0) |
| Basketball | 24 (24.0) |
| Voleyball | 11 (11.0) |
| Yoga | 3 (3.0) |
| Tennis | 5 (5.0) |
| Rowing | 2 (2.0) |
| Kickbox | 5 (5.0) |
| Fitness | 8 (8.0) |
| Other | 9 (9.0) |

**Table 2. Correlation between the tested scores.**

| | EQ5D VAS | IKDC | MARS |
|---|---|---|---|
| **EQ5D VAS** | 1.000 | 0.621** | 0.265** |
| **IKDC** | | 1.000 | 0.253* |
| **MARS** | | | 1.000 |

Table 2. Spearman's correlation coefficient between the tested scores (n = 100)
* correlation is significant at the 0.05 level;
** Correlation is significant at the 0.01 level; EuroQol visual analogue scale (EQ5D VAS), International Knee Documentation Co

**Table 3. Inter-item correlation for the two MARS forms.**

| | M1 | M2 | M3 | M4 |
|---|---|---|---|---|
| M1 | 1.000 | 0.700 | 0.512 | 0.475 |
| M2 | | 1.000 | 0.571 | 0.582 |
| M3 | | | 1.000 | 0.476 |
| M4 | | | | 1.000 |
| | **M1 (re-test)** | **M2 (re-test)** | **M3 (re-test)** | **M4 (re-test)** |
| M1 (re-test) | 1.000 | 0.383 | 0.363 | 0.384 |
| M2 (re-test) | | 1.000 | 0.639 | 0.621 |
| M3 (re-test) | | | 1.000 | 0.457 |
| M4 (re-test) | | | | 1.000 |

## DISCUSSION

As a result, a method of assessing this activity is crucial for research comparing two therapy results to guarantee that the patient groups are equal in this regard. Thus, assessments such as MARS are required for assessing activity level in individuals with knee diseases. That's why, our aim was to perform validity and reliability of the MARS. The present findings demonstrated that the Turkish translation of the MARS is acceptable, reliable, and valid. The degree of activity is an essential factor that should be assessed independently. The frequency and intensity with which patients participate in sports vary greatly.

The results demonstrated the sufficient psychometric properties of this scale according to internal consistency and test-retest reliability for patients in the Turkish population with various knee disorders. The test-retest reliability result was eligible and adequate with an 0.9 ICC and a Cronbach's alpha of 0.8 and 0.7 for the retest for subscales of the MARS. These values align with prior reports: ICC of 0.9 in the original study developed the MARS and ICC of 0.7 for the Iranian translation, respectively (Marx et al., 2001; Negahban et al., 2011). In this study, floor and ceiling effects were found as fewer minimal and maximal responses (9% & 4%, respectively) with comparing other studuies (Negahban et al. -35% & Ageberg et al.-22% and 20%) (Ageberg et al., 2017; Negahban et al., 2011).

In the original validation study of the MARS, the Cincinnati, Tegner and Daniel Scales were used for convergent validity. An index (MARS) can be calculated from these scales using values established for the target population (country), as well as quality-adjusted life years and disability-adjusted life years.

They demonstrated excellent or moderate correlation with all three of them (Spearman's r = 0.6, Spearman's r = 0.6 and Spearman's r = 0.5, respectively) (Marx et al., 2001).

In a study, we used the IKDC and the EQ5D, because these scales will be more pertinent in current academic, research projects, and also appropriate based on the reviewed literature. (Anderson, Irrgang and Kanakamedala, 2016; Negahban et al., 2011; Suciu et al., 2020). Suciu et al. found significant correlations between the MARS score and IKDC (Spearman's r = 0.8, p < 0.001) and EQ-5D score (Spearman's r = 0.4, p < 0.001), respectively (Suciu et al., 2020).In another study conducted by Negahban et al., the Tegner and Marx activity scales both have a high ICC. Marx scale exceeded the minimum Cronbach's alpha level of 0.7. The majority of a priori assumptions were confirmed in terms of construct validity.In one systematic review, The reported test-retest intraclass correlations (ICCs) for the IKDC-SKF and MARS are 0.8 to 0.9 and 0.8 to 0.9, respectively (ICC>0.7). The IKDC-SKF has been shown to have moderate/excellent correlations with 60/72 (83%) concomitantly administered physical health measures and poor/fair correlations with 28/31 (90%) mental health indicators, indicating both convergent and divergent validity. The MARS displays moderate/excellent correlations with 3/3 (100%) of the concurrently administered measures of level of sports activities, demonstrating its convergent validity (Kanakamedala et al., 2016). In this study, there were significant correlations between the MARS score and the IKDC (Spearman's r = 0.2, p=0.0) and EQ5D VAS (Spearman's r = 0.2, p=0.0, Table 2) respectively.

These results were correlated well with each other, similar to previous studies.

The current study limitation can be the sample size. Although our sample size is sufficient according to the literature information and power analysis results, larger population should be applied to individuals with more diverse knee problems. In addition, there is no accepted and ideal range in the literature for test-retest interval. The short test-retest interval can be risk for the patient reaction because of their memory of the initial assessment. Although a longer time period may reduce this likelihood, other factors must be considered during this longer time period. For example, it is unethical not to cure an acute complaint for a long time, and patients with chronic diseases may be included in studies with long retest intervals. In addition, there may be spontaneous improvement in acute complaints and unexpected changes in complaints in patients with chronic diseases. Given these considerations, repeated applications of a clinical findings assessment should be relatively short (Celik et al., 2013). Suciu et al. used a 1-month follow-up period in their MARS validity and reliability study with Romanians. Negahban et al. used an interval of 2 to 6 days in their MARS validity and reliability study with Iranians (Negahban, et al., 2011; Suciu et al., 2020). Considering previous studies and literature, we determined the test-retest interval of 7-14

days and therefore, the clinical limitations related with this selection were accepted.

**Limitations and Strengths of the Study**

The Turkish MARS includes enough questions to designate the functional condition of patients who have the knee problems. It is a brief and straightforward scale for clinicians, researchers, and patients. Both the translation and the cultural adaption of the Turkish version of MARS are reliable and valid. This scale can put to good use the functional limitations of people suffering from knee problems. Although this pilot investigation supported the proposed translation, the Turkish form of MARS must be evaluated in more extensive and diverse groups.

## CONCLUSION

In patients with knee problems, the Turkish translation of the MARS is a valid, consistent, and reliable outcome assessment.

## 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:** ETC, EBK, YB, HSA, GSB, GM; **Material, methods and data collection:** ETC, EBK, YB, HSA, GSB, GM; **Data analysis and comments:** ETC, EBK, YB, HSA, GSB, GM; **Writing and corrections:** ETC, EBK, YB, HSA, GSB, GM.

## REFERENCES


Aicale, R., Tarantino, D., & Maffulli, N. (2018). Overuse injuries in sport: a comprehensive overview. *Journal of orthopaedic surgery and research, 13*(1), 1-11. https://doi.org/10.1186/s13018-018-1017-5

Balestroni, G., & Bertolotti, G. (2012). EuroQol-5D (EQ-5D): an instrument for measuring quality of life. Monaldi *Archives for Chest Disease, 78*(3). https://doi.org/10.4081/monaldi.2012.121

Beaton, D. E., Bombardier, C., Guillemin, F., & Ferraz, M. B. (2000). Guidelines for the process of cross-cultural adaptation of self-report measures. *Spine, 25*(24), 3186-3191.

Cameron, K. L., Peck, K. Y., Thompson, B. S., Svoboda, S. J., Owens, B. D., & Marshall, S. W. (2015). Reference values for the Marx Activity Rating Scale in a young athletic population: history of knee ligament injury is associated with higher scores. *Sports Health, 7*(5), 403-408. https://doi.org/10.1177/1941738115576121

Celik, D., Coşkunsu, D., & Kılıçoğlu, Ö. (2013). Translation and cultural adaptation of the Turkish Lysholm knee scale: ease of use, validity, and reliability. *Clinical Orthopaedics and Related Research, 471*, 2602-2610. https://doi.org/10.1007/s11999-013-3046-z

Çelik, D., Coşkunsu, D., Kılıçoğlu, Ö., Ergönül, Ö., & Irrgang, J. J. (2014). Translation and cross-cultural adaptation of the international knee documentation committee subjective knee form into Turkish. *Journal of orthopaedic & sports physical therapy, 44*(11), 899-909. https://www.jospt.org/doi/10.2519/jospt.2014.4865

da Silva, M. V., & Pereira, B. (2017). Biomechanics of Lower Limb Injuries. In J. Espregueira-Mendes, C. Niek van Dijk, P. Neyret, M. Cohen, S.D. Villa, H. Pereira, J.M. Oliveira. (Eds.) *Injuries and Health Problems in Football: What Everyone Should Know* (pp. 53-64). Springer Nature.

Flosadottir, V., Roos, E. M., & Ageberg, E. (2017). Translation, cross-cultural adaptation, and validation of the activity rating scale for disorders of the knee. *Orthopaedic Journal of Sports Medicine, 5*(9), 2325967117729361. https://doi.org/10.1177/2325967117729361

Greco, N. J., Anderson, A. F., Mann, B. J., Cole, B. J., Farr, J., Nissen, C. W., & Irrgang, J. J. (2010). Responsiveness of the International Knee Documentation Committee subjective knee form in comparison to the Western Ontario and McMaster Universities Osteoarthritis Index, modified Cincinnati Knee Rating System, and Short Form 36 in patients with focal articular cartilage defects. *The American journal of sports medicine, 38*(5), 891-902. https://doi.org/10.1177/0363546509354163

Hopper, M. A., & Grainger, A. J. (2010). Knee injuries. In P. Robinson (Ed.), *Essential Radiology for Sports Medicine*, (pp. 1-28). Springer Nature.

Kahyaoğlu Süt, H., & Ünsar, S. (2011). Is EQ-5D a valid quality of life instrument in patients with acute coronary syndrome? Anatolian Journal of Cardiology/Anadolu *Kardiyoloji Dergisi, 11*(2). https://doi.org/10.5152/akd.2011.037

Kanakamedala, A. C., Anderson, A. F., & Irrgang, J. J. (2016). IKDC Subjective Knee Form and Marx Activity Rating Scale are suitable to evaluate all orthopaedic sports medicine knee conditions: a systematic review. *Journal of ISAKOS, 1*(1), 25-31. https://doi.org/10.1136/jisakos-2015-000014

Koh, J. L., Parikh, S., Stein, B. S., & JUPITER Group. (2019). Conducting a multicenter trial: learning from the JUPITER (Justifying Patellar Instability Treatment by Early Results) experience. In V. Musahl, J. Karlsson, M.T. Hirschmann, O.R. Ayeni, · R.G. Marx, J. L. Koh, N. Nakamura (Eds.), *Basic methods handbook for clinical orthopaedic research: A practical guide and case based research approach*, (pp. 415-425). Springer Nature.

Kuru, T., Dereli, E. E., & Yaliman, A. (2010). Validity of the Turkish version of the Kujala patellofemoral score in patellofemoral pain syndrome. *Acta Orthopaedica et Traumatologica Turcica, 44*(2), 152-6. https://doi.org/10.3944/AOTT.2010.2252

Lindanger, L., Strand, T., Mølster, A. O., Solheim, E., & Inderhaug, E. (2019). Return to play and long-term participation in pivoting sports after anterior cruciate ligament reconstruction. *The American journal of*

*sports medicine, 47*(14), 3339-3346. https://doi.org/10.1177/0363546519878159

Lysholm, J., & Tegner, Y. (2007). Knee injury rating scales. *Acta orthopaedica, 78*(4), 445-453. https://doi.org/10.1080/17453670710014068

Marx, R. G. (2003). Knee rating scales. Arthroscopy: *The Journal of Arthroscopic & Related Surgery, 19*(10), 1103-1108. https://doi.org/10.1016/j.arthro.2003.10.029

Marx, R. G., Stump, T. J., Jones, E. C., Wickiewicz, T. L., & Warren, R. F. (2001). Development and evaluation of an activity rating scale for disorders of the knee. *The American journal of sports medicine, 29*(2), 213-218. https://doi.org/10.1177/03635465010290021601

Mokkink, L. B., Terwee, C. B., Knol, D. L., Stratford, P. W., Alonso, J., Patrick, D. L., et al. (2010). The COSMIN checklist for evaluating the methodological quality of studies on measurement properties: a clarification of its content. *BMC medical research methodology, 10*(1), 1-8. https://doi.org/10.1186/1471-2288-10-22

Negahban, H., Mostafaee, N., Sohani, S. M., Mazaheri, M., Goharpey, S., Salavati, M., et al. (2011). Reliability and validity of the Tegner and Marx activity rating scales in Iranian patients with anterior cruciate ligament injury. *Disability and rehabilitation, 33*(22-23), 2305-2310. https://doi.org/10.3109/09638288.2011.570409

Nishitani, K., Nakamura, S., & Kuriyama, S. (2023). Clinical evaluation of knee joint diseases. *Journal of Joint Surgery and Research, 1*(1), 9-17. https://doi.org/10.1016/j.jjoisr.2022.12.003

Patel, D. R., & Villalobos, A. (2017). Evaluation and management of knee pain in young athletes: overuse injuries of the knee. *Translational Pediatrics, 6*(3), 190. https://doi.org/10.21037/tp.2017.04.05

Suciu, O., Prejbeanu, R., Haragus, H., Faur, C., Onofrei, R. R., & Todor, A. (2020). Cross-cultural adaptation and validation of the Romanian Marx activity rating scale for anterior cruciate ligament reconstruction. *In Healthcare, 8*(3), 318. https://doi.org/10.3390/healthcare8030318

Timpka, T., Alonso, J. M., Jacobsson, J., Junge, A., Branco, P., Clarsen, B., et al. (2014). Injury and illness definitions and data collection procedures for use in epidemiological studies in Athletics (track and field): consensus statement. *British journal of sports medicine, 48*(7), 483-490. http://dx.doi.org/10.1136/bjsports-2013-093241

Webster, K. E., & Hewett, T. E. (2019). What is the evidence for and validity of return-to-sport testing after anterior cruciate ligament reconstruction surgery? A systematic review and meta-analysis. *Sports Medicine, 49,* 917-929. https://doi.org/10.1007/s40279-019-01093-x

Whittaker, J. L., Toomey, C. M., Nettel-Aguirre, A., Jaremko, J. L., Doyle-Baker, P. K., Woodhouse, L. J., et al. (2019). Health-related Outcomes after a Youth Sport-related Knee Injury. *Medicine and science in sports and exercise, 51*(2), 255-263. https://doi.org/10.1249/mss.0000000000001787

Zelle, B. A., Herzka, A. S., Harner, C. D., & Irrgang, J. J. (2005). Evaluation of clinical outcomes in anterior cruciate ligament surgery. *Operative Techniques in Orthopaedics, 15*(1), 76-84. https://doi.org/10.1053/j.oto.2004.11.013

**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.1376483

# Evaluation of Genital Hygiene Behaviors and Vaginal Douching Practices of Married Women Aged 15-49 in Fertile Period

Aytül HADIMLI[1], Mahide DEMİRELÖZ AKYÜZ[1], Serap ÇETİNTAŞ ÖNER[2], Birsen KARACA SAYDAM[1], Esin ÇEBER TURFAN[1], Neriman SOĞUKPINAR[1]

[1] Ege University, Faculty of Health Sciences, Department of Midwifery
[2] Hakkari University, Faculty of Health Sciences, Department of Midwifery

***Geliş Tarihi / Received:****16.10.2023,* ***Kabul Tarihi / Accepted:*** *30.11.2023*

**ABSTRACT**

**Objective:** Analyzing the genital hygiene behaviors and vaginal douching practices of married women aged 15-49 in the fertile period. **Materials and Methods:** Married women aged 15-49 in the fertile period (N: 142) registered to the Family Health Center No 11 in Bornova District of İzmir province constituted the universe of the study, while 120 women accepting to participate in the study constituted its sample. Data were collected through the "Women's Descriptive Features Questionnaire" and "Genital Hygiene Behavior Inventory (GHBI)". The t-test, Kruskal-Wallis H test, and Mann-Whitney U test were used in independent samples with percentage calculations in evaluating data, while the correlation between variables was assessed with the chi-squared test. **Results:** The mean GHBI score of women is 78.36±9.3. A statistically significant difference between women's educational background, income status, family type, vaginal douching, and complaints about a malodorous vaginal discharge experience among their socio-demographic features, and their mean GHBI score ($p<0.05$). **Conclusion:** The total score that the women obtained from the inventory reflects a mid-level genital hygiene behavior on their part. It can be suggested that training sessions be organized for their necessities and awareness on the issue be raised for them to earn correct genital hygiene behaviors.

**Keywords:** Women's Health, Genital Hygiene, Vaginal Douching.

# Doğurganlık Dönemindeki 15-49 Yaş Evli Kadınların Genital Hijyen Davranışlarının ve Vajinal Duş Uygulamalarının Değerlendirilmesi

**ÖZ**

**Amaç:** Doğurganlık dönemindeki 15-49 yaş arası evli kadınların genital hijyen davranışlarının ve vajinal duş uygulamalarının incelenmesi. **Gereç ve Yöntemler:** İzmir ili Bornova ilçesi 11 No'lu Aile Sağlığı Merkezi'ne kayıtlı 15-49 yaş arası doğurgan dönemdeki evli kadınlar (N: 142) araştırmanın evrenini, araştırmaya katılmayı kabul eden 120 kadın ise örneklemini oluşturmuştur. Veriler "Kadının Tanıtıcı Özellikleri Anketi" ve "Genital Hijyen Davranış Envanteri (GHBE)" ile toplanmıştır. Verilerin değerlendirilmesinde yüzde hesaplamaları ile bağımsız örneklemlerde t-testi, Kruskal-Wallis H testi ve Mann-Whitney U testi kullanılırken, değişkenler arasındaki korelasyon ki-kare testi ile değerlendirilmiştir. **Bulgular:** Kadınların ortalama GHBI skoru 78.36±9.3'tür. Kadınların sosyo-demografik özelliklerinden eğitim durumu, gelir durumu, aile tipi, vajinal duş yapma ve kötü kokulu vajinal akıntı şikayeti ile GHBI puan ortalamaları arasında istatistiksel olarak anlamlı bir fark bulunmuştur ($p<0.05$). **Sonuç:** Kadınların envanterden aldıkları toplam puan orta düzeyde bir genital hijyen davranışını yansıtmaktadır. Doğru genital hijyen davranışları kazanmaları için ihtiyaçlarına yönelik eğitimler düzenlenmesi ve bu konuda farkındalık yaratılması önerilebilir.

**Anahtar Kelimeler:** Kadın Sağlığı, Genital Hijyen, Vajinal Duş.

***Sorumlu Yazar / Corresponding Author:*** Mahide DEMİRELÖZ AKYÜZ, Ege University, Faculty of Health Sciences, Department of Midwifery, İzmir, Türkiye.
***E-mail:*** mahide.demireloz@ege.edu.tr

***Bu makaleye atıf yapmak için / Cite this article:*** Hadımlı, A., Demirelöz Akyüz, M., Çetintaş Öner, S., Karaca Saydam, B., Çeber Turfan, E., & Soğukpınar, N. (2024). Evaluation of genital hygiene behaviors and vaginal douching practices of married women aged 15-49 in fertile period. *BAUN Health Sci J, 13*(1), 67-74. https://doi.org/10.53424/balikesirsbd.1376483

## INTRODUCTION

The 15-49 age interval, the fertile period of women, is a period in which reproductive health problems occur. Urogenital infection is one of the most common reasons for women in the fertile period to visit gynecology policlinics. Every year, approximately one million women in the world, at least 75% of whom have genital infection history, are diagnosed with urogenital system infection (Calik et al., 2020). Factors leading to genital infection in women are varied. The fact that the urethra, vagina, and anus are anatomically close to one another is an important predisposing factor for genital infections. Also, factors such as low-level educational background, incorrect genital hygiene practices, vaginal douching, and improper perineum cleaning in the toilet are effective in the genital infection development (Hadımlı et al., 2012; Calik et al., 2020). In regional studies carried out in Turkey, genital infections and risky hygiene behaviors that could lead to vaginal infections have been stated to be common (Koştu and Taşçı, 2009; Yaman et al., 2016). One of the most important of these risky behaviors is vaginal douching. Maintaining its existence among women with different cultures throughout the world, vaginal douching (VD) is defined as the act of washing the vagina with water, soap, or other chemical products (Okumuş and Demirci, 2014; Martino and Vermund, 2002). Vaginal douching behavior is a complicated issue affected by psychological, social, and cultural determinants (Martino and Vermund, 2002). McKee et al. (2009) base the reasons for women to practice vaginal douching on two conceptual models, namely, the cosmetic model and infection control model (McKee et al., 2009). Women douche to feel themselves to be clean during/after menstruation or after sexual intercourse within the context of the cosmetic model, and to eliminate itching and odor and prevent sexually transmitted diseases or vaginal infections within the context of the infection control model (Okumuş and Demirci, 2014; Martino and Vermund, 2002; Cottrell, 2003). Apart from the aforementioned models, it is stated in studies done in Muslim countries that women practice vaginal douching as part of their ghusl ablution, which is a ritual act of washing the whole body so that there is no dry area on the body after intercourse. Although no such requirement is specified in religious sources, many women believe that they will not be clean if they do not douche during their ghusl ablution (Arslantas et al., 2010; Sunay et al., 2011; İlmihal, 2014; Yaman et al., 2016). In a study carried out by the Turkish Ministry of Health in 2014, 96.2% of women were expressed to douche for hygiene, while 52.8% and 12.7% were stated to practice it for religious reasons and to prevent pregnancy, respectively (Directorate-General for Health Research, 2014).

Throughout the world, it has been determined that more than 25% of women douche regularly, while 73% have practiced VD in one period of their lives (Ekpenyong et al., 2014). According to the National Survey of Family Growth (NSFG) carried out in the US, the percentage of douching women 15-49 years of age was 15.8% in 2017 (National Survey of Family Growth, 2019). There are also studies demonstrating VD practice to be common in African and Far East countries. The percentage of VD practice has been stated to be as high as 79.2% in Nigeria, 89.6% in Indonesia, and 76.7% in Cambodia (Ekpenyong et al., 2014). The frequency of VD practice ranges from 22.5% to 80.6% in different regions in Turkey (Sunay et al., 2011; Yaman et al., 2016; Guzel et al., 2011; Orak and Canuygur, 2014; Coşkun et al., 2017; Yanıkkerem and Yasayan, 2016).

Vaginal douching leads to important changes in vaginal flora. The pH level of the vagina is disrupted, and the quantity and quality of lactobacilli change, leading to them being replaced by pathogenic microorganisms (Martino et al., 2002; Wan and Jacobs, 2018; Luong et al., 2010). Gynecological problems scientifically proven to be related to VD are namely increased chlamydia and bacterial vaginosis prevalence and vaginal infection history (Martino et al., 2002; Arslantas et al., 2010; Wan and Jacobs, 2018; Yıldırım et al., 2020). A pelvic inflammatory disease caused by infection is one of the most common reasons for ectopic pregnancy and infertility (Martino et al., 2004). In addition, vaginal douching causes chronic bacterial colonization within the uterus and stimulates preterm labor with the inflammatory response (Luong et al., 2010; Fiscella, 2002). In a study analyzing the genital hygiene habits of women with and without genital infection in Turkey, 52.4% of the women with genital infection were stated to have performed VD (Süt, 2016).

A common reproductive health problem, genital tract infections are closely related to a woman's personal hygiene besides various factors. Perceiving the reality of VD, performed by women for genital hygiene, and the risks caused by genital hygiene practices are extremely crucial. Health personnel's knowledge on the ways of and the reasons for women to perform genital hygiene is one of the essential points in providing health training and planning care and treatment in case of a disease. In this regard, the genital hygiene behaviors and vaginal douching practices of married women aged 15-49 in the fertile period have been analyzed in this study.

## MATERIALS AND METHODS

### Study type

This study is a cross-sectional study designed to evaluate the genital hygiene behaviors and vaginal douching practices of married women aged 15-49 in the fertile period.

### Study group

This research is a cross-sectional study planned to evaluate the genital growth and normal douche application status of married women of reproductive age between the ages of 15-49. In the region where the research was conducted, all married women of reproductive age (N: 142) between the ages of 15-49, registered to the Family Health Center No. 11, which is at a medium socio-economic level in the region of XXXX District of Izmir province, were created, but they were not systematically examined; The purpose of

recruitment was explained to all women and they were invited to participate, and a total of 120 women participated in the study (participation rate 84.50%).

**Procedures**

Created by the researchers in light of the related literature, 11 questions regarding the descriptive features of the women and 17 questions regarding their obstetric and gynecological features (the number of pregnancies and births, live birth history, abortion status, the family planning method used, the existence of complaints regarding urinating, the existence of post-sexual intercourse complaints, the existence of malodorous discharge, features of the discharge, and the status of seeking medical advice) were included in the questionnaire used in the study. The "Genital Hygiene Behavior Inventory" (GHBI), developed by Ege and Eryılmaz in 2005, was used to determine the participating women's genital hygiene behavior status. Each statement in this Likert-type scale is scored with 1 to 4 points. For the positive questions, 1 point, 2 points, 3 points, and 4 points were assigned to the responses of "never", "sometimes", "frequently", and "always" respectively. The lowest score to be obtained from the GHBI is 27, while the highest is 108. The genital hygiene behavior level is reflected to be more satisfactory as the score obtained from the inventory gets higher. The research data was collected via the face-to-face interview method.

**Statistical analysis**

The data were analyzed by regarding their significance level as $p<0.05$ in the SPSS 16.0 software package. The correlation between the number and percentage distribution of the results regarding the women's socio-demographic features and the GHBI points obtained by them, and their urogenital system symptoms were evaluated with the t-test, the Kruskal-Wallis H test, and the Mann-Whitney U test, while the correlation between the categorical variables was assessed with the chi-squared test.

**Ethical considerations**

Necessary permits were obtained with the protocol no 111-2017 numbered 02/58 from Ege University Scientific Research and Publication Ethics Committee to conduct the study, which was supported under Ege University Scientific Research Projects. Besides, to carry out the study, the application permit from the Turkish Ministry of Health Public Health Board, and the informed consent from the women participating in the study were obtained.

## RESULTS

The mean age of the women participating in the study is 29.21 ± 7.18. Of these participants, 40.8% are elementary school graduates, 90.9% are homemakers, and all of them have health coverage. Their mean age upon marriage is 20.4 ± 3.4, while their mean age upon the first pregnancy is 21.06 ± 3.38, and 75.7% have been pregnant for at least two times and their mean pregnancy number is 2.77 ± 1.69. 37.8% of the women have had at least one natural miscarriage, and 27.7% have undergone an abortion. 40.3% of the women have been utilizing a family planning method, and 10% among these use the conventional method, while the remaining 90% use the modern method. 32.5% of women use vaginal douche. All of those who do vaginal douche stated that they use it for cleaning and ghusl ablution.

The mean total GHBI score of the women participating in the study is 78.36 ± 9.3 (min: 58, max: 108). The highest and lowest scores obtained in this study from the GHBI, from which the lowest score to be obtained is 27 and the highest is 108, were found to be 108 and 58 respectively. The fact that 60.8% of the women responded positively in the inventory (8.3%: sometimes, frequently: 7.5%, always: 45%) to the statement "I wash from the region where I have my bowel movement towards the area where I urinate in the toilet", which is an indicator of an incorrect genital hygiene behavior, demonstrates that two out of every three women have incorrect hygiene habits (Table 1).

**Table 1. The Results from the Genital Hygiene Behavior Inventory (GHBI).**

| Genital Hygiene Behavior Inventory | Never | | Sometimes | | Frequently | | Always | |
|---|---|---|---|---|---|---|---|---|
| | N | % | N | % | N | % | N | % |
| 1. I participate in educational meetings conducted on issues regarding sexual health. | 86 | 71.7 | 27 | 22.5 | 2 | 1.7 | 5 | 4.2 |
| 2. I monitor the genital area carefully with regard to diseases symptoms. | 24 | 20.0 | 22 | 18.3 | 24 | 20.0 | 50 | 41.7 |
| 3. I follow the news published on written and visual media about sexual health. | 39 | 32.5 | 36 | 30.0 | 15 | 12.5 | 30 | 25.0 |
| 4. I obtain information from health personnel about genital area hygiene. | 49 | 40.8 | 37 | 30.8 | 9 | 7.5 | 25 | 20.8 |
| 5. I visit a gynecologist regularly. | 37 | 30.8 | 33 | 27.5 | 27 | 22.5 | 23 | 19.2 |
| 6. I care about genital area hygiene. | 1 | 0.8 | 5 | 4.2 | 21 | 17.5 | 93 | 77.5 |
| 7. I daily change my underwear. | 4 | 3.3 | 10 | 8.3 | 19 | 15.8 | 87 | 72.5 |
| 8. I iron my underwear. | 58 | 48.3 | 26 | 21.7 | 5 | 4.2 | 31 | 25.8 |
| 9. My underwear is made of cotton. | 7 | 5.8 | 22 | 18.3 | 11 | 9.2 | 80 | 66.7 |

**Table 1. (Continued) The Results from the Genital Hygiene Behavior Inventory (GHBI).**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 10. I use hygenic pads during my period. | 15 | 12.5 | 6 | 5.0 | 6 | 5.0 | 93 | 77.5 |
| 11. I take a shower during my period. | 24 | 20.0 | 22 | 18.3 | 12 | 10.0 | 62 | 51.7 |
| 12. I request my partner to use a condom when I experience malodorous discharge. | 57 | 47.5 | 17 | 14.2 | 11 | 9.2 | 35 | 29.2 |
| 13. I dry with toilet paper after cleaning my genital area with water. | 10 | 8.3 | 8 | 6.7 | 8 | 6.7 | 94 | 78.3 |
| 14. I visit a doctor when I experience malodorous discharge. | 9 | 7.5 | 15 | 12.5 | 13 | 10.8 | 83 | 69.2 |
| 15. I visit a doctor when I have itching in the genital area. | 13 | 10.8 | 14 | 11.7 | 13 | 10.8 | 80 | 66.7 |
| 16. I visit a doctor when I experience pain or bleeding during sexual intercourse. | 18 | 15.0 | 9 | 7.5 | 13 | 10.8 | 80 | 66.7 |
| 17. I use a piece of cloth during my period. | 83 | 69.7 | 12 | 10.0 | 7 | 5.8 | 18 | 15.0 |
| 18. I wash my hands before changing my pad. | 24 | 20.0 | 16 | 13.3 | 11 | 9.2 | 69 | 57.5 |
| 19. I wash my hands after changing my pad. | 1 | 0.8 | 2 | 1.7 | 4 | 3.3 | 113 | 94.2 |
| 20. I wash my hands before sexual intercourse. | 32 | 26.7 | 17 | 14.2 | 11 | 9.2 | 60 | 50.0 |
| 21. I wash my hands after sexual intercourse. | 3 | 2.5 | 5 | 4.2 | 5 | 4.2 | 107 | 89.2 |
| 22. I wash my genital area before sexual intercourse. | 37 | 30.8 | 10 | 8.3 | 5 | 4.2 | 68 | 56.7 |
| 23. I wash my genital area after sexual intercourse | 8 | 6.7 | - | - | 8 | 6.7 | 104 | 86.7 |
| 24. I wash my hands before going to the bathroom. | 43 | 35.8 | 27 | 22.5 | 6 | 5.0 | 44 | 36.7 |
| 25. I wash my hands after going to the bathroom. | 1 | 0.8 | - | - | 7 | 5.8 | 112 | 93.3 |
| 26. I wash from the region where I have my bowel movement towards the area where I urinate in the toilet. | 46 | 38.3 | 10 | 8.3 | 9 | 7.5 | 54 | 45.0 |
| 27. I always use a piece of cloth. | 59 | 49.2 | 29 | 24.2 | 11 | 9.2 | 21 | 17.5 |

The difference between the educational background, income status, and family type among the women's socio-demographic features and their mean total GHBI score was detected to be statistically significant ($p<0.05$), while their employment status was not found to create any difference in the total GHBI score (Table 2).

32.5% of the women stated that they performed vaginal douching, while 42.5%, 47.5%, and 49.2% expressed that they experienced dysuria, post-coital pain/soreness, and malodorous vaginal discharge respectively in the recent year. A significant difference was found between the women's total GHBI scores and vaginal douching practices, and whether they experienced malodorous vaginal discharge in the recent year ($p<0.05$) (Table 3).

**Table 2. The correlation between the total Genital Hygiene Behavior Inventory (GHBI) scores and the socio-demographic features.**

| | N | % | X± SD | Test | p |
|---|---|---|---|---|---|
| **Educational background** | | | | | |
| Illiterate | 13 | 10.8 | 78.07 ± 8.94 | $X^2 = 12.48$* | **0.01** |
| Elementary school | 49 | 40.8 | 77.28 ± 9.52 | | |
| Middle school | 24 | 20.0 | 75.08 ± 9.92 | | |
| High school | 27 | 22.5 | 82.59 ± 8.62 | | |
| University | 7 | 5.9 | 84.85 ± 6.61 | | |
| **Income status** | | | | | |
| Income less than expense | 44 | 36.7 | 76.04 ± 11.09 | $X^2 = 6.28$* | **0.04** |
| Income and expense equal | 70 | 58.3 | 79.92 ± 8.40 | | |
| Income more than expense | 6 | 5.0 | 81.16 ± 10.30 | | |
| **Employment status** | | | | | |
| Employed | 10 | 8.3 | 80.90 ± 6.87 | U = 431.00** | 0.25 |
| Unemployed | 110 | 91.7 | 78.35 ± 9.88 | Z = -1.13 | |
| **Family type** | | | | | |
| Nuclear family | 92 | 76.7 | 79.80 ± 9.80 | U = 879.50** | **0.01** |
| Extended family | 28 | 23.3 | 74.50 ± 8.13 | Z = -2.53 | |

*Kruskal-Wallis H Test **Mann-Whitney U Test

**Table 3. The correlation between the total Genital Hygiene Behavior Inventory (GHBI) scores and the urogenital system results.**

| | N | % | X± SD | t | p |
|---|---|---|---|---|---|
| **Vaginal Douching Practice** | | | | | |
| Yes | 39 | 32.5 | 76.05 ± 8.10 | -2.001 | **0.04** |
| No | 81 | 67.5 | 79.77 ± 10.17 | | |
| **Dysuria complaints in the recent year** | | | | | |
| Yes | 51 | 42.5 | 77.21 ± 8.80 | -1.319 | 0.19 |
| No | 69 | 57.5 | 79.56 ± 10.22 | | |
| **Post-coital pain/soreness complaints in the recent year** | | | | | |
| Yes | 57 | 47.5 | 78.08 ± 9.03 | -.514 | 0.60 |
| No | 63 | 52.5 | 79.00 ± 10.27 | | |
| **Malodorous vaginal discharge in the recent year** | | | | | |
| Yes | 59 | 49.2 | 76.67 ± 9.03 | -2.13 | **0.03** |
| No | 61 | 50.8 | 80.39 ± 10.20 | | |

Upon being asked what they did to get rid of their complaints, 86.3% of the ones with dysuria complaints, 49.1% of the ones with post-coital pain/soreness complaints, and 62.7% of the ones with malodorous vaginal discharge stated that they visited their doctors. 32.5% of the women stated that they had a vaginal douche, 42.5% complained of dysuria in the last year, 47.5% complained of postcoidal pain, and 49.2% complained of foul-smelling vaginal discharge. Among the women having experienced discharge, 44.1% stated their discharge to be white and sticky, while 45.8% expressed the discharge to be malodorous. A statistically significant difference was detected in the comparison between vaginal douching practices and whether there were any complaints about malodorous vaginal discharge ($p<0.05$) (Table 4)

.

**Table 4. The valuation of the correlation between vaginal douching practices and urogenital symptoms.**

| | Vaginal Douche Practice | | Test | |
|---|---|---|---|---|
| | Practices It | Does not practice it | | |
| **Urogenital symptoms** | **n (%)** | **n (%)** | **$X^2$** | **p** |
| **Dysuria complaints in the recent year** | | | | |
| Yes | 21 (41.2) | 30 (48.8) | 3.044 | 0.081 |
| No | 18 (26.1) | 51 (73.9) | | |
| **Post-coital pain/soreness in the recent year** | | | | |
| Yes | 23 (40.4) | 34 (59.6) | 3.050 | 0.081 |
| No | 16 (25.4) | 47 (74.6) | | |
| **Malodorous vaginal discharge in the recent year** | | | | |
| Yes | 27 (45.8) | 32 (54.2) | 9.306 | **0.002** |
| No | 12 (19.7) | 49 (80.3) | | |

## DISCUSSION

Urogenital infections are the most frequently encountered infections throughout the world. Genital hygiene has an important role in being protected against genital infections (Calik et al., 2020). In this study, the mean GHBI score of the participating women is 78.36±9.3. If evaluated within the context of the minimum and maximum scores to be obtained from the inventory, these women can be said to have mid-level genital hygiene behaviors. The mean GHBI scores were found to be 77.7±12.8 in the study carried out by Ege and Eryılmaz in which they analyzed genital hygiene, 77.41±9.05 in the study done by Çalık et al., 80.90±10.54 in the study done by Orak and Canuygur, and 78.96±11.65 in the multicenter study of Apay et al. in which seven provinces from seven geographical regions of Turkey were included in the sample (Ege and Eryılmaz, 2006; Çalik et al., 2020; Orak and Canuygur, 2014; Apay et al., 2014). The fact that the scores obtained from the scale are close to each other in numerous studies in which the same inventory was used puts forth the interactively learned aspect of genital hygiene applications socially.

More than half of the women responded "never" to the statements of *"I participate in educational meetings conducted on issues regarding sexual health" (71.7%), "I obtain information from health personnel about the genital area hygiene"* (40.8%), and *"I request my partner to use a condom when I*

*experience malodorous discharge"* (57.5%), and *"always"* to the statement *of "I wash from the region where I have my bowel movement towards the area where I urinate in the toilet"* (45.0%). Even though these genital hygiene applications are thought to be efficient when evaluated with a scale tool, it is possible to say that some incorrect behaviors have turned into a habit. After the planned genital hygiene training organized by Ege % Eryılmaz for women aged 15-49 who were diagnosed with genital infection, a significant increase was detected in the women's mean GHBI score (Ege and Eryılmaz, 2006). This is important in that it demonstrated the effects of health training on behavioral changes.

Among the women participating in the study, the ones with an educational background of high school or higher, a high status of income, and living within a nuclear family were detected to have better genital hygiene behaviors. In numerous studies carried out, educational background and income status, and genital hygiene have been found to be correlated (Koştu and Beydağ, 2009; Orak and Canuygur, 2014; Oner and Turfan, 2020). It can be stated that as people have higher educational backgrounds, they become more knowledgeable regarding hygienic issues and their behaviors develop more positively, and as they have a higher income status, they can afford hygienic products more easily. On the other hand, these results are assessed to be important in that they show the effects of the extended family type on passing down incorrect conventional applications. It is crucial to focus on this field in structured training to break this chain.

A harmful practice for women's health done throughout the world and especially in Asia and Africa, the vaginal douching rate was found to be 32.5% in this study. The total GHBI scores of the women who douche and have vaginal discharge complaints are significantly lower ($p<0.05$). In various studies conducted in Turkey, vaginal douching has been stated to be extremely common among women. 22.5% of the women in a study done in a training and research hospital in Istanbul (Orak and Canuygur, 2014), 47.7% of the women in a study conducted in Eskisehir (Arslantas et al., 2010), 59.4% of the women in a study done in Ankara (Sunay et al., 2011), and 80.6% of the women in a study carried out in rural settlement in the Southeastern Anatolia Region of Turkey (Guzel et al., 2011) have all been detected to douche. All these studies were carried out in different geographical regions. In rural settlements, vaginal douching is more common due to conventional and extended family types. Determinants such as education, culture, religious belief, and economy which vary regionally in Turkey can be stated to have an impact on vaginal douching practices. This can also suggest that women may be reluctant to talk about their vaginal douching practices.

Incorrect genital hygiene and vaginal douching are demonstrated to be among the most important reasons for genital infections (Ekpenyong and Davis, 2013; Yanıkkerem and Yasayan, 2016; Calik et al., 2020; Felix et al., 2020). While no significant difference was observed in a study analyzing the correlation between vaginal douching and vaginal bacterial colonization, it was also stated that women who douched had more vaginal infection history (Yıldırım et al., 2020). In studies analyzing the correlation between VD and sexually transmitted diseases, HPV and HIV infections were stated to occur more in women who douched (Luo et al., 2016; Esber et al., 2016). The significant difference between vaginal douching and malodorous vaginal discharge complaints and the decreased mean total GHBI scores of these women in our study, in which we have ascertained two out of every three women to practice vaginal douching, support the literature.

**Limitations of Study**

This study was conducted in İzmir province and cannot be generalized to other provinces and regions.

## CONCLUSION

It has been observed that those who do vaginal douche have incorrect genital hygiene behaviors and attitudes such as "It makes me feel clean", "I want to be protected from sexually transmitted infections" and "I need to do vaginal douche during ablution". Especially in these women, there was a significant difference in the frequency of complaints of foul-smelling discharge in the last year. Giving up on conventional methods that are practiced in our country just as in many other cultures and have turned into a habit can only be solved by raising women's awareness. Education on genital hygiene practices starts during the childhood period and is provided by families. Therefore, incorrect practices become a habit in childhood and persist in later periods. Structured training with explanations based on cause-effect relationships should be organized on VD, which is regarded to be a part of genital hygiene and religious practices in Muslim societies.

Primarily, professional health personnel working in preventive health services should explain that washing the inside of the vagina is an incorrect practice along with its consequences while monitoring those aged 15-49, reasons behind vaginal douching should be examined, and the issue should be assessed from every aspect. Problems raised by this cultural but incorrect habitual practice can only be effectively solved with the help of multidisciplinary cooperation of a team formed by gynecologists, midwives, nurses, sociologists, teachers, and religious experts and the inclusion of the non-governmental organizations of the aforementioned professions.

**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:** AH, MDA; **Material, methods and data collection:** AH, MDA, SÇÖ, BKS, EÇT, NS; **Data analysis and comments:** AH, MDA, SÇÖ; **Writing and corrections:** AH, MDA, SÇÖ, BKS, EÇT, NS.

**Funding**
This study was supported by Ege University Scientific Research Projects Coordinator.

**REFERENCES**

Apay, S., E., Özdemir, F., Nazik, E., Potur, D., C., Hadımlı, A., Tanrıverdi, D., Alaca, C. (2014). Determination of the genital hygiene behaviours of women in seven different provinces: a multicentred cross-sectional study. *Journal of Anatolia Nursing and Health Sciences*, *17*(4), 245-252. https://doi.org/10.17049/ahsbd.05569

Arslantas, D., Karabagli, H., Koc, F. (2010). Vaginal douching practice in Eskisehir in Turkey. *Journal of Public Health and Epidemiology, 2*(9), 245-250.

Calik, K., Y., Erkaya, R., İnce, G., & Yildiz, N., K. (2020). Genital hygiene behaviors of women and their effect on vaginal infections. *Clinical and Experimental Health Sciences, 10*(3), 210-216. https://doi.org/10.33808/clinexphealthsci.565845

Coşkun, A.,M., Yakıt, E., Karakaya, E. (2017). Evaluation of the use of vaginal tampons and vaginal douche practices among women. *Journal of Human Sciences*, *14*(1), 74-88. doi: https://doi.org/10.14687/jhs.v14i1.4308

Ege, E., Eryılmaz, G. (2006). The effect of planned education given to women on genital hygiene behaviors. *Journal of Anatolia Nursing and Health Sciences*, *9*(3), 8-16.

Ekpenyong, C.,E, Davies, K.,G. (2013). Associations between vaginal douching practice and lower genital tract symptoms and menstrual disorders among young women: a search for risk modulating factors. *Advances in Sexual Medicine*, *3*(4), 76-84. https://doi.org/10.4236/asm.2013.34012

Ekpenyong, C.,E, Daniel, N.,E., Akpan, E.,E. (2014). Vaginal douching behavior among young adult women and the perceived adverse health effects. *Journal of Public Health and Epidemiology*, *6*(5), 182-191. https://doi.org/0.5897/JPHE2014.0622

Esber, A., Rao, N., Norris, A., Reese, P. C., Kandodo, J., Nampandeni, P., ... & Turner, A. N. (2016). Intravaginal practices and prevalence of sexual and reproductive tract infections among women in rural Malawi. *Sexually transmitted diseases, 43*(12), 750. https://doi.org/0.1097/OLQ.0000000000000531

Felix, T., C., de Araújo, L., B., de Brito Röder, D., V., D., & dos Santos Pedroso, R. (2020). Evaluation of vulvovaginitis and hygiene habits of women attended in primary health care units of the family. *International Journal of Women's Health, 12*, 49. https://doi.org/0.2147/IJWH.S229366

Fiscella, K., Franks, P., Kendrick, J., Meldrum, M., Kieke, B. (2002). Risk of preterm birth that is associated with vaginal douching. *Am J Obstet Gynecol, 186*, 1345–1350. https://doi.org/10.1067/mob.2002.122406

Guzel, A.,I., Kuyumcuoglu, U., Celik, Y. (2011). Vaginal douching practice and related symptoms in a rural area of Turkey. *Arch Gynecol Obstet, 284*, 1153–1156. https://doi.org/10.1007/s00404-010-1805-6

Hadımlı, A., Öztürk Can, H., Soğukpınar, N., Demirel Bozkurt, Ö., Baykal Akmeşe, Z., Çakır Koçak, Y., Sarıcan, E. S., & Karaca Saydam, B. (2012). Do women make vaginal lavage with the aim of genital hygiene?. *e-Journal of New World Sciences Academy*, *7*(3), 16-27.

İlmihal (2014). TC. Diyanet İşleri Başkanlığı Kütüphanesi. Retrieved from https://kutuphane.diyanet.gov.tr/Files/document/%C4%B0lmihal,%20Diyanet%20Vakf%C4%B1.pdf.

Koştu, N., & Taşçı, K. (2009). Determination of 15-49 year old married women's protecting attitude their reproductive health. *Anadolu Hemşirelik ve Sağlık Bilimleri Dergisi*, *12*(1), 91-97.

Luo, L., Xu, J. J., Wang, G., X., Ding, G., W., Wang, N., & Wang, H., B. (2016). Vaginal douching and association with sexually transmitted infections among female sex workers in a prefecture of Yunnan Province, China. *International Journal of STD & AIDS*, *27*(7), 560-567. https://doi.org/10.1177/0956462415589044

Luong, L., Libman, M., Dahhou, M., Chen, M.F., Kahn, S.R., Goulet, L., Séguin, L., Lydon, J., McNamara, H., Platt, R.,W., Kramer, M.,S. (2010). Vaginal douching, bacterial vaginosis, and spontaneous preterm birth. *Journal of Obstetrics and Gynaecology Canada*, *32*(4), 313-32. https://doi.org/10.1016/S1701-2163(16)34474-7

Martino, J.,L., Vermund, S.,H. (2002). Vaginal douching: Evidence for risks or benefits to women's health. *Epidemiol Rev*., *24*(2), 109–124. https://doi.org/10.1093/epirev/mxf004

Martino, J.,l., Youngpaıroj, S., Vermund, S.,H. (2004). Vaginal douching: personal practices and public policies. *Journal of Women's Health*. *13(*9), 1048-1065. https://doi.org/10.1089/jwh.2004.13.1048

McKee, M.,D., Baquero, M., Anderson, M.,R., Alvarez, A., Karasz, A. (2009). Vaginal douching among latinas: practices and meaning. *Maternal and Child Health Journal*, *13*(1), 98-106. https://doi.org/10.1007/s10995-008-0327-3

National Survey of Family Growth - D Listing (2019). Retrieved from https://www.cdc.gov/nchs/nsfg/key_statistics/d_2015-2017.htm

Okumuş, F., Demirci, N. (2014). The reality of vaginal douche in Turkey. *Florence Nightingale Journal of Nursing, 22*(1), 53-62.

Oner, S., Turfan, E.,Ç. (2020). The effect of planned education given to the pregnant women on genital hygiene behaviour and the symptoms of urinary tract ınfection. *Van Saglik Bilimleri Dergisi, 13*(1), 10-18.

Orak, N.,Ş., Canuygur, A. (2014). Investigation of the genital hygiene behavior of the hospitalized patients in department of gynecology. *Balikesir Saglik Bil Derg, 3*(3), 130-134. https://doi.org/10.5505/bsbd.2014.21043

T.R. Ministry of Health Health Women Health Survey, ISBN: 978-975-590-491-7, Ankara.

Sunay, D., Kaya, E., Ergün, Y. (2011). Vaginal douching behavior of women and relationship among vaginal douching and vaginal discharge and demographic factors. *Journal of the Turkish Society of Gynecology and Obstetrics,* *8*(4), 264-71. https://doi.org/10.5505/tjod.2011.57805

Süt, H. (2016). Investigation of Relationship between Genital Infection and Genital Hygiene Behaviors in Women Aged 18-49 Years. *Journal of Duzce University Graduate School of Health Sciences, 6*(1), 8-13.

Wan, B., P., & Jacobs, C., K. (2018). Does vaginal douching cause bacterial vaginosis? *Evidence-Based Practice,* *21*(6), 13. https://doi.org/10.1097/01.EBP.0000545159.00070.00

Yaman, H.,E., Aygün, M., Tosun, H. (2016). Traditional genital hygiene practices in Turkey. *Indian Journal of Traditional Knowledge*, 15(2), 214-218.

Yanikkerem, E., Yasayan, A. (2016). Vaginal douching practice: Frequency, associated factors and relationship with vulvovaginal symptoms. *J Pak Med Assoc, 66*(4), 387-92.

Yıldırım, R., Vural, G., & Koçoğlu, E. (2020). Effect of vaginal douching on vaginal flora and genital infection. *Journal of the Turkish German Gynecological Association, 21*(1), 29-34. https://doi.org/10.4274/jtgga.galenos.2019.2018.01

**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.1382254

# Immunohistochemical Characterisation of BMP-2, - 4, -7, TGF-β1 and Gremlin1 in Canine Osteosarcoma

Yonca Betil KABAK [1], Sinem INAL [1], Mahmut SOZMEN [1], Mustafa Yavuz GULBAHAR [1]

[1] Ondokuz Mayis University, Faculty of Veterinary Medicine, Department of Pathology

***Geliş Tarihi / Received:*** *27.10.2023,* ***Kabul Tarihi / Accepted:*** *15.11.2023*

**ABSTRACT**

**Objective:** This study aims to evaluate the expression of Bone morphogenic proteins (BMP) -2, -4, -7, Transforming growth factor (TGF) -β1, and Gremlin1 in different subtypes of naturally occurring canine osteosarcoma (OS) by immunohistochemical method and contribute to a better understanding of the tumor microenvironment. **Materials and Methods:** Formalin-fixed, paraffin-embedded blocks of 16 naturally occurring canine OS were used. The tumors were classified according to the modified WHO's international histological classification of pet tumors. Compact bone tissues from five normal dogs were used as controls. **Results:** Immunohistochemically, BMP-2,-4, -7, TGF-β1, and Gremlin1 were not expressed in control tissues. BMP-2, -4, -7, TGF-β1, and Gremlin1 were expressed by undifferentiated mesenchymal cells and extracellular matrix in all OS subtypes. However, it was seen that there were differences in the expressions of these factors in different components of the tumor tissue. Although BMP-2, -4, -7, TGF-β1, and Gremlin1 have antagonistic effects in some pathways, they were co-expressed simultaneously in some regions in different OS subtypes. **Conclusion**: It was concluded that BMP-2, -4, -7, TGF-β1, and Gremlin1 could be expressed together in the same or different components of tumor tissues, and each can affect the behavior of tumor cells with their together or independent roles.

**Keywords:** BMP-2, BMP-4, BMP-7, Osteosarcoma, TGF-β1.

# Köpek Ostesarkomunda BMP-2,- 4, -7, TGF-B1 ve Gremlin1'in İmmunohistokimyasal Karakterizasyonu

**ÖZ**

**Amaç:** Bu çalışmanın amacı, köpeklerde doğal yollarla oluşan osteosarkomun (OS) farklı alt tiplerinde Bone morphogenic proteins (BMP)-2, -4, -7, Transforming growth factor (TGF)-β1 ve Gremlin1 ekspresyonlarının immünohistokimyasal yöntemle değerlendirilmesi ve tümör mikroçevresinin daha iyi anlaşılmasına katkıda bulunmaktır. **Gereç ve Yöntem:** Doğal yollarla meydana gelen 16 köpek OS'u formalinde fikse edildi ve parafine gömüldü. Tümörler, WHO'nun modifiye uluslararası histolojik pet tümörleri sınıflandırmasına göre sınıflandırıldı. Kontrol için beş sağlıklı köpekten alınan kompakt kemik dokusu kullanıldı. **Bulgular:** İmmünohistokimyasal olarak, kontrol dokusunda BMP-2,-4, -7, TGF-β1 ve Gremlin1 ekspresyonu gözlenmedi. Tüm OS alt tiplerinde andiferensiye mezenşimal hücrelerde ve ekstraselüler matrikste BMP-2, -4, -7, TGF-β1 ve Gremlin1 ekspresyonu gözlendi. Bununla birlikte, tümör dokusunun farklı bileşenlerinde bu faktörlerin ekspresyonlarında farklılıklar olduğu görüldü. BMP-2, -4, -7, TGF-β1 ve Gremlin1'in bazı yolaklarda antagonistik etkileri olmasına rağmen, farklı OS alt tiplerinde bazı bölgelerde eş zamanlı olarak birlikte eksprese edildiği belirlendi. **Sonuç:** BMP-2, -4, -7, TGF-β1 ve Gremlin1'in tümör dokularının aynı veya farklı bileşenlerinde birlikte ifade edilebileceği ve her birinin birlikte veya bağımsız rolleriyle tümör hücrelerinin davranışını etkileyebileceği sonucuna varılmıştır.

**Anahtar Kelimeler:** BMP-2, BMP-4, BMP-7, Osteosarkom, TGF-β1.

***Sorumlu Yazar / Corresponding Author:*** Yonca Betil KABAK, Ondokuz Mayis University, Faculty of Veterinary Medicine, Department of Pathology, Samsun, Türkiye
***E-mail:*** ybkabak@omu.edu.tr

***Bu makaleye atıf yapmak için / Cite this article:*** Kabak, Y. B., Inal, S., Sozmen M., & Gulbahar, M. Y. (2024). Immunohistochemical characterisation of BMP-2,- 4, -7, TGF- β1 and Gremlin1 in canine osteosarcoma. *BAUN Health Sci J, 13*(1), 75-82. https://doi.org/10.53424/balikesirsbd.1382254

## INTRODUCTION

Osteosarcoma (OS) is a common primary malignant tumor of bone in dogs. About 85% of all canine bone tumors are malignant. It is frequent in large dog breeds. Although it is common among middle-aged dogs, it is seen in a broad age range. OS progresses rapidly and has a poor prognosis (Meuten, 2017).

Bone morphogenetic proteins (BMPs) are members of the transforming growth factor (TGF) superfamily, except BMP-1, which is in the metalloproteinase family (Kessler et al., 1996). BMPs regulate bone and cartilage formation and repair, cell proliferation in the embryonic period, and regulation of bone homeostasis in the adult (Chen et al., 2004). BMP-2 stimulates the osteogenic differentiation of mesenchymal stem cells, initiates bone shaping and healing, and promotes the expression of other BMPs (Carreira et al., 2014; Park et al., 2009). BMP-4 is an osteochondrogenic factor and is essential for bone healing. BMP-7 stimulates cartilage and bone formation and plays a role in bone homeostasis and calcium regulation (Carreira et al., 2014).

Transforming growth factor-beta (TGF-β), belonging to the TGFβ superfamily, is involved in many essential physiological processes such as embryonic development, cell growth and differentiation, cell motility, extracellular matrix production, angiogenesis, apoptosis, and cellular immunity. The mammalian has three isoforms of TGF-β (β1, β2, and β3) (Haque & Morris, 2017). The role of TGF-β varies according to the stage of the tumor. It acts as a tumor suppressor by inhibiting cellular transformation in the early stage of tumorigenesis and preventing cancer progression. In the late period, it supports tumor development by facilitating epithelial-mesenchymal transformation, stimulating angiogenesis, immunosuppression, and metastasis (Haque & Morris, 20174; Wu et al., 2016).

Gremlin1 is a member of the DAN/Cerberus family, which is essential in regulating organogenesis and tissue differentiation. Gremlin1, a BMP-specific antagonist, exerts its antagonistic effect by preventing the binding of BMPs to extracellular BMPR-I and -II in the TGF-β signaling pathway (Gazzerro et al., 2005; Nguyen et al., 2014). Gremlin1, as a proangiogenic VEGFR2 agonist, has an angiogenic effect by binding to VEGFR2 in endothelial cells or by attaching directly to the surface of cancer cells (Kim et al., 2012; Mitola et al., 2010).

Canine OS is a good model for human OS, but some biological differences are likely (Kloen et al., 1997; Kubista et al., 2011). BMPs and TGF-β have been investigated in human and animal OS, but the results are highly controversial (Alfranca et al., 2015; Sulzbacher et al., 2002; Yoshikawa, Rettig, Lane et al., 1994; Yoshikawa, Rettig, Takaoka, et al., 1994). Moreover, there are few studies on Gremlin1 expression in human and canine osteosarcoma (Gu et al., 2019; Kim et al., 2012). Expressions of BMP-2, -4, and -7, TGF-β1, and Gremlin1 were not investigated together in canine OS. This study predicted that investigating the effects of BMP-2, -4, and -7, TGF-β1, and Gremlin1 on the development and behavior of OS in malignant bone tumors in dogs will contribute to the treatment protocols to be developed against OS.

## MATERIALS AND METHODS

### Tissue samples

Sixteen formalin-fixed paraffin-embedded canine OS tissues were used in this study. The samples used in the study are tissue blocks that came for diagnosis to Ondokuz Mayıs University, Faculty of Veterinary Medicine, Department of Pathology, between 2006 and 2017. Control tissues for each antibody and five normal bone tissues obtained from the dogs that had died of causes unrelated to tumor development were also used as healthy control tissues. Tumor and control tissues were fixed in 10% buffered formalin for 2 days and then decalcified in formic acid solution for approximately 4 weeks. After routine tissue follow-up, they were paraffin blocked. There is no information about whether it metastasizes to other tissues and what survival times are after OS diagnosis.

### Microscopical examinations

Serial sections of 5 µ were taken from the blocks for H&E and immunohistochemical staining. The tumors were classified according to the modified WHO's international histological classification of pet tumors (Craig et al., 2016). Tumor tissues were graded according to the mitotic count, the degree of nuclear pleomorphism, and the percentage of necrosis, as described previously (Loukopoulos & Robinson, 2007). Two separate pathologists evaluated these OS.

### Immunohistochemical examinations

Immunohistochemical staining was performed according to the manufacturer's protocol specified in the streptavidin-biotin-peroxidase kit (Ultravision Detection System, Thermo Scientific, Freemont, USA). After blocking the sections with proteinase K (Roche) and 3% hydrogen peroxide-methanol solution, protein blocking was performed. Sections were incubated in antibodies with BMP-2 (NBP1-1975, Novus Biologicals, 1:250), BMP-4 (LS-B3101, LSBio, 1:250), BMP-7 (bs-2242R, Bioss, 1:100), TGF-β1 (NB100-91995, Novus Biologicals, 1:100), and Gremlin1 (bs-1475R, Bioss, 1:250) at 4 °C overnight. As chromogen, 3-Amino-9-Ethylcarbazole (AEC substrate system, TA- 125-HA, Thermo Scientific, USA) was used. Counterstaining was performed with Mayer's hematoxylin.

The canine lung for BMP-2, the rat and canine kidney for BMP-4, and -7, the rat and canine spleen for TGF-β1, and the Gremlin1 canine small intestine tissues were used as positive controls. Sections were incubated with Phosphate-buffered saline (PBS) instead of the primary antibody as a negative control.

**Evaluation of immunostaining**

The immunostained area and staining intensity in tumor tissue in sections were evaluated at 200 final magnifications from a total of 10 different areas. Staining intensities were evaluated as 0, negative; 1, weak; 2, moderate; 3, strong. The immunostained area was determined by calculating the ratio of the stained areas to the total areas (0, negative; 1, < 25% low; 2, 26-75% moderate; 3, > 76% common). The immunoreactivity score (IRS) was obtained by multiplying the immunostaining intensity score by the immunostaining area score. IRS ranged from 0 to a maximum of 300.

**Statistical analysis**

All the data were expressed as median (minimum-maximum). Normal distribution analysis was not performed on the data as the number of samples within the groups was very small. It was assumed that all data did not show normal distribution. Multiple groups were compared using the Kruskal-Wallis test, while pairwise groups were evaluated by Mann-Whitney U tests with Bonferroni correction. Data were analyzed at the 95% confidence level, and a p-value < 0.05 was considered statistically significant. SPSS (Version 21.0) software was used for statistical analyses.

**Ethical considerations**

Since this study used tissues sent to our laboratory for diagnosis, ethics committee approval is not required.

## RESULTS

**Microscopic findings**

Three of the OS included in the study were fibroblastic (FOS) (18.75%), four were chondroblastic (COS) (31.25%), five were productive osteoblastic (POOS) (25%), two were nonproductive osteoblastic OS (NPOOS) (12.5%), and two were determined giant cell-rich OS (GCROS) (%12.5). It was determined that 62.5% of the tumors were grade I, and 37.5% were grade II (Figure 1).

**Immunohistochemical findings**

In all OS subtypes examined in the study, undifferentiated mesenchymal cells were observed to express BMP-2, -4, and -7 cytoplasmically. The expression of BMP-2/ -4 in the nucleus of some of these cells was remarkable. BMP-2, -4, and -7 were also positive in the extracellular matrix surrounding these cells.

The osteoid matrix in POOS, similarly, the chondroid matrix and chondroblasts in COS gave an immunopositive reaction with BMP-2 (Figure 2A). In GCROS, giant cells, osteocytes in the trabeculae, and well-differentiated osteoblasts around the trabeculae did not express BMP-2. There was a statistically significant difference in BMP-2 antibody expression between the OS subtypes and the control group in the study ($P < 0.05$). Among the subtypes, only the difference between COS and NPOOS was significant ($P < 0.05$) (Table 1).

BMP-4 did not express the chondroid matrix in COS and osteoid matrix in POOS. However, some anaplastic osteoblasts and chondroblasts in these matrices had both cytoplasmic and nuclear expressions for BMP-4 (Figure 2B). In GCROS, giant cells were strongly immunopositive while some were not. Osteocytes in normal compact bone tissue were negative for BMP-4. Regarding BMP-4 antibody expression, the difference between OS subtypes and the control group and between POOS and GCROS were statistically significant ($P < 0.05$) (Table 1).

The osteoid matrix in osteoblastic OS was stained diffusely with BMP-7, the entire chondroid matrix and the peripheral regions of the bone trabecula were positive in COS. In addition, some anaplastic osteoblast, chondroblast, and giant cells exhibited cytoplasmic BMP-7 expression (Figure 2C). Osteocytes did not express BMP-7 in normal compact bone tissue. Regarding BMP-7 antibody expression, the difference between OS subtypes and the control group and between COS and GCROS were statistically significant ($P < 0.05$) (Table 1).

TGF-β1 expression was detected in all OS subtypes except GCROS. In general, TGF- β1 was found to be expressed cytoplasmically in anaplastic osteoblastic and chondroblastic cells as well as other undifferentiated malignant mesenchymal cells. It was also expressed in the extracellular matrix in these regions. In POOS, TGF-β1 expression was more intense in the peripheral regions of the osteoid matrix, especially in the regions where osteoblasts were localized. Similarly, in COS, the peripheral regions of the chondroid matrix were immunoreacted, while the centers of the osteoid and chondroid matrix did not express TGF-β1 (Figure 2D). However, TGF-β1 expression was negative in normal compact bone tissue used as a control. Except for GCROS, the difference in TGF-β1 antibody expression was statistically significant between the other subtypes and the control group ($P < 0.05$). The difference between COS, and POOS, NPOOS, GCROS ($P < 0.05$) and the difference between POS and COS and GCROS were statistically significant ($P < 0.05$) (Table 1).

All NPOOS, one POOS, and one GCROS sample of OS subtypes included in the study did not express Gremlin1. Gremlin1 was expressed in the cytoplasm of undifferentiated malignant mesenchymal cells, anaplastic osteoblastic and chondroblastic cells. It was also weakly expressed in the outer border of the osteoid matrix with some regions of the extracellular matrix in tumor tissue. Compact bone tissue used as control did not express Gremlin1 (Figure 3A-B). Statistics could not be made due to the small number of samples stained for the Gremlin1 antibody (Table 1).

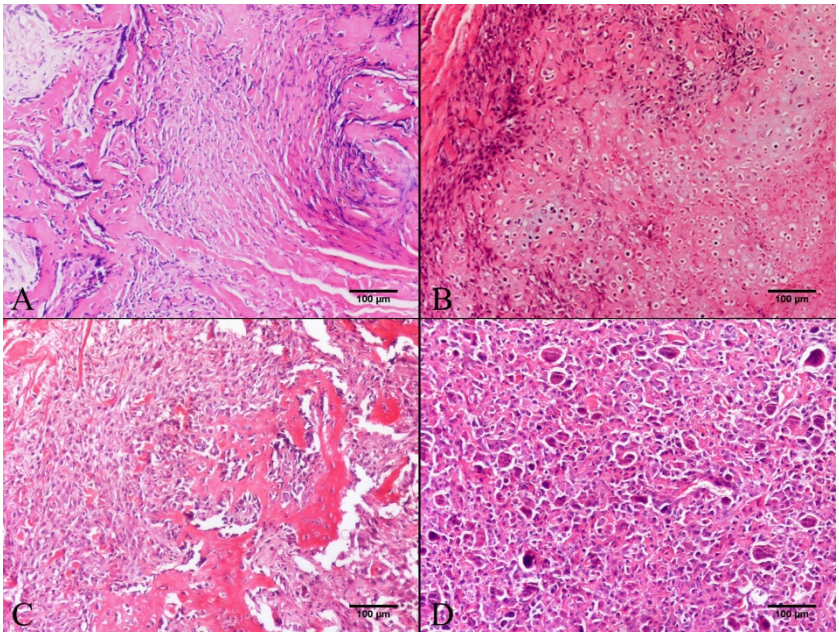


**Figure 1.** H&E histochemical staining results in primer canine OS. (A) FOS, (B) COS, (C) POOS, (D) GCROS. H&E, Bar=100 µm.

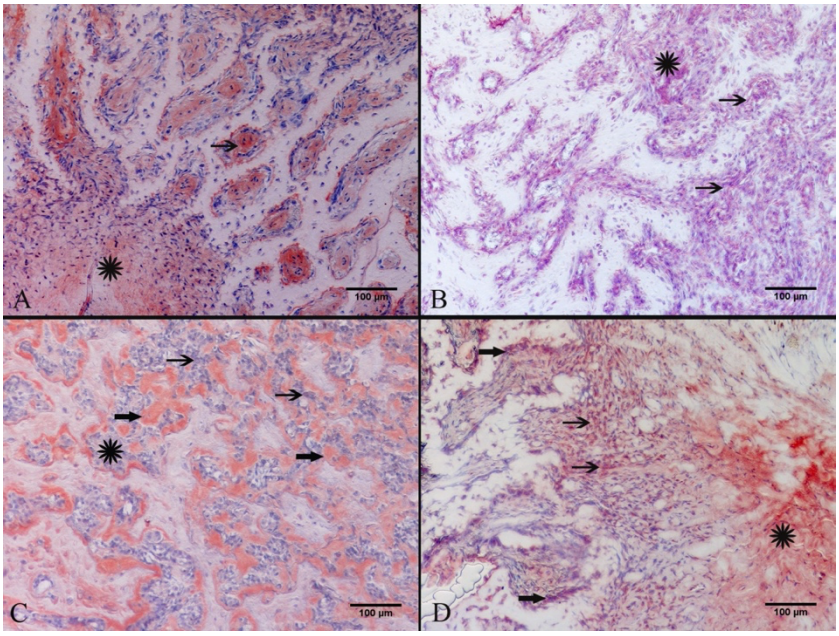


**Figure 2.** Immunohistochemical staining results for the BMP-2, BMP-4, BMP-7, and TGF-β1in primer canine OS. (A) BMP-2 expression in malignant mesenchymal cells (thin arrow) and the surrounding extracellular matrix (*) in FOS. (B) BMP4 expression in malignant mesenchymal cells and the surrounding extracellular matrix (*) and malignant mesenchymal cells (thin arrows) in FOS. (C) BMP-7 expression in malignant mesenchymal cells (thin arrows), the surrounding extracellular matrix (*), and the peripheral regions of the osteoid matrix (thick arrows) in COS. (D) TGF-β1 expression in malignant mesenchymal cells (thin arrows), the extracellular matrix (*), and the anaplastic osteoblastic cells (thick arrows) surrounding the bone trabecula in FOS. All microphotographs on the plate IHC and Bar=100 µm.

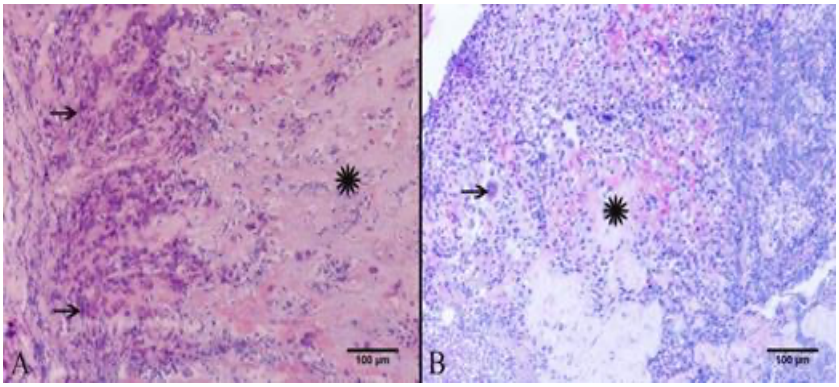


**Figure 3.** Immunohistochemical staining results for the Gremlin1 in primer canine OS. (A) Gremlin1 expression in chondroblastic cells (thin arrows) and the extracellular matrix (*) in COS. (B) Gremlin1 expression in extracellular matrix (*), and giant cell (thin arrow) in GCROS. All microphotographs on the plate IHC and Bar=100 µm.

**Table 1. IRS for antibodies in subtypes of OS*.**

| | n | BMP-2 | BMP-4 | BMP-7 | TGF-β1 | Gremlin1 |
|---|---|---|---|---|---|---|
| **FOS** | 3 | 6 (6-9)[a] | 5 (5-6)[a] | 6 (4-6)[a] | 2 (2-4)[a] | 2 |
| **COS** | 4 | 6 (6-9)[c,e] | 5.5 (5-7)[e] | 7.5 (6-9)[b,e] | 4 (4-6)[b,c,d,e] | 3 (2-3) |
| **POOS** | 5 | 6 (4-6)[g] | 6 (5-7)[f,g] | 4 (2-6)[b,g] | 2 (1-2)[b,f,g] | 2 (0-3) |
| **NPOOS** | 2 | 4[c,h] | 5[h] | 3.5 (3-4)[h] | 2[c,h] | 0 |
| **GCROS** | 2 | 7.5 (6-9)[i] | 4[f,i] | 5 (4-6)[i] | 0[d,f] | 1 (0-2) |
| **Control** | 5 | 0[a,e,g,h,i] | 0[a,e,g,h,i] | 0[a,e,g,h,i] | 0[a,e,g,h] | 0 |

*The data is presented as median (minimum-maximum). Mann-Whitney U test used. [a]The difference between FOS and Control is significant ($p < 0.05$). [b]The difference between COS and POOS is significant ($p < 0.05$). [c]The difference between COS and NPOOS is significant ($p < 0.05$). [d]The difference between COS and GCRO is significant ($p < 0.05$). [e]The difference between COS and Control is significant ($p < 0.05$). [f]The difference between POOS and GCROS is significant ($p < 0.05$). [g]The difference between POOS and Control is significant ($p < 0.05$). [h]The difference between NPOS and Control is significant ($p < 0.05$). [i]The difference between GCROS and Control is significant ($p < 0.05$)

## DISCUSSION

Osteosarcoma has a complex cell heterogeneity and an abnormally produced immature osteoid matrix and arises as a result of poorly defined oncogenic events in this complex environment. Recent studies support that the bone microenvironment underlies OS initiation and progression (Corre et al., 2020). There are inconsistencies in the information regarding the expression of BMPs in OS. It has been reported in a human study that COS does not express BMP-2/4 (Yoshikawa, Rettig, Takaoka, et al., 1994). In one human study, all OS subtypes, including COS, were reported to express BMPs. This study reported that BMP-7 was expressed at the highest level in osteoblastic OS (Sulzbacher et al., 2002). Another human OS study using gene expression analysis reported that the BMP7 gene was expressed in osteoblastic OS at quite a different level than in non-osteoblastic OS (Kubista et al., 2011). We found that all OS subtypes examined in our study expressed BMP-2, -4, and -7 antibodies.

BMP-2/-4 expression is not at the same level at all stages of mesenchymal development, and there is no need for continued BMP-2/-4 expression after mesenchymal differentiation (Yoshikawa, Rettig, Takaoka, et al., 1994). Yoshiawa et al. showed that BMP-2/-4 are expressed in the cytoplasm of undifferentiated mesenchymal cells in most human OS (Yoshikawa, Rettig, Lane, et al., 1994; Yoshikawa, Rettig, Takaoka, et al., 1994). In our study, it was observed that BMP-2, -4, and -7 were expressed in the cytoplasm of undifferentiated mesenchymal cells, but BMP-2 and -4 were also expressed in the nuclei of some of these cells. A study on human OS reported that BMP-2/4 was not expressed in normal bone, osteoid and chondroid matrix and has little or no expression in osteoblastic and chondroblastic cells (Yoshikawa, Rettig, Lane, et al., 1994). However, osteoid and chondroid matrices in our study expressed BMP-2 and -7. Moreover, neoplastic osteoblasts and chondroblasts were also immunopositive for BMP-2, and -7. Although BMP-4 was not defined in the chondroid and osteoid matrix, some neoplastic chondroblasts and

osteoblasts at the periphery of these components showed immunoreaction for BMP-4. Sulzbacher et al. reported that BMP-2, -4, and -7 were expressed by neoplastic cells in human OS, similar to our findings (Sulzbacher et al., 2002). It is known that BMP-2 has a stimulating effect on the osteogenic differentiation of normal mesenchymal stem cells and also promotes the expression of other BMPs (Carreira et al., 2014; Park et al., 2009). BMP-4, and -7 is also an osteochondrogenic factor that promotes osteoblastic differentiation of mesenchymal stem cells (Carreira et al., 2014). The results we obtained in this study suggest that BMP-2, -4, and -7 expressions may contribute to the development of bone tumors.

In our study, BMP expression in the extracellular matrix, especially in the surrounding areas of undifferentiated mesenchymal cells, was noted in all OS subtypes. Complex events that occur during the development of bone tumors cause the release of some bone matrix growth factors such as BMPs, which promotes tumor cell proliferation and further bone resorption. This facilitates the movement and metastasis of tumor cells (Alfranca et al., 2015).

Aggressive clinical behaviors of the high-grade OS are associated with highly expressed TGF-β1 (Franchi et al., 1998). Nguyen et al. showed that TGF-β1 expression is higher in high-grade OS than in low-grade OS (Nguyen et al., 2014). Consistent with the literature, in our study, TGF-β1 expression was higher in grade II OS samples than in low-grade ones. In addition, COS expressed the highest TGF-β1 levels; these tumors were grade II, while two giant cell-rich OS samples that did not express TGF-β1 were grade I.

Franchi et al. reported that the chondroid matrix in the human OS does not express TGF-β1 (Franchi et al., 1998). In our study, peripheral regions of the osteoid, and chondroid matrix, neoplastic osteoblasts, and chondroblasts in tumor tissues expressed TGF-β1. In addition, undifferentiated mesenchymal cells, were also TGF-β1 immunopositive as noted in some other studies (Franchi et al., 1998; Kloen et al., 1997; Zhang et al., 2013). Zhang et al. reported that when the TGF-β1 signaling pathway was inhibited in human OS in vitro, OS cells could not form colonies and their differentiation properties were interrupted (Zhang et al., 2013). Cytokines and growth factors such as TGF-β1 produced by tumor cells facilitate tumor progression by disrupting the balance between bone resorption and bone formation (Lamora et al., 2016). Our results support Verrecchia and Reddini's thesis that this microenvironment expressing TGF-β1 in OS may indicate poor prognosis in primary bone tumors to promote angiogenesis, bone remodeling and cell migration (Verrecchia & Rédini, 2018).

Gremlin1 has been studied in certain human tumors (Karagiannis et al., 2015; Namkoong et al., 2006; Sato et al., 2016; Sneddon et al., 2006). In osteosarcoma, studies are few and results are inconsistent (Gu et al., 2019; Kim et al., 2012). A study investigating the tumor microenvironment showed that, unlike the stroma of normal tissues, Gremlin1 is expressed in the stroma of many carcinomas, thus providing a favorable microenvironment for the survival and spread of cancer cells (Sneddon et al., 2006). Sato et al. reported that high mRNA expression of Gremlin1 in human cervical cancer was significantly correlated with tumor size (Sato et al., 2016). Another human colon cancer study reported that Gremlin1 is secreted from cancer-associated fibroblasts and its expression is mainly localized at the invasion site (Karagiannis et al., 2015). A study with A549 cell culture suggested that Gremlin1 interacts directly with neoplastic cells independently of BMP and VEGFR2, triggering cell migration, invasion, and proliferation (Kim et al., 2012). Unlike other work, Gu et al. reported that the Gremlin1 gene and protein are significantly downregulated in different OS cell lines and their ability to proliferate and invade OS cells is reduced when they artificially upregulate Gremlin1 (Gu et al., 2019). Accordingly, they suggested that the metastasis ability of OS would be inhibited in the presence of Gremlin1 and that Gremlin1 is a marker showing a good prognosis (Gu et al., 2019). Gremlin1 was noted to be expressed in COS samples and tumor samples classified as grade II. Our results, Kim et al. (2012) confirmed the results. However, it should not be forgotten that tumor grade has no prognostic significance according to studies conducted in recent years (Schott et al., 2018).

## CONCLUSION

In our study, BMP-2, -4, -7, TGF-β1, and Gremlin1 were expressed at the highest level in COS. FOS and osteoblastic osteosarcomas followed this. All of these proteins were expressed together in some components of the tumor tissue, especially in the undifferentiated mesenchymal cells and the extracellular matrix surrounding these cells. The fact that these proteins, which have opposing effects in some pathways, are expressed in the same regions and even by the same cells in different OS subtypes suggested that there may be other mechanisms other than those currently known.

Therefore, it was concluded that the tumor microenvironment is important in tumor development, invasion, and metastasis in different OS subtypes; further research on this subject is needed to predict tumor behavior and develop new treatment approaches.

**Acknowledgement**

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

A part of this study was previously presented as an oral presentation with the title "Immunohistochemical detection of gremlin, BMP-2, -7, and TGF-β1 in the naturally occurring canine osteosarcomas" at the 5th International Vet-Istanbul

Group Congress held in Ohrid, R. of Macedonia, 23-27 September 2018.

**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**

**Plan, design:** YBK, MS; **Material, methods and data collection:** YBK, MS, SI; **Data analysis and comments:** YBK, MS, SI; **Writing and corrections:** YBK, MS, SI, MYG.

**REFERENCES**


Alfranca, A., Martinez-Cruzado, L., Tornin, J., Abarrategi, A., Amaral, T., de Alava, E., Menendez, P., Garcia-Castro, J., & Rodriguez, R. (2015). Bone microenvironment signals in osteosarcoma development. *Cellular and Molecular Life Sciences*, 72, 3097-3113. https://doi.org/10.1007/s00018-015-1918-y.

Carreira, A. C., Alves, G. G., Zambuzzi, W. F., Sogayar, M. C., & Granjeiro, J. M. (2014). Bone morphogenetic proteins: structure, biological function and therapeutic applications. *Archives of Biochemistry and Biophysics,* 561, 64-73. https://doi.org/10.1016/j.abb .2014.07.011.

Chen, D., Zhao, M., & Mundy, G. R. (2004). Bone morphogenetic proteins. *Growth Factors*, *22*(4), 233-241. https://doi.org/10.1080/08977190412331279890.

Corre, I., Verrecchia, F., Crenn, V., Redini, F., & Trichet, V. (2020). The osteosarcoma microenvironment: a complex but targetable ecosystem. *Cells, 9*(4), 1-25. https://doi.org/10.3390/cells9040976.

Craig, L., Dittmer, K., & Thompson, K. (2016). Bones and joints. In M. G. Maxie (Ed.), Jubb, Kennedy & Palmer's pathology of domestic animals (6th ed., Vol. 1, pp. 17-163). Elsevier.

Franchi, A., Arganini, L., Baroni, G., Calzolari, A., Capanna, R., Campanacci, D., Caldora, P., Masi, L., Brandi, M. L., & Zampi, G. (1998). Expression of transforming growth factor β isoforms in osteosarcoma variants: association of tgfβ1 with high-grade osteosarcomas. *Journal of Pathology, 185*(3), 284-289. https://doi.org/10.1002/(SICI)1096-9896(199807)185:3<284::AID-PATH94>3.0.CO;2-Z.

Gazzerro, E., Pereira, R. C., Jorgetti, V., Olson, S., Economides, A. N., & Canalis, E. (2005). Skeletal overexpression of gremlin impairs bone formation and causes osteopenia. *Endocrinology, 146*(2), 655-665. https://doi.org/10.1210/en.2004-0766.

Gu, Q., Luo, Y., Chen, C., Jiang, D., Huang, Q., & Wang, X. (2019). GREM1 overexpression inhibits proliferation, migration and angiogenesis of osteosarcoma. *Experimental Cell Research, 384*(1), 111619. https://doi.org/10.1016/j.yexcr.2019.111619.

Haque, S., & Morris, J. C. (2017). Transforming growth factor-β: A therapeutic target for cancer. *Human Vaccines & Immunotherapeutics, 13*(8), 1741-1750. https://doi.org/10.1080/21645515.2017.1327107.

Karagiannis, G. S., Musrap, N., Saraon, P., Treacy, A., Schaeffer, D. F., Kirsch, R., Riddell, R. H., & Diamandis, E. P. (2015). Bone morphogenetic protein antagonist gremlin-1 regulates colon cancer progression. *Biological Chemistry, 396*(2), 163-183. https://doi.org/10.1515/hsz-2014-0221.

Kessler, E., Takahara, K., Biniaminov, L., Brusel, M., & Greenspan, D. S. (1996). *Bone Morphogenetic Protein-1: The Type I Procollagen C-Proteinase. Science, 271*(5247), 360-362. https://doi.org/10.1126/science.271.5247.360.

Kim, M., Yoon, S., Lee, S., Ha, S. A., Kim, H. K., Kim, J. W., & Chung, J. (2012). Gremlin-1 induces BMP-independent tumor cell proliferation, migration, and invasion. *PLoS One, 7*(4), 1-8. https://doi.org/10.1371/journal.pone.0035100.

Kloen, P., Gebhardt, M. C., Perez-Atayde, A., Rosenberg, A. E., Springfield, D. S., Gold, L. I., & Mankin, H. J. (1997). Expression of transforming growth factor-β (TGF-β) isoforms in osteosarcomas: TGF-β3 is related to disease progression. *Cancer, 80*(12), 2230-2239. https://doi.org/10.1002/(SICI)1097-0142(19971215)80:12<2230::AID-CNCR3>3.0.CO;2-Y.

Kubista, B., Klinglmueller, F., Bilban, M., Pfeiffer, M., Lass, R., Giurea, A., Funovics, P. T., Toma, C., Dominkus, M., & Kotz, R. (2011). Microarray analysis identifies distinct gene expression profiles associated with histological subtype in human osteosarcoma. *International Orthopaedics*, *35*(3), 401-411. https://doi.org/10.1007/s00264-010-0996-6.

Lamora, A., Talbot, J., Mullard, M., Brounais-Le Royer, B., Redini, F., & Verrecchia, F. (2016). TGF-β signaling in bone remodeling and osteosarcoma progression. *Journal of Clinical Medicine, 5(*11), 1-11. https://doi.org/10.3390/jcm5110096.

Loukopoulos, P., & Robinson, W. F. (2007). Clinicopathological relevance of tumour grading in canine osteosarcoma. *Journal of Comparative Pathology, 136*(1), 65-73. https://doi.org/10.1016/j.j cpa.2006.11.005.

Meuten, D. J. (2017). Tumors in domestic animals. In (5 ed., pp. 356-423). Wiley Blackwell.

Mitola, S., Ravelli, C., Moroni, E., Salvi, V., Leali, D., Ballmer-Hofer, K., Zammataro, L., & Presta, M. (2010). Gremlin is a novel agonist of the major proangiogenic receptor VEGFR2. *Blood, 116*(18), 3677-3680. https://doi.org/10.1182/blood-2010-06-291930.

Namkoong, H., Shin, S. M., Kim, H. K., Ha, S.-A., Cho, G. W., Hur, S. Y., Kim, T. E., & Kim, J. W. (2006). The bone morphogenetic protein antagonist gremlin 1 is overexpressed in human cancers and interacts with YWHAH protein. *BMC Cancer, 6*(1), 1-13. https://doi.org/10.1186/1471-2407-6-74.

Nguyen, A., Scott, M. A., Dry, S. M., & James, A. W. (2014). Roles of bone morphogenetic protein signaling in osteosarcoma. *International Orthopaedics, 38*(11), 2313-2322. https://doi.org/ 10.1007/s00264-014-2512-x .

Park, K.-H., Kim, H., Moon, S., & Na, K. (2009). Bone morphogenic protein-2 (BMP-2) loaded nanoparticles mixed with human mesenchymal stem cell in fibrin hydrogel for bone tissue engineering. *Journal of Bioscience and Bioengineering, 108*(6), 530-537. https://doi.org/10.1016/j.jbiosc.2009.05.021.

Sato, M., Kawana, K., Fujimoto, A., Yoshida, M., Nakamura, H., Nishida, H., Inoue, T., Taguchi, A., Takahashi, J., & Adachi, K. (2016). Clinical significance of Gremlin 1 in cervical cancer and its effects on cancer stem cell maintenance. *Oncology Reports, 35*(1), 391-397. https://doi.org/10.3892/or 2015.4367.

Schott, C. R., Tatiersky, L. J., Foster, R. A., & Wood, G. A. (2018). Histologic grade does not predict outcome in dogs with appendicular osteosarcoma receiving the standard of care. *Veterinary Pathology, 55*(2), 202-211. https://doi.org/10.1177/0300985817747329.

Sneddon, J. B., Zhen, H. H., Montgomery, K., van de Rijn, M., Tward, A. D., West, R., Gladstone, H., Chang, H. Y., Morganroth, G. S., & Oro, A. E. (2006). Bone morphogenetic protein antagonist gremlin 1 is widely expressed by cancer-associated stromal cells and can promote tumor cell proliferation. *Proceedings of the National Academy of Sciences, 103*(40), 14842-14847. https://doi.org/10.1073/pnas.0606857103.

Sulzbacher, I., Birner, P., Trieb, K., Pichlbauer, E., & Lang, S. (2002). The expression of bone morphogenetic proteins in osteosarcoma and its relevance as a prognostic parameter. *Journal of Clinical Pathology, 55*(5), 381-385. https://doi.org/ 10.1136/jcp.55.5.381.

Verrecchia, F., & Rédini, F. (2018). Transforming growth factor-β signaling plays a pivotal role in the interplay between osteosarcoma cells and their microenvironment. *Frontiers in Oncology*, 8, 1-11. https://doi.org/10.3389/fonc.2018.00133.

Wu, M., Chen, G., & Li, Y.-P. (2016). TGF-β and BMP signaling in osteoblast, skeletal development, and bone formation, homeostasis and disease. *Bone Research, 4*(1), 1-21. https://doi.org/10.1038/bonere s.2016.9.

Yoshikawa, H., Rettig, W. J., Lane, J. M., Takaoka, K., Alderman, E., Rup, B., Rosen, V., Healey, J. H., Huvos, A. G., & Garin-Chesa, P. (1994). Immunohistochemical detection of bone morphogenetic proteins in bone and soft-tissue sarcomas. *Cancer, 74*(3), 842-847. https://doi.org/10.1002/1097-0142(19940801)74:3 <842::aid-cncr2820740309>3.0.co;2-b.

**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.1384674

# Investigation of Factors Affecting Motor Competence in Healthy Early Adolescents

Gulhan YILMAZ GOKMEN [1], Fatma Nur YILMAZ [1], Esra KESKIN [1], Sule KECELIOGLU [1], Ebru KAYA MUTLU [1]

[1] Bandırma Onyedi Eylul University, Faculty of Health Sciences, Department of Physiotherapy and Rehabilitation

***Geliş Tarihi / Received:*** *01.11.2023,* ***Kabul Tarihi / Accepted:*** *09.11.2023*

**ABSTRACT**

**Objective:** This study aims to retrospectively evaluate the fundamental motor competence of healthy early adolescents and to investigate the affecting factors. **Materials and Methods:** 89 children aged 11.33±0.95 were included in the study. Minnesota Manual Dexterity Test (MMDT) for manual dexterity, 9-Hole Peg Test (9-HPT) for finger dexterity, Korebalance™ Premiere for balance, manual muscle strength measurement device for quadriceps muscle strength, hand dynamometer for hand grip strength, EMG Biofeedback for muscle activation was used. **Results:** Compared by gender, there was a statistically significant difference in the right and left-hand placing of MMDT and 9-HPT (p=0.004, p=0.041, p=0.004, respectively). In comparison of the age groups, there was a statistically significant difference in the left-hand placing and turning subtests of MMDT and left grip strength (p=0.010, p=0.048, p=0.025, respectively). In a correlation analyses, age had a correlation with the left-hand placing of MMDT (r=-0.336, p=0.001); and left grip strength (r=0.219, p=0.039). Height and weight had a correlation with dynamic balance (r=-0.242, p=0.022; r=-0.244, p=0.021). Weight and BMI had a correlation with static balance (r=0.342, p=0.001; r=0.305, p=0.004) and EMG Biofeedback score (r=0.237,p=0.025; r=0.212,p=0.046). **Conclusion:** Manual dexterity and hand grip strength develop with age in children, and girls' manual and finger dexterities are better than boys. While the increase in BMI and weight affect static balance negatively, the increase in height and weight affect dynamic balance positively. It is thought that investigating the factors affecting motor competence will be important in evaluating the development of children and directing them to appropriate sports.

**Keywords:** Balance, Finger dexterity, Manual dexterity, Muscle activation.

# Sağlıklı Erken Adölesan Dönemdeki Çocuklarda Motor Yeterliliği Etkileyen Faktörlerin Araştırılması

**ÖZ**

**Amaç:** Çalışmadaki amacımız, sağlıklı erken adölesan dönemdeki çocukların temel motor yeterliliklerini retrospektif olarak değerlendirmek ve etkileyen faktörleri incelemektir. **Gereç ve Yöntemler:** Çalışmaya yaşları 11.33±0.95 olan 89 çocuk dahil edildi. El becerisi Minnesota El Beceri Testi (MEBT) ile, parmak becerisi 9 Delikli Peg Test (9-DPT) ile, denge Korebalance™ Premiere ile, kuadriseps kas gücü manuel kas gücü ölçüm cihazı ile, el kavrama gücü el dinamometresi ile, kas aktivasyonu EMG Biofeedback ile değerlendirildi. **Bulgular:** Verilerin cinsiyete göre karşılaştırılmasında MEBT sağ ve sol-el yerleştirme ve 9-DPT'in arasında (sırasıyla p=0.004, p=0.041, p=0.004); yaş gruplarına göre karşılaştırılmasında MEBT'nin sol el-yerleştirme ve döndürme testleri ile sol kavrama kuvveti arasında istatistiksel olarak anlamlı fark vardı (sırasıyla p=0.010, p=0.048, p=0.025). Korelasyon analizinde yaş ile MEBT'nin sol el-yerleştirme (r=-0.336, p=0.001) ve sol kavrama kuvvetiyle (r=0.219, p=0.039); boy (r=-0.242, p=0.022) ve kilonun (r=-0.244, p=0.021) dinamik denge ile kilo ve beden kitle indeksinin (BKİ) statik denge (r=0.342, p=0.001; r=0.305, p=0.004) ve EMG Biofeedback skoru (r=0.237, p=0.025; r=0.212, p=0.046) ile korelasyonu vardı. **Sonuç:** Çocuklarda yaş ilerledikçe el becerisi ve el kavrama kuvveti gelişmekte olup kızların el ve parmak becerileri erkeklere göre daha iyidir. BKİ ve kilonun artması statik dengeyi olumsuz yönde etkilerken, boy ve kilonun artması dinamik dengeyi olumlu yönde etkilemektedir. Motor yeterliliği etkileyen faktörlerin araştırılmasının çocukların gelişimlerinin değerlendirilmesi ve uygun sporlara yönlendirilmesi açısından önemli olacağı düşünülmektedir.

**Anahtar Kelimeler:** Denge, Parmak becerisi, El becerisi, Kas aktivasyonu.

***Sorumlu Yazar / Corresponding Author:*** Gulhan YILMAZ GOKMEN, Bandirma Onyedi Eylul University, Faculty of Health Sciences, Department of Physiotherapy and Rehabilitation, Balikesir/Bandirma, Turkey
***E-mail:*** ggokmen@bandirma.edu.tr

***Bu makaleye atıf yapmak için / Cite this article:*** Yilmaz Gokmen, G., Yilmaz, F. N., Keskin, E., Kecelioglu, S., & Kaya Mutlu, E. (2024). Investigation Of Factors Affecting Motor Competence In Early Adolescents. *BAUN Health Sci J, 13*(*1*), 83-94 https://doi.org/10.53424/balikesirsbd.1384674

## INTRODUCTION

Motor competence can be defined as a person's ability to perform different motor actions, including the coordination of fine and gross motor skills necessary to manage daily tasks. Gross motor competence, in particular, plays an essential role in growth, development, and maintaining an active lifestyle (Lubans, Morgan, Cliff, Barnett, & Okely, 2010). Gross motor competence is often defined as proficiency in basic movement skills (e.g., throwing, catching, running) that are ideally learned during the preschool and early school years. These provide a foundation for children to develop more specific movement sequences, such as sport-specific and lifelong physical activity (PA) movement skills (e.g., cycling and swimming) (Hulteen et al., 2015). Fundamental movement skills (FMS) are often defined more precisely as essential stability (e.g., static balance), object control (also called manipulative, e.g., throwing), or locomotor movements involving two or more body parts (e.g., jumping) (Gallahue & Donnelly, 2007). FMS are recognized as the building blocks that lead to specific movement sequences necessary for adequate participation in many organized and nonorganized physical activities for children, adolescents, and adults. It is suggested that mastery of FMS involves the physical, mathematical, and social development of the child and the development of an active lifestyle (Gallahue & Donnelly, 2007). Recently, FMS proficiency has been suggested to interact with perceptions of motor competence and health-related fitness to predict physical activity from childhood to adulthood and subsequent obesity (Stodden et al., 2008).

The human hand is a foundation and indispensable organ that contains skills that can vary from fine motor to gross motor. High levels of hand activity are required for various daily behaviors (e.g., eating and personal care) and sports activities. Grip strength depends on the strength of the hand and forearm muscles (Subramani et al., 2015). "Hand Grip Strength" refers to the maximum force produced by the contraction of intrinsic and extrinsic hand muscles, causing the hand joints to stretch (Abdullahi, Audu, & Ter Goon, 2020). Dexterity is typically defined as the ability to synchronize small muscle movements with the eyes, hands, and fingers and is defined as the capacity to move objects quickly and coordinate fingers and is an important factor in assessing hand function (Wang, Bohannon, Kapellusch, Garg, & Gershon, 2015). Play and leisure activities, as well as work activities, require both grip strength and dexterity. These abilities are essential for adults, but they are even more important for children, whose physical and functional development is greatly affected by their dexterity development (Tissue et al., 2017). Many school activities require fine motor skills and manual dexterity. Therefore, assessment of hand functions provides important information regarding physical ability and manual dexterity (Wang et al., 2015).

Adolescence is discussed in three parts: early, middle, and late adolescence. Early adolescence is between the ages of 10-14 (Çuhadaroğlu F, 2000). One of the most critical changes in adolescence is rapid physical growth. The fastest increase in length is between the ages of 14-15 for boys and between the ages of 12-13 for girls. Weight gain in adolescents becomes apparent approximately six months after the period when it increases in length most rapidly (Parlaz, Tekgül, Karademirci, & Öngel, 2012). Girls' weight begins to grow faster than their male counterparts. The reason is that girls enter puberty earlier. Longitudinal growth is slow; transverse growth is faster. This is the period when intrinsic muscles develop rapidly. Thanks to developing manual skills, they become successful in playing ball, using basic hand tools, and playing instruments. Nerve, muscle, and joint coordination have begun to be achieved. Harmony has been achieved between muscle strength and organ development. Boys are more enduring and more robust than girls. However, this difference is slight (Çuhadaroglu F, 2000; Parlaz et al., 2012). A systematic review investigating children's gross motor competence (Barnett et al., 2016) showed that increasing age was directly related to children's gross motor competence, while healthy weight status, male gender, and good socioeconomic status had consistent correlations with only certain aspects of motor competence. A longitudinal study has shown that low motor competence is associated with increasing body mass index (BMI) over time (Vítor P Lopes, David F Stodden, Mafalda M Bianchi, Jose AR Maia, & Luis P Rodrigues, 2012). In other words, while motor competencies increase as children grow, the increase in BMI negatively affects motor abilities. Determining the normative value of fundamental motor competence such as hand grip strength, manual dexterity and finger dexterity of healthy developing children is of great importance in determining the development level of atypically developing children and detecting retardation. It is also important to direct children to the appropriate sports branch. No comprehensive research has been found on this subject in Turkiye. Our study will be guided since it includes a comprehensive evaluation. The aim of this study is to retrospectively investigate the physical evaluations (muscle strength, manuel and finger dexterity, balance, muscle activation) of 100 adolescents aged 10-13, whom we reached through the "Body Awareness" program organized by the Department of Physiotherapy and Rehabilitation within the scope of The Children's University at Bandırma Onyedi Eylül University, and to investigate what affects children's fundamental motor competence in healthy early adolescence.

## MATERIALS AND METHODS

### Study design and participants

This retrospective cross-sectional and descriptive study was conducted with a total of 100 children, aged 10-13, who participated in the "Body Awareness" program organized by the Physiotherapy and Rehabilitation Department within the scope of the Children's University at Bandırma Onyedi Eylül University. The program was held on the following periods: August 23-28, 2021(33 children); August 22-26 (36 children), 2022; and August 28-September 2, 2023 (31 children); therefore the data was collected on the same dates. Within the program, children's static and dynamic balance, muscle activation, muscle strength, and manual and finger dexterity were assessed. From the study, data from children with chronic diseases (1 child), those who did not complete all evaluations (6 children), and those with evaluations conducted in different years (more than one) (4 children) were excluded. Data from a total of 89 children were analyzed (Figure 1). The "Body Awareness" program was conducted at the Faculty of Health Sciences, Department of Physiotherapy and Rehabilitation application unit.

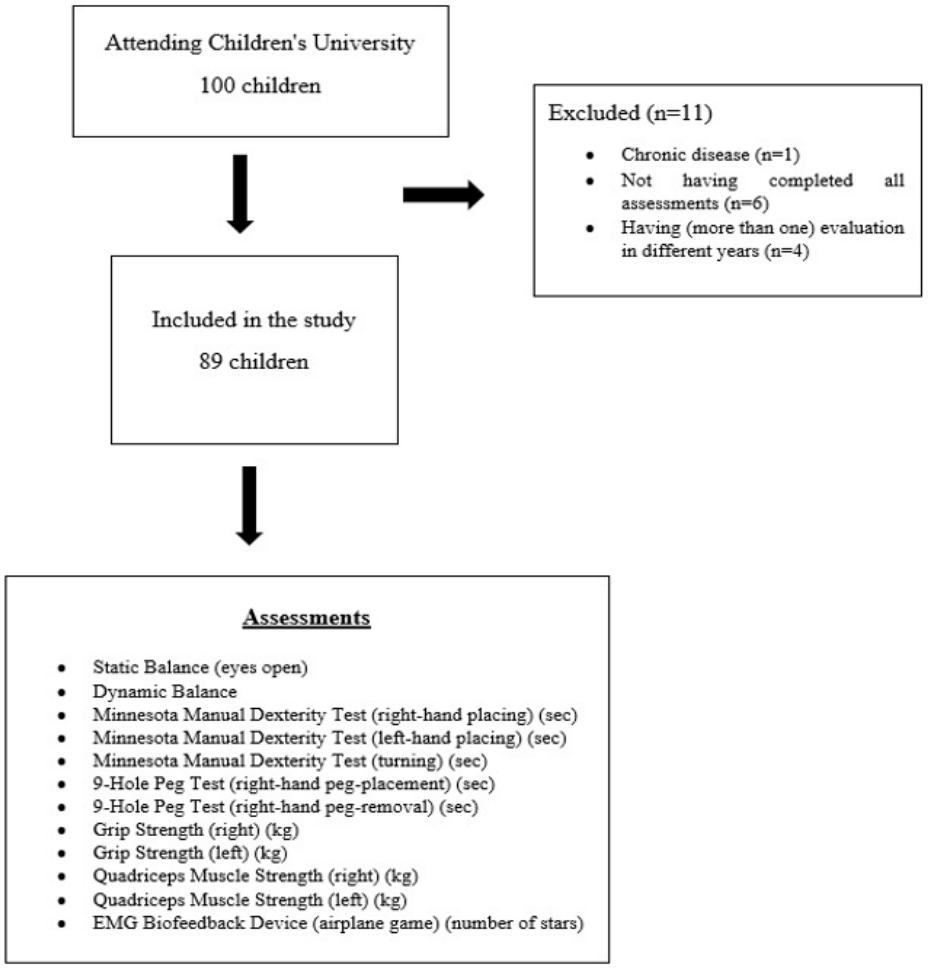


**Figure 1:** Flow chart

### Measurements

Demographic characteristics of the children (age, height, weight, presence of any chronic medical conditions, history of surgery, etc.) were recorded. Children's manual dexterity skills were assessed using the Minnesota Manual Dexterity Test (MMDT), finger dexterity was evaluated with the 9-Hole Peg Test (9-HPT), static and dynamic balance assessment was conducted using the Korebalance ™ Premiere balance device, quadriceps muscle strength was measured using a manual muscle strength measurement device, hand grip strength was evaluated with a hand-held dynamometer, and muscle activation potential was assessed using EMG Biofeedback (airplane game).

**Static and Dynamic Balance Assessment**: The static and dynamic balance values of the children were assessed using the Korebalance ™ Premiere balance device (Med-Fit Systems, Inc., VA, USA). The Korebalance ™ Premiere balance device is a laboratory-based patented balance assessment and exercise training system that includes a balance platform, an integrated computer system, and a specialized software package, offering a wide range of adjustable options for testing and training on static-dynamic balance, postural control, proprioception, vestibular parameters, and more (Karatekin, Yasin,

Yumusakhuylu, Bayram, & Icagasioglu, 2020). The Korebalance™ Premiere balance device provides options for static tests to assess static balance and dynamic tests to evaluate dynamic balance.

**Quadriceps Muscle Strength:** The Quadriceps muscle strength of the patients was measured using a manual muscle strength measurement device (Lafayette Instrument, USA) and recorded in kg/force. Maximal voluntary isometric contraction, commonly known as the "make technique," was used for muscle strength measurements, which is reported to be more reliable in the literature and frequently utilized (Roy & Doherty, 2004). Muscle strength measurements were repeated three times for both lower extremities at a 30-second interval, and the highest measurement was recorded.

**Hand Grip Strength:** Hand grip strength was assessed using a hand-held dynamometer (SAEHAN Corporation, Korea). Participants were instructed to sit in an upright position with their shoulders adducted, elbows flexed at a 90-degree angle, and wrists in a neutral position between supination and pronation. Measurements were taken separately for the right and left hands, and the tests were repeated three times for each hand. The average measurement of these repetitions was used for evaluation. The interpretation of measurement values was provided as a percentage of expected values for the same age and gender range in a healthy population, as determined by reference equations (Massy-Westropp, Gill, Taylor, Bohannon, & Hill, 2011).

**Minnesota Manual Dexterity Test (MMDT):** MMDT includes the placement of black and red discs, consisting of subtests called right-hand placing test, left-hand placing test, and turning test. The test is designed to assess gross hand dexterity, coordination, and speed (Cederlund, 1995) . In a study that investigated the validity, reliability, and reference values of the MMDT in healthy elderly individuals, the test-retest reliability was found to be high (0.79 to 0.87) (Desrosiers, Rochette, Hebert, & Bravo, 1997).

-In right-hand placing subtest, a wooden platform is placed in front of the individual, and the test begins with the individual starting from the right column. The bottom disc is placed in the top hole of the wooden platform, and the other discs are arranged in succession following the same pattern. As each column is completed, the next column is continued, and the test is completed when all the columns are filled with discs. The time it takes to complete the test is recorded.

-In left-hand placing subtest, the same procedure is followed, but the individual begins from the left column.

-In the turning test, discs with the same color are placed one on top of the other on a wooden board in front of the person. The individual uses their left hand to pick up the top disc from the right corner of the top row, turns it, and hands it to the right hand to place it back on the board. This process is repeated until the top row is completed. When the second row is reached, the disc is picked up with the right hand and turned, handed to the left hand, and placed on the board. This pattern is continued until the test is completed. The time it takes to complete the test is recorded.

**9- Hole Peg Test (9-HPT):** 9-HPT involves the placement and removal of nine pegs, and it is used to assess fine motor skills. It is particularly suitable for children and individuals with cognitive impairments (Ryder, 2014 ).

This test is applicable to individuals of all age groups, and it is an easy and fast method. For the 9-HPT, a set of pegs is evenly spread out over a perforated wooden board, and nine pegs are cut from an equal length of wooden dowel. Participants were informed about the procedure before the measurement. The measurement device was placed on the table to align with the midline of the participant's body, and the children were seated on a chair at an appropriate height. Participants were asked to remove and replace the nine pegs as quickly as possible. The test was conducted for the dominant hand, and the time it took to complete the test was recorded in seconds (s).

**EMG Biofeedback:** Electromyographic Biofeedback (EMG biofeedback) is a biofeedback technique that converts myoelectric activity in the muscle into visual and auditory signals through electrodes placed on the muscle. The action potential resulting from voluntary muscle contraction is displayed as a numerical value on the EMG biofeedback device. This value is typically expressed in microvolts (μV) (Basmajian, 1988). Electrodes are typically placed in the vicinity of the muscle's origin and insertion points.

The EMG Biofeedback assessment was conducted using the NeuroTrac™ ETS MyoPlus Pro2 device (Verity Medical Ltd., Romsey, Hampshire, UK) and the NeuroTrac™ EMG v5.0 software (Verity Medical Ltd., UK). In the game-based EMG Biofeedback training program, a visual image (airplane game) moved simultaneously with changes in EMG signals. Electrodes were placed on the tibialis anterior muscle. Children played the game by performing dorsiflexion and relaxation. In the game, each contraction-relaxation cycle had a specific target (star). Children were instructed to complete these cycles within specified time intervals. The number of stars collected at the end of the game was recorded.

**Statistical power and analysis**

After the evaluation of 89 individuals, post-hoc power analysis was performed using the G*Power (ver.3.1.9.7) program. The power of the study (1-β) was calculated as 90% with a 5% margin of error (α=0.05) for intergroup comparison analysis of the results of finger dexterity assessment.

IBM SPSS Statistics 23 (Statistical Package for Social Sciences) analysis program was used for statistical analysis. For descriptive statistics, if quantitative data provided the parametric assumption,

they were given as mean and standard deviation (SD); if not, as median and minimum (min)-maximum (max) values, and qualitative data were given as frequency (n) and percentage (%) values. The suitability of the quantitative data for normal distribution was evaluated with the Kolmogorov-Smirnov Test (since the sample size was 30 and above) (Cevahir, 2020). In comparing two independent groups, the Independent samples T-test was used if the data were normally distributed, and the Mann-Whitney U Test was used if it was not normally distributed. The correlation of manual dexterity and finger dexterity with other evaluation parameters and the correlation of demographic characteristics with other evaluation parameters were evaluated with Pearson Correlation Analysis. According to the correlation coefficients, 0-0.3 was taken as weak, 0.3-0.7 as moderate, and 0.7-1.0 as strong. Statistical significance was $p<0.05$.

**Ethical considerations**

Children's University Unit obtained permission from the families of the children in this program to ensure the confidentiality of data obtained within the program, to use the information exclusively for the study, and not to share the data with third parties. This study received approval from the Bandırma Onyedi Eylül University Health Sciences Non-Interventional Research Ethics Committee (Ethics Committee No: 2032-178), and the study was conducted in accordance with the principles of the Declaration of Helsinki.

**Table 1. Demographic characteristics of children**

| **Variables (n=89)** | |
|---|---|
| **Age (years) (mean±SD)** | 11.33±0.95 |
| **Height (m) (mean±SD)** | 1.53±0.07 |
| **Weight (kg) (mean±SD)** | 43.69±8.48 |
| **BMI (kg/m2) (mean±SD)** | 18.73±3.31 |
| **Gender n (%)** | |
| **Girl** | 36 (40.4%) |
| **Boy** | 53 (59.6%) |
| **Age Group n (%)** | |
| **10-11 age group** | 50 (56.2%) |
| **12-13 age group** | 39 (43.8%) |
| **Distribution by Age n (%)** | |
| **10 years** | 20 (22.5%) |
| **11 years** | 30 (33.7%) |
| **12 years** | 29 (32.6%) |
| **13 years** | 10 (11.2%) |

SD= Standard Deviation, BMI= Body Mass Index

## RESULTS

Eighty-nine children with an average age of 11.33±0.95 were included in the study at Children's University (Figure 1). The demographic characteristics of the participating children are in Table 1.

Comparing balance, manual dexterity, finger dexterity, grip strength, quadriceps muscle strength, and EMG data in children according to gender, there was a statistically significant difference in the right-hand placing and left-hand placing subtests of the MMDT and the right-hand peg-placement subtest of the 9-HPT (p=0.004, p=0.041, p=0.004, respectively). There was no significant difference between girls and boys genders in terms of other evaluation parameters (p>0.05) (Table 2).

When comparing balance, manual dexterity, finger dexterity, grip strength, quadriceps muscle strength, and EMG data in children according to age groups (10-11 years, 12-13 years), there was a statistically significant difference in the left-hand placing and turning subtests of the MMDT, in left grip strength (p=0.010, p=0.048, p=0.025, respectively). There was no significant difference between age groups in terms of other evaluation parameters (p>0.05) (Table 3).

When the correlation of manual dexterity and finger dexterity with other evaluation parameters was investigated, for the MMDT, the right-hand placing subtest had a statistically significant correlation at a weak level in a positive direction with static balance (eyes open) (r = 0.276, p = 0.009); the right-hand placing subtest had a statistically significant correlation at a weak level, in a negative direction with right grip strength and right quadriceps muscle strength (r=-0.224, p=0.035; r=-0.228, p=0.032, respectively). The left-hand placing subtest had a statistically significant correlation at a weak level, in a negative direction with right and left grip strength (r=-0.274, p=0.009; r=-0.287, p=0.006, respectively). The turning subtest had a statistically significant correlation at a moderate level, in a negative direction with the EMG Biofeedback Device (airplane game) (r=-0.353, p=0.001). For the 9-HPT, the right-hand peg-placement had a statistically significant correlation at a weak level, in a negative direction with right and left grip strength (r=-0.267, p=0.012; r=-0.225, p=0.034, respectively). There was no statistically significant correlation between the right-hand peg-removal subtest and other evaluation parameters (p>0.05) (Table 4).

When the correlation of demographic characteristics with other evaluation parameters in children was investigated, age had a statistically significant correlation at a moderate level, in a negative direction with the left-hand placing subtest of the MMDT (r=-0.336, p=0.001); age had a statistically significant correlation at a weak level, in a positive direction with the left grip strength (r=0.219, p=0.039). Height had a statistically significant correlation at a weak level, in a negative direction with dynamic balance (r=-0.242, p=0.022). Weight had a statistically significant correlation at a moderate level, in a positive direction with static balance (eyes open) (r=0.342, p=0.001); weight had a statistically significant correlation at a weak level, in a negative direction with dynamic

balance (r=-0.244, p=0.021); weight had a statistically significant correlation at a weak level, in a positive direction with with the EMG Biofeedback Device-airplane game (r=0.237, p=0.025). BMI had a statistically significant correlation at a moderate level, in a positive direction with static balance (eyes open) (r=0.305, p=0.004); BMI had a statistically significant correlation at a weak level, in a positive direction with EMG Biofeedback Device-airplane game (r=0.212, p=0.046) (Table 5).

**Table 2. Comparison of balance, manual dexterity, finger dexterity, grip strength, quadriceps muscle strength and EMG data in children according to gender**

| Variables | Girl (n=36) | Boy (n=53) | p |
|---|---|---|---|
| **Age (years)** | 11.47±1.06 | 11.22±0.87 | 0.252[b] |
| **Height (m)** | 1.53±0.07 | 1.52±0.07 | 0.424 [b] |
| **Weight (kg)** | 41.99±6.69 | 44.84±9.38 | 0.098 [b] |
| **BMI (kg/m2)** | 17.87±2.84 | 19.31±3.49 | **0.035*[b]** |
| **Static Balance (eyes open)** | 146 (55-613) | 182 (61-1470) | 0.150[a] |
| **Dynamic Balance** | 1564.50 (1027-2370) | 1575 (1146-2433) | 0.857[a] |
| **MMDT (right-hand placing) (sec)** | 66.73 (54-79) | 69 (59.50-88) | **0.004***[a] |
| **MMDT (left-hand placing) (sec)** | 70.20 (58-118) | 73 (59-92) | **0.041***[a] |
| **MMDT (turning) (sec)** | 68 (39.90-95) | 75 (45.85-215) | 0.052[a] |
| **9-HPT (right-hand peg-placement) (sec)** | 11.46±1.65 | 12.57±1.80 | **0.004*[b]** |
| **9-HPT (right-hand peg-removal) (sec)** | 5.94 (4.64-16.80) | 6.30 (3.11-9.85) | 0.670[a] |
| **Grip Strength (right) (kg)** | 20 (12-45) | 20 (11-55) | 0.453[a] |
| **Grip Strength (left) (kg)** | 19 (11-45) | 19 (8-60) | 0.920[a] |
| **Quadriceps Muscle Strength (right) (kg)** | 10.35 (5.90-20.30) | 10.50 (7.30-24.60) | 0.528[a] |
| **Quadriceps Muscle Strength (left) (kg)** | 10 (6.40-18.10) | 9.90 (5.40-23.40) | 0.977[a] |
| **EMG Biofeedback Device (airplane game) (number of stars)** | 44.50 (25-50) | 47 (20-50) | 0.121[a] |

9-HPT=9-Hole Peg Test , MMDT= Minnesota Manual Dexterity Test, SD = Standard Deviation, EMG = Electromyography, [a]= Mann-Whitney U Test-data are presented as median (min-max), [b]= Independent samples T-test- data are presented as mean±SD, *=p<0.05

**Table 3: Comparison of balance, manual dexterity, finger dexterity, grip strength, quadriceps muscle strength and EMG biofeedback data in children according to age groups**

| Variables | 10-11 age group (n=50) | 12-13 age group (n=39) | p |
|---|---|---|---|
| **Age (years)** | 10.60±0.49487 | 12.26±0.44 | **<0.001*[b]** |
| **Height (m)** | 1.50±0.06 | 1.56±0.08 | **<0.001*[b]** |
| **Weight (kg)** | 43.34±8.90 | 44.14±7.99 | 0.657[b] |
| **BMI (kg/m2)** | 19.22±3.70 | 18.11±2.66 | 0.102[b] |
| **Static Balance (eyes open)** | 217.50 (55-711) | 132 (61-1470) | 0.051[a] |
| **Dynamic Balance** | 1587.50 (1146-2328) | 1554 (1027-2433) | 0.554[a] |
| **MMDT (right-hand placing) (sec)** | 69.53±7.44 | 68.24±6.03 | 0.383[b] |
| **MMDT (left-hand placing) (sec)** | 75.26±10.10 | 70.39±6.28 | **0.010*[b]** |
| **MMDT (turning) (sec)** | 75 (39.90-215) | 68 (45.73-118) | **0.048*[a]** |
| **9-HPT (right-hand peg-placement) (sec)** | 12.32±1.83 | 11.86±1.78 | 0.242[b] |
| **9-HPT (right-hand peg-removal) (sec)** | 5.96 (3.11-16.80) | 6.03 (4.03-8.48) | 0.490[a] |
| **Grip Strength (right) (kg)** | 20 (11-45) | 22 (14-55) | 0.123[a] |
| **Grip Strength (left) (kg)** | 16 (8-60) | 20 (12-45) | **0.025*[a]** |
| **Quadriceps Muscle Strength (right) (kg)** | 10.45 (6.40-20.20) | 10.60 (5.90-24.60) | 0.960[a] |
| **Quadriceps Muscle Strength (left) (kg)** | 9.70 (6.70-20) | 9.90 (5.40-23.40) | 0.753[a] |
| **EMG Biofeedback (airplane game) (number of stars)** | 45 (20-50) | 45 (23-50) | 0.931[a] |

9-HPT=9-Hole Peg Test , MMDT= Minnesota Manual Dexterity Test, SD = Standard Deviation, EMG = Electromyography, [a]= Mann-Whitney U Testi-data are presented as median (min-max), [b]= Independent samples T-test- data are presented as mean±SD, *=p<0.05

**Table 4. Correlation of manual dexterity and finger dexterity with other evaluation parameters in children.**

| Pearson Correlation Analysis (n=89) | Static Balance (eyes open) | Dynamic Balance | Grip Strength (right) | Grip Strength (left) | Quadriceps Muscle Strength (right) | Quadriceps Muscle Strength (left) | EMG Biofeedback (airplane game score) |
|---|---|---|---|---|---|---|---|
| **MMDT (right-hand placing)** | | | | | | | |
| **r** | 0.276** | 0.124 | -0.224* | -0.180 | -0.228* | -0.189 | 0.047 |
| **p** | 0.009 | 0.246 | 0.035 | 0.091 | 0.032 | 0.077 | 0.662 |
| **MMDT (left-hand placing)** | | | | | | | |
| **r** | 0.090 | 0.083 | -0.274** | -0.287** | -0.168 | -0.178 | -0.004 |
| **p** | 0.400 | 0.440 | 0.009 | 0.006 | 0.115 | 0.096 | 0.971 |
| **MMDT (turning)** | | | | | | | |
| **r** | 0.110 | 0.120 | -0.111 | -0.113 | -0.090 | -0.099 | -0.353** |
| **p** | 0.307 | 0.264 | 0.302 | 0.291 | 0.401 | 0.357 | 0.001 |
| **9-HPT (right-hand peg-placement)** | | | | | | | |
| **r** | 0.131 | 0.054 | -0.267* | -0.225* | -0.166 | -0.142 | 0.046 |
| **p** | 0.221 | 0.616 | 0.012 | 0.034 | 0.121 | 0.185 | 0.671 |
| **9-HPT (right hand peg-removal)** | | | | | | | |
| **r** | -0.062 | 0.135 | -0.038 | -0.043 | -0.045 | -0.031 | -0.055 |
| **p** | 0.565 | 0.207 | 0.723 | 0.691 | 0.677 | 0.775 | 0.607 |

9-HPT=9-Hole Peg Test , MMDT= Minnesota Manual Dexterity Test *=p<0.05, **=p<0.01

**Table 5. Correlation of demographic characteristics with other evaluation parameters in children**

| Pearson Correlation Analysis (n=89) | MMDT (right-hand placing) | MMDT (left-hand placing) | MMDT (turning) | 9-HPT (right-hand peg-placement) | 9-HPT (right-hand peg-removal) | Static Balance (eyes open) | Dynamic Balance | Grip Strength (right) | Grip Strength (left) | Quadriceps Muscle Strength (right) | Quadriceps Muscle Strength (left) | EMG Biofeedback Device (airplane game) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Age** | | | | | | | | | | | | |
| **r** | -0.166 | -0.336** | -0.183 | -0.182 | -0.137 | -0.065 | 0.019 | 0.197 | 0.219* | 0.034 | 0.053 | 0.067 |
| **p** | 0.121 | 0.001 | 0.087 | 0.087 | 0.201 | 0.546 | 0.861 | 0.064 | 0.039 | 0.754 | 0.621 | 0.535 |
| **Height** | | | | | | | | | | | | |
| **r** | 0.037 | -0.035 | -0.057 | -0.047 | 0.014 | 0.129 | -0.242* | 0.171 | 0.139 | -0.097 | -0.161 | 0.112 |
| **p** | 0.731 | 0.746 | 0.593 | 0.661 | 0.896 | 0.228 | 0.022 | 0.109 | 0.194 | 0.366 | 0.131 | 0.297 |
| **Weight** | | | | | | | | | | | | |
| **r** | 0.135 | 0.076 | -0.128 | 0.075 | -0.004 | 0.342** | -0.244* | 0.044 | 0.008 | -0.012 | -0.138 | 0.237* |
| **p** | 0.208 | 0.480 | 0.232 | 0.485 | 0.972 | 0.001 | 0.021 | 0.682 | 0.941 | 0.912 | 0.196 | 0.025 |
| **BMI** | | | | | | | | | | | | |
| **r** | 0.140 | 0.114 | -0.117 | 0.100 | -0.006 | 0.305** | -0.143 | -0.059 | -0.076 | 0.030 | -0.071 | 0.212* |
| **p** | 0.192 | 0.287 | 0.273 | 0.349 | 0.953 | 0.004 | 0.181 | 0.583 | 0.477 | 0.778 | 0.507 | 0.046 |

9-HPT=9-Hole Peg Test , MMDT= Minnesota Manual Dexterity Test, BMI = Body Mass Index, *=p<0.05, **=p<0.01

## DISCUSSION

According to the results of our study, in which we retrospectively investigated the physical evaluations of 89 adolescents between the ages of 10-13, we found that dexterity and hand grip strength improved with age in all children and that these were related to each other. We found that girls have better manual and finger dexterities than boys. We also saw that static balance was negatively affected by BMI and weight gain, but dynamic balance was positively affected by height and weight increase. We found that age or gender had no effect on muscle activation, which we assessed with EMG Biofeedback, and that it was related to BMI, weight gain, and manual dexterity (turning test).

In a systematic review (Lubans et al., 2010) on the relationships between FMS and health benefits in children and adolescents, they found that FMS levels were inversely related to weight. Similarly, Lopes et al. (V. P. Lopes, D. F. Stodden, M. M. Bianchi, J. A. Maia, & L. P. Rodrigues, 2012), in their study with 7175 children, showed that motor coordination was inversely associated with BMI in childhood and early adolescence, and the strength of the inverse relationship increased in childhood but decreased in early adolescence (12-14 years of age). The change in muscle mass during the growth spurt may have caused this. This is explained by the appearance of rapid and differentiated individual growth (i.e., differential growth spurt and growth intensity) typical during this period. In fact, during pubertal years, it is expected that the relationship between motor coordination and BMI can be dramatically altered by the rapid and individualized changes in somatic growth that result in changes in muscle mass (boys) and adipose tissue (girls).

In the results of our study, demographic characteristics (age, weight, height, BMI) affect our measurements in different ways. We observe that weight, height, and BMI mainly affect balance. BMI and weight gain affect static balance negatively, but height and weight increase affect dynamic balance positively. The literature has researched chiefly this issue on obese children. A study (Maślanko, Graff, Stępień, & Rekowski, 2020) investigating the relationship between BMI and balance in 166 children aged 7 to 18 years found that obese children performed significantly worse than their non-obese peers on all balance tests on a moving platform. However, when a static platform was used to compare the stability of obese children with children of normal body weight, it was observed that the balance of obese children was worse (Maślanko et al., 2020). Similarly, it has been reported that children with more obesity and/or a predominance of the endomorphic component perform worse in static and dynamic postural balance tests (Guzmán-Muñoz, Valdes Badilla, Méndez-Rebolledo, Concha-Cisternas, & Castillo Retamal, 2019). In the study conducted by Hung et al. (Hung, Gill, & Meredith, 2013), it was reported that obese or overweight children walked slower and had higher postural instability in the Dual Task condition (carrying a box) compared to normal-weight children. In fact, the result of our study supports the literature. We can say that under static conditions, postural oscillations are greater in adolescents with high BMI and that this situation is especially associated with weight gain. Differently dynamic stability was positively affected by the increase in height and weight, regardless of BMI. When comparing our results with the literature, it should be taken into consideration that the majority of our study population was normal BMI children and that the number was insufficient since it was a retrospective study. Our study is a pioneer in the prospective studies that need to be done in this field for Turkiye.

Our age group covers the early adolescence period and is the year when gender-related changes begin, but the development of children is still not completed. That is why, when we separate and examine the data by age and look at the correlation, we see that only hand-related parameters affect it. We found that dexterity and hand grip strength improve with age, and as age increases, dexterity, and hand grip strength increase. This pattern of progressive strength may be explained by the similar arm and forearm muscle group development that is generally independent of the geographical area among boys and girls up to age 16 across the world (Bohannon, Wang, Bubela, & Gershon, 2017; Häger-Ross & Rösblad, 2002; Yim, Cho, & Lee, 2003). Hand grip strength showed a linear and parallel development for boys and girls until the age of 11 years, after which hand grip strength progression shows a steeper upward slope in boys than in girls, which was similar to the findings of Ahmed Omar et al. (Omar, Alghadir, Zafar, & Al Baker, 2018) ve Hager-Ross et al. (Häger-Ross & Rösblad, 2002). In our study, similar to the literature, hand grip strength increases with age. In addition, it has been observed that girls are better at manual and finger dexterity than boys. Ahmed Omar et al. (Omar et al., 2018) also found that manual dexterity, which they evaluated with the 9-HPT, was better in girls, similar to our study results. However, in a cross-sectional study conducted in Korea to determine normative data (Yim et al., 2003) similar to our population, when the dexterity of 10, 11 and 12-year-old children were compared as boys and girls, no gender differences were found in any age group. We think that in addition to physical characteristics, social factors such as culture and education may also be effective in developing skills. Therefore, theories that are always accepted, such as hand grip strength due to muscle development, may not be valid for dexterity. In addition, there was a moderate correlation between the manual dexterity-turning test time and the EMG biofeedback airplane game score. In this game, electrodes are connected to the tibialis anterior, and children are asked to perform dorsi

flexion while raising the plane and relax when lowering it. When it contracts and relaxes at the right speed and time, the number of stars it collects increases. Speed is also very important in the turning test. This relationship suggested reaction time. Manual dexterity is related to reaction time (Ingram et al., 2019). In this regard, we can gain insight into children's reaction times in clinical practice with EMG biofeedback games. Of course, the most accurate measurement is the method that objectively measures reaction time (Burghart, Craig, Radel, & Huisinga, 2018).

Our study has some limitations. The study is retrospective, and since it was not planned as a prospective study, participants distribution, such as age, gender, and BMI, is not homogeneous. Therefore, we divided the age groups into 10-11 years and 12-13 years. If the changes at each age could be evaluated separately, the stages of physical change in children could be better examined. Despite these, the power of our study is 90%, so our results have high evidence value and we think that our study can be a guide for studies to be carried out in our country because it includes a comprehensive evaluation.

## CONCLUSION

Manual dexterity and hand grip strength develop with age in children, and girls' manual and finger dexterities are better than boys'. While the increase in BMI and weight affect static balance negatively, the increase in height and weight affect dynamic balance positively. In addition, the correlation between EMG biofeedback game score and manual dexterity speed may be suggestive of reaction time. In clinical practice, both measurements may give us an idea about reaction time of children. Although there are many studies examining the FMS and normative values of healthy adolescents in the world, the lack of research on this subject in our country is noticeable. Determining the normative value of basic motor competence of healthy children is of great importance in terms of determining the development level of atypically developing children and detecting retardation, as well as directing children to the appropriate branch of sports. Therefore, our study is a precursor to the prospective studies that need to be done in this field in Turkiye.

**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:** GYG, FNY, EK, SK, EKM; **Material, methods and data collection:** GYG, FNY, EK, SK; **Data analysis and comments:** GYG, SK; **Writing and corrections:** GYG, FNY, EK, SK, EKM.

## REFERENCES

Abdullahi, Y., Audu, T., & Ter Goon, D. (2020). Handgrip strength and body mass index among adolescents in Northern Nigeria. *Journal of Health Sciences, 10*(3), 196-203. https://doi.org/10.17532/jhsci.2020.983

Barnett, L. M., Lai, S. K., Veldman, S. L. C., Hardy, L. L., Cliff, D. P., Morgan, P. J., . . . Okely, A. D. (2016). Correlates of Gross Motor Competence in Children and Adolescents: A Systematic Review and Meta-Analysis. *Sports Med, 46*(11), 1663-1688. https://doi.org/10.1007/s40279-016-0495-z.

Basmajian, J. V. (1988). Research foundations of EMG biofeedback in rehabilitation. *Biofeedback Self Regul, 13*(4), 275-298. https://doi.org/10.1007/bf00999085.

Bohannon, R. W., Wang, Y. C., Bubela, D., & Gershon, R. C. (2017). Handgrip Strength: A Population-Based Study of Norms and Age Trajectories for 3- to 17-Year-Olds. *Pediatr Phys Ther, 29*(2), 118-123. https://doi.org/10.1097/pep.0000000000000366

Burghart, M., Craig, J., Radel, J., & Huisinga, J. (2018). Reliability and validity of a motion-based reaction time assessment using a mobile device. *Applied Neuropsychology: Adult*. https://doi.org/10.1080/23279095.2018.1469491

Cederlund, R. (1995). The use of dexterity tests in hand rehabilitation. *Scandinavian Journal of Occupational Therapy, 2*(3-4), 99-104. https://doi.org/ 10.3109/11038129509106801

Cevahir, E. (2020). Cevahir E. *SPSS ile nicel veri analizi rehberi*: Kibele. ISBN:9786059467360

Çuhadaroğlu, F. (2000). Ergenlik döneminde psikolojik gelişim özellikleri. *Katkı Pediatri Dergisi,* 21(6), 863-868.

Desrosiers, J., Rochette, A., Hebert, R., & Bravo, G. (1997). The Minnesota Manual Dexterity Test: reliability, validity and reference values studies with healthy elderly people. *Canadian Journal of Occupational Therapy, 64*(5), 270-276. https://doi.org/ 10.1177/000841749706400504

Gallahue, D. L., & Donnelly, F. C. (2007). *Developmental physical education for all children*: Human Kinetics.

Guzmán-Muñoz, E., Valdes Badilla, P., Méndez-Rebolledo, G., Concha-Cisternas, Y. F., & Castillo Retamal, M. (2019). [Relationship between anthropometry and balance of postural control in children 6-9 years old]. *Nutr Hosp, 36*(1), 32-38. https://doi.org/10.20960/nh.02072.

Häger-Ross, C., & Rösblad, B. (2002). Norms for grip strength in children aged 4-16 years. *Acta Paediatr, 91*(6), 617-625. https://doi.org/10.1080/080352502760068990.

Hulteen, R. M., Lander, N. J., Morgan, P. J., Barnett, L. M., Robertson, S. J., & Lubans, D. R. (2015). Validity and Reliability of Field-Based Measures for Assessing Movement Skill Competency in Lifelong Physical Activities: A Systematic Review. *Sports Med, 45*(10), 1443-1454. https://doi.org/10.1007/s40279-015-0357-0.

Hung, Y. C., Gill, S. V., & Meredith, G. S. (2013). Influence of dual-task constraints on whole-body organization during walking in children who are overweight and obese. *Am J Phys Med Rehabil, 92*(6), 461-467; quiz 468-471. https://doi.org/10.1097/PHM.0b013e31828cd59d.

Ingram, L. A., Butler, A. A., Walsh, L. D., Brodie, M. A., Lord, S. R., & Gandevia, S. C. (2019). The upper limb Physiological Profile Assessment: Description, reliability, normative values and criterion validity. *PloS one, 14*(6), e0218553. https://doi.org/10.1371/journal.pone.0218553

Karatekin, B. D., Yasin, S., Yumusakhuylu, Y., Bayram, F., & Icagasioglu, A. (2020). Validity of the Korebalance® balance system in patients with postmenopausal osteoporosis. *Medeniyet medical journal, 35*(2), 79. https://doi.org/10.5222/MMJ.2020.18828

Lopes, V. P., Stodden, D. F., Bianchi, M. M., Maia, J. A., & Rodrigues, L. P. (2012). Correlation between BMI and motor coordination in children. *Journal of science and medicine in sport, 15*(1), 38-43. https://doi.org/10.1016/j.jsams.2011.07.005

Lopes, V. P., Stodden, D. F., Bianchi, M. M., Maia, J. A., & Rodrigues, L. P. (2012). Correlation between BMI and motor coordination in children. *J Sci Med Sport, 15*(1), 38-43. https://doi.org/10.1016/j.jsams.2011.07.005.

Lubans, D. R., Morgan, P. J., Cliff, D. P., Barnett, L. M., & Okely, A. D. (2010). Fundamental movement skills in children and adolescents: review of associated health benefits. *Sports Med, 40*(12), 1019-1035. https://doi.org/10.2165/11536850-000000000-00000.

Maślanko, K., Graff, K., Stępień, A., & Rekowski, W. (2020). Evaluation of postural stability in children depending on the body mass index. *Polish Annals of Medicine, 27*(1). https://doi.org/10.29089/2019.19.00090

Massy-Westropp, N. M., Gill, T. K., Taylor, A. W., Bohannon, R. W., & Hill, C. L. (2011). Hand Grip Strength: age and gender stratified normative data in a population-based study. *BMC research notes, 4*(1), 1-5. https://doi.org/10.1186/1756-0500-4-127

Omar, M. T. A., Alghadir, A. H., Zafar, H., & Al Baker, S. (2018). Hand grip strength and dexterity function in children aged 6-12 years: A cross-sectional study. *J Hand Ther, 31*(1), 93-101. https://doi.org/10.1016/j.jht.2017.02.004.

Parlaz, E. A., Tekgül, N., Karademirci, E., & Öngel, K. (2012). Ergenlik dönemi: fiziksel büyüme, psikolojik ve sosyal gelişim süreci. *Turkish Family Physician, 3*(2), 10-16.

Roy, M.-A. G., & Doherty, T. J. (2004). Reliability of hand-held dynamometry in assessment of knee extensor strength after hip fracture. *American journal of physical medicine & rehabilitation, 83*(11),813-818. https://doi.org/10.1097/01.PHM.0000143405.17932.78

Ryder, D. (2014). *Bilek ve elin muayenesi,Nöromuskuloskeletal Muayene ve Değerlendirme Fizyoterapistler İçin El Kitabı* (T. N. J. Petty (M. Eren & H. Yücel Ed. 4 ed ed.). İstanbul: Hiper tıp.

Stodden, D. F., Goodway, J. D., Langendorfer, S. J., Roberton, M. A., Rudisill, M. E., Garcia, C., & Garcia, L. E. (2008). A developmental perspective on the role of motor skill competence in physical activity: An emergent relationship. *Quest, 60*(2), 290-306. https://doi.org/10.1080/00336297.2008.10483582

Subramani, M. V., RCMP, F. U., Ganesh, S. S., RCMP, F. U., Isaac, J. J., & RCMP, F. U. (2015). Factors Affecting Hand Grip Strength and Its Evalution: A Systemic Review. *Int J Physiother Res* 3(6), 1288-1293. https://doi.org/10.16965/ijpr.2015.193.

Tissue, C. M., Velleman, P. F., Stegink-Jansen, C. W., Aaron, D. H., Winthrop, B. G., & Gogola, G. R. (2017). Validity and reliability of the Functional Dexterity Test in children. *J Hand Ther, 30*(4), 500-506. https://doi.org/10.1016/j.jht.2016.08.002

Wang, Y. C., Bohannon, R. W., Kapellusch, J., Garg, A., & Gershon, R. C. (2015). Dexterity as measured with the 9-Hole Peg Test (9-HPT) across the age span. *J Hand Ther, 28*(1), 53-59; quiz 60. https://doi.org/10.1016/j.jht.2014.09.002.

Yim, S. Y., Cho, J. R., & Lee, I. Y. (2003). Normative data and developmental characteristics of hand function for elementary school children in Suwon area of Korea: grip, pinch and dexterity study. *J Korean Med Sci, 18*(4), 552-558. https://doi.org/10.3346/jkms.2003.18.4.552

**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.1301296

# The Association of Vitamin D Insufficiency/Deficiency with Metabolic Syndrome, Quality of Life and Depression in Postmenopausal Women

Sefa Can KUCUK[1], Artun YIBAR[2], Guler SALTIKLAR[3], Semra BEYNEL[3]

[1] Bursa Uludag University, Institute of Health Sciences, Department of Food Hygiene and Technology
[2] Bursa Uludag University, Faculty of Veterinary Medicine, Department of Food Hygiene and Technology
[3] Private Pedmer Medical Center, Bursa, Turkey

***Geliş Tarihi / Received:*** *23.05.2023,* ***Kabul Tarihi / Accepted:*** *06.12.2023*

**ABSTRACT**

**Objective:** This cross-sectional study aimed to assess the association of vitamin D insufficiency/deficiency with metabolic syndrome risk factors, quality of life, and depression in postmenopausal women aged 50 years and older. **Materials and Metods:** The study was conducted with women (n=165) who attended a handicraft course **i**n Bursa Province, Turkey, in March 2019**.** At the initial visit, blood samples were obtained from the individuals, and the study continued with 150 participants whose serum 25-hydroxyvitamin D (25(OH)D) levels lower than 30 ng/mL and met the research criteria. At the second visit, the subjects were questioned about their general characteristics, quality of life, and depression. In addition to the questionnaire, metabolic syndrome was defined according to the diagnostic criteria of the International Diabetes Federation, and waist circumference and blood pressure measurements were made for each participant. **Results:** The prevalences of vitamin D insufficiency and deficiency in the participants were 21.3% and 78.7, respectively. When compared to the women with vitamin D insufficiency, those with vitamin D deficiency displayed a significantly higher metabolic syndrome prevalence (46.6% vs 18.8%), waist circumference, blood pressure, and fasting blood glucose levels, and significantly lowered high density lipoprotein cholesterol levels ($P<0.05$). Furthermore, the differences observed between the women with vitamin D deficiency/insufficiency for physical function, energy level/vitality, mental and general health, which are sub parameters of the quality of life scale, and depression and anxiety scores, were also statistically significant ($P<0.05$). **Conclusion:** It was concluded that low vitamin D levels in postmenopausal women may be associated with metabolic syndrome**,** low quality of life, and depression.

**Keywords:** Vitamin D, Cholesterol, Waist Circumference, Depression, Anxiety.

# Postmenopozal Kadınlarda D vitamini Eksikliği/Yetersizliğinin Metabolik Sendrom, Yaşam Kalitesi ve Depresyon ile İlişkisi

**ÖZ**

**Amaç:** Bu kesitsel çalışmada, 50 yaş ve üstü postmenopozal kadınlarda D vitamini eksikliği/yetersizliğinin metabolik sendrom risk faktörleri, yaşam kalitesi ve depresyon ile ilişkisinin araştırılması amaçlandı. **Gereç ve Yöntem:** Bu çalışma, Mart 2019'da Bursa'da bir el sanatları kursuna katılan kadınlarla (n=165) gerçekleştirildi. İlk ziyarette bireylerden kan örnekleri alındı ve serum 25-hidroksivitamin D [25(OH)D] seviyesi 30 ng/mL'den düşük olan ve araştırma kriterlerini karşılayan 150 kadın ile çalışmaya devam edildi. İkinci ziyarette bireylerin genel özellikleri, yaşam kalitesi ve depresyon durumları sorgulandı. Anketlere ek olarak, Uluslararası Diyabet Federasyonu'nun tanı kriterlerine göre metabolik sendrom tanımlandı ve her katılımcı için bel çevresi ve tansiyon ölçümleri yapıldı. **Bulgular:** Katılımcıların %21,3'ünde D vitamini yetersizliği ve %78,7'sinde D vitamini eksikliği vardı. D vitamini yetersizliği olan kadınların D vitamini eksikliği olan kadınlara kıyasla metabolik sendrom prevalansı (%18,8'e karşılık %46,6), bel çevresi ve açlık kan şekeri anlamlı derecede düşük ve yüksek yoğunluklu lipoprotein kolesterol düzeyleri anlamlı derecede yüksek bulundu **(**$P<0.05$). Ayrıca, D vitamini eksikliği/yetersizliği olan kadınların yaşam kalitesi ölçeğinin alt parametreleri olan fiziksel fonksiyonu, enerji düzeyi/canlılık, ruh sağlığı ve genel sağlık durumu ile depresyon ve anksiyete puanları arasında gözlene farklar da istatistiksel olarak anlamlı bulundu ($P<0.05$). **Sonuç:** Postmenopozal kadınlarda düşük D vitamini düzeylerinin metabolik sendrom, düşük yaşam kalitesi ve depresyon ile ilişkili olabileceği sonucuna varıldı.

**Anahtar Kelimeler:** D Vitamini, Kolesterol, Bel Çevresi, Depresyon, Anksiyete.

***Sorumlu Yazar / Corresponding Author:*** Sefa Can KÜÇÜK, Bursa Uludag University, Institute of Health Sciences, Department of Food Hygiene and Technology, Bursa, Turkey
***E-mail:*** sefa_can_kucuk@hotmail.com

***Bu makaleye atıf yapmak için / Cite this article:*** Kucuk, S. C., Yıbar, A., Saltıklar, G., & Beynel, S. (2024). The association of vitamin D ınsufficiency/deficiency with metabolic syndrome, quality of life and depression in postmenopausal women. *BAUN Health Sci J, 13(1), 95-104*. https://doi.org/10.53424/balikesirsbd.1301296

## INTRODUCTION

The most significant influence of vitamin D, among the fat-soluble vitamins, is on calcium, phosphorus metabolism, and bone mineralization (Marsman et al., 2018). Although there is no consensus on optimal vitamin D levels, deficiency has been described as having a 25-hydroxyvitamin D [25(OH)D] level < 20 ng/mL, whereas insufficiency refers to a level ranging between 20 - 30 ng/mL, with a level of > 30 ng/mL adopted as sufficient by most specialists (Perez-Lopez, Chedraui & Pilz 2020).

Vitamin D plays an important role in musculoskeletal health. Vitamin D status may also be associated with metabolic syndrome (MetS), obesity, insulin resistance, diabetes, cardiovascular disease, immune responses to various cancers, and death (Chiang, Stanczyk & Kanaya, 2018; Haimi & Kremer, 2017; Kaur et al., 2019). Also, studies have shown that there may be an association between vitamin D deficiency and mood disorders. Recent research has shown a negative association between vitamin D levels and depressive disorders (Musazadeh, Keramati, Ghalchi, 2023). Besides, some recent studies proposed that vitamin D status and quality of life (QoL) are positively correlated. However, available data is inconsistent due to differences in the populations studied and the QoL assessment tools (Tepper et al., 2016).

This study purposed to evaluate the relation between vitamin D deficiency with MetS markers [waist circumference (WC), fasting blood glucose, blood pressure (BP), triglyceride (TG), high-density lipoprotein cholesterol (HDL-C) levels, and low-density lipoprotein cholesterol (LDL-C) levels], depression, and QoL in postmenopausal women aged 50 and over.

## MATERIALS AND METHODS

### Subject characteristics

The population of the research consisted of all women (n=165) aged 50 and over (between 50 and 70 years of age, mean 55.26 ± 5.11) who attended a handicraft course in Bursa Province, Turkey, in March 2019. No sample selection was made from the population, and women who were in the course on the days when the research was conducted and agreed to participate in the research were included. Five participants did not return to the study following the initial visit, and 10 participants did not meet the inclusion criteria, resulting in 150 subjects completing the study.

Inclusion criteria were (i) postmenopausal females aged 50 and over; (ii) vitamin D deficiency or insufficiency; and (iii) no disease with poor prognosis in the short term. Exclusion criteria were (i) premenopausal females; (ii) individuals with a cognitive impairment that would not allow them to complete the study; and (iii) participation in a clinical trial during the three months preceding the entry into the study.

### Study design

A cross-sectional study design was used to examine the effects of insufficient or deficient levels of vitamin D on MetS risk factors, depression, and QoL. Postmenopausal women aged 50 and over were visited on two separate occasions. After verbal information was given about the study at the first visit, the written consent of the women, who met the inclusion criteria, was obtained. Then for biochemical analysis, blood samples were collected from each participant. The second part of the study was proceeded with women with vitamin D levels below 30 ng/mL. At the second visit, the subjects were asked to fill in questionnaires to assess their physical activity, sun exposure, QoL, and depression. MetS was determined according to the International Diabetes Federation (IDF) diagnostic criteria (IDF, 2006), including abdominal obesity (WC ≥ 80 cm) plus two of the following criteria: hyperglycemia (fasting blood glucose ≥ 100 mg/dL), hypertriglyceridemia (TG ≥ 150 mg/dL), HDL-C < 50 mg/dL, and hypertension (BP ≥ 130/85 mmHg). In addition, WC and BP were both measured following the relevant standards.

### Procedures

*Questionnaires*

Health Status Questionnaire: This is a screening questionnaire used to check for the sociodemographic characteristics of individuals, inclusion criteria or any health issues that might impact a study's findings.

Sun Exposure Questionnaire: The level of sun exposure and the capacity of clothing to inhibit vitamin D synthesis were determined using a validated questionnaire (Atli, Gullu, Uysal & Erdogan, 2005).

The participants were divided into four groups based on the criteria used to determine their level of exposure to the sun (Group 1A-4A) and the ability of their garments to prevent sunlight (Group 1B-4B).

Group 1A: Women who were not exposed to direct sun.

Group 2A: Women who were exposed to the sun, except for the period between 11.00 and 15.00 hours.

Group 3A: Women who were continuously exposed to the sun between 11.00 and 15.00 hours.

Group 4A: Women who were in the sun all day.

Group 1B: Women whose daily clothes exposed their head, face, neck, arms, hands, and legs and who bathed in the sun wearing a bathing suit for at least a week in the summer.

Group 2B: Women whose daily clothes exposed their face, head, neck, arms, and legs.

Group 3B: Women whose daily clothes exposed their face, neck, hands, and occasionally arms.

Group 4B: Women who wore skin-covering daily clothes.

Physical Activity Questionnaire: The physical activity levels of the individuals were evaluated by using the International Physical Activity Questionnaire-short form (IPAQ-SF) (Craig et al., 2003). Severe physical activity duration, moderate physical activity duration, walking, and sitting time in the last seven days were

questioned with the IPAQ. In the evaluation of physical activities, the criterion was that each activity should be done for at least 10 minutes a time. The results were used to calculate energy consumption in metabolic equivalent minutes per week (MET-min/week). According to the IPAQ scoring system, the MET min/week for a certain activity is calculated by multiplying the MET value of that activity (8.0 for severe, 4.0 for moderate, and 3.3 for walking) by the hours spent. Based on the IPAQ recommended cut-off values, the scores of each individual were divided into low, moderate, and high levels of physical activity.

QoL Questionnaire: QoL of the individuals was determined by the Short Form-36 Health Survey Questionnaire (SF-36). This form is composed of 36 questions in eight subscales, including general health perceptions, mental health, physical functioning, social functioning, vitality, bodily pain, and role limitations caused by physical health problems or emotional issues. Scores range from 0 to 100, where higher scores indicate better health (Koçyiğit, Aydemir, Fişek, Ölmez & Memiş, 1999; Ware & Sherbourne, 1992).

Depression Questionnaire: Psychological annoyance of the women was assessed by the 14-item Hospital Anxiety and Depression Scale (HADS). It consists of two subscales, anxiety and depression. Higher scores indicate more severe anxiety and depression (Zigmond & Snaith, 1983).

*Waist circumference (WC) measurements*

WC was measured in centimeters using non-stretchable plastic tape in lightly clothed, standing, and normally breathing subjects at a level midway between the lower rib margin and the iliac crest. Measurements were taken twice on the left side of the body, and the mean of the two values was used.

*Blood pressure (BP)*

Systolic (SBP) and diastolic blood pressures (DBP) were measured twice using a mercury sphygmomanometer in a sitting position on the right arm after a 10-minute rest. The average of the two measurements was used for analysis.

*Laboratory measurements*

Ten milliliters of blood were collected from the antecubital vein of each participant, in the seated position, according to the standard protocol, following fasting of at least eight hours for the biochemical assays. Blood specimens were transferred to the laboratory in an opaque container to prevent exposure to light and were centrifuged at 3500 rpm for 5 min. The serum was separated and analyzed immediately after being extracted. Serum 25(OH)D concentrations (deficient: < 20 ng/mL; insufficient: > 20 to < 30 ng/mL; normal: > 30 ng/mL) was analyzed using an immunofluorescence method on an Afias-i-chroma (BODITECH-South Korea) device. Fasting blood glucose, TG, LDL-C, and HDL-C levels were analyzed by a photometric method using biochemistry kits (Randox Laboratories Limited, United Kingdom) and a fully automatic autoanalyzer (2000, BT-Italy).

**Statistical analysis**

SPSS 21.0 software was used to analyze the data obtained in this study. Pearson's chi-square test was used for the comparison of categorical variables. One-way analysis of variance (ANOVA) was used for the comparison of numerical variables with a normal distribution (post-hoc Tukey test when variances were equal for paired comparisons and Tamhane's T2 test when variances were not equal), whilst the Kruskal-Wallis test was used for the comparison of numerical variables that did not show a normal distribution (Mann-Whitney U test for paired comparisons). Spearman's correlation test was used to determine the correlation between numerical variables. The statistical significance level was set at $p<0.05$.

**Ethical considerations**

The study protocol was confirmed by the Ethics Committee of Bursa *Uludag University,* Faculty of Medicine (Approval No.: 2019-4/17). Written and verbal assent was obtained from each woman who agreed to participate in the study.

## RESULTS

A total of 150 women, 32 (21.3%) of whom had vitamin D insufficiency and 118 (78.7%) of whom had vitamin D deficiency, participated in the study. The distribution of the general features of the women accordingly to vitamin D insufficiency and deficiency is shown in Table 1. The mean age was 55.3 years, with a minimum of 50 and a maximum of 70 years. The vitamin D-deficient group was older than the vitamin D-insufficient group (p=0.027). The three groups were homogeneous for the following three variables: marital status (p=0.194), smoking habit (0.111), and alcohol consumption (p=1.000).

The serum 25 (OH) vitamin D concentration of the women was significantly correlated with the duration of sun exposure and clothing style (p=0.000) (Table 2).

A statistically significant association was found between the serum 25 (OH) vitamin D levels of women and their physical activity levels (p=0.004). Women with vitamin D deficiency were found to be less physically active (Table 3).

Statistically significant differences were found between the serum 25 (OH) vitamin D levels of the women and their mean general health (p=0.022), mental health (p=0.021), physical function (p=0.007), and vitality (p=0.040) scores from the SF-36 QoL scale sub-parameters. However, no statistically significant difference was found for the mean pain (p=0.678), social function (p=0.531), physical role limitation (p=0.699), and emotional role limitation scores (p=0.286) (Table 4).

The depression and anxiety scores of the women with vitamin D insufficiency were $5.28\pm3.51$ and $6.21\pm3.11$, respectively. On the other hand, the depression and anxiety scores of the women with vitamin D deficiency were $7.32\pm3.08$ and $8.27\pm4.42$, respectively. The serum 25(OH)D levels and mean

depression (p=0.008) and anxiety (p=0.028) scores of the women were determined to significantly differ (Table 5).

According to IDF criteria, the risk of MetS exists in 18.8% of women with vitamin D insufficiency and 46.6% of women with vitamin D deficiency. Thereby, the risk of MetS was more common in the women with vitamin D deficiency (p=0.004). WC (p=0.001), BP (p=0.008), and fasting blood glucose levels (p=0.034) were higher in the vitamin D-deficient group. HDL-C levels (p=0.009) were higher in the group with vitamin D insufficiency. There was no significant difference between the two groups for triglyceride levels (p=0.659) (Table 6).

**Table 1. The distribution of the general characteristics of the postmenopausal women based on vitamin D deficiency and insufficiency.**

| General features | 25(OH)D level (ng/mL) | | | | | | |
|---|---|---|---|---|---|---|---|
| | < 20 (n = 118) | | 20-30 (n = 32) | | Overall (n = 150) | | |
| | n | % | n | % | n | % | P |
| **Aged** | | | | | | | |
| 50-54 | 67 | 56.8 | 24 | 75.0 | 91 | 60.7 | 0.153 |
| 55-59 | 24 | 20.3 | 5 | 15.6 | 29 | 19.3 | |
| 60-64 | 14 | 11.9 | 3 | 9.4 | 17 | 11.3 | |
| 65-70 | 13 | 11.0 | 0 | 0.0 | 13 | 8.7 | |
| **Mean age (years±SD)** | 55.72±5.31 | | 53.59±3.90 | | 55.26±5.11 | | |
| Min-max | 50-70 | | 50-63 | | 50-70 | | 0.027 |
| **Marital status** | | | | | | | |
| Married | 104 | 88.1 | 31 | 96.9 | 135 | 90.0 | 0.194 |
| Divorced/widow | 14 | 11.9 | 1 | 3.1 | 15 | 10.0 | |
| **Smoking habit** | | | | | | | |
| Smoker | 35 | 29.7 | 5 | 15.6 | 40 | 26.7 | 0.011 |
| Non-smoker | 83 | 70.3 | 27 | 84.4 | 110 | 73.3 | |
| **Alcohol consumption** | | | | | | | |
| Drinker | 7 | 5.9 | 1 | 3.1 | 8 | 5.3 | 1.000 |
| No-drinker | 111 | 94.1 | 31 | 96.9 | 142 | 94.7 | |

**Table 2. The association of vitamin D status with sun exposure and clothing style in postmenopausal women.**

| Sunlight exposure | 25(OH)D level (ng/mL) | | | | | | |
|---|---|---|---|---|---|---|---|
| | < 20 (n = 118) | | 20-30 (n = 32) | | Overall (n = 150) | | |
| | n | % | n | % | n | % | P |
| **Duration of sun exposure** | | | | | | | |
| Group 1A | 110 | 93.2 | 12 | 37.5 | 122 | 81.3 | 0.000 |
| Group 2A | 8 | 6.8 | 20 | 62.5 | 28 | 18.7 | |
| Group 3A | 0 | 0 | 0 | 0 | 0 | 0 | |
| Group 4A | 0 | 0 | 0 | 0 | 0 | 0 | |
| **Clothing style** | | | | | | | |
| Group 1B | 0 | 0.0 | 5 | 1.1 | 5 | 3.3 | 0.000 |
| Group 2B | 39 | 33.1 | 19 | 59.4 | 58 | 38.7 | |
| Group 3B | 5 | 4.2 | 0 | 0 | 5 | 3.3 | |
| Group 4B | 74 | 62.7 | 8 | 25 | 82 | 54.7 | |

**Table 3. The association of vitamin D status and physical activity.**

| Physical activity | 25(OH)D level (ng/mL) | | | | | | |
|---|---|---|---|---|---|---|---|
| | < 20 (n = 118) | | 20-30 (n = 32) | | Overall (n = 150) | | |
| | n | % | n | % | n | % | P |
| **Highly active** (≥ 3000 MET-min/week*) | 0 | 0 | 3 | 9.4 | 3 | 2 | 0.004 |
| **Moderately active** (600-3000 MET-min/week*) | 82 | 69.5 | 23 | 71.9 | 105 | 70 | |
| **Low active** (< 600 MET-min/week*) | 36 | 30.5 | 6 | 18.8 | 42 | 28 | |

*Metabolic equivalent minutes per week

**Table 4. The association of vitamin D status and quality of life (QoL.**

| SF-36 QoL scale* | 25(OH)D level (ng/mL) | | | | |
|---|---|---|---|---|---|
| | < 20 (n = 118) | | 20-30 (n = 32) | | |
| | X±SD | Min-max | X±SD | Min-max | P |
| **General health** | 55.46±18.73 | 5-90 | 63.12±16.10 | 10-85 | 0.022 |
| **Mental health** | 56.40±20.50 | 4-100 | 66.15±12.69 | 56-96 | 0.021 |
| **Physical functioning** | 70.46±26.07 | 10-100 | 84.06±15.78 | 40-100 | 0.007 |
| **Social functioning** | 77.86±21.01 | 25-100 | 80.46±20.56 | 37.5-100 | 0.531 |
| **Energy level/vitality** | 48.51±19.50 | 0-90 | 57.03±17.45 | 30-95 | 0.040 |
| **Pain** | 68.91±25.89 | 0-100 | 72.73±15.80 | 50-100 | 0.678 |
| **Role constraints due to physical problems** | 66.10±42.55 | 0-100 | 74.21±30.77 | 0-100 | 0.699 |
| **Role constraints due to emotional problems** | 63.55±41.80 | 0-100 | 72.91±37.33 | 0-100 | 0.286 |

*Short Form-36 Health Survey Questionnaire (SF-36)

**Table 5. The association of vitamin D status with depression and anxiety.**

| HAD scale* | 25(OH)D level (ng/mL) | | | | |
|---|---|---|---|---|---|
| | < 20 (n = 118) | | 20-30 (n = 32) | | |
| | X±SD | Min-max | X±SD | Min-max | P |
| **Depression** | 7.32±3.08 | 0-15 | 5.28±3.51 | 0-12 | 0.008 |
| **Anxiety** | 8.27±4.42 | 1-17 | 6.21±3.11 | 1-11 | 0.028 |

*Hospital Anxiety and Depression Scale

**Table 6. The association of vitamin D status and metabolic syndrome based on IDF diagnostic criteria.**

| MetS* & components | 25(OH)D level (ng/mL) | | | | | | |
|---|---|---|---|---|---|---|---|
| | < 20 (n = 118) | | 20-30 (n = 32) | | Overall (n = 150) | | |
| | n | % | n | % | n | % | P |
| **MetS (IDF)*** | | | | | | | |
| Yes | 55 | 46.6 | 6 | 18.8 | 61 | 40.7 | 0.004 |
| No | 63 | 53.4 | 26 | 81.3 | 89 | 59.3 | |
| **WC (cm)**** | | | | | | | |
| ≥ 80 | 113 | 95.8 | 25 | 78.1 | 138 | 92.0 | 0.001 |
| < 80 | 5 | 4.2 | 7 | 21.9 | 212 | 8.0 | |
| **Triglyceride (mg/dL)** | | | | | | | |
| ≥ 150 | 38 | 32.2 | 9 | 28.1 | 47 | 31.3 | 0.659 |
| < 150 | 80 | 67.8 | 23 | 71.9 | 103 | 68.7 | |
| **HDL-C (mg/dL)** | | | | | | | |
| < 50 | 52 | 44.1 | 6 | 18.8 | 58 | 38.7 | 0.009 |
| ≥ 50 | 66 | 55.9 | 26 | 81.3 | 92 | 61.3 | |
| **BP (mm Hg)** | | | | | | | |
| ≥ 130/85 | 44 | 37.3 | 4 | 12.5 | 48 | 32.0 | 0.008 |
| < 130/85 | 74 | 62.7 | 28 | 87.5 | 102 | 68.0 | |
| **Fasting blood glucose (mg/dL)** | | | | | | | |
| ≥ 100 | 37 | 31.4 | 4 | 12.5 | 41 | 27.3 | 0.034 |
| < 100 | 81 | 68.6 | 28 | 87.5 | 109 | 72.7 | |

*Metabolic syndrome according to the diagnostic criteria of the International Diabetes Federation (IDF)
**Waist circumference

## DISCUSSION

Serum vitamin D status has been studied on all continents and in many countries. Globally vitamin D deficiency and insufficiency affect more than one billion people (Tepper et al., 2016). Although also common among the elderly, pregnant women, adolescents, middle-aged adults, and even children, deficiency of vitamin D is more common in postmenopausal women, most probably as a result of the scarcity of natural food sources rich in vitamin D, inadequate exposure to sunlight, reduced vitamin D synthesis in the skin due to the aging process, decreased intestinal absorption, and natural hypoestrogenism in the postmenopausal period

(Cheng et al., 2014; Tayem, Alotaibi, Hozayen & Hassan, 2019; Valladares et al., 2019). It is estimated that 32.1% of postmenopausal women living in the European Union have vitamin D deficiency (<20 ng/mL). Besides, it was reported that the vitamin D deficiency status of postmenopausal women living in India, China, and the USA was 53.3%, 72.1%, and 53%, respectively (Tayem et al., 2019). Our study demonstrated that, of the female subjects, 21.3% and 78.8% had vitamin D insufficiency and deficiency, respectively. Our results were consistent with previous studies that showed a higher incidence of vitamin D deficiency in postmenopausal women.

Smoking exposes individuals to a mixture of dangerous chemicals that are involved in the pathogenesis of various diseases (Mousavi, Amini, Heydarpour, Chermahini & Godderis, 2019). Specifically, the association of smoking with serum vitamin D concentrations is not clear (Jiang et al., 2016). Some studies (Jiang et al., 2016; Lokki, Heikkinen-Eloranta, Öhman, Heinonen, Surcel & Nielsen 2020) suggest that smokers have lower serum vitamin D levels than non-smokers, while other studies (Grimnes et al., 2010; Lee & Longo, 2016) suggest the opposite. On the other hand, some researchers have not observed any significant association between these two parameters (Kimlin et al., 2007; McKinney, Breitkopf, Berenson, 2008). The present study showed a important association between the vitamin D vitamin status of the subjects and their smoking habits. Our findings on the smoking status of women is consistent with previous studies that have shown smoking to be associated with lower serum vitamin D levels in postmenopausal women (Cheng et al., 2014).

Excessive alcohol consumption can alter serum vitamin D status. Various researches have reported that chronic alcohol consumption may be related with a decrease in serum 25(OH)D levels (Carlson et al., 2017; Wijnia et al., 2013). They have revealed that low vitamin D concentrations in alcohol-dependent individuals can be caused by many factors, including limited sunlight exposure, malnutrition, malabsorption, and a direct effect of alcohol on vitamin metabolism (Wijnia et al., 2013). In our study, no significant relationship was found between the vitamin D status of women and their alcohol consumption habits. It is considered that this may be due to only few of the subjects having declared to drink alcohol.

Worldwide, dietary vitamin D intake has been reported to be below the recommendations. Because very few foods, such as fatty fish such as salmon, sardines, fish liver oil, mushrooms and eggs, are rich in vitamin D and these foods are not part of the daily diet. Therefore, since the most effective source of vitamin D is sunlight, less exposure to sunlight is considered the main determinant of vitamin D deficiency. This study showed that 37.5% of the women with vitamin D insufficiency and 93.2% of the women with vitamin D deficiency were not exposed to the sun. Furthermore, a skin-covering clothing style due to environmental, psychological, religious and cultural factors, also affects vitamin D synthesis in the skin (Al-Yamata, AlOtaibi, Al-Bader & Al-shoumer, 2019). The association of low vitamin D levels with skin-covering garments has been shown in Turkey and also some middle-east countries with adequate sunlight, including Egypt, Jordan, Kuwait, and Lebanon. Several reports demonstrated that skin-covering garments wearing was associated with low vitamin D levels (Al-Yamata et al., 2019; Buyukuslu et al., 2014). The present study showed that 25% of the women with vitamin D insufficiency and 62.7% of the women with vitamin D deficiency dressed in skin-covering garments. These findings suggest that wearing skin-covering garments and reduced exposure to sunlight may be major risk factors for vitamin D deficiency.

The findings of our study show that as physical activity decreases, serum vitamin D levels decrease. Decreased physical activity is associated with lower vitamin D levels, as decreased physical activity outdoors often results in decreased skin exposure to sunlight (Brock et al., 2010; Wang et al., 2018). The findings of this study tend to support this association. Similarly, in a previous study conducted in Turkish women with osteoporosis, those with vitamin D levels below 20 ng/mL were found to have significantly lower physical activity levels than those with vitamin D levels above 20 ng/mL (Basaran, Guzel, Coskun-Benlidayi & Güler-Uysal, 2007). Another study it was reported that increased physical activity is related with decreased vitamin D deficiency/insufficiency frequency (Kaur et al., 2019). Thus, exercise can maintain the vitamin D status and increase skin exposure to sunlight (Brock et al., 2010). A sedentary lifestyle and attending indoor courses reduce the exposure of women to sunlight. Therefore, increasing physical activity would induce positive effects and increase serum vitamin D levels.

It is necessary to assess treatments for their potential biological effects and consequences for an individual's QoL. Many scales have been developed to evaluate the QoL for general and disease-specific purposes (Hoffmann, Senior & Mager, 2015). Recent studies have shown a positive correlation between QoL and vitamin D levels, yet available data is inconsistent due to differences in the populations studied and the quality-of-life assessment scales used (Civelek, Pekyavas, Cetin, Cosar & Karatas, 2014; Ecemis & Atmaca, 2012; Feng et al., 2016; Motsinger, Lazovich, MacLehose, Torkelson & Robien, 2012). Nevertheless, the findings of our study also support this positive correlation. In the present study, the mean physical function, energy level/vitality, general health scores, and mental health scores of SF-36 QoL scale sub-parameters were found to be significantly lower in the women with

vitamin D deficiency. However, no statistically significant difference was found for the pain, social function, role limitations caused by emotional or physical problems. This was attributed to the women participating in the present study being 50 and over, as well as to their accompanying health problems due to advancing age.

Depression is a common mental illness, which is prolonged or recurring, and significantly reduces an individual's ability to function in daily life (Huang, Wang & Hu, 2016). It is conjectural that more than 300 million people globally are affected by depression (Vellekkatt & Menon, 2019), and one in four older adults has a mental illness such as anxiety or depression (Motsinger et al., 2012). It is also increasingly recognized that symptoms of depression are present at subclinical levels in healthy populations (Huang et al., 2016). Many researches have shown that low level of vitamin D are related with the risk of depression (Boulkrane et al., 2020; Ersoy & Ersoy, 2017; Musazadeh et al., 2023). Similar to literature reports, the present study revealed significantly higher depression and anxiety scores in vitamin D deficient women. The presence of vitamin D receptors in multiple areas in the brain, which affect depression, and significant immunoreactivity for 1α-hydroxylase in most of these regions, further support this association (Ersoy & Ersoy, 2017).

MetS is a cluster of clinical conditions posing a cardiometabolic risk, including obesity, insulin resistance, hypertension, and dyslipidemia (Alaklabi & Alsharairi, 2018; Wang et al., 2018). The etiology of MetS is complex and affected by several factors, including smoking, alcohol intake, increasing age, unhealthy diet, obesity, and lack of exercise. Vitamin D deficiency can also be considered as a risk factor for MetS (Alaklabi & Alsharairi, 2018). Many researches have shown a reverse relationship between MetS and serum vitamin D levels (Al-Dabhani et al., 2017; Liu et al., 2020; Wang et al., 2018). Similarly, in this study, we found that vitamin D deficiency was importantly related with an increased risk of MetS in postmenopausal women, based on IDF criteria.

The preceding research results on the relation of serum vitamin D levels with MetS components are inconsistent. While some researches have shown vitamin D levels to be associated with all MetS (Yahyaoui et al., 2019) components, some others have revealed an association with some MetS components (Liu et al., 2020; Sarmiento-Rubiano et al., 2018). In the current study, it was observed that WC, BP, HDL-C levels, and fasting blood sugar levels, all which are components of MetS, were associated with vitamin D deficiency. However, no significant association was determined for triglyceride level, another component of MetS. The findings of this study support the hypothesis that heavily obese individuals are at risk for serum vitamin D deficiency. Different theories have been proposed to explain the association between obesity and vitamin D deficiency. Firstly, it has been suggested that obese individuals are less exposed to sunlight due to limited outdoor activity arising from social acceptance problems and have limited vitamin D synthesis in the skin due to a more loose clothing style that covers a large part of their body compared to slim individuals. In addition, vitamin D is an essential determinant of serum parathyroid hormone (PTH) level. High concentrations of PTH increase lipogenesis and may contribute to weight gain. Other related hypotheses are based on the assumption that hepatic steatosis, which develops with obesity, decreases 25(OH)D synthesis in the liver, and high circulating leptin and interleukin-6 levels inhibit 25(OH)D synthesis by affecting vitamin D receptors. In addition, vitamin D metabolites can be retained in adipose tissue. Therefore, it has been suggested that cholecalciferol, taken in the diet or synthesized in the dermal, is partially sequestered by body fat before being transported to the liver for initial hydroxylation. Thus, obesity may be a direct result of vitamin D deficiency and/or a cause of vitamin D deficiency (Pereira-Santos et al., 2015).

In several different studies, researchers have shown a relationship between low vitamin D status and high blood pressure (hypertension) (Latic & Erben, 2020). The deficiency of vitamin D can induce hypertension by increasing the activity of the renin-angiotensin system, causing endothelial dysfunction and leading to hyperparathyroidism (He & Hao, 2019; McMullan, Borgi, Curhan, Fisher & Forman, 2017).

Vitamin D also regulates glucose metabolism by enhancing insulin secretion and action. Human and animal studies have shown a strong correlation between decreased insulin secretion and vitamin D deficiency (Wimalawansa, 2018). Some researchers have found that vitamin D levels are significantly correlated with blood lipid levels, positively correlated with HDL-C levels, and negatively associated with triglyceride levels (Liu et al., 2020). In our study, we found a significantly inverse association between vitamin D levels and HDL-C levels. But, no relation was observed with triglyceride levels. While the effects of vitamin D on lipid metabolism are known, the potential mechanisms are yet to be elucidated. In various studies, it has been reported that vitamin D plays indirect and direct roles in the lipid profile by affecting lipid metabolism (Faraji & Alizadeh, 2020). Factors such as age, gender, menopausal status, exposure to less sunlight, skin-covering garments, and lower physical activity level may cause differences between studies and complicate the interpretation of their results.

This study has several limitations. First, because the study design was cross-sectional, a cause-effect relationship could not be established between serum vitamin D and MetS, QoL, and depression. Second, the effect of seasonal factors on the results could not be evaluated because the study was conducted in the winter season. Third, we did not have detailed food

consumption records to calculate dietary vitamin D intake. Finally, this study is a single-center study with a relatively small sample size. The relationship we found between vitamin D and MetS, QoL and depression is valid for postmenopausal women and may differ in different gender, age and ethnic groups. Therefore, we cannot generalize our results. Therefore, larger, prospective studies are needed on this subject.

As a result, the findings of the present study support a positive association between vitamin D deficiency and the presence of MetS in postmenopausal women. MetS components, such as WC, fasting blood glucose levels, HDL-C, and BP, were detected to be related with serum vitamin D levels. Decreased exposure to sunlight, skin-covering, concealing clothing style due to religious factors, and decreased physical activity limit vitamin D synthesis in the skin. Serum vitamin D level and the health-related QoL were found to be positively correlated. Sufficient vitamin D levels can contribute to the protection of the musculoskeletal system and increase the quality of life.

Serum vitamin D levels must be measured regularly in postmenopausal women to maintain optimal levels. To remedy vitamin D deficiency and insufficiency, it is crucial to prioritize and implement strategies such as increasing exposure to sunlight, consuming natural foods high in vitamin D, using nutritional vitamin D supplements, and employing dietary supplementation. In order to establish optimal vitamin D levels in society, the Ministry of Health, the Ministry of Agriculture and Forestry, and health professionals need to collaborate.

**Acknowledgement**

We thank Nazife ELBUKEN for her contribution to BP measurement and taking blood samples for biochemical analysis and Semra MACIT for her assistance in the biochemical analysis of blood samples.

**Conflict of Interest**

The authors have no conflicts of interest to declare that are relevant to the content of this article.

**Author Contributions**

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

**REFERENCES**

Alaklabi, A. M., & Alsharairi, N. A. (2018). Current evidence on vitamin D deficiency and metabolic syndrome in obese children: what does the evidence from Saudi Arabia tell us? *Children (Basel),* *5*(1), 11. https://doi.org/10.3390/children5010011.

Al-Dabhani, K., Tsilidis, K .K., Murphy, N., Ward, H. A., Elliott, P., Riboli, E., et al. (2017). Prevalence of vitamin D deficiency and association with metabolic syndrome in a Qatari population. *Nutrition & Diabetes*, 7 (4), e263. https://doi.org/10.1038/nutd.2017.14.

Al-Yamata, F. I., AlOtaibi, F., Al-Bader, M. D., & Al-Shoumer K. A. (2019). The effect of clothing on vitamin D status, bone turnover markers, and bone mineral density in young Kuwaiti females. *International Journal of Endocrinology*, 6794837. https://doi.org/10.1155/2019/6794837.

Atli, T., Gullu, S., Uysal, A .R., & Erdogan, G. (2005). The prevalence of vitamin D deficiency and effects of ultraviolet light on vitamin D levels in elderly Turkish population. *Archives of Gerontology and Geriatrics*, *40*(1), 53-60. https://doi.org/10.10106/j.archger. 2004.05.006.

Basaran, S., Guzel, R., Coskun-Benlidayi, I., & Guler-Uysal, F. (2007). Vitamin D status: effects on quality of life in osteoporosis among Turkish women. *Quality of Life Research*, *16*(9), 1491-9. https://doi.org/ 10.1007/s11136-007-9257-6.

Boulkrane, M. S., Fedotova, J., Kolodyaznaya, V., Micale, V., Drago, F., Tol, A .J. M., et al. (2020). Vitamin D and depression in women: a mini-review. *Current Neuropharmacology*, *18*(4), 288-300. https://doi.org/10.2174/1570159X17666191108111120

Buyukuslu, N., Esin, K., Hizli, H., Sunal, N., Yigit, P., & Garipagaoglu, M. (2014). Clothing preference affects vitamin D status of young women. *Nutrition Research*, 34(8), 688-93. https://doi.org/10.1016/j.nutres.2014. 07.012.

Brock, K., Huang, W. Y., Fraser, D. R., Ke, L., Tseng, M., Stolzenberg-Solomon, R., et al. (2010). Low vitamin D status is associated with physical inactivity, obesity and low vitamin D intake in a large US sample of healthy middle-aged men and women. *The Journal of Steroid Biochemistry and Molecular Biology*, *121*(1-2), 462-6. https://doi.org/10.1016/j.jsbmb.2010.03.091.

Carlson, C. R., Uriu-Adams, J. Y., Chambers, C. D., Yevtushok, L., Zymak-Zakutnya, N., Chan, P. H. et al (2017). Vitamin D deficiency in pregnant Ukrainian women: effects of alcohol consumption on vitamin D status. *Journal of the American College of Nutrition*, *36*(1), 44-56. https://doi.org/10.1080/07315724 .2016.1174091.

Cheng, T. Y. D., Millen, A. E., Wactawski-Wende, J., Beresford, S. A. A., LaCroix, A. Z., Zheng, Y., et al. (2014). Vitamin D intake determines vitamin D status of postmenopausal women, particulary those with limited sun exposure. *The Journal of Nutrition,* 144 (5), 681-89. https://doi.org/10.3945/jn.113.183541.

Chiang, J. M., Stanczyk, F. Z., & Kanaya, A. M. (2018). Vitamin D levels, body composition, and metabolic factors in Asian Indians: results from the metabolic syndrome and atherosclerosis in south Asians living in America pilot study. *Annals of Nutrition & Metabolism*, *72*(3): 223-30. https://doi.org/10. 1159/000487272.

Civelek, G. M., Pekyavas, N. O., Cetin, N., Cosar, S. N., & Karatas, M. (2014). Association of vitamin D deficiency with muscle strength and quality of life in postmenopausal women. *Climacteric*, *17*(4): 472-7. https://doi.org/10.3109/13697137.2014.898265.

Craig, C. L., Marshall, A. L., Sjöström, M., Bauman, A. E., Booth, M. L., Ainsworth, B. E., et al. (2003). International physical activity questionnaire: 12-country reliability and validity. *Medicine and Science in Sports and Exercise*, *35*(8): 1381-95. https://doi.org/10.1249/01.MSS.000008924.61453

Ecemis, G., & Atmaca, A. (2012). Quality of life in premenopausal women with vitamin D deficiency and Vitamin D insufficiency. *Endocrine Abstracts*, 29: 225.

Ersoy, N., & Ersoy, G. (2017). D vitamini yetersizliği ve depresyon: Ne yapabiliriz? *Hacettepe Üniversitesi Sağlık Bilimleri Fakültesi Dergisi*, *4*(3), 1-4 (in Turkish with an abstract in English).

Faraji, S., & Alizadeh, M. (2020). Mechanistic effects of vitamin D supplementation on metabolic syndrome components in patients with or without vitamin D deficiency. *Journal of Obesity & Metabolic Syndrome*, *29*(4) 270-80.

Feng, X., Guo, T., Wang, Y., Kang, D., Che, X., Zhang, H., et al. (2016). The vitamin D status and its effects on life quality among the elderly in Jinan, China. *Archives of Gerontology and Geriatrics*, 62: 26-9. https://doi.org/10.1016/j.archger.2015.09.002.

Grimnes, G., Almaas, B., Eggen, A. E., Emaus, N., Figenschau, Y., Hopstock, L. A., et al. (2010). Effect of smoking on the serum levels of 25-hydroxyvitamin D depens on the assay employed. *European Journal of Endocrinology*, *163*(2), 339-48. https://doi.org/10. 1530/EJE-10-0150.

Haimi, M., & Kremer, R. (2017). Vitamin D deficiency/insufficiency from childhood to adulthood: insights from a sunny country. *World Journal of Clinical Pediatrics*, *6(*1): 1-9. https://doi.org/10.5409 /wjcp.v6.i1.1.

He, S., & Hao, X. (2019). The effect of vitamin $D_3$ on blood pressure in people with vitamin D deficiency. *Medicine, 98*(19), e15284. https://doi.org/10.1097/MD .0000000000015284.

Hoffmann, M. R., Senior, P. A., & Mager, D. R. (2015). Vitamin D supplementation and health-related quality of life: a systematic review of the literature. *Journal of the Academy of Nutrition and Dietetics*, *115*(3), 406-18. https://doi.org/10.1016/j.jand.2014.10.023.

Huang, R., Wang, K., & Hu, J. (2016). Effect of probiotics on depression: a systematic review and meta-analysis of randomized controlled trials. *Nutrients*, *8*(8), 483. https://doi.org/10.3390/nu8080483.

International Diabetes Federation (IDF). (2022, April 27). The IDF consensus worldwide definition of the metabolic syndrome 2006. Available from: *https://www.idf.org/component/attachments/attachments.html?id=705&task=download*

Jiang, C. Q., Chan, Y. H., Xu, L., Jin, Y. L., Zhu, T., Zhang, W. S., et al. (2016). Smoking and serum vitamin D in older Chinese people: cross-sectional analysis based on the Guangzhou Biobank Cohort Study. *BMJ Open*, *6*(6), e010946. https://doi.org/10.1136/bmjopen-2015-010946.

Kaur, J., Ferguson, S. L., Freitas E, et al (2019). Association of vitamin D status with chronic disease risk factor and cognitive dysfunction in 50-70 year old adults. *Nutrients*, *11*(1), 141. https://doi.org/10.3390/ nu11010141.

Kimlin, M., Harrison, S., Nowark, M., Moore, M., Brodie, A., & Lang, C. (2007). Does a high UV environment ensure adequate vitamin D status? *Journal of Photochemistry and Photobiology*, *89*(2-3), 139-47. https://doi.org/10.1016/j.jphotobiol.2007.09.008.

Koçyiğit, H., Aydemir, Ö., Fişek, G., Ölmez, N. & Memiş A. K. (1999). Form-36 (KF-36)'nın Türkçe versiyonunun güvenilirliği ve geçerliliği. *İlaç ve Tedavi Dergisi, 12*(2), 102-106.

Latic, N., & Erben, R. G. (2020). Vitamin D and cardiovascular disease, with emphasis on hypertension, atherosclerosis, and hearth failure. *International Journal of Molecular Sciences*, *21*(18), 6483. https://doi.org/10.3390/ijms21186483.

Lee, C., & Longo, V. (2016). Dietary restriction with and without caloric restriction for healthy aging. *F1000Research*, 5, 1117. https://doi.org/10.12688/f 1000research.7136.1.

Liu, L., Cao, Z., Lu, F., Liu, Y., Lv, Y., Qu, Y., et al. (2020). Vitamin D deficiency and metabolic syndrome in elderly Chinese individuals: evidence from CLHLS. *Nutrition & Metabolism*, *17*, 58. "https://doi.org/10. 1186/s12986-020-004793.

Lokki, A. I., Heikkinen-Eloranta, J., Öhman, H., Heinonen, S., Surcel, H. M ., & Nielsen, H. S. (2020). Smoking during pregnancy reduces vitamin D levels in a Finnish birth register cohort. *Public Health Nutrition*, *23*(7), 1273-7. https://doi.org/10.1017/S1368980018003932.

Marsman, D., Belsky, D. W., Gregori D., Johnson, M. A., Dog, T. L., Meydani, S., et al, (2018). Healthy ageing: the natural consequences of good nutrition- a conference report. *European Journal of Nutrition*, *57*(2), 15-34. https://doi.org/10.1007/s00394-018 1723-0.

McKinney, K., Breitkopf, C. R., & Berenson, A. B. (2008). Association of race, body fat and season with vitamin D status among young women: a cross-sectional study. *Clinical Endocrinology*, *69*(4), 535-41. https://doi.org/10.1111/j.13652265.2008.03233.x.

McMullan, C. J., Borgi, L., Curhan, G. C., Fisher, N., Forman, J. P. (2017). The effect of vitamin D on renin-angiotensin system activation and blood pressure: a randomized control trial. *Journal of Hypertension*, *35*(4), 822-9. https://doi.org/10.1097 /HJH.0000000000001220.

Motsinger, S., Lazovich, D., MacLehose, R. F., Torkelson, C. J., & Robien, K. (2012). Vitamin D intake and mental health-related quality of life in older women: the lowa Women's Health Study. *Maturitas*, *71*(3), 267-73. https://doi.org/10.1016/j.maturitas.2011.12. 005.

Mousavi, S. E., Amini, H., Heydarpour, P., Chermahini, F. A., & Godderis, L. (2019). Air pollution, environmental chemicals, and smoking may trigger vitamin D deficiency: Evidence and potential mechanisms. *Environment International*, *122*, 67-90. https://doi.org/10.1016/j.envint.2018.11.052.

Musazadeh, V., Keramati, M., Ghalichi, F., Kavyani, Z., Ghoreishi, Z., Alras, K. A., et al. (2023). Vitamin D protects against depression: Evidence from an umbrella meta-analysis on interventional and observational meta-analyses. *Pharmacological Research*, *187*, 106605. https://doi.org/10.1016 /j.phrs.2022.106605.

Pereira-Santos, M., Costa, P. R. F., Assis, A. M. O., Santos, C. A. S. T., & Santos, D. B. (2015). Obesity and vitamin D deficiency: a systematic review and meta-analysis. *Obesity Reviews*, *16*(4), 341-9. https://doi.org/10. 1111/obr.12239.

Perez-Lopez, F., Chedraui, P., & Pilz, S. (2020). Vitamin D supplementation after the menopause. *Therapeutic Advances in Endocrinology and Metabolism*, *11*, 1-13. https://doi.org/10.1177/2042018820931291.

Sarmiento-Rubiano, L. A., Ruidiaz, J. A. A., Davilla, H. F. S., Rodriguez, A. S., Rebolledo-Cobos, R. C., & Becerra, J. E. (2018). Relationship between serum vitamin D levels and HDL cholesterol in postmenopausal women from Colombian Caribbean. *Journal of Nutrition and Metabolism*, 1-6. https://doi.org/10.1155/2018/9 638317.

Tayem, Y., Alotaibi, R., Hozayen, R., & Hassan, A. (2019). Therapeutic regimens for vitamin D deficiency in postmenopausal women: a systematic review. *Przeglad Menopauzalny*, *18*(1), 57-62. https://doi.org/10.5114 /pm.2019.84159.

Tepper, S., Dabush, Y., Shahar, D. R., Endevelt, R., Geva, D., & Ish-Shalom, S. (2016). Vitamin D status and quality of life in healthy male high-tech employees. *Nutrients*, *8*(6), 366. https://doi.org/10.3390/nu8 060366.

Valladares, T., Simoes, R., Bernardo, W., Schmitt, A. C. B., Cardoso, M. R. A., & Aldrighi, J.M. (2019). Prevalence of hypovitaminosis D in postmenopausal women: a systematic review. *Revista da Associaçao Medica Brasileira, 65*(5), 691-98. https://doi.org/10.1590/180 69282.65.5.691.

Vellekkatt, F., & Menon, V. (2019). Efficacy of vitamin D supplementation in major depression: A meta-analysis of randomized controlled trials. *Journal of Postgraduate Medicine*, *65*(2), 74-80. https://doi.org/ 10.4103/jpgm.JPGM_571_17.

Wang, C. M., Chang, C. S., Chang, Y. F., Wu, S. J., Chiu, C.J., Hou, M. T., et al. (2018). Inverse relationship between metabolic syndrome and 25-hydroxyvitamin D concentraction in elderly people without vitamin D deficiency. *Scientific Reports*, *8*(1), 17052. https://doi.org/10.1038/s41598-018-35229-2.

Ware, J. E., & Sherbourne, C. D. (1992). The MOS 36-item short-form health survey (SF-3). I. Conceptual framework and item selection. *Medical Care*, *30*(6), 473-83.

Wijnia, J. W., Wielders, J. P. M., Lips, P., Wiel, A. V. D., Mulder, C. L., & Nieuwenhuis, K. G. A. (2013). Is vitamin D deficiency a confounder in alcoholic skeletal muscle myopathy? *Alcoholism, Clinical and Experimental Research, 37*(1), 1-7. https://doi.org/10. 1111/j.1530-0277.2012.01902.x.

Wimalawansa, S. J. (2018). Associations of vitamin D with insulin resistance, obesity, type 2 diabetes, and metabolic syndrome. *The Journal of Steroid Biochemistry and Molecular Biology*, 175, 177-89. https://doi.org/10.1016/j.jsbmb.2016.09.017.

Yahyaoui, S., Jmal, L., Sammound, A., Abdenebi, M., Jmal, A., & Boukthir, S. (2019). Vitamin D deficiency is associated with metabolic syndrome in Tunisian children with obesity. *La Tunisie Medicine*, *97*(12), 1353-6.

Zigmond, A. S., & Snaith, R. P. (1983). The hospital anxiety and depression scale. *Acta Psychiatrica Scandinavica*, *67*(6), 361-70. https://doi.org/10.1111/j.16000447. 1983.tb09716.x.

**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.1274939

# The Relationship Between the Lunar Cycle and Epileptic Attacks and Their Treatment

Hilal AYDIN[1], Oguzhan KORKUT[2], Aslihan IZOL[1], Ibrahim Hakan BUCAK[3]

[1] Balıkesir University, Faculty of Medicine, Department of Pediatrics
[2] Balıkesir University, Faculty of Medicine, Department of Medical Pharmacology
[3] Adıyaman University, Faculty of Medicine, Department of Pediatrics

***Geliş Tarihi / Received:*** *01.04.2023,* ***Kabul Tarihi / Accepted:*** *27.08.2023*

**ABSTRACT**
**Objective:** The purpose of the present study was to evaluate the potential association between the phases of the moon and seizure attacks and treatment in patients diagnosed with epilepsy at a pediatric neurology clinic. **Materials and Methods:** 199 patients presenting to the Balıkesir University Medical Faculty pediatric neurology clinic, Turkey, diagnosed with epilepsy based on ILAE criteria were included in the study. The patients' demographic characteristics, medications used, and family histories, and the frequency and duration of attacks were investigated retrospectively. **Results:** Analysis revealed that seizures were most frequent in the full moon (N=54, 27.1%), followed by the new moon (N=52, 26.1%) and first quarter (N=47, 23.6%), and were least common in the third quarter (N=46, 23.1%). No statistically significant variation was determined in terms of attack frequencies during the different lunar phases between patients receiving monotherapy and polytherapy (p=0.206). **Conclusion:** The results of the present study suggest that there is no relationship between the lunar cycle and the frequency of epileptic attacks.
**Keywords:** Children, Epilepsy, Lunar Cycle.

## Epileptik Ataklar ve Tedavisi ile Ay Döngüsü Arasındaki İlişki

**ÖZ**
**Amaç:** Bu çalışmanın amacı, bir pediatrik nöroloji kliniğinde epilepsi tanısı alan hastalarda ayın evreleri ile nöbet atakları ve tedavi arasındaki potansiyel ilişkiyi değerlendirmektir**. Gereç ve Yöntem:** Balikesir Üniversitesi Tıp Fakültesi Çocuk Nörolojisi Kliniğine başvuran, ILAE kriterlerine göre epilepsi tanısı alan 199 hasta çalışmaya dahil edildi. Hastaların demografik özellikleri, kullandıkları ilaçlar, aile öyküleri, atak sıklıkları ve süreleri retrospektif olarak incelendi. **Bulgular:** Analiz, nöbetlerin en sık dolunayda (N=54, %27,1), ardından yeni ayda (N=52, %26,1) ve ilk dördün (N=47, %23,6) ve en az da son dördün döneminde (N=46, %23,1) görüldüğünü ortaya koydu ve bu durum istatiksel olarak anlamlı değildi. Monoterapi ve politerapi alan hastalar arasında farklı ay fazları sırasındaki atak sıklıkları açısından istatistiksel olarak anlamlı bir farklılık saptanmadı (p=0.206). **Sonuç:** Bu çalışmanın sonuçları, ay döngüsü ile epileptik atakların sıklığı arasında bir ilişki olmadığını göstermektedir.
**Anahtar Kelimeler:** Çocuklar, Epilepsi, Ay Döngüsü.

***Sorumlu Yazar / Corresponding Author:*** Hilal AYDIN, Balikesir University, Faculty of Medicine, Department of Pediatrics, Balikesir, Turkey
***E-mail:*** drhilalaydin@gmail.com

***Bu makaleye atıf yapmak için / Cite this article:*** Aydin, H., Korkut, O., Izol, A., Bucak, & I. H. (2024). The relationship between the lunar cycle and epileptic attacks and their treatment. *BAUN Health Sci J, 13*(1), 105-111. https://doi.org/10.53424/balikesirsbd.1274939

## INTRODUCTION

The belief that celestial bodies can affect numerous physiopathological processes, particularly human behaviors, is an ancient one (Owens & McGowan, 2006). The moon is a satellite of the earth and the closest celestial body to it. Historically, phenomena such as increased sexual desire, menstruation, sleepwalking, and some mental disorders and suicide have been attributed to supernatural powers acting through the brightness of the moon (Oliven, 1943). The fact that the word 'lunacy' derives from the Roman goddess Luna shows that mental disorders were previously associated with the moon (Owens & McGowan, 2006).

The periodic changes in the luminous surface of the moon that are visible from earth are known as the 'lunar cycle.' This cycle lasts four weeks and involves four distinct phases – the new moon, the first quarter, the full moon, and the third (final) quarter (Nissani, 1994). The potential effects of the lunar cycle on different variables on earth and on human health have historically attracted the interest of numerous researchers. Although no relationship has been shown in the majority of studies, others have associated the lunar cycle with medical phenomena such as cardiopulmonary resuscitation, fertility, acute coronary events, and neuropsychiatric findings (Abell & Greenspan, 1979, Eisenburger, et al., 2003, Gorvin & Roberts, 1994). Studies have also reported an increase in acute behavioral disorders, non-effective psychotic disorders, depression, gastrointestinal bleeding, reproductive functions, acute myocardial infarction, and sudden unexpected deaths (Bevington, 2015; Calver, Stokes & Isbister, 2009; Chakraborty, 2014). Some survey studies among health workers also confirm that such personnel also believe in this association (Vance, 1995).

Changes in the lunar cycle are known to alter the force of gravity on the earth and the rises and falls in the ocean tides (Bevington, 2015). However, their potential effects on human health and the effect mechanisms involved remain a mystery. The potential effect of the lunar cycle of human physiology and diseases is known as the 'Transylvania effect' in the literature (Owens & McGowan, 2006; Mason, 1997). Although the mechanism of this effect is unclear, it has essentially been linked to effects on 'biological rhythms' [Baxendale & Fisher, 2008; Myers, 1995). Research shows that the different lunar phases can cause changes in 'biological rhythms' in humans in association with their effects on the earth's electromagnetic field and gravity (Chakraborty, 2014). Autonomic nervous system, cardiovascular and endocrine changes occurring during the cycle are thought to underlie potential changes in human physiopathology (Chakraborty, 2014; Kalra, Agrawal & Sahay, 2012; Cajochen, Altanay-Ekici, Munch, Frey, Knoblauch & Wirz-Justice, 2013). It has also been reported that changes in the lunar cycle can have a direct impact on the body's water mass, as well as on the planet's bodies of water (Myers, 1995).

It has long been known that the seizures can be triggered by various environmental factors and functional changes in the human body (Vul, 1976). Some central nervous system and cerebrovascular diseases and factors such as alcohol intake, stress, and excessive light can precipitate seizures in patients with epilepsy (Elger & Schmidt, 2008). The possibility of an association between epileptic seizures and the lunar cycle has also been suggested since very ancient times (Temkin, 1994; Bruno et al., 2011). Studies have reported an increase in the frequency of epileptic attacks in the full and new moon phases, and that the full moon triggers and exacerbates attacks (Vul, 1976).

The significance of circadian rhythm disturbances on the pathophysiology of several diseases, including epilepsy, has been investigated in recent years. Chronopharmacology maintains that therapeutic management can be optimized by adjusting the treatments to be administered in these diseases according to individual rhythms (Sion & Bégou, 2021). The purpose of the present study was to evaluate the potential association between the phases of the moon and seizure attacks and treatment in patients diagnosed with epilepsy at a pediatric neurology clinic.

## MATERIALS AND METHODS

199 patients presenting to the Balıkesir University Medical Faculty pediatric neurology clinic, Turkey, between 01.08.19 and 01.03.2022 diagnosed with epilepsy based on ILAE criteria were included in the study. The patients' demographic characteristics, medications used. The use of levetiracetam, valproic acid, phenobarbital, lamotrigine, clonazepam, carbamazepine, oxcarbazepine, topiramate as single drug-monotherapy or multi-drug-polytherapy and family histories, and the frequency and duration of attacks were investigated retrospectively. Patients undergoing attacks during the investigation were enrolled. Patients with deficient data or whose attack dates were not recorded were excluded from the analysis. The lunar phase during which attacks occurred was determined based on the lunar calendar from the "Time and Date" website (timeanddate.com).

### Statistical analysis

Statistical analyses were performed on SPSS version 15 software. Once the patients' demographic data had been collected, associations between gender, age group, treatments, electroencephalography (EEG) and cranial magnetic resonance imaging (MRI) findings, lunar phases, and attacks were evaluated using the Chi-square test.

### Ethical considerations

The requisite approval was obtained from the Balıkesir University Ethics Committee before the study commenced (No. 2022/57).

**RESULTS**

The mean age of the patients enrolled in the study (N=199) was 10.07±4.90 years. The patients were most frequently in the 12-18 age range (N=83, 41.7%). with 64 (32.2%) being aged 6-12, 39 (19.6%) aged 2-6, and only six (3%) aged 0-1 year. The majority of patients were male (N=104, 52.3%).

No prenatal pathological characteristic was present in 80.4% (N=160) of the cases. A history of delivery at <37 weeks was present in 12.6% of the patients and at >42 weeks in 1.5%. Additionally, 48.3% were delivered by the normal spontaneous vaginal route and 51.8% by cesarean section. The majority of cases had normal birth weights, while 30.7% (N=61) weighed <3000 g and 6% (N=12) >4000 g. Fifty-five (%27.6) patients had histories of incubation for various reasons. Histories of consanguinity in the family was present in 26 (13.1%) cases (Table 1).

**Table 1. Clinical characteristic features of epileptic patients.**

| | |
|---|---|
| **Age (years)** | 10.07±4.90 (1-18) |
| **Sex** | **N (%)** |
| Boys | 104 (52.3%) |
| Girls | 95 (47.7%) |
| **Seizure type** | |
| Focal | 53 (26.6%) |
| Generalized | 84 (42.2%) |
| Unknown | 62 (31.2%) |
| **Electroencephalogram features** | |
| Normal | 84 (42.2%) |
| Abnormal | 81 (40.7%) |
| Epileptiform discharges | 34 (17.1%) |
| **Magnetic resonance imaging features** | |
| Normal | 130 (65.3%) |
| Anormal | 69 (34.7%) |
| **Antiseizure drugs** | |
| **Monotherapy** | 167 (83.9%) |
| **Polytherapy** | 32 (16.1%) |

Seizures were most frequent when the patient was awake (N=68, 34.2%). Analysis revealed that seizures were most frequent in the full moon (N=54, 27.1%), followed by the new moon (N=52, 26.1%) and first quarter (N=47, 23.6%), and were least common in the third quarter (N=46, 23.1%). Boys represented the majority of patients undergoing attacks in the new moon and first quarter, and girls the majority during the full moon. Gender distributions of attacks in the third quarter were equal. No significant association was observed between attack frequency and lunar phases in terms of age group or gender (p=0.746 and p=0.779, respectively) (Table 2,3).

**Table 2. Gender distribution according to lunar cycles of epileptic attacks.**

| | Girls N (%) | Boys N (%) |
|---|---|---|
| **New Moon** | 22 (11.06%) | 30 (15.08%) |
| **First Quarter** | 22 (11.06%) | 25 (12.56%) |
| **Full Moon** | 28 (14.07%) | 26 (13.07%) |
| **Third Quarter** | 23 (11.56%) | 23 (11.56%) |

**Table 3. Distribution of age groups according to lunar cycles of epileptic attacks.**

| | 0-1 year N (%) | 1-2 years N (%) | 2-6 years N (%) | 6-12 years N (%) | 12-18 years N (%) | p |
|---|---|---|---|---|---|---|
| **New Moon** | - | 2 (1.01%) | 12 (6.03%) | 20 (10.05%) | 18 (9.05%) | 0.48* |
| **First Quarter** | 2 (1.01%) | 1 (0.50%) | 9 (4.52%) | 13 (6.53%) | 22 (11.06%) | |
| **Full Moon** | 1 (0.50%) | 3 (1.51%) | 11 (5.53%) | 18 (9.05%) | 21 (10.55%) | (*Comparison between 12 years old and under 12 years old) |
| **Third Quarter** | 3 (1.51%) | 1 (0.50%) | 7 (3.52%) | 13 (6.53%) | 22 (11.06%) | |

**Table 4. Distribution of clinical features of patients according to lunar cycles of epileptic attack**

| **Characteristics of the Patients** | **Lunar Cycle** | | | | |
|---|---|---|---|---|---|
| | **New Moon** | **First Quarter** | **Full Moon** | **Third Quarter** | **p** |
| **Age (years) mean ±SD (min.-max.)** | 9.83±4.65 2-17 | 10.34±4.99 1-17 | 9.93±5.03 1-18 | 10.22±5.09 1-17 | 0.75 |
| **Gender N (%)** | | | | | 0.77 |
| **Female** | 22 (11.06%) | 22 (11.06%) | 28 (14.07%) | 23 (11.56%) | |
| **Male** | 30 (15.08%) | 25 (12.56%) | 26 (13.07%) | 23 (11.56%) | |
| **Epilepsy type N (%)** | | | | | 0.11 |
| **Focal** | 15 (7.54%) | 11(5.53%) | 13(6.53%) | 14 (7.04%) | |
| **Generalized** | 15 (7.54%) | 27(13.57%) | 25 (12.56%) | 17 (8.54%) | |
| **Unknown** | 22 (11.06%) | 9 (4.52%) | 16 (8.04%) | 15 (7.54%) | |
| **EEG features N (%)** | | | | | 0.31 |
| **Epileptiform** | 8 (4.02%) | 9 (4.52%) | 11 (5.53%) | 6 (3.02%) | |
| **Normal** | 29 (14.57%) | 16 (8.04%) | 21 (10.55%) | 18 (9.05%) | |
| **Abnormal** | 15 (7.54%) | 22 (11.06%) | 22 (11.06%) | 22 (11.06%) | |
| **Cranial MRI N (%)** | | | | | 0.57 |
| **Normal** | 35 (17.59%) | 27 (13.57%) | 38 (19.10%) | 30 (15.08%) | |
| **Abnormal** | 17 (8.54%) | 20 (10.05%) | 16 (8.04%) | 16 (8.04%) | |
| **Patient receiving antiseizure drug treatment N (%)** | | | | | 0.2 |
| **Monoteraphy** | 48 (24.12%) | 38 (19.10%) | 42 (21.11%) | 39 (19.60%) | |
| **Polyteraphy** | 4 (2.01%) | 9 (4.52%) | 12 (6.03%) | 7 (3.52%) | |

*EEG;Electroencephalogram, MRI; Magnetic resonance imaging, SD; Standart Deviation

In terms of treatments used during attacks, 167 patients (83.9%) were receiving monotherapy and 32 (16.1%) polytherapy. The most frequently used antiseizure drug in monotherapy was levetiracetam (57.8%), followed by valproic acid (16.6%). Patients receiving monotherapy were in the majority in all the lunar phases (new moon N=48, 24.12%, first quarter N=38, 19.10%, full moon N=42, 21.11%, third quarter N=39, 19.60%). No statistically significant variation was determined in terms of attack frequencies during the different lunar phases between patients receiving monotherapy and polytherapy (p=0.206). In terms of seizure types, the undetermined type was in the majority during the new moon (N=22, 11.06%), while generalized seizures predominated in the other phases (first quarter N=27, 13.57%, full moon N=25, 12.56%, third quarter N=17, 8.54%). Focal seizures were most frequent during the new moon phase (N=15, 7.54%). Evaluation of patients' cranial EEG and MRI findings revealed normal MRI findings (N=130, 65.3%) and pathological EEG (N=115, 57.8%) findings in most cases. MRI pathologies were most common in the first quarter (N=20, 10.05%) and EEG pathologies in the full moon (N=33, 16.59%). No significant difference was observed in seizure type, or MRI and EEG findings in terms of the lunar phases (p=0.113, p=0.575, and p=0.317, respectively) (Table 4)

## DISCUSSION

The lunar cycle and its potential effects on human health have attracted the interest of numerous researchers. This interest has been kept alive by the fact that the association and, if such exists, the effect mechanisms involved have not yet been explained. Both beliefs that have existed throughout the course of history and various scientific studies make it essential for the possible link, and the mechanism involved, between the lunar cycle and epilepsy to be investigated (Raison, Klein & Steckler, 1999). The present study investigated the potential association between the phases of the moon and epileptic attacks in patients presenting to the Balikesir University Medical Faculty Pediatric Neurology Clinic and diagnosed with epilepsy based on International League Against Epilepsy (ILAE) criteria.

Epileptic seizures are known to exhibit temporal patterns, the most frequently examined of which are the circadian rhythm and the sleep-wake cycle. Several researchers have investigated the effect of sleep on epileptic seizures and studies have shown that sleep deficiency triggers such seizures (Langdon-Down & Brain 1929; Shouse, Da Silva & Sammritano 1996). Sleep deficiency/deprivation has also been reported to cause seizure development even in asymptomatic individuals, and that it is highly likely to trigger seizures, especially within 48 hours of the onset of deficiency (Friis & Lund 1974; Rodin,1991) Sleep can be affected by many factors. Studies have shown that the lunar cycle also has an effect on it, and even that melatonin levels, which exhibit a sleep-related circadian rhythm, change during the full moon (Kalra, Agrawal & Sahay, 2012; Cajochen, Altanay-Ekici, Munch, Frey, Knoblauch & Wirz-Justice, 2013). Research has found that sleep efficiency decreases in the full moon, with less deep sleep and an increase in REM latency, and also a decrease in total sleep duration and subjective sleep quality (Kalra, Agrawal & Sahay, 2012; Turányi et al., 2014). Roosli et al. showed that healthy individuals sleep 20 minutes on average less during the full moon phase, and that morning fatigue is higher than during that phase (Roosli, Juni, Braun-Fahrlander, Brinkhof, Low & Egger, 2006). Researchers have therefore investigated whether or not this relative lack of sleep during the full moon phase is responsible for an increase in epileptic seizures (Raison, Klein & Steckler, 1999). However, due to the retrospective nature of our study, the relationship between epilepsy patients and sleep during the lunar cycle could not be examined.

The findings of studies of the relationship between the lunar cycle and epileptic seizures are inconsistent. Polychronopoulos et al. evaluated presentations to the emergency department due to epileptic seizures over a five-year period and detected a statistically significant increase in presentation rates during the full moon (Polychronopoulos et al., 2006) In contrast, Rüegg et al. evaluated rates of hospitalization in the intensive care unit for three years due to status epilepticus and found a statistically significant increase in the new moon quarter approximately 3-4 days after the new moon (Rüegg, Hunziker, Marsch & Schindler, 2008) Baxendale et al. also reported a negative correlation between numbers of seizures occurring in a special epilepsy unit and the fraction of the moon illuminated by the sun (Baxendale & Fisher, 2008).

However, in addition to studies supporting the idea of a relationship between the lunar cycle and epilepsy, others have observed no such association. In a three-year study conducted in an epilepsy observation center, Benbadis et al. reported finding no relationship between the phases of the moon and total numbers of seizures. However, they reported more epileptic seizures in the final quarter and psychogenic non-epileptic seizures in the full moon quarter (Benbadis, Chang, Hunter & Wang, 2004). Kim et al. also found no association between the lunar cycle and the frequency of febrile seizures, while similarly, in a study of 1710 cases, Wang et al. reported that seizures were equally distributed across the lunar phases, with no significant differences between them in terms of first seizure occurrence (Kim, Shim, Kang, Park, Jin & Lee, 2019; Wang, Boston, Lawn, & Seneviratne, 2022). In the present study, epileptic attack frequencies were 54 (27.1%) in the full moon quarter, 52 (26.1%) in the new moon quarter, 47 (23.6% in the first quarter, and 46 (23.1%) in the third quarter.

The importance and effects of circadian rhythm disorders and lunar cycles in the pathophysiology of several diseases, including epilepsy, have been investigated in recent years. Researchers have suggested that adjusting treatments in these diseases according to individual rhythms can optimize therapeutic management (Sion & Bégou, 2021). The present study investigated the relationship between the lunar cycle and the frequency of attacks in patients with epilepsy and the treatment received. The majority of our patients were receiving polytherapy and using different medications. The potential effect of the treatments administered in epilepsy could not therefore be evaluated in terms of chronopharmacology.

The existence of possible mechanisms and seizures being observed to occur mostly during the full moon in the literature increase the possibility of establishing a relationship between moonlight and epilepsy. However, the existence of studies, including the present research, in which this relationship could not be clearly demonstrated and in which contradictory results were obtained, raises the possibility that the frequency of epileptic seizures may be due to a random encounter with the lunar cycle occurring in four-week periods.

## CONCLUSION

In conclusion, the results of the present study suggest that there is no relationship between the lunar cycle and the frequency of epileptic attacks. However, this study is important because it examines the relationship between epilepsy treatment (poly/monotherapy) and lunar cycles. Further studies involving larger number of patients, and pharmacokinetic and pharmacodynamic parameters such as dosage, dose interval, and blood drug levels in addition to rhythmic periods and possible therapeutic and side-effects of medications used in treatment are now needed.

**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:** HA, OK, AI, IHB; **Material, methods and data collection:** HA, OK, AI, IHB; **Data analysis and comments:** HA, OK, AI, IHB; **Writing and corrections:** HA, OK, AI, IHB.

## 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/nejm 197901113000223.

Baxendale, S., & Fisher, J. (2008) Moonstruck? The effect of the lunar cycle on seizures. *Epilepsy & Behavior, 13(3),* 549-50. https://doi.org/10.1016/j.yebeh. 2008.06.009.

Benbadis, S.R., Chang, S., Hunter, J., & Wang W. (2004) The influence of the full moon on seizure frequency: myth or reality? *Epilepsy & Behavior, 5,* 596–7. https://doi.org/10.1016/j.yebeh.2004.04.001.

Bevington, M. (2015) Lunar biological effects and the magnetosphere. *Pathophysiology 22(4)*, 211–22. https://doi.org/10.1016/j.pathophys.2015.08.00 5.

Bruno, E., Bartoloni, A., Sofia, V., Rafael, F., Magnelli, D., Ortiz, E., et al (2011) Sociocultural dimension of epilepsy: an anthropological study among Guarani communities in Bolivia—an International League Against Epilepsy/International Bureau for Epilepsy/World Health Organization Global Campaign against Epilepsy regional project. *Epilepsy & Behavior, 22(2)*, 346–51. https://doi.org/10.1016 /j.yebeh.2011.07.012.

Cajochen, C., Altanay-Ekici, S., Munch, M., Frey, S., Knoblauch, V. & Wirz-Justice, A. (2013) Evidence that the lunar cycle influences human sleep. *Current Biology: CB 23(15),* 1485–1488. https://doi.org/10. 1016/j.cub.2013.06.029.

Calver, L.A., Stokes, B.J. & Isbister, G.K. (2009) The dark side of the moon. *Medical Journal of Australia, 191(11-12),* 692–4. https://doi.org/10.5694/j.1326-5377.2009.tb03385.x.

Chakraborty, U. (2014) Effects of different phases of the lunar month on humans. *Biological Rhythm Research, 3(45),* 383-96.

Eisenburger, P., Schreiber, W., Vergeiner, G., Sterz, F., Holzer, M., Herkner, H., Havel, C., & Laggner, A. N. (2003). Lunar phases are not related to the occurrence of acute myocardial infarction and sudden cardiac death. *Resuscitation*, *56*(2), 187–189. https://doi.org/ 10. 1016/ s0300-9572(02)00298-8

Elger, C. E., & Schmidt, D. (2008). Modern management of epilepsy: a practical approach. *Epilepsy & Behavior:E&B*, *12*(4),501–539. https://doi.org/10.10 16/j.yebeh.2008.01.003

Friis, M.L. & Lund, M. (1974) Stress convulsions. *Archives of Neurology, 31*(3), 155–159. https://doi.org/10.1001/archneur.1974.00490390037002

Gorvin, J. J., & Roberts, M. S. (1994). Lunar phases and psychiatric hospital admissions. *Psychological Reports*, *75*(3 Pt 2), 1435–1440. https://doi.org/10.2466/pr0.1994.75.3f.1435.

Kalra, S., Agrawal, S., & Sahay, M. (2012) The Reno-pineal axis: A novel role for melatonin. *Indian Journal of Endocrinology and Metabolism, 16,* 192-94. https://doi.org/10.4103/2230-8210.93735.

Kim, S.H., Shim, H.S., Kang, S.M., Park, H., Jin, M.H., & Lee, J.H. (2019) Are there effects of lunar cycle on pediatric febrile seizure?: A single-center retrospective study (2005-2018). *Science of The Total Environment, 20;* 589-94. https://doi.org/10.1016/j. scitotenv.2019.07.077.

Langdon-Down, M., & Brain, W.R, (1929) Times of day in relation to convulsions in epilepsy. *The Lancet 213(5516),*1029-32.

Mason, T. (1997) Seclusion and the lunar cycles. *Journal of Psychosocial Nursing and Mental Health Services, 35*, 14–8. https://doi.org/10.3928/0279-3695-19970601-17.

Myers, D.E. (1995) Gravitational effects of the period of high tides and the new moon on lunacy. *Journal of Emergency Medicine, 13(4),* 529-32. https://doi.org/10.1016/0736-4679(95)80013-1.

Nissani, M. (1994). Phases of the Moon, Science Activities, 31:3, 26-29, DOI: 10.1080/00368121.1994.10113146

Oliven, J.F. (1943) Moonlight and nervous disorders: a historical study. *American Journal of Psychiatry, 99,* 579-584.

Owens, M., & McGowan, I.W. (2006) Madness and the moon: the lunar cycle and psychopathology. *German Journal of Psychiatry, 9,* 123–7.

Polychronopoulos, P., Argyriou, A.A., Sirrou, V., Huliara, V., Aplada, M., Gourzis, P., et al (2006) Lunar phases and seizure occurrence: just an ancient legend? *Neurology 66,* 1442–3. https://doi.org/10.1212/01.wnl.0000210482.75864.e8.

Raison, C.L., Klein, H.M., & Steckler, M. (1999) The moon and madness reconsidered. *Journal of Affective Disorders, 53,* 99–106. https://doi.org/10.1016/s0165-0327(99)00016-6.

Rodin, E. (1991) Sleep deprivation and epileptological implications. *Epilepsy Research Suppl. 2*, 265-73.

Roosli, M., Juni, P., Braun-Fahrlander, C., Brinkhof, M.W., Low, N., & Egger, M. (2006) Sleepless night, the moon is bright: longitudinal study of lunar phase and sleep. *Journal of Sleep Research ,15*(2), 149–53. https://doi.org/10.1111/j.1365-2869.2006.00 520.x

Rüegg, S., Hunziker, P., Marsch, S., & Schindler, C. (2008) Association of environmental factors with the onset of status epilepticus. *Epilepsy & Behavior, 12,*66–73. https://doi.org/10.1016/j.yebeh.2007. 08.020,

Shouse, M.N., Da Silva, A.M., & Sammritano, M. (1996) Circadian rhythm, sleep and epilepsy. *Journal of Clinical Neurophysiology, 13,* 32–50. https://doi.org/10.1097/00004691-199601000-00004.

Sion, B., & Bégou, M. (2021) Can chronopharmacology improve the therapeutic management of neurological diseases? *Fundamental & Clinical Pharmacology, 35(3),* 564-81. https://doi.org/10. 1111 /fcp.12659.

Temkin, O. Falling sickness: a history of epilepsy from the Greeks to the beginnings of modern neurology. 2nd ed. Baltimore: Johns Hopkins University Press; 1994.

Turányi, C.Z., Rónai, K.Z., Zoller, R., Véber, O., Czir,a M.E., Újszászi, A., et al (2014) Association between lunar phase and sleep characteristics. *Sleep Medicine, 15*(11),1411–6. https://doi.org/10.1016/j.sleep.2014.06.020.

Vance, D.E. (1995) Belief in lunar effects on human behavior. *Psychological Reports, 76*(1), 32–34. https://doi.org/10.2466/pr0.1995.76.1.32

Vul, F.R. (1976) Lunar rhythms in the course of epileptic process. *Zhurnal Nevrologii i Psikhiatrii imeni S.S. Korsakova, 76,* 1875–79.

Wang, S., Boston, R., Lawn, N., & Seneviratne, U. (2022) Revisiting an ancient legend: influence of the lunar cycle on occurrence of first-ever unprovoked seizures. *Journal of Internal Medicine, 52(6),*1057-60. https://doi.org/10.1111/imj.15135.

**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.1329307

# The Relationship between Anxiety Levels and Menstruation Symptoms in Adolescents

Figen TURK DUDUKCU[1], Berna BAYIR[2]

[1] Pamukkale University, Faculty of Health Sciences, Department of Nursing
[2] KTO Karatay University, Faculty of Health Sciences, Department of Nursing

***Geliş Tarihi / Received:*** *18.07.2023,* ***Kabul Tarihi / Accepted:*** *08.12.2023*

**ABSTRACT**
**Objective:** The aim of the study is to determine the relationship between anxiety levels and menstrual symptoms in adolescents. **Material and Methods:** The research is a descriptive and relationship-seeking research. 602 adolescents studying in two schools were invited to the study. The sample group of the study consisted of 544 adolescents who agreed to participate in the research. Data was collected using a personal information form, Menstrual Symptom Questionnaire, and Beck Anxiety Inventory. The relationship between two continuous variables was evaluated with the Pearson Correlation Coefficient. Statistical significance level was considered as $p<0.05$. **Results:** The BAI Subjective Anxiety subscale mean score was 28.49±8.28, the Somatic Symptom subscale mean score was 17.16±5.60, and the total mean score was 45.65±13.07. MSQ Negative effects/somatic complaints subscale mean score 33.75±10.59, pain subscale mean score 20.92±6.74, coping subscale mean score 62.64±18.59, and total mean score was 117.36±34.44. **Conclusion:** There is a positive, moderate level and statistically significant relationship between Menstrual Symptom Questionnaire total score and Beck Anxiety Inventory total score. Anxiety level does affect menstrual symptoms in adolescents.
**Keywords:** Adolescent, Anxiety, Menstrual Symptoms, Nurse.

# Adolesanlarda Anksiyete Düzeyleri ile Menstruasyon Semptomları Arasındaki İlişki

**ÖZ**
**Amaç:** Bu araştırmanın amacı, adolesanlarda anksiyete düzeyi ile menstruasyon belirtileri arasındaki ilişkiyi incelemektir. **Gereç ve Yöntem:** Araştırma, tanımlayıcı ve ilişki arayıcı bir araştırmadır. İki okulda öğrenim gören 602 adolesan araştırmaya davet edildi. Araştırmaya katılmayı kabul eden 544 adolesan araştırmanın örneklem grubunu oluştudu Veriler kişisel bilgi formu, Menstruasyon Semptom Ölçeği ve Beck Anksiyete Envanteri kullanılarak toplandı. İki sürekli değişken arasındaki ilişki Pearson Korelasyon Katsayısı ile değerlendirildi. $p<0.05$ düzeyi istatistiksel olarak anlamlı kabul edildi. **Bulgular:** Beck Anksiyete Ölçeği Öznel Anksiyete alt boyutu puan ortalaması 28.49±8.28, Bedensel Belirti alt boyutu puanı ortalaması 17.16±5.60 ve toplam puan ortalaması 45.65±13.07 idi. Mensturasyon Semptom Anketi Olumsuz etkiler/bedensel yakınmalar alt boyutu puan ortalaması 33.75±10,59, ağrı alt boyutu puanı ortalaması 20.92±6.74, başa çıkma alt boyutu puanı ortalaması 62.64±18.59 ve toplam puanı 117.36±34.44 idi. **Sonuç:** Menstrual Semptom Ölçeği toplam puanı ile Beck Anksiyete Ölçeği toplam puanı arasında pozitif, orta düzey ve istatistiksel olarak anlamlı bir ilişki vardır. Anksiyete düzeyi adolesanlarda menstruasyon semptomlarını etkilemektedir.
**Anahtar Kelimeler:** Adolesan, Anksiyete Düzeyi, Menstruasyon Belirtileri, Hemşire.

***Sorumlu Yazar / Corresponding Author:*** Figen TÜRK DÜDÜKCÜ, Pamukkale University, Faculty of Health Sciences, Department of Nursing, Denizli, Turkey
***E-mail:*** figenturkdudukcu@gmail.com

***Bu makaleye atıf yapmak için / Cite this article:*** Turk Dudukcu., F., & Bayir, B. (2024). The relationship between anxiety levels and menstruation symptoms in adolescents. *BAUN Health Sci J, 13*(1), 112-118.
https://doi.org/10.53424/balikesirsbd.1329307

## INTRODUCTION

Menstruation, which starts with menarche and ends with menopause, is an integral part of women's health (Thiyagarajan, Basit, & Jeanmonod, 2021). The normal duration of menstrual bleeding is 3-5 days, but it is also normal for a woman to be as short as 1 day and as long as 8 days (Mínguez-Alarcón et al., 2022; Thiyagarajan et al., 2021). Menstruation affects physical, mental and social well-being in millions of women worldwide (Critchley et al., 2020). Attitudes towards menstruation are shaped by personal experience, knowledge, social learning, and cultural beliefs (Wong & Khoo, 2011). Menarche and menstrual management are frequently associated with concepts of privacy, fear, embarrassment, sexual vulnerability, positive/negative attitudes, myths and taboos, and sociocultural constraints in low- and middle-income countries, according to a coverage review examining puberty and menstruation among young adolescents (Coast, Lattof, & Strong, 2019). Most research focuses on the negative aspects of menstruation and premenstrual experiences (Munro et al., 2021; Siahbazi et al., 2018).

About half of women experience emotional symptoms during the premenstrual period. Other common menstrual disorders are dysmenorrhea and irregular menstrual bleeding (Direkvand-Moghadam et al., 2014). Studies have reported that the prevalence of menstrual symptoms is high, and the most prominent symptoms are dysmenorrhea, psychological complaints, and fatigue (Schoep et al., 2019). In another study, it was found that menstrual cycle irregularity shortens sleep time and causes depressive mood in adolescents (Nam, Han, & Lee, 2017), and there is a relationship between menstrual pain and depression (Takeuchi, Oishi, & Harada, 2005). Anxiety is the most common mental disorder among adolescents. The anxiety rate among adolescents in the United States is very high and continues to rise over time (Goodwin et al, 2020; Merikangas et al., 2010). Anxiety rates are higher in girls than boys (De France, Hancock, Stack, Serbin, & Hollenstein, 2022; Ho, Dai, Mak, Liu, & Psychology, 2018). Being exposed to negative psychosocial experiences such as anxiety at an early age increases the susceptibility to permanent emotional, immune system and metabolic diseases in later life (Danese et al., 2009). It is important to provide early interventions in hopes to mitigate anxiety symptoms to alleviate the problems that may arise in the following years (Ho et al., 2018). The aim of the study is to determine the relationship between anxiety levels and menstrual symptoms in adolescents.

### Research questions

What is the level of anxiety in adolescents?

What is the level of menstrual symptoms in adolescents?

What is the relationship between anxiety level and menstrual symptoms in adolescents?

## MATERIALS AND METHODS

### Type of research

This research is a cross-sectional research type that looks for a relationship from descriptive research.

### Place and time of research

The research was conducted with 12th grade female students studying in four high schools in a city located in Central Anatolia. Interviews with students for the research were held between 20 April and 30 May 2022. 12th-grade students in Turkey are in an intense preparation period for the university exam. Therefore, the 12th grade period is a year when anxiety can be high for students. Therefore, data were collected from 12th grade students.

### Sample design

The population of the study consisted of 12th grade students of four high schools in two different central districts of Konya province. It was determined that the population size of the research consisted of 602 adolescents. Sample selection was not made in the study and all students enrolled in the 12th grade of four high schools in the 2021-2022 academic year and who met the inclusion criteria were included in the study. 544 adolescents (n=544) who agreed to participate in the research formed the sample group of the research. The rate of participation in the research was 90.3%.

### Dependent and independent variables

The age of the adolescents, the education level of the parents, the age of the first menstruation, the menstrual cycle interval, the duration of menstruation, and the level of anxiety were independent variables, whereas menstrual symptoms were dependent variables.

### Data collection

Personal Information Form: Socio-demographic questions consisted of the adolescents' age, income level, mother's education level, father's education level, family type, age at menarche, menstruation pattern, how often menstruation occurs, how many days the menstruation period is, and anxiety level. It consisted of 10 questions containing personal information.

Beck Anxiety Inventory (BAI): This scale used in the research is used to determine the level of anxiety in individuals. The scale items are four-point Likert type and consist of 21 items. Scale items are scored between 0 and 3 points. A high score on the scale indicates that the anxiety level of the participant is high. A score between 0 and 7 points defines a minimal or normal anxiety level, a score between 8 and 15 points indicates a mild anxiety level, a score between 16 and 25 points indicates a moderate anxiety level, and a score between 26 and 63 points indicates a severe anxiety level. The Turkish validity and reliability study of the scale was conducted by Ulusoy et al. in 1998. It was determined that the scale has sufficient validity and reliability for use in our country. The internal consistency coefficient value for the BAI total score is 0.905 (Ulusoy, Şahin, & Erkmen 1998).

Menstrual Symptom Questionnaire (MSQ): The scale was first developed by Chesney and Tasto (1975) to assess menstrual pain and symptoms. Cronbach's Alpha value of the scale is 0.86 (Chesney & Tasto 1975). The scale was adapted to Turkish by Güvenç et al. (2014) (Guvenc, Seven, & Akyüz, 2014). Consisting of 22 items, this scale is a five-

point Likert-type scale. The items in the scale are scored between 1 and 5 points. The adolescents who participated in the study scored "never" as 1 and "always" as 5 according to the symptoms they experienced related to menstruation. The higher the average score obtained from the scale, the higher the severity of menstrual symptoms. Items 1-13 were included in the "Negative effects/somatic complaints" sub-dimension, items 14-19 were included in the "Menstrual pain symptoms" sub-dimension, and items 20-22 were included in the "Coping methods" sub-dimension. The scores obtained from the sub-dimensions of the scale indicate the severity of menstrual symptoms in that sub-dimension. The internal consistency value of the total score obtained from the MSQ is 0.917.

Data collection: The questionnaire was applied face-to-face by the researchers in the schools. In order to enable face-to-face interviews, only female students were asked not to leave the classroom after the end of each lesson. Questionnaires were distributed by the researchers while the students were in their classrooms. These forms, which are self-reported questionnaires, were answered by each student by reading them. Data collection for a class took an average of 10-15 minutes.

**Statistical analyses of data**

The data obtained from adolescents were analysed using SPPS 25 software. Descriptive statistics were given for continuous and categorical variables. The normal distribution between the variables was analysed by "Shapiro-Wilk" and the homogeneity of the distribution was analysed by Levene's test. Pearson Correlation analysis was used to determine the correlation between two variables with normal distribution, and variables without normal distribution were evaluated by Spearman Correlation Coefficient. $p<0.05$ level was considered statistically significant.

**Ethical considerations**

Before the study was started, ethics committee approval number 04 was obtained from the institutional ethics committee of Karatay University on 15.04.2022 (2022/013). Verbal and written permission was obtained from the high school principals. A statement was made that the adolescents were free to participate or not participate in the research. After the adolescents participating in the study and their families were informed about the research, verbal and written consent was obtained. While conducting the research, the Declaration of Helsinki was followed.

**RESULTS**

The statistical results of the data obtained from 544 adolescents participating in the study were determined. It was determined that the mean age of the adolescents participating in the research was 17.60±0.70, the mean age of menarche were 13.32±1.18. It was observed that 77.60% of the adolescents lived in a nuclear family, 72.10% of their mothers and 50.70% of their fathers had a primary school graduation at most. When the income level was evaluated, it was determined that 64% of them were equal to their expenses. 70.20% of the participants stated that their menstruation was in a regular period, 28% consulted a doctor because of a problem related to menstruation, 61.40% stated that the menstrual frequency ranged between 21-28 days, and 76.80% stated that their period of menstruation ranged from 5-7 days. Adolescents were asked to evaluate their perceptions of their anxiety level, and 63.60% of them stated their anxiety as moderate (Table 1).

BAI and MSQ total scores and sub-dimensions scores are given in Table 2. Accordingly, the BAI Subjective Anxiety sub-dimension mean score was 28.49±8.28, the Somatic Symptom sub-dimension mean score was 17.16±5.60, and the total score average was 45.65±13.07. MSQ Negative effects/somatic complaints subscale mean score 33.75±10.59, Menstrual pain symptoms subscale mean score 20.92±6.74, Coping methods subscale mean score 62.64±18.59, and total score mean 117.36±34.44 (Table 2).

In Table 3, there is a statistically significant positive correlation between BAI and its sub-dimensions ($p<0.001$). The correlation between the scale total score and the subjective anxiety sub-dimension is higher. There was a high level of statistically significant positive correlation between MSQ and its sub-dimensions ($p<0.001$). It was determined that the highest correlation between MSQ total score and its sub-dimensions was between coping methods, and the lowest relationship was between menstrual pain symptoms. There was a positive, moderate and statistically significant correlation between MSQ total score and BAI total score ($p<0.001$) (Table 3).

**Table 1. Socio-demographic Characteristics of the Participants (n=544).**

| | Frequencies | | | Frequencies | |
|---|---|---|---|---|---|
| **Variables** | **Mean±SD** | **Min-Max** | **Variables** | **Mean±SD** | **Min-Max** |
| **Age, years** | 17.60 ±0.70 | 15-20 | **Age of menarche** | 13.32 ± 1.18 | 10-16 |
| | **n** | **%** | | **n** | **%** |
| **Family type** | | | **Seeing a doctor for menstrual complaints** | | |
| Nuclear family | 422 | 77.6 | | | |
| Extended family | 98 | 18.0 | Yes | 152 | 28 |
| Single Parent family | 24 | 4.4 | No | 392 | 72 |

**Table 1. (Continue) Socio-demographic Characteristics of the Participants (n=544).**

| | | | | | |
|---|---|---|---|---|---|
| **Mother's education level** | | | **Menstruation frequency (days)** | | |
| Primary school | 392 | 72.1 | 15-20 | 100 | 18.4 |
| Middle School | 84 | 15.4 | 21-28 | 344 | 61.4 |
| High school | 44 | 8.1 | Longer than 28 days | 110 | 20.2 |
| Licence | 24 | 4.4 | | | |
| **Father's education level** | | | **Period of menstruation (day)** | | |
| Primary school | 276 | 50.7 | 3-4 | 70 | 12.9 |
| Middle School | 128 | 23.5 | 5-7 | 418 | 76.8 |
| High school | 96 | 17.6 | 8-10 | 52 | 9.6 |
| Licence | 44 | 8.1 | Longer than 10 days | 4 | 0.7 |
| **Income perception** | | | **Anxiety level perception** | | |
| Less income | 118 | 21.7 | Light | 106 | 19.5 |
| Equal income | 348 | 64.0 | Middle | 346 | 63.6 |
| More income | 78 | 14.3 | Severe | 92 | 16.9 |
| **Menstruation pattern** | | | | | |
| Regular | 382 | 70.2 | | | |
| Irreguler | 162 | 29.8 | | | |
| **Total** | **544** | **100** | **Total** | **544** | **100** |

*Summary statistics are given as mean±standard deviation, minimum-maximum value*

**Table 2. BAI and MSQ total scores and sub-dimensions scores (n=544).**

| Scales and sub-dimensions | Mean±SD | Min-Maks | Cronbach's Alpha |
|---|---|---|---|
| Subjective Anxiety | 28.49±8.28 | 14.00-50.00 | 0.85 |
| Somatic Symptom | 17.16±5.60 | 8.00-32.00 | 0.82 |
| BAI Total Score | 45.65±13.07 | 22.00-80.00 | 0.91 |
| Negative effects/somatic complaints | 33.75±10.59 | 12.00-60.00 | 0.87 |
| Menstrual pain symptoms | 20.92±6.74 | 6.00-30.00 | 0.85 |
| Coping methods | 62.64±18.59 | 21.00-103.00 | 0.76 |
| MSQ Total Score | 117.36±34.44 | 39.00-191.00 | 0.92 |

*Summary statistics are given as mean±standard deviation, minimum-maximum value, Cronbach's Alpha.*

**Table 3. Relationship Between BAI, MSQ and Sub-Dimensions (n=544).**

| | | Subjective anxiety | Somatic symptom | BAI Total Score | Negative effects/somatic complaints | Menstrual pain symptoms | Coping methods | MSQ Total Score |
|---|---|---|---|---|---|---|---|---|
| **Somatic symptom** | r | 0.767** | 1 | 0.914** | 0.417** | 0.386** | 0.434** | 0.437** |
| | p | 0.000 | | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| **BAI Total Score** | r | 0.962** | 0.914** | 1 | 0.448** | 0.427** | 0.469** | 0.474** |
| | p | 0.000 | 0.000 | | 0.000 | 0.000 | 0.000 | 0.000 |
| **Negative effects/somatic complaints** | r | 0.426** | 0.417** | 0.448** | 1 | 0.693** | 0.936** | 0.948** |
| | p | 0.000 | 0.000 | 0.000 | | 0.000 | 0.000 | 0.000 |
| **Menstrual pain symptoms** | r | 0.413** | 0.386** | 0.427** | 0.693** | 1 | 0.871** | 0.878** |
| | p | 0.000 | 0.000 | 0.000 | 0.000 | | 0.000 | 0.000 |
| **Coping methods** | r | 0.447** | 0.434** | 0.469** | 0.936** | 0.871** | 1 | 0.997** |
| | p | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | | 0.000 |
| **MSQ Total Score** | r | 0.452** | 0.437** | 0.474** | 0.948** | 0.878** | 0.997** | 1 |
| | p | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | |

**p<0.05; **p<0.001 1: Pearson Correlation Coefficient (r); Summary statistics are given as r (p) values.*

## DISCUSSION

This research was conducted with female adolescents who are preparing for university entrance exams in Turkey, and therefore these adolescents are under intense stress. Adolescents in Turkey go through a tough exam process at the end of high school in grade 12 for university placement. Families and society expect young people to achieve a high score in order to be placed into a competitive program in a good university. It has been estimated that being in the adolescence period, going through the COVID-19 process, and/or preparing for the university exam may be the reasons that may cause anxiety in younger individuals, or it may increase existing anxiety levels. The aim of the study is to determine the relationship between anxiety levels and menstrual symptoms in adolescents.

In the study, it was found that the majority of the participants had regular menstrual cycles and the menstruation period continued for 5-7 days, and more than half of the subjects started the process every 21-28 days. Our research results are similar to the results of studies conducted with adolescent women (Öztürk & Güneri 2021; Rabiepoor, Valizadeh, & Barjasteh, 2017) In our study, adolescents were asked to determine their own anxiety levels. The vast majority of adolescents stated their anxiety as moderate. However, it was found that they had severe anxiety level (45.65±13.07) according to their BAI score. This is important because it shows that adolescents are not aware of how severe their anxiety level is. In the study, nearly one-third of the participants reported that they consulted a doctor because of menstruation complaints. Our research results are similar to the study results of Öztürk & Er Güneri (2021).

In the study, it was found that the mean BAI scale total score of the participants was 45.65±13.07, the average of the subjective anxiety sub-dimension was 28.49±8.28, and the mean of the somatic symptom sub-dimension was 17.16±5.60. Accordingly, the anxiety levels of the adolescents participating in our study were quite high. A study found that there is a relationship between premenstrual symptoms and anxiety level (Topel & Pehlivan, 2021).

In the study, it was found that the MSQ total score average of the participants was 117.36±34.44, the Negative effects/somatic complaints sub-dimension was 33.75±10.59, the menstrual pain symptoms sub-dimension was 20.92±6.74, and the coping methods sub-dimension was 62.64±18.59. In a study, the mean MSQ score was calculated as 69.84±15.48, Negative effects/somatic complaints sub-dimension 40.96±9.64, menstrual pain symptoms sub-dimension 21.06±5.18, coping methods sub-dimension 7.78±3.31 and it was interpreted that menstruation symptoms were severe. Accordingly, the adolescents participating in our study have a much higher menstruation symptom severity, but their coping methods sub-dimension mean scores are also much higher. It can be said that the adolescents participating in our study were able to cope with the symptoms they experienced. No significant relationship was found between the level of education of the parents, family type, income perception, frequency and duration of menstruation, and the mean MSQ score of the adolescents. In a study, it was found that there was a significant relationship between the education level of the mother, the education level of the father, and the MSQ score averages (Öztürk & Güneri 2021). In the study, there was a strong positive correlation between the MSQ total score and its sub-dimensions ($p<0.05$). There was a strong positive correlation between the BAI total score and its sub-dimensions ($p<0.05$). In the study, the sample group was selected from the group studying for the university exam, which has a very high stress factor especially for adolescents. As expected at the beginning of the research, the anxiety level of the adolescents was very high. Moderate, positive correlations were found between MSQ total score and BAI total score ($p<0.05$). This finding is important as it shows that the level of anxiety in adolescents does affect menstrual symptoms. This finding is important as it shows that the level of anxiety in adolescents does affect menstrual symptoms.

## CONCLUSION

Adolescents experience menstrual symptoms and anxiety symptoms at high levels. There is a moderate relationship between menstrual symptoms and anxiety symptoms. It is recommended to conduct studies showing the extent to which menstrual symptoms affect anxiety symptoms. Public health nurses and pediatric nurses should provide counseling and care to adolescents regarding menstrual symptoms and coping methods.

### Strengths

The strength of the research is that the research data were collected from four high schools at different levels in the central districts of a large city in Central Anatolia.

### Limitation of study

There were limitations of our study. Firstly, the sample size of this study was not large enough to generalize the data extracted. Not using a method for sample selection in the research is a limitation. The presence of the Covid-19 pandemic may have been a confounding factor for the level of anxiety. In addition, participants' answers were identified by surveys, so findings were dependent on participants' statements.

### Conflict of Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

### Author Contributions

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

**REFERENCES**


Chesney, M. A. and Tasto, D. L. (1975). The development of the menstrual symptom questionnaire. *Behavior Research & Therapy, 13*(4), 237 – 244 . https://doi.org/10.1016/0005-7967(75 )90028-5.

Critchley, H. O., Babayev, E., Bulun, S. E., Clark, S., Garcia-Grau, I., Gregersen, P. K., & Griffith, L. G. (2020). Menstruation: science and society. *American Journal of Obstetrics and Gynecology, 223*(5), 624-664. https://doi.org/10.1016/j.ajog. 2020.06.004.

Coast, E., Lattof, S. R., & Strong, J. (2019). Puberty and menstruation knowledge among young adolescents in low-and middle-income countries: a scoping review. *International Journal of Public Health, 64*(2), 293-304. https://doi.org/10.1007/s00038-019-01209-0.

Danese, A., Moffitt, T. E., Harrington, H., Milne, B. J., Polanczyk, G., Pariante, C. M., ... & Caspi, A. (2009). Adverse childhood experiences and adult risk factors for age-related disease: depression, inflammation, and clustering of metabolic risk markers. *Archives of Pediatrics & Adolescent Medicine, 163*(12), 1135-1143. https://doi.org/10. 1001 /archpediatrics.2009.214.

De France, K., Hancock, G. R., Stack, D. M., Serbin, L. A., & Hollenstein, T. (2022). The mental health implications of COVID-19 for adolescents: Follow-up of a four-wave longitudinal study during the pandemic. *American Psychologist, 77*(1), 85. https://doi.org/10.1037/amp0000838.

Direkvand-Moghadam, A., Sayehmiri, K., Delpisheh, A., & Kaikhavandi, S. (2014). Epidemiology of premenstrual syndrome (PMS)-a systematic review and meta-analysis study. *Journal of Clinical and Diagnostic Research: JCDR, 8*(2), 106. https://doi.org/10.7860/JCDR/2014/8024.4021.

Goodwin, R. D., Weinberger, A. H., Kim, J. H., Wu, M., & Galea, S. (2020). Trends in anxiety among adults in the United States, 2008–2018: Rapid increases among young adults. *Journal of Psychiatric Research, 130,* 441-446. https://doi.org/10.1016 /j.jpsychires.2020.08.014.

Güvenç, G., Seven, M., & Akyüz, A. (2014). [Adaptation of the Menstrual Symptom Questionnaire into Turkish. TAF Preventive Medicine Bulletin, 13(5).

Ho, S. M., Dai, D. W. T., Mak, C., Liu, K. W. K. J. I. j. o. c., & psychology, h. (2018). Cognitive factors associated with depression and anxiety in adolescents: A two-year longitudinal study. *International Journal of Clinical and Health Psychology:IJCHP, 18*(3), 227-234. https://doi.org/10.1016/j.ijchp.2018 .04. 001.

Merikangas, K. R., He, J. P., Burstein, M., Swanson, S. A., Avenevoli, S., Cui, L., Benjet, C., Georgiades, K., & Swendsen, J. (2010). Lifetime prevalence of mental disorders in U.S. adolescents: results from the National Comorbidity Survey Replication--Adolescent Supplement (NCS-A). *Journal of the American Academy of Child and Adolescent Psychiatry, 49*(10), 980–989. https://doi.org/10.1016/j.jaac.2010.05.017.

Mínguez-Alarcón, L., Rifas-Shiman, S. L., Soria-Contreras, D. C., Hivert, M.-F., Shifren, J., Oken, E., & Chavarro, J. E. J. M. (2022). Self-reported menstrual cycle length during reproductive years in relation to menopausal symptoms at midlife in *Project Viva. 29*(10), 1130-1136. https://doi.org/10.1097/GME.0000000000002042.

Munro, A. K., Hunter, E. C., Hossain, S. Z., & Keep, M. (2021). A systematic review of the menstrual experiences of university students and the impacts on their education: a global perspective. *PLoS One, 16*(9), e0257333. https://doi.org/10.1371/journal. pone.0257333.

Nam, G. E., Han, K., & Lee, G. (2017). Association between sleep duration and menstrual cycle irregularity in Korean female adolescents. *Sleep Medicine*, *35*, 62-66. https://doi.org/10.1016/j. sleep.2017.04.009.

Öztürk, R., & Güneri, S. E. (2021). Symptoms experiences and attitudes towards menstruation among adolescent girls. *Journal of Obstetrics and Gynaecology, 41*(3), 471-476. https://doi.org/10. 1080/01443615.2020.1789962.

Rabiepoor, S., Valizadeh, R., & Barjasteh, S. (2017). Study of menstrual attitudes and knowledge among postmenarcheal students, in Urmia, North West of Iran. *International Journal of Pediatrics, 5*(5), 4991-5001. https://doi.org/10.22038/ijp.2017.2190 5.1831.

Schoep, M. E., Nieboer, T. E., van der Zanden, M., Braat, D. D., & Nap, A. W. (2019). The impact of menstrual symptoms on everyday life: a survey among 42,879 women. *American Journal of Obstetrics and Gynecology, 220*(6), 569-e1. https://doi.org/10.1016/j.ajog.2019.02.048.

Siahbazi, S., Montazeri, A., Taghizadeh, Z., & Masoomie, R. (2018). The consequences of premenstrual syndrome on the quality of life from the perspective of affected women: a qualitative study. *Journal of Research in Medical and Dental Science, 6*(2), 284-292. https://doi.org/10.5455 /jrmds.20186243.

Takeuchi, H., Oishi, T., & Harada, T. (2005). Association between moringness-eveningness preference and mental/physical premenstrual symptoms in Japanese females 12 to 31 years of age. *Chronobiology İnternational, 22*(6), 1055–1068. https://doi.org/10.1080/07420520500398007.

Topel, M., & Pehlivan, M. (2021). Evaluation of Premenstrual Syndrome Frequencies and Nutritional Habits of Female Students in The Faculty of Health Sciences. KTO Karatay University Journal of Health Sciences, 2(3), 84-96.

Thiyagarajan, D. K., Basit, H., & Jeanmonod, R. (2021). Physiology, menstrual cycle. In StatPearls [Internet]: StatPearls Publishing.

Ulusoy, M., Sahin, N. H., & Erkmen, H. (1998). Turkish version of the Beck Anxiety Inventory: psychometric properties. *Journal of Cognitive Psychotherapy, 12*(2), 163.

Wong, L. P., & Khoo, E. M. (2011). Menstrual-related attitudes and symptoms among multi-racial Asian adolescent females. *International Journal of Behavioral Medicine, 18*(3), 246–253. https://doi.org/10.1007/s12529-010-9091-z.

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.1221224

# Determination of Sexual Functioning and Factors Affecting Sexual Functions of Women Following Abdominal and Vaginal Hysterectomy

Sibel PEKSOY KAYA[1], Füsun TERZİOĞLU[2]

[1] Ankara Yıldırım Beyazıt University, Faculty of Health Sciences, Department of Nursing
[2] Avrasya University, Rector, Faculty of Health Sciences, Department of Midwifery

***Geliş Tarihi / Received:*** *19.12.2022,* ***Kabul Tarihi / Accepted:*** *18.10.2023*

**ABSTRACT**
**Objective:** The study was designed as an analytic and descriptive study to determine sexual functioning and the factors affecting sexual functions in women undergoing abdominal and vaginal hysterectomy. **Materials and Methods:** Based on the power calculation, 120 women (Abdominal hysterectomy=60; Vaginal hysterectomy=60) were included in the study. The study data were collected using "Demographic and Individual Information Form", "Female Sexual Function Index (FSFI)", and "Beck Depression Inventory (BDI)". **Results:** The mean FSFI scores were similar in women who underwent abdominal hysterectomy (22.73±6.94) and vaginal hysterectomy (20.84±8.22) ($p>0.05$). There was a significant relationship between the mean FSFI score and age, menopausal status, and changes in sexual life after hysterectomy in women in both groups ($p<0.05$). In women undergoing hysterectomy, there was a negative correlation between FSFI and BDI scores ($p<0.05$). **Conclusion:** The mean FSFI score of women who had abdominal and vaginal hysterectomy were similar. In both types of hysterectomy, depression, advanced age and being in menopause affected sexual function negatively. For this reason, it is thought that it is significant increase of the variables that may affect women's sexuality (i.e. age, menopause, depression, etc.) and to inform women about their sexual lives in this process, in the training and counseling services that health care professionals will provide for both hysterectomy groups.
**Keywords:** Abdominal Hysterectomy, Vaginal Hysterectomy, Sexuality, Depression.

# Abdominal and Vajinal Histerektomi Sonrası Kadınların Cinsel İşlev Durumlarının ve Etkileyen Faktörlerin Belirlenmesi

**ÖZ**
**Amaç:** Bu çalışma, abdominal ve vajinal histerektomi sonrası kadınların cinsel işlev durumlarını ve etkileyen faktörleri belirlemek amacıyla analitik ve tanımlayıcı olarak yapıldı. **Gereç ve Yöntem:** Güç hesaplamasına göre 120 kadın (Abdominal histerektomi=60; Vajinal histerektomi=60) çalışmaya dahil edildi. Araştırma verileri "Sosyo-demografik ve Bireysel Bilgi Formu", "Kadın Cinsel İşlev Ölçeği (KCİÖ)" ve "Beck Depresyon Ölçeği (BDÖ)" kullanılarak toplandı. **Bulgular:** Abdominal histerektomi (22,73±6,94) ve vajinal histerektomi (20,84±8,22) geçiren kadınlarda FSFI puan ortalamaları benzerdi ($p>0,05$). Her iki gruptaki kadınlarda histerektomi sonrası KCİÖ puan ortalaması ile yaş, menopoz durumu ve cinsel yaşamdaki değişiklikler arasındaki ilişki anlamlıydı ($p<0,05$). Histerektomi sonrası kadınlarda, KCİÖ ve BDÖ puanları arasında negatif bir korelasyon vardı ($p<0,05$). **Sonuç:** Abdominal ve vajinal histerektomi geçiren kadınların KCİÖ puan ortalaması benzerdir. Her iki histerektomi tipinde de depresyon, ileri yaş ve menopozda olma cinsel işlevi olumsuz etkilemekteydi. Bu nedenle sağlık profesyonellerinin her iki histerektomi grubuna vereceği eğitim ve danışmanlık hizmetlerinde, kadınların cinselliklerini etkileyebilecek değişkenlere (yaş, menopoz ve depresyon gibi) ilişkin farkındalıklarının artırılması ve kadınların bu süreçte cinsel yaşamlarına yönelik bilgilendirilmesinin önemli olduğu düşünülmektedir.
**Anahtar kelimeler:** Abdominal Histerektomi, Vajinal Histerektomi, Cinsellik, Depresyon.

***Sorumlu Yazar / Corresponding Author:*** Sibel PEKSOY KAYA, Ankara Yıldırım Beyazıt University, Faculty of Health Sciences, Department of Nursing, Ankara, TURKEY
***E-mail:*** sibelpeksoy@gmail.com, sibelpeksoykaya@aybu.edu.tr

***Bu makaleye atıf yapmak için / Cite this article:*** Peksoy, Kaya, S., & Terzioğlu, F. (2024). Determination of Sexual Functioning and the Factors Affecting Sexual Functions of Women Following Abdominal and Vaginal Hysterectomy. *BAUN Health Sci J, 13*(1), 119-127. https://doi.org/10.53424/balikesirsbd.1221224

## INTRODUCTION

Hysterectomy is one of the most commonly performed surgeries in women (Harvey et al., 2022; Lycke et al., 2021) after cesarean section (Jones & Rock, 2015). Various techniques are used in the surgical procedure (abdominal, vaginal, and laparoscopic); however, abdominal hysterectomy (AH) and vaginal hysterectomy (VH) are the two most commonly used approaches (Jones & Rock, 2015; Lycke et al., 2021).

The prevalence of hysterectomies ranges from 5.6 to 21% in developed countries (Harvey et al., 2022; Lycke et al., 2021), while it ranges 11.3 to 14.5% in developing countries (Egbe et al., 2018; Rout et al., 2023). Although the prevalence of peripartum hysterectomy performed for obstetric reasons has been reached in Turkey (Yildirim et al., 2021; Tahaoğlu et al., 2016), there are no studies estimating the prevalence of hysterectomy for gynecological reasons. It is estimated that the prevalence of hysterectomy performed for gynecological reasons is high in Turkey (Güven et al., 2010). It is emphasized in the literature that there has been an increase in the trend of laparoscopic hysterectomy in our country in recent years (Orhan et al., 2019; Seçkin et al., 2015).

The frequency of performing hysterectomy surgery increases with age in women (Desai et al., 2015; Harvey et al., 2022). The literature indicates that the most common age range for hysterectomy is 40-60 years of age (Lycke et al., 2021; Rout et al., 2023), and it is estimated that one in every three women will have their uterus surgically removed by the age of 65 (Jones & Rock, 2015; Rout et al., 2023). As one of the developed countries in terms of benign causes, abdominal hysterectomies account for nearly half of the hysterectomy procedures (44.9%) performed in Denmark, and vaginal hysterectomies rank second (28.2%) (Lycke et al., 2021). Desai et al. (2017) emphasize that the average age of performing the hysterectomy procedure in India is 36 and at younger ages than other countries. The rate of abdominal hysterectomies has been reported to be approximately four or five-fold higher compared to the rate of vaginal hysterectomies in the studies that were conducted in developing countries (Butt et al., 2012; Egbe at al., 2018).

The hysterectomy procedure is usually performed at the end of reproductive age or during menopause due to various health problems. Abnormal uterine bleeding, pelvic prolapse, uterine fibroids, and urinary incontinence, which are common indications for hysterectomy, can affect the quality of life of the women (Alshawish, 2021; Jones & Rock, 2015; Körpe et al., 2022; Radosa et al., 2014; Sözeri-Varma et al., 2011). Even if improving the quality of life has been a primary objective after this surgery, hysterectomies can cause certain biopsychosocial (Alshawish, 2021; Körpe et al., 2022) and sexual (Alshawish, 2021; Dedden et al., 2020; Lonnée-Hoffmann & Pinas, 2014; Radosa et al., 2014) problems.

Hysterectomies can cause severed from the feminine essence and a loss of fertility and sexual functioning in these women. The elimination of problems arising in one's sexual life after a hysterectomy is essential for improving the quality of life. Besides all these, the effects of hysterectomies on sexual life can vary depending on many factors (Onat-Bayram & Kizilkaya-Beji, 2010). Approximately 20% of women reported impaired sexual function after hysterectomy (Lonnée-Hoffmann & Pinas, 2014). These factors mainly include age (Rodríguez et al., 2012), menopause (Durukan-Duran & Sinan, 2020; Rodríguez et al., 2012), chronic disease status (Meston & Bradford; 2007), mental health status (Onat-Bayram & Kizilkaya-Beji, 2010) and the technique of hysterectomy (Radosa et al., 2014).

Mental health status is also an essential factor affecting the quality of life and sexuality of women after this surgery (Onat-Bayram & Kizilkaya-Beji, 2010; Körpe et al., 2022). The studies in the literature have reported depression as the common mental health problem occurring after hysterectomy (Alshawish, 2021; Jones & Rock, 2015; Onat-Bayram & Kizilkaya-Beji, 2010; Radosa et al., 2014). High levels of depression can negatively affect sexual function (Onat-Bayram & Kizilkaya-Beji, 2010). There is no difference between depression levels of the patients depending on the type of hysterectomy (Onat-Bayram & Hotun-Şahin, 2008); however, hysterectomy itself can be a reason for depression. Healthcare professionals, especially nurses, have important roles and responsibilities in identifying sexual problems related to hysterectomy and dealing with these problems (Yılmaz, 2019). Nurses should discuss the operation with women or couples before and after a hysterectomy (Alshawish et al., 2020; Yılmaz, 2019; Gerçek et al., 2016). Women often do not know how to express sexual function and are hesitant to communicate with health professionals (Alshawish et al., 2020). It is thought that the results obtained from this study will guide nurses in counseling services regarding hysterectomy.

This study was designed as a descriptive and analytic study to aim at the effects of AH and VH techniques on sexual functioning and the factors affecting sexual functions in women undergoing AH and VH. The research questions (RQ) for the study were as follows;

RQ1: Is there a difference in sexual functions in women after AH and VH?

RQ2: Is there a difference in the factors affecting sexual functions in women who have undergone AH and VH?

## MATERIALS AND METHODS

### Study type

This study was a descriptive and analytic study. The study was conducted from January 2009 to December 2009 at Etlik-Zübeyde Hanım Women's Diseases Training and Research Hospital and at the Gynaecology Clinic of Hacettepe University Adult's Hospital in Ankara, Turkey.

### Participants

The research population was 783 women (AH: 563, VH: 220) who underwent hysterectomy in the hospitals where the research was conducted. The sample size calculation of the study was made based on the percentage of women

who had sexual problems after hysterectomy (AH=49%; VH=74%) (Onat-Bayram, 2005). The study sample was comprised of 120 women (AH=60, VH=60) as calculated based on the formula for "the sample size for the testing difference between the rates of two independent groups". The power calculation for the study sample was conducted using the NCSS 2007/PASS software. The power of the study was found to be 85%.

**Sample selection criteria**

The study sample included women for whom: i) at least six months and maximum one year have elapsed since hysterectomy, ii) were sexually active, iii) did not have hearing or speech disorder that would complicate communication, iv) did not have mental problems, and v) underwent hysterectomy for benign reasons.

**Data collection**

The data were obtained using "Demographic and Individual Information Form", "Female Sexual Function Index", and "Beck Depression Inventory".

"Demographic and Individual Information Form": Data collection developed in accordance with the literature review (Onat-Bayram & Hotun-Şahin, 2008; Yang et al., 2006; Yeoum & Park, 2005), conducted by the researchers comprises two sections. The first section contains age, educational status, occupation, menopausal status, reason of hysterectomy, other gynecological procedures conducted together with hysterectomy, and questions related to mental health. The second section contains questions about "the sexual life of women".

"Female Sexual Function Index (FSFI)": This scale composed of 19 items (Min: 2; Max: 36) and six subscales: "desire", "aurosal", "lubrication", "orgasm", "satisfaction" and "pain" (Rosen et al., 2000; Aygin and Aslan, 2005). The cut-off value of the FSFI is 22.7, and the scale score of 22.7 and above indicates sexual dysfunction (Çayan et al., 2004). In the adaptation study (Aygin & Aslan, 2005) and in the study, the reliability values of the FSFI were found to be 0.98 and 0.96, respectively.

"Beck Depression Inventory (BDI)": This scale composed of 21 items (Min: 0; Max: 63) (Beck et al.1961; Hisli, 1989). The cut-off value for the inventory was 10 for bodily diseased patients. A high score is associated with the level of depression (Hisli, 1988; Hisli, 1989). In the adaptation study (Hisli, 1989) and in the study, the reliability values of the BDI were found to be 0.80 and 0.87, respectively.

**Implementation of the study**

The research was carried out in the gynecological outpatient clinics of two hospitals (Hacettepe University Adult Hospital, Department of Obstetrics and Gynecology; Etlik Zübeyde Hanım Women's Health Training and Research Hospital). Interviews with women in both hospitals were held in a suitable room. The data collection form and scales were applied by the researcher for the interview in the gynecology clinics. Data collection by face-to-face interview was approximately 20-25 minutes for each participant.

**Data analysis**

"SPSS 17.0 for Windows software package" was used for statistical analysis. "Yates correction", "Fisher's exact chi-square test", and "the marginal homogeneity tests" were used to evaluate categorical variables. "The student's t test" and "the one-way ANOVA" were used to compare changes in age, menopause status, and sexual life with scale scores in the AH and VH groups. "The Bonferroni test", which was used in the analysis examining the change in sexual life (positive, negative, no change) after hysterectomy, was used to determine the group that caused the difference. "Pearson's correlation analysis" was used to determine the relationship between BDI and FSFI scores.

**Ethical considerations**

In order to conduct the research, necessary legal permissions were obtained from the Hacettepe University Faculty of Medicine Medical Research Local Ethics Committee (January 30, 2009; No. 08/48-46), Etlik Zübeyde Hanım Women's Health Training and Research Hospital Ethics Committee (January 13, 2009; No. 30/06) and hospital administrations. All necessary explanations were given to the women in the study group in line with the Helsinki Principles. Written consent of the women for the study was obtained after giving information about the study.

## RESULTS

In the study, it was determined that four out of every five women (79.2%) were literate or primary school graduates. 87.5% of the women were housewives. The average age of women was 48.07±5.45, with nearly half of them aged 47 and over. 37.5% of women were in the menopausal period. The mean age of women at menopause was 47.81±4.63. Menopausal period was 3 years or more in 57.8% of the women (Table 1).

The mean FSFI scores were similar in women who underwent AH (M±SD=22.73±6.94) and VH (M±SD=20.84±8.22) ($p>0.05$). In terms of FSFI subscales, the orgasm score was higher in the AH group than in the other group ($p<0.05$). When the women that underwent hysterectomy were evaluated according to age group and menopausal status, in FSFI scores of patients above 47 years and above who entered the menopause were significantly lower when compared to women aged 40-46 years who did not enter menopause ($p<0.05$). In terms of changes in sexual life after VH, the FSFI score of women who reported positive changes in their sexual life was higher than women who reported negative changes and no changes ($p<0.05$). In the AH group, the FSFI score of women who reported positive changes and no changes in their sexual life was higher than women who reported negative changes ($p<0.05$). Besides, the FSFI score of the AH group, which reported no change in sexual life, was higher than the VH group ($p<0.05$) (Table 2).

**Table 1. Some Socio-demographic and Menopausal Characteristics of Women by Groups (n= 120)**

| Characteristics | Type of Hysterectomy | | Total (n=120) |
|---|---|---|---|
| | Abdominal Hysterectomy (n=60) | Vaginal Hysterectomy (n=60) | |
| | n(%) or Mean±SD | n(%) or Mean±SD | n(%) or Mean±SD |
| **Age (avegare)** | 45.92±3.87 | 50.23±5.95 | 48.07±5.45 |
| **Age (years)** | | | |
| 40-46 | 37(61.7) | 19(31.7) | 56(46.7) |
| 47 and above | 23(38.3) | 41(68.3) | 64(53.3) |
| **Education** | | | |
| Primary school and lower | 50(83.3) | 45(75.0) | 95(79.2) |
| Secondary school | 5(8.3) | 7(11.7) | 12(10.0) |
| High school and above | 5(8.3) | 8(13.3) | 13(10.8) |
| **Occupation** | | | |
| Employed/Retired[#] | 7(11.7) | 8(13.3) | 15(12.5) |
| Housewife | 53(88.3) | 52(86.7) | 105(87.5) |
| **Menopausal status** | | | |
| Menopausal | 14(23.3) | 31(51.7) | 45(37.5) |
| Not-menopausal | 46(76.7) | 29(48.3) | 75(62.5) |
| **Age of menopause (avegare)** | 47.27±4.53 | 48.19±4.74 | 47.81±4.63 |
| **Duration of menopause (years)** | | | |
| 2 years or less | 11(78.6) | 8(25.8) | 19(42.2) |
| 3 years or more | 3(21.4) | 23(74.2) | 26(57.8) |

n: Frequency, %: Percentage, SD: Standart Deviation. [#]Number of employed women was eight, number of retired women was seven.

**Table 2. Comparison of Some Characteristics and Female Sexual Function Index Scores by Groups (n= 120)**

| Scale Scores and Characteristics | Type of Hysterectomy | | | | Analysis[#] |
|---|---|---|---|---|---|
| | Abdominal Hysterectomy | | Vaginal Hysterectomy | | |
| | Female Sexual Function Index | | | | |
| | n | Mean±SD | n | Mean±SD | |
| **FSFI Total Score** | 60 | 22.73±6.94 | 60 | 20.84±8.22 | $t$=1.357, $p$=0.177 |
| **Subscales** | | | | | |
| Desire | 60 | 2.96±1.37 | 60 | 2.82±1.45 | $t$=0.540, $p$=0.590 |
| Arousal | 60 | 3.40±1.40 | 60 | 2.95±1.55 | $t$=1.667, $p$=0.098 |
| Lubrication | 60 | 3.81±1.66 | 60 | 3.66±1.86 | $t$=0.465, $p$=0.643 |
| Orgasm | 60 | 3.84±1.43 | 60 | 3.25±1.62 | **$t$=2.095, $p$=0.038** |
| Satisfaction | 60 | 3.94±1.39 | 60 | 3.53±1.66 | $t$=1.472, $p$=0.144 |
| Pain | 60 | 4.78±1.56 | 60 | 4.63±1.45 | $t$=0.532, $p$=0.595 |
| **Age** | | | | | |
| 40-46 | 37 | 24.33±7.15 | 19 | 24.87±8.19 | $t$=-0.250, $p$=0.801 |
| 47 and above | 23 | 20.17±5.87 | 41 | 18.99±7.64 | $t$=0.640, $p$=0.524 |
| **Analysis[#]** | **$t$=2.344, $p$<0.05** | | **$t$=2.711, $p$<0.01** | | |
| **Menopausal Status** | | | | | |
| Yes | 14 | 18.69±7.11 | 31 | 17.66±7.26 | $t$=0.439, $p$=0.663 |
| No | 46 | 23.97±6.47 | 29 | 24.25±7.92 | t=-0.170, $p$=0.118 |
| **Analysis[#]** | **$t$=2.611, $p$<0.05** | | **$t$=-3.358, $p$<0.01** | | |
| **Changes in Sexual Life After Hysterectomy** | | | | | |
| Positive | 17 | 26.02±5.94[a] | 22 | 27.44±6.06[a] | $t$=-0.732, $p$=0.469 |
| Negative | 27 | 19.32±6.65[b] | 22 | 16.13±6.47[b] | $t$=1.689, $p$=0.469 |
| No Change | 16 | 24.99±6.05[a] | 16 | 18.25±7.24[b] | **$t$=2.855, $p$<0.01** |
| **Analysis[¥]** | **$F$=7.283, $p$<0.01** | | **$F$=18.138, $p$<0.001** | | |

n: Frequency, SD: Standart Deviation. [#]The significance of difference between two mean values was used, [¥]Analysis of variance was used.
[a,b] FSFI scores differed between mean±standard deviations with the same letter. [*]p<0.05, [**]p<0.01.

In terms of sexual satisfaction, there was no significant difference between good, moderate or bad satisfaction categories among women who underwent VH (p>0.05). When the women that underwent AH were evaluated according to sexual satisfaction, 63.3% reported "good" satisfaction before hysterectomy, and 41.7% reported "good" satisfaction after hysterectomy. There was an increase in the rate of women reporting "moderate" (26.7%) and "poor" (31.7%) satisfaction after AH when compared to women reporting "moderate" (21.7%) and "poor" (15%) satisfaction before hysterectomy. There was a significant difference between women who underwent AH that reported good, moderate, or poor satisfaction (p<0.05) (Table 3).

In the study, when the depression symptoms were evaluated as to whether they affected the sexual life of these women, a moderate and negative correlation was found between in BDI and FSFI scores (r=-0.424, p<0.001) (Figure 1). Accordingly, depressive symptoms affected sexual life in 18% of women who underwent hysterectomy. The BDI score was 10.63±8.92 in the VH group and 8.57±7.19 in the AH group. This score was not

significant according to the type of the hysterectomy technique (p>0.05) (Figure 2).

**Table 3. Sexual Satisfaction in Women Before and After Hysterectomy by Groups (n= 120)**

| Sexual Satisfaction | | After Hysterectomy | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Abdominal Hysterectomy | | | | Vaginal Hysterectomy | | | |
| | | Good n(%) | Moderate n(%) | Poor n(%) | Total n(%) | Good n(%) | Moderate n(%) | Poor n(%) | Total n(%) |
| Before Hysterectomy | Good | 21(84) | 9(56.3) | 8(42.1) | 38(63.3) | 10(47.6) | 7(43.8) | 4(17.4) | 21(35) |
| | Moderate | 2(8) | 6(37.5) | 5(26.3) | 13(21.7) | 9(42.9) | 6(37.5) | 10(43.5) | 25(41.7) |
| | Poor | 2(8) | 1(6.3) | 6(31.6) | 9(15.0) | 2(9.5) | 3(18.8) | 9(39.1) | 14(23.3) |
| | Total | 25(41.7) | 16(26.7) | 19(31.7) | 60(100.0) | 21(35) | 16(26.7) | 23(38.3) | 60(100) |
| Analysis¥ | | | | | ***p*<0.05** | | | | *p*=0.216 |

n: Frequency, %: Percentage, ¥Marginal homogeneity test, *p<0.05.

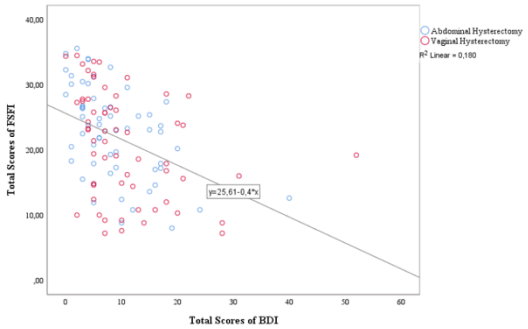


**Figure 1. Correlation Plot of Scale Scores**

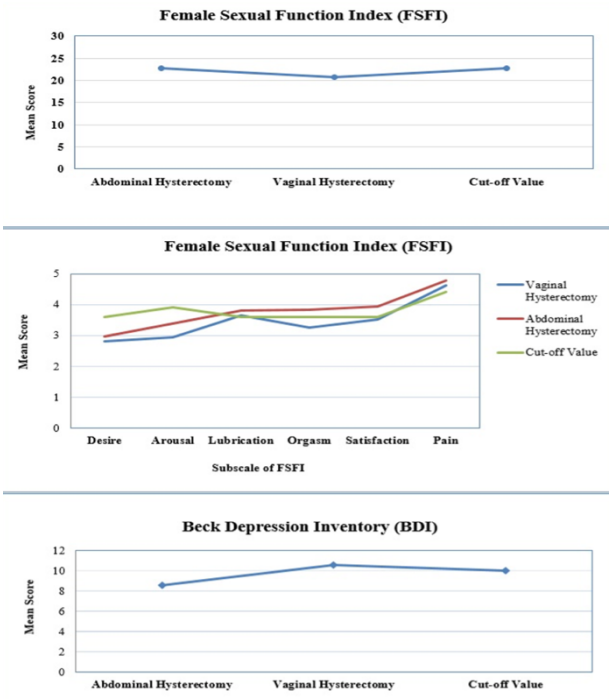


**Figure 2. Scores and Cut-off Values of the Scales**

## DISCUSSION

The FSFI total scores and FSFI subscales scores of patients who underwent VH were lower than the scores of patients who underwent AH. However, the difference was not statistically significant. In addition, before and after hysterectomy sexual satisfaction in the VH group was similar (p>0.05), but the AH group reported negative changes in post-hysterectomy sexual satisfaction (p<0.05). In a study conducted by Onat-Bayram and Hotun-Şahin (2008), women that underwent VH achieved lower scores in FSFI subscales and total scores in FSFI compared to patients that underwent AH. Danish et al. (2015) emphasized that most sexual disorders improved after hysterectomy for benign reasons, and that most women had similar or better sexual functions after surgery. However, when women who underwent VH and AH were compared in terms of sexual functions in the literature, it was reported that they were similar in terms of frequency of sexual intercourse, dyspareunia and sexual response cycles (Ayoubi et al., 2003). Similarly, literature reported no difference between the surgical techniques (VH, supracervical laparoscopic hysterectomy and laparoscopic hysterectomy) used regarding quality of life and sexuality (Radosa et al., 2014; Skorupska et al., 2021). Thakar (2015) report that studies on the effect of hysterectomy on sexual life have different methodologies and that, regardless of the type of hysterectomy, hysterectomy does not cause any change or improvement in sexual function in the majority of women in the short term. However, deterioration in sexual function may be observed in long-term follow-up after hysterectomy. It is emphasized that this problem can be explained by aging and surgical menopause (Thakar, 2015). Possible changes in sexual function after hysterectomy can be concerning for women and healthcare professionals (Onat-Bayram & Kizilkaya-Beji, 2010). Healthcare professionals should take into consideration that adverse effects may occur in a small number of women after hysterectomy surgery (Thakar, 2015). Nurses' sexual health consultancy roles have a place in this surgery (Kamal Ali et al., 2022). Nurses should provide preoperative education and counseling to women about possible negative changes in sexual life after hysterectomy. In this context, nurses should consider aging and surgical menopause in sexual health counseling during hysterectomy.

FSFI score of the participants aged 47 years or above was lower than the patients aged 40-46 years in the study. Age is an important determinant in hysterectomy performed

for gynecological indications, and it is noteworthy that its frequency increases, especially over the age of 40 (Harvey et al., 2022; Lycke et al., 2021). Durukan-Duran and Sinan (2020) emphasized that women may face postmenopausal sexual life problems. Rodriguez et al. (2012) emphasized that FSFI scores decrease with advanced age and menopause in women and that 53% of women may experience sexual dysfunction. The studies in the literature also report negative effects on sexual life with aging (Durukan-Duran & Sinan, 2020; Rodriguez et al., 2012; Onat-Bayram & Kizilkaya-Beji, 2010). In the study, low mean scores in FSFI as a result of the changes caused by advancing age and postmenopausal changes suggest that sexual life is affected independently from the type of hysterectomy. Therefore, nurses should integrate possible age-related sexual health problems in hysterectomy surgery into nursing care.

During the menopausal period, various changes occur in the hormones, as well as changes in the sense of femininity, sexual identity, and psychosomatic changes as a result of decrease in hormone levels. The decrease in the estrogen level results in vaginal atrophy and decreased lubrication. The common complaints reported in the postmenopausal period include dyspareunia, loss of libido, sexual dysfunction in the partner, decrease in sexual drive and in the frequency of sexual intercourse (Onat-Bayram & Hotun-Şahin, 2008; Onat-Bayram & Kizilkaya-Beji, 2010). The effects of hysterectomy and the negative effects due to the characteristic conditions of the climacteric period may cause confusion (Onat-Bayram & Kizilkaya-Beji, 2010). In the study, FSFI scores in menopausal women were lower compared to pre-menopausal women in both hysterectomy groups. This finding indicated that menopausal women might have experienced sexual problems, regardless of the type of surgery. In this regard, the negative impact of menopausal symptoms on sexual life should not be ignored in nursing care performed during surgical menopause and postmenopausal hysterectomy.

The women having a higher total score in BDI had a lower total score in FSFI. There was also a negative correlation between total scale scores ($p<0.001$).Thus, the women are more likely to suffer from sexual problems as the level of depression increases. In the study by Onat-Bayram and Hotun-Şahin (2008), a negative relationship was reported between sexual functioning and the level of depression. In the study by Aziz et al. (2005) an improvement was reported in the level of depression after hysterectomy and overall improvement in general health perception. In addition, Hoffman and Pinas (2014) emphasized that the presence of depression and sexual problems before hysterectomy are predictive factor in the decrease of sexual desire after hysterectomy. Depression can cause diminished libido, decrease in sexual desire, fatigue, and a self-perception of being unattractive, and thereby affects sexual functioning and sexual life (Onat-Bayram & Hotun-Şahin, 2008; Onat-Bayram & Kizilkaya-Beji, 2010). Erdogan et al. (2019) reported that psychological care had positive results on anxiety, body image, and depressive symptoms in women who had undergone hysterectomy. In this regard, it is most significant to provide sexual education and counseling for women who have undergone hysterectomy so that they can cope with post-operative problems and improve their sexual functions (Danesh et al., 2015). Therefore, psychosocial care is an important component in routine nursing care for hysterectomy surgery (Rehan et al., 2023; Erdoğan et al., 2019). Nurses should have sufficient knowledge about care and psychosocial support in hysterectomy surgery (Gerçek et al., 2016). There is a need for holistic evaluation of women planned for hysterectomy after hospitalization.

**Limitations of the study**

The sexual functions and depression status of the women were evaluated after hysterectomy. This may have resulted in the inclusion of women who experienced sexual or mental health problems that remained unrecognized before hysterectomy. Future studies are advised to employ the same measurement tools before and after hysterectomy to prospectively evaluate the sexual and mental health status.

## CONCLUSION

In the study, it was determined that FSFI scores of participants who had VH and AH were similar. However, the sexual satisfaction of the women that underwent AH was found to be negatively affected. In addition, age, menopausal status, and depression level appeared to be important factors affecting sexual life in both hysterectomy groups. As a result, factors affecting sexual life must be taken into account after hysterectomy while providing sexual health and counseling services. Additionally, it may be recommended to provide sexual counseling services in sexual life, taking into account life periods, and to provide these services in cooperation with the healthcare team. The concept of sexual health is an important determinant of general health. In this context, it may be recommended to integrate nursing care into women's sexual health counseling services before and after surgeries that may directly affect sexual life, such as hysterectomy.

**Acknowledgement**

The authors thank all of women who agreed to participate in the study.

**Conflict of Interest**

The authors declare no conflict of interest.

**Author Contributions**

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

**Additional Information**

This study is based on Hacettepe Institute of Health Sciences the master's thesis (year:2011; No. 281195). The study was presented as an oral presentation (abstract) at 'The 1st Clinical Nursing Research Congress' in May 29-June 1, 2012 in İzmir, Turkey.

**REFERENCES**


Alshawish, E. (2021). *Perspective of women about her body after hysterectomy.* Abduljabbar H, ed. Fibroids, London: IntechOpen. https://doi.org/10.5772/intechopen.94260

Alshawish, E., Qadous, S., & Ala'a, Yamani, M. (2020). Experience of Palestinian women after hysterectomy using a descriptive phenomenological study. *The Open Nursing Journal, 14,* 74-79. https://doi.org/10.2174/1 874434602014010074

Aygin, D., & Eti-Aslan, F. (2005). The Turkish adaptation of the female sexual function index. *Turkiye Klinikleri Journal of Medical Sciences, 25(3),* 393–399. https://www.turkiyeklinikleri.com/article/tr-kadin-cinsel-islev-olceginin-turkceye-uyarlamasi-36254.html

Ayoubi, J. M., Fanchin, R., Monrozies, X., Imbert, P., Reme, J. M., & Pons, J. C. (2003). Respective consequences of abdominal, vaginal, and laparoscopic hysterectomies on women's sexuality. *European Journal of Obstetrics & Gynecology and Reproductive Biology, 111(2),* 179–182. https://doi.org/10.1016/s0301-2115(03)00213-6

Aziz, A., Bergquist, C., Nordholm, L., Möller, A., & Silfverstolpe, G. (2005). Prophylactic oophorectomy at elective hysterectomy: Effects on psychological well-being at 1-year follow-up and its correlations to sexuality. *Maturitas, 51(4),* 349–357. https://doi.org/10.1016/j.mat uritas.2004.08.018

Beck, A., Ward, C., Mendelson, M., Mock, J., & Erbaugh, J. (1961). An inventory for measuring depression. *Archives of General Psychiatry, 4(6),* 561–571. https://doi.org/10.1001/archpsyc.1961.01710120031004

Butt, J. L., Jeffery, S. T., & Van der Spuy, Z. M. (2012). An audit of indications and complications associated with elective hysterectomy at a public service hospital in South Africa. *International Journal of Gynecology & Obstetrics, 116(2),* 112–116. https://doi.org/10.1016/j.ij go.2011.09.026

Çayan, S., Akbay, E., Bozlu, M., Canpolat, B., Acar, D., & Ulusoy, E. (2004). The prevalence of female sexual dysfunction and potential risk factors that may impair sexual function in Turkish women. *Urologia Internationalis, 72(1),* 52–57. https://doi.org/10.1159/ 000075273

Danesh, M., Hamzehgardeshi, Z., Moosazadeh, M., & Shabani-Asrami, F. (2015). The effect of hysterectomy on women's sexual function: A narrative review. *Medical Archives. 9(6),* 387. https://doi.org/10.5455/medarh.20 15.69.387-392

Dedden, S. J., van Ditshuizen, M. A. E., Theunissen, M., & Maas, J. W. M. (2020). Hysterectomy and sexual (dys)function: An analysis of sexual dysfunction after hysterectomy and a search for predictive factors. *European journal of obstetrics, gynecology, and reproductive biology,* 247, 80–84. https://doi.org/10.1 016/j.ejogrb.2020.01.047

Desai, S., Shukla, A., Nambiar, D., & Ved, R. (2015). Patterns of hysterectomy in India: a national and state-level analysis of the Fourth National Family Health Survey (2015-2016). *Family Health Survey,* 126(S4), 72–80. https://doi.org/10.1111/1471-0528.1585 8

Desai, S., Campbell, O. M., Sinha, T., Mahal, A., & Cousens, S. (2017). Incidence and determinants of hysterectomy in a low-income setting in Gujarat, India. *Health policy and planning*, 32(1), 68–78. https://doi.org/10.1093/heapol /czw099

Durukan-Duran, A., & Sinan, Ö. (2020). Doğal ve cerrahi menopoza giren kadınlarda cinsel fonksiyon bozukluklarının ve depresyon durumlarının belirlenmesi. *Kocaeli Üniversitesi Sağlık Bilimleri Dergisi, 6(2),* 150–156. https://doi.org/10.30934/kusbed.633350

Egbe TO, Kobenge FM, Arlette MMJ, Eta-Nkongho E, Nyemb JE, et al. (2018) Prevalence and outcome of hysterectomy at the Douala General Hospital, Cameroon: A Cross-Sectional Study. Obinchemti, E.T., Mbi, K.F., Junette, A.M., Eta-Nkongho, E., Ernest, N.J., & Enow, M.R. (2018). Prevalence and Outcome of Hysterectomy at the Douala General Hospital, Cameroon: A Cross-Sectional Study. *International Journal of Surgery Research and Practice,* 5, 092. https://doi.org/110.23937/2378-3397/14 10092

Erdoğan, E., Demir, S., Çalışkan, B. B., & Bayrak, N. G. (2020). Effect of psychological care given to the women who underwent hysterectomy before and after the surgery on depressive symptoms, anxiety and the body image levels. *Journal of obstetrics and gynaecology: the journal of the Institute of Obstetrics and Gynaecology, 40(7),* 981–987. https://doi.org/10.1080/01443615.2019.16785 74

Gercek, E., Dal, N. A., Dag, H., & Senveli, S. (2016). The information requirements and self-perceptions of Turkish women undergoing hysterectomy. *Pakistan journal of medical sciences, 32(1),* 165–170. https://doi.org/10.126 69/pjms.321.7962

Güven, D., Kilico, I., Koçak, I., & Üstün C. (2010). Hysterectomy-related morbidity and mortality rates in Turkey from 1999 to 2008. *Journal of Endometriosis*, *2(1),* 41-44. https://doi.org/10.1177/22840265100020 0107

Harvey, S. V., Pfeiffer, R. M., Landy, R., Wentzensen, N., & Clarke, M. A. (2022). Trends and predictors of hysterectomy prevalence among women in the United States. *American journal of obstetrics and gynecology,* 227(4), 611.e1–611.e12. https://doi.org/10.1016/j.ajog.2 022.06.028

Hisli, N. (1988). A study on the validity of the Beck Depression Inventory. *Turkish Journal of Psychology, 6(22),* 118–126. https://www.psikolog.org.tr/tr/yayinlar/dergiler/

Hisli, N. (1989). The validity and reliability of Beck Depression Inventory for university students. *Turkish Journal of Psychology, 7(23),* 3–13. https://www.psikolog.org.tr/ tr/yayinlar/dergiler/

Jones, H., & Rock, J. (2015). *Abdominal hysterectomy, vaginal hysterectomy.* In: Jones H, Zimmerman C, ed. Te Linde's Operative Gynecology. 11th ed. p.697-735. Wolters Kluwer.

Kamal, Ali, F., Abd, El, Aliem, R. S., & Hassan, H. M. (2022). Effect of nursing approach based on roy's adaptation model on sexual function and health promoting behaviors of women after hysterectomy. *Assiut Scientific Nursing Journal, 10(32),* 182-198. https://doi.org/10.21608/as nj.2022.161378.1430

Körpe, B., Yorganci, A., & Evliyaoğlu Bozkurt, Ö. (2022). Quality of life and sexual function after abdominal versus laparoscopic hysterectomy: a prospective study. *Minerva obstetrics and gynecology,* 74(2), 137–145. https://doi.org/10.23736/S2724-606X.21.04741-2

Lycke, K. D., Kahlert, J., Damgaard, R., Mogensen, O., & Hammer, A. (2021). Trends in Hysterectomy Incidence Rates During 2000-2015 in Denmark: Shifting from Abdominal to Minimally Invasive Surgical Procedures. *Clinical epidemiology*, 13, 407–416. https://doi.org/ 10.2147/CLEP.S300394

Lonnée-Hoffmann, R., & Pinas, I. (2014). Effects of hysterectomy on sexual function. *Current Sexual Health Reports, 6(4),* 244. https://doi.org/10.1007/s11930-014-0029-3

Meston, C. M., & Bradford, A. B. (2007). A brief review of the factors influencing sexuality after hysterectomy. *Sexual and Relationship Therapy, 19(1),* 5–14. https://doi.org/10.1080/14681990410001640790

Onat-Bayram, G. (2005). *The determination effects of hysterectomy on sexual life.* (Master thesis), İstanbul University Institute of Health Sciences.

Onat-Bayram, G., & Hotun-Şahin, N. (2008). Hysterectomy's Psychosexual Effects in Turkish Women. *Sexuality and Disability, 26,* 149–158. https://doi.org/10.1007/s11195-008-9085-9

Onat-Bayram, G., & Kizilkaya-Beji, N. (2010). Psychosexual adaptation and quality of life after hysterectomy. *Sexuality and Disability, 28,* 3–13. https://doi.org/10. 1007/s11195-009-9143-y

Orhan, A., Ozerkan, K., Kasapoglu, I., Ocakoglu, G., Cetinkaya Demir, B., Gunaydin, T., & Uncu, G. (2019). Laparoscopic hysterectomy trends in challenging cases (1995-2018). *Journal of gynecology obstetrics and human reproduction, 48(10),* 791–798. https://doi.org/10.1016/j.jogoh.2019.06.007

Radosa, J. C., Meyberg-Solomayer, G., Kastl, C., Radosa, C. G., Mavrova, R., Gräber, S., Baum, S., & Radosa, M. P. (2014). Influences of different hysterectomy techniques on patients' postoperative sexual function and quality of life. *The Journal of Sexual Medicine, 11(9),* 2342–2350. https://doi.org/10.1111/jsm.12623

Rehan, M. K., Qasem, E. A., El, Malky, M. E., Elhomosy, S. M. (2023). Effect of Psychosexual Counseling Program on Sexual Quality of Life among Post-Hysterectomy Women. *Menoufia Nursing Journal, 8(1),* 61-79. https://doi.org/10.21608/MENJ.2023.288829

Rodríguez, M. C., Chedraui, P., Schwager, G., Hidalgo, L., & Pérez-López, F. R. (2012). Assessment of sexuality after hysterectomy using the Female Sexual Function Index. *Journal of Obstetrics and Gynaecology, 32(2),* 180–184. https://doi.org/10.3109/01443615.2011.634035

Rosen, R., Brown, C., Heiman, J., Leiblum, S., Meston, C., Shabsigh, R., Ferguson, D., & D'Agostino, R., Jr (2000). The Female Sexual Function Index (FSFI): a multidimensional self-report instrument for the assessment of female sexual function. *Journal of Sex & Marital Therapy, 26(2),* 191–205. https://doi.org/10.10 80/009262300278597

Rout, D., Sinha, A., Palo, S. K., Kanungo, S., & Pati, S. (2023). Prevalence and determinants of hysterectomy in India. *Scientific reports,* 13(1), 14569. https://doi.org/10.1038/ s41598-023-41863-2

Seçkin, K. D., Karslı, M. F., Yücel, B., Kabakçı, M., Kadiroğulları, P., Aslan-Barut, S., Gündüz, N., & Yıldırım, G. (2015). The Evaluation of clinical indications, histopathologic findings and surgical methods routes for hysterectomy, A Tertiary Referral Center Experience. *İKSST Dergisi, 7(3),* 116-120. https:// doi.org/10.5222/iksst.2015.116

Skorupska, K., Wawrysiuk, S., Bogusiewicz, M., Miotła, P., Winkler, I., Kwiatkowska, A., & Rechberger, T. (2021). Impact of Hysterectomy on Quality of Life, Urinary Incontinence, Sexual Functions and Urethral Length. Journal of clinical medicine, 10(16), 3608. https: /doi.org/10.3390/jcm10163608

Sözeri-Varma, G., Kalkan-Oğuzhanoğlu, N., Karadağ, F., & Özdel, O. (2011). The effect of hysterectomy and/or oophorectomy on sexual satisfaction. *Climacteric, 14(2),* 275–281. https://doi.org/10.3109/13697137.2010.532251

Tahaoglu, A. E., Balsak, D., Togrul, C., Obut, M., Tosun, O., Cavus, Y., Bademkiran, H., & Budak, S. (2016). Emergency peripartum hysterectomy: our experience. *Irish journal of medical science, 185(4),* 833–838. https:// doi.org/10.1007/s11845-015-1376-4

Thakar R. (2015). Is the Uterus a Sexual Organ? Sexual Function Following Hysterectomy. *Sexual medicine reviews, 3(4),* 264–278. https://doi.org/10.1002/smrj.59

Yang, Y., Chao, Y., Chen, Y., & Yao, G. (2006). Changes and factors influencing health-related quality of life after hysterectomy in premenopausal women with benign gynecologic conditions. *Journal of the Formosan Medical Association = Taiwan yi zhi, 105(9),* 731–742. https://doi.org/10.1016/S0929-6646(09)60201-1

Yeoum, Sç, & Park, C. (2005). Adjustment after a hysterectomy. *Taehan Kanho Hakhoe chi, 35(6),* 1174–1182. https://doi.org/10.4040/jkan.2005.35.6.1174

Yildirim, G. Y., Koroglu, N., Akca, A., Talmac, M., Dikmen, S., Yıldırım, G., Polat, I., & Ozdemir, I. (2021). What is new in peripartum hysterectomy? A seventeen year experience in a tertiary hospital. *Taiwanese journal of obstetrics & gynecology, 60(1),* 95–98. https://doi.org/10.1016/j.tjog.2020.11.014

Yılmaz, K. (2019). *The effectiveness of nursing support program developed for women undergoing hysterectomy.* (Master thesis), İstanbul University-Cerrahpaşa, Institute of Graduate Studies.

**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.1347404

# Effect of Emotional Labor Levels of Nurses on Their Attitudes of Elderly Care

Mehmet Emin ŞANLI [1], Müjde KERKEZ [2]

[1] Batman University, Vocational Higher School of Health Services, Department of Medical Services and Techniques
[2] Sirnak University, Faculty of Health Sciences, Department of Nursing

***Geliş Tarihi / Received:*** *21.08.2023,* ***Kabul Tarihi / Accepted:*** *01.10.2023*

**ABSTRACT**

**Objective:** The study aims to investigate the impact of emotional labor levels on nurses' attitudes towards elderly care. **Material and Methods:** The research was planned in analytical-sectional type. The population of the research was composed of 309 nurses, 204 female (66%) and 105 male (34%) who work in a training and research hospital of Turkey. The data of the research was collected by utilizing Sociodemographic Form, Emotional Labor Behaviors Scale for Nurses (ELS) and Kogan Aged Attitudes Scale (ATE). **Results:** In this study, the mean scores of ELS and ATE are 3.77±0.62 and 97.20±12.48 respectively. In the correlation analysis between total scores of ELS and ATE, a statistically significant positive relation was found ($r=0.320$, $p<0.001$). It was established that attitudes towards the ATE has a positive effect on ELS. The effect of the characteristics depending on the qualitative data on the ATE was determined, and $R=0.405$ was found as $Adj.R^2= 0.118$, and it was found out that ELS has a positive effect on ATE. **Conclusion:** In the study, it was determined that socio-demographic factors and emotional labor behavior levels of nurses affected their attitudes of elderly care by 11.8%.

**Keywords:** Elderly Care, Emotional Labor, Nursing.

# Hemşirelerin Duygusal Emek Düzeylerinin Yaşlı Bakımına İlişkin Tutumlarına Etkisi

**ÖZ**

**Amaç:** Bu çalışmada, hemşirelerin duygusal emek düzeylerinin yaşlı bakımına ilişkin tutumlarına etkisinin incelenmesi amaçlanmıştır. **Materyal:** Araştırma, analitik-kesitsel desende yapıldı. Araştırmanın evrenini Türkiye'de bir eğitim ve araştırma hastanesinde çalışan 204 kadın (%66) ve 105 erkek (%34) olmak üzere 309 hemşire oluşturdu. Araştırmanın verileri Sosyodemografik Form, Hemşireler için Duygusal Emek Davranışları Ölçeği (DEDÖ) ve Kogan Yaşlı Tutumları Ölçeği (KOPS) kullanılarak toplandı**. Bulgular:** Bu çalışmada DEDÖ ve KOPS puan ortalamaları sırasıyla 3.77±0.62 ve 97.20±12.48'dir. DEDÖ toplam puanları ile KOPS arasındaki korelasyon analizinde istatistiksel olarak anlamlı pozitif bir ilişki bulundu ($r=0.320$; $p<0.001$). Nitel verilere bağlı özelliklerin KOPS üzerindeki etkisi $R=0.405$ ve $Adj.R^2=0.118$ olup, DEDÖ'nün KOPS üzerinde olumlu etkisi olduğu belirlendi. **Sonuç:** Çalışmada, hemşirelerin sosyodemografik faktörlerinin ve duygusal emek davranış düzeylerinin yaşlı bakımına yönelik tutumlarını %11.8 oranında etkilediği saptandı.

**Anahtar Kelimeler:** Duygusal Emek, Hemşirelik, Yaşlı Bakımı.

***Sorumlu Yazar / Corresponding Author:*** Müjde KERKEZ, Sirnak University, Faculty of Health Sciences, Department of Nursing, Şırnak, Turkiye.
***E-mail:*** mujjde_@hotmail.com

***Bu makaleye atıf yapmak için / Cite this article:*** Şanlı M.E. & Kerkez, M. (2024). Effect of emotional labor levels of nurses on their attitudes of elderly care. *BAUN Health Sci J, 13*(1), 128-136. https://doi.org/10.53424/balikesirsbd.1347404

## INTRODUCTION

The aging of the global population has been a significant demographic shift over the past century (Eser & Küçük, 2021). As the number of elderly individuals continues to rise, issues such as declining functional capacity, shifts in social status, and an increased prevalence of degenerative diseases arise (de Oliveira et al., 2019). The factors that impact the health of older adults, specifically their quality of life, result in extended hospital stays and consequently have a negative effect on healthcare costs (Donelan et al., 2019). Nurses play a crucial role in enhancing and sustaining the well-being of elderly individuals through their significant duties and responsibilities. They contribute to this process by ensuring effective coordination of healthcare services, not only in hospitals but also in family homes (Waterworth et al., 2015). The literature asserts that health professionals' quality of care for the elderly has been impacted from the perspective of health service providers (Golfenshtein & Drach-Zahavy, 2015; Rush et al., 2016). The elderly patients value the respect from health professionals (listening attentively, providing confidence and assisting in everyday activities etc.) (de Oliveira et al., 2019; Değirmenci Öz & Baykal, 2018). Nurses must comprehend the physical, psychological, social, and environmental changes experienced by elderly adults to provide better care. This knowledge enhances their ability to understand elderly patients. Numerous studies globally have demonstrated both positive and negative outcomes of nurses' attitudes towards elderly care (Golfenshtein & Drach-Zahavy, 2015; Donelan et al., 2019; Demir et al., 2021; Günday et al., 2021). Negative attitudes towards elderly individuals lead to a decrease in the quality of care and can result in significantly worse health outcomes among older adults. It is important to maintain a neutral perspective when addressing issues related to aging and to be mindful of the impact of such attitudes on health and wellness (Han et al., 2018; Ha et al., 2021). Effective care for older adults requires nurses to be emotionally available. Failure to address emotional availability can negatively impact the quality of care provided. Nurses should establish compassionate relationships while caring for the elderly, rather than relying solely on task-oriented relationships. Compassionate communication entails navigating complex clinical situations and managing strong emotions (Jeffrey, 2016). Therefore, it is crucial for nurses to maintain a positive, objective attitude toward patients and bolster their communication skills to enhance the standard of care provided to elderly patients with complex medical conditions (Rosen et al., 2018). Nurses, who mostly have face-to-face communication in the care of the elderly, are expected to provide care in a professional capacity such as giving morale to patients, eliminating concerns or showing empathy (Moudatsou et al., 2020). Professional care involves displaying the expected emotions of healthcare personnel and concealing their true emotions when appropriate. The term 'emotional labor' is used in the literature to describe the act of promoting or curtailing emotional expressions for the benefit of others (Brighton et al., 2019; Moudatsou et al., 2020; Theodosius et al., 2020). In other words, emotional labor refers to the management of one's emotions while activating and suppressing them as part of one's job. In nursing, emotional labor can be classified into three types: therapeutic, occupational, and instrumental (Moudatsou et al., 2020). The connections and exchanges made by nurses and patients are labeled as therapeutic emotional work. Professional emotional labor includes the regulation and management of emotional expressions by nurses in the course of their job duties (Theodosius et al., 2020). Nurses' ability to communicate effectively and perform clinical tasks with confidence to alleviate patients' pain, discomfort, or anxiety associated with clinical processes and procedures is known as instrumental emotional labor (Moudatsou et al., 2020; Theodosius et al., 2020).

Nurses regulate their emotions and expressions through deep and surface role-playing strategies to present behaviors that benefit individuals who are receiving care. The utilization of in-depth role-playing has been associated with positive aspects of emotional labor, including job contentment, stronger patient relationships, and patient gratification (Golfenshtein & Drach-Zahavy, 2015). Surface acting, on the other hand, is connected to emotional dissonance, which arises when there is a disparity between genuinely felt emotions and the emotions that are expected to be displayed. Surface acting may result in emotional exhaustion, stress, and burnout, as well as mental and physical health consequences (Jeung et al., 2018). Managing emotional demands in nursing care can lead to positive outcomes, though it is much more closely related to managing discomfort, vulnerability, and unfavorable health outcomes for patients. Such encounters may create high levels of emotional labor, which can impact nurses' well-being, working methods, and relationships with patients, families, and coworkers (Andela et al., 2016). To our knowledge, existing research has not specifically examined emotional labor among nurses caring for elderly patients. However, related issues such as stress, caregiving, and knowledge have been examined in this population (Waterworth et al., 2015; Wyman et al., 2017; Thi Thanh et al., 2019). Therefore, identifying levels of emotional labor among nurses can aid in the development of interventions pertaining to the care of elderly individuals. Our hypothesis in this study was: Nurses' emotional labor levels affect their attitudes towards elderly care.

## MATERIALS AND METHODS

### Study type

The research utilized an analytical-sectional design to investigate the impact of nurses' emotional labor levels on their attitudes towards caring for the elderly.

### Study group

The research encompassed nurses affiliated with Batman Training and Research Hospital as its study population (N=828). It was established that in determining the sample size, a total of 265 nurses should be reached with alpha=0.05 and 95% confidence level (Yazıcıoğlu & Erdoğan, 2004). Accordingly, the research was completed with 309 nurses who voluntarily agreed to participate (37%). The research was conducted face-to-face with nurses working in a training and research hospital between January and March 2023. Inclusion criteria for the research: Nurses who met the following criteria were included in the study: (i) they volunteered to participate, and (ii) they worked in internal medicine, infectious diseases, adult hematology, palliative care, or chest diseases services. Nurses who did not volunteer or worked in specific departments, such as intensive care units and operating rooms, were excluded.

### Dependent and independent variables

The research's independent variables encompass gender, age, education status, marital status, employment status, working time, weekly working hours, number of patients seen daily, choosing profession voluntarily status, difficulty in elderly patient care, difficulties encountered during care, Emotional Labor Behavior Scale for Nurses. The dependent variable is, Attitudes towards the Aged Scale.

### Procedures

Nurses' sociodemographic characteristics form, Emotional Labor Behavior Scale and Kogan Aged Attitude Scale, were used to collect data.

### Emotional Labor Behavior Scale for Nurses

The scale, developed by Değirmenci-Öz, and Baykal (2018), consists of 24 items and 3 sub-dimensions (surface behavior, in-depth behavior and sincere behavior). During the assessment of scores derived from the scale, the total score within each sub-dimension is divided by the number of items within that specific sub-dimension, resulting in the calculation of the sub-dimension's average score. The mean score for each sub-dimension on the subscale ranges from "1" to "5". As the average score approaches "1" in the sub-dimensions of the scale, emotional labor behavior is rated as low, whereas as the score approaches "5", the behavior is rated as high. The Cronbach Alpha coefficient for all items of the scale is 0.90; and for its
sub-dimensions it is 0.75, 0.86 and 0.75, respectively. The Cronbach's Alpha coefficient in our study was 0.94 for the whole scale, and 0.84, 0.91, 0.79 for its sub-dimensions, respectively.

### Attitudes towards the Aged Scale

Developed by Kogan (1961), and conducted by Kılıç and Adıbelli (2011) for Turkish validity and reliability, the scale consists of 26 items and 1sub-dimension. The scale allows for a total score range of 50-130. Greater total scores on the scale correspond to a heightened level of positive attitude. The scale's Cronbach Alpha coefficient is reported as 0.81, while in our study, we obtained a Cronbach Alpha coefficient of 0.77.

### Statistical analysis

In the analysis of the study's data, we employed the SPSS 22.0 software package. The data evaluation included the utilization of percentage, frequency, mean, Pearson correlation, and regression tests. The significance level was set at $p<0.05$.

### Ethical considerations

Ethics Committee Permission (Approval no: 2023-E.56391/55411) was obtained from Şırnak University to conduct the study, and institutional permission (Approval no: E-47960527-770-207069021) was obtained from the Provincial Health Directorate to conduct the research in a state hospital. During the research, the rules stated in the Declaration of Helsinki were followed. Verbal and written consents were obtained from the nurses who accepted to participate in the study.

## RESULTS

Upon examination of Table 1 sociodemographic characteristics of nurses, it is revealed that 66.0% of the nurses are female, 63.1% hold an undergraduate or graduate degree, 70.6% are not married, and 86.1% work in the service industry. Furthermore, the data shows that 54.7% of the nurses work 40 hours and 57.9% work in shifts. Furthermore, according to Table 1, 40.8% of the surveyed nurses reported caring for 10-20 patients on a daily basis, 75.7% of them entered the nursing profession voluntarily, and 43.7% expressed partial positivity and satisfaction with their career. When examining the characteristics of nurses regarding care for elderly patients, it was found that 59.5% received training specific to elderly patient care, 66.7% have an elderly family member, and 77.0% experience occasional difficulties in providing care. Additionally, 31% of nurses reported that they had problems with elderly patients' limited mobility and their inability to participate in their own care (Table 1).

Table 2 presents the results of the correlation analysis conducted to examine the relationships between the total and subscale scores of the Emotional Labor Behavior Scale (ELS) and the Attitudes towards the Aged Scale (ATE). A statistically significant positive correlation was identified between ELS and ATE ($r=0.320$, $p<0.001$). A statistically significant negative correlation was found between ELS Surface Behavior sub-dimension and ATE ($r=-0.285$, $p<0.001$). A statistically significant positive correlation was observed among the ELS total score and its sub-dimensions: Surface Behavior, In-Depth

Behavior, and Sincere Behavior (r=0.640, p<0.001; r=0.326, p<0.001; r=0.347, p<0.001, respectively). Morover, the ELS sub-dimensions of surface behavior, in-depth behavior, and sincere behavior demonstrated a statistically significant and highly positive correlation (r=0.714, p<0.001; r=0.600, p<0.001, respectively.

**Table 1. Sociodemographic characteristics of the nurses (n=309).**

| Variables | | n | % |
|---|---|---|---|
| **Gender** | Female | 204 | 66.0 |
| | Male | 105 | 34.0 |
| **Education Status** | High School | 43 | 13.9 |
| | Associate Degree | 71 | 23.0 |
| | Undergraduate and Graduate | 195 | 63.1 |
| **Marital Status** | Married | 91 | 29.4 |
| | Single | 218 | 70.6 |
| **Employment Status** | Service Nurse | 266 | 86.1 |
| | Responsible Nurse | 43 | 13.9 |
| **Weekly working hours** | 40 hours | 169 | 54.7 |
| | 48-56 hours | 93 | 30.1 |
| | 64-72 hours | 23 | 7.4 |
| | 72 hours and over | 24 | 7.8 |
| **Working shift** | Day-time | 113 | 36.6 |
| | Night-time | 17 | 5.5 |
| | Day and Night Shift | 179 | 57.9 |
| **Number of patients cared daily** | Number of patients<10 patients | 85 | 27.5 |
| | 10≤Number of patients≤20 patients | 126 | 40.8 |
| | 20<Number of patients≤30 patients | 42 | 13.6 |
| | Number of patients>30 patients | 56 | 18.1 |
| **Status of voluntarily choosing the profession** | Yes | 234 | 75.7 |
| | No | 75 | 24.3 |
| **Satisfaction with the profession** | Not satisfied | 56 | 18.1 |
| | Somewhat satisfied | 135 | 43.7 |
| | Satisfied | 118 | 38.2 |
| **Receiving education on elderly care status** | Yes | 184 | 59.5 |
| | No | 125 | 40.5 |
| **Presence of elderly at home** | Yes | 206 | 66.7 |
| | No | 103 | 33.3 |
| **Experiencing difficulty in elderly care** | Frequently | 38 | 12.3 |
| | Occasionally | 238 | 77.0 |
| | Never | 33 | 10.7 |
| **Frequently encountered difficulties in elderly care*** | Communication Difficulty | 60 | 21.7 |
| | Rejection therapy | 42 | 15.2 |
| | Deficiency of self-care | 50 | 18.1 |
| | Movement restriction and inability to participate in care | 87 | 31.6 |
| | Difficulties arising from physiological changes (posture disorder, skin changes...) and mental changes (Alzheimer, dementia) | 37 | 13.4 |
| | | **Mean** | **SD** |
| **Age** | | 28.07 | 4.9 |
| **Working years** | | 5.8 | 5.5 |
| **Total** | | **309** | **100.0** |

*Experiencing difficulties in the care process (n=276 nurses answered).

Moreover, a statistically significant and strong positive association was observed between the ELS sub-dimensions of in-depth behavior and sincere behavior (r=0.806, p<0.001). In our study, the total mean score of the ELS was 3.77±0.62, and the total mean score on ATE was 97.20±12.48. The mean scores obtained from the ELS sub-dimensions were 3.76±0.72 for Surface Behavior, 3.78±0.66 for In-depth Behavior, and 3.77±0.71 for Sincere Behavior, respectively (Table 2). In Table 3, the factors

affecting the Nurses' Attitudes towards the Elderly are examined. The effects of the variables we examined on ATE were found to be significant at p<0.05 level. The effect of characteristics based on qualitative data on ATE was determined, and R=0.405 was found as Adj.$R^2$=0.118. The analysis indicated that these variables accounted for a statistically significant portion of the total variance in the dependent variable ATE, explaining approximately 11.8% of the variance (p<0.05). It was determined that ELS had a positive (5.662) effect on ATE. It was determined that the number of patients cared for daily and the choice of profession voluntarily had a negative (-1.921, -4.605) effect on ATE (Table 3). The study concluded that alterations in other sociodemographic factors did not influence ATE (p>0.05) (Table 3).

**Table 2. Relationship between ELS and ATE (n=309).**

| | Variables | Mean±SD | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|---|
| **1** | **ATE Total Score** | 97.20±12.48 | - | | | | |
| **2** | **ELS Total Score** | 3.77±062 | 0.320** | - | | | |
| | **p** | | **p<0.001** | | | | |
| **3** | **Surface Behavior** | 3.76±0.72 | -0.285** | 0.640** | - | | |
| | **p** | | **p=0.001** | **p<0.001** | | | |
| **4** | **In-Depth Behavior** | 3.78±0.66 | 0.326** | 0.746** | 0.714** | - | |
| | **p** | | **p<0.001** | **p<0.001** | **p<0.001** | | |
| **5** | **Sincere Behavior** | 3.77±0.71 | 0.347** | 0.667** | 0.600** | 0.806** | - |
| | **p** | | **p<0.001** | **p<0.001** | **p<0.001** | **p<0.001** | |

**Correlation is significant at the 0.01 level (2-tailed), ATE: Attitudes towards the Aged Scale, ELS: Nurses' Emotional Labor Behavior Scale.

**Table 3. Effect of ELS and some descriptive characteristics of nurses on ATE.**

| | Unstandardized Coefficients | | Standardized Coefficients | | |
|---|---|---|---|---|---|
| | **B** | **Std. Error** | **Beta** | **t** | **p** |
| **(Constant)** | 75.111 | 10.068 | | 7.460 | **<0.001** |
| **Gender** | 2.137 | 1.481 | 0.081 | 1.443 | 0.150 |
| **Age** | 0.216 | 0.156 | 0.085 | 1.386 | 0.167 |
| **Education status** | 0.563 | 0.952 | 0.033 | 0.591 | 0.555 |
| **Marital Status** | 0.702 | 1.723 | 0.026 | 0.407 | 0.684 |
| **Employment status** | 2.173 | 2.021 | 0.060 | 1.076 | 0.283 |
| **Working time** | 0.137 | 0.487 | 0.019 | 0.282 | 0.778 |
| **Weekly working hours** | -0.104 | 0.736 | -0.008 | -0.142 | 0.887 |
| **Number of patients seen daily** | -1.921 | 0.696 | -0.161 | -2.760 | **0.006** |
| **Choosing profession voluntarily status** | -4.605 | 1.759 | -0.159 | -2.618 | **0.009** |
| **Difficulty in elderly patient care** | 1.395 | 1.504 | 0.054 | 0.928 | 0.354 |
| **Difficulties encountered during care** | -0.570 | 0.492 | -0.066 | -1.159 | 0.247 |
| **ELS** | 5.662 | 1.170 | 0.286 | 4.838 | **<0.001** |
| | R=0.405[a] | $R^2$=0.164 | Adj. $R^2$=0.118 | F=3.581 | **p<0.001** |

B: unstandardized coefficients; Std Error: standard error; Beta: standardized coefficients; $R^2$: determination coefficient; Adj. $R^2$:Adjusted R-Squared; F: Anova; p<0.05

## DISCUSSION

Nurses are in effective communication with their patients during care and increase patient satisfaction.

Nurses, who are aware of their own emotions and can empathize, are expected to exhibit positive attitudes and behaviors towards elderly individuals, especially in order to communicate with them effectively. In this study, it was ascertained that the emotional labor behaviors and attitudes of nurses, who are part of the interdisciplinary team in elderly care, are positive. In the present study, the mean emotional labor behavior score of the nurses was 3.77 (out of 5) and it was found that the nurses experienced moderate emotional labor. Since different tools measuring nurses' emotional labor behaviors are used in the literature, it is difficult to compare them with other studies (Lee & Ji, 2018; Ha et al., 2021). For example; In Lee et al.'s (2018) cross-sectional study with 165 nurses, the total emotional labor score was stated as 3.43 (out of 5). In the meta-analysis conducted by Ha et al. (2021), which involved 131 nurses employed in general hospital settings, it was underscored that nurses' emotional labor behaviors were characterized as mild to moderate in nature. In their descriptive study with 310 nurses, Demir et al. (2021) found the total emotional labor score to be 3.88 (out of 5). Differences among these studies might be attributed to variances in the regions where nurses work. The research was conducted among nurses employed in a region in Turkey characterized by a lower patient volume compared to secondary-level hospitals. Therefore, this may be related to the tendency of nurses in this hospital to give more emotional labor than nurses working in more intensive hospitals in other provinces. As a matter of fact, it is known that nurses cannot spare time for their patients due to their workload, that they exhibit superficial behaviors such as managing their emotions in their relationships with patients and their relatives, playing a role, and trying to act as if everything is normal (Değirmenci & Baykal, 2018).

In our study, among the three factors of emotional labor, nurses' in-depth behavior efforts received the highest average score, while surface behavior got the lowest score compared to sincere behavior. In-depth behavior is defined as the change of employees' inner feelings in a way that it is consistent with the rules of demonstration, while surface behavior is performed when employees change their appearance without shaping their inner feelings (Byrne et al., 2020). This result reveals that while giving care, nurses activate their inner feelings, act naturally and sincerely, and make an effort accordingly. This perspective, as felt by nurses, can be a helpful tool for understanding patient emotions and enhancing care quality in assessing their needs (Zamanzadeh et al., 2015). As a matter of fact, in their cross-sectional study with 378 nurses, Han et al. (2018) stated that nurses' in-depth behaviors directly and indirectly increase their level of service delivery and customer focus. However, when the service content and characteristics of the nursing profession are taken into account, it can be considered as an expected situation that nurses should show more natural and sincere feelings towards their patients and not pretend (Hassmiller & Wakefield, 2022). Similarly, Heydari et al. (2019) found that nurses primarily viewed the care they provided to elderly patients as routine interventions with a technical focus. The study identified a need for more emphasis on the emotional and social aspects of caregiving for this demographic (2019).

Nurses' attitudes towards elderly patients will increase the quality of care and facilitate recovery by helping to prevent complications. In this study, it was found that nurses exhibited positive attitudes toward the elderly. Existing literature suggests that nurses' attitudes toward the elderly may fluctuate across different societies, yet they tend to lean towards positivity on the whole (Salia et al., 2022; Thi Thanh et al., 2019; Ali et al., 2020; Pehlivan & Vatansever, 2019; Polat et al., 2014; Uysal et al., 2020). In a study conducted by Demirtürk Selçuk and Demirbağ (2020), the average total score of nurses from the ATE Geriatric Attitude Scale was 107.21. In the research conducted by Koç et al. (2018), the finding was established at 91.10. On the other hand, in a study conducted by Abozeid (2015), it is stated that nurses' attitudes towards elderly patients are negative (Mansouri Arani et al., 2017; Attafuah et al., 2022). Although the study results are similar to the literature, it is thought that the positive attitude towards the elderly may be related to our cultural values.

Another finding in our study was that there was a positive relationship between nurses' emotional labor behaviors and their attitudes towards the elderly. When the literature is examined, it is seen that nurses' attitudes towards the elderly have not been examined in terms of emotional labor, and results have been found to be related to spirituality, compassion fatigue, emotional intelligence and empathy, which are part of the therapeutic relationship. Studies examined in this direction have stated that as the level of therapeutic relationship increases, its positive effect on attitudes towards older adults also increases (Rush et al., 2016; Waterworth et al., 2015). These results can be associated with the demographic structure of the province where the study was conducted, because of having a younger population. In addition, this may be associated with greater family support for the care of elderly due to the family structure of the society. Indeed, family product support in both acute care settings and long-term care facilities has been noted to facilitate patients' participation in parts of care (Ris et al., 2019).

It was found in this study that with an increase in the number of patients cared for each day, there was a decrease in positive attitudes towards the elderly. Furthermore, it was observed that individuals who willingly opt for this profession exhibit positive attitudes toward the elderly. It has been noted in the literature that corporate practices, including stressful work environments, increased workloads, human resources limitations, and overtime, are associated

with unfavorable results in the workforce and have an adverse impact on elderly care (Kılıç and Adibelli, 2011; Chenigi et al., 2019; Labrague et al., 2017). On the other hand, professional motivation positively affects attitudes towards elderly care; therefore, it has been reported to improve the quality of care outcomes (Wyman, et al., 2017; Thi Tahnh Vu., 2019). These results may indicate the quality of care may be enhanced by associating occupational motivation and reduced work pressure with a positive mood.

This study, we had some limitations. The conclusions drawn from this research are applicable primarily to the geographic area in which the study was executed. The research is limited to the data obtained from the nurses who were actively working in the clinics at the time the data collection tools were applied.

## CONCLUSION

This study showed that emotional labor levels and professional motivation among nurses increased their positive attitude towards elderly care, while work intensity resulted in negative attitudes. Our study results confirmed our hypothesis that "Nurses' emotional labor levels have an effect on their attitudes towards elderly care". Our study results highlight the importance of creating motivating and supportive work environments to improve the quality of elderly care. On the other hand, these results may be useful in developing management solutions that address the negative consequences of emotional labor on nurses' health, healthcare costs, and quality of geriatric care. Furthermore, it is advisable to replicate this investigation with more extensive sample sizes and conduct long-term measurements to validate its credibility.

**Acknowledgement**

The authors wish to thank all of the nursing participating in the 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:** MEŞ, MK; **Material, methods and data collection:** MEŞ, MK; **Data analysis and comments:** MK; **Writing and corrections:** MEŞ, MK.

## REFERENCES

Ali, A., Khan, M. I., Ali, S., Muhammad, D., Naeema. (2020). Knowledge and attitudes regarding care of geriatric patients among nurses in Peshawar, Khyber Pakhtunkhwa. *Journal of Medical Sciences (Peshawar), 28*(3), 205–209.

Andela, M., Truchot, D., & Van der Doef, M. (2016). Job stressors and burnout in hospitals: The mediating role of emotional dissonance. *International Journal of Stress Management, 23(*3), 298–317. https://doi.org/10.1037/STR0000013

Attafuah, P. Y. A., Amertil, N. P., Abuosi, A. A., & Nyonator, D. (2022). Nurses knowledge and attitude towards care of older patients: A cross-sectional study. *International Journal of Africa Nursing Sciences,* 16(March), 100413. https://doi.org/10.1016/j.ijans.2022.100413

Brighton, L. J., Selman, L. E., Bristowe, K., Edwards, B., Koffman, J., & Evans, C. J. (2019). Emotional labour in palliative and end-of-life care communication: A qualitative study with generalist palliative care providers. *Patient Education and Counseling, 102*(3), 494–502. https://doi.org/10.1016/j.pec.2018.10.013

Byrne, A.L., Baldwin, A., Harvey, C. (2020). Whose centre is it anyway? Defining person-centred care in nursing: An integrative review. *PLoS One*, 10;*15*(3):e0229923. doi:10.1371/journal.pone.0229923.

Değirmenci Öz, S., & Baykal, Ü. (2018). Developing in the scale of emotional labor behavior for nurses. *International Refereed Journal of Nursing Researches,* (12), 119-139. https://doi.org/10.17371/uhd.2018.1.3

Demir, Y., Oruç, P., Baştürk, Y.A. & Özpınar, S. (2021). Hemşirelerde duygusal emek davranışı ve etkileyen faktörler: Kamu hastaneleri örneği. *Samsun Sağlık Bilimleri Dergis*i, *6*(1),76–84. https://doi.org/10.47115/jshs.790178

Demirtürk Selçuk, E., Demirbağ, B. C. (2020). Hemşirelerin yaşlılık ve yaşlı bakımına ilişkin görüşleri ve tutumları. *Kastamonu Sağlık Akademisi, 5*(1), 37–51.

de Oliveira, L. D. S. S. C. B., Souza, E. C., Rodrigues, R. A. S., Fett, C. A., & Piva, A. B. (2019). The effects of physical activity on anxiety, depression, and quality of life in elderly people living in the community. *Trends in Psychiatry and Psychotherapy, 41*(1), 36–42. https://doi.org/10.1590/2237-6089-2017-0129

Donelan, K., Chang, Y., Abebe, J. B., Spetz, J., Auerbach, D. I., Norman, L., & Buerhaus, P. I. (2019). Care management for older adults: The roles of nurses, social workers, and physicians. *Health Affairs, 38*(6), 941–949. https://doi.org/10.1377/hlthaff.2019.00030

Eser, B. & Küçük, S. (2021). Yaşlanan nüfus, sorunlar ve politikalar: Türkiye için bir değerlendirme. *Gümüşhane Üniversitesi Sosyal Bilimler Dergisi*, *12* (2), 541-556.

Golfenshtein, N., & Drach-Zahavy, A. (2015). An attribution theory perspective on emotional labour in nurse-patient encounters: A nested cross-sectional study in paediatric settings. *Journal of Advanced Nursing, 71*(5), 1123–1134. https://doi.org/10.1111/jan.12612

Günday, F., Taş, A., Abacıgil, F., & Arslantaş, H. (2021). Hemşirelerde iş doyumu ve iş yaşamı kalitesini etkileyen faktörler: kesitsel bir çalışma. *Adnan Menderes Üniversitesi Sağlık Bilimleri Fakültesi Dergisi, 6*(2), 216–232. https://doi.org/10.46237/amusbfd.918747

Ha, D. J., Park, J. H., Jung, S. E., Lee, B., Kim, M. S., Sim, K. L., Choi, Y. H., & Kwon, C. Y. (2021). The experience of emotional labor and its related factors among nurses in general hospital settings in republic of korea: A systematic review and meta-analysis. *Sustainability (Switzerland), 13*(21), 11634. https://doi.org/10.3390/su132111634

Han, S. S., Han, J. W., & Kim, Y. H. (2018). Effect of nurses' emotional labor on customer orientation and service delivery: the mediating effects of work engagement and burnout. *Safety and Health at Work, 9*(4), 441–446. https://doi.org/10.1016/j.shaw.2017.12.001

Hassmiller, S. B., & Wakefield, M. K. (2022). The future of nursing 2020–2030: Charting a path to achieve health equity. Nursing Outlook, *70*(6), 1-9.

Heydari A, Sharifi M, Moghaddam AB. Challenges and Barriers to Providing Care to Older Adult Patients in the Intensive Care Unit: A Qualitative Research. Open Access Maced J Med Sci. 2019 Oct 13;*7*(21):3682-3690. doi: 10.3889/oamjms.2019

Jeffrey, D. (2016). Empathy, sympathy and compassion in healthcare: Is there a problem? Is there a difference? Does it matter? *Journal of the Royal Society of Medicine, 109*(12), 446–452. https://doi.org/10.1177/0141076816680120

Jeung, D. Y., Kim, C., & Chang, S. J. (2018). Emotional labor and burnout: A review of the literature. *Yonsei Medical Journal, 59*(2), 187–193. https://doi.org/10.3349/ymj.2018.59.2.187

Kiliç, D., & Adibelli, D. (2011). The validity and reliability of Kogan's attitude towards old people scale in the Turkish society. *Health, 3*(09), 602–608. https://doi.org/10.4236/health.2011.39101

Koç, A., Öztaş, D., Uysal, N., Demircan, Z., Erdem, Ö., Sarı, E. (2018). Klinik hemşirelerin yaşlılara ilişkin düşünce ve tutumları. Ankara Medical Journal, *18*(4). https://doi.org/10.17098/amj.498024

Kogan, N. (1961). Attitudes toward old people: The development of a scale and an examination of correlates. *Journal of Abnormal and Social Psychology, 62*(1), 44–54. https://doi.org/10.1037/h0048053

Lee, E. K., & Ji, E. J. (2018). The moderating role of leader–member exchange in the relationships between emotional labor and burnout in clinical nurses. *Asian Nursing Research, 12*(1), 56–61. https://doi.org/10.1016/j.anr.2018.02.002

Mansouri Arani, M., Aazami, S., Azami, M., & Borji, M. (2017). Assessing attitudes toward elderly among nurses working in the city of Ilam. *International Journal of Nursing Sciences, 4*(3), *311–313. https://doi.org/10.1016/j.ijnss.20*17.06.009

Moudatsou, M., Stavropoulou, A., Philalithis, A., & Koukouli, S. (2020). The role of empathy in health and social. *Healthcare, 8*(36), 7–9.

Pehlivan, S., Vatansever, N. (2019). Hemşirelerin yaşlıya tutumları ve etkileyen faktörler. *Uludağ Üniversitesi Tıp Fakültesi Dergisi, 45*(1), 47–53. https://doi.org/10.32708/uutfd.468622

Ris I, Schnepp W, Mahrer Imhof R. An integrative review on family caregivers' involvement in care of home-dwelling elderly. Health Soc Care Community. 2019 May; *27*(3):e95-e111. doi: 10.1111/hsc.12663.

Rosen, M. A., DiazGranados, D., Dietz, A. S., Benishek, L. E., Thompson, D., Pronovost, P. J., & Weaver, S. J. (2018). Teamwork in healthcare: Key discoveries enabling safer, high-quality care. *American Psychologist, 73*(4), 433–450. https://doi.org/10.1037/amp0000298

Rush, K. L., Hickey, S., Epp, S., & Janke, R. (2016). Nurses' attitudes towards older people care: An integrative review. *In International Journal of Laboratory Hematology*, *38*(1), 42-49. https://doi.org/10.1111/ijlh.12426

Salia, S. M., Adatara, P., Afaya, A., Jawula, W. S., Japiong, M., Wuni, A., Ayanore, M. A., Bangnidong, J. E., Hagan, F., Sam-Mensah, D., & Alhassan, R. K. (2022). Factors affecting care of elderly patients among nursing staff at the Ho teaching hospital in Ghana: Implications for geriatric care policy in Ghana. *PLoS ONE, 17*(6 June), 1–16. https://doi.org/10.1371/journal.pone.0268941

Thakre, S. B., Thakre, S. S., & Thakre, S. N. (2017). Quality of work life of nurses working at tertiary health care institution: a cross sectional study. International *Journal Of Community Medicine And Public Health, 4*(5), 1627.https://doi.org/10.18203/2394-6040.ijcmph20171775

Theodosius, C., Koulouglioti, C., Kersten, P., Rosten, C. (2020). Collegial surface acting emotional labour, burnout and intention to leave in novice and pre-retirement nurses in the United Kingdom: A cross-sectional study. *Nurs Open, 15*;8(1):463-472. doi:10.1002/nop2.649

Thi Thanh Vu, H., Hoang Nguyen, L., Xuan Nguyen, T., Thi Hoai Nguyen, T., Ngoc Nguyen, T., Thi Thu Nguyen, H., Trung Nguyen, A., Pham, T., Tat Nguyen, C., Xuan Tran, B., A Latkin, C., S H Ho, C., & C M Ho, R. (2019). Knowledge and attitude toward geriatric palliative care among health professionals in Vietnam. *International Journal of Environmental Research and Public Health, 16*(15), 1–11. https://doi.org/10.3390/ijerph16152656

Uysal, N., Ünal Toprak, F., Koç, A. (2020). Hemşirelik öğrencileri ve klinik hemşirelerinin yaşlılığa ilişkin tutumlarının karşılaştırılması. *İnönü Üniversitesi Sağlık Hizmetleri Meslek Yüksek Okulu Dergisi, 8*(2),461–471. https://doi.org/10.33715/inonusaglik.729543

Yazıcıoğlu, Y., Erdoğan, S. (2004). SPSS uygulamalı bilimsel araştırma yöntemleri Retrieved April 14, 2022, from https://www.nadirkitap.com/spss-uygulamali-bilimsel-arastirma-yontemleri-yahsi-yazicioglu-samiye-erdogan-kitap5881998.html

Waterworth, S., Gott, M., Raphael, D., Parsons, J., & Arroll, B. (2015). Working with older people with multiple long-term conditions: a qualitative exploration of nurses' experiences. *Journal of Advanced Nursing, 71*(1), 90–99. https://doi.org/10.1111/jan.12474

Wyman, M. F., Shiovitz-Ezra, S., & Bengel, J. (2018). Ageism in the health care system: Providers, patients, and systems. *Contemporary perspectives on ageism,* 193-212. https://doi.org/10.1093/geroni/igx004.044.

Zamanzadeh, V., Jasemi, M., Valizadeh, L., Keogh, B., Taleghani, F. (2015).Effective factors in providing holistic care: a qualitative study. *Indian J Palliat Care*, *21*(2):214-24. https://doi.org/10.4103/0973-1075.156506.

**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.1277353

# The Effect of Virtual Reality on Pain During Blood Draw in Children Aged 6-10 Years

Fatma GÖKSU[1],Tülay KUZLU AYYILDIZ[2]

[1]Zonguldak Bulent Ecevit University, Application and Research Center
[2]Zonguldak Bulent Ecevit University, Institute of Health Sciences, Department of Pediatric Nursing

***Geliş Tarihi / Received:*** *05.04.2023,* ***Kabul Tarihi / Accepted:*** *05.12.2023*

**ABSTRACT**
**Objective:** This was study that was performed to determine the effect of distraction technique which was applied by a virtual reality for decreasing the pain of the child during blood draw. **Methods:** In this randomized controlled experimental study, venous blood samples were taken from children aged 6–10 years. In order to evaluate the level of pain that the children felt during the procedure, the Faces Comparative Pain Scale and Visual Comparative Pain Scale were used. Children in the experimental group were shown video with virtual reality glasses during the blood collection process. **Results:** It was found that mean score of the children in the experimental group from "Faces Pain Scale" was 1.02±1.12 following the procedure and their mean score from "Visual Comparative Pain Scale" was 1.87±1.97. For the children in control group, mean score from "Faces Comparative Pain Scale was 2.47±1.83 and mean score from "Visual Comparative Pain Scale" was 4.17±3.16; and also, a statistically significant difference was found between two groups (p=0.0001 and p=0.001). **Conclusion:** Virtual reality glasses, that are used during venous blood collection, are an effective instrument which draw the attention of the children, do not require no prior preparation, can be applied easily and decrease pain.
**Key words:** Blood Drawal, Distraction, Nonpharmacological Method, Pain, Virtual Reality.

# Kan Alımı Sırasında Kullanılan Sanal Gerçekliğin Çocukların Hissettikleri Ağrıya Etkisi: Randomize Kontrollü Bir Çalışma

**Amaç:** Sanal gerçeklik gözlüğü ile uygulanan dikkati dağıtma tekniğinin çocuğun kan alımı sırasında ağrısını azaltmak için etkisini belirlemek amacıyla yapılmış bir çalışmadır. **Yöntem:** Bu randomize kontrollü deneysel çalışmada, 6–10 yaş arası çocuklardan venöz kan örnekleri alındı. Çocukların işlem sırasında hissettikleri ağrı düzeyini değerlendirmek için Yüzler Karşılaştırmalı Ağrı Ölçeği ve Görsel Karşılaştırmalı Ağrı Ölçeği kullanıldı. Deney grubundaki çocuklara kan alma işlemi sırasında sanal gerçeklik gözlüğü ile video izletildi. **Bulgular:** Deney grubu çocukların işlem sonrası "Yüzler Ağrı Kıyaslama Ölçeğine" verdikleri puanın ortalamasının 1.02±1.12, "Görsel Ağrı Kıyaslama Ölçeğine" verdikleri puanın ortalaması 1.87±1.97, kontrol grubu çocukların ise "Yüzler Ağrı Kıyaslama Ölçeğine" verdikleri puanın ortalamasının 2.47±1.83, "Görsel Ağrı Kıyaslama Ölçeğine" verdikleri puanın ortalaması 4.17±3.16 olduğu belirlenmiş, iki grup arasında ileri düzeyde anlamlı fark olduğu saptanmıştır (p=0.0001 ve p=0.001). **Sonuç:** Venöz kan alımı sırasında kullanılan sanal gerçeklik gözlüğü çocukların dikkatini çeken, ön hazırlık gerektirmeyen, kolay uygulanabilen ve ağrıyı azaltan etkili bir araçtır.

**Anahtar kelimeler:** Kan Alma, Dikkat Dağıtma, Nonfarmakolojik Yöntem, Ağrı, Sanal Gerçeklik.

***Sorumlu Yazar / Corresponding Author:*** Fatma GÜLTEKİN, Zonguldak Bülent Ecevit University, Application and Research Center, Zonguldak, Turkey.
***E-mail*** fgoksu78@gmail.com

***Bu makaleye atıf yapmak için / Cite this article:*** *Göksu, F.* & Kuzlu Ayyıldız, T. (2024). The Effect of Virtual Reality on Pain During Blood Draw in Children Aged 6-10 Years. *BAUN Health Sci J, 13*(1), 137-143. https://doi.org/balikesirsbd.1277353

## INTRODUCTION

Individuals face with pain due to any trauma, disease or various medical interventions during childhood period at the first time (Cohen et al., 2008; Dinçer et al., 2011). Although pain is considered as one ofthe important factors throughout one's life, the needs of children during painful procedures have not gained enough importance (Tüfekci & Erci, 2007). According to American Academy of Pediatrics and American Pain Society, pain is evaluated and treated inadequately for children (Conk et al., 2013; American Academy of Pediatrics, 2001).

Painful medical procedures such as blood drawing, injection and vaccine application are among the fears of children. These fears may lead to frustration in children and parents most of the time; and it affects subsequent treatment and care process of the child negatively. If the child has undergone a painful procedure previously, this experience may cause anxiety in children during later procedures; and this condition significantly affects the degree of the pain felt (İnal & Canbulat, 2015).

Physiologically, pain causes tachycardia, an increase in the oxygenation of myocardium, an increase in cardiac output, respiratory alkalosis, tachypnea, a decrease in lung ventilation, hypoxia, nausea and vomiting; and psychologically, it causes problems such as an increase in stress and anxiety levels, behavioral disorders, sleeping problems, disappointment and guilt among parents (Yılmaz & Atay, 2014; Conk et al., 2013; Törüner & Büyükgönenç, 2011).

Provision of effective pain control during painful interventions applied to children will increase tolerance against pain during further interventions (Mutlu & Balcı, 2015). Successful pain management increases life quality of the child, provides early mobilization and decreases hospital costs by shortening the duration of hospitalization (Conk et al., 2013; Akatın, & Kocaman, 2018).

A multidisciplinary team approach is required to achieve the desired success in pain management among children (Mutlu & Balcı, 2015). Nurses have a central position within this team due to their roles such as spending a long time with the patient, learning previous pain history and pain coping style of the patient, and also, benefiting from these methods when necessary, nurses teach patients how to cope with the pain, guide the patients, perform the planned treatment and follow up its outcomes (Cohen et al., 2008).

Pharmacological and nonpharmacological methods are used in pain management (Conk et al., 2013; Törüner & Büyükgönenç, 2011). Nonpharmacological methods are the independent practices conducted by nurses. At the same time, these methods are inexpensive, reliable, non-invasive, easy to apply, cost-effective and has no side effects (Mutlu & Balcı, 2015; Akatın, & Kocaman, 2018).

Distraction is a nonpharmacological nursing intervention that provides better pain management by drawing patient's attention to another direction. Some of the methods used for distraction are watching cartoon movies (Erbay, 2016), balloon inflation, cough trick (Mutlu & Balcı, 2015), kaleidoscope (Kunjumon, & Upendrababu, 2018), virtual reality (Ustuner Top & Kuzlu Ayyıldız 2021), buzzy® and distraction cards (Erdogan, & Ozdemir, 2021).

The aim of this study was to determine the effect of distraction technique, that is applied during blood collection, on the pain of children aged between 6–10 years old. The hypothesis of the study was indicated as "There is a difference between the pain felt, the pulse measured and the saturation values of the children in the study and control groups."

## MATERIALS AND METHODS

### Design

The present study was a prospective, randomized, controlled study.

### Place and time of research

The study was carried out in the pediatric blood collection unit of a university hospital between May and September 2016.

### The study population and sample of the research

The children who not between 6 and 10 years of age, who had pain at admission, who had a disease causing a chronic pain, who used a medication that might cause an analgesic effect within the last 24 hours before the admission, who were not willing to participate in the study, who had a mental and neurological disability, who could not speak Turkish, who had a chronic disease requiring frequent blood collection (such as renal failure or diabetes), who were experiencing a fever disease during admission and who had a history of faint during blood collection were excluded from the study. Children whose parents provided consent and who did not have pain at admission were enrolled (n=106). Among these, 16 children gave up blood collection with virtual reality glasses during the procedure. Ten children did not fill the pain scale following the procedure. Therefore, the study was carried out by assigning 80 children to experimental and control groups as 40 per each. The study adhered to the CONSORT guidelines (Figure 1) (Schulz, Altman, Moher, & CONSORT Group, 2010). Randomization was performed using a computer program.

The number of the universe could not be calculated since registration process did not take place in a blood collection clinic. The calculation of the sample size was performed by G-power 3.1 package program. Minimum number of patients per group was calculated as 30 with an effect size of 0.8 and power of 0.80. Considering that there may be case losses and that there may be cases that disrupt homogeneity in terms of variables affecting pain and that they may be removed from the study groups, 40 people were included in each group.

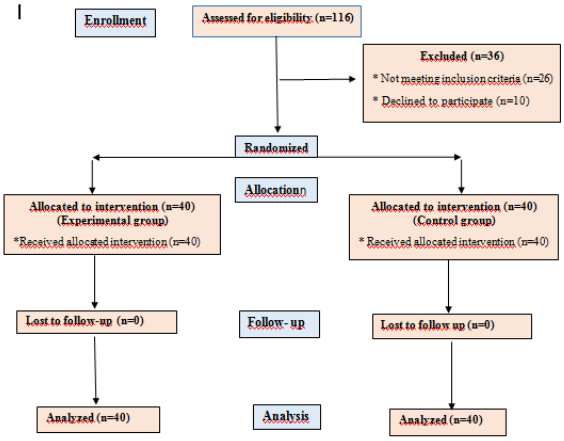


**Figure 1. Consort diagram of the study**

**Variables**

*The dependent variable of the study;*

- Faces Pain Scale-Revised
- Visual Analog Scale
- Heart rate,
- Oxygen saturation values.

*The independent variables of the study*

- Watching video with virtual reality glasses

**Data collection tools**

The data were collected by using the Descriptive Information Form, Faces Pain Scale and Visual Analog Scale.

*Descriptive Information Form*

There were 33 questions in the form including sociodemographic characteristics of the children, the person accompanying the child during the procedure and experiences, feelings, thoughts and responses of the child during previous blood collection.

*Faces Pain Scale-Revised (FPS-R)*

There were 6 facial expressions which were scored between 0 and 5 in the scale that was used for children who were older than 3 years old, who were conscious and who had ability to communicate. The severity of the pain increased as the score increased (Cohen et al., 2008; Conk et al., 2013; Törüner & Büyükgönenç, 2011).

*Visual Analog Scale (VAS)*

The children were asked to show pain they felt on a 10-cm ruler within an interval from "no pain" to "the most severe pain"(Conk et al., 2013; Törüner & Büyükgönenç, 2011).

*Virtual Reality Glasses*

Virtual reality glasses are a technological product that are used to watch displays prepared as 360 degrees and that can show the display greater and clearer due to the special lenses inside it. In this study, "VR BOX 3.0" virtual reality glasses that were white in color were used. The distance between the cell phone and objective can be adjusted personally. It has air outlets that might dissipate the heat transmitted by the phones. While using the product, there is no need for any power or connection unit except the phone. The weight of the product was 0.414 kg. The dimensions (height x depth x length) were 19.5x14x11 cm/7.66x5.50x4.32 inches.

**Ethical considerations**

Written consents for the study were taken from Zonguldak Bulent Ecevit University (BEU) Clinical Research Ethics Committee and from Head Physician of Zonguldak BEU Health Practice and Research Center. Parents were informed about the aim and research plan of the study before the treatment. Informed Consents were taken from the parents who accepted to participate in the study. Verbal consents were taken from the children who accepted to be included in the study.

**Intervention**

*Before the venipuncture procedure*

Children in experimental and control groups and their parents filled "Descriptive Information Form" just 30 minutes before the procedure. Oxygen saturation and the heart rates of the children participating in the study, were measured before the procedure, and they were recorded into "Application Registration Form". Children were reminded that one of their parents would be with them during the procedure.

*Venipuncture procedure*

Blood was collected from the children in experimental and control groups by a pediatric nurse using a 21 guage + 1.5 inch vacutainer. Blood was collected from all children at the first trial. Their parents were besides their children during the procedure.

*Control group*

A pain-decreasing intervention was not applied to the children in the control group. Their blood was collected by the nurses working in the pediatric clinic through routine nursing care. Parents were allowed to stay besides their children during the procedure but they did not perform any pain-decreasing intervention.

*Experimental group*

Virtual reality glasses were introduced to the children in the experimental group before the procedure and children who were willing to wear were made to try glasses, and their consent for blood collection was taken with these devices on. The child was made to watch a two to three minutes long video with virtual reality glasses before starting the procedure; and it continued until the end of the blood drawing procedure (an average of five minutes). Each child was made to watch "Aquarium-VRA" video.

*After the venipuncture procedure*

Just after the procedure, oxygen saturation and heart rates were measured again. The score of pain felt during blood collection was asked to the child second minutes after the procedure; and it was marked on Visual Analog Scale (VAS) and Faces Pain Scale. The children in the experimental group and their parents were asked their opinions about virtual reality glasses after the procedure.

**Data analysis**

Statistical analyses of the study were done by Statistical Package for the Social Sciences (SPSS Inc., Chicago, IL, USA), Version 19.0 package program. Descriptive statistics for continuous variables in the study were presented with mean, standard deviation, minimum and maximum values; and they were given with frequency

and percentages for categorical variables. Compliance with normal distribution of continuous variables was evaluated by Shapiro Wilk test. Pearson chi-square test was used to compare groups of categorical variables. Independent-samples ttest was used to compare variables showing normal distribution while Mann Whitney U test was used to compare variables that did not show normal distribution. Paired-tamples t test was used to compare variables in dependent groups showing normal distribution; and two-related-samples test was used to compare variables which did not present normal distribution. P value below 0.05 was found to be statistically significant for all statistical analyses in the study.

## RESULTS

It was detected that 45.0% (n=18) of the children in each group were females, and 55.0% (n=22) were males; and mean age was found to be 7.65±1.30 (6-10) years old. Based on the ranking of the child among his/her siblings, it was determined that 57.5% (n=23) in experimental group and 62.5% (n=25) in the control group were the oldest children within their families (Table 1).

When children in experimental and control groups were examined based on their age, sex and ranking between the siblings, no statistically significant differences were found between the groups (p>0.05).

**Table 1. Comparison of sociodemographic characteristics of the children based on groups.**

| Variables | Experimental Group Ort±*SS* Median (Min–Max) | | Control Group Ort±*SS* Median (Min–Max) | | Total Ort±*SS* Median (Min–Max) | | p |
|---|---|---|---|---|---|---|---|
| **Age** | 7.4+2.46 (6–10) | | 7.4+2.46 (6–10) | | 7.4+2.46 (6–10) | | 1.000[a] |
| **Child's sex** | **n** | **%** | **n** | **%** | **n** | **%** | |
| Boys | 18 | 45.0 | 18 | 45.0 | 36 | 45.0 | 1.000[b] |
| Girls | 22 | 55.0 | 22 | 55.0 | 44 | 55.0 | |
| **Enumeration between siblings** | | | | | | | |
| 1st Child | 23 | 57.5 | 25 | 62.5 | 48 | 60.0 | 0.74[b] |
| 2nd Child | 12 | 30.0 | 12 | 30.0 | 24 | 30.0 | |
| 3rd and over | 5 | 12.5 | 3 | 7.5 | 8 | 10.0 | |
| **Total** | **40** | **100.0** | **40** | **100.0** | **80** | **100.0** | |

[a]Mann Whitney U Test [b]PearsonChi-Square Test

When children in experimental and control groups were compared based on the causes for admission to hospital and their states of having a companion, no statistically significant differences were found (p>0.05(Table 2).

**Table 2. Comparison of the children in experimental and control groups based on the reason for their admission to hospital and their status of attendant.**

| Variables | Experimental Group | | Control Group | | Total | | p |
|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | |
| **The reason for their admission to hospital** | | | | | | | |
| Thyroid gland diseases | 5 | 12.5 | 5 | 12.5 | 10 | 12.5 | 0.39[b] |
| Allergy | 6 | 15.0 | 4 | 10.0 | 10 | 12.5 | |
| Respiratory system diseases | 6 | 15.0 | 3 | 7.5 | 9 | 11.1 | |
| GİS* diseases | 8 | 20.0 | 7 | 17.5 | 15 | 18.8 | |
| Circumcision | 5 | 12.5 | 2 | 5.0 | 7 | 8.8 | |
| Other** | 10 | 25.0 | 19 | 47.5 | 29 | 36.3 | |
| **Attendant** | | | | | | | |
| Mother | 28 | 70.0 | 31 | 77.5 | 59 | 73.8 | 0.77 [b] |
| Father | 10 | 25.0 | 7 | 7.5 | 17 | 21.2 | |
| Other | 2 | 5.0 | 2 | 5.0 | 4 | 5.0 | |
| **Total** | **40** | **100.0** | **40** | **100.0** | **80** | **100.0** | |

[b]PearsonChi-Square Test*Gastrointestinal System

**Control, vertigo, developmental disorder, early puberty, weight gain, anemia, perspiration, nose bleeding, urinary incontinence, swelling around, sebaceous gland, tick

It was found that the mean score of the children in the experimental group from "Faces Pain Scale" was 1.02±1.12 following the procedure and their mean score from "Visual Comparative Pain Scale" was 1.87±1.97. For the children in the control group, the mean score from "Faces Comparative Pain Scale was 2.47±1.83 and the mean score from "Visual Comparative Pain Scale" was 4.17±3.16; and also, a statistically significant difference

was found between two groups (p=0.0001 and p=0.001) (Table 3).

**Table 3. Comparison of the levels of pain felt by children during blood collection.**

| Pain Scales | Experimental Group Ort±ss Min–Max | Control Group Ort±ss Min–Max | p |
|---|---|---|---|
| **FPS-R** | 1.02±1.12 (0.00–3.0) | 2.47±1.83 (0.00–5.0) | **0.001**[a] |
| **VAS** | 1.87±1.97 (0.00–6.0) | 4.17±3.16 (0.00–10.0) | **0.001**[a] |

[a]Mann Whitney U Test

When the levels of pain felt by the participants were compared, it was found that significantly less pain was felt by the children in the experimental group compared to the children in the control group.When physiological changes of the participants before and after the tretment were examined, a statistically significant difference was observed between both groups about their pulse values before and after the treatment (p=0.046 and p=0.033) whereas no statistically significant difference was observed between groups before and after the treatment in terms of saturation values (p=0.676 and p=0.479) (Table.4).

**Table 4. Comparison of pulse and $SPO_2$ values of the children before and after the procedure.**

| Physiological changes | | Before Procedure X±SS (Min–Max) | After Procedure X±SS (Min–Max) | p |
|---|---|---|---|---|
| **Pulse** | Experimental Group<br>Control Group | 106.12±16.90 (63–151)<br>105.07±15.53 (77–153) | 102.57±19.85 (60–149)<br>108.70±18.03 (80–155) | **0.04**[c]<br>**0.03**[c] |
| p | | 0.28 0.77 | -1.44 0.15 | |
| **Saturation** | Experimental Group<br>Control Group | 98.12±1.01 (94–100)<br>98±01.81 (95–100) | 98.20±1.32 (92–100)<br>98.10±0.81 (96–100) | 0.67[c]<br>0.47[c] |
| p | | 0.35[a] | 0.32 [a] | |

[a]Mann Whitney U Test [c]Wilcoxon Signed Ranks Test

## DISCUSSION

Pain may cause children to get scared of procedures such as blood collection and injections, and may lead to unwillingness for these, and even neglection or delay of the treatment. One of the non-pharmacological methods used in pain management is distraction. The method of distraction is a nursing intervention that provides better control and a decrease in pain by drawing attention of the patient away from the procedure (Conk et al., 2013; Törüner & Büyükgönenç, 2011; Inal & Canbulat, 2015). After having compared the individual and familial characteristics of the children in experimental and control groups, the causes for their admission to hospital, their states of having a companion at hospital, their experiences regarding blood collection, their states of fear and emotions before blood collection and their less favorite procedure, no significant differences were found. This situation showed that experimental and control groups were homogenous.

When levels of pain felt by the participants were compared, it was found that children in experimental group felt significantly less pain during blood collection compared to the children in the control group. This situation was thought to stem from the fact that the children in the experimental group felt less pain due to the ability of virtual reality glasses applied to the experimental group to draw the attention of children to another direction. The findings obtained from the study show similarities with the other studies. Some studies are reporting that distraction during procedures such as establishing vascular access or drawing blood decreased the pain felt among children of different age groups (Canbulat et al., 2014; Inal & Canbulat, 2015; Erbay 2016; Mutlu & Balcı, 2015; Kunjumon, & Upendrababu, 2018; Ustuner Top & Kuzlu Ayyıldız, 2021; Erdogan, & Ozdemir, 2021; Şahin & Ayyıldız, 2022).

There are some studies reporting that distraction during the procedures such as establishing vascular access or drawing blood decreased the pain felt among children of different age groups. Many researchers have reported that several techniques helped to decrease pain among children of different ages such as distraction cards, virtual reality, and buzzy® among 7-12 age group (Erdogan, & Ozdemir, 2021); blowing soap foam among 3-6 age group (Caprilli et al., 2012); balloon inflation and coughing exercises among 6–12 age group (Mutlu & Balcı, 2015); watching to virtual reality among 4–6 age group, (Ustuner Top & Kuzlu Ayyıldız, 2021) and using colorful cards and kaleidoscope among 7–11 age group (Canbulat et al., 2014).

In the study, physiological changes in both groups were evaluated before and after blood collection. In terms of pulse values, pulse rate decreased after the treatment in the experimental group whereas it showed an increase in

the control group (p=0.046 and p=0.033). For $SP0_2$ values, there was not a statistically significant difference between both groups in terms of saturation values before and after the treatment (p>0.05).

The most reliable source in pain evaluation is the self pain expression of the patient. However, it is required to transform this subjective statement into objective to make it measurable. Perception of pain is accompanied with significant physiological changes such as heart rate, blood pressure, electrodermal activity and electromyography especially in case of acute pain (Demir, 2012). Heart rate, respiration rate and blood pressure may increase and oxygen saturation may decrease in children during pain (Törüner & Büyükgönenç, 2011).

According to the measurement results of our study, it was detected that there was not a significant difference in oxygen saturation values before and after the procedure; but there was a significant difference in pulse values between both groups. It is thought that this condition might be due to the shortness of the procedure. It has been reported that it was difficult to detect changes showing autonomic stimulation during short painful procedures, physiological changes turned into normal rapidly due to the shortness of the duration of the procedure and adaptation and harmony occurred in a short time (Oakes, 2011; Rostami et al., 2006).

In the previous studies relevant with this topic, different results were found about the changes in vital findings of children during painful procedures. In their study evaluating the effect of making 2–7 year old children to watch cartoons during establishing peripheric vascular access on the pain felt, Erbay et al. (2016) have found that there were not significant differences between average pulse, respiration and oxygen saturation before and after the procedure. In the study by Mutlu et al (2015) that aims to decrease pain during blood drawal among 9–12 year old children, it was found that there was not a significant difference in oxygen saturation before and after the procedure in balloon and coughing groups, but average pulse value following the procedure was found to be significantly higher compared to the value before the procedure in coughing group. Rostami et al (2006) applied local cooling to the children of 6–12 years old during establishing venous vascular access in order to decrease pain in their study; and did not detect a statistically significant difference in pulse values.

In this study, it was observed that application of virtual reality glasses was effective for decreasing pain of 6–10 year old children during blood collection. The efficiency of the use of virtual reality glasses is recommended to be supported by evidence-based studies that will be performed with distinct age groups and for distinct painful procedures.

**Research Strengths**

- The study is a randomized controlled trial.
- It is the first study in which virtual glasses were used during blood collection in children in Turkey.

**Limitations**

This study has some limitations. Some children did not want to continue the study since they felt too much pain. Some of the children, who provided consent for blood collection by using virtual reality glasses before the procedure, declared that they did not want to wear glasses when they entered the blood collection room. The families who wanted to spendless time in the hospital did not want to participate in the study. For these reasons, there were case losses.

## CONCLUSION

Virtual reality glasses, that are used during venous blood collection, are an effective instrument which draw the attention of the children, do not require no prior preparation, can be applied easily and decrease pain.

**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:** FG, TKA; **Material, methods and data collection:** FG, TKA; **Data analysis and comments:** FG, TKA; **Writing and corrections:** FG, TKA.

## REFERENCES

Akatın, Y., & Kocaman, G. (2018). Çocuk Hastaların Ağrısını Değerlendirmede Kanıta Dayalı Uygulama Önerilerine Uyumun Arttırılması İçin Kullanılan Stratejiler. *İzmir Katip Çelebi Üniversitesi Sağlık Bilimleri Fakültesi Dergisi*, *3*(1), 23–31.

American Academy of Pediatrics. (2001). The assessment and management of acute pain in infants, children, and adolescents. *Pediatrics, 108*(3), 793–797. https://doi.org/10.1542/peds.108.3.793

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

Caprilli, S.,Vagnoli, L., Bastiani, C., & Messeri, A. (2012). Pain and distress in children undergoing blood sampling: Effectiveness of distraction with soap bubbles. A randomized controlled study. *Italian Journal of Pediatric Nursing Science*, *4*(1), 15–18.

Cohen, L. L., Lemanek, K., Blount, R. L., Dahlquist, L. M., Lim, C. S., Palermo, T. M., … Weis, K. E. (2008). Evidence-based assessment of pediatric pain. *Journal of Pediatric Psychology, 33*(9), 939–955. https://doi.org/ 10.1093/jpepsy/jsm103

Conk, Z., Başbakkal, Z., Yılmaz, B. H.,& Bolışık, B. (2013). *Pediatric Nursing*. Ankara, Academician Medical Book Store, 885-900.

Demir, Y. (2012). Pain experience in intensive care unit care and pain assessment: Literature review. *Düzce University Institute of Health Sciences*, *2*(1), 24–30.

Dinçer,Ş., Yurtçu, M., & Günel E. (2011). Pain in newborns and nonpharmacologic treatment procedures. *Selçuk University Medical Journal*, 27(1), 46–51.

Erbay, E. (2016). Effect of the distraction technique which is done during peripheral venous cannulation in the children on reducing pain. Bülent Ecevit University, Institute of Health Science, Unpublished Master's Thesis, 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.2 021.01.001

Inal, S., & Canbulat, N. (2015). Using of distraction methods on procedural pain management of pediatric patients. *Journal of Health Science and Profession,* 2(3), 372–378. https://doi.org/10.17681/hsp.47420

Mutlu, B., &Balcı, S. (2015). Effects of balloon inflation and cough trick methods on easing pain in children during the drawing of venous blood samples: A randomized controlled trial. *Journal for Specialists in Pediatric Nursing, 20*(3), 178–186. https://doi.org/10.1111/jsp n.12112

Oakes, L. L. (2011). Infant and child pain management. *New York: Springer Publishing Company,* 3-23.

Rostami, S., Salsali, M., Mohavedi, A. F., Keikhaee, B., &Moradi, A. (2006). Effect of local refrigeration prior to venipuncture on pain related responses in school age children. *Australian Journal of Advanced Nursing*, *24*(2), 51–55.

Schulz, K. F., Altman, D. G., Moher, D., & the CONSORT Group (2010). CONSORT 2010 statement: Updated guidelines for reporting parallel group randomized trials. British Medical Journal, 340, c332. https://doi.org/1 0.1136/bmj.c332 .

Şahin, S., & Ayyıldız, T. K. (2022). Effect of Buzzy® Application on Pain During Subcutaneous Application in Children. *Journal Of Educatıon And Research In Nursıng*, *19*(3), 283–289. https://doi.org:10.5152/jern.20 21.82642

Toruner, E. K., & Buyukgonenc L. (2011). Basic approaches to child health nursing. Goktug Publishing, Ankara, 146–170.

Kunjumon, D., & Upendrababu, V. (2018). Effect of kaleidoscope on pain perception of children aged 4-6 years during intravenous cannulation. *American Journal of Nursing Science, 7*, 137. https://doi.org/10.1164 8/j.ajns.20180704.14

Tüfekçi, F. G.,&Erci, B. (2007). The opinion of children, parents and health staff about parental presence during painful procedures. *Atatürk University Nursing School Journal, 10*(4), 52–62.

Ustuner Top, F., & Kuzlu Ayyıldız, T. (2021). Pain management in children during invasive procedures: A randomized clinical trial. *Nursing Forum*, *56*(4), 816–822. https://doi.org/10.1111/nuf.12616

Yılmaz, F., & Atay, S. (2014). Clinical pain management of nursing students. *Journal of Hacettepe University Faculty of Nursing, 1*(2), 32–41.

**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.1138887

# Gebelikte Yaşanan Distresin Prenatal Bağlanmaya Etkisi

Derya KAYA ŞENOL[1], Aylin PEKYİĞİT[2]

[1] Osmaniye Korkut Ata Üniversitesi, Sağlık Bilimleri Fakültesi, Ebelik Bölümü
[2] Çankırı Karatekin Üniversitesi, Sağlık Bilimleri Fakültesi, Çocuk Sağlığı ve Hastalıkları Hemşireliği Bölümü

***Geliş Tarihi / Received:*** *01.07.2022* ***Kabul Tarihi / Accepted:*** *19.09.2023*

**ÖZ**

**Amaç:** Araştırmamız son trimesterde kadının yaşadığı distresin prenatal bağlanmaya etkisini belirlemek amacıyla yapılmıştır. **Gereç ve Yöntem:** Çalışma, tanımlayıcı ve kesitsel tipte bir araştırmadır. Çalışmanın örneklemini araştırmanın yürütüldüğü tarihler arasında kadın doğum polikliniklerine başvuran, son trimesterde olan 154 gebe oluşturmuştur. **Bulgular:** Araştırmada Prenatal Distres Ölçeği (PDÖ) puan ortalamalarının 20–34 yaş aralığında, ortaokul mezunu, çalışmayan, gelir düzeyi giderlerinden az olan, geniş ailede yaşayan gebelerde daha yüksek olduğu görülmüştür. Prenatal Bağlanma Envanteri (PBE) puan ortalamaları ise yaşı 35 ve üzeri, okur-yazar olmayan, çalışmayan, gelir düzeyi giderlerinden az olan, geniş ailede yaşayan gebelerde daha yüksektir. **Sonuç:** Çalışmada gebelerin PDÖ ve PBE puanları arasında negatif yönlü zayıf bir ilişki olduğu, prenatal distres azaldıkça prenatal bağlanmanın arttığı saptanmıştır.
**Anahtar Kelimeler:** Distres, Ebe/hemşire desteği, Gebelik, Prenatal bağlanma.

# The Effect of Distress in Pregnancy on Prenatal Attachment

**ABSTRACT**

**Aim:** Our research was carried out to determine the effect of the distress experienced by the woman in the last trimester on prenatal attachment. **Materials and Methods:** This is a descriptive cross-sectional study. The sample of the study consisted of 154 pregnant women in the last trimester who applied to the obstetrics outpatient clinics between the dates of the study. **Results:** In the study, it was observed that the mean scores of the Prenatal Distress Scale (PDS) were higher in pregnant women between the ages of 20–34, middle school graduates, unemployed, with lower income and living in an extended family. Mean scores of Prenatal Attachment Inventory (PAI) were higher for women who were illiterate, unemployed, living in an extended family, with a mean age of 35 and above. **Conclusion:** In the study, it was found that there is a weak negative relationship between the PDS and PAI scores of pregnant women, and prenatal attachment increases as prenatal distress decreases.
**Keywords:** Distress, Midwife/nurse support, Pregnancy, Prenatal attachment.

***Sorumlu Yazar / Corresponding Author:*** Aylin PEKYİĞİT, Çankırı Karatekin University, Faculty of Health Sciences, Department of Pediatric Nursing, Çankırı, Turkey.
***E-mail:*** aylinpekyigit@hotmail.com

***Bu makaleye atıf yapmak için / Cite this article:*** Kaya Şenol, D., & Pekyiğit, A. (2024). Gebelikte Yaşanan Distresin Prenatal Bağlanmaya Etkisi. *Balıkesir Sağlık Bilimleri Dergisi, 13(1),* 144-150.
https://doi.org/10.53424/balikesirsbd.1138887

## GİRİŞ

Gebelik, annede fizyolojik ve psikolojik değişikliklerin yanı sıra, psikosomatik değişikliklerin yaşandığı bir süreci de kapsamaktadır (Rollè ve ark., 2020). Vücuttaki değişimler ile birlikte, anne adayı annelik kimliğini kazanma sürecinden geçmektedir (Hung ve ark., 2011). Anne olmak, sosyal, kültürel, çevresel ve kişisel deneyimlerden etkilenen, dinamik ve gelişen bir süreçtir. Anne adayı, annelik rolündeki yeni taleplere ve zorluklara aktif olarak uyum sağlar, ancak bu geçiş, algılarına ve kaynaklarına bağlı olarak bazıları için zor ve üzücü olarak değerlendirilebilir. Buna ek olarak, gebeler annelik rolüne uyum sağlamada sorun yaşadıklarını kabul etmeyebilirler. Çünkü anne olmak, sosyal açıdan mutlu bir olay olarak algılanmaktadır. Anne olma konusunda olumsuz düşüncelere sahip oldukları için kendilerini suçlu hissedebilirler ve endişeleri için yardım istemeyebilirler (Copeland ve Harbaugh, 2019). Özellikle gebeliğin ilk üç ayında, ebeveynler bu sürece uyum sağlamaya çalışırken daha yüksek düzeyde bir kaygı yaşamaktadırlar. İkinci üç aylık dönemde ebeveynler bu yeni fiziksel ve psikolojik durumu kabul etme eğilimindedirler. 18. gebelik haftasından itibaren, fetal hareketin algılanması annenin kendisi ve fetus arasında ayrım yapmasını, anne-bebek iletişimin başlamasını sağlar. Bu dönemde doğum öncesi bağlanma gelişmeye başlar (Polizzi ve ark., 2019).

Anne adayının gebelik boyunca bebeğine sevgi, şefkat ve gereksinimlerine özen göstermesi, onunla etkileşim kurması, bebeğini korumak amacıyla geliştirdiği emosyonel davranışların tümü prenatal bağlanmayı tanımlanmaktadır (Maddahi-Sedat ve ark., 2016). Gebelik sürecinde anne ve fetüs arasında kurulan bağlanma ikili arasındaki ilk önemli ilişkidir (Elkin, 2015). Gebelik ilerledikçe anne adayı, fetüsü kendinden farklı, ayrı bir birey olarak algılamaktadır. Bağlanma, annelik rolünün gelişmesine, anneliğe uyum sağlamaya, bebeğine şefkat ve sevgi göstermesine, beslemesine, onu korumasına, gereksinimlerine duyarlı olmasına, onunla etkileşim kurmasına yardımcı olur (Elkin, 2015).

Zayıf perinatal bağlanma yetersiz doğum öncesi bakım ve fetal izlem, erken doğum, prenatal ve postnatal dönemde ortaya çıkan depresif belirtiler nedeniyle bebeğe yetersiz bakım verilmesi gibi olumsuz etkiler ortaya çıkabilir (Smorti, Ponti ve Tani, 2019). Çocuğun davranışsal, bilişsel, dilsel ve duygusal sorunları, annenin perinatal depresyonunun uzun vadeli bir etkisi olarak okul çağına kadar devam edebilir (Goodman, 2019). Ayrıca, maternal ve paternal antenatal ruh halleri, ergenlerde anksiyete sorunları, depresyon bozuklukları ve antisosyal davranışlarla ilişkili olabilir (Capron ve ark., 2015).

Gebenin annelik rolünü benimsemesi, anne ve bebek arasındaki bağın oluşmasında oldukça önemlidir (Topaç Tunçel ve Kahyaoğlu Süt, 2019). Fizyolojik ve psikolojik değişikliklerin yaşandığı gebelik döneminde bağlanma, gebeliğe olumlu tepki geliştiği zaman başlamaktadır. Bu doğrultuda gebenin gebeliği kabulü ve uyumu oldukça önemlidir (Metin ve Pasinlioğlu, 2016).

## GEREÇ VE YÖNTEM

### Araştırmanın Tipi

Bu çalışma tanımlayıcı ve kesitsel tipte bir çalışmadır.

### Araştırmanın Evreni ve Örneklemi

Araştırmanın evrenini devlet hastanesine gebe izlem polikliniklerine başvuran, araştırmaya dahil edilme kriterlerini taşıyan, katılmayı gönüllü kabul eden gebeler oluşturmuştur. Araştırmanın örneklemini ise gebelik öncesi herhangi bir psikiyatrik sorunu olmayan, araştırmanın yürütüldüğü tarihler arasında Çankırı'da bir devlet hastanesinin kadın doğum polikliniklerine, 10 Şubat–10 Ağustos 2020 tarih aralığında başvuran, son trimesterde olan, herhangi bir gebelik komplikasyonu bulunmayan, tek ve sağlıklı bir fetüse sahip olan, iletişim engeli bulunmayan ve araştırmaya katılmayı gönüllü kabul eden 154 gebe oluşturmuştur.

### Veri Toplama Araçları

Araştırmada veriler, araştırmacılar tarafından hazırlanan Katılımcı Bilgi Formu, Prenatal Distres Ölçeği (PDÖ) ve Prenatal Bağlanma Envanteri (PBE) kullanılarak veriler toplanmıştır.

***Katılımcı bilgi formu:*** Gebelerin ve eşlerinin sosyo-demografik özelliklerini belirlemeye yönelik, eğitim, çalışma durumu, yaş, sosyal güvence, akraba evliliği, aile tipi, gelir düzeyi ile ilgili 8 soru, kadınların obstetrik özelliklerini belirlemeye yönelik, gebeliği planlama durumu, gebelikte yaşanan sağlık probleminin varlığı gibi bilgileri içeren 10 adet olmak üzere toplam 18 soru içermektedir.

***PDÖ–Revize Versiyonu:*** 17 maddeden oluşan üçlü Likert tipi bir ölçek olup gebelik boyunca ortaya çıkabilecek fiziksel ve emosyonel semptomları, ilişkileri, gebeliğe özgü konularda kadınların yaşadıkları endişeleri belirlemek amacı ile 12 maddelik versiyonunu Yali ve Lobel (1999) geliştirmiştir. Sonrasında tüm gebelik dönemini kapsayan 17 maddeli versiyonu Lobel ve arkadaşları (2008a, 2008b) tarafından revize edilerek oluşturulmuştur. Ülkemizde Türkçe geçerlilik ve güvenirliliği 2011 yılında Yüksel ve arkadaşları (2011) tarafından yapılmıştır. Katılımcılardan ölçekte yer alan bir ifadeye, o anda endişeli veya sıkıntılı olup olmadıklarını tanımlamak için "Hiç" (0), "Biraz" (1) ve "Çok fazla" (2) şeklinde sıralanan seçeneklerden birisini seçmesi istenmektedir. Ölçekten minimum 0 puan elde edilirken maksimum 34 puan elde edilmektedir. Ölçekten alınan toplam puan arttıkça prenatal distres düzeyinin arttığı anlamına gelmektedir. PDÖ'nün toplam Cronbah Alpha güvenirlik katsayısı 0.85'tir. Çalışmamızda PDÖ ölçeğinin Cronbach Alpha katsayısı 0.73 olarak saptanmıştır.

***Prenatal Bağlanma Envanteri (PBE) (The Prenatal Attachment Inventory):*** Ölçek, 1993 yılında Mary Muller tarafından geliştirilmiştir. Ülkemizde Türkçe

geçerlilik ve güvenilirlik çalışması 2009 yılında Yılmaz ve Kızılkaya Beji tarafından yapılmıştır. Ölçeğin orijinali ve Türkçe'ye uyarlanan halinde gebeliğin 20. haftası itibari ile kullanılabileceği belirtilmiştir. PBE, annenin bebeğine prenatal dönemde bağlanma düzeyini belirlemek amacıyla 21 maddeden oluşmaktadır. Ölçekte yer alan her madde 1 ile 4 puan arasında olup dörtlü likert tipte olup ölçekten toplamda en fazla 84 en az 21 puan alınabilmektedir. Elde edilen puan yükseldikçe prenatal bağlanmanın da yüksek olduğu anlamını taşımaktadır. Ölçeğin Cronbach Alpha katsayısını 0.84 olarak belirtmişlerdir (Yılmaz ve Kızılkaya Beji, 2013). Bu çalışmada kullandığımız PBE'nin Cronbach Alpha katsayısı 0.75 olarak saptanmıştır.

Veriler yüz yüze görüşme yöntemi ile kadın doğum polikliniklerinde, araştırmaya dahil edilme kriterlerine uyan, katılmaya gönüllü gebelerden toplanmıştır. Gebeler çalışma hakkında bilgilendirildikten ve katılımı kabul ettikten sonra anketler, kendilerini ifade edebilecekleri özel bir odada, araştırmacı tarafından uygulanmıştır. Veri toplama formunun uygulanması yaklaşık 10–15 dakika sürmüştür.

**Veri Analizi ve Değerlendirme Yöntemi**

Araştırmadan elde edilen veriler bilgisayar ortamında, Statistical Package for Social Sciences (SPSS) 22.0 paket programı ile değerlendirilmiştir. Çalışma verilerinin değerlendirilmesinde tanımlayıcı istatistiksel metotlar (ortalama, standart sapma, minimum, maksimum, frekans, oran), Student t Test ve ANOVA testi kullanılmıştır. Verilerin normal dağılıma uygunluğunu belirlemek için Kormogrov–Smirnov dağılım testi yapılmıştır. Bağımlı ve bağımsız değişkenler arasındaki farklılığın belirlenmesinde Ki-kare ve ortalama değerlerin karşılaştırmasında t-testi kullanılmıştır.

**Etik Boyutu**

Araştırmanın etik yönden uygunluğunun belirlenmesi için Çankırı Karatekin Üniversitesi Etik Kurulu'ndan onay alınmıştır (Karar Tarihi: 26.12.2019, Karar No: 148). Çalışmanın gerçekleşeceği hastaneden yazılı kurum izni alınmıştır. Gebelere elde edilen verilerinin, isimlerini belirtmeden bilimsel amaçlı kullanılacağı bireylere açıklanmıştır ve Helsinki Bildirgesi'ne uygun olarak yazılı ve sözlü onam alınmıştır.

**Tablo 1.Gebelerin sosyo-demografik özellikleri ile PDÖ ve PBE puan ortalamalarının karşılaştırılması (n=154).**

| Değişkenler | S (%) | PDÖ | Test ve Önemlilik | | PBE | Test ve Önemlilik | |
|---|---|---|---|---|---|---|---|
| | | X̄±SS | *t/F* | *p* | X̄±SS | *t/F* | *p* |
| **Yaş** | | | 2.882 | 0.005 | | -4.110 | **0.000** |
| 20-34 yaş aralığı | 122 (79.2) | 28.00±5.28 | | | 40.72±7.70 | | |
| 35 ve üzeri | 32 (20.8) | 25.06±4.46 | | | 47.0±7.59 | | |
| **Eğitim Durumu** | | | *3.563 | 0.008 | | | |
| Okur-yazar | 7 (4.5) | 24.85±1.06 | | | 53.0±9.27 | 5.179 | 0.001 |
| İlkokul | 19 (12.3) | 26.10±3.07 | | | 40.26±5.97 | | |
| Ortaokul | 29 (18.8) | 29.13±4.25 | | | 44.51±6.91 | | |
| Lise | 50 (32.5) | 28.72±5.54 | | | 40.74±8.28 | | |
| Üniversite ve üzeri | 49 (31.8) | 25.85±5.88 | | | 41.0±7.75 | | |
| **Çalışma durumu** | | | *8.584 | **0.000** | | 0.276 | 0.760 |
| Çalışıyor | 30 (22.1) | 24.76±4.94 | | | 42.14±6.76 | | |
| Çalışmıyor | 106 (68.8) | 27.75±4.86 | | | 42.19±8.53 | | |
| Ücretsiz işte çalışıyor | 14 (9.1) | 31.00±6.17 | | | 40.50±7.68 | | |
| **Sosyal Güvence** | | | -0.554 | 0.580 | | 0.055 | 0.956 |
| Var | 145 (94.2) | 27.33±5.19 | | | 42.04±8.27 | | |
| Yok | 9 (5.8) | 28.33±6.40 | | | 41.88±3.78 | | |
| **Gelir Düzeyi** | | | | | | 4.457 | 0.013 |
| Kötü | 14 (9.1) | 28.35±5.10 | *0.750 | 0.474 | 47.92±6.69 | | |
| Orta | 71 (46.1) | 26.85±4.53 | | | 41.81±8.70 | | |
| İyi | 69 (44.8) | 27.73±5.94 | | | 40.05±7.20 | | |
| **Aile Tipi** | | | -2.060 | 0.041 | | -0.486 | 0.627 |
| Çekirdek Aile | 141 (91.6) | 27.12±5.21 | | | 41.93±7.93 | | |
| Geniş Aile | 13 (8.4) | 30.23±5.03 | | | 43.07±9.74 | | |
| **Eşin Eğitim Durumu** | | | | | | | |
| Okur-yazar | 3 (1.9) | 25.00±0.00 | *1.335 | 0.260 | 57.00±0.00 | 3.989 | 0.004 |
| İlkokul | 12 (7.8) | 27.33±4.67 | | | 44.00±0.00 | | |
| Ortaokul | 31 (20.1) | 29.03±5.78 | | | 40.83±8.27 | | |
| Lise | 54 (35.1) | 27.50±4.45 | | | 43.07±7.98 | | |
| Üniversite ve üzeri | 54 (35.1) | 26.48±5.79 | | | 40.40±7.15 | | |
| **Eşin Çalışma durumu** | | | | | | | |
| Çalışıyor | 144 (93.5) | 27.47±5.41 | 0.802 | 0.424 | 41.58±8.02 | -2.673 | 0.008 |
| Çalışmıyor | 10 (6.5) | 26.10±1.19 | | | 48.50±5.87 | | |

* F= ANOVA test, t=Bağımsız gruplarda t testi.

## BULGULAR

Tablo 1'de gebelerin sosyo-demografik özellikleri ile PDÖ ve PBE puan ortalamalarına ait özellikler verilmiştir. Araştırmada PDÖ puan ortalamalarının 20–34 yaş aralığında, ortaokul mezunu olan, çalışmayan, gelir düzeyi giderlerinden az olan, geniş ailede yaşayan gebelerde daha yüksek olduğu görülmüştür. Gebelerin PDÖ ve PBE puan ortalamaları karşılaştırıldığında ise yaş ve çalışma durumu açısından gruplar arasında anlamlı bir farklılık olduğu saptanmıştır ($p<0.05$). Çalışmada 35 ve üzeri, okur-yazar olmayan, çalışmayan, gelir düzeyi giderlerinden az olan, geniş ailede yaşayan

gebelerde PBE puan ortalamaları daha yüksek olarak belirlenmiştir.

Gebelerin obstetrik özellikleri ile PDÖ ve PBE puan ortalamaları karşılaştırıldığında gruplar arasında bebeğin cinsiyetini bilme, gebelikte endişelendiren bir durum yaşama ve gebelikte rahatsızlık yaşama açısından istatistiksel olarak anlamlı bir farklılık olduğu saptanmıştır ($p<0.05$). Gebelik sayısı 1–3 arasında olan, hiç doğum yapmamış, 1–2 yaşayan çocuğu ve 1–2 abortusu olan, gebeliği planlı olmayan, gebeliğinde kendi ve bebek sağlığı için endişe duyan, bebeğinin cinsiyeti erkek olan, gebelikte fiziksel rahatsızlık yaşadığını ifade eden gebelerin PDÖ puan ortalamaları daha yüksektir. PBE puan ortalamalarına bakıldığında ise, gebelik sayısı 4 ve üzeri olan, 1–2 abortusu ve 1–2 yaşayan çocuğu olan, planlı gebeliği olan, gebeliğinde bebeğin sağlığı için endişe duyan, bebeğin cinsiyeti kız olan gebelerin puanları daha yüksek saptanmıştır (Tablo 2).

**Tablo 2.Gebelerin obstetrik özellikleri ile PDÖ ve PBE puan ortalamalarının karşılaştırılması (n=154).**

| Değişkenler | S (%) | PDÖ | Test ve Önemlilik | | PBE | Test ve Önemlilik | |
|---|---|---|---|---|---|---|---|
| | | $\bar{X}$±SS | *t/F* | *p* | $\bar{X}$±SS | *t/F* | *p* |
| **Gebelik Sayısı** | | | | | | | |
| 1-3 arası | 123(79.9) | 27.60±5.74 | 0.998 | 0.320 | 41.61±8.16 | -1.272 | 0.205 |
| 4 ve üzeri | 31(60.4) | 26.54±2.32 | | | 43.67±7.58 | | |
| **Doğum Sayısı** | | | | | | | |
| Hiç doğum yapmayan | 42(27.3) | 27.80±6.04 | 0.868 | 0.422 | 38.52±8.98 | *5.889 | 0.003 |
| 1-2 arası | 93(60.4) | 27.49±5.29 | | | 43.48±7.19 | | |
| 3 ve üzeri | 19(12.3) | 25.94±2.72 | | | 42.68±8.07 | | |
| **Düşük/Küretaj Sayısı** | | | | | | | |
| Hiç düşük yapmayan | 117(76) | 27.33±5.70 | 0.053 | 0.948 | 41.51±8.21 | 1.614 | 0.202 |
| 1-2 arası | 28(18.2) | 27.67±3.87 | | | 42.85±8.32 | | |
| 3 ve üzeri | 9(5.8) | 27.22±1.92 | | | 46.22±2.72 | | |
| **Yaşayan Çocuk** | | | | | | | |
| 1-2 çocuk | 135(87.7) | 27.59±5.51 | -0.375 | 0.708 | 41.96±8.09 | 1.281 | 0.202 |
| 3 ve üzeri | 19(12.3) | 25.94±2.27 | | | 42.68±8.07 | | |
| **Son gebeliğin planlı/istenme durumu** | | | | | | | |
| Evet | 125(81.2) | 27.28±5.19 | -0.497 | 0.620 | 42.07±7.64 | 0.016 | 0.900 |
| Hayır | 29(18.8) | 27.82±5.57 | | | 41.86±9.85 | | |
| **Gebelikte destek** | | | | | | | |
| Eşi | 128(83.1) | 41.82±7.81 | 1.398 | 0.246 | 26.95±5.01 | *3.718 | 0.013 |
| Annesi | 22(14.3) | 43.95±9.62 | | | 30.31±5.89 | | |
| Kayınvalidesi | 1(0.6) | 48.00±0.00 | | | 32.00±0.00 | | |
| Kız kardeşi | 3(1.9) | 35.00±0.00 | | | 23.00±0.00 | | |
| **Gebelikte endişelendiren durum** | | | | | | | |
| Endişem yok | 68(44.2) | 41.26±8.11 | 1.038 | 0.377 | 25.58±4.28 | *7.773 | **0.000** |
| Bebeğimin sağlığı | 41(26.6) | 41.53±6.51 | | | 30.26±6.37 | | |
| Kendi sağlığım | 7(4.5) | 41.57±7.34 | | | 26.57±2.82 | | |
| Doğum korkusu | 38(24.7) | 44.02±9.48 | | | 27.65±4.50 | | |
| **Bebeğin cinsiyeti** | | | | | | | |
| Kız | 76(49.4) | 27.15±4.19 | 0.226 | 0.798 | 43.90±8.05 | *10.703 | **0.000** |
| Erkek | 65(42.2) | 27.72±6.09 | | | 41.55±7.13 | | |
| Bilmiyorum | 13(8.4) | 27.07±6.51 | | | 33.46±7.10 | | |
| **Gebelikte fiziksel rahatsızlık yaşama** | | | | | | | |
| Yaşayan | 124(80.5) | 42.54±8.33 | 1.611 | 0.203 | 26.44±4.23 | *13.359 | **0.000** |
| Yaşamayan | 30 (19.5) | 39.41±5.61 | | | 32.50±8.38 | | |

*F= ANOVA test, t=Bağımsız gruplarda t testi.

Çalışmada gebelerin PDÖ puan ortalamalarının 27.38±8.07 ve PBE puan ortalamalarının 42.03±5.25 olduğu belirlendi (Tablo 3).

**Tablo 3. Gebelerin PDÖ ve PBE puan ortalamaları, minimum-maksimum değerleri (n=154).**

| Değişkenler | $\bar{X}$ | *SS* | *Minimum* | *Maksimum* |
|---|---|---|---|---|
| PDÖ | 27.38 | 8.07 | 21 | 57 |
| PBE | 42.03 | 5.25 | 17 | 52 |

Çalışmada gebelerin PDÖ ve PBE puanları arasında negatif yönde zayıf bir ilişki saptanmıştır (r=-0.090, p=0.267). Başka bir ifade ile prenatal distres azaldıkça prenatal bağlanma artmaktadır (Tablo 4).

**Tablo 4.Gebelerin PDÖ ve PBE puanlarının**

| Korelasyon Dağılımı (n=154) | PBE |
|---|---|
| PDÖ | *r**= -0.090<br>*p*=0.267 |

*Korelasyon t testi.

## TARTIŞMA

Ebeveynliğe geçiş, genellikle stresin eşlik ettiği, artan bir kırılganlık dönemi olarak kabul edilmektedir. Ebeveynlerin, ebeveynlik taleplerini karşılamaya yönelik mevcut kaynakları algılaması ile ebeveynlik rolünün algılanan talepleri arasındaki uyumsuzluk ebeveyn stresine neden olabilir (Mazzeschi ve ark., 2015). Yapılan çalışmalarda yaş, eğitim durumu, gelir durumu, gebenin çalışma durumu ile ailenin aylık geliri gibi sosyo-demografik, gebelik haftası, gebelik sayısı, gebeliği planlanma durumu, şimdiki gebeliğinde gebelikle ilişkili sorun yaşama gibi özelliklerin prenatal distres düzeylerini etkilediği belirtilmektedir (Çapık ve ark., 2015, Yüksel ve ark., 2014). Çalışma sonuçlarına göre PDÖ puan ortalamalarının 20–34 yaş aralığında, ortaokul mezunu olan, ücretsiz bir işte çalışan, gelir düzeyi giderlerinden az olan, geniş ailede yaşayan gebelerde daha yüksek olduğu saptandı. Yapılan bir araştırmada da benzer şekilde düşük gelirli annelerde yetersiz kaynaklar ve çevresel stres faktörleri nedeniyle daha fazla prenatal stres yaşandığı belirtilmektedir (Suplee ve ark., 2014).

Çalışmada hiç doğum yapmayanlarda ve doğum korkusu yaşayanlar kadınlarda prenatal stres daha fazla belirlenmiştir. Yapılan benzer bir çalışmada da primigravidaların stres düzeyinin multigravidalardan daha yüksek olduğu belirtilmektedir (Coşkun ve ark., 2019). Ayrıca bir çalışmada gebenin doğumla ilgili korkuları veya endişelerinin daha fazla prenatal distres yaşanmasına neden olduğu vurgulanmaktadır (Yali ve Lobel, 1999). Çalışma sonuçları, özellikle doğum korkusu yaşayan primipar gebelerin gebelik ve doğum konusundaki bilgi gereksiniminin karşılanması gereken duygusal desteklerini ortaya koymaktadır.

Çalışmamızda gebeliği planlı olmayan, kendisi ve bebeğinin sağlığı hakkında endişe duyan ve gebeliği boyunca fiziksel sağlık sorunu yaşayan gebelerin prenatal distres puan ortalamalarının yüksek olduğu görülmüştür. Yapılan benzer bir çalışmada bebeğin bakımı ve doğum sonrası dönem ile ilgili endişe duyan, kronik bir hastalığı olan, gebeliğinde sağlık sorunu ve riskli bir durum yaşayan gebelerin prenatal distres düzeylerinin yüksek olduğu belirtilmektedir (Yılmaz ve Şahin, 2019). Coşkun ve arkadaşlarının (2020) yaptığı çalışmada da benzer şekilde planlamadan gebe kalan ve bu gebeliğinde sağlık sorunu yaşayan gebelerin, stres düzeylerinin anlamlı düzeyde olumsuz etkilendiği belirtilmektedir.

Prenatal bağlanma, yaş, eğitim, annenin çalışma durumu, gelir düzeyi, gebelik sayısı, çocuk sayısı, daha önceki gebelik kaybı, evlilik süresi, aile içerisindeki iletişim, gebeliğin kabulü, bebeğin cinsiyeti, gestasyonel yaş, sağlık kontrollerine gitme durumu gibi faktörlerden etkilenmektedir (Elkin, 2015; Maddahi-Sedat ve ark., 2016). Literatürle benzerlik gösteren çalışma sonuçlarında 35 ve üzeri olan, okur–yazar olmayan, çalışmayan, gelir düzeyi giderlerinden az olan, geniş ailede yaşayan, büyük ebeveynlerden destek alan gebelerin PBE puan ortalamalarının daha yüksek olduğu görülmüştür. Dikmen ve Çankaya'nın çalışmasında da (2018) gelir düzeyi kötü, geniş aile yapısına sahip olan, çalışmayan, eğitim durumu ilkokul ve altı olan ve gebelikte sağlık sorunu yaşayan gebelerin PBE puan ortalamalarının düşük olduğu belirtilmektedir. Önceki gebelik öyküleri, obstetrik ve tıbbi komplikasyonlar da prenatal bağlanmayı etkileyen çeşitli faktörlerdir (Maddahi ve ark., 2016). Çalışma sonuçlarında gebeliği planlı olan, 3 ve üzeri sayıda düşük ve küretajı olan gebelerde prenatal bağlanma daha yüksek olarak belirlenmiştir. Yapılan çalışmalarda da gebeliğin planlı olmaması, gebenin destek alması (Erkal Aksoy ve Dereli Yılmaz, 2016), gebelik, düşük öyküsü, doğum ve yaşayan çocuk sayısı, riskli gebelik gibi durumların prenatal bağlanmayı olumsuz etkilediği belirtilmektedir (Erkal Aksoy ve Dereli Yılmaz, 2016; Yılmaz ve Beji, 2010). Bu doğrultuda çalışma sonuçlarımız literatürle benzerlik göstermektedir.

Çalışmada gebelerin PDÖ puan ortalamalarının 27.38±8.07 olduğu belirlenmiştir. Yapılan bir çalışmada da gebelerin gebelik süresince hafif ya da düşük düzeyde distres yaşadığı belirtilmektedir (Kaplan ve ark., 2007).

Çalışmada PBE puan ortalamalarının 42.03±5.25 olduğu belirlenmiştir. Literatürde yapılan benzer çalışmalara bakıldığında doğum öncesi bağlanma düzeylerini, Topaç Tunçel ve Kahyaoğlu Süt (2019) 60.1±12.6, Elkin (2015) 57.3±12.3, Küçükkaya (2020) 64.9±21.2 olarak bildirmiştir. Yapılan araştırma sonuçlarına bakıldığında bu çalışmada gebelerimizin algıladıkları prenatal bağlanma durumlarının daha düşük düzeyde olduğu görülmektedir.

Gebelikte yaşanan distres durumu, prenatal bağlanmayı olumsuz yönde etkilemektedir (Coşkun ve ark., 2019). Çalışmada gebelerin çalışma sonuçlarında prenatal distres azaldıkça prenatal bağlanmanın arttığı görülmüştür. Literatüre bakıldığında gebelik stresi ile maternal fetal bağlanma arasında pozitif bir korelasyonlar olduğu, kaygı ve anksiyete düzeyi azaldıkça bağlanma düzeyinin arttığı belirtilmektedir (Chang ve ark., 2016; Coşkun ve ark., 2019; Mako ve Deak, 2014). Yapılan bir çalışmada ise gebeliğe özgü daha yüksek stres, daha güçlü maternal fetal bağlanma ile

ilişkilendirilmiştir (Chang ve ark., 2016). Bu durumun, bebeğin ihtiyaçlarına daha fazla duyarlı olan annelerin ve daha fazla bağlanma yaşandığını düşündürmektedir.

## SONUÇ VE ÖNERİLER

Çalışma sonuçlarına göre, 20–34 yaş aralığında, ortaokul mezunu, ücretsiz bir işte çalışan, gelir düzeyi giderlerinden az olan, geniş ailede yaşayan, gebeliği planlı olmayan, hiç doğum yapmayan, gebeliğinde kendi ve bebek sağlığı için endişe duyan, gebelikte fiziksel rahatsızlık yaşadığını ifade eden gebelerde prenatal distres, 35 ve üzeri, okur-yazar olmayan, çalışmayan, gelir düzeyi giderlerinden az olan, geniş ailede yaşayan gebeliği planlı olan, gebeliğinde bebeğin sağlığı için endişe duyan gebelerde ise prenatal bağlanma artmaktadır. Prenatal distres azaldıkça prenatal bağlanma artmaktadır.

Elde edilen sonuçlar, hemşire ve ebeler tarafından gebelikte anksiyete, korku, kaygı veya strese neden olabilecek risk faktörlerinin, kişisel özelliklerin, psikososyal faktörlerin, obstetrik özelliklerin değerlendirmesinin ve tanımlamasının önemini ortaya koymaktadır. Prenatal distres ve bağlanmanın değerlendirilmesi, sağlıklı bir gebelik süreci geçirmek için fiziksel, duygusal, sosyal olarak gebeye uygun desteğin sağlanması konusunda sağlık personelinin bilinçli olması, riskli gruplarda düzenli ve sistematik değerlendirmelerin yapılması, stresi önlemek ve oluşabilecek stres durumunda gebeliğe uyumunu sağlamak için eğitim programları ve düzenli izlemlerin yapılması önerilir.

### Çıkar çatışması

Yazarlar, bu makalenin araştırılması, yazarlığı ve/veya yayınlanması ile ilgili olarak herhangi bir potansiyel çıkar çatışması beyan etmemiştir.

### Yazar katkıları

**Plan, tasarım:** DKŞ; **Gereç, yöntem ve veri toplama:** AP; **Analiz ve yorum:** DKŞ; **Yazım ve eleştirel değerlendirme:** DKŞ, AP

### Ek bilgi

Bu çalışma 20–22 Kasım 2020 tarihleri arasında gerçekleştirilen Online 1. Uluslararası Anadolu Ebeler Derneği Kongresi'nde özet sözel bildiri olarak sunulmuştur.

## KAYNAKLAR

Alan Dikmen, H., Çankaya, S. (2018). Maternal Obezitenin Prenatal Bağlanma Üzerine Etkisi. *Acıbadem Üniversitesi Sağlık Bilimleri Dergisi*, *9* (2), 118-123. https://doi.org/10.31067/0.2018.1

Capron, L. E., Glover, V., Pearson, R. M., Evans, J., O'Connor, T. G., Stein, A., et al. (2015). Associations of maternal and paternal antenatal mood with offspring anxiety disorder at age 18 years. *Journal of Affective Disorders*, *187*, 20-26. https://doi.org/10.1016/j.jad.2015.08.012

Chang, H., Chen, S., Chen, C. (2016). Predictors of antenatal psychosocial stress in Taiwanese women. *Journal of Nursing Research, 24* (3), 193-200. doi: 10.1097/jnr.0000000000000122

Copeland, D. B., Harbaugh, B. L. (2019). It's Hard Being a Mama: Validation of the Maternal Distress Concept in Becoming a Mother. *The Journal of Perinatal Education*, *28* (1), 28-42. doi: 10.1891/1058-1243.28.1.28

Coşkun, A. M., Arslan, S., Okcu, G. (2020). Gebe kadınlarda gebelik algısının stres, demografik ve obstetrik özellikler açısından incelenmesi. *Koç Üniversitesi Hemşirelikte Eğitim ve Araştırma Dergisi, 17* (1), 1-8. doi:10.5222/HEAD.2020.001

Coşkun, A. M., Okcu, G., Arslan, S. (2019). Gebelikte distres durumunun prenatal bağlanmaya etkisi. *Perinatoloji Dergisi, 27* (2), 49-55. doi:10.2399/prn.19.0272001

Çapık, A., Ejder-Apay, S., Sakar, T. (2015). Determination of the level of distress in pregnant women. *Anadolu Hemşirelik ve Sağlık Bilimleri Dergisi*, *18* (3), 196-203. https://doi.org/10.17049/ahsbd.97570

Elkin, N. (2015). Gebelerin prenatal bağlanma düzeyleri ve bunları etkileyen faktörler. *Sürekli Tıp Eğitimi Dergisi, 24* (6), 230-236.

Erkal Aksoy, Y., Dereli Yılmaz, S., Aslantekin, F. (2016). Riskli gebeliklerde prenatal bağlanma ve sosyal destek. *Türkiye Klinikleri Journal of Health Science*, *1* (3), 163-169. https://doi.org/10.5336/healthsci.2016-50668

Goodman, J. H. (2019). Perinatal depression and infant mental health. *Archives Psychiatric Nursing, 33*, 217–224. https://doi.org/10.1016/j.apnu.2019.01.010

Hung, C. H., Lin, C. J., Stocker, J., Yu, C. Y. (2011). Predictors of postpartum stress. *Journal of Clinical Nursing, 20* (5-6), 666-74. https://doi.org/10.1111/j.1365-2702.2010.03555.x

Kaplan, S., Bahar, A. & Sertbas, G. (2007). Gebelerde doğum öncesi ve doğum sonrası dönemlerde durumluk kaygı düzeylerinin incelenmesi. *Atatürk Üniversitesi Hemşirelik Yüksekokulu Dergisi, 10*, 113-121.

Küçükkaya, B., Kahyaoğlu Süt, H., Öz, S., Altan Sarıkaya, N. (2020). Gebelik döneminde çiftler arası uyum ve prenatal bağlanma arasındaki ilişki. *Acıbadem Üniversitesi Sağlık Bilimleri Dergisi, 11* (1), 102-110. https://doi.org/10.31067/0.2020.246

Lobel, M. (2008a). The Stony Brook pregnancy project: Revised Prenatal Distress Questionnaire (NUPDQ) Scoring information. 2008.

Lobel, M. (2008b). The Stony Brook pregnancy project: Revised Prenatal Distress Questionnaire (NUPDQ): 17-Item Version, NUPDQ2.DOC 2008; 06/25/96 18.

Mako, H., Deak, A. (2014). Reliability and Validity of the Hungarian Version of the Maternal Antenatal Attachment Scale. *International Journal of Gynecological and Obstetrical Research, 2* (1), 1–13.

Maddahi-Sedat, M., Dolatian, M., Khoramabadi, M., Talebi, A. (2016). Correlation of maternal-fetal attachment and health practices during pregnancy with neonatal outcomes. *Electronic Physician, 8* (7), 2639-2644. http://dx.doi.org/10.19082/2639.

Mazzeschi, C., Pazzagli, C., Radi, G., Raspa, V., and Buratta, L. (2015). Antecedents of maternal parenting stress: the role of attachment style, prenatal attachment, and dyadic adjustment in first-time mothers. *Frontiers Psychology, 6*, 1443. doi: 10.3389/fpsyg.2015.01443

Metin, A., Pasinlioğlu, T. (2016). The relationship between perceived social support and prenatal attachment in pregnant women. *International Refereed Journal of Gynaecology and Maternal Child Health,* 49–66. doi:10.17367/JACSD.2016516857.

Muller, M. E. (1993). Development of the Prenatal Attachment Inventory. *Western Journal of Nursing Researches*, *15* (2), 199-211. https://doi.org/10.1177/019394599301500205

Polizzi, C., Perricone, G., Duca, V., Carollo, A., Marceca, M., & Fontana, V. (2017). A study on maternal-fetal attachment in pregnant women undergoing fetal echocardiography. *Journal of Pediatric and Neonatal Individualized Medicine, 6* (1), e060137. https://doi.org/10.7363/060137

Rollè, L., Giordano, M., Santoniccolo, F., and 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

Smorti, M., Ponti, L., Tani, F. (2019). Maternal depressive symptomatology during pregnancy is a risk factor affecting newborn's health: A longitudinal study. *Journal of Reproductive and Infant Psychology, 37*, 444–452. https://doi.org/10.1080/02646838.2019.1581919

Suplee, P. D., Gardner, M. R., & Borucki, L. C. (2014). Low-income, urban minority women's perceptions of self and infant care during the postpartum period. *Journal of Obstetric, Gynecologic, & Neonatal Nursing, 43* (6), 803–812. https://doi.org/10.1111/1552-6909.12506

Topaç Tunçel, N., Kahyaoğlu Süt, H. (2019). Gebelikte Yaşanan Anksiyete, Depresyon ve Prenatal Distres Düzeyinin Doğum Öncesi Bebeğe Bağlanmaya Etkisi. *Jinekoloji - Obstetrik ve Neonatoloji Tıp Dergisi*, *16* (1), 9-17.

Yali, M. A., Lobel, M. (1999). Coping and distress in pregnancy: an investigation of medically high risk women. *Journal of Psychosomatic Obstetrics & Gynecology, 20* (1), 39-52.

Yılmaz, E. B., Şahin, E. (2019). Factors associated with prenatal distress levels of pregnant women. *Journal of Psychiatric Nursing, 10* (3), 197-203 DOI: 10.14744/phd.2019.17363

Yılmaz, Ş., Beji, N. K. (2013). Prenatal Bağlanma Envanterinin Türkçe'ye Uyarlanması: güvenirlilik ve geçerlilik çalışması. *Anadolu Hemşirelik ve Sağlık Bilimleri Dergisi*, *16* (2), 103-109.

Yuksel, F., Akin, S., Durna, Z. (2014). Prenatal distress in Turkish pregnant women and factors associated with maternal prenatal distress. *Journal of Clinical Nursing, 23* (1-2), 54–64. https://doi.org/10.1111/j.1365-2702.2012.04283.x

Yüksel, F., Akın, S., Durna, Z. (2011). The Turkish Adaptation of the "Revised Prenatal Distress Questionnaire": A Reliability / Validity and Factor Analysis Study. *Hemşirelikte Eğitim ve Araştırma Dergisi, 8* (3), 43-51.

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.1209515

# Prejudice Determination of Glass Ceiling Barriers in Academicians

Sinan ASLAN[1], Akgün YEŞİLTEPE[2], Aygül TUNÇDEMİR[3]

[1] Batman University, Faculty of Health Sciences
[2] Munzur University, Faculty of Health Sciences
[3] Adiyaman University, Vocational School of Health Services

***Geliş Tarihi / Received:*** *24.11.2022,* ***Kabul Tarihi / Accepted:*** *25.07.2023*

**ABSTRACT**
**Aim:** This study was planned to determine the perceptions of academicians working at universities in Turkey about artificial barriers that prevent women from rising to upper levels of management. **Materials and Methods:** This descriptive study was carried out by reaching 394 academicians who are actively working in the Academy and who agreed to participate in the study between February 16 and March 15, 2022, via online survey method. **Results:** While a difference was found between perceived glass ceiling barriers of academicians who participated in the study and their age, gender, marital status, status of having children, educational status and academic title ($p<0.05$); no difference was found between perceived glass ceiling barriers and income status, working years, number of boards academicians were in, the state of choosing the profession willingly and the state of being satisfied with the profession ($p>0.05$). Mean score of Glass Ceiling Barriers Scale for Academicians used in this study was found as 74.30±18.93 and it was found that academicians had moderate level of perceptions about artificial barriers preventing women from rising to upper levels of management.
**Conclusion:** The research clearly reveals the thoughts of both men and women on gender equality and provides guiding data for academics.
**Keywords:** Glass Ceiling, Academician, University, Women Executives, Gender Equity

# Akademisyenlerde Cam Tavan Engellerinin Belirlenmesi

**ÖZ**
**Amaç:** Bu çalışma akademisyenlerin kadınların üst yönetim kademelerine gelmelerini engelleyen yapay engellere ilişkin algılarını belirlemek amacıyla yapılmıştır. **Gereç ve Yöntem:** Tanımlayıcı tipte olan bu çalışma 16 Şubat -15 Mart 2022 tarihleri arasında araştırmaya katılmaya kabul eden aktif olarak akademide çalışan 374 akademisyene çevrimiçi anket uygulama metoduyla ulaşılarak yürütülmüştür. Araştırmada veri toplama aracı olarak "Anket Formu" ve "Akademisyenler İçin Cam Tavan Engelleri Ölçeği" kullanılmıştır. **Bulgular:** Çalışmaya katılan akademisyenlerin yaşı, cinsiyeti, medeni durumu, çocuk varlığı, eğitim durumu ve akademik unvan ile cam tavan engelleri arasında bir fark bulunurken ($p<0.05$); gelir durumu, çalışma yılı, görevli olduğu kurul sayısı, mesleği isteyerek seçmek ve meslekten memnuniyet arasında bir fark bulunmamıştır ($p>0.05$). Bu araştırmada kullanılan Cam Tavan Engelleri ölçeğinin ortalaması 74.30±18.93 olarak saptanmış olup akademisyenlerin kadınların üst yönetim kademelerine gelmelerini engelleyen yapay engellere ilişkin algılarının orta seviyede olduğu belirlenmiştir. **Sonuç:** Araştırma hem erkeklerin hem de kadınların toplumsal cinsiyet eşitliği konusundaki düşüncelerini açıkça ortaya koymakta ve akademisyenler için yol gösterici veriler sunmaktadır.
**Anahtar Kelimeler:** Cam Tavan, Akademisyen, Üniversite, Kadın Yöneticiler, Cinsiyet Eşitliği

***Sorumlu Yazar / Corresponding Author:*** Akgün Yeşiltepe. Faculty of Health Sciences, Munzur University, Tunceli, Turkiye.
***E-mail:*** akgun_62@hotmail.com

***Bu makaleye atıf yapmak için / Cite this article*** Aslan, S., & Yeşiltepe, A., & Öztürk, A. (2024). Determination of glass ceiling barriers in Academicians. *BAUN Health Sci J, 13*(1), 151-159. https://doi.org/10.53424/balikesirsbd.1209515

## INTRODUCTION

With the industrial revolution, women entered the economic life outside home actively and they also began to work as paid workers in business life (Korkmaz, 2016). Although women have increased in number in business life, efforts have been made to keep women managers outside business life with visible and invisible barriers (Akdemir & Çalış Duman, 2017). For the first time in 1986, in an article published in Wall Street Journal, Hymowitz and Schellhard defined the term glass ceiling as the barriers women who wanted and strived to rise to top positions in state institutions, corporations and educational institutions or non-governmental organizations faced (Hymowitz & Schellhardt, 1986). "Glass ceiling" metaphor is used for the widespread observation that although women have entered almost all areas traditionally occupied mainly by men, they are almost non-existent or in symbolic numbers in prestigious elite leadership positions (Carnes et al., 2008). Glass ceiling is a metaphor of invisible and artificial barriers that prevent women and minorities from rising to management or managerial positions in corporations (Johns, 2013). In another definition, glass ceiling is defined as invisible and unbreakable barriers that prevent women who want to get promoted to higher positions in official workplaces, private sector, educational institutions, or other institutions from rising (Sezen, 2008).

Glass Ceiling Commission established in the United States in 1990s reported that there are various barriers preventing women and minorities from reaching top positions of management such as social, governmental, intercompany and commercial structural obstacles. Social barriers include prejudices and bias towards cultural, gender and colour-based differences (Johns, 2013). Factors that cause glass ceiling in businesses can be caused by individual, organizational and social factors. Examples of individual factors are roles women undertake as wife and mother and the difficulties they experience about time management. The existing organizational culture in the corporation, company policies and the difficulties women experience in participating in informal communication networks are examples of organizational factors (Mızrahi and Aracı, 2010). Some of the social factors are the existing gender inequality and gender-based prejudices in the society. McMahon et al. (2006) tried to document the thoughts of women on their careers over a period of ten years. They classified the barriers affecting women's careers as age, decisions on family-work balance, personality, gender bias, structure of department, organizational policy, and geographical location (McMahon et al.; 2006).

Women who are discriminated throughout all levels of their education and who graduate as eliminated from all levels are also exposed to difficulties and gender-based discrimination in the work force (Gök, 2014). This situation, which is encountered in many professional fields, is also valid for women in the field of Academy. Career development of women is not a simple issue, especially in the largely traditional higher education environment, but a complex process with a social context (Thomas, 2004). When the 2021 statistics of Higher Education Institution are examined, the rate of professors is 32.8% for women and 67.2% for men, the rate of associate professors is 40.2% for women and 59.8% for men, the rate of assistant professors is 45.2% for women and 54.8% for men, the rate of lecturers is 50.5% for women and 49.5% for men, and the rate of research assistants is 51.8% for women and 48.2% for men. This difference in the context of gender can also be seen in the rates of being in management and leadership positions. The number of female members in Higher Education Council (Council of Higher Education) in 2021 is only (4.8%), while the number of female rectors among 200 universities is only 16 (8.0%) (YÖK, 2021). When these statistics are evaluated, it can be seen that the rate of female academicians at most stages of academic staff is lower than the rate of male academicians and male dominance continues in top positions; therefore, women are faced with barriers in both promotions and in reaching top managerial positions. Considering the need for advancing women's leadership in higher education (Thomas 2004), it is thought that finding out the artificial barriers of academician women, who have a high level of education in the society, in reaching top positions by using a valid and reliable scale will contribute as a reference to literature. This study was planned to of academicians working at universities in Turkey about artificial barriers that prevent women from rising to upper levels of management.

### Research Questions

- How is the academicians' level of the glass ceiling barriers?
- Is there a relationship between academicians' age, working years, glass ceiling barriers?
- Do academicians' glass ceiling barriers levels differ according to their sociodemographic variables?

## MATERIALS AND METHODS

### Design and sample

The data of this descriptive and cross-sectional study were collected between February 16 and March 15 by using online survey method. Random sampling selection was carried out in the study. In this study, using the OpenEpi program, the power of the work with a margin of error of 0.05 was calculated after data collection. According to OpenEpi programme; Sample for the study was determined as 383 with a 0.95 representative power of the population, at 95% confidence interval at 0.05 error level. 394 individuals participated in the study.

**Data collection tools**

Descriptive Information Form and Glass Ceiling Barriers Scale for Academicians were used in the study as data collection tools. These forms were turned into electronic survey form through Google forms.

***Descriptive information form***

The form created by the researchers as a result of reviewing literature consists of 11 questions. This form consists of descriptive questions (age, gender, marital status, monthly income level etc.) about academicians.

***Glass ceiling barriers scale for academicians***

The scale was developed, and its validity-reliability study was conducted by Yavuzer and Özkan (2020). The scale consists of 30 items and 6 factors. Possible scores that can be obtained from the overall scale are between 30 and 150, while the possible score from the factors is between 5 and 25 for multiple roles factor, between 7 and 35 for personal preference factor, between 3 and 15 for informal communication factor, between 4 and 20 for professional discrimination factor, between 3 and 15 for mentoring factor and between 8 and 40 for stereotyped prejudices factor. High scores from the overall scale and each factor show that perceptions regarding the artificial barriers preventing women from rising to top management positions are intense (Yavuzer & Özkan, 2020).

**Data collection process**

The data was collected online using by Google forms. The Academicians gave consent to participate in the study, they filled in the data collection tools online via Google forms.

**Data analysis**

Statistical analyses of the results obtained in the study were performed with SPSS for IBM 25 package program. Statistical methods (number, percentage, min-max values, mean and standard deviation) were used in the analysis of the data in survey form. Normality distribution of the data used was tested with Kolmogorov-Smirnov. Since the data were normally distributed, parametric tests t-test and One-Way ANOVA analysis were conducted. Bonferroni analysis was used to find out the difference in multiple comparisons. 95% confidence interval and $p<0.05$ error level was considered to assess the results obtained.

**Ethical considerations**

Required legal permissions were taken from Batman University Ethics Committee (2022/02-12). The participants were informed about the study in line with the Declaration of Helsinki and the participants approved the Volunteer Information Form. Permission was also taken to use the Glass Ceiling Barriers Scale for Academicians in the study.

## RESULTS

Mean age of the academicians who participated in the study was 37.18±2.04, 48.3% were between the ages of 36 and 47, 63.1% were female, 36.9% were male, 66.7% were married and 56.8% had children. 52.0% of the participants in the study stated that their income was equal to their expense. When the educational status of the participants was examined, it was found that 74% had doctoral degree. It was found that 33.3% of the academicians were assistant professor doctors, they had a mean working years of 11.90±7.46, 27% had worked for 1–15 years on average, the mean number of boards the participants were assigned to was 2.23±2.15 while 21.5% of the participants were not assigned to any boards. The rate of academicians who chose their profession willingly was 89.6%, while the rate of those who were satisfied with their profession was 93.7% (Table 1).

**Table 1. Demographic characteristics of the academicians.**

| Variables | | n | (%) |
|---|---|---|---|
| **Age (37.18±7.01)** | 24–35 years (a) | 174 | 43.9 |
| | 36–47 years (b) | 191 | 48.3 |
| | ≥48 years (c) | 31 | 7.8 |
| **Gender** | Female | 250 | 63.1 |
| | Male | 146 | 36.9 |
| **Marital status** | Married | 264 | 66.7 |
| | Single | 132 | 33.3 |
| **The state of having children** | Yes | 225 | 56.8 |
| | No | 171 | 43.2 |
| **Educational status** | Undergraduate (a) | 6 | 1.5 |
| | Master's (b) | 97 | 24.5 |
| | Doctorate (c) | 293 | 74.0 |
| **Income status** | Income<Expense | 43 | 10.9 |
| | Income=Expense | 206 | 52.0 |
| | Income>Expense | 147 | 37.1 |

| Table 1. Demographic characteristics of the academicians. (Continues) | | | |
|---|---|---|---|
| **Variables** | | **n** | **(%)** |
| **Academic title** | Research assistant (a) | 86 | 21.7 |
| | Lecturer (b) | 102 | 25.8 |
| | Specialist (c) | 4 | 1.0 |
| | Assist. Prof. Dr. (d) | 132 | 33.3 |
| | Assoc. Prof. Dr. (e) | 48 | 12.1 |
| | Professor (f) | 24 | 6.1 |
| **Working years (11.90±7.46)** | 0-5 years | 84 | 21.2 |
| | 6-10 | 97 | 24.5 |
| | 11-15 | 107 | 27.0 |
| | 16-20 | 59 | 14.9 |
| | 21-25 | 25 | 6.3 |
| | ≥26 | 24 | 6.1 |
| **Number of boards (2.23±2.15)** | None | 85 | 21.5 |
| | 1 | 82 | 20.7 |
| | 2 | 78 | 19.7 |
| | 3 | 73 | 18.4 |
| | 4 | 30 | 7.6 |
| | 5 | 28 | 7.1 |
| | 6 | 8 | 2.0 |
| | ≥7 | 12 | 3.0 |
| **Choosing the profession willingly** | Yes | 355 | 89.6 |
| | No | 41 | 10.4 |
| **Satisfaction with the profession** | Yes | 371 | 93.7 |
| | No | 25 | 6.3 |
| **Total** | | 396 | 100 |

Mean score of Glass Ceiling Barriers Scale used in this study was found as 74.30±18.93 and the mean score was found to be moderate. In terms of factors, mean scores were found as 13.55±5.04 for MR, as 14.99±5.45 for PP, as 9.57±3.03 IC, as 12.29±4.31 for PD, as 7.69±3.08 for M and as 16.19±6.70 for SP. Total Cronbach alpha value for Glass Ceiling Barriers Scale used in this study was found as 0.91 (Table 2).

**Table 2. Descriptive statistics and mean scores of glass ceiling barriers scale and factors.**

| Scale/Factor | Number of items | Items | Min–Max. | X±SD | Cronbach Alpha |
|---|---|---|---|---|---|
| **Glass Ceiling Barriers** | **30 items** | **Items 1–30** | **30–150** | **74.30±18.93** | **0.91** |
| Multiple roles (MR) | 5 items | Items 1–5 | 5–25 | 13.55±5.04 | 0.85 |
| Personal preference (PP) | 7 items | Item 6–12 | 7–35 | 14.99±5.45 | 0.88 |
| Informal communication (IC) | 3 items | Items 13–15 | 3–15 | 9.57±3.03 | 0.70 |
| Professional discrimination (PD) | 4 items | Items 16–19 | 4–20 | 12.29±4.31 | 0.87 |
| Mentoring (M) | 3 items | Items 20–22 | 3–15 | 7.69±3.08 | 0.85 |
| Stereotyped prejudices (SP) | 8 items | Items 23–30 | 8–40 | 16.19±6.70 | 0.89 |

According to Pearson correlation analysis results, a low positive correlation was found between glass ceiling barriers and age (r=0.163, p=0.001) and between glass ceiling barriers and working years (r=0.102, p=0.042) (Table 3). Distribution graph of the scores obtained from Glass Ceiling Barriers and the variable of age is shown in Graph 1 (women and men).

**Table 3. Correlation results of glass ceiling barriers and age and working years**

| Correlation results of Glass Ceiling Barriers | | | |
|---|---|---|---|
| | **1** | **2** | **3** |
| **1. Glass Ceiling Barriers** | **1.000** | 0.163* | 0.102** |
| **2. Age** | | **1.000** | 0.822* |
| **3. Working years** | | | **1.000** |

**p<0.05, *p<0.01

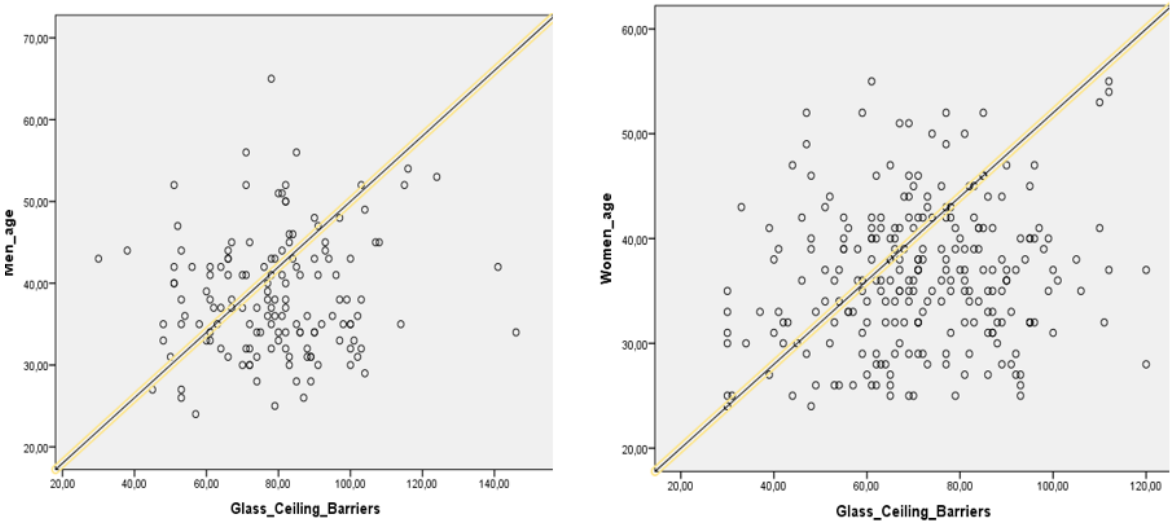


**Figure 1. Distribution graph of the scores obtained from glass ceiling barriers and the variable of age (men and women).**

While difference was found between academicians' glass ceiling barriers and age, gender, marital status, the state of having children, educational status and academic title (p<0.05); no difference was found between income status, working years, number of boards assigned to, the state of choosing the profession willingly and being satisfied with the profession (p>0.05) (Table 4).

**Table 4. Comparison of glass ceiling barriers mean scores of academicians in the study according to their socio-demographic characteristics (n=396).**

| **Variables** | | **n** | **(%)** | **X±SD** | **t/F** | **p** | **Bonferroni** |
|---|---|---|---|---|---|---|---|
| **Age *** (37.18±7.01)** | 24-35 years (a) | 174 | 43.9 | 72.47±20.04 | 4.594 | ***0.011** | 3>1<br>3>2 |
| | 36-47 years (b) | 191 | 48.3 | 74.47±17.16 | | | |
| | ≥48 years (c) | 31 | 7.8 | 83.54±20.73 | | | |
| **Gender**** | Female | 250 | 63.1 | 71.36±18.48 | 0.122 | ***0.000** | – |
| | Male | 146 | 36.9 | 79.34±18.70 | | | |
| **Marital status**** | Married | 264 | 66.7 | 76.12±19.29 | 0.758 | ***0.007** | – |
| | Single | 132 | 33.3 | 70.67±17.71 | | | |
| **The state of having children**** | Yes | 225 | 56.8 | 76.62±18.78 | 0.000 | ***0.003** | – |
| | No | 171 | 43.2 | 71.21±18.74 | | | |
| **Educational status***** | Undergraduate (a) | 6 | 1.5 | 79.66±22.05 | 4.758 | **0.009** | c>b |
| | Master's (b) | 97 | 24.5 | 69.26±16.80 | | | |
| | Doctorate (c) | 293 | 74.0 | 75.86±19.29 | | | |

**Table 4. Comparison of glass ceiling barriers mean scores of academicians in the study according to their socio-demographic characteristics (n=396). (Continues)**

| Variables | n | (%) | X±SD | t/F | p | Bonferroni | |
|---|---|---|---|---|---|---|---|
| **Income status*** ** | Income<Expense | 43 | 10.9 | 76.93±19.71 | 0.517 | 0.597 | – |
| | Income=Expense | 206 | 52.0 | 73.70±18.58 | | | |
| | Income>Expense | 147 | 37.1 | 74.38±19.25 | | | |
| **Academic title*** ** | Research assistant (a) | 86 | 21.7 | 69.41±19.34 | 2.756 | ***0.018** | f>a |
| | Lecturer (b) | 102 | 25.8 | 73.68±18.42 | | | |
| | Specialist (c) | 4 | 1.0 | 85.50±14.05 | | | |
| | Assist. Prof. Dr. (d) | 132 | 33.3 | 74.83±18.35 | | | |
| | Assoc. Prof. Dr. (e) | 48 | 12.1 | 78.00±18.77 | | | |
| | Professor (f) | 24 | 6.1 | 82.33±20.21 | | | |
| **Working years*** (11.90±7.46)** | 0-5 years | 84 | 21.2 | 70.52±20.45 | 2.104 | 0.064 | – |
| | 6-10 | 97 | 24.5 | 75.08±19.63 | | | |
| | 11-15 | 107 | 27.0 | 76.02±17.53 | | | |
| | 16-20 | 59 | 14.9 | 71.06±16.12 | | | |
| | 21-25 | 25 | 6.3 | 77.20±17.41 | | | |
| | ≥26 | 24 | 6.1 | 81.70±22.08 | | | |
| **Number of boards*** (2.23±2.15)** | None | 85 | 21.5 | 75.21±21.65 | 1.121 | 0.349 | – |
| | 1 | 82 | 20.7 | 73.19±19.63 | | | |
| | 2 | 78 | 19.7 | 71.58±17.17 | | | |
| | 3 | 73 | 18.4 | 77.98±15.98 | | | |
| | 4 | 30 | 7.6 | 74.43±18.08 | | | |
| | 5 | 28 | 7.1 | 71.21±18.17 | | | |
| | 6 | 8 | 2.0 | 69.00±31.20 | | | |
| | ≥7 | 12 | 3.0 | 81.25±12.97 | | | |
| **Choosing the profession willingly**** | Yes | 355 | 89.6 | 73.98±19.12 | 0.680 | 0.324 | – |
| | No | 41 | 10.4 | 77.07±17.14 | | | |
| **Satisfaction with the profession**** | Yes | 371 | 93.7 | 74.14±19.00 | 0.409 | 0.504 | – |
| | No | 25 | 6.3 | 77.76±17.98 | | | |
| *p<0.05 **t test, ***F=One Way ANOVA | | | | | | | |

According to Bonferroni analysis results, it can be seen that the group causing the difference between age categories is the group aged 48 years and older. According to the results, mean glass ceiling barriers scores of the participants aged 48 and older (83.54±20.73) are higher than those of the participants aged between 24 and 35 years (72.47±20.04) and those aged between 36 and 47 years (74.47±17.16). In terms of gender, mean glass ceiling barriers scores of male participants (79.34±18.70) were found to be higher than those of female participants (71.36±18.48); therefore, it was found that male participants had higher perceptions regarding the artificial barriers preventing women from rising to top managerial positions. It was also found that married participants (76.12±19.29) when compared with single participants (70.67±17.71) and participants who had children (76.62±18.78) when compared with those who did not (71.21±18.74) had higher mean glass ceiling barriers scores. In terms of educational status, higher mean glass ceiling barriers scores were found in doctorate graduates (75.86±19.29) when compared with master's graduates (69.26±16.80) and in professors (82.33±20.21) when compared with research assistants (69.41±19.34) (Table 4).

## DISCUSSION

Due to inequalities in the workplace, women working as academicians are faced with many barriers that can result in "leakage" from the pipe line. Leaky pipeline results in loss of women before reaching top positions in STEM (science, technology, engineering and mathematics) and probably other areas (Goulden et al., 2011; Resmini, 2016; Howes et al., 2018).

Mean glass ceiling barriers scale score was found as 74.30±18.93 in the study and this result shows that academicians have moderate level of perception about artificial barriers preventing women to rise to top positions (Table 1). In their study, Kiaye and Singh (2013) found that the participants had glass ceiling barriers and these barriers were social role and situational barriers. In a study conducted by Tlaiss and Kauser (2010) to find out the perceptions of women in Lebanon about their career progression in organizations, it was found that organizational culture, practices, communication network and mentoring affected the progression in their career. In

a study by Çizel and Çizel, it was found that 45.7% of the teachers had glass ceiling perceptions (Çizel & Çizel, 2014).

Significant difference was found between academicians' glass ceiling barriers and age, gender, marital status, state of having children, educational status and academic title ($p<0.05$) (Table 3). According to the results, mean glass ceiling barriers of the participants aged 48 and older was 83.54±20.73 and it was found to be higher than those of the other age groups. In a study conducted by Örücü et al. (2017), it was found that the perceptions of women regarding the artificial barriers preventing them from rising to top positions got higher as age increased and it was thought that familial responsibilities of women prevented them from rising to top positions. In a study by Mızrahı & Aracı (2010), no statistically significant difference was found in terms of the variable of age. In Karaca's study (2007), no significant difference was found between the variables when managers' total attitude scores were compared in terms of the variable of age. In a study by Bingöl et al. (2011), it was found that attitudes towards female workers did not differ in terms of managers' age.

When glass ceiling barriers perception was detailed in terms of gender, glass ceiling barriers mean scores of female participants (71.36±18.48) were found to be higher than those of male participants (79.34±18.70) and this result shows that women's perceptions about artificial barriers preventing them to rise to top management positions were high. In their study, Örücü et al. (2007) found that men had higher glass ceiling barrier perceptions than women women. In their study, Mızrahı and Aracı (2010) found that women had higher glass ceiling perceptions than men. Karaca (2007) found that women had higher "Glass Ceiling Barriers Scale" scores than men. In their study, Bingöl et al. (2011) found that attitudes of female managers towards women were more negative than those of male managers. In their study on the relationship between glass ceiling syndrome and power distance, Can et al. (2018) found that glass ceiling barriers scores did not differ in terms of gender. In their study, Anafarta et al (2008) found that female managers working in accommodation enterprises had the perception that they were more exposed to discrimination in terms of opportunities for payment, education and promotion. In a methodological study İmadoğlu et al. (2020) conducted on 33 women, it was found that glass ceiling barriers were caused by gender bias, child care and male dominance. One of the participants in this study stated that although women had sufficient abilities, training and experience, women were prevented from reaching the position they deserved. Another participant stated a patriarchal society had the perception that women cannot "do" (İmadoğlu et al., 2020)

When glass ceiling perception was examined in terms of marital status and the state of having children, it was found that married participants (76.12±19.29) when compared with single participants (70.67±17.71) and participants who had children (76.62±18.78) when compared with those who did not had higher glass ceiling barriers mean scores. In their study, Çizel and Çizel (2014) found that one of the factors affecting the glass ceiling perception of the participants was the state of having children. In a study conducted by Bulut (2014), it was concluded that the reason why very few women had high positions was due to the fact that they focused on different fields such as child care and housework. In their study, Örücü et al. (2007) stated that the reason why women could not rise to top positions was the fact that they had too many familial responsibilities. When total attitude scores of managers were compared in terms of the variables of marital status in Karaca's study (2007), no significant difference was found between the variables. In their study, Bingöl et al. (2011) found that attitudes towards female employees did not differ in terms of marital status. In a study McLay (2008) conducted on head teacher career paths of women and men in schools in England, it was found that female teachers gave career breaks to have children and having children was described as a disadvantage for women.

In terms of educational status, higher mean glass ceiling barriers scores were found in doctorate graduates (75.86±19.29) when compared with master's graduates (69.26±16.80) and in professors (82.33±20.21) when compared with research assistants (69.41±19.34). In a study conducted on academicians working in Finland and Turkey, no significant difference was found between glass ceiling scale mean scores and age, marital status, academic title and years in the profession (Karahan, 2018). In our study, it was found that when compared with research assistants, professors had higher perceptions about artificial barriers preventing them from rising to top managerial positions. While it is expected that the perception of glass ceiling barriers perceptions will decrease with the increase in educational status, the fact that the opposite result found in our study shows that the fight against this situation has started. It has been found that no matter what their level of education is, individuals raised with traditional gender roles can maintain this mentality throughout their lives. On the other hand, the continuation of exploitation by relying on patriarchy will reinforce the rise of men over women's labour and therefore women's staying in the background. In Karaca's study (2007), it was stated that attitudes towards female employees and female managers did not differ statistically significantly in terms of educational status.

**Limitations**

It would be more appropriate to use the probability sampling method to obtain a more comprehensive

overall assessment. Research on glass ceiling is limited in our country and in the world.

## CONCLUSIONS

The present study discussed the concept of glass ceiling to show the existing situation in individuals with higher education level. The fact that academicians working in universities where an atmosphere based on woman-man equality should dominate in the light of science had moderate level of glass ceiling barriers perceptions shows that the traditional sexist atmosphere created against women in all fields of life is also present in the Academy. This result will also cause consequences such as low rate of female managers when compared with male managers. The results obtained also show that social expectations and assumptions regarding the role of women will continue to have a negative effect on women's career opportunities and development. It is thought that in order to advance women's leadership in higher education, a curriculum including gender equality should be applied to individuals at all levels of education starting from primary education.

**Acknowledgments**

The authors thank the participants in this study.

**Author Contributions**

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

**Conflict of Interests**

This research does not contain any conflict of interest.

## REFERENCES

Akdemir, B., & Duman, M. Ç. (2017). Kadın çalışanların performansında cam tavan sendromu engeli. *International Journal of Academic Value Studies, 3*(15), 517-526. https://doi.org/10.23929/javs.572.

Anafarta, N., Sarvan, F., & Yapıcı, N. (2008). Konaklama işletmelerinde kadın yöneticilerin cam tavan algısı: antalya ilinde bir araştırma. *Akdeniz İİBF Dergisi,* 15, 111-137. https://dergipark.org.tr/tr/download/article-file/372642.

Bingöl, D., Aydoğan, E., Şenel, G., & Erden, P. (2011). Cam tavan sendromu ve kadınların hiyerarşik yükselmelerindeki engeller: T.C. enerji ve tabii kaynaklar bakanlığı ankara merkez teşkilatı örneği. *İşletme Fakültesi Dergisi*, *12*(1), 115-132. https://dergipark.org.tr/tr/download/article-file/234829.

Bulut, M. B. (2014). The reasons for women that they are not able to come to high positions. T*he Journal of Academic Social Science*, 7, 202-215. http:// 10.16992/ASOS.365.

Can, E., Kaptanoğlu, S., & Halo, L. M. (2018). Akademisyenlerde cam tavan sendromunun güç mesafesi ile ilişkisi. *Marmara Üniversitesi Öneri Dergisi*, *13*(50), 52-64. http://10.14783/maruoneri.v13i38778.383151.

Carnes, M., Morrissey, C., & Geller, S. E. (2008). Women's health and women's leadership in academic medicine: hiting the same glass ceiling? *Journal of Women's Health*, *17*(9), 1453-1463. http://10.1089/jwh.2007.0688.

Çizel, R. B, & Çizel, B. (2014). Factors influence women teachers' perception of glass ceiling syndrome. *Mediterrranean Journal of Humanities*, *4*(1), 63-69. http://10.13114/MJH.201416424.

Goulden, M., Mason, M. A, & Frasch, K. (2011). Keeping women in the science pipeline. *The Annals of the American Academy of Political and Social Science,* 638, 141–162. http://10.1177/002716211416925.

Gök, F., & Çankaya, D, (2013). Education and employment in (women's labor and insecurity). Health and Social Service Workers' Union Publications.

Howes, S. S, Henning, J., Mills, M. J., & Huffman, A. H. (2018). Yes virginia, there is a gender disparity problem—and it goes beyond STEM. *Ind. Industrial and Organizational Psychology,* 11:318-323. http://10.1017/iop.2018.22

Hymowitz, C., & Schellhardt, T. D. (1986). The glass ceiling. *The Wall Street Journal* 24, ID-5D.

Imadoğlu, T., Kurşuncu, R. S & Çavuş, M. F. (2020). The effect of glass ceiling syndrome on women's career barriers in management and job motivation. *Holıstıca–Journal of Business and Public Administration, 11*(2), 85-99. https://doi.org/10.2478/hjbpa-2020-0021

Johns, M. L. (2013). Breaking the glass ceiling: structural, cultural, and organizational barriers preventing women from achieving senior and executive positions. Perspectives in Health Information Management/AHIMA, *American Health Information Management Association*, 1-8.

Karaca, A. (2007). Career barriers in female managers: an applied research on glass ceiling syndrome. [Unpublished master thesis]. Selcuk University Institute of Social Sciences, Department of Business Administration.

Karahan, M. A. (2018). Comparative study of organizational culture and the glass ceiling syndrome among academics in Turkey and Finland [Unpublished doctoral dissertation]. Yıldız Teknik University Institute of Social Sciences.

Kiaye, R. E, & Singh, A. M. (2013). The glass celiing: a perspective of women working in Durban. *Gender in Management: An International Journal, 28*(1), 28-42. http://dx.doi.org/10.1108/17542411311301556

Korkmaz, H. (2016). Women at the management positions and the glass ceiling syndrome. *Alternative Policy*, 8, 95-112.

McLay, M. (2008). Headteacher career paths in UK independent secondary coeducational schools: Gender issues. *Educational Management Administration & Leadership*, *36*(3), 353-372. http://dx.doi.org/10.1177/1741143208090594.

McMahon, M., Limerick, B., Cranston, N., & Andersen, C. (2006). Going up? Women in the public sector. *Career Development International, 11*(7), 609-618. http://dx.doi.org/10.1108/13620430610713472

Mızrahı, R., & Aracı, H. (2010). Kadın yöneticiler ve cam tavan sendromu üzerine bir araştırma. *Organizasyon ve Yönetim Bilimleri Dergisi*, *2*(1), 149-156. https://dergipark.org.tr/tr/pub/oybd/issue/16335/171020.

Örücü, E., Kılıç, R., & Kılıç, T. (2007). Cam tavan sendromu ve kadınların üst düzey yönetici pozisyonuna yükselmelerindeki engeller: Balıkesir ili örneği. *Yönetim ve Ekonomi, 14*(2), 117-135. https://dergipark.org.tr/tr/pub/yonveek/issue/13687/165643.

Resmini, M. (2016). The 'leaky pipeline. *Chemistry–A European Journa*l, 22, 3533–3534. http://10.1002/chem.201600292.

Sezen, B. (2008). Glass ceiling obstacles encountered by female employees in organizations: a research in medium and large scale hotel businesses, [Unpublished master's thesis], Çanakkale On sekiz Mart University, Institute of Social Sciences, Çanakkale.

Thomas, K. M, Bierema, L., & Landau, H. (2004). Advancing women's leader ship in academe: new directions for research and hrd practice. *Equal Oppotunities International, 23*(7/8), 62-77. https://doi.org/10.1108/02610150410787909.

Tlaiss, H., & Kauser, S. (2010). Perceived organizational barriers to women's career advancement in lebenon. *Gender in management: An International Journal*, *25*(6), 462-496. http://10.1108/17542411011069882.

Yavuzer, Y., & Özkan, R. (2020). Cam tavan algısı ölçeği: geçerlik ve güvenirlik çalışması. *Pamukkale Üniversitesi Sosyal Bilimler Enstitüsü Dergisi,* (40), 585-599. https://doi.org/10.30794/pausbed.647791.

YÖK. (2021, November 10). https://istatistik.yok.gov.tr/

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.1209740

# The Mediator Role of Rejection Sensitivity Between Perceived Maternal Narcissism and Risk of Eating Disorders

Haydeh FARAJİ[1], Cemile BİLĞİŞ[2], Dilan YELÖRGÜ[2]

[1] Istanbul Aydın University, Faculty of Science and Literature, Department of Psychology
[2] Istanbul Aydın University, Institute of Postgraduate Education

***Geliş Tarihi / Received:*** *25.11.2022,* ***Kabul Tarihi / Accepted:*** *7.11.2023*

**ABSTRACT**
**Objective:** This study aimed to determine the mediating role of rejection sensitivity between perceived maternal narcissism and risk of eating disorders. **Materials and Methods:** The participants were administered the Sociodemographic Data Form, the Perceived Maternal Narcissism Scale (PMNS), the Eating Attitudes Test–26 (EAT 26) and the Rejection Sensitivity Questionnaire (RSQ) and the data obtained in the study were analyzed using SPSS 25.0. The data were analyzed using Pearson Correlation Analysis, Independent Group t-tests, ANOVA, and Regression Analysis. **Results:** The Rejection Sensitivity Questionnaire, the Eating Attitudes Test-26 ($r=0.318$, $p<0.01$), and the Perceived Maternal Narcissism Scale ($r=0.547$, $p<0.01$) were revealed to be positively and significantly correlated. The independent variables of perceived maternal narcissistic characteristics and rejection sensitivity explain 11% of the variance in the eating attitude dependent variable score. **Conclusion:** The study's findings suggest that rejection sensitivity mediates the relationship between perceived maternal narcissistic characteristics and eating disorders. It was observed that as age and education increased, perceived maternal narcissistic characteristics, dysfunctional eating attitudes and rejection sensitivity decreased. Eating disorder studies in the literature focus on female and young adult sampling. In the current study, working with a sample that includes two genders and a wide age range and examining eating disorders within the scope of the variable of perceived maternal narcissism shows the importance of the research.
**Keywords:** Perceived Maternal Narcissism, Eating Disorder, Eating Attitude, Rejection Sensitivity.

# Anneden Algılanan Narsisizm ile Yeme Bozuklukları Arasında Reddedilme Duyarlılığının Aracı Rolü

**ÖZ**
**Amaç:** Bu çalışmanın amacı anneden algılanan narsisizm ve yeme bozuklukları riski arasında reddedilme duyarlılığının aracı rolünün incelenmesidir. **Gereç ve Yöntem:** Araştırmada Reddedilme Duyarlılığı Ölçeği (RDÖ), Yeme Tutum Testi (YTT) ve Anneden Algılanan Narsisistik Özellikler Ölçeği (AANÖÖ) kullanılmıştır. Verilerin analizi için SPSS 25 programında; Pearson Korelasyon Analizi, Bağımsız Örneklemler t-testi, ANOVA ve Basit ve Çoklu Doğrusal Regresyon Analizi kullanılmıştır. **Bulgular:** Reddedilme Duyarlılığı Ölçeği ile Yeme Tutum Testi ($r=0.318$, $p<0.01$), Reddedilme Duyarlılığı Ölçeği ile Anneden Algılanan Narsisistik Özellikler Ölçeği ($r=0.547$, $p<0.01$) arasında pozitif ve anlamlı bir ilişki vardır. Anneden algılanan narsisistik özellikler ve reddedilme duyarlılığı bağımsız değişkenleri, yeme tutumu bağımlı değişkeni puanındaki varyansın %11'ini açıklamaktadır. **Sonuç:** Anneden algılanan narsisizm ile yeme bozukları arasında reddedilme duyarlılığının aracı bir rolü olduğu saptanmıştır. Yaş ve eğitim arttıkça anneden algılanan narsisistik özelliklerin, işlevsiz yeme tutumlarının ve reddedilme duyarlılığının azaldığı görülmüştür. Literatürde yeme bozukluğu ağırlıklı olarak kadın ve genç yetişkin örnekleme odaklanmaktadır. Mevcut araştırmada, iki cinsiyetin ve geniş yaş aralığının dahil olduğu bir örneklemle çalışılması ve yeme bozukluklarının anneden algılanan narsisizm değişkeni kapsamında incelenmesi araştırmanın önemini göstermektedir.
**Anahtar Kelimeler:** Anneden Algılanan Narsisizm, Yeme Bozukluğu, Yeme Tutumu, Reddedilme Duyarlılığı.

***Sorumlu Yazar / Corresponding Author:*** Haydeh FARAJİ, Istanbul Aydın University, Faculty of Science and Literature, Department of Psychology, Istanbul, Turkey
***E-mail:*** haydehfaraji@aydin.edu.tr

***Bu makaleye atıf yapmak için / Cite this article:*** Faraji, H., Bilğiş, C., & Yelörgü, D. (2024). The mediator role of rejection sensitivity between perceived maternal narcissism and risk of eating disorders. *BAUN Health Sci J, 13*(1), 160-171. https://doi.org/10.53424/balikesirsbd.1209740

## INTRODUCTION

Mother's personality traits are important factors affecting parenting style, and living with a mother with narcissistic personality traits can lead to negative experiences in childhood (Crocker, 2009; Alpay, 2020). The expectations and demands of narcissistic parents in their relationships with their children can largely be directed towards their own needs (Wetzel & Robins, 2016). Accordingly, parents who show narcissistic traits may see their children as extensions of themselves may be largely devoid of empathy and may exhibit an emotionally cold attitude toward the child (Rappoport, 2005; Leggio, 2018). In such a relationship, the mother can expect the child to satisfy her desire to be unique both physically and spiritually, as well as other narcissistic needs (Crocker, 2009). When these needs of the parents are not adequately met by the child, the parents can respond to the child with responses such as blame, emotional withdrawal and negative criticism (Wetzel & Robins, 2016; Alpay, 2020). Children may have some imperfect judgments about themselves regarding these attitudes of their parents. However, they may feel inadequate in the face of these demands and vulnerable to rejection (Rappoport, 2005).

Parents with narcissistic characteristics may exhibit exploitative behaviors in their relations with the child and try to provide control and omnipotence over the child (Wetzel & Robins, 2016). Such a parenting attitude may reinforce the belief that the child is an extension of the parent, may cause difficulty in forming the child's own identity, and the child's self-esteem may be damaged (Mahoney et al., 2016; Leggio, 2018). Trumpeter et al. (2008) in a study conducted with university students, stated that the consistency of empathy and love perceived from the mother predicts the development of the functional self. According to this information, it is thought that a child growing up with a mother who shows narcissistic personality traits may not be able to build a holistic self-perception (Trumpeter et al., 2008; Leggio, 2018). This can make the child vulnerable to self-esteem injuries (Mahoney et al., 2016; Alpay, 2020). At the same time, a person may turn to external resources as a way to cope with intense desires and emotions. Thus, a person can develop an excessive dependence on the approval of others, intense anxiety and expectation of rejection (Dutton et al., 2011; Faraji & Sucu, 2021). A person may try to maintain him/herself at an acceptable level both physically and psychologically (Mahoney et al., 2016).

Parents with narcissistic characteristics might show love to their children conditionally (Rappoport, 2005; Alpay, 2020). It is known that the parent's giving their love to the child over conditions increases of the rejection sensitivity (Downey et al. 1997; Faraji & Sucu, 2021). Ayar (2021), in her study with 327 adult women, shows that perceived maternal attitudes are associated with eating disorders. A child, who cannot establish enough emotional bond and support with the mother, may develop maladaptive eating behaviors and negative eating attitudes to cope with negative emotions (Faraji & Fırat, 2022). Given this knowledge, it is thought that the individual may resort to maladaptive eating attitudes, and eating disorders may occur to cope with emotions such as anger, shame, and anxiety, which may be related to the perceived maternal narcissism and the rejection sensitivity that may occur. The current study aimed to examine the mediating role of rejection sensitivity between perceived maternal narcissism and risk of eating disorders. It is predicted that this study may contribute to the relevant literature in order to understand the effect of maternal narcissism and rejection sensitivity on the formation and proceed of dysfunctional eating attitudes. However, it is thought that an inclusive study on the mediating role of rejection sensitivity between perceived maternal narcissistic traits and risk of eating disorders will help to determine which therapy methods may be useful in psychotherapeutic interventions.

## MATERIALS AND METHODS

### Study type

This relational screening model study was carried out between September 2022 and October 2022. Participants were reached through online channels.

### Study group

The universe of the study consists of adults in our country. The sample for this study was determined by random sampling, and the participants were 400 people, 207 women (51.8%) and 193 men (48.2%), residing in Istanbul in 2022, who willingly participated in the research. Of the participants of the study, 48.0% are between the ages of 18-34, and 30.3% are between the ages of 35-54, 21.8% are 55 and over, 10.3% are primary school graduates, 24.3% are high school graduates, 47.0% are undergraduate graduates, 18.5% are postgraduate graduates, 28.8% 's mothers have a low monthly income, 41.3%'s mothers have medium income, 30.0%'s mothers have a high income, 39.8%'mothers are primary school graduates, 44.9%'s mothers are high school graduates, 11.5%'s mothers are undergraduate graduates, and 3.8%'s mothers are postgraduate graduates.

### Data collection tools

The Sociodemographic Data Form was prepared by the researchers in line with the purposes of the study. It includes items that aim to question the participants' age, gender, education level, education and income level of their mothers.

The Perceived Maternal Narcissism Scale (PMNS) was developed by Alpay (2020) to evaluate narcissistic characteristics perceived from the mother. The scale has a total of 5 sub-dimensions: grandiosity pretentiousness, control-manipulation, criticism-accusation, empathy deficiency, parentification-exploitation. Alpay (2020) reported the Cronbach's alpha as 0.94 in his study. In this study, the Cronbach

Alpha value was 0.98 for the total score, 0.96 for the empathy deficiency subscale, 0.95 for the grandiosity pretentiousness subscale, 0.96 for the criticism-accusation subscale, 0.95 for the control-manipulation subscale, 0.90 for the parentification-exploitation subscale.

The Eating Attitudes Test-26 (EAT 26), 26-question short form of the Eating Attitude Test, adapted in Turkish by Ergünel-Okumuş and Sertel Berk (2020), is the shortened version of the 40-question form, revised by Garner et al. (1982). The scale has 3 subscales: dieting, bulimia and food preoccupation, oral control. The cronbach alpha value of the scale was reported as 0.83 (Ergüney-Okumuş & Sertel-Berk, 2020). In this study, the Cronbach Alpha value was 0.89 for the total score.

The Rejection Sensitivity Questionnaire (RSQ) was developed by Downey & Feldman (1996). In this study, Guncu et al. (2017) the latest version of the RSQ, which they developed by examining the psychometric properties in a Turkish sample, was used. The cronbach alpha value of the scale was reported as 0.85 for study 1 and 82. for study 2. In this study, the Cronbach Alpha value was 0.98 for the total score.

**Procedures**

First, the necessary permissions and scale information were obtained from the people who made the Turkish adaptation of the scales to be used in the study and who carried out the reliability and validity studies. Then, ethics committee approval was taken from the ethical committee of the Istanbul Aydın University (Date: 28.02.2022 No: 2022/03). The scales were distributed online to our sample with their instructions. No identity information was obtained from the participants. It took an average of 20 minutes to complete the scales. The data obtained from the study were analyzed with the SPSS 25 program.

**Statistical analysis**

Data were analyzed using SPSS 25.0. The assumption of normal distribution, which is one of the first steps of the analysis, was checked. In this process, to evaluate this assumption, the kurtosis and skewness values of the scales and subscales were examined and the fact that these two coefficients are within the range of -2 +2 indicates that the normal distribution assumption is realized (HahsVaughn & Lomax, 2020).

The Independent Groups t-test and ANOVA were used to assess the significance of the difference between groups, while Pearson correlation analysis was employed to examine the relationship between variables. PROCESS 3.5 was used to investigate intermediary roles. The confidence interval referenced in the whole study was 95%, and the p value was 0.05.

**Ethical considerations**

Written ethics committee approval was taken from the ethical committee of the Istanbul Aydın University (Date: 28.02.2022 No: 2022/03). Necessary permissions and information about the scales were obtained from those who developed the Turkish version of the scales used in the study and who carried out the reliability and validity studies.

**RESULTS**

The correlation analysis revealed a moderate and positive relationship between the Rejection Sensitivity Questionnaire and the following variables: Eating Attitudes Test ($r=0.318$, $p<0.01$), Perceived Maternal Narcissism Scale ($r=0.547$, $p<0.01$), Empathy Deficiency ($r=0.547$, $p<0.01$), Grandiosity Pretentiousness ($r=0.516$, $p<0.01$), Criticism-Accusation ($r=0.528$, $p<0.01$), Control-Manipulation ($r=0.533$, $p<0.01$), Parentification-Exploitation ($r=0.486$, $p<0.01$). A weak and positive correlation was found between the Rejection Sensitivity Questionnaire and the following variables: Dieting ($r=0.252$, $p<0.01$), Bulimia and Food Preoccupation ($r=0.256$, $p<0.01$), Oral Control ($r=0.289$, $p<0.01$).

The correlation analysis revealed a weak and positive relationship between the Eating Attitudes Test and the following variables: Perceived Maternal Narcissism Scale ($r=0.276$, $p<0.01$), Empathy Deficiency ($r=0.271$, $p<0.01$), Grandiosity Pretentiousness ($r=0.265$, $p<0.01$), Criticism-Accusation ($r=0.243$, $p<0.01$), Control-Manipulation ($r=0.299$, $p<0.01$), Parentification-Exploitation ($r=0.240$, $p<0.01$).

The correlation analysis revealed a weak and positive relationship between Dieting and the following variables: Perceived Maternal Narcissism Scale ($r=0.288$, $p<0.01$), Empathy Deficiency ($r=0.280$, $p<0.01$), Grandiosity Pretentiousness ($r=0.281$, $p<0.01$), Criticism-Accusation ($r=0.257$, $p<0.01$), Parentification-Exploitation ($r=0.257$, $p<0.01$). A moderate and positive correlation was found between Dieting and Control-Manipulation ($r=0.309$, $p<0.01$).

The correlation analysis revealed a weak and positive relationship between Bulimia and Food Preoccupation and the following variables: Perceived Maternal Narcissism Scale ($r=0.271$, $p<0.01$), Empathy Deficiency ($r=0.266$, $p<0.01$), Grandiosity Pretentiousness ($r=0.264$, $p<0.01$), Criticism-Accusation ($r=0.250$, $p<0.01$), Control-Manipulation ($r=0.287$, $p<0.01$), Parentification-Exploitation ($r=0.226$, $p<0.01$) (Table 1.)

When we evaluated the results in the table of findings, it was seen that the independent variable of the perceived maternal narcissism scale explained 7% of the variance in the dependent variable score of the eating attitude test in the first model. In the second phase, the independent variable of Rejection Sensitivity Questionnaire was added to the model. It was observed that the independent variable of the Rejection Sensitivity Questionnaire explained 4% of the variance in the eating attitudes test dependent variable score. It was determined according to the findings that the independent variables of the perceived maternal narcissism scale and the Rejection Sensitivity Questionnaire explained 11% of the

variance in the eating attitudes test dependent variable score.

**Table 1. Findings of the correlation rejection sensitivity questionnaire, eating attitudes test and perceived maternal narcissism scale**

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **1-Rejection sensitivity questionnaire** | 1 | | | | | | | | | | |
| **2-Eating attitudes test** | 0.318** | 1 | | | | | | | | | |
| **3-Dieting** | 0.252** | 0.918** | 1 | | | | | | | | |
| **4-Bulimia and food preoccupation** | 0.256** | 0.843** | 0.713** | 1 | | | | | | | |
| **5-Oral control** | 0.289** | 0.647** | 0.354** | 0.399** | 1 | | | | | | |
| **6-PMNS** | 0.547** | 0.276** | 0.288** | 0.271** | 0.078 | 1 | | | | | |
| **7-Empathy deficiency** | 0.547** | 0.271** | 0.280** | 0.266** | 0.084 | 0.971** | 1 | | | | |
| **8-Grandiosity pretentiousness** | 0.516** | 0.265** | 0.281** | 0.264** | 0.065 | 0.969** | 0.922** | 1 | | | |
| **9-Criticism-accusation** | 0.528** | 0.243** | 0.257** | 0.250** | 0.054 | 0.979** | 0.943** | 0.940** | 1 | | |
| **10-Control-manipulation** | 0.533** | 0.299** | 0.309** | 0.287** | 0.097 | 0.951** | 0.892** | 0.907** | 0.916** | 1 | |
| **11-Parentification-exploitation** | 0.486** | 0.240** | 0.257** | 0.226** | 0.065 | 0.930** | 0.852** | 0.909** | 0.903** | 0.870** | 1 |

** p <0.01, * p <0.05 Pearson correlation test

With the addition of the independent variable of the Rejection Sensitivity Questionnaire in the second stage, the beta value of the independent variable of the perceived maternal narcissism scale decreased from 0.28 to 0.15. Afterward, 5000 resampling options and 95% confidence interval options were applied from the Bootstrapping analysis to control this decrease in beta value, and it was determined that the lower limit and upper limit did not include 0 in the result. When the mediator role analysis results were evaluated, it was determined that there was partial mediation according to the findings (Table 2).

**Table 2. Findings on the mediator role of the rejection sensitivity questionnaire in the prediction of the perceived maternal narcissism scale to the eating attitudes test**

| *Model* | | *R* | *R²* | *B* | *SH* | *β* | *t* | *p* | Lower bound | Upper bound |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | **(Constant)** | 0.28 | 0.07 | 6.42 | 1.56 | | 4.11 | 0.000* | 3.35 | 9.49 |
| | **PMNS** | | | 0.12 | 0.02 | 0.28 | 5.72 | 0.000* | 0.08 | 0.16 |
| 2 | **(Constant)** | 0.34 | 0.11 | 3.37 | 1.69 | | 1.99 | 0.047* | 0.05 | 6.69 |
| | **PMNS** | | | 0.06 | 0.02 | 0.15 | 2.58 | 0.010* | 0.02 | 0.11 |
| | **RSQ** | | | 0.14 | 0.03 | 0.24 | 4.22 | 0.000* | 0.07 | 0.20 |
| | **Indirect total impact (Intermediary)** | | | 0.06 | 0.02 | | | | 0.03 | 0.09 |

*p<0.05 PROCESS 3.5

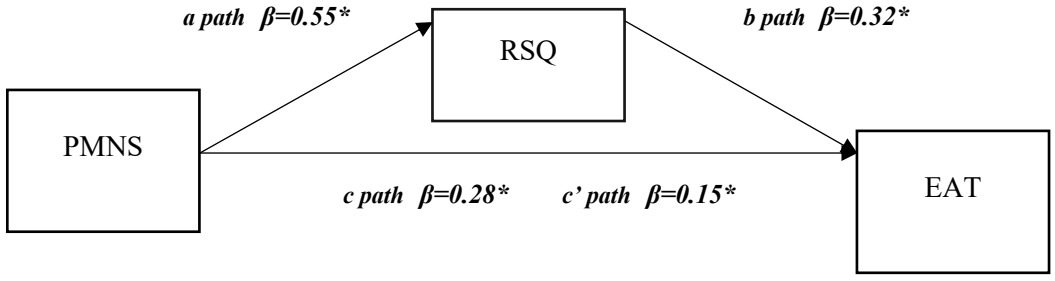


**Figure 1. Beta coefficients of the mediator role of the rejection sensitivity questionnaire in the prediction of the to the perceived maternal narcissism scale to the eating attitudes test** **p<0.05*

**Table 3: ANOVA results comparing age on rejection sensitivity questionnaire, perceived maternal narcissism scale and eating attitudes test scores.**

| | | n | M | SD. | | Sum of Square | df. | Mean Square | F | p |
|---|---|---|---|---|---|---|---|---|---|---|
| **Rejection sensitivity questionnaire** | 18-34 | 192 | 54.36 | 22.04 | Between group | 22159.75 | 2 | 11079.88 | 23.08 | 0.000* |
| | 35-54 | 121 | 55.93 | 23.41 | Within group | 190548.81 | 397 | 479.97 | | |
| | 55+ | 87 | 37.00 | 19.31 | Total | 212708.56 | 399 | | | |
| | Total | 400 | 51.06 | 23.09 | | | | | | |
| **Eating attitudes test** | 18-34 | 192 | 16.97 | 14.18 | Between group | 2118.93 | 2 | 1059.46 | 6.31 | 0.002* |
| | 35-54 | 121 | 12.15 | 11.45 | Within group | 66626.01 | 397 | 167.82 | | |
| | 55+ | 87 | 12.71 | 12.05 | Total | 68744.94 | 399 | | | |
| | Total | 400 | 14.59 | 13.13 | | | | | | |
| **Dieting** | 18-34 | 192 | 9.21 | 8.21 | Between group | 777.33 | 2 | 388.67 | 6.45 | 0.002* |
| | 35-54 | 121 | 6.40 | 7.49 | Within group | 23936.14 | 397 | 60.29 | | |
| | 55+ | 87 | 6.45 | 7.10 | Total | 24713.48 | 399 | | | |
| | Total | 400 | 7.76 | 7.87 | | | | | | |
| **Bulimia and food preoccupation** | 18-34 | 192 | 3.38 | 4.20 | Between group | 157.25 | 2 | 78.62 | 5.66 | 0.004* |
| | 35-54 | 121 | 2.11 | 3.23 | Within group | 5518.95 | 397 | 13.90 | | |
| | 55+ | 87 | 2.14 | 3.22 | Total | 5676.20 | 399 | | | |
| | Total | 400 | 2.72 | 3.77 | | | | | | |
| **Oral control** | 18-34 | 192 | 4.39 | 4.28 | Between group | 41.35 | 2 | 20.67 | 1.17 | 0.312 |
| | 35-54 | 121 | 3.64 | 3.67 | Within group | 7019.03 | 397 | 17.68 | | |
| | 55+ | 87 | 4.13 | 4.71 | Total | 7060.38 | 399 | | | |
| | Total | 400 | 4.11 | 4.21 | | | | | | |
| **PMNS** | 18-34 | 192 | 76.51 | 30.01 | Between group | 55553.63 | 2 | 27776.82 | 36.58 | 0.000* |
| | 35-54 | 121 | 68.63 | 27.01 | Within group | 301444.33 | 397 | 759.31 | | |
| | 55+ | 87 | 46.10 | 22.07 | Total | 356997.96 | 399 | | | |
| | Total | 400 | 67.51 | 29.91 | | | | | | |
| **Empathy deficiency** | 18-34 | 192 | 24.68 | 10.19 | Between group | 5772.85 | 2 | 2886.42 | 34.21 | 0.000* |
| | 35-54 | 121 | 22.09 | 8.58 | Within group | 33497.59 | 397 | 84.38 | | |
| | 55+ | 87 | 14.87 | 7.50 | Total | 39270.44 | 399 | | | |
| | Total | 400 | 21.76 | 9.92 | | | | | | |
| **Grandiosity pretentiousness** | 18-34 | 192 | 11.47 | 5.02 | Between group | 1341.61 | 2 | 670.80 | 31.74 | 0.000* |
| | 35-54 | 121 | 10.45 | 4.60 | Within group | 8391.27 | 397 | 21.14 | | |
| | 55+ | 87 | 6.77 | 3.49 | Total | 9732.88 | 399 | | | |
| | Total | 400 | 10.14 | 4.94 | | | | | | |
| **Criticism-accusation** | 18-34 | 192 | 13.92 | 6.04 | Between group | 1983.44 | 2 | 991.72 | 32.45 | 0.000* |
| | 35-54 | 121 | 12.36 | 5.50 | Within group | 12133.96 | 397 | 30.56 | | |
| | 55+ | 87 | 8.17 | 4.24 | Total | 14117.40 | 399 | | | |
| | Total | 400 | 12.20 | 5.95 | | | | | | |
| **Control-manipulation** | 18-34 | 192 | 14.78 | 5.53 | Between group | 2369.67 | 2 | 1184.83 | 42.70 | 0.000* |
| | 35-54 | 121 | 13.11 | 5.35 | Within group | 11014.72 | 397 | 27.74 | | |
| | 55+ | 87 | 8.49 | 4.49 | Total | 13384.39 | 399 | | | |
| | Total | 400 | 12.91 | 5.79 | | | | | | |
| **Parentification-exploitation** | 18-34 | 192 | 11.66 | 4.59 | Between group | 895.90 | 2 | 447.95 | 25.15 | 0.000* |
| | 35-54 | 121 | 10.62 | 4.38 | Within group | 7070.10 | 397 | 17.81 | | |
| | 55+ | 87 | 7.79 | 2.95 | Total | 7966.00 | 399 | | | |
| | Total | 400 | 10.50 | 4.47 | | | | | | |

*p<0.05 ANOVA

When we compared the scores obtained from the Rejection Sensitivity Questionnaire ($F(2.397)= 23.08$, $p<0.05$) according to age, a significant difference was found between the averages. After the Levene's test applied, it was found that the variances of the groups were not homogeneously distributed ($p<0.05$). According to the results of the Games-Howell test, which was performed when the variance homogeneity of the post hoc test was not achieved, it was determined that the scores of those aged between 18-34 and 35-54 were higher than those aged 55 and over.

When we compared the scores obtained from the Eating Attitudes Test ($F(2.397)= 6.31$, $p<0.05$) according to age, a significant difference was found between the averages. According to the results of the Games-Howell test, which was performed when the

variance homogeneity of the post hoc test was not achieved, it was determined that the scores of those aged between 18-34 were higher than those aged 35-54 and aged 55 and over.

When we compared the scores obtained from the Perceived Maternal Narcissism Scale ($F(2.397)= 36.58$, $p<0.05$) according to age, a significant difference was found between the averages. After the Levene's test applied, it was found that the variances of the groups were not homogeneously distributed ($p<0.05$). According to the results of the Games-Howell test, which was performed when the variance homogeneity of the post hoc test was not achieved, it was determined that the scores of those aged between 18-34 were higher than those aged 35-54 and aged 55 and over (Table 3).

When we compared the scores obtained from the Rejection Sensitivity Questionnaire ($F(3.396)= 24.32$, $p<0.05$) according to educational status, a significant difference was found between the averages. It was determined by Levene's test that the group variance distributions were homogeneous ($p>0.05$). According to the results of the Tukey test, which was performed when the homogeneity of variance of the post hoc test was achieved, it was determined that the scores of those who graduated from high school were higher than those who graduated from primary school, undergraduate, and postgraduate. It was determined that the scores of those who graduated from primary school and undergraduate were higher than those who graduated with postgraduate.

When we compared the scores obtained from the Eating Attitudes Test ($F(3.396)= 7.93$, $p<0.05$) according to educational status, a significant difference was found between the averages. According to the results of the Games-Howell test, which was performed when the variance homogeneity of the post hoc test was not achieved, it was determined that the scores of those primary school, high school, and undergraduate graduates were higher than those of postgraduate graduates.

When we compared the scores obtained from the Perceived Maternal Narcissism Scale ($F(3.396)= 11.03$, $p<0.05$) according to educational status, a significant difference was found between the averages. It was determined by Levene's test that the group variance distributions were homogeneous ($p>0.05$). According to the results of the Tukey test, which was performed when the homogeneity of variance of the post hoc test was achieved, it was determined that the scores of those primary school and high school graduates were higher than those of undergraduate and postgraduate graduates (Table 4

**Table 4. ANOVA results comparing educational status on rejection sensitivity questionnaire, perceived maternal narcissism scale and eating attitudes test scores.**

| | | n | M | SD. | | Sum of Square | df. | Mean Square | F | p |
|---|---|---|---|---|---|---|---|---|---|---|
| **Rejection Sensitivity Questionnaire** | Primary school | 41 | 53.71 | 20.34 | Between Group | 33097.44 | 3 | 11032.48 | 24.32 | 0.000* |
| | Highschool | 97 | 65.34 | 21.14 | Within Group | 179611.12 | 396 | 453.56 | | |
| | Undergraduate | 188 | 47.96 | 21.96 | Total | 212708.56 | 399 | | | |
| | Postgraduate | 74 | 38.74 | 20.27 | | | | | | |
| | Total | 400 | 51.06 | 23.09 | | | | | | |
| **Eating Attitudes Test** | Primary school | 41 | 19.73 | 17.67 | Between Group | 3895.90 | 3 | 1298.63 | 7.93 | 0.000* |
| | Highschool | 97 | 17.53 | 15.48 | Within Group | 64849.04 | 396 | 163.76 | | |
| | Undergraduate | 188 | 13.94 | 10.74 | Total | 68744.94 | 399 | | | |
| | Postgraduate | 74 | 9.53 | 10.31 | | | | | | |
| | Total | 400 | 14.59 | 13.13 | | | | | | |
| **Dieting** | Primary school | 41 | 9.83 | 9.42 | Between Group | 815.65 | 3 | 271.88 | 4.51 | 0.004* |
| | Highschool | 97 | 9.21 | 9.29 | Within Group | 23897.83 | 396 | 60.35 | | |
| | Undergraduate | 188 | 7.50 | 6.69 | Total | 24713.48 | 399 | | | |
| | Postgraduate | 74 | 5.36 | 7.12 | | | | | | |
| | Total | 400 | 7.76 | 7.87 | | | | | | |
| **Bulimia and Food Preoccupation** | Primary school | 41 | 4.98 | 5.66 | Between Group | 447.76 | 3 | 149.25 | 11.30 | 0.000* |
| | Highschool | 97 | 3.44 | 4.42 | Within Group | 5228.44 | 396 | 13.20 | | |
| | Undergraduate | 188 | 2.47 | 3.12 | Total | 5676.20 | 399 | | | |
| | Postgraduate | 74 | 1.18 | 1.88 | | | | | | |
| | Total | 400 | 2.72 | 3.77 | | | | | | |
| **Oral Control** | Primary school | 41 | 4.93 | 5.06 | Between Group | 181.23 | 3 | 60.41 | 3.48 | 0.016* |
| | Highschool | 97 | 4.88 | 4.60 | Within Group | 6879.15 | 396 | 17.37 | | |
| | Undergraduate | 188 | 3.97 | 3.94 | Total | 7060.38 | 399 | | | |
| | Postgraduate | 74 | 2.99 | 3.56 | | | | | | |
| | Total | 400 | 4.11 | 4.21 | | | | | | |

**Table 4. ANOVA results comparing educational status on rejection sensitivity questionnaire, perceived maternal narcissism scale and eating attitudes test scores (continued).**

| | | n | M | SD. | | Sum of Square | df. | Mean Square | F | p |
|---|---|---|---|---|---|---|---|---|---|---|
| **PMNS** | Primary school | 41 | 78.61 | 30.92 | Between Group | 27533.00 | 3 | 9177.67 | 11.03 | 0.000* |
| | Highschool | 97 | 78.27 | 26.87 | Within Group | 329464.96 | 396 | 831.98 | | |
| | Undergraduate | 188 | 63.80 | 28.83 | Total | 356997.96 | 399 | | | |
| | Postgraduate | 74 | 56.69 | 30.17 | | | | | | |
| | Total | 400 | 67.51 | 29.91 | | | | | | |
| **Empathy Deficiency** | Primary school | 41 | 25.88 | 10.04 | Between Group | 2930.61 | 3 | 976.87 | 10.65 | 0.000* |
| | Highschool | 97 | 25.05 | 8.83 | Within Group | 36339.82 | 396 | 91.77 | | |
| | Undergraduate | 188 | 20.55 | 9.75 | Total | 39270.44 | 399 | | | |
| | Postgraduate | 74 | 18.26 | 9.83 | | | | | | |
| | Total | 400 | 21.76 | 9.92 | | | | | | |
| **Grandiosity Pretentiousness** | Primary school | 41 | 11.90 | 5.29 | Between Group | 718.38 | 3 | 239.46 | 10.52 | 0.000* |
| | Highschool | 97 | 11.94 | 4.54 | Within Group | 9014.49 | 396 | 22.76 | | |
| | Undergraduate | 188 | 9.47 | 4.74 | Total | 9732.88 | 399 | | | |
| | Postgraduate | 74 | 8.53 | 4.83 | | | | | | |
| | Total | 400 | 10.14 | 4.94 | | | | | | |
| **Criticism-Accusation** | Primary school | 41 | 14.00 | 6.06 | Between Group | 1021.78 | 3 | 340.59 | 10.30 | 0.000* |
| | Highschool | 97 | 14.39 | 5.45 | Within Group | 13095.62 | 396 | 33.07 | | |
| | Undergraduate | 188 | 11.51 | 5.71 | Total | 14117.40 | 399 | | | |
| | Postgraduate | 74 | 10.08 | 6.05 | | | | | | |
| | Total | 400 | 12.20 | 5.95 | | | | | | |
| **Control-Manipulation** | Primary school | 41 | 14.51 | 5.86 | Between Group | 772.50 | 3 | 257.50 | 8.09 | 0.000* |
| | Highschool | 97 | 14.74 | 5.25 | Within Group | 12611.89 | 396 | 31.85 | | |
| | Undergraduate | 188 | 12.38 | 5.59 | Total | 13384.39 | 399 | | | |
| | Postgraduate | 74 | 10.93 | 6.14 | | | | | | |
| | Total | 400 | 12.91 | 5.79 | | | | | | |
| **Parentification-Exploitation** | Primary school | 41 | 12.32 | 4.51 | Between Group | 658.13 | 3 | 219.38 | 11.89 | 0.000* |
| | Highschool | 97 | 12.14 | 4.04 | Within Group | 7307.86 | 396 | 18.45 | | |
| | Undergraduate | 188 | 9.89 | 4.29 | Total | 7966.00 | 399 | | | |
| | Postgraduate | 74 | 8.89 | 4.51 | | | | | | |
| | Total | 400 | 10.50 | 4.47 | | | | | | |

*p<0.05 ANOVA

**Table 5. ANOVA results comparing maternal educational status on rejection sensitivity questionnaire, perceived maternal narcissism scale and eating attitudes test scores.**

| | | n | M | SD. | | Sum of square | df. | Mean square | F | p |
|---|---|---|---|---|---|---|---|---|---|---|
| **Rejection sensitivity questionnaire** | Primary school | 159 | 49.64 | 24.89 | Between group | 7877.93 | 3 | 2625.98 | 5.08 | 0.002* |
| | Highschool | 180 | 55.06 | 21.76 | Within group | 204830.63 | 396 | 517.25 | | |
| | Undergraduate | 46 | 41.07 | 19.54 | Total | 212708.56 | 399 | | | |
| | Postgraduate | 15 | 48.73 | 18.99 | | | | | | |
| | Total | 400 | 51.06 | 23.09 | | | | | | |
| **Eating attitudes test** | Primary school | 159 | 15.61 | 13.34 | Between group | 1409.28 | 3 | 469.76 | 2.76 | 0.042* |
| | Highschool | 180 | 15.17 | 13.68 | Within group | 67335.66 | 396 | 170.04 | | |
| | Undergraduate | 46 | 10.50 | 9.99 | Total | 68744.94 | 399 | | | |
| | Postgraduate | 15 | 9.33 | 9.36 | | | | | | |
| | Total | 400 | 14.59 | 13.13 | | | | | | |
| **Dieting** | Primary school | 159 | 8.67 | 8.30 | Between group | 493.39 | 3 | 164.46 | 2.69 | 0.046* |
| | Highschool | 180 | 7.77 | 7.90 | Within group | 24220.09 | 396 | 61.16 | | |
| | Undergraduate | 46 | 5.61 | 5.80 | Total | 24713.48 | 399 | | | |
| | Postgraduate | 15 | 4.60 | 6.90 | | | | | | |
| | Total | 400 | 7.76 | 7.87 | | | | | | |

**Table 5. ANOVA results comparing maternal educational status on rejection sensitivity questionnaire, perceived maternal narcissism scale and eating attitudes test scores (continued).**

| | | n | M | SD. | | Sum of square | df. | Mean square | F | p |
|---|---|---|---|---|---|---|---|---|---|---|
| **Bulimia and food preoccupation** | Primary school | 159 | 2.84 | 3.69 | Between group | 57.21 | 3 | 19.07 | 1.34 | 0.260 |
| | Highschool | 180 | 2.92 | 4.10 | Within group | 5618.99 | 396 | 14.19 | | |
| | Undergraduate | 46 | 1.80 | 2.79 | Total | 5676.20 | 399 | | | |
| | Postgraduate | 15 | 1.93 | 2.74 | | | | | | |
| | Total | 400 | 2.72 | 3.77 | | | | | | |
| **Oral control** | Primary school | 159 | 4.10 | 4.52 | Between group | 98.99 | 3 | 33.00 | 1.88 | 0.133 |
| | Highschool | 180 | 4.48 | 4.04 | Within group | 6961.39 | 396 | 17.58 | | |
| | Undergraduate | 46 | 3.09 | 3.51 | Total | 7060.38 | 399 | | | |
| | Postgraduate | 15 | 2.80 | 4.28 | | | | | | |
| | Total | 400 | 4.11 | 4.21 | | | | | | |
| **PMNS** | Primary school | 159 | 72.38 | 35.58 | Between group | 10771.96 | 3 | 3590.65 | 4.11 | 0.007* |
| | Highschool | 180 | 66.76 | 25.54 | Within group | 346226.00 | 396 | 874.31 | | |
| | Undergraduate | 46 | 55.98 | 22.81 | Total | 356997.96 | 399 | | | |
| | Postgraduate | 15 | 60.27 | 20.85 | | | | | | |
| | Total | 400 | 67.51 | 29.91 | | | | | | |
| **Empathy deficiency** | Primary school | 159 | 23.29 | 11.58 | Between group | 1171.63 | 3 | 390.54 | 4.06 | 0.007* |
| | Highschool | 180 | 21.63 | 8.51 | Within group | 38098.80 | 396 | 96.21 | | |
| | Undergraduate | 46 | 17.96 | 8.43 | Total | 39270.44 | 399 | | | |
| | Postgraduate | 15 | 18.80 | 7.20 | | | | | | |
| | Total | 400 | 21.76 | 9.92 | | | | | | |
| **Grandiosity pretentiousness** | Primary school | 159 | 10.94 | 5.78 | Between group | 260.77 | 3 | 86.92 | 3.63 | 0.013* |
| | Highschool | 180 | 9.96 | 4.37 | Within group | 9472.10 | 396 | 23.92 | | |
| | Undergraduate | 46 | 8.41 | 3.65 | Total | 9732.88 | 399 | | | |
| | Postgraduate | 15 | 9.13 | 3.52 | | | | | | |
| | Total | 400 | 10.14 | 4.94 | | | | | | |
| **Criticism-accusation** | Primary school | 159 | 13.08 | 6.96 | Between group | 341.11 | 3 | 113.70 | 3.27 | 0.021* |
| | Highschool | 180 | 12.03 | 5.21 | Within group | 13776.28 | 396 | 34.79 | | |
| | Undergraduate | 46 | 10.11 | 4.66 | Total | 14117.40 | 399 | | | |
| | Postgraduate | 15 | 11.27 | 4.56 | | | | | | |
| | Total | 400 | 12.20 | 5.95 | | | | | | |
| **Control-manipulation** | Primary school | 159 | 13.74 | 6.77 | Between group | 338.17 | 3 | 112.72 | 3.42 | 0.017* |
| | Highschool | 180 | 12.82 | 5.07 | Within group | 13046.22 | 396 | 32.95 | | |
| | Undergraduate | 46 | 10.96 | 4.70 | Total | 13384.39 | 399 | | | |
| | Postgraduate | 15 | 11.07 | 3.92 | | | | | | |
| | Total | 400 | 12.91 | 5.79 | | | | | | |
| **Parentification-exploitation** | Primary school | 159 | 11.33 | 5.20 | Between group | 294.64 | 3 | 98.21 | 5.07 | 0.002* |
| | Highschool | 180 | 10.32 | 3.91 | Within group | 7671.36 | 396 | 19.37 | | |
| | Undergraduate | 46 | 8.54 | 3.44 | Total | 7966.00 | 399 | | | |
| | Postgraduate | 15 | 10.00 | 3.02 | | | | | | |
| | Total | 400 | 10.50 | 4.47 | | | | | | |

*$p<0.05$ (ANOVA)*

When we compared the scores obtained from the Rejection Sensitivity Questionnaire ($F(3.396)=5.08$, $p<0.05$) according to maternal educational status, a significant difference was found between the averages. It was determined that the scores of those high school graduates were higher than those of undergraduate and postgraduate graduates.

When we compared the scores obtained from the Eating Attitudes Test ($F(3.396)=2.76$, $p<0.05$) according to maternal educational status, a significant difference was found between the averages. According to the results of the Games-Howell test, which was performed when the variance homogeneity of the post hoc test was not achieved, it was determined that the mean of the primary school graduates group ($F(3.396)=2.76$, $p<0.05$) got a significantly higher than the mean of the undergraduate and postgraduate graduates group.

When we compared the scores obtained from the Perceived Maternal Narcissism Scale ($F(3.396)=4.11$, $p<0.05$) according to maternal educational status, a significant difference was found between the averages. It was determined by Levene's test that the group variance distributions were

homogeneous (p>0.05). According to the results of the Games-Howell test, which was performed when the variance homogeneity of the post hoc test was not achieved, scores of those primary school and high school graduates were higher than those of undergraduate graduates (Table 5).

## DISCUSSION

The current study aimed to examine the mediating role of rejection sensitivity between perceived maternal narcissism and risk of eating disorders. The study's primary findings revealed that rejection sensitivity mediates the relationship between perceived maternal narcissism and eating disorders. Although the relationship between perceived maternal narcissism, rejection sensitivity, and eating disorders has not yet been evaluated in the literature; studies are showing that there is a significant relationship between maternally perceived attitudes and eating attitudes (Waller & Hartley, 1994; Ayar, 2021), studies are showing that perceived maternal attitude and rejection sensitivity are related (Çardak et al., 2012; Kolcheva, 2022), and studies are showing that there is a significant relationship between rejection sensitivity and eating disorders (Cardi et al., 2013; Bondü et al., 2020). This condition demonstrates that the perceived maternal narcissistic personality traits may create a predisposition to eating disorders, together with the use of maladaptive eating attitudes, when sensitivity to rejection occurs in the relationship of the person with others.

When the findings obtained from this study are examined, it is seen that there is a significant relationship between rejection sensitivity and perceived maternal narcissistic features such as criticism-accusation, and control-manipulation. Çardak et al., (2012) state that children of authoritarian parents have higher rejection sensitivity than children whose parents are not authoritarian. Alpay (2020) in a study in which he examined the mediating role of self-criticism between the perceived maternal narcissistic features and psychopathology; showed that perceived maternal narcissistic traits predicted self-criticism. Similarly, Rappoport (2005) and Donaldson-Pressman & Pressman (1997) state that having narcissistic parents is associated with self-blame and criticism. The fact that the mother with narcissistic characteristics reflects the feeling of anger arising from the perceived rejection from the child in her relationship with the child may cause feelings of shame and guilt in the child. The mother's attempt to control the child's behavior for this purpose and the re-experiencing of these experiences with the child may create a sensitivity to rejection in the child against negative comments or unmet demands that may come from outside in the future.

In the findings obtained from the current study, it is seen that there is a significant relationship between eating attitude and rejection sensitivity and the perceived maternal narcissistic characteristics such as criticism-accusation, empathy deficiency, control-manipulation, parentification-exploitation. Mothers with narcissistic characteristics may parentalize their children and approach the needs of the child with a low level of empathy (Horne, 1998; Sukenick, 2002; Rappoport, 2005). Waller & Hartley (1994), in their study examining the relationship between perceived parenting style and eating disorders, showed that there is a significant relationship between perceived maternal disapproval and eating attitude. Nutrition is one of the needs in which empathy occupies an important place in the healthy development of the relationship between mother and child (Faraji & Fırat, 2022). When the feelings of children whose parents have a controlling attitude are not accepted by their parents as they are, a feeling of emptiness may occur in people and they may try attempt to fill this feeling through food (Tunç, 2020). It can be thought that the mother's disapproval of the child's attempts at individuation and her failure to provide empathetic care to the child may cause the development of maladaptive eating behaviors in the child to cope with negative emotions. At the same time, there may be intense fear and sensitivity in order not to lose the mother's love. It can be thought that a person develops maladaptive eating attitudes to cope with rejection sensitivity and establish dominance over their own body (Faraji & Fırat, 2022).

Waller & Hartley (1994), in their study comparing groups with and without an eating disorder diagnosis, showed that people with bulimia nervosa had significantly higher perceived disapproval scores from their mothers compared to healthy controls. Ayar (2021) states that there is a significant relationship between eating attitudes and the following maternal attitudes and behaviors: normative, belittling/criticizing, emotionally depriving, and exploitative/abusive. It can be said that the current study results are compatible with the literature. When the findings obtained from this study are examined, it is seen that there is a positive and significant relationship between bulimia and food preoccupation and rejection sensitivity, and the following perceived maternal narcissistic characteristics: empathy deficiency, grandiosity pretentiousness, criticism-accusation, control-manipulation. It can be thought that the person who has a mother with narcissistic characteristics develops an eating attitude that will provide satisfaction in a very short time as a compensatory strategy to cope with the pain and anger of rejection and to protect their self. For this, the person may consume more food than necessary. At this point, the anger and pain of rejection can be replaced by intense guilt and shame, along with the fact that the individual thinks that he/she has lost control (Faraji & Fırat, 2022). It can be thought that they vomit everything they eat to regain control over their body and cope with the repeated sensitivity of rejection (Waller et al., 2007). Stice (2001) suggests that dissatisfaction with the

body may increase with the reinforcement of perceived responses from the family. Sukenick (2001), in a study conducted with adolescent models, states that some models express that they model only to make their mothers look good. The results of the current study are consistent with the findings in the literature. When the findings obtained from this study are examined, it is seen that there is a positive and significant relationship between rejection sensitivity, dieting, bulimia and food preoccupation, and the following perceived maternal narcissistic features: grandiosity pretentiousness, empathy deficiency, and parentification-exploitation.

In this study, it was determined that as age increases rejection sensitivity, eating attitude, and perceived maternal narcissism decrease. The reason for these findings may be that some of the symptoms of personality disorders decrease with age and there is a partial improvement (Öztürk & Uluşahin, 2020). At the same time, as people get older, their chances of getting away from their parents increase. Thus, the dominant influence of their relationship with their parents may decrease as they establish relationships with other people (Leggio, 2018). Over time, it can be thought that the maladaptive defenses that the person uses due to the increase in his age have decreased and that the narcissistic characteristics of the mother subsided with the increasing age of the mother. Leggio (2018), in a study in which narcissistic parents examined the mental health outcomes of their adult children, supports these findings, and shows that the perceived parental narcissism decreases as the participant's age increases. Similarly, in a study conducted by Izydorczyk & Sitnik-Warchulska (2018) with adolescent and adult women, supporting these results, they show that the youngest participants are less satisfied with their bodies compared to adults, and put significantly more effort into bulimic tendencies and perfectionism.

It was found that the scores of rejection sensitivity, eating attitude, and perceived maternal narcissistic traits were lower in those with higher maternal education levels and those with a postgraduate degree compared to other education level groups in the current study. The reason for this may be that, as a result of the education level received, they have the opportunity to develop more adaptive and functional strategies in order to cope with the negative emotions developed by the rejection sensitivity and perceived maternal narcissistic characteristics. However, unlike the findings of the current study, Nicholls et al., (2016) concluded in their longitudinal study that a high maternal education level increases the lifetime risk of eating disorders. The reason for this difference may be that the present study did not have the opportunity to observe the participants over a long period and to examine other variables that may affect the eating disorder. As a matter of fact, the high educational level of the mother may become a protective factor against eating disorders along with other variables. However, the role of maternal education level on eating attitude cannot be fully determined, since the present study could not determine how much other variables in the participants' lives affect their eating attitude.

**Strengths and Limitations of Study**

This study has strengths and limitations. The narcissistic characteristics of the mother are limited only to the self-report scale obtained from her children, so it is not known whether the mothers of the participants in the study were diagnosed with a narcissistic personality disorder. Therefore, the results cannot be generalized to the clinical population. The strength of the study is that while the sample of eating disorder studies in the literature is predominantly female and adolescent age groups, this study was conducted with a sample that included both men and women and a wide age range.

## CONCLUSION

In this study, the mediating role of rejection sensitivity between perceived maternal narcissism and risk of eating disorders was investigated. Rejection sensitivity has been found to have a mediating role between perceived maternal narcissism and eating disorder. It was found that there was a positive and significant relationship between rejection sensitivity and the following eating attitudes: dieting, bulimia and food preoccupation and the following perceived maternal narcissistic characteristics: empathy deficiency, grandiosity pretentiousness, criticism-accusation, control-manipulation, parentification-exploitation. It was observed that as age and education increased, perceived maternal narcissism, dysfunctional eating attitudes and rejection sensitivity decreased.

It is recommended to include mothers diagnosed with narcissistic personality disorder in future studies in order to compare the perceived maternal narcissistic characteristics with healthy controls and to generalize the research findings to the clinical population. Finally, in the psychotherapeutic interventions of adult children of mothers with narcissistic characteristics who are treated for eating disorders it is thought that the application of schema therapy methods such as parental restructuring for perceived maternal narcissism will be beneficial. In addition, it is thought that the application of cognitive techniques to evaluate negative automatic thoughts, intermediate beliefs, and core beliefs will be useful for rejection sensitivity.

**Acknowledgments**

The authors would like to express their gratitude to all who contributed to this study.

**Conflict of Interest**

Regarding this article's research, writing, or publication, the authors state that there are no potential conflicts of interest.

**Author Contributions**

**Plan, design:** HF; **Material, methods and data collection:** HF, CB, DY; **Data analysis and comments:** HF, CB, DY; **Writing and corrections:** HF, CB.

**REFERENCES**


Alpay, E. H. (2020). *Anneden Algılanan Narsisistik Özellikler ile Psikopatoloji Arasındaki İlişkide Kendini Eleştirinin Aracı Rolü*. Doctoral Thesis, Mersin Üniversitesi.

Ayar, N. (2021). *Algılanan anne tutumları, duygu düzenleme stratejileri ve erken dönem uyumsuz şemaların yeme tutumu üzerindeki yordayıcı rolü.* Işık Üniversitesi Sosyal Bilimler Enstitüsü, İstanbul.

Bondü, R., Bilgin, A., & Warschburger, P. (2020). Justice sensitivity and rejection sensitivity as predictors and outcomes of eating disorder pathology: A 5-year longitudinal study. *International Journal of Eating Disorders*, *53*(6), 926-936. https://doi.org/10.1002/eat.23273.

Brunton, J. N., Lacey, J. H., & Waller, G. (2005). Narcissism and eating characteristics in young nonclinical women. *The Journal of Nervous and Mental Disease, 193*(2), 140-43. https://doi.org/10.1097/01.nmd.0000152784.01448.fe.

Cardi, V., Matteo, R. D., Corfield, F., & Treasure, J. (2013). Social reward and rejection sensitivity in eating disorders: An investigation of attentional bias and early experiences. *The World Journal of Biological Psychiatry*, *14*(8), 622-633. https://doi.org/10.3109/15622975.2012.665479.

Crocker, B. (2009). *The children of narcissus exploring the development of existential trauma.* Pacifica Graduate Institute, California.

Çardak, M., Sarıçam, H., & Onur, M. (2012). Perceived parenting styles and rejection sensitivity in university students. *The Online Journal of Counselling and Education*, *1*(3), 57-69.

Donaldson-Pressman, S., & Pressman, R. M. (1997). *The narcissistic family: Diagnosis and treatment*. London: Jossey-Bass.

Downey, G., & Feldman, S. I. (1996). Implications of rejection sensitivity for intimate relationships. *Journal of Personality and Social Psychology*, *70*(6), 1327-1343. DOI:10.1037//0022-3514.70.6.1327.

Donald G. Dutton, Matthew K. Denny-Keys & Joanna R. Sells (2011) Parental personality disorder and its effects on children: A review of current literature, *Journal of Child Custody, 8*,4, 268-283. DOI: 10.1080/15379418.2011.620928.

Ergüney-Okumuş, F. E., & Sertel-Berk, H. O. (2020). Yeme tutum testi kısa formunun (YTT-26) üniversite örnekleminde türkçeye uyarlanması ve psikometrik özelliklerinin değerlendirilmesi. *Psikoloji Çalışmaları-Studies in Psychology.* https://doi.org/10.26650/SP2019-0039.

Faraji, H., & Sucu, H. (2021). Yetişkin bireylerde ilk nesne ilişkileri ve reddedilme duyarlılığı. *I. Uluslararası Psikolojide Güncel Yaklaşımlar ve Araştırmalar Kongresi,* İstanbul.

Faraji, H., & Fırat, B. (2022). Yeme bozuklukları ve duygular. *Fenerbahçe Üniversitesi Sosyal Bilimler Dergisi*, *2* (1), 153-174. https://dergipark.org.tr/tr/pub/fbujoss/issue/70817/1116892.

Garner, D. M., Olmsted, M. P., Bohr, Y., & Garfinkel, P. E. (1982). The eating attitudes test: psychometric features and clinical correlates. *Psychological Medicine*, *12*(4), 871-878. DOI:10.1017/S0033291700049163.

Göncü Köse, A. Özen-Çıplak, A., Ulaşan-Özgüle, E.T. & Sümer, N. (2017). Reddedilme duyarlılığı ölçeğinin türkçeye uyarlanması. *Nesne Psikoloji Dergisi*, *5*(11), 383-403. DOI: 10.7816/nesne-05-11-03.

Hahs-Vaughn, D. L., & Lomax, R. G. (2020). *Statistical concepts: A first course.* (1.Baskı). New York: Routledge. https://doi.org/10.4324/9780429261268.

Horne, S. (1998). *The role of parental narcissism and depression in predicting adolescent empathy, narcissism, self-esteem, pleasing others, and peer conflict* (Unpublished Doctoral Dissertation) University of Georgia: Georgia.

Izydorczyk, B., & Sitnik-Warchulska, K. (2018). Sociocultural appearance standards and risk factors for eating disorders in adolescents and women of various ages. *Frontiers in Psychology*, *9*: 429. DOI: 10.3389/fpsyg.2018.00429.

Kolcheva, Nadya (2022). Rejection sensitivity in adulthood and its relationship with perceived parental acceptance–rejection in childhood. *Diogenes, 30*(1):99-115. DOI: 10.54664/htgg1443.

Leggio, J. N. (2018). *Mental health outcomes for adult children of narcissistic parents* (Doctoral Thesis), Adler University, Chicago.

Mahoney, D., Rickspoone, L. & Hull, J. C. (2016). Narcissism, parenting, complex trauma: The emotional consequences created for children by narcissistic parents. *The Practitioner Scholar: Journal of Counseling and Professional Psychology*, 5(1). 45-59.

Öztürk, M. O., & Uluşahin, A. (2020). *Ruh sağlığı ve bozuklukları*. (16. Baskı) Ankara: Nobel Tıp Kitabevleri. (Original work published: 1988).

Rappoport, A. (2005). Co-narcissism: How we accommodate to narcissistic parents. *The Therapist*, 1, 1-8.

Stice, E. (2001). A prospective test of the dual-pathway model of bulimic pathology. Mediating effects of dieting and negative affect. *Journal of Abnormal Psychology*, 100 (1), 124-135. https://doi.org/10.1037/0021-843X.110.1.124.

Sukenick, J. M. (2002). *Narcissism and self-esteem in adolescent female models and the role of perceived parental narcissism* (Doktoral Thesis), New York University, New York.

Trumpeter, N. N., Watson, P. J., O'Leary, B. J., & Weathington, B. L. (2008). Self-functioning and perceived parenting: Relations of parental empathy and love inconsistency with narcissism, depression, and self-esteem. *The Journal of Genetic Psychology*, *169*(1), 51–71. https://doi.org/10.3200/gntp.169.1.51-71.

Tunç, P. (2020). Çocukluk çağı travması ile bozulmuş yeme tutumları ilişkisinde ebeveyne bağlanmanın düzenleyici rolünün incelenmesi. *Turk J Child Adolesc Ment Health*, 27(2), 75-84. DOI: 10.4274/tjcamh.galenos.2020.03521.

Türker, Ö. (2018). *The role of perceived maternal narcissism and depression on the later development of narcissistic personality organization.* Bilgi Üniversitesi, İstanbul.

Twenge, J. M., & Campbell, W. K. (2003). "Isn't it fun to get the respect that we're going to deserve?" Narcissism, social rejection, and aggression. *Personality and Social Psychology Bulletin*, *29*(2), 261-272. https://doi.org/10.1177/0146167202239.

Waller, G., & Hartley, P. (1994). Perceived parental style and eating psychopathology. *European Eating Disorders Review*, 2(2), 76-92. https://doi.org/10.1002/erv.2400020204.

Wetzel, E., & Robins, R. W. (2016). Are parenting practices associated with the development of narcissism? Findings from a longitudinal study of mexican-origin youth. *Journal of Research in Personality, 63,* 84–94. https://doi.org/10.1016/j.jrp.2016.05.005.

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.1295786

# The Relationship Between Body Mass Index of Pregnant Women and Maternal Perception, Body Perception, Distress and Fear of Birth

Cevriye OCAKTAN TETİKÇOK [1], Hacer ALAN DİKMEN [1]
[1]Selcuk University, Faculty of Health Sciences, Department of Midwifery

***Geliş Tarihi / Received:*** *11.05.2023,* ***Kabul Tarihi / Accepted:*** *08.12.2023*

**ABSTRACT**
**Objective:** The study aimed to examine the relationship between maternal obesity and motherhood perception, body perception, distress level and fear of birth in pregnant women. **Materials and Methods:** The data of the study, which was designed as a descriptive and relationship-seeking type, were collected between December 2021 and April 2022, using an introductory information form, the Self-perception Scale of Pregnant Women (SSPW), the Tilburg Pregnancy Distress Scale (TPDS), and the Wijma Birth Expectation/Experience Scale-A Version (W). -Collected with DBÖ/A Version). Data were analyzed using Spearman correlation test, Kruskal Wallis test and chi-square test. **Results:** The median gestational age of the pregnant women participating in the study was 34 (21-40) and the median BMI was 30.46 (9.38-39.86). 54.1% of the pregnant women were obese according to BMI. 89.6%of pregnant women reported that they paid attention to adequate and balanced nutrition during pregnancy, and 21.6% reported that they did regular exercise during pregnancy. A statistically significant difference was detected between the presence of obesity in pregnant women and the median score of the Tilburg Pregnancy Distress Scale (p=0.004). There was a significant, positive and low-level correlation between the pregnant women's median BMI score and BMI (rs=0.146, p=0.017) and body perception median score (rs=0.158, p=0.010). **Conclusion:** No statistically significant difference was found between the presence of obesity in pregnant women and Vas, perception of motherhood, body perception, presence of distress and fear of birth. Health care professionals should plan pregnancy, regulate weight gain during pregnancy, and provide nutrition and exercise training to women in the risk group.
**Keywords:** Maternal perception, Body perception, Distress, Fear of childbirth, Maternal obesity

## Gebelerin Beden Kitle İndeksi ile Annelik Algısı, Beden Algısı, Stres ve Doğum Korkusu Arasındaki İlişki

**ÖZ**
**Amaç:** Bu çalışmada maternal obezitenin gebelerde annelik algısı, beden algısı, distres düzeyi ve doğum korkusu ile ilişkisinin incelenmesi amaçlanmıştır. **Gereç ve Yöntem:** Tanımlayıcı ve ilişki arayıcı türde tasarlanan çalışmanın verileri Aralık 2021-Nisan 2022 tarihleri arasında tanıtıcı bilgi formu, Gebelerin Kendilerini Algılama Ölçeği (GKAÖ), Tilburg Gebelikte Distres Ölçeği (TGDÖ) ve Wijma Doğum Beklentisi/ Deneyimi Ölçeği- A Versiyonu (W-DBÖ/ A Versiyonu) ile toplandı. Veriler Spearman korelasyon testi, Kruskal Wallis testi ve ki-kare testi ile analiz edildi. **Bulgular:** Çalışmaya katılan gebelerin gebelik haftası ortancası 34 idi (21-40) veve BKİ ortancası 30.46 (9.38-39.86) idi. Gebelerin %54.1'i BKİ'ne göre obezdi. Gebelerin %89.6'sı gebelikte yeterli ve dengeli beslenmeye dikkat ettiğini, gebelikte %21.6'sı düzenli egzersiz yaptığını bildirdi. Gebelerde obezite varlığı ile Tillburg Gebelikte Distres Ölçeği puan ortancası arasında istatistiksel olarak anlamı bir fark saptandı (p=0,004). Gebelerin BKİ puan ortancası ile GKAÖ ($r^s$=0,146, p=0,017) ve beden algısı puan ortancası arasında ($r^s$=0,158, p=0,010) anlamlı, pozitif yönlü ve düşük seviyede bir korelasyon vardı. **Sonuç:** Gebelerde obezite varlığı ile GKAÖ, beden algısı ve distres varlığı arasında istatistiksel olarak anlamlı bir fark saptanmamıştır. Sağlık bakım profesyonelleri, risk grubundaki kadınlara gebeliğin planlanması, gebelik döneminde kilo alımının düzenlenmesi, beslenme ve egzersiz eğitimleri planlanmalıdır.
**Anahtar kelimeler:** Annelik algısı, Beden algısı, Distres, Doğum korkusu, Maternal obezite.

***Sorumlu Yazar / Corresponding Author:*** Cevriye OCAKTAN TETİKÇOK, Selcuk University Faculty of Health Sciences, Department of Midwifery.
***E-mail:*** ocaktancevriye@gmail.com

***Bu makaleye atıf yapmak için / Cite this article:*** Ocaktan Tetikçok, C., & Alan Dikmen, H. (2024). The relationship between body mass index of pregnant women and maternal perception, body perception, distress and fear of birth. *BAUN Health Sci J, 13*(1), 172-183.
https://doi.org/10.53424/balikesirsbd.1295786

## INTRODUCTION

Obesity is a multifaceted and intricate ailment characterized by an excess accumulation of fat, posing significant health risks. The World Health Organization (WHO) has acknowledged obesity as a critical public health concern (WHO, 2023). The WHO categorizes body mass index (BMI) into distinct groups: underweight (BMI<18.5), normal (BMI=18.5–24.9), overweight (BMI=26–29.9), and obese (BMI>30). On a global scale, obesity is most prevalent in the American Continent (61%). Moreover, over 50% of women in the European Continent and Mediterranean Region are classified as overweight, with nearly half of women in all three regions falling into the obese category. It is worth noting that, across all regions worldwide, women exhibit a higher likelihood of obesity compared to men (WHO, 2023). The 2018 Turkey Demographic and Health Survey (2018 TDHS) indicated that 59% of women in Turkey are either overweight or obese. Notably, the incidence of obesity is on the rise among women of reproductive age. This situation is also seen in women during pregnancy (TNSA, 2019). According to WHO reports, more than 20% of women are overweight and obese when they become pregnant (WHO, 2023). Physical activity limitation and nutritional problems during pregnancy affect maternal obesity (Demir Yıldırım & Hotun Şahin, 2022; Koçak et al., 2022). While the prevalence of obesity in pregnant women was 18.8% in a study conducted in our country (Doğan et al., 2018), it was 29.8 in another research (Alan Dikmen & Çankaya. Maternal obesity can cause pregnancy-induced hypertension, gestational diabetes, cesarean delivery, bleeding, fetal macrosomia, abortion, dystocia, preterm birth and stillbirth (Demir Yıldırım & Hotun Şahin, 2022; Langley-Evans, 2022; Mossie et al., 2022; WHO, 2023). Because of the high rate of complications in maternal obesity pregnancy, it is observed that the rates of follow-up in the intensive care unit increase because of temporary tachypnea, respiratory distress, and hypoglycemia in newborns (Özgül & Taşdemir, 2019). According to a case-control study on the effect of obesity on maternal and fetal outcomes in pregnant women, the birth weights of newborns in obese pregnant women are higher (Koçak et al., 2022). It was reported that shoulder dystocia is more common in obese and overweight women during pregnancy, increasing the risk of uterine rupture and perineal trauma (Yanıkkerem & Mutlu, 2012). As research shows, maternal obesity puts the pregnancy and birth process at risk, which can cause obese pregnant women to experience anxiety and uncertainty regarding their pregnancy process. (Rivera et al., 2015). The presence of anxiety and uncertainty during pregnancy can significantly impact maternal perception, posing challenges to the adaptation process of pregnancy.

Negative maternal perception in pregnant women causes psychological distress during the perinatal period, delays in seeking help, and difficulties establishing bonds with their babies (Caldwell et al., 2022). A study observed a lower level of prenatal attachment among pregnant women who are obese (Alan Dikmen & Çankaya, 2018). The number of studies on the maternal perception in maternal obesity pregnancy is very limited in the literature. Maternal obesity also has an adverse impact on the self-esteem and body image of expectant mothers. Çevik and Yanıkkerem (2020) reported that excessive weight gain during pregnancy adversely influences the self-esteem and body image of pregnant women and raises the risk of depression (Çevik & Yanıkkerem, 2020). Negative body perception that develops in mothers negatively affects women's self-esteem, quality of life and mother-infant relationship (Kumcağız et al., 2017). Küçükkaya et al. (2020) stated that when a positive body perception of pregnancy develops in pregnant women, it is easier for expectant mothers to accept pregnancy (Küçükkaya et al., 2020). Coşkun et al. (2020) revealed that as body perception increases in pregnant women, the level of prenatal attachment also increases (Coşkun et al., 2020). As can be seen, the positive body perception that develops during pregnancy can also positively affect the pregnancy and maternal perception. A study revealed a correlation between the self-perception levels of pregnant women and the degree of distress throughout pregnancy (Alan Dikmen & Şanlı, 2019). In comparison, negative maternal perception during pregnancy heightens the distress level among pregnant women. Studies show that maternal obesity also increases stress and anxiety levels during pregnancy (Çapık et al., 2015; Taşdemir et al., 2015). Stressors such as pain, tension, fear, helplessness, loss of control, separation from loved ones, incomprehensible processes, foreign environment, fear of surgical procedures, hopelessness, deterioration of body image, and anxiety about becoming a parent may develop in pregnant women who have to be hospitalized due to the negative health effects of maternal obesity. All these stressors can cause distress (Çapık et al., 2015; Taşdemir et al., 2015). Hilaliah et al. (2022) reported that it increases the level of anxiety in pregnant women who are obese (Arif & Annagraini, 2022). Health problems and anxiety in maternal obesity pregnancy can also lead to fear of childbirth in women.

In a systematic review, including 24 studies by Nilson et al. (2018), the rates of fear of childbirth were reported as between 6.3% and 14.8% (Nilsson et al., 2018). In the study by Dönmez et al. (2014), 58% of women stated they feared childbirth (Dönmez et al., 2014). Individuals may experience varying levels of delivery fear due to reasons such as the number of births, type of birth, negative birth experiences, socioeconomic status, psychological health, and lack of knowledge (Erbil, 2022; Kuo et al.,2022; Şahin et al., 2019). Studies applied in Turkey reported that

7.5% to 82.6% of women preferred cesarean delivery due to fear of vaginal delivery (Bülbül et al., 2016; Karabulutlu, 2012). The study by Gün and Ege (2018) revealed that primiparous women had more fear of childbirth (Özen Gün & Ege 2022). No existing literature has explored the correlation between maternal obesity and the apprehension of childbirth. As a result, one of the study's main objectives is to delve into the potential connection between maternal obesity and fear of childbirth. Furthermore, no prior research has been encountered investigating the interplay between maternal obesity and maternal perception, body perception, distress levels, and fear of childbirth. It was planned to examine the relationship between the body mass index of pregnant women and their perception of maternity, body perception, stress and fear of birth.

*Research Questions:*

1. Is there a relationship between the body mass index of the pregnant woman and the perception of the mother?
2. Is there a relationship between the pregnant woman's body mass index and body perception?
3. Is there a relationship between the body mass index of the pregnant woman and her level of distress?
4. Is there a relationship between the pregnant woman's body mass index and fear of birth?

## MATERIALS AND METHODS

### Study type

This study was conducted in descriptive and correlational types.

### Study group

The study data were collected at the antenatal care outpatient clinic of a university hospital situated in Konya between December 2021 and April 2022. The study population comprised pregnant women seeking care at the hospital's antenatal follow-up clinic. A random sampling method was employed to select pregnant women, who were then informed about the study, and their consent was obtained if they willingly agreed to participate.

The total sample size for the study was determined to be 265 individuals, with calculations performed using Gpower package software version 3.1.9.4. The chosen parameters included a 0.20 effect size, a 0.05 type I error, and a minimum of 90% power (The GPower Team, Düsseldorf, Germany). During the specified dates, 302 eligible pregnant women attended the polyclinic, where 34 of them declined participation due to time constraints for completing the data collection forms. The study concluded after achieving a sample size of 268 pregnant women who successfully completed the data collection forms. Each pregnant woman took approximately 10-15 minutes to fill out the forms. The data collection process occurred in a designated private room within the respective polyclinic, ensuring utmost privacy. Efforts were made to ensure that the room where the data collection took place was adequately heated, well-lit, and arranged in a manner that prohibited access to anyone other than the researcher and necessary healthcare personnel.

### Sample Selection Criteria

Those aged 19 and above, who could speak and understand Turkish, who conceived spontaneously, who were open to communication, who were mentally and physically healthy, who had a single pregnancy, who were not in the risk pregnancy category (with a diagnosed chronic disease, gestational diabetes mellitus, bleeding (ablatio placenta/placenta previa), premature rupture of membranes, threatened preterm birth and hypertensive conditions during pregnancy), The study also included pregnant women in their second and third trimesters.

*Data Collection Tools*

The data were obtained by Self-perception Scale of Pregnant Women (SSPW), Tilburg Pregnancy Distress Scale (TGSS), and The Wijma Delivery Expectancy/Experience Questionnaire A Version (W-DEQ/ A Version) with the introductory information form evaluating the personal information created in the light of the literature (Alan Dikmen & Çankaya, 2018; Çapık et al., 2015; Körükçü et al., 2012; İnegöl Gümüş et al., 2010).

### Introductory Information

The introductory information form, developed in alignment with existing literature, comprises two sections. (Alan Dikmen & Çankaya, 2018; Çapık et al., 2015). The initial section of the form consists of 10 questions encompassing the socio-demographic attributes of pregnant women and their spouses. These questions cover factors such as age, spouse's age, educational background, place of residence, employment status, and the spouse's educational and employment details. In the second section, there are 15 questions that include obstetric and nutritional characteristics of the pregnant women (week of pregnancy, number of pregnancies, weight and height of the pregnant women).

### Self-perception Scale of Pregnant Women (SSPW)

The 4-point Likert-type scale (4=Always, 3=Often, 2=Rarely, 1=Never), developed by Kumcagiz et al. (2017), consists of 12 items. The scale has a total of two sub-dimensions, namely maternal perception and body perception. The sub-dimension of maternal perception of pregnancy includes 7 items, and as the scores in this sub-dimension increase, the level of maternal perception of pregnancy also increases (minimum-maximum=7-28). Sub-dimension of body perception of pregnancy has 5 items, and as the score increases in this sub-dimension, body perception of pregnancy is evaluated negatively (minimum-maximum=5-20). In the original scale, Cronbach's alpha coefficient was calculated as 0.86 for the maternal perception of pregnancy and 0.75 for the body perception of pregnancy (Kumcağız et al., 2017 In this study, Cronbach's alpha reliability coefficient

was calculated as 0.70 in the dimension of maternal perception and 0.79 in the dimension of body perception.

**Tilburg Pregnancy Distress Scale (TPDS)**

The distress assessment scale was developed by Pop et al. (2011) to evaluate distress during pregnancy. The Turkish version's validity and reliability were established by Çapık and Pasinlioğlu (2015) (Çapık et al., 2015). This scale, suitable for pregnant women at or beyond 12 weeks of gestation, employs a 4-point Likert-type scale (0=Very often, 1=Quite often, 2=Sometimes, 3=Rarely/never) and comprises 16 items. The cumulative score ranges from 0 to 48, where a score of 28 or higher indicates potential distress risk. Notably, items 3, 5, 6, 7, 9, 10, 11, 12, 13, 14, and 16 on the scale are reverse-coded.

The scale features two sub-dimensions: "negative affect," encompassing 11 items, and "spouse participation," comprising 5 items. Specifically, items 1, 2, 4, 8, and 15 relate to spouse participation, while the remaining items pertain to negative affect. The Cronbach's alpha coefficient for the scale was determined to be 0.8319. This study determined distress among pregnant women using the established cut-off score, yielding a calculated Cronbach's alpha coefficient of 0.82.

**The Wijma Delivery Expectancy/Experience Questionnaire A Version (W-DEQ/ A Version)**

The Fear of Childbirth Scale, developed by Wijma et al. (1998), comprises a total of 33 items. Utilizing a 6-point Likert scale, respondents assign numbers from 0 to 5, where 0 signifies "absolutely" and 5 corresponds to "never." Possible scores on the scale range from 0 to 165. Notably, as the score increases, so does the intensity of fear experienced by women concerning childbirth. Questions 2, 3, 6, 7, 8, 11, 12, 15, 18, 19, 20, 24, 25, 27, and 31 are reverse-scored within the scale. The Turkish version of the scale underwent validity and reliability assessment by Körükcü et al., resulting in a calculated Cronbach's alpha coefficient of 0.89 (Körükçü et al., 2012). In the context of this study, Cronbach's alpha coefficient was determined to be 0.81.

**Statistical Analyzes**

The statistical data analysis employed the SPSS 20.0 software package (IBM, New York, USA). The normality of the data was assessed using the Kolmogorov-Smirnov test and given that the mean score of all scales was <0.05, nonparametric tests were conducted. The analysis encompassed various statistical methods, including Spearman correlation analysis, Mann Whitney U test, and logistic and linear regression analysis, supplemented by descriptive statistics (such as numbers, percentages, medians, and minimum and maximum values).

Throughout the study, two-tailed tests were employed, and significance was deemed to be present when $p<0.05$, adhering to the guidelines of Tabachnick and Fidell (2013). The study's dependent variables encompassed maternal and body perception levels and the extent of distress and fear of childbirth experienced by pregnant women. Notably, the study's independent variable was pregnant women's body mass index (BMI).

**Ethical considerations**

Ethical approval (Decision No: 2021/853) and institutional consent were acquired from the hospital in which the study was executed (Number: E-14567952-900-108786). The study was conducted in adherence to the ethical principles set forth in the 1964 Declaration of Helsinki. Written consent was secured from pregnant women who willingly participated in the study. This research did not receive dedicated funding from any public, commercial, or non-profit financial entity.

## RESULTS

The median age of the pregnant women participating in the study was 27.78±4.94, and the median duration of marriage (in years) was 4 (range: 1-25). Of the pregnant women, 59% had attained a high school education or higher. Furthermore, 83.6% of the pregnant women perceived their income to be equivalent to their expenses (Table 1). The average gestational week of the pregnant women was 34 (range: 21-40), with a median pregnancy count of 2 (range: 0-6), and a median BMI of 30.46 (range: 9.38-39.86). Among the participants, 86.6% indicated that their most recent pregnancy was planned, while 83.6% reported regular attendance to prenatal check-ups. According to BMI classification, 54.1% of pregnant women were classified as obese. In terms of nutrition, 89.6% of the pregnant women reported adhering to sufficient and balanced dietary habits during pregnancy (Table 2). The median SSPW score of the pregnant women in the study was 36 (range: 25-45), the median TPDS score was 19 (range: 6-32), and the median W-DEQ/ A Version score was 66 (range: 15-96). The presence of distress was identified in 10.4% of the pregnant women (Table 3). No statistically significant correlation was observed between the median BMI score of the pregnant women and the median maternal perception ($rs=0.081$), TPDS ($rs=0.021$), and W-DEQ/ A Version ($rs=-0.053$) scores ($p>0.05$). However, a significant yet moderate positive correlation was identified between the median BMI score of the pregnant women and both the median SSPW ($rs=0.146$, $p=0.017$) and the body perception score ($rs=0.158$, $p=0.010$) (Table 4). The study did not reveal any statistically significant differences between the presence of obesity in pregnant women and SSPW, maternal perception, body perception, distress levels, and fear of childbirth ($p>0.05$). Nonetheless, a statistically significant distinction emerged between the presence of obesity in pregnant women and the median TPDS score ($p=0.004$). The Post Hoc tests (Tukey HSD and Bonferroni) elucidated that this significance was attributed to the "normal" group, with their median TPDS score

significantly higher than the other two groups (Table 5).

**Table 1. Distribution of Socio-demographic Characteristics of Pregnant Women (n=268).**

| Variables | Mean±SD | Median (Minimum-Maximum) |
|---|---|---|
| Age | 27.78±4.94 | 27 (19-39) |
| Spouse age | 31.60±5.25 | 31 (22-47) |
| | **Number (%)** | **95% Confidence interval** |
| The place she lived the longest | | |
| Province | 208 (77.6) | 72.4-82.5 |
| Rural | 60 (22.4) | 17.5-27.6 |
| Education Level | | |
| Literate person/primary education | 110 (41) | 35.1-47.4 |
| High School and above | 158 (59) | 52.6-64.9 |
| Family | | |
| Elementary family | 210 (78.4) | 73.5-83.2 |
| Extended family | 58 (21.6) | 16.8-26.5 |
| Employment status | | |
| Employed | 31 (11.6) | 8.2-15.3 |
| Unemployed | 237 (88.4) | 84.7-91.8 |
| Spouse Education Level | | |
| Literate person/primary education | 103 (38.4) | 32.8-44.8 |
| High School and above | 165 (61.6) | 55.2-67.2 |
| Spouse Employment Status | | |
| Employed | 236 (88.3) | 85.1-91.5 |
| Unemployed | 42 (11.7) | 8.5-14.9 |
| Perceived income Status | | |
| Income less than expenses | 33 (12.3) | 8.2-16.4 |
| Income equal to expenses | 224 (83.6) | 78.7-88.1 |
| Income more than expenses | 11 (4.1) | 1.9-6.7 |

**Table 2. Distribution of Obstetric Characteristics and Nutrition and Exercise Characteristics of Pregnant Women.**

| Variables | Mean±SD | Median (Minimum-Maximum) |
|---|---|---|
| Pregnancy week | 33.24±4.87 | 34 (21-40) |
| Pregnancy number | 2.45±1.14 | 2 (0-6) |
| Birth number | 1.35±1.01 | 1 (0-4) |
| Pregnancy weight (kg) | 79.45±13.40 | 80 (50-106) |
| Pregnancy height (cm) | 162.33±5.68 | 163 (150-174) |
| Pregnant BMI | 30.18±5.14 | 30.46 (19.38-39.86) |
| Number of main meals per day | 2.84±0.36 | 3 (2-3) |
| Number of snacks per day | 2.17±1,01 | 2 (0-5 |
| | **Number (%)** | **95% Confidence interval** |
| Volunteer pregnancy | | |
| Yes | 232 (86.6) | 82.5-90.7 |
| No | 36 (13.4) | 9.3-17.5 |
| Getting regular prenatal care | | |
| Yes | 224 (83.6) | 79.5-88.1 |
| No | 44 (16.4) | 11.9-20.5 |
| Presence of obesity according to BMI[a] | | |
| Normal (18,5-24,9) | 43 (16) | 11.9-20.5 |
| Pre-obese/Slightly overweight (25-29,9) | 80 (29.9) | 24.6-35.1 |
| Obese (>30) | 145 (54.1) | 48.1-59.3 |
| Regular exercise before pregnancy | | |
| Yes | 35 (13.1) | 9.3-17.2 |
| No | 233 (86.9) | 82.8-90.7 |

BMI: Body Mass Index, [a] NIH, National Institute of Health, ACOG: The classification of American Society of Obstetrics and Gynecology

**Table 2. Distribution of Obstetric Characteristics and Nutrition and Exercise Characteristics of Pregnant Women (Continue).**

| | | |
|---|---|---|
| **Regular exercise during pregnancy** | | |
| Yes | 58 (21.6) | 16.8-26.5 |
| No | 210 (78.4) | 73.5-83.2 |
| **Paying attention to a balanced and adequate diet before pregnancy** | | |
| Yes | 207 (77.2) | 72.4-82.8 |
| No | 61 (22.8) | 17.2-27.6 |
| Paying attention to a balanced and adequate diet during pregnancy | | |
| Yes | 240 (89.6) | 85.6-92.9 |
| No | 28 (10.4) | 7.1-14.2 |

BMI: Body Mass Index, [a] NIH, National Institute of Health, ACOG: The classification of American Society of Obstetrics and Gynecology

**Table 3. Distribution of the Median Scores and Minimum-Maximum Values of the pregnant women's SSPW, maternal perception, body perception, TPDS and W-DEQ/ A Version, and the prevalence of distress (n=268).**

| **Variables** | **Mean±SD** | **Median (Minimum-Maximum)** |
|---|---|---|
| **SSPW** | 35.53±3.49 | 36 (25-45) |
| Maternal perception[a] | 26.01±2.48 | 27 (19-28) |
| Body perception[a] | 9.52±3.05 | 10 (5-19) |
| **TPDS** | 19.31±6.30 | 19 (6-32) |
| **W-DEQ/ A Version** | 62.78±16.28 | 66 (15-96) |
| | **Number (%)** | **95% Confidence interval** |
| **There is distress** (TPDS cut-off score of 28 and above) | 28 (10.4) | 85.8-92.9 |
| **There is no distress** (TPDS cut off score<28) | 240 (89.6) | 7.1-14.2 |

**Table 4. The Relationship Between BMI of Pregnant Women and Maternal Perception, Body Perception, Distress and Fear of Birth (n=268).**

| | | **SSPW** | **Maternal Perception** | **Body perception** | **TPDS** | **W-DEQ/ A Version** |
|---|---|---|---|---|---|---|
| **BMI** | **$r^s$** | 0.146 | 0.081 | 0.158 | 0.021 | -0.053 |
| | **p** | 0.017 | 0.188 | 0.010 | 0.737 | 0.390 |

BMI: Body Mass Index, SSPW: Self-perception Scale of Pregnant Women, [a] Sub-dimension of PWSS, TPDS: Tillburg Pregnancy Distress Scale,
W-DEQ/ A Version: Wijma Delivery Expectancy/Experience Questionnaire - A Version, $r^s$ : Spearman correlation

**Table 5. Difference Between Maternal Obesity and Maternal Perception, Body Perception, Distress and Fear of Birth in Pregnant Women (n=268).**

| | Presence of obesity according to BMI[a] | | | Test (p) |
|---|---|---|---|---|
| | Normal (18.5-24.9) | Pre- obese/Slightly overweight (25-29.9) | Obez (>30) | |
| **SSPW** | | | | |
| Mean±SD | 34.07±4.13 | 35.29±2.69 | 36.10±3.56 | K=5.866 p=0.053 |
| Median (Minimum-Maximum) | 34 (25-39) | 36 (29-41) | 36 (29-45) | |
| **Maternal perception** | | | | |
| Mean±SD | 25.53±2.78 | 25.86±2.42 | 26.23±2.41 | K=3.162 p=0.206 |
| Median (Minimum-Maximum) | 27 (20-28) | 27 (19-28) | 27 (19-28) | |
| **Body perception** | | | | |
| Mean±SD | 8.53±2.59 | 9.43±3.03 | 9.87±3.13 | K=4.768 p=0.092 |
| Median (Minimum-Maximum) | 10 (5-12) | 10 (5-19) | 10 (5-19) | |
| **TPDS** | | | | |
| Mean±SD | 21.19±7.24 | 17.44±5.92 | 19.78±6.00 | K=10.996 p=0.004 |
| Median (Minimum-Maximum) | 24 (8-31) | 17 (6-28) | 20 (7-32) | |
| **Distress,** Number (Percentage) | | | | |
| There is distress | 6 (21.4) | 7 (25) | 15 (53.6) | $X^2$=0.813 p=0.666 |
| There is no distress | 37 (15.4) | 73 (30.4) | 130 (54.2) | |
| **W-DEQ/ A Version** | | | | |
| Mean±SD | 63.07±16.76 | 61.95±21.32 | 63.15±12.64 | K=0.869 p=0.647 |
| Median (Minimum-Maximum) | 68 (18-84) | 66 (15-96) | 66 (18-87) | |

SSPW: Self-perception Scale of Pregnant Women, [a]Sub-dimensions of PWSS, TPDS: Tillburg Pregnancy Distress Scale, W-DEQ/ A Version: Wijma Delivery Expectancy/Experience Questionnaire - A Version, $r^s$ : Spearman correlation, K: Kruskal Wallis test, $X^2$: chi-square test. [a]The group that creates significance (determined by Post Hoc Tests).

## DISCUSSION

In parallel with the increase in obesity worldwide, the prevalence of maternal obesity is also increasing. In Hungary, Ireland, Portugal, Spain and the United Kingdom, more than 20% of women were reported to be obese before becoming pregnant (WHO, 2023). The increase in obesity prevalence in women of reproductive age shows that pregnant women are also in the risk group (Yanıkkerem & Mutlu 2012). In a study carried out in Turkey, the prevalence of obesity in preconception was 18.8% ( Doğan et al., 2018). In this study, which explores maternal perception, body perception, distress levels, and fear of childbirth among pregnant women with maternal obesity, the prevalence of obesity was determined to be 54.1% (Table 2). A previous study conducted by İnegöl Gümüş et al. (2010) reported that 53.1% of pregnant women were categorized as overweight, while 5.77% were identified as obese (İnegöl et al., 2010). It is thought that genetic predisposition, environmental factors and socio-economic status of pregnant women increase obesity rates. (Giouleka et al., 2023; Mahmoud et al., 2022; Syböck et al., 2023). This study's findings are consistent with those of other research in the literature.

Regular exercise is recommended for obese women from the antenatal period for their and the baby's health. In our study, while regular exercise was 13.1% before conception, it was 21.6% during pregnancy. These rates show that women's exercise status increases with pregnancy. In the study conducted by Demirel Bozkurt (2022), it is seen that 36.9% of

pregnant women exercise regularly (Demirel Bozkurt et al., 2022). In the study by Coşar Çetin et al. (2017) examining physical complaints, it is seen that 44.5% of pregnant women exercise, and 55.5% do not exercise regularly (Coşar Çetin et al., 2017). Based on these results, we can say that the exercise habits of pregnant women in Konya are insufficient. The low rate of exercise during pregnancy may result from sociocultural differences. Exercising during pregnancy is recommended because it regulates weight gain, affects the physical and mental health of pregnant women positively and facilitates compliance with pregnancy. However, before deciding to exercise, the risky pregnancy status should be questioned, and an exercise program should be created for the pregnant woman in line with the recommendations of the physician, midwife and dietitian.

When the diets of pregnant women are examined in a study, 74% of them eat three main meals, and 44.8% eat three snacks (Şeker et al., 2021). This study shows that 89.6% of pregnant women pay attention to balanced and adequate nutrition. According to the results of the study, adequate and balanced nutrition habits are high. It is thought that this situation stems from the high level of education. Healthcare professionals should organize nutrition education for women who are obese during pregnancy, and their nutritional habits should be questioned during pregnancy follow-ups. Alterations such as weight gain and skin changes that occur during pregnancy could influence the perception of the pregnancy experience (Arslan et al., 2019). The maternal perception was identified as moderate in research investigating the correlation between body perception concerning weight gain during pregnancy and the embracement of pregnancy (Küçükkaya et al., 2020). In a study examining the expectant mothers' self-perception scale, it is seen that maternal perception is high (Dönmez et. al., 2014). In a study examining the distress level and pregnancy perception of pregnant women with progressive muscle relaxation exercises, it was found that the maternal perception was high (Alan Dikmen & Şanlı 2019). In another study examining the relationship of pregnancy perception with fetal health locus of control, a high maternal perception makes them feel psychologically well[35]. Age, education level, income status, planned pregnancy, psychological and physiological changes, positive perception of one's own body, regular check-ups, baby's gender, and BMI during pregnancy are among the factors affecting maternal perception (Erdemoğlu et al., 2022, Ersanlı Kaya & Atasever 2022). In the literature, it is seen that maternal perception is high in pregnant women with high educational status (Ersanlı Kaya & Atasever, 2022). In this study, it is seen that maternal perception is high in pregnant women (Table 3), and there is no significant relationship between maternal perception and maternal obesity (Table 4). The high maternal perception score in the study is similar to the literature (Gür&Pasin 2020). This may be due to the high educational status of the pregnant women included in the study, the high rates of receiving prenatal care, and the fact that they were in the last trimester of pregnancy. In our study, maternal obesity does not affect maternal perception during pregnancy. The factors that will negatively affect the maternal perception of women at risk for maternal obesity should be evaluated starting from the preconception period. Healthcare professionals should increase the number of prenatal care follow-ups of obese pregnant women and try to detect the risks that may arise during pregnancy in the early period. Also, information, physical care and psychological support should be provided to the pregnant woman. There is no study in the literature examining maternal perception in obese pregnant women. It may be recommended to conduct different studies that affect maternal perception in obese women.

During pregnancy, weight gain often leads to decreased self-perceived attractiveness among women (Şeker et al., 2021). Concerns about regaining pre-pregnancy weight after delivery can further contribute to a decline in body image (Arslan et al., 2019). This study examined pregnant women's median body perception score of 10, indicating a moderate level (Table 3). Although a low correlation exists between pregnant women's median BMI score and body perception (Table 4), another study showed that 53% of pregnant women reported a positive body perception (Öztürk et al., 2021). Similarly, a study investigating perceived stress and self-perception in women with three or more pregnancies found a significant difference between maternal and body perceptions (Alkin & Beydağ, 2020). In contrast to our findings, a study on body perception in pregnant women did not find a statistically significant difference between BMI and body perception during pregnancy (Gür & Pasinlioğlu, 2020; Grenier et al., 2021). It is also observed that pregnant women who experience body image anxiety are dissatisfied with their bodies. (Fard et al., 2022).

Multiple factors contribute to negative body perception, including changes in body shape due to weight gain, hormonal fluctuations, reduced physical activity, feelings of inadequacy, and emotional challenges. Obese women planning a pregnancy are advised to achieve weight loss before conception, while guidelines recommend careful weight gain during pregnancy. Antenatal care should include weight gain and nutritional status evaluations, along with targeted nutrition education and support for positive eating habits. Pregnancy encompasses both physiological and psychological dimensions, with stress levels potentially increasing during this period. A study exploring the link between pregnancy perception, psychological well-being, and fetal health locus of control found that high maternal perception positively influences psychological well-being,

whereas negative body perception adversely impacts it (Ersanlı Kaya & Atasever, 2022).

This study indicated a 10% distress rate among pregnant women, with no significant relationship between BMI and distress level (Table 4). Existing literature lacks studies examining distress levels, specifically in obese pregnant women. Distress during pregnancy is recognized to affect both maternal and fetal health adversely (Denker et al., 2019; Mcleod et al., 2022; Zhao et al., 2022). Consequently, antenatal care must encompass thorough evaluations of distress. In maternal obesity pregnancies, health-related concerns may heighten anxiety levels and contribute to fear of childbirth (Arif & Anggraini, 2022). A range of factors, such as cultural disparities, trauma, lack of social support, unemployment, and economic issues, as well as previous birth experiences, contribute to fear of childbirth among pregnant women (Dal Moro et al. 2023; Kılıç & Yılmaz, 2022; Uçar & Gölbaşı, 2015). Comparatively, primiparous pregnant women often experience more intense fear of childbirth than multiparous ones (Uçar & Gölbaşı, 2015). Another study on the psychosocial health of primiparous pregnant women indicated that higher levels of psychosocial well-being corresponded with decreased fear of childbirth (Kılıç & Yılmaz, 2022). Nonetheless, this study did not find a significant relationship between maternal obesity and fear of childbirth (Table 4). This observation may be attributed to antenatal education and higher levels of education, both of which are linked to reduced childbirth-related anxiety. As such, it is recommended that fear of childbirth be assessed in obese pregnant women during the third trimester and appropriate psychosocial support provided.

## CONCLUSION

A statistically significant, positively oriented, and minor correlation emerged between the median BMI score of pregnant participants and the averaged scores of SSPW and body perception. Furthermore, a notable association surfaced between the presence of obesity and heightened levels of distress among pregnant individuals. According to these results, to reduce obesity rates in pregnant women, diet and exercise programs should be developed to ensure weight control in expectant mothers from the preconception period. If necessary, the expectant mother should be referred to a dietitian.

Obesity during pregnancy may cause stress. The presence of distress and other psychological disorders in obese pregnant women should be determined early, and if necessary, pregnant women should be referred to a psychiatrist.

Women who are pregnant or contemplating pregnancy should have their BMI calculated by midwives and nurses. They should explain the importance of adequate and balanced nutrition and prepare a suitable diet list for all pregnant women at the point of adequate and balanced nutrition. If the pregnant woman still cannot control her weight, she should be referred to a dietitian. Maternal obesity exerts a detrimental impact on the body perception of expectant mothers. Consequently, it is imperative to assess the body perception of pregnant women grappling with obesity and to offer guidance towards weight reduction.

**Limitations of Study**

The findings of our study are limited only to the sample group in which the research was conducted and cannot be generalized to the entire society. No study has been found in the literature examining the perception of motherhood, body perception, distress level and fear of birth in maternally obese women. In this respect, it is thought that this study will contribute to the literature.

**Acknowledgement**

The authors wish to express their heartfelt gratitude to all individuals who contributed to this study.

**Conflict of Interest**

The authors declare no conflict of interest.

**Author Contributions**

**Plan, design:** COT **Material, methods and data collection:** HAD, COT **Data analysis and comments:** HAD, COT **Writing and corrections:** HAD, COT

## REFERENCES

Alan Dikmen, H., & Çankaya, S., (2018). Maternal obezitenin prenatal bağlanma üzerine etkisi. *Acıbadem Universitesi Sağlık Bilim Dergisi.* (2):118-23. https://doi.org/10.31067/0.2018.1.

Alan Dikmen, H. & Şanlı, Y. (2019). Progresif kas gevşeme egzersizlerinin gebelerin distres düzeyi ve gebelik algısına etkisi. *Dokuz Eylül Hemşirelik Fakültesi Dergisi, 12*(3):186-98.

Alkin, E. D., & Beydağ, K.D., (2020). The Relationship between Perceived Stress Level and Self-Perception Level of Women Having Three or More Pregnancies. *Journal Psychiatric. Nursing, 11*(3):228-238. https://doi.org/10.14744/phd.2020.72621.

Arif, A., & Anggraini, H., (2022). Relationship of obesity, anxiety level and sleep quality in pregnant women with preeclamsia in Rsud Dr. Hm Rabain Muara Enim. *Science Midwifery. 10*(2): 829-34.

Arslan, S., Okçu, G., & Coşkun, A. M., (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

Baran, G.K., Şahin, S., Öztaş, D., (2020). Gebelerin algılanan stres düzeylerinin ve stres nedenlerinin değerlendirilmesi. *Cukurova Medical Journal, 45*(1):170-8.https://doi.org/10.17826/cumj.633534

Bülbül, T., Özen, B., Çopur, A., (2016) Gebelerin doğum korkusu ve doğum şekline karar verme durumlarinin incelenmesi. *Sağlık Bilimleri Dergisi, 25*(3):126-30. https://doi.org/10.34108/eujhs.552894

Caldwell, J., Meredith, P., Whittingham, K., et al., (2022). Associations between prenatal factors and self-reported emotional availability at 3- and 6-months postpartum. *Integrative and Complementary Medicine 7*(3).https://doi.org/1-25.10.21926/obm.icm.2203028

Coşkun, A. M., Arslan, S., & Okçu, G. (2020). Gebe kadınlarda gebelik algısının stres, demografik ve obstetrik özellikler açısından incelenmesi. *HEAD, 17*(1):1-8. https://doi.org/10.5222/HEAD.2020.001

Çapık, A., Ejder, Apay, S., & Sakar, T., (2015). Gebelerde distres düzeyinin belirlenmesi. *Anadolu Hemşirelik ve Sağlık Bilimleri Dergisi, 18*(3):196–203. https://doi.org/10.17049/ahsbd.97570

Çevik, E., & Yanikkerem, E. (2020). The factors affecting self-esteem, depression and body image of pregnant women in a state hospital in Turkey. *J. Pak. Med. Assoc.* 70: 1159–164.https://doi.org/10.5455/JPMA.19892

Dal, Moro, A. P. M., Soecki, G., de Fraga, F. S., Petterle, R. R., & Rückl, S. Z., (2023). Fear of childbirth: prevalence and associated factors in pregnant women of a maternity hospital in southern Brazil. *BMC Pregnancy and Childbirth*, *23*(1), 632. https://doi.org/10.1186/s12884-023-05948-0

Demir Yıldırım, A., & Hotun Şahin, N. (2022). Anne Ölümlerinin Önlenmesi: Uluslararası Bakım ve İzlem Modelleri. *Jinekoloji-Obstetrik ve Neonatoloji Tıp Dergisi, 19*(1):1184-191. https://doi.org/10.38136/jgon.842685.

Demirel, Bozkurt, Ö., Taner, A. & Doğan, S., (2022) Gebelerin COVID-19 pandemi sürecinde anksiyete düzeyleri, baş etme durumları ve Eekileyen Faktörler. *J Nursology, 25*(2):69-76.https://doi.org/10.5152/JANHS.2022.955740

Dencker, A., Nilsson, C., Begley, C., (2019). Causes and outcomes in studies of fear of childbirth: A systematic review. *Women Birth. 32*(2):99-111.https://doi.org/10.1016/j.wombi.2018.07.004

Doğan, R., Sayıner, F. D., & Tanır, H. M. (2018) Aile sağlığı merkezine başvuran gebelerde obezite sıklığının ve obezitenin yaşam kalitesine etkisinin incelenmesi, *Sağlık Bilimleri ve Meslekleri Dergisi, 5*(1):16-23. https://doi.org/10.17681/hsp.332707.

Dönmez, S., Yeniel, Ö. A., & Kavlak, O. (2013). Vajinal doğum ve sezaryen doğum yapan gebelerin durumluk kaygı düzeylerinin karşılaştırılması. *Gümüşhane Üniversitesi Sağlık Bilimleri Dergisi,* 3: 908-20.

Erbil, N. (2022) Relationship of self-compassion and fear of childbirth among pregnant women. *IJCS.15*(1):255.

Erdemoğlu, Ç., Ay, Ç. K., & Derya, Y. A., (2022). Gebelik Algısının Psikolojik İyi Oluş ve Fetal Sağlık Kontrol Odağı ile İlişkisi. Samsun Sağlık Bilimleri Dergisi 7(2):537-50.https://doi.org/10.47115/jshs.1102088

Ersanlı, Kaya, C., & Atasever, Z., (2022). Gebelerin kendilerini algılama durumları ve etkileyen faktörler. *Gümüşhane Üniversitesi Sağlık Bilimleri Dergisi,11*(3):956-68. https://doi.org/10.37989/gumussagbil.908030

Fard, Z. R., Azadi. A., Veisani, Y., (2022). Body image, quality of life, and their predicting factors in pregnant women: A cross-sectional study. *Kesmas: Jurnal Kesehatan Masyarakat Nasional (National Public Health Journal)*, *17*(1).https://doi.org/10.21109/kesmas.v17i1.5414

Giouleka, S., Tsakiridis, I., Koutsouki, G., Kostakis, N., Mamopoulos, A., Kalogiannidis, & I., Dagklis, T. (2023). Obesity in pregnancy: a comprehensive review of influential guidelines. *Obstetrical & Gynecological Survey*, *78*(1), 50-68. https://doi.org/10.1097/OGX.0000000000001091.

Grenier, L. N., Atkinson, S. A., Mottola, M. F., Wahoush, O., Thabane, L., Xie, F., & Murray-Davis, B., (2021). Be healthy in pregnancy: exploring factors that impact pregnant women's nutrition and exercise behaviours. *Maternal & child nutrition*, *17*(1), e13068. https://doi.org/10.1111/mcn.13068

Gür, E.Y., & Pasinlioğlu, T., (2020). Gebelerin gebelik sürecinde beden imajını algılama durumlarının belirlenmesi. *Ebelik ve Sağlık Bilimleri Dergisi, 3* (2), 71-81.

İnegöl, Gümüş, İ., Karakurt, F., & Kargili, A., (2010). Association between prepregnancy body mass index, gestational weight gain, and perinatal outcomes. *Turk J Med Sci. 40*(3): 365-70. https://doi.org/10.3906/sag-0808-35

Karabulutlu, Ö. (2012). Identifying the women`s choice of delivery methods of and the factors that affect them. *Florence Nightingale Nursing Journal, 20*(3): 210-128.

Kılıç S and Yılmaz S. (2022) The Relationship between Psychosocial Health Status Of Primiparous Pregnant Women And Fear Of Childbirth. *Turkish Journal of Family Medicine and Primary Care* *16*(2):412-21. DOI: https://doi.org/10.21763/tjfmpc.1063671

Koçak, N., Ersoy, S., & Pala, E. (2022) The Effects of pregnant obesity in newborn. *MDR 4*(2):123-7. https://doi.org/10.37990/medr.973852.

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

Kumcağız, H., Ersanlıı E. & Murat, N., (2017). Gebelerin kendilerini algılama ölçeğinin geliştirilmesi ve psikometrik özellikleri. *Psikiyatri Hemşireliği Dergisi,* *8*(1):23-31.https://doi.org/10.14744/phd.2017.12599.

Kuo, T., Au, H. K., Chen, S. R. (2022). Effects of an integrated childbirth education program to reduce fear of childbirth, anxiety, and depression, and improve dispositional mindfulness: A single-blind randomised controlled trial. *Midwifery,* 113:103438.https://doi.org/10.1016/j.midw.2022.103438

Küçükkaya, B., Altan, Sarıkaya, N., Kahyaoğlu, Süt, H., & Öz, S., (2020). Gebelikte alınan kiloya bağlı beden algısı ile gebeliğin kabulü arasındaki ilişki. *JAREN.* 6(3): 426-32.https://doi.org/10.5222/jaren.2020.15010

Langley-Evans, S. C., (2022). Early life programming of health and disease: The long-term consequences of obesity in pregnancy. *J Hum Nutr Diet.* *35*(5):816-32. https://doi.org/10.1111/jhn.13023.

Mahmoud, R., Kimonis, V., & Butler, M.G. (2022) Genetics of obesity in humans: A clinical review. *International Journal of Molecular Sciences*, *23*(19),11005. https://doi.org/10.3390/ijms231911005

McLeod, C., Ebeling, M. D., Baatz, J. E., Shary, J. R., Mulligan, J. R., & Wagner, C. L., (2022). Sociodemographic factors affecting perceived stress during pregnancy and the association with immune-mediator concentrations. *Journal of Perinatal Medicine*, *50*(2), 192-199. https://doi.org/10.1515/jpm-2021-0227.

Mossie, A., Ali, S. A. & Tesema, H. G. (2022). Anesthetic implications of morbid obesity during pregnancy; a literature based review. *International Journal of Surgery Open,* 100444.https://doi.org/10.1016/j.ijso.2022.100444

Nilsson, C., Hessman, E., & Sjöblom, H, (2018). Definitions, measurements and prevalence of fear of childbirth: a systematic review. *BMC pregnancy and childbirth,* 18:1-15.https://doi.org/10.1186/s12884-018-1659-7.

Organization WH. *European Regional Obesity Report, pps.who.int/iris/bitstream/handle/10665/353747/9789289057738-eng.pdf,* accessed date:13.02. 2023.

Organization WH. Obesity. *https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight, accessed date:*13.02.2023.

Özen, Gün, E., & Ege, E. (2022) Primipar ve multipar gebelerde doğum korkusu ve ilişkili faktörler: Karşılaştırmalı bir çalışma. *JGEHES, 4*(1):1-11. https://doi.org/10.ç511123/jgehes.202.38

Özgül, S. & Taşdemir, A., (2019). Maternal obezitenin anne ve yenidoğan sağlığına etkisi, *Adnan Menderes Üniversitesi Sağlık Bilimleri Dergisi, 3* (3):178-79.

Öztürk, Altınayak, Ö., Özkan, H., & Hür, S., (2021) Anne adaylarının kendilerini algılama durumlarının değerlendirilmesi. *Göbeklitepe Sağlık Bilimleri Dergisi. 4*(6):118-28.

Rivera, H. M., Christiansen, K. J., & Sullivan, E. L., (2015). The role of maternal obesity in the risk of neuropsychiatric disorders. *Frontiers in neuroscience*, 194.https://doi.org/10.3389/fnins.2015.00194

Syböck, K., Hartmann, B., & Kirchengast, S., (2023). Maternal prepregnancy obesity affects foetal growth, birth outcome, mode of delivery, and miscarriage rate in Austrian Women. *International Journal of Environmental Research and Public Health*, *20*(5), 4139. https://doi.org/10.3390/ijerph20054139

Şahin, S., Güler, S. D., Özdemir, K., and Ünsal, A., (2019) Gebelerde doğum ile ilgili bilgi düzeyi ve doğum korkusunun değerlendirilmesi. Bakırköy Tıp Dergisi, 15(1):5-14. https://doi.org/10.4274/BTDMJB.galenos.2017.20170603015031

Şeker, S., Canbay, F. Ç., Cesur, C., (2021). Beden algısının gebelikte kilo alımı üzerine etkisinin incelenmesi: analitik kesitsel araştırma. *İnönü Üniversitesi Sağlık Hizmetleri Meslek Yüksek Okulu Dergisi,* *9*(1):206-18. https://doi.org/10.33715/inonusaglik.812225

Şimşek, Küçükkelepçe, D., Özkan, S. A. & Yılmaz, S., (2022) Gebelikte psikolojik distres deneyimleyen primipar gebelerde, postpartum dönemde depresyon görülmesi arasındaki ilişkinin incelenmesi: Prospektif çalışma. *Journal of Social and Analytical Health* *2*(1):8-14.https://doi.org/10.5281/zenodo.6342685.

Taşdemir, D., Karaman, E., & Yıldız, A., (2015). The effect of obesity on maternal and fetal outcomes in pregnant women. A case control study. *Istanbul Kanuni Sultan Süleyman Med. J. 2* 7:73-8.

Türkiye Nüfus ve Sağlık Araştırması, *Hacettepe Üniversitesi Nüfus Etütleri Enstitüsü.* 2019. http://www.sck.gov.tr/wp content/uploads/2020/08/TNSA2018_ana_ Rapor.pdf, accessed date: 15.02.2023.

Uçar, T. & Gölbaşı, Z. (2015). Nedenleri ve sonuçlarıyla doğum korkusu. *Annals of Health Sciences Research, 4* (2):54-58.

Yanıkkerem, E., & Mutlu, S., (2012). Maternal obezitenin sonuçları ve önleme stratejileri. *TAF Prev Med Bull, 11*(3):37-43.https://doi.org/10.30934/kusbed.359281.

Zhao, H., Shi, H., Chen, C., Ren, Z., He, M., Li, X., Zhang, X., (2022). Association between pregnant specific stress and depressive symptoms in the late pregnancy of Chinese women: the moderate role of family relationship and leisure hobbies. *Journal of Public Health*, 1-12.https://doi.org/10.1007/s10389-022-01806-z

**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.1349116

# The Impact of Cognitive-Behavioral Play Therapy on Children's Anxiety Levels: A Systematic Review

Hacer ALEMDAR[1], Aysel KARACA[2], Dilek KONUK ŞENER[2], Sultanberk HALMATOV[3]

[1] Duzce University, Vocational School of Healthcare Services, Department of Medical Services and Techniques
[2] Duzce University, Faculty of Health Sciences, Department of Nursing
[3] Bilecik Sheyh Edebali University, Faculty of Humanities and Social Sciences, Department of Psychology

***Geliş Tarihi / Received:*** *24.08.2023* ***Kabul Tarihi / Accepted:*** *09.10.2023*

**ABSTRACT**

**Objective:** This study aims to systematically investigate the effect of Cognitive Behavioral Play Therapy (CBPT), a specific form of play therapy, on children's levels of anxiety. **Materials and Methods:** The research focused on studies involving CBPT published within the last decade. Various databases were searched, including Web of Science, Cochrane, PubMed, Scopus, Google Scholar, and ULAKBIM. Following the PRISMA process, eight studies that met the established criteria were included in the review. **Results:** The researchers included various study designs in this review, including randomized controlled trials (n=4), experimental study designs (n=1), quasi-experimental study designs (n=2), and one case report (n=1). Among these, in the randomized controlled trials, experimental, and quasi-experimental studies, CBPT was conducted over 8-12 sessions held once a week. **Conclusion:** This systematic review study provides valuable insights into the effectiveness of CBPT in reducing anxiety levels in children. The findings suggest that this therapeutic approach has a positive impact on children's mental health by alleviating anxiety. This contribution to the literature is expected to pave the way for further research in the field of child mental health, helping to address and understand anxiety-related issues in children more comprehensively.

**Keywords:** Cognitive Behavioral Play Therapy, Child, Anxiety.

# Bilişsel Davranışçı Oyun Terapinin Çocukların Kaygı Düzeyine Etkisi: Sistematik İnceleme

**ÖZ**

**Amaç:** Bu çalışma oyun terapi çeşitlerinden biri olan Bilişsel Davranışçı Oyun Terapi'nin (BDOT) çocukların kaygı düzeyine etkisinin sistematik olarak incelenmesini amaçlamaktadır. **Gereç ve Yöntem:** Bu çalışma sistematik derleme niteliğinde olup, araştırmanın yapılması ve raporun hazırlanmasında "Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA)" protokolü takip edilmiştir. Araştırmalara Haziran-Ağustos 2023 tarih aralığında; Web of Science, Cochrane, PubMed, Scopus, Google Scholar ve ULAKBİM veri tabanlarında İngilizce "cognitive behavioral play therapy", "child" ve "anxiety"; Türkçe "bilişsel davranışçı oyun terapi", "çocuk", "anksiyete" ve "kaygı" anahtar kelimelerle tarama yapılarak ulaşılmıştır. Tarama sonucunda tam metnine ulaşılabilen ve dahil edilme kriterlerine uyan 8 çalışma inceleme kapsamına alınmıştır. **Bulgular:** Çalışma kapsamına alınan araştırmalar; randomize kontrollü (n=4), deneysel çalışma tasarımı (n=1), yarı deneysel çalışma tasarımı (n=2) ve olgu sunumu (n=1) şeklindedir. Randomize kontrollü, deneysel ve yarı deneysel çalışmalarda deney gruplarına haftada birer kez olmak üzere 8 ila 12 oturumluk, Bilişsel Davranışçı Oyun Terapi seansı uygulanmıştır. **Sonuç:** Bu sistematik incelemede değerlendirilen araştırmaların sonucunda Bilişsel Davranışçı Oyun Terapi'nin çocukların kaygı düzeyini azaltmada etkili bir role sahip olduğu görülmüştür. Bu çalışmanın çocuk ruh sağlığı ile ilgili ileride yapılacak olan araştırmalara ışık tutması açısından literatüre önemli bir katkı sağlayacağı düşünülmektedir.

**Anahtar Kelimeler:** Bilişsel Davranışçı Oyun Terapi, Çocuk, Anksiyete, Kaygı.

***Sorumlu Yazar / Corresponding Author:*** Hacer ALEMDAR, Duzce University, Vocational School of Healthcare Services, Department of Medical Services and Techniques, Duzce, Turkey
***E-mail:*** hacercetin@duzce.edu.tr

***Bu makaleye atıf yapmak için / Cite this article:*** Alemdar, H., Karaca, A., Konuk Şener, D., & Halmatov, S. (2024). The impact of cognitive-behavioral play therapy on children's anxiety levels: A Systematic review. *BAUN Health Sci J, 13*(1), 184-191. https://doi.org/10.53424/ balikesirsbd.1349116

## INTRODUCTION

According to Article 1 of the United Nations Convention on the Rights of the Child, adopted by the United Nations General Assembly on November 20, 1989, "every human being under the age of eighteen years is considered a child" (UNICEF, 2004). The period of childhood under the age of eighteen is characterized by physical, cognitive, linguistic, and socio-emotional development, during which numerous experiences and skills are acquired (Karoğlu & Ünüvar, 2017), (Ateş & Hızlı Sayar, 2023). Throughout this process, children's mental, physical, and social competencies during critical periods lead to continuous change and development in their mental well-being, influenced by environmental factors (Yılmaz & Türkleş, 2015). Variables such as the geographical region, culture, and family structure in which a child resides play a significant role in developing their mental well-being. Nurturing a mentally healthy childhood involves identifying risk factors during this phase and taking necessary measures, which is of utmost importance for society's mental health in the future (Fidan, 2011). Child mental well-being can be defined as a state of well-being that involves the developmental ability of an individual within the age range of 0 to 18 to utilize their capabilities, cope with life's challenges, be productive and effective, and exhibit appropriate cognitive, emotional, and behavioral attributes relevant to their developmental stage. Many psychological disorders that originate during childhood persist throughout life and carry significant importance (Terzioğlu et al., 2023). Mental disorders emerging during this period can lead to increasing functional impairment in the child as time progresses, potentially resulting in enduring detrimental effects in adulthood (Aktepe et al., 2010).

In childhood, anxiety is an emotional response that is recognized as a normal part of the developmental process, characterized by tension, fear, worrisome thoughts, and alterations in social domains (Çakır & Ertem, 2021). These enduring and pervasive responses can be indicative of an anxiety disorder when avoidance behaviors become prominent (Kaya, 2021). Anxiety disorders can induce disruptions in a child's school environment, family relationships, and social functioning (Göker et al., 2015).

According to the World Mental Health Survey, anxiety disorders have been found to have the highest prevalence among all mental disorders (Auerbach et al., 2018). In line with this, anxiety disorders also hold the top position among the most commonly observed mental disorders during childhood. A meta-analysis conducted by Polanczky and colleagues in 2015 revealed a global prevalence of 13.4% for mental disorders in children and adolescents, with anxiety disorders ranking first at a rate of 6.5%, surpassing other mental disorders (Polanczyk et al., 2015). Anxiety disorders in children, such as separation anxiety, social phobia, generalized anxiety disorder, panic disorder, obsessive-compulsive disorder, and specific phobias, manifest in various forms and are predominantly observed within the age range of 6 to 17 years (Nursanaa & Citra Ady, 2020). Children with anxiety and behavioral problems are known to perceive insecure situations as more threatening compared to children without emotional and behavioral issues (Aydın, 2014). In children with anxiety disorders, somatic complaints such as excessive sweating, dizziness, abdominal pain, muscle tension, difficulty breathing, and palpitations, as well as emotional symptoms like sadness, fear, panic, restlessness, and anxiety, are observed. However, behavioral problems tend to be more prominent in these children. Avoidance is one of the behavioral manifestations of anxiety, often seen in problems related to school, health, peers, and family conflicts. Nail biting, thumb sucking, compulsions, and excessive sleeplessness are other behavioral indicators of anxiety (Karakaya & Öztop, 2013). Due to their cognitive, emotional, behavioral, and physiological effects, anxiety disorders negatively impact the family, school, and social functionality of children and, if left untreated, can exacerbate these issues further (Sevi et al., 2016).

While Cognitive Behavioral Therapy (CBT) is the most commonly used therapeutic approach for childhood anxiety disorders, the severity of symptoms, socio-economic disparities, comorbidity, mood, and other behavioral disorders, as well as demographic factors and clinical conditions, need to be taken into consideration. (Hudson, Rapee, Lyneham, McLellan, Wuthrich, & Schniering, 2015). (Sevi Tok, Arkar, & Bildik, 2016). Another treatment approach for childhood anxiety disorders is play therapy applications.

Play is an activity that occupies a significant time and space in the lives of children, contributing to their enjoyment, learning, and growth (Demirer, 2021), (Teke & Sürücü, 2020). Simultaneously, play supports a child's psychomotor, emotional, cognitive, social, personality, and linguistic development, fostering positive behaviors and habits (Koçkaya & Siyez, 2017). Through play, children reveal and confront their problems, attempting to overcome troublesome behaviors with the therapeutic power of play (Küçük et al., 2019). According to the International Association for Play Therapy, play therapy is an interpersonal process that involves using the therapeutic powers of play to facilitate optimal growth and development in clients based on preventing or resolving their psychological distress, in line with a theoretical model (Association for Play Therapy).

Various developmental theories have shaped play therapy and can be broadly categorized into Non-Directive (Unstructured) Play Therapy and Directive (Structured) Play Therapy. Among the unstructured forms of play therapy are Psychodynamic Play Therapy, Child-Centered Play Therapy, and

Experiential Play Therapy. On the other hand, Structured Play Therapy includes Filial Therapy and Cognitive Behavioral Play Therapy (Genç & Tolan, 2020). Cognitive Behavioral Play Therapy (CBPT) is a type of psychotherapy that draws on play therapy techniques to aid in the healing process of children with emotional and behavioral problems (Türe & Barut, 2020). Developed by Knell, Cognitive Behavioral Play Therapy is an extension of cognitive behavioral therapy (Knell, 2017). Grounded in the cognitive model of emotional issues, CBPT is a problem-focused, structured, and goal-oriented approach that employs Socratic questioning. It effectively utilizes homework assignments during sessions to establish a therapeutic relationship between the therapist and child, creating an active process (Söylemez & Ayas, 2023). Emphasizing the child's participation in therapy, CBPT focuses on empowerment, control, self-efficacy, and responsibility for one's behavioral change (Teke & Avşaroğlu, 2020). By incorporating cognitive behavioral techniques such as cognitive restructuring, problem-solving, systematic desensitization, role-playing, exposure, relaxation techniques, bibliotherapy, and psychoeducation, Cognitive Behavioral Play Therapy provides an effective recovery model for children with anxiety (Knell & Dasari, 2006),(Zamani, Tavallaei ve Kahdouei 2020). This study aims to systematically investigate the effect of Cognitive Behavioral Play Therapy, a specific form of play therapy, on children's levels of anxiety.

## MATERIALS AND METHODS

### Study type

This study is a systematic review, and the "Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA)" protocol was followed to conduct the research and to prepare the review report (Hür, 2021).

### Review Strategy

This study reviews the research conducted using Cognitive Behavioral Play Therapy and published in the last ten years (2014-2023). The research was conducted between June and August 2023, using the keywords "cognitive behavioral play therapy," "child," and "anxiety" in English and "bilişsel davranışçı oyun terapi," "çocuk," "anksiyete," and "kaygı" in Turkish on the Web of Science, Cochrane, PubMed, Scopus, Google Scholar, and ULAKBİM databases. The flowchart illustrating the inclusion of studies in this systematic review is presented in Table 1.

**Table 1: PRISMA flow chart of the study**

| | | |
|---|---|---|
| **Identification** | Web of Science (n=13)<br>Scopus (n=21)<br>Cochrane (n=13)<br>PubMed (n=13)<br>Scholar Google (n=88)<br>ULAKBİM (n=104) | |
| **Screening** | Records screened (n=252) | Records excluded by title, abstract, and duplication (n=237) |
| **Eligibility** | Records evaluated for eligibility (n=15) | Excluded records (n=7)<br>• Not full text (n=1)<br>• Book chapter (n=1)<br>• Not Turkısh or English (n=3)<br>• Patient population unsuitable (n=2) |
| **Included** | Topics included(n=8) | |

Following the search, eight studies that met the inclusion criteria and had full-text access were included in the review. The inclusion and exclusion criteria are outlined in Table 2. To reduce the potential risk of bias in this systematic review processes such as literature review, article selection, and evaluation were independently conducted by a second researcher.

### Ethical considerations

This study is a systematic review, and since it does not have any impact on humans, animals, or any living beings, it was not necessary to obtain ethical approval from an ethics committee.

## RESULTS

### Review Results

Following a comprehensive search in the Web of Science (n=13), Scopus (n=21), Cochrane (n=13), PubMed (n=13), Google Scholar (n=88), and ULAKBİM (n=104) databases, a total of 252 articles were initially reviewed. Among these articles, 237 were excluded due to not meeting the inclusion criteria in their title and abstract and because of duplication. The remaining 15 studies were evaluated in more detail based on the inclusion criteria, and seven were excluded from the review because they did not meet the inclusion criteria. As a result, eight studies that met the inclusion criteria and had full-text access were included in the systematic review.

**Table 2: Criteria for inclusion and exclusion in the study**

| | Inclusion Criteria | Exclusion Criteria |
|---|---|---|
| **Language** | English/Turkish | Others |
| **Year** | 2014-2023 | Others |
| **Sample type** | Children with anxiety | Others |
| **Type of design** | Experimental, quasi-experimental, randomized, controlled | Methodological studies, reviews |
| **Publication Type** | Research paper | Theses, congress papers, reports, lecture notes, presentations, book chapters |
| **Keyword** | "cognitive-behavioral play therapy", "Child" "Anxiety" | |

**Study Characteristics**

Among the eight studies included in the review, 3 were randomized controlled trials, one was a double-blinded randomized controlled trial, one was a case presentation, one was an experimental study, and two were quasi-experimental studies (Table 3). Three of these studies (Atayi et al., 2018; Mehrara et al., 2018; Mohammedinia et al., 2018) were published in 2018; one study by Zamani, Tavallaei, and Kahdouei was published in 2020; two studies (Obiweluozo et al., 2021; Hassani et al., 2021) were published in 2021; one study by Sadeghi, Mousavi, Goudarzi, and Shahsavari was published in 2022, and one study by Egbe et al. was published in 2023. The sample sizes in the eight studies in the review (excluding the case presentation) ranged from 12 to 89, with 223 participants receiving cognitive-behavioral play therapy.

Children with high levels of anxiety due to various reasons such as social phobia, learning disorders, speech disorders, attachment disorders, and medical interventions were included in the samples in the studies.

Different measurement tools were used to determine the anxiety levels of the samples. Specifically, two studies used the Spence Children's Anxiety Scale (SCAS), one used the Connor Social Phobia Inventory, two used the Liebowitz Social Anxiety Scale for Children and Adolescents, one used The Separation Anxiety Assessment Scale, one used the Preschool Anxiety Scale, and one used the Child State-Trait Anxiety Questionnaire.

The studies in the review had different numbers of sessions and intervention durations. In the intervention groups, cognitive behavioral play therapy was administered with sessions lasting between 30 minutes and 60 minutes at least once a week. The shortest intervention duration observed was eight weeks, while the longest was 12 weeks.

It was observed that the age ranges of the groups included in the studies varied between 4 and 18 years old. Details about the studies included in the review and participants can be found in Table 3.

**DISCUSSION**

This systematic review focused on studies that applied cognitive-behavioral play therapy to children with high anxiety levels for various reasons. The review included eight studies conducted between 2014 and 2023 that met the inclusion criteria. Of these studies, four were randomized controlled trials, one was an experimental study, two were quasi-experimental studies, and one was a case presentation. The samples in these studies consisted of children with high anxiety levels for different reasons.

In the study involving 30 children aged 4-6 with Reactive Attachment Disorder, anxiety scores were measured using the Spence Children's Anxiety Scale (SCAS). Through randomization, 15 children were assigned to the experimental group and 15 to the control group. Fifteen children in the experimental group received Cognitive Behavioral Play Therapy (CBPT), which consisted of 10 sessions, each lasting 40 minutes. After the CBPT intervention, a decrease in anxiety scores was observed (Zamani et al., 2020).

In the study involving 178 children aged 6-12 with Stuttering Disorder, anxiety levels were measured using the Liebowitz Social Anxiety Scale for Children and Adolescents before and after the intervention. Through randomization, 89 children were allocated to the experimental group and 89 to the control group. In the experimental group, children received Cognitive Behavioral Play Therapy (CBPT), which consists of 12 sessions, each lasting one hour per week. After the CBPT intervention, a decrease in anxiety scores was observed (Obiweluozo et al., 2021).

Similarly, in the study involving 122 individuals aged 11-18 with Speech Disorder, anxiety was assessed using the Severity Measure. Generalized Anxiety Disorder - Child Age 11-17 and the Liebowitz Social.Anxiety Scale for Children and Adolescents. Through randomization, 61 of these individuals received Cognitive Behavioral Play Therapy (CBPT) consisting of 12 sessions, each lasting one hour per week. After the CBPT intervention, a decrease was observed in anxiety scores (Egbe et al., 2023).

**Table 3: Characteristics of the studies included in the research.**

| | Characteristics of Included Studies | | | | | | |
|---|---|---|---|---|---|---|---|
| | **Writers and year** | **Research Design** | **Age** | **Application time** | **Participants** | **Evaluation Tools** | **Results** |
| 1 | Zamani et al. 2020 | Experimental study with pretest-posttest control group | 4-6 years | 40 minutes a week, Ten sessions CBPT-Group | 15 experiments 15 controls | Spence Children's Anxiety Scale (SCAS) | Anxiety score dropped |
| 2 | Atayi et al. 2018 | A quasi-experimental study with pretest-posttest control group | 12-13 years | 1 hour per week, Eight sessions CBPT-Group | 12 experiments 12 controls | Connor Social Phobia Inventory | |
| 3 | Obiweluozo et al. 2020 | Randomized controlled study | 6-9 years 10-12 years | 1 hour per week, 12 sessions CBPT-Group | 89 experiments 89 controls | Liebowitz Social Anxiety Scale for Children and Adolescents | |
| 4 | Egbe et al. 2022 | Randomized controlled study | 11-18 years | 1 hour per week, 12 sessions CBPT-Group | 61 experiments 61 controls | Severity Measure for Generalized Anxiety Disorder for Children Aged 11–17<br><br>Liebowitz Social Anxiety Scale for Children and Adolescents | |
| 5 | Hassani et al. 2021 | Case report | Seven years | Two days a week, Eight sessions CBPT | One case | Preschool Anxiety Scale | |
| 6 | Mehrara et al. 2018 | Randomized controlled study | 9-12 years | 1 hour per week, Eight sessions CBPT-Group | 15 experiments 15 controls | Child State-trait Anxiety Questionnaire | |
| 7 | Sadeghi et al. 2022 | A quasi-experimental study with the pretest-posttest control group | 9-10 years | 30 minutes a week, Eight sessions CBPT-Group | 15 experiments 15 controls | The Separation Anxiety Assessment Scale | |
| 8 | Mohammadinia et al. 2018 | Double-blind randomized controlled | 8-10 years | One day per week, Ten sessions CBPT-Group | 15 experiments 15 controls | Spence Children's Anxiety Scale | |

According to the semi-experimental study with a pre-test and post-test control group design that examined the effect of cognitive-behavioral play therapy on separation anxiety, the anxiety levels of children were measured using The Separation Anxiety Assessment Scale. In the experimental group of children aged 9-10, Cognitive Behavioral Play Therapy (CBPT) was applied for a total of 8 sessions, each lasting 30 minutes, once a week. It was observed that CBPT reduced anxiety levels as measured by the same scale (Sadeghi et al., 2022).

Similarly, in the semi-experimental study with a pre-test post-test control group design that aimed to determine the effect of CBPT on self-esteem and social anxiety, the Connor Social Phobia Inventory was administered to children aged 12-13 to identify those with high anxiety scores. From the group of 24 children identified, 12 were selected as the experimental group, and they received CBPT for a total of 8 sessions, once a week, each lasting one hour. It was observed that anxiety scores decreased in this group (Atayi et al., 2018).

In the randomized controlled study that examined the impact of CBPT on anxiety and academic achievement in children with learning disabilities, 15 children with high anxiety levels based on the Spence Children's Anxiety Scale (SCAS) were assigned to the experimental group. They received CBPT for a total of 10 sessions once a week. It was observed that anxiety scores decreased in this group (Mohammedinia et al., 2018). When the literature is reviewed, it can be seen that CBPT applied to children with learning disabilities positively affects sustained attention (Azizi et al., 2020).

Cognitive-behavioral play therapy has been observed to have a reducing effect on aggression in children with attention deficit hyperactivity disorder (Akbari & Rahmati, 2015). Similarly, in one of the studies included in this review, which was a case presentation, a 7-year-old child with attention deficit hyperactivity disorder received individual cognitive-behavioral play therapy sessions lasting 45 minutes twice a week. It was reported that the child's anxiety decreased following the therapy (Hassani et al., 2021).

Various factors such as hospitalization, the course of illness, medical procedures, and the unpredictability of the illness can increase anxiety levels in pediatric patients. In the randomized controlled study conducted in Isfahan in 2018, 30 children with leukemia were divided into 15 experimental and 15 control groups through randomization. After applying CBPT for eight sessions, 1 hour per week, it was reported that the anxiety levels, measured using the

Child State-Trait Anxiety Scale, decreased in the intervention group compared to before the intervention (Mehrara et al., 2018). Similarly, there are studies in the literature indicating that CBPT can reduce preoperative anxiety (Rajeswari et al., 2019). According to the findings of the reviewed studies, cognitive behavioral play therapy (CBPT) appears to be effective in reducing anxiety arising from various reasons, such as social anxiety, separation anxiety, speech disorders, learning disorders, and the process of illness. The strengths of these studies include their randomized controlled and experimental designs and the measurement of anxiety scores before and after the interventions in all studies. It is evident that planning CBPT sessions as individual or group sessions with a minimum of eight sessions, each lasting at least 30-45 minutes, can enhance the effectiveness of the intervention. In light of these findings, it can be stated that CBPT is an appropriate and effective method for clinical use in children with anxiety disorders.

**Limitations and strengths of the study**

Including only studies conducted in the last decade in this systematic review and excluding languages other than Turkish and English are limitations of the study, while its strength is that it includes randomized controlled and experimental studies.

## CONCLUSION

In childhood, anxiety significantly impairs a child's quality of life and can lead to problems in school, family, and peer relationships. Early intervention and treatment of anxiety disorders in childhood are believed to prevent the development of psychiatric disorders in the future. While the evidence obtained from this systematic review suggests that cognitive behavioral play therapy plays an influential role in reducing children's anxiety levels, it is observed that studies in this area are limited given the fact that only eight studies could be included in the review, covering the last ten years of literature. Larger sample sizes and more comprehensive studies are needed. This study is expected to make a significant contribution to the literature by shedding light on future research on child mental health and anxiety disorders in children.

**Acknowledgment**

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

**Conflict of Interest**

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

**Author Contributions**

**Plan, design:** HA, AK, DK, SH; **Material, methods and data collection:** HA, AK; **Data analysis and comments:** HA, AK, DK, SH; **Writing and corrections:** HA, AK, DK, SH.

## REFERENCES

Akbari, B., & Rahmati, F. (2015). The Efficacy of Cognitive Behavioral Play Therapy on the Reduction of Aggression in Preschool Children with Attention-Deficit/Hiperactivity Disorder. *Journal of Child Ment Health, 2*(2), 93-100.

Aktepe, E., Demirci, K., Çalışkan, A., & Sönmez, Y. (2010). Çocuk ve ergen psikiyatrisi polikliniğine başvuran hastalarda belirti ve tanı dağılımları. *Düşünen Adam Psikiyatri ve Nörolojik Bilimler Dergisi, 23*(2), 100-108.

Association for Play Therapy (2023). Play therapy definition. https://www.a4pt.org/page/ClarifyingUseofPT. 09.08.2023 tarihinde ulaşılmıştır.

Atayi, M., Razini, H. H., & Hatami, M. (2018). Effect of cognitive behavioral play therapy in the self-esteem and social anxiety of students. *Journal of Research & Health, 8*(3), 278-285.

Ateş, B., & Hızlı Sayar, F. (2023). Çocukluk dönemi duygusal yaşantısı ve duygusal zekâ kavramı. *Üsküdar Üniversitesi Sosyal Bilimler Dergisi,* (16), 229-250. http://doi.org/10.32739/uskudarsbd.9.16.127

Auerbach, R., Mortier, P., & Bruffaerts, R. (2018). The WHO World Mental Health Surveys International College Student Project: Prevalence and Distribution of Mental Disorders. *J Abnorm Psychol, 127*(7), 623–638.

Aydın, A. (2014). Kaygı bozukluğu olan çocuklar için bilişsel davranışçı terapide anne babaların tedaviye katılımı. *Türk Psikiyatri Dergisi , 25*(3), 181-89.

Azizi, A., Drikvand, F. M., & Sepahvandi, M. A. (2020). Effect of cognitive - behavioral play therapy on working memory, short-term memory and sustained attention among school-aged children with specific learning disorder: a preliminary randomized controlled clinical tria. *Current Psychology, 39*, 2306–2313. https://doi.org/10.1007/s12144-018-9914-7

Çakır, Ö., & Ertem , M. (2021). Yaygın anksiyete bozukluğu tanılı çocuk/ ergenlerin annelerinin ebeveyn tutumu ile duygu düzenleme durumları arasındaki ilişkinin incelenmesi. *Tepecik Eğit. ve Araşt. Hast. Dergisi, 31*(1), 16-25. https://doi:10.5222/terh.2021.17363

Demirer, E. (2021). Çocuk merkezli oyun terapisinin çocuktaki kaygı düzeyine etkisinin

incelenmesi. *Academic Platform Journal of Education and Change, 4*(1), 91–110.

Egbe, C. I., Ugwuanyi, L. T., Ede, M. O., Agbigwe, I. B., Onuorah, A. R., Okon, O. E., & Ugwu, J. C. (2023). Cognitive behavioural play therapy for social anxiety disorders (SADS) in children with speech impairments. *Journal of Rational-Emotive & Cognitive-Behavior Therapy*, *41*(1), 24-44.

Fidan, T. Y. (2011). Bir Çocuk-ergen ruh sağlığı ve Hastalıkları Polikliniğine başvuran çocuk ve ergenlerin ruhsal belirtileri ve risk faktörlerinin değerlendirilmesi. *Konuralp Tıp Dergisi, 3*(1), 1-8.

Genç, M., & Çakmak Tolan, Ö. (2021). Okul öncesi dönemde sık görülen psikolojik ve gelişimsel bozukluklarda oyun terapisi uygulamaları. *Psikiyatride Güncel Yaklaşımlar, 13*(2), 207-231. https://doi:10.18863/pgy.757366

Göker, Z., Güney, E., Dinç, G., Hekim, Ö., & Üneri, Ö. Ş. (2015). Çocuk ve ergenlerde anksiyete ile ilişkili bozuklukların klinik ve demografik özellikleri: Bir yıllık kesitsel bir örneklem. *Klinik Psikiyatri, 18*, 7-14.

Hassani, Z., Hosseinpour, F., Mirshoja, M. S., & Boozhabadi, A. (2021). Effectiveness of cognitive-behavioral play therapy on improving anxiety and aggression disorders in a child with ADHD: A Case Study. *Case Reports in Clinical Practice, 6*(3), 116–119.

Hudson, J., Rapee, R., Lyneham, H., McLellan, L., Wuthrich, V., & Schniering, C. (2015). Comparing outcomes for children with different anxiety disorders following cognitive behavioural therapy. *Behaviour Research and Therapy, pp. 72*, 30–37. https://doi.org/10.1016/j.brat.2015.06.007

Hür, G. (2021). PRISMA kontrol listesi 2020 güncellemesi. *Online Turkish Journal of Health Sciences, 6*(4), 603–605. https://doi.org/10.26453/otjhs.1001606

Karakaya, E., & Öztop, D. (2013). Kaygı bozukluğu olan çocuk ve ergenlerde bilişsel davranışçı terapi. *Bilişsel Davranışçı Psikoterapi ve Araştırmalar Dergisi, 2*, 10-24.

Karoğlu, H., & Ünüvar, P. (2017). Okul öncesi dönem çocuklarinin gelişim özellikleri ve sosyal beceri düzeyleri. *Mehmet Akif Ersoy Üniversitesi Eğitim Fakültesi Dergisi*(43), 231-254. https://doi.org/10.21764/efd.12383

Kaya, M. M. (2021). Ayrılma kaygısı bozukluğu üzerine bir inceleme. *Sosyal Bilimler Akademi Dergisi, 4*(2), 209-220.

Knell, S. M. (2017). Bilişsel davranışçı oyun Terapisi. C. E. Schaefer içinde, *Foundations of Play Therapy* (s. 313-329). Ankara: Nobel Akademik Yayıncılık.

Knell, S.M., & Dasari, M. (2006). Cognitive-behavioral play therapy for children with anxiety and phobias içinde H. G. Kaduson (Ed.) & C. E. Schaefer, *Short-term play therapy for children* (pp. 22–50). The Guilford Press.

Koçkaya, S., & Siyez, D. M. (2017). Okul Öncesi Çocuklarının Çekingenlik Davranışları Üzerine Oyun Terapisi Uygulamalarının Etkisi. *Psikiyatride Güncel Yaklaşımlar-Current Approaches in Psychiatry , 9*(1), 31-44. https://doi:10.18863/pgy.281082

Küçük Şahin, İ., & Tortop, H. S. (2019). Gelişimsel oyun terapisinin okul öncesi dönemde kullanımı. *Üstün Zekâlılar Eğitimi ve Yaratıcılık Dergisi, 6*(2), 65-73.

Mehrara, M., Ghaffari, Z., Ghezelghabr, R. M., Ghavasi, F., & Fatemizadeh, M. (2018). The effectiveness of cognitive behavioral play therapy on pain tolarance and trait-state anxiety among children with Leukemia Cancer in Isfahan city. *International Journal of Applied Behavioral Sciences, 5*(2), 22-27.

Mohammedinia, N., Fatemi, F. S., Nasiri, M., & Pirnia, B. (2018). The effectiveness of cognitive-behavioral play therapy on anxiety and academic achievement among children with LD. *International Journal of Applied Behavioral Sciences, 5*(1), 41–48.

Nursanaa, W., & Citra Ady, I. (2020). Play therapy for children with anxiety disorders. *Atlantis Press SARL, 395*, 81-86. https:// doi:10.2991/assehr.k.200120.018

Obiweluozo, P. E., Onyemaechi, M., Onwurah, C. N., Uzodinma, U. E., Dike, I. C., & Ejiofor, J. N. (2021). Impact of cognitive behavioural play therapy on social anxiety among school children with stuttering deficit. *Clinical Trial/Experimental Study, 100*(19), 1-11. http://dx.doi.org/10.1097/MD.0000000000024350

Polanczyk, G., Salum, G., Sugaya, L., Caye, A., & Rohde, L. (2015). Annual research review: A meta-analysis of theworldwide prevalence of mental disorders in childrenand adolescents. *Journal of Child Psychology and Psychiatry, 56*(3), 345-365. https://doi.org/10.1111/jcpp.12381

Rajeswari, S. R., Changrasekhar, R., Vinay, C., Uloopi, K., RojaRamya, K. S., & Ramesh, M. V. (2019). Effectiveness of cognitive behavioral play therapy and audiovisual distraction for management of preoperative anxiety in children. *International Journal of Clinical Pediatric Dentistry, 12*(5), 419–422. https://doi:10.5005/jp-journals-10005-1661

Sadeghi, F., Mousavi, S., Goudarzi, A., & Shahsavari, M. R. (2022). The effect of cognitive-behavioral play therapy on emotion

regulation and separation anxiety: A quasi-experimental study in elementary-school children in Isfahan. *Caspian J Pediatrs, 8*(2), 737-745.

Sevi Tok, E. S., Arkar, H., & Bildik, T. (2016). Çocukluk çağı kaygı bozukluklarında bilişsel davranışçı terapi, ilaç tedavisi ve kombine tedavinin etkililiğinin karşılaştırılması. *Türk Psikiyatri Dergisi, 27*(2), 110-118. https://doi:10.5080/u13697

Söylemez, A., & Ayas, T. (2023). The effect of cognitive behavioral play therapy-based psychoeducation program on the level of Violent content digital game addiction and aggressiveness. *Sakarya University Journal of Education, 13*(1), 68-83. https://doi.org/10.19126/suje.1196533

Teke, E., & Avşaroğlu, S. (2020). Çocuklarda oyunun ve oyun terapisinin terapötik kullanımı ve iyileştirici etkileri: Kavramsal bir analiz. *Social Mentality And Researcher Thinkers Journal, 6*(32), 1078-1087. http://dx.doi.org/10.31576/smryj.553

Teke, E., & Sürücü, A. (2020). Oyun terapisiyle bütünleştirilmiş grupla psikolojik danışmanın ilkokul öğrencilerinin sosyal kaygı düzeylerine etkisi. *Manas Sosyal Araştırmalar Dergisi, 9*(2), 695-708. https://doi.org/10.33206/mjss.566539

Terzioğlu, Ö., Çelikay Söyler, H., & Menekşe, Ö. (2023). Çocukluk çağı travmalarının, yalnızlık duygusu ve sosyal anksiyete ile ilişkisi. *Sosyal, Beşerî ve İdari Bilimler Dergisi, 6*(2), 60-182. https://doi.org/10.26677/TR1010.2023.1177

Türe, E., & Barut, Y. (2020). Türkiye'de yapılan Oyun terapisi çalışmalarının incelenmesi. *Life Skills Journal of Psychology, 4*(8), 127-138. https://doi.org/10.31461/ybpd.837024

*UNICEF*. (2004). 09.08. 2023 tarihinde http://www.unicefturk.org/public/uploads/files/UNICEF _CocukHaklarinaDairSozlesme.pdf adresinden alındı.

Yılmaz, M., & Türkleş, S. (2015). Çocuk-ergen ruh sağlığı ve psikiyatri hemşireliği uygulamaları kapsamında Türkiye'de yapılmış çalışmaların hemşirelik müdahalelerine etkisi: Sistematik bir derleme. *Türkiye Klinikleri, 1*(2), 107-114.

Zamani, N., Tavallaei, M., & Kahdouei, S. (2020). Cognitive-behavioral play therapy in children with reactive attachment disorder: help reduce anxiety, impulsivity, bullying, and antisocial behaviors. *Journal of Advanced Pharmacy Education & Research, 10*(4), 115-122.

**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.1139258

# Dolaşım Sistemi Hastalarında Algılanan Sağlık Statüsü ve Belirleyicileri

Birol YETİM[1], Özgür UĞURLUOĞLU [2]

[1] Muş Alparslan Üniversitesi, Sağlık Bilimleri Fakültesi, Sağlık Yönetimi Bölümü
[2] Hacettepe Üniversitesi, İktisadi ve İdari Bilimler Fakültesi, Sağlık Yönetimi Bölümü

***Geliş Tarihi / Received:*** *01.07.2022,* ***Kabul Tarihi / Accepted:*** *21.11.2023*

**ÖZ**

**Amaç:** Sağlığın tanımı ve ölçümü noktasında halen bir uygulama birliği bulunmamasına rağmen birey ve toplum sağlığının ölçümü, mevcut durumun tespiti ve iyileştirilebilmesi için son derece önemlidir. Literatürde farklı türden hastalığı olan bireyler üzerinde bu tür araştırmaların yapıldığını görmek mümkündür. Söz konusu hastalıkların başında ise dolaşım sistemi hastalıkları gelmektedir. Ancak Türkiye'de yapılan çalışmalar incelendiğinde söz konusu çalışmaların sayıca az olduğu söylenebilir. Bu çalışmada Türkiye'de dolaşım sistemi hastalığı olan bireylerin algılanan sağlık statülerinin ortaya konulması ve söz konusu durumu etkileyen faktörlerin tespit edilmesi amaçlanmıştır. **Gereç ve Yöntem:** Bu amaçla Türkiye İstatistik Kurumu tarafından 2019 yılında yayımlanan Türkiye Sağlık Araştırması veri seti kullanılmıştır. Veriler, SPSS 23 programı ile analiz edilmiş ve çalışmanın amacına ulaşabilmek için tanımlayıcı istatistiklerden, fark testlerinden ve regresyon analizinden faydalanılmıştır. **Bulgular:** Çalışma sonucunda; dolaşım sistemi hastalarının sağlık statülerinin hastaların bireysel ve demografik özelliklerinden, eşlik eden farklı bir hastalığa sahip olma durumu ve sağlık hizmetine erişim düzeylerinden etkilendiği tespit edilmiştir ($p<0,05$). Kadın, orta yaş ve üzerinde yer alan, eğitim almamış, herhangi bir işte çalışmayan ve düşük bir gelir düzeyine sahip olan dolaşım sistemi hastalarının algılanan sağlık statüleri daha düşüktür. **Sonuç:** Sonuç olarak; bu çalışma kapsamında elde edilen bilgilerin sağlık sektörü paydaşları ile politika yapıcıları için kanıta dayalı bilgiler sunacağı düşünülmektedir.

**Anahtar Kelimeler:** Sağlık Statüsü, Dolaşım Sistemi Hastalıkları, Kesitsel Araştırma.

# Perceived Health Status in Circulation System Patients and It's Determinants

**ABSTRACT**

**Objective:** There isn't consensus on the definition and measurement of health. The measurement health, however, is crucial for investigating and improving the current situation. It's possible to see studies conducted on patients suffering from different diseases. Circulatory system diseases are among them. When the studies are investigated, it's seen the number of the studies is rare. Thus, it's aimed to reveal the health status of patients suffering circulatory system disease and living in Turkey. It's aspired to determine the factors which affect the health status. **Materials and Methods:** The Turkey Health Study published by the Turkish Statistical Institute in 2019 was used. The data were analyzed with the SPSS 23. Descriptive statistics, difference tests and regression analysis were employed. **Results:** The health status was affected by individual and demographic characteristics, the presence of a different comorbid disease, and the level of use of health services ($p<0.05$). The health status of women, those who are above middle age, those who don't have education, those who don't work in any job, and those having a lower income level, are lower in circulatory system patients. **Conclusion:** It's thought the information obtained within this study will provide evidence-based information for stakeholders and policy-makers.

**Keywords:** Health Status, Circulatory System Diseases, Cross Sectional Study.

***Sorumlu Yazar / Corresponding Author:*** Birol YETİM, Muş Alparslan Üniversitesi, Sağlık Bilimleri Fakültesi, Sağlık Yönetimi Bölümü, Sağlık Yönetimi Bölümü, Muş, Türkiye
***E-mail:*** birolyetim@hacettepe.edu.tr

***Bu makaleye atıf yapmak için / Cite this article:*** Yetim, B., & Uğurluoğlu, Ö. (2024). Perceived health status in circulation system patients and ıt's determinants. *BAUN Health Sci J, 13*(1), 192-201. https://doi.org/10.53424/balikesirsbd.1139258

## GİRİŞ

Sağlık, insanlık tarihi kadar eski ve bir o kadar da tartışmalı konulardan biridir (Shepherd ve Patzelt, 2015). Literatür incelendiğinde, sağlık ile ilgili çok sayıda tanım (Viner ve Macfarlane, 2005) ve araştırmanın (Pishvaei ve ark., 2013; World Health Organization [WHO], 2000) yapıldığını görmek mümkündür. Bu noktada sağlık, kimi yazarlara göre *herhangi bir hastalığın ya da sakatlığın olmaması* olarak tanımlanırken kimi yazarlar tarafından ise *öznel iyilik hali* olarak ele alınmaktadır (Hassett vd., 2009; Kumar ve Kapoor, 2008). Dünya Sağlık Örgütü (DSÖ) ise 1948 yılında yayımladığı raporunda; sağlığı, *sadece hastalık ve sakatlığın olmayışı değil aynı zamanda ruhen, bedenen ve toplumsal olarak tam bir iyilik hali* olarak tanımlamıştır (WHO, 1948). Bu açıdan ele alındığında, söz konusu kavramın içerik ve kapsamı konusunda genel kabul görmüş bir tanımın olmadığını söylemek mümkündür. Bu durumun nedeni, sağlığın doğası gereği insan yaşamını oluşturan farklı türden çok sayıda alanı etkilemesidir. Bu, söz konusu kavramın ölçümünde farklı türden ölçüm yöntem ve araçlarının da gelişmesine neden olmuştur. Literatür incelendiğinde, farklı türden çok sayıda teknik ve ölçüm aracının bir arada ya da ayrı ayrı kullanıldığı çok sayıda çalışma (Hunt ve ark., 1985; Rabin ve Charro, 2001; Wilson ve ark., 2022) görmek mümkündür.

Literatürde sağlık kavramının içerik ve kapsamı ile çok sayıda tanım bulunmaktadır. Ancak bu tanımların yanı sıra birey ve toplum sağlığının takibi, mevcut durumun ortaya konulabilmesi ve iyileştirilebilmesi için oldukça önemlidir. Literatür incelendiğinde farklı hastalıklara sahip bireyler üzerinde bu tip çalışmaların sıklıkla yapıldığını görmek mümkündür. Örneğin; O'leary ve arkadaşları, 2002 yılında yaptıkları bir çalışmada bronşektazi (bronchiectasis) hastalarında psikolojik iyilik hali ile sağlık düzeyleri arasındaki ilişkiyi ele almışlardır. Yazarlar çalışmalarında daha fazla nefes darlığı yaşayan hastaların genel sağlık statüleri ile iyilik hallerinin çok daha düşük olduğunu tespit etmişlerdir (O'leary ve ark., 2002). Dobrozsi ve arkadaşları ise pediatrik kanser tedavisi alan hastalar üzerinde yaptıkları bir çalışmada, hastaların önemli bir bölümünün ciddi fiziksel ağrılar yaşadıklarını ve bu durumun genel sağlık statülerini olumsuz etkilediğini ortaya koymuşlardır (Dobrozsi ve ark., 2017). Sibilitz ve arkadaşları ise kalp kapakçığı ameliyatı olmuş bireylerin düşük bir sağlık statüsü düzeyine sahip olduklarını bulmuşlardır (Sibilitz ve ark., 2015). Benzer şekilde farklı kronik hastalıklar üzerinde farklı türden sağlık statüsü ölçüm araç ve teknikleri kullanılarak yapılan çok sayıda çalışma da bulunmaktadır (Habib ve Aslam, 2003; Inge ve ark., 2016; Nittayananta ve ark., 2010; Novella ve ark., 2006; Salbach ve ark., 2006). Ancak bu çalışmaların önemli bir kısmı, başta dolaşım sistemi hastalıkları olmak üzere farklı türden kronik hastalıklar üzerinde yapılmıştır. Bu durumun temel nedeninin, söz konusu hastalıkların sağlık statüsü üzerindeki yıkıcı etkilerinden ve insan yaşamının farklı yönlerini farklı şekillerde etkileyebilmelerinden kaynaklandığı düşünülmektedir. Ayrıca başlıca ölüm nedenleri ile ilgili istatistikler de incelendiğinde; dolaşım sistemi hastalıklarının birçok ülkede en ölümcül hastalıklar arasında ilk sıralarda yer aldığı görülmektedir (Organisation for Economic Co-operation and Development [OECD], 2022). Türkiye özelinde de benzer bir durum söz konusudur. Türkiye İstatistik Kurumu (TÜİK) tarafından 2018 yılında yayımlanan ölüm nedeni ile ilgili istatistiklerde dolaşım sistemi hastalıklarının Türkiye'deki ölümlerin yaklaşık %38'inden sorumlu olduğu ifade edilmektedir (TÜİK, 2022). Ancak literatür incelendiğinde Türkiye'de dolaşım sistemi hastalarının genel sağlık statüsünü ortaya koyan az sayıda çalışma olduğu görülmektedir (Demir ve Özer, 2020; Soyuer ve ark., 2006). Bu çalışmalar, daha çok spesifik bir dolaşım sistemi hastalığı üzerinedir. Ayrıca bu çalışmalarda dolaşım sistemi hastalarının genel sağlık statüsü düzeylerini etkileyen faktörlere ilişkin yeterli bulguya ulaşılamamıştır. Bu nedenle, bu çalışmada Türkiye'de yaşayan ve en az bir dolaşım sistemi hastalığı olan bireylerin genel sağlık statülerinin belirlenmesi amaçlanmaktadır. Bu çalışmada ayrıca söz konusu dolaşım sistemi hastalarının sağlık statülerini etkileyen faktörlerin de belirlenmesi amaçlanmaktadır.

## GEREÇ VE YÖNTEM

### Araştırmanın tipi

Bu çalışma, kesitsel nitelikte bir araştırma makalesidir ve bu çalışmanın temel amacı, Türkiye'de dolaşım sistemi hastalarının sağlık statülerini tespit etmek ve bireysel ve demografik değişkenlere göre söz konusu hastaların genel sağlık statülerinde bir farklılık olup olmadığını ortaya koymaktır. Bu çalışmada ayrıca, dolaşım sistemi hastalarının sağlık hizmetlerine erişim düzeylerinin sağlık statüleri üzerinde bir etkisinin olup olmadığının da ortaya konulması amaçlanmaktadır. Bu açıdan ele alındığında, bu çalışma kapsamında aşağıdaki araştırma sorularına yanıt aranmaktadır:

**Araştırma sorusu 1:** Türkiye'de yaşayan dolaşım sistemi hastalarının genel sağlık statüsü düzeyi nasıldır?

**Araştırma sorusu 2:** Türkiye'de yaşayan dolaşım sistemi hastalarının genel sağlık statüsü hastaların bireysel ve demografik özelliklerine *(cinsiyet, yaş, medeni durum, eğitim durumu, çalışma durumu, gelir düzeyi, sosyal güvencesinin olup olmama durumu)* göre farklılık göstermekte midir?

**Araştırma sorusu 3:** Türkiye'de yaşayan dolaşım sistemi hastalarının genel sağlık statüsü sağlık hizmetlerine erişim düzeylerine *(ödeme güçlüğü nedeniyle tıbbı bakım hizmetlerini alamama,*

*randevularda gecikme yaşama, ulaşım nedeniyle sağlık hizmeti almada gecikme yaşama, ödeme güçlüğü nedeniyle ilaç alamama)* göre farklılık göstermekte midir?

**Araştırma sorusu 4:** Türkiye'de yaşayan dolaşım sistemi hastalarının genel sağlık statüsü, dolaşım sistemi hastalıkları dışında eşlik eden bulaşıcı ve bulaşıcı olmayan hastalıkların varlığı ve sayısına göre farklılık göstermekte midir?

**Araştırma sorusu 5:** Türkiye'de yaşayan dolaşım sistemi hastalarının genel sağlık statüsünü etkileyen faktörler nelerdir?

**Araştırmanın verileri, evren ve örneklemi**

Çalışmanın amaçlarına ulaşabilmek ve yukarıda yer alan araştırma sorularına cevap verebilmek için TÜİK tarafından 2019 yılında yayımlanan Türkiye Sağlık Araştırması (TSA) veri seti kullanılmıştır. TSA-2019 veri setinde 23199 katılımcı bulunmaktadır. Ancak söz konusu katılımcıların önemli bir kısmı 17 yaş ve altında yer alan bireylerden oluşmaktadır. Bu nedenle, 18 yaş altında yer alan 6946 kişi çalışma kapsamı dışında tutulmuştur. Ayrıca bu çalışma, soru formunda yer alan ve yaşanan kronik rahatsızlıkları sorgulayan *"Son 12 ay içerisinde ... yaşadınız mı?"* sorularından dolaşım sistemi hastalıkları *(koroner kalp hastalığı, enfarktüs, inme/felç ve hipertansiyon)* ile ilgili olanlardan en az birine *"evet"* cevabını veren bireyler üzerinde yürütülmüştür. Dolayısıyla bu çalışmanın örneklemini, ilgili sorulardan en az birine evet cevabını veren ve 18 yaş ve üzerinde yer alan 3892 (%16.77) birey oluşturmaktadır.

**İstatistiksel analiz ve değişkenler**

Çalışmanın amaçlarına ulaşabilmek için tanımlayıcı istatistiklerden, fark testlerinden (iki ortalama arasındaki farkın önemlilik testi [t-testi], tek yönlü varyans analizi [ANOVA]) ve regresyon analizinden faydalanılmış ve analizlerin tamamı, Statistical Package for the Social Sciences (SPSS) 23 programı üzerinden yapılmıştır. Ancak analizler gerçekleştirilmeden önce veri setinde yer alan bazı değişkenler bu çalışmanın amacı doğrultusunda yeniden kodlanmıştır. Bu noktada; yaş değişkeni *18-34, 35-54* ve *55 yaş ve üzeri* olacak şekilde üç sınıfta toplanmıştır. Dul ve boşanmış bireyler, bekar bireyler ile aynı sınıfta olacak şekilde yeniden kodlanmıştır. Eğitim değişkeni *eğitim almamış*, *ilköğretim*, *lise* ile *ön lisans ve üstü mezunu* olacak şekilde dört kategoride bir araya getirilmiştir. Gelir düzeyi değişkeni beşli kategorik bir değişken haline getirilmiştir. Son olarak da genel sağlık statüsü değişkeni 5'li kategoriden (çok kötü, kötü, orta, iyi, çok iyi) 3'lü kategoriye (kötü, orta, iyi) dönüştürülmüş ve yorum kolaylığı sağlamak amacıyla ters kodlanmıştır. Oluşturulan yeni sağlık statüsü değişkeninde "1" kötü sağlık durumu ve "3" ise iyi sağlık durumunu ifade etmektedir.

**Araştırmanın etik yönü**

Verilerin kullanımı ile ilgili yasal süreçler yürütülmüş ve 12.11.2021 tarih ve 6918 başvuru numaralı talep yazısı ile TÜİK'ten gerekli izinler alınmıştır. Ayrıca bu çalışmada kullanılan veri seti, ikincil verilerden oluştuğu ve katılımcılara ilişkin herhangi bir kişisel bilgiye yer vermediği için etik kurul iznine gerek duyulmamıştır.

## BULGULAR

Çalışma kapsamına alınan dolaşım sistemi hastaları ile ilgili tanımlayıcı istatistikler Tablo 1'de verilmiştir. İlgili tablo incelendiğinde; dolaşım sistemi hastalığı olan bireylerin önemli bir bölümünü kadınların oluşturduğu görülmektedir. Zira çalışma kapsamında dikkate alınan 3892 dolaşım sistemi hastasının %63.2'si kadın, %36.8'i erkektir. Ayrıca bu hastaların önemli bir kısmı 55 yaş ve üzerinde (%65.6) yer almaktadır. Bu açıdan ele alındığında; Türkiye'de dolaşım sistemi hastalıklarının daha çok orta yaş ve üzerinde yer alan bireylerde yaygınlık gösterdiği söylenebilir. 16-34 yaş aralığında yer alan hastalar, çalışma örnekleminin %5.2'sini oluştururken bu oran 35-54 yaş aralığı için %29.2'dir. Ayrıca çalışma kapsamında dikkate alınan hastaların önemli bir bölümü ilköğretim mezunudur (%53.8). Bu oran eğitim düzeyinin artması ile azalmaktadır ancak Türkiye'de yaşayan dolaşım sistemi hastalarının yaklaşık dörtte biri (%27.9) resmi olarak herhangi bir eğitim almamıştır.Katılımcıların medeni durumları incelendiğinde dörtte üçe yakın bir kısmının (%74) evli olduğu ve kalan kısmının bekar, dul ve boşanmış bireylerden oluştuğu görülmektedir. Söz konusu dolaşım sistemi hastalarının sadece %18.1'lik bir kısmı hali hazırda düzenli bir işte çalışmaktadır. Zira örneklem kapsamında yer alan hastaların %22.8'inin hane halkı gelir düzeyi 1669 TL'nin altında yer almaktadır ve bu oran da gelir düzeyinde artışla beraber kayda değer bir azalış göstermektedir. Bu açıdan ele alındığında, 5053 TL ve üzerinde aylık hane halkı geliri olan hastalar, çalışma kapsamında yer alan dolaşım sistemi hastalarının %13.4'ünü oluşturmaktadır. Ayrıca hastaların %4'ünün herhangi bir sosyal güvencesi bulunmamaktadır.Çalışma kapsamına alınan 3892 dolaşım sistemi hastasının algılanan sağlık statüsü düzeyleri incelendiğinde, %30.4'ünün sağlık statülerinin kötü olduğu görülmektedir. Sağlık statüsünün iyi olduğunu ifade eden hastaların oranı sadece %20.3'tür. Eşlik eden bulaşıcı ve bulaşıcı olmayan hastalıklarının sayısına bakıldığında ise hastaların %12.4'ünde sadece dolaşım sistemi hastalığı olduğu görülmektedir. Dolaşım sistemi hastalığı ile birlikte en az bir farklı hastalığı daha olan bireylerin oranı ise %87.6'dır. Çalışma örneklemini oluşturan hastaların %12.7'si ise son 12 ay içerisinde ihtiyaç duyduğu halde ödeme güçlüğü nedeniyle sağlık hizmetini alamadığını dile getirirken %8.4'ü ise aynı sebepten ötürü reçete edilen ilaçlarını temin edemediklerini ifade etmişlerdir. Randevu süresinin uzun olması nedeniyle sağlık hizmeti almada gecikme yaşayanların oranı %27.0'dir. Ayrıca dolaşım sistemi hastalarının %15.3'ü de uzaklık ve/veya ulaşım problemi nedeniyle ihtiyaç

duydukları sağlık hizmetlerini almada gecikme yaşadıklarını bildirmişlerdir. Çalışma kapsamında yer alan dolaşım sistemi hastalarının sağlık statülerinin bireysel ve demografik özelliklerine göre farklılık gösterip göstermediğine ilişkin t-testi ve ANOVA analizi ile ilgili sonuçlar, Tablo 2'de verilmiştir. Tablo 2 incelendiğinde; sosyal güvence sahibi olma durumu dışında ($t=0.201$; $p>0.05$) çalışma kapsamında dikkate alınan tüm bireysel ve demografik değişkenler açısından hastaların genel sağlık statülerinin istatistiksel olarak anlamlı bir farklılık gösterdiği görülmektedir ($p<0.05$). Bu açıdan ele alındığında; erkek hastaların kadınlara ve 18-34 yaş aralığında yer alan bireylerin 35 yaş ve üzerindeki bireylere göre algılanan sağlık statüleri daha yüksektir. Öte yandan en düşük sağlık statüsüne sahip bireyler, hiçbir eğitim almamış bireylerdir.

**Tablo 1. Katılımcılara ilişkin tanımlayıcı istatistikler.**

| **Değişkenler** | | **n** | **%** |
|---|---|---|---|
| **Cinsiyet** | Erkek | 1434 | 36.8 |
| | Kadın | 2458 | 63.2 |
| **Yaş** | 18-34 | 204 | 5.2 |
| | 35-54 | 1136 | 29.2 |
| | 55 yaş ve üstü | 2552 | 65.6 |
| **Eğitim durumu** | Eğitim almamış | 1085 | 27.9 |
| | İlköğretim | 2094 | 53.8 |
| | Lise | 385 | 9.9 |
| | Ön lisans ve üstü | 328 | 8.4 |
| **Medeni durum** | Bekar | 1012 | 26.0 |
| | Evli | 2880 | 74.0 |
| **Çalışma durumu** | Çalışıyor | 704 | 18.1 |
| | Çalışmıyor | 3188 | 81.9 |
| **Gelir düzeyi** | 0-1668 TL | 887 | 22.8 |
| | 1669-2424 TL | 996 | 25.6 |
| | 2425-3398 TL | 668 | 17.2 |
| | 3399-5052 TL | 820 | 21.1 |
| | 5053 TL ve üstü | 521 | 13.4 |
| **Sosyal güvence** | Var | 3737 | 96.0 |
| | Yok | 155 | 4.0 |
| **Sağlık statüsü** | Kötü | 1185 | 30.4 |
| | Orta | 1917 | 49.3 |
| | İyi | 790 | 20.3 |
| **Eşlik eden hastalık** | Sadece Dol. Sis. Hast. | 481 | 12.4 |
| | Dol. Sis. Hast. + 1 | 660 | 17.0 |
| | Dol. Sis. Hast. + 2 | 699 | 18.0 |
| | Dol. Sis. Hast. + 3 | 593 | 15.2 |
| | Dol. Sis. Hast. + 4 | 475 | 12.2 |
| | Dol. Sis. Hast. + 5 ve üzeri | 984 | 25.3 |
| **Tıbbı bakıma erişim** | Sorun yaşayan | 494 | 12.7 |
| | Sorun yaşamayan | 3311 | 85.1 |
| **İlaca erişim** | Sorun yaşayan | 324 | 8.4 |
| | Sorun yaşamayan | 3865 | 91.6 |
| **Randevu** | Sorun yaşayan | 1047 | 27.0 |
| | Sorun yaşamayan | 2825 | 73.0 |
| **Ulaşım** | Sorun yaşayan | 592 | 15.3 |
| | Sorun yaşamayan | 3280 | 84.7 |

Benzer bir durum gelir düzeyi için de geçerlidir. Özellikle geliri 1668 TL ve altında yer alan bireylerin genel sağlık statüsün diğerlerine kıyasla oldukça çok daha düşük olduğu görülmektedir.

**Tablo 2. Dolaşım sistemi hastalarında algılanan sağlık statüsünün hastaların bireysel ve demografik özelliklerine göre farklılaşıp farklılaşmadığına yönelik fark testi sonuçları.**

| Değişkenler | | x̄ | σ | Post-Hoc* | t/F | p |
|---|---|---|---|---|---|---|
| **Cinsiyet** | Erkek | 1.994 | 0.714 | - | 6.468 | **<0.001** |
| | Kadın | 1.843 | 0.694 | | | |
| **Yaş** | 18-34 (1) | 2.230 | 0.674 | 1 > 2, 3<br>2 > 3 | 63.271 | **<0.001** |
| | 35-54 (2) | 2.031 | 0.686 | | | |
| | 55 yaş ve üstü (3) | 1.813 | 0.699 | | | |
| **Eğitim Durumu** | Eğitim almamış (1) | 1.618 | 0.661 | 1 < 2, 3, 4<br>2 < 3, 4<br>3 < 4 | 117.348 | **<0.001** |
| | İlköğretim (2) | 1.937 | 0.680 | | | |
| | Lise (3) | 2.174 | 0.706 | | | |
| | Ön lisans ve üstü (4) | 2.259 | 0.657 | | | |
| **Medeni Durum** | Bekar | 1.788 | 0.690 | - | -5.910 | **<0.001** |
| | Evli | 1.938 | 0.706 | | | |
| **Çalışma Durumu** | Çalışıyor | 2.186 | 0.660 | - | 12.629 | **<0.001** |
| | Çalışmıyor | 1.835 | 0.699 | | | |
| **Gelir Düzeyi** | 0-1668 TL (1) | 1.665 | 0.666 | 1 < 2, 3, 4, 5<br>2 < 3, 4, 5<br>3 < 4, 5 | 45.993 | **<0.001** |
| | 1669-2424 TL (2) | 1.865 | 0.695 | | | |
| | 2425-3398 TL (3) | 1.954 | 0.707 | | | |
| | 3399-5052 TL (4) | 2.000 | 0.694 | | | |
| | 5053 TL ve üstü (5) | 2.129 | 0.688 | | | |
| **Sosyal Güvence** | Var | 1.898 | 0.704 | - | 0.201 | 0.841 |
| | Yok | 1.910 | 0.724 | | | |

x̄: Ortalama; σ: Standart sapma, *: Scheffe testlerine göre farklılık gösteren gruplar.

Tablo 3'te dolaşım sistemi hastalarının sahip oldukları eşlik eden hastalık sayıları ile sağlık hizmetlerine erişimde yaşadıkları problemlere göre genel sağlık statüsü düzeylerinin farklılık gösterip göstermediğine ilişkin fark testlerinin sonuçlarına yer verilmiştir.

Tablo 3 incelendiğinde; dolaşım sistemi hastalığının yanı sıra bulaşıcı ya da bulaşıcı olmayan herhangi bir hastalığı olmayan bireylerin genel sağlık statüsü diğerlerine kıyasla çok daha yüksek olduğu görülmektedir. Bu açıdan ele alındığında, en düşük sağlık statüsü düzeyine sahip olan hastaların dolaşım sistemi hastalıklarının yanı sıra 5 ve/veya daha fazla hastalığa sahip olan bireyler olduğu söylenebilir. Bu fark, istatistiksel olarak anlamlıdır ($p<0.05$).

**Tablo 3. Dolaşım sistemi hastalarında algılanan sağlık statüsünün hastaların sağlık hizmeti kullanımlarına ve eşlik eden hastalıklara sahip olma durumlarına yönelik fark testi sonuçları.**

| Değişkenler | | x̄ | σ | Post-Hoc* | t/F | p |
|---|---|---|---|---|---|---|
| **Eşlik eden Hastalık** | Sadece Dol. Sis. Hast. (1) | 2.333 | 0.663 | 1 > 2, 3, 4, 5, 6<br>2 > 3, 4, 5, 6<br>3 > 4, 5, 6<br>4 > 5, 6<br>5 > 6 | 121.798 | **<0.001** |
| | Dol. Sis. Hast. +1 (2) | 2.136 | 0.690 | | | |
| | Dol. Sis. Hast. +2 (3) | 1.970 | 0.690 | | | |
| | Dol. Sis. Hast. +3 (4) | 1.870 | 0.643 | | | |
| | Dol. Sis. Hast. +4 (5) | 1.798 | 0.663 | | | |
| | Dol. Sis. Hast. +5 ve üzeri (6) | 1.542 | 0.607 | | | |
| **Tıbbı bakıma erişim** | Sorun yaşayan | 1.646 | 0.687 | - | 8.560 | **<0.001** |
| | Sorun yaşamayan | 1.930 | 0.699 | | | |
| **İlaca erişim** | Sorun yaşayan | 1.691 | 0.711 | - | 5.427 | **<0.001** |
| | Sorun yaşamayan | 1.915 | 0.702 | | | |
| **Randevu** | Sorun yaşayan | 1.877 | 0.687 | - | 1.001 | 0.317 |
| | Sorun yaşamayan | 1.902 | 0.711 | | | |
| **Ulaşım** | Sorun yaşayan | 1.709 | 0.681 | - | 7.202 | **<0.001** |
| | Sorun yaşamayan | 1.930 | 0.703 | | | |

x̄: ortalama; σ: standart sapma, *: Scheffe testlerine göre farklılık gösteren gruplar

Öte yandan ödeme güçlüğü nedeni ile ihtiyaç duydukları sağlık hizmetlerini ve reçete edilmiş ilaçları alamayan hastaların genel sağlık statülerinin daha düşük olduğu tespit edilmiştir. Bu fark da istatistiksel olarak anlamlıdır ($p<0.05$). Benzer bir durum ulaşım ya da uzaklık nedeniyle sağlık hizmetlerine erişimde gecikme yaşayan bireyler için de geçerlidir. Söz konusu hastaların ulaşım problemi yaşamayan dolaşım sistemi hastaları ile kıyaslandığında algılanan sağlık statülerinde ciddi bir düşüş görülmektedir. Bu açıdan ele alındığında ilgili farkın istatistiksel olarak anlamlı olduğu söylenebilir ($t=7.202$; $p<0.05$). Ancak bireylerin randevu sürelerinde yaşanan sorunlar nedeniyle sağlık hizmetlerinde gecikme yaşama durumları açısından sağlık statüleri düzeyleri arasında istatistiksel olarak anlamlı bir fark bulunamamıştır ($p>0.05$).

**Tablo 4. Dolaşım sistemi hastalarında algılanan sağlık statüsünü etkileyen faktörlerin tespitine yönelik regresyon analizi sonuçları.**

| **Değişkenler** | | **β** | **t** | **p** |
|---|---|---|---|---|
| **Cinsiyet** | Erkek | Ref | | |
| | Kadın | 0.060 | 3.596 | **<0.001** |
| **Yaş** | 18-34 | Ref | | |
| | 35-54 | -0.072 | -2.256 | **<0.050** |
| | 55 yaş ve üstü | -0.107 | -3.280 | **<0.001** |
| **Eğitim durumu** | Eğitim almamış | Ref | | |
| | İlköğretim | 0.152 | 8.248 | **<0.001** |
| | Lise | 0.141 | 8.066 | **<0.001** |
| | Ön lisans ve üstü | 0.148 | 8.140 | **<0.001** |
| **Medeni durum** | Bekar | Ref | | |
| | Evli | 0.012 | 0.785 | 0.432 |
| **Çalışma durumu** | Çalışıyor | 0.075 | 4.468 | **<0.001** |
| | Çalışmıyor | Ref | | |
| **Gelir düzeyi** | 0-1668 TL | Ref | | |
| | 1669-2424 TL | 0.044 | 2.323 | **<0.050** |
| | 2425-3398 TL | 0.062 | 3.382 | **<0.001** |
| | 3399-5052 TL | 0.065 | 3.388 | **<0.001** |
| | 5053 TL ve üstü | 0.072 | 3.798 | **<0.001** |
| **Eşlik eden hastalık** | Sadece Dol. Sis. Hast. | 0.307 | 17.730 | **<0.001** |
| | Dol. Sis. Hast. + 1 | 0.252 | 14.233 | **<0.001** |
| | Dol. Sis. Hast. + 2 | 0.193 | 10.993 | **<0.001** |
| | Dol. Sis. Hast. + 3 | 0.134 | 7.832 | **<0.001** |
| | Dol. Sis. Hast. + 4 | 0.096 | 5.811 | **<0.001** |
| | Dol. Sis. Hast. + 5 ve üzeri | | | |
| **Tıbbı bakıma erişim** | Sorun yaşayan | -0.057 | -2.966 | **<0.001** |
| | Sorun yaşamayan | Ref | | |
| **İlaca erişim** | Sorun yaşayan | 0.005 | 0.246 | 0.806 |
| | Sorun yaşamayan | Ref | | |
| **Ulaşım** | Sorun yaşayan | -0.037 | -2.348 | **<0.050** |
| | Sorun yaşamayan | Ref | | |
| **Model istatistikleri** | R | 0.456 | | |
| | $R^2$ | 0.208 | | |
| | Uyarlanmış $R^2$ | 0.203 | | |
| | Durbin-Watson | 1.733 | | |
| | F | 49.438 | | |
| | p | **<0.001** | | |

**β:** Standardize edilmiş beta değeri.

Tablo 4'te dolaşım sistemi hastalığına sahip olan hastaların algılanan sağlık statülerini etkileyen faktörleri tespit edebilmek için yapılan çoklu regresyon analizi sonuçlarına yer verilmiştir. Ancak fark testlerinde sağlık statüsü açısından karşılaştırılan gruplar arasında anlamlı bir farklılığın tespit edilmediği *sosyal güvence sahibi olma* ile *randevulardaki süre nedeniyle sağlık hizmetlerine erişimde gecikme yaşama* değişkenleri regresyon analizine dahil edilmemiştir. Yapılan regresyon

analizine ilişkin model istatistikleri incelendiğinde; söz konusu regresyon analizinin istatistiksel olarak anlamlı ($p<0.05$) olduğu ve regresyon kapsamında dikkate alınan bağımsız değişkenlerin dolaşım sistemi hastalarının genel sağlık statüsündeki toplam varyansın yaklaşık %20'sini açıkladığı görülmektedir. Ayrıca söz konusu modelde bir otokorelasyon sorunu da bulunmamaktadır (Durbin-Watson Değeri= 1.733). Regresyon analizi sonuçları incelendiğinde; dolaşım sistemi hastalarının algılanan sağlık statülerinin bireysel ve demografik değişkenlerden, eşlik eden hastalığa sahip olma ve sağlık hizmetlerine erişimde problem yaşama durumlarından etkilendiği görülmektedir ($p<0.05$). Dikkate alınan değişkenler içerisinden sadece medeni durum ve ödeme güçlüğü nedeni ile ilaç alamama durumunun dolaşım sistemi hastalarının genel sağlık statüleri üzerinde istatistiksel olarak anlamlı bir etkisi tespit edilememiştir ($p>0.05$). Bu açıdan ele alındığında; yaş, eğitim düzeyi, çalışma durumu ve gelir düzeyi genel sağlık statüsünün önemli bireysel ve demografik belirleyicileri arasında yer almaktadır. Zira; bireylerin yaşları arttıkça genel sağlık statülerinde ciddi bir azalma meydana gelirken eğitim durumları ve gelir düzeyleri arttıkça bir artış olduğu görülmektedir. Ayrıca çalışan bireylerin genel sağlık statüsü de çalışmayanlara kıyasla çok daha yüksektir. Eşlik eden hastalık durumu ve sayısı da dolaşım sistemi hastalarında algılanan sağlık statüsünü olumsuz etkileyen faktörlerin başında gelmektedir. Özellikle dolaşım sistemi hastalığı dışında başka bir hastalığa sahip olmayan bireylerin sağlık statüsü düzeyi olanlara kıyasla çok daha yüksektir ve dolaşım sistemi hastalığının yanı sıra var olan bulaşıcı ve bulaşıcı olmayan hastalık sayısında bir artış meydana geldikçe çalışma kapsamında dikkate alınan hastaların genel sağlık statülerinde de azalma meydana gelmektedir. Bu etki de istatistiksel olarak anlamlıdır ($p<0.05$). Çalışma kapsamındaki dolaşım sistemi hastalarının sağlık hizmetlerine erişimde zorluk yaşama durumlarının genel sağlık statüleri üzerindeki etkileri incelendiğinde, ödeme güçlüğü nedeniyle ihtiyaç duyulan sağlık hizmetlerini alamama ile ulaşım ve uzaklık nedeniyle sağlık hizmetlerine erişimde gecikme yaşama durumlarının bireylerin sağlık statüleri üzerinde negatif bir etkisinin olduğu görülmektedir ve bu etkinin de istatistiksel olarak anlamlı olduğu söylenebilir ($p<0.05$).

## TARTIŞMA

Literatür incelendiğinde sağlığın insanlık tarihi kadar eski bir kavram olduğu görülmektedir (Aguayo-Rico vd., 2005). Buna rağmen söz konusu kavramın içerik ve kapsamının halen tam olarak anlaşılamadığını söylemek mümkündür. Bu durumun nedeni, sağlığın insan yaşamını oluşturan çok sayıda alanı farklı yönlerde etkilemesidir. Nitekim ilgili literatürde de sağlığın ölçümü ile ilgili farklı türden çok sayıda araç ve yöntemin kullanıldığı görülmektedir (Rabin ve Charro, 2001; Wilson vd., 2022). Bu açıdan ele alındığında sağlığın doğasını daha iyi anlamaya ve onu daha doğru bir şekilde ölçmeye yönelik yeni araştırmaların da yapılması kaçınılmazdır. Ancak söz konusu kavramın nasıl tanımlanması ve/veya nasıl ölçülmesi gerektiğinden bağımsız olarak da mevcut durumun tespit edilebilmesi ve birey ve toplum sağlığında sağlanabilecek olası iyileştirmelerin elde edilebilmesi için sağlığın sürekli temelde izlenmesi önem arz etmektedir. Bu noktada kronik hastalıklar ön plana çıkmaktadır. Zira kronik hastalıkların birey ve toplum sağlığı üzerindeki olası etkileri çok daha fazladır (Han ve ark., 2022; Pei-Shan ve ark., 2020) ve bu tür hastalığı olan bireylerin sağlık statülerinin ölçümü, bireysel ve toplumsal sağlığa ve genel yaşam kalitesine katkı sağlayacaktır.

Literatür incelendiğinde başta kronik hastalıklar olmak üzere farklı türden hastalıklara sahip bireylerin sağlık statülerini ortaya koymaya yönelik çok sayıda çalışma (Boume ve McGrowder, 2009; Habib ve Aslam, 2003; Inge ve ark., 2016; Nittayananta ve ark., 2010; Novella ve ark., 2006; Salbach ve ark., 2006; Yoo ve ark., 2011) yapıldığını görmek mümkündür. Bu hastalıkların önemli bir kısmını kalp ve damar hastalıkları başta olmak üzere bazı dolaşım sistemi hastalıkları oluşturmaktadır. Bu durumun dolaşım sistemi hastalıklarının toplumun önemli bir kısmını etkilemesinden ve birçok toplumda başlıca ölüm nedenleri arasında (OECD, 2022) yer almasından kaynaklandığı düşünülmektedir. Türkiye için de benzer bir durum söz konusudur. Türkiye'deki ölümlerin üçte biri dolaşım sistemi hastalıklarından kaynaklanmaktadır (TÜİK, 2022). Bu nedenle Türkiye'de yaşayan dolaşım sistemi hastalarının genel sağlık statülerinin ortaya konulmasının oldukça önemli olduğu düşünülmektedir. Nitekim ilgili literatür incelendiğinde de Türkiye'de söz konusu hastalıklar üzerinde yapılan çalışmaların sayıca az olduğu görülmektedir (Demir ve Özer, 2020; Soyuer ve ark., 2006). Bu nedenle bu çalışmada, TÜİK tarafından 2019 yılında yayımlanan TSA veri seti kullanılarak Türkiye'de yaşayan ve en az bir dolaşım sistemi hastalığı olan bireylerin sağlık düzeylerini incelemek ve sağlık statülerini etkileyen faktörleri tespit etmek amaçlanmıştır. Çalışma sonucunda TSA veri setinde yer alan bireylerin yaklaşık beşte birinde (%16.77) dolaşım sistemi hastalığı olduğu ve söz konusu hastaların önemli bir bölümünün (%87.6) de bulaşıcı ve/veya bulaşıcı olmayan başka bir hastalığa daha sahip olduğu tespit edilmiştir. Çalışmada ayrıca dolaşım sistemi hastalarının kayda değer bir kısmının da sağlık hizmetlerine erişim noktasında bazı sorunlar yaşadığı bulgulanmıştır. Bu açıdan ele alındığında çalışma kapsamında yer alan dolaşım sistemi hastalarının %12.7'si son bir yıl içerisinde ödeme güçlüğü nedeniyle ihtiyaç duydukları sağlık hizmetlerini alamadıklarını bildirmişlerdir. Yine söz konusu dolaşım sistemi hastalarının %27'si randevularda yaşanan gecikmeler nedeniyle sağlık hizmetlerini zamanında alamadıklarını ifade

etmişlerdir. Çalışma kapsamında ayrıca Türkiye'de yaşayan dolaşım sistemi hastalarının ortalamanın üzerinde bir (1.89) sağlık statüsüne sahip oldukları ve sağlık statülerinin demografik özelliklerine göre farklılıklar gösterdiği tespit edilmiştir. Bu bakımdan ele alındığında; kadın, 55 yaş ve üzerinde yer alan, eğitim almamış ya da ilköğretim mezunu olan, bekar, düzenli bir işte çalışmayan ve daha düşük bir gelir seviyesine sahip olan dolaşım sistemi hastalarında algılanan sağlık statüsü düzeyi diğerlerine kıyasla daha düşüktür. Bu farklılıklar ise istatistiksel olarak anlamlıdır ($p<0.05$). Ayrıca kurulan regresyon modelinde de medeni durum değişkeni dışında kalan diğer bireysel ve demografik değişkenlerin tamamının da dolaşım sistemi hastalarının sağlık statülerini etkilediği tespit edilmiştir ($p<0.05$). Uluslararası literatür incelendiğinde de sağlık statüsü ile ilgili değişkenler arasında benzer bulguların elde edildiği çok sayıda çalışma (Golinowska ve Sowa, 2006; Sowa ve ark., 2015) görmek mümkündür.

Bu çalışma kapsamında elde edilen bulgulardan biri de eşlik eden hastalık sayısı arttıkça dolaşım sistemi hastalarının sağlık statüsünün önemli ölçüde azaldığıdır. Zira en düşük sağlık düzeyine sahip olan hastaların en az beş farklı hastalığı daha bulunmaktadır. Ayrıca sağlık hizmetlerine erişimde problem yaşanması da çalışma kapsamında dikkate alınan dolaşım sistemi hastalarının genel sağlık statüsünü azaltan faktörlerin başında gelmektedir. Bu açıdan ele alındığın ilgili literatürde de sağlık hizmetine erişim ile sağlık statüsü arasında negatif bir ilişki ortaya koyan çalışmalar da bulunmaktadır (Headen ve Headen, 1985). Bu nedenle ülke genelinde sağlık hizmetlerine erişimin artırılması noktasında uygulama ve kararların hayata geçirilmesi ve randevu, ulaşım gibi yapısal sorunların ortadan kaldırılması önerilmektedir.

## SONUÇ

Dolaşım sistemi hastalıkları başta olmak üzere hasta ve sağlıklı bireylerin algılanan sağlık statüsü düzeylerinin ortaya konulması, söz konusu bireylerin mevcut sağlık durumunun korunması, geliştirilmesi ve iyileştirilmesi açısından önem taşımaktadır. Zira; bu çalışmada, dolaşım sistemi hastalığı olan bireylerin genel sağlık statülerinin bireysel ve demografik faktörlere ile sağlık sistemine ilişkin farklı türden unsurlara göre farklılık gösterdiği tespit edilmiştir. Bu açıdan ele alındığında; Türkiye'de yaşayan dolaşım sistemi hastalarının sağlık statülerinin iyileştirilebilmesi için ilk olarak ülke genelinde sağlık hizmetlerine erişimi artırabilecek uygulama ve kararların hayata geçirilmesi ve randevu, ulaşım gibi sağlık sistemi ile ilgili yapısal sorunların ortadan kaldırılması gerekmektedir. Ayrıca yaşlılığın getirdiği fiziki kısıtlılıkların hastaların ihtiyaç duydukları sağlık hizmetlerine erişimleri hususunda oluşturduğu engellerin de ortadan kaldırılabileceği yapısal değişimler yapılabilir. Bu noktada; evde bakım hizmetleri ile söz konusu bireylerin temel sağlık ihtiyaçları karşılanabilir. Ayrıca 65 yaş üstü bireylerin zamanında ve etkin sağlık hizmeti alabilmesini sağlayabilmek adına randevu sisteminin daha etkili kullanımı sağlanabilir. Ayrıca gelir düzeyi düşük olan bireylerin de daha fazla finanse edildiği bir yapı ile düşük gelir düzeyine sahip olan ve/veya çalışmayan dolaşım sistemi hastalarının sağlık hizmeti kullanım düzeyleri ile sağlık statülerinde bir iyileşme elde edilebilir. Bu noktada eğitim hizmetleri oldukça önemlidir. Bireylerin ve toplumun eğitim düzeyinin artırılması gelir ve çalışma durumu kaynaklı birçok problemin ortadan kalkmasına katkı sağlayabilir.

**Çıkar Çatışması**

Bu çalışmada herhangi bir çıkar çatışması bulunmamaktadır.

**Yazar Katkıları**

**Plan, tasarım:** BY, ÖO; **Gereç, Yöntem ve Veri Toplama:** BY, ÖO; **Veri Analizi ve Yorumlama:** BY, ÖO; **Yazım ve Eleştirel Değerlendirme:** BY, ÖO.

## KAYNAKLAR

Aguayo-Rico, A., Guerra-Turrubiates, I. A., Montes, R., & Estudios, T. (2005). Empirical evidence of the impact of health on economic growth. halshs-00678713, version 1-16 Mar 2012 Arora, S., 2001., Health, Human Productivity, and Long-Term Economic Growth, The Journal of Economic History, Retrivied March, 15, 2022, from https://blogs.elon.edu/ipe/files/2021/02/v14-aguayorico-final.pdf.

Boume, P. A., & McGrowder, D. A. (2009). Health status of patients with self-reported chronic diseases in Jamaica. *North American Journal of Medical Sciences*, *1*(7), 356. https://doi.org/10.4297/najms.2009.7356.

Demir, Ş., & Özer, Z. (2020). Predictors of health status of patients with advanced heart failure. *Turk J Cardiovasc Nurs*, *11*(24), 23-30. https://doi.org/10.5543/khd.2020.24483.

Dobrozsi, S., Yan, K., Hoffmann, R., & Panepinto, J. (2017). Patient-reported health status during pediatric cancer treatment. *Pediatric Blood & Cancer*, *64*(4), e26295. https://doi.org/10.1002/pbc.26295.

Golinowska, S., & Sowa, A. (2006). Health and Morbidity in the Accession Countries Country Report–Poland. ENEPRI Reseach Reports No. 29, 6 December 2006. http://dx.doi.org/10.2139/ssrn.2013215.

Habib, S. S., & Aslam, M. (2003). Risk factors, knowledge and health status in diabetic patients. *Saudi medical journal*, *24*(11), 1219-1224. Retrieved March, 15, 2022, from https://www.researchgate.net/profile/Syed-Habib-4/publication/8982706_Risk_factors_knowledge_and_health_status_in_diabetic_patients/links/004635264db5c9a040000000/Risk-factors-knowledge-and-health-status-in-diabetic-patients.pdf.

Han, T. C., Lin, H. S., & Chen, C. M. (2022). Association between Chronic Disease Self-Management, Health Status, and Quality of Life in Older Taiwanese Adults with Chronic Illnesses. In *Healthcare* (Vol. 10, No. 4, p. 609). MDPI. https://www.mdpi.com/2227-9032/10/4/609#.

Hassett, A. L., Maclean, R., Peterson, C., Stuart, M. R., Buyske, S., Park, N., Savage, S. V., Li, T., & Seligman, M. E. (2009). The observational evaluation of subjective well-being in patients with rheumatoid arthritis. *Applied Psychology: Health and Well-Being*, *1*(1), 46-61. https://doi.org/10.1111/j.17580854.2008.01002.x .

Headen Jr, A. E., & Headen, S. W. (1985). General health conditions and medical insurance issues concerning Black women. *The Review of Black Political Economy*, *14*(2-3), 183-197. https://doi.org/10.1007%2FBF02689886.

Hunt, S. M., McEwen, J., & McKenna, S. P. (1985). Measuring health status: a new tool for clinicians and epidemiologists. *The Journal of the Royal College of General Practitioners*, *35*(273), 185-188. Retrieved March, 15, 2022, from https://www.researchgate.net/publication/19171725_Measuring_health_status_a_new_tool_for_clinicians_and_epidemiologists

Inge, T. H., Courcoulas, A. P., Jenkins, T. M., Michalsky, M. P., Helmrath, M. A., Brandt, M. L., Harmon, C. M., Zeller, M. H., Chen, M. K., & Xanthakos, S. A. (2016). Weight loss and health status 3 years after bariatric surgery in adolescents. *New England Journal of Medicine*, *374*(2), 113-123. https://doi.org/10.1056/nejmoa1506699.

Kumar, R. K., & Kapoor, K. (2008). Health Profile of Parhaiya. *Bio-social Issues in Health*, 463.

Nittayananta, W., Talungchit, S., Jaruratanasirikul, S., Silpapojakul, K., Chayakul, P., Nilmanat, A., & Pruphetkaew, N. (2010). Effects of long-term use of HAART on oral health status of HIV-infected subjects. *Journal of Oral Pathology & Medicine*, *39*(5), 397-406. https://doi.org/10.1111/j.1600-0714.2009.00875.x.

Novella, J., Boyer, F., Jochum, C., Jovenin, N., Morrone, I., Jolly, D., Bakchine, S., & Blanchard, F. (2006). Health status in patients with Alzheimer's disease: an investigation of inter-rater agreement. *Quality of Life Research*, *15*(5), 811-819. https://doi.org/10.1007/s11136-005-5434-7.

OECD. (2022). *Ölüm Nedenleri*. https://stats.oecd.org/index.aspx?queryid=30115, Retrieved March, 15, 2022.

O'leary, C., Wilson, C., Hansell, D., Cole, P., Wilson, R., & Jones, P. (2002). Relationship between psychological well-being and lung health status in patients with bronchiectasis. *Respiratory Medicine*, *96*(9), 686-692. https://doi.org/10.1053/rmed.2002.1330.

Pei-Shan, L. I., Hsieh, C. J., & Nae-Fang, M. I. A. O. (2020). A study of physical activity, frailty, and health-related quality of life among community-dwelling older adults in Taiwan. *The Journal of Nursing Research*, *28*(6), e124. https://doi.org/10.1097/jnr.0000000000000402

Pishvaei, M., Moradi, N., Armanmehr, V., & Baghery, P. (2013). Equity in health: From concept to application in healthcare system. *Journal of Research and Health*, *3*(2), 333-334. Retrieved March, 15, 2022, http://jrh.gmu.ac.ir/browse.php?a_code=A-10-364-1&slc_lang=en&sid=1.

Rabin, R., & Charro, F. d. (2001). EQ-SD: a measure of health status from the EuroQol Group. *Annals of Medicine*, *33*(5), 337-343. https://doi.org/10.3109/07853890109002087.

Salbach, N. M., Mayo, N. E., Robichaud-Ekstrand, S., Hanley, J. A., Richards, C. L., & Wood-Dauphinee, S. (2006). Balance self-efficacy and its relevance to physical function and perceived health status after stroke. *Archives of Physical Medicine and Rehabilitation*, *87*(3), 364-370. https://doi.org/10.1016/j.apmr.2005.11.017.

Shepherd, D. A., & Patzelt, H. (2015). The "heart" of entrepreneurship: The impact of entrepreneurial action on health and health on entrepreneurial action. *Journal of Business Venturing Insights*, *4*, 22-29. http://dx.doi.org/10.1016/j.jbvi.2015.08.001 .

Sibilitz, K., Berg, S., Thygesen, L., Hansen, T., Køber, L., Hassager, C., & Zwisler, A.-D. (2015). High readmission rate after heart valve surgery: a nationwide cohort study. *International Journal of Cardiology*, *189*, 96-104.

https://doi.org/10.1016/j.ijcard.2015.04.078
.

Sowa, A., Topór-Mądry, R., Tobiasz-Adamczyk, B., & Golinowska, S. (2015). Health status of older people: evidence from Europe. *Zeszyty Naukowe Ochrony Zdrowia, Zdrowie Publiczne i Zarządzanie*, *13*(4). Retrieved March, 15, 2022, from https://www.ejournals.eu/Zdrowie-Publiczne-i-Zarzadzanie/2015/Tom-13-zeszyt-4/art/7322/.

Soyuer, F., Ünalan, D., & Öztürk, A. (2006). Kronik beyin damar hastalıklarında yaşam kalitesi ve etkileyen faktörler. *Journal of Turgut Ozal Medical Center*, *13*(3), 157-162. Retrieved March, 15, 2022, from https://dergipark.org.tr/tr/pub/totm/issue/13112/157978.

TÜİK. (2022). *Ölüm Nedeni İstatistikleri, 2018*. https://data.tuik.gov.tr/Bulten/Index?p=Olum-Nedeni-Istatistikleri-2018-30626,Retrieved March, 15, 2022.

Viner, R., & Macfarlane, A. (2005). Health promotion. *BMJ*, *330*(7490), 527-529, https://doi.org/10.1136/bmj.330.7490.527.

WHO (1948). *Constitution. World Health Organization*.

WHO (2000). *The world health report 2000: health systems: improving performance*. World Health Organization. Retrieved March, 15, 2022, from https://apps.who.int/iris/handle/10665/42281

Wilson, R., Cuthbertson, L., Kazis, L., & Sawatzky, R. (2022). Measuring health status in long-term residential care: Adapting the Veterans RAND 12 item health survey (VR-12©). *Clinical Gerontologist*, *45*(3), 562-574. https://doi.org/10.1080/07317115.2020.1752347

Yoo, H., Kim, C. J., Jang, Y., & You, M. A. (2011). Self-efficacy associated with self-management behaviours and health status of South Koreans with chronic diseases. *International Journal of Nursing Practice*, *17*(6), 599-606. https://doi.org/10.1111/j.1440172x.2011.01970.x

**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.1089892

# Physical Activity Counseling and Practices in Preventive Health: Review

Gülfidan TOKGOZ[1]

[1] Balıkesir University, Bigadiç Vocational School, Department of Therapy and Rehabilitation,

***Geliş Tarihi / Received:*** *18.03.2022* ***Kabul Tarihi / Accepted:****13.09.2022*

**ABSTRACT**
İncreasing the physical activity levels of all individuals in society and developing effective interventions for the prevention of diseases are public health priority. Physical Activity Counseling (PAC), one of these applications, can be defined as providing verbal and written advice or guidance to encourage increased physical activity and can be applied face-to-face or with technology-based methods. PAC, one of the preventive health services, is recommended by many public health organizations, including the World Health Organization. The aim of this review is to research the literature about the role and applications of PAC in preventive health and to provide current evidence-based information to clinicians and academics working in this field.
**Keywords:** Counseling, Exercise, Preventive health, Health

## Koruyucu Sağlıkta Fiziksel Aktivite Danışmanlığı ve Uygulamaları: Derleme

**ÖZ**
Toplumdaki tüm bireylerin fiziksel aktivite düzeylerinin artırılması ve hastalıkların önlenmesine yönelik etkili müdahalelerin geliştirilmesi bir halk sağlığı önceliğidir. Fiziksel aktiviteyi arttırmaya yönelik sözlü- yazılı tavsiye veya rehberlik sağlamak olarak tanımlanan Fiziksel Aktivite Danışmanlığı (PAC) yüz yüze veya teknoloji tabanlı yöntemlerle uygulanabilir. Koruyucu sağlık hizmetlerinden biri olan PAC, Dünya Sağlık Örgütü de dâhil olmak üzere birçok halk sağlığı kuruluşu tarafından tavsiye edilmektedir. Bu derlemenin amacı, koruyucu sağlıkta PAC'nin rolü ve uygulamaları hakkında literatürü araştırmak, bu alanda çalışan klinisyenlere ve akademisyenlere kanıta dayalı güncel bilgiler sağlamaktır.
**Anahtar Kelimeler:** Danışmanlık, Egzersiz, Koruyucu sağlık, Sağlık.

***Sorumlu Yazar / Corresponding Author:*** Gulfidan TOKGOZ, Balıkesir University, Bigadiç Vocational School, Department of Therapy and Rehabilitation, Balıkesir/Turkey.

***E-mail:*** gulfidan.tokgoz@balikesir.edu.tr

***Bu makaleye atıf yapmak için / Cite this article:*** Tokgoz, G. Physical Activity Counseling and Practices in Preventive Health: Review. *BAUN Health Sci J, 13*(1), 202-209. https://doi.org/10.53424/balikesirsbd.1089892

## INTRODUCTION

Studies from the 1950s to the present provide evidence that an active lifestyle is important and beneficial for physical activity (Morris JN et al, 1953). The literature emphasizes that inactivity, which is defined as insufficient physical activity, is associated with an increased risk of many chronic diseases such as heart diseases, some types of cancer, diabetes, stroke, depression, and metabolic syndrome (Lee et al., 2012; Moore SC et al,, 2016). Lee et al. reported in their study that physical inactivity increases the risk of coronary heart disease, type 2 diabetes, breast and colon cancer by 33%, 20% and 33%, respectively (Lee, 2012). Physical activity has produced positive effects such as increase in well-being and quality of life, a decrease in fatigue and depression, even in individuals who have survived cancer, which is one of these chronic diseases (Fong et al., 2012). In addition, studies on diabetes, another chronic disease, have reported that physical activity has protective effects in individuals with impaired glucose tolerance, and it reduces the risk of cardiovascular disease and premature death in individuals with type 2 diabetes (Tuomilehto et al., 2011; Zethelius et al., 2014). The consequences of inactivity, are not only in terms of health, but also have wide and comprehensive consequences in terms of economic, environmental and social aspects. Experts suggest that inactivity is one of the five leading risk factors for chronic diseases and global mortality, so it should be considered as a pandemic situation (Kohl et al., 2012).

Today, increasing the physical activity levels of all individuals in society and developing effective interventions for the prevention of diseases are public health priority (Ferrucci, 2004). The World Health Organization (WHO) draws attention to the issue of primary care public health in order to raise awareness of individuals about health to encourage and support the use of tools and technology (World Health Organization, 2013).

Physical Activity Counseling (PAC), a method used in primary health care, is recommended by many public health institutions, including the WHO and International Society for Physical Activity and Health (ISPAH), due to its universal access and high potential for health services (World Health Organization, 2020; ISPAH, 2022). PAC, which are defined as providing verbal or written advice/guidance in order to encourage the participant to increase their physical activity level, can be applied face-to-face, over the phone or with technological approaches such as web programs (Otmanowski et al., 2020). Today, the applicability of current developments in technology in health services have increased, as in every field. The aim of this review is to research the literature about the role and applications of PAC in preventive health and to provide current information to clinicians and academics working in this field.

### Theories of physical activity counseling

In order to increase the success of PAC interventions, to better interpret the achievements and to ensure the sustainability of the gains, knowing the underlying theories of the concept can provide the opportunity to look from a wide perspective and increase the efficiency of the application. Recent studies have focused on these theoretical models, which constitute the scientific infrastructure of PAC applications (Otmanowski, 2020; Hillsdon, 2005; Kerse, 2005; Rasinaho, 2012). Theoretical models used in many randomized controlled studies on PAC in the literature are social cognitive theory and transtheoretical models (Rasinaho, 2012; Rossen, 2021; Rossen 2015). We believe that knowing the mediators, components and methods of the theories will increase the effectiveness of PAC applications.

Social cognitive theory (SCT) is a widely used theory in PAC applications. One of the main components of this theory is concept of “self-efficacy” (Bandura, 1997). Self-efficacy can be increased by motivational, face-to-face, technology-based interviews and effective counseling methods (Bandura, 1997). Therefore, these methods may be preferred in PAC applications according to SCT. Social cognitive theory consists of personal, social and environmental variables. While the personal variables consists of self-efficacy, incentives and self-regulatory skills, the social variables consists of observational learning and support of physical activity components, and environment variables consist of access to facilities, access to resources that promote physical activity and access to programs (Rasinaho et al., 2012).

Another theory of behavior change is the transtheoretic models. This theory is based on regulating behavior such as advancing towards the goal or sometimes moving away from it. Within the scope of this theory, feedback and self-evaluation methods are frequently used (Kanfer, 1991). In this model, the PAC consultant defines the participant’s process such as preparation, action, and maintenance before initiating appropriate interventions and sets goals accordingly (Marcus, 2006). Therefore, transtheoretical model consists of pre-contemplation, contemplation and preparation phases (Rasinaho et al., 2012).

Information on the methods of the theories is available in Figure 1 (Rasinaho et al., 2012).

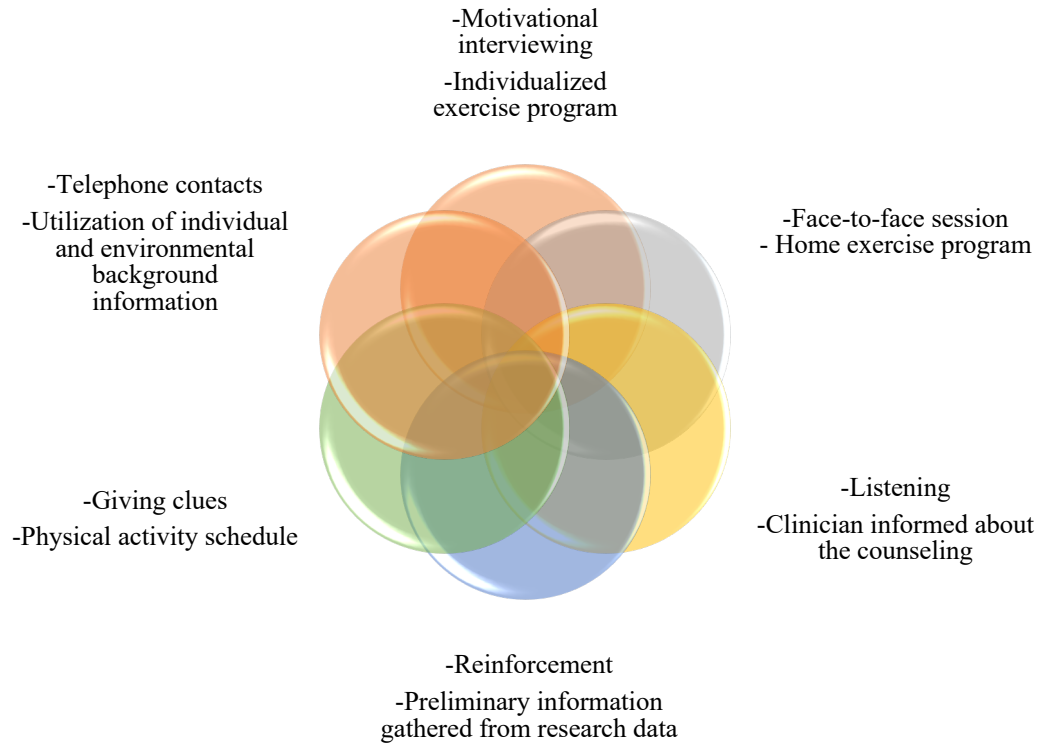


**Figure 1. Methods of the physical activity counseling (Rasinaho et al., 2012).**

**Practices of physical activity counseling**

Each year, the evidence for the harmful effects of inactivity is increasing, and the consequences of inactivity are becoming more pronounced (Shuval, 2017). Published guidelines for physical activity recommend that adults engage in at least 150 minutes of moderate-intensity physical activity per week. (Physical Activity Guidelines Advisory Committee Report, 2008). The applicability of the recommendations published in the guidelines in daily life is important in terms of the protection and sustainability of health. Some organizations recommend including physical activity counseling within the scope of primary health care services, as physical activity has multiple benefits in terms of individual, social and economic aspects such as maintaining health and preventing chronic diseases like diabetes, obesity, stroke, depression, and metabolic syndrome (Physical Activity Guidelines Advisory Committee Report, 2008; Hebert, 2012). The American College of Sports Medicine (ACSM) emphasizes that "physical inactivity" should be evaluated as a basic parameter such as weight and blood pressure measurement within the scope of preventive health services. Therefore, PAC applications have an important role in preventive health services in terms of preventing and diagnosing chronic diseases. ACSM and the National Institute for Health and Care Excellence (NICE) also emphasizes that PAC practices such as preparing personalized physical activity prescriptions should be included within the scope of preventive health services (American College of Sports Medicine, 2016; National Institute for Health and Care Excellence, 2013).

**Content of physical activity counseling**

In PAC practices, individualized physical activity targets are created in line with the needs of the participant by considering personal factors such as age, gender, occupation, socio-economic conditions, environmental factors, interests and preferences (Füzéki, 2020). The steps to reach the goal are planned with the cooperation of the consultant-participant (Füzéki, 2020). In a review of 19 studies in 2020, in which PAC application contents were extensively investigated by Füzeki et al., ıt has been reported that there are suggestions for types of physical activity, information about health benefits of physical activity, suggestions about frequency and intensity of activity, exercise preferences of patients, exercise capacities of individuals, motivational interviewing, referral to group exercise sessions or therapists, setting appropriate goals, and follow-up (Füzéki, 2020).

In PAC practices, it is recommended to apply the 5A framework (assess, advise, agree, assist, arrange) to clinicians working in the field in order to transform the gains in physical activity into behavioral dimensions and to ensure sustainability (Estabrooks, 2003). The contents of the 5A Framework are shown in Figure 2 (Shuval et al., 2017).

**Creating Physical Activity Counseling Strategies**

An important approach that increases the effectiveness of PAC interventions from primary health care practices is the determination of appropriate strategies by the consultant. Studies emphasize that goal setting is an important strategy (Hoekstraa, 2019; Vries 2016). The accessibility or suitability of the goals can be determined by objective evaluations made at regular intervals. It is a wise approach to identify the characteristics, physical activity determinants, barriers, and motivators of the participant to whom PAC service is provided and to create strategies accordingly. Otmanowski reported that when working with older adults, it plays an important role relieving the anxiety of the participant, giving reassurance and encouragement (Otmanowski, 2020). Herghelegui et al. used a health risk assessment tool prior to PAC to identify the participant's barriers to activity (Herghelegiu, 2017).

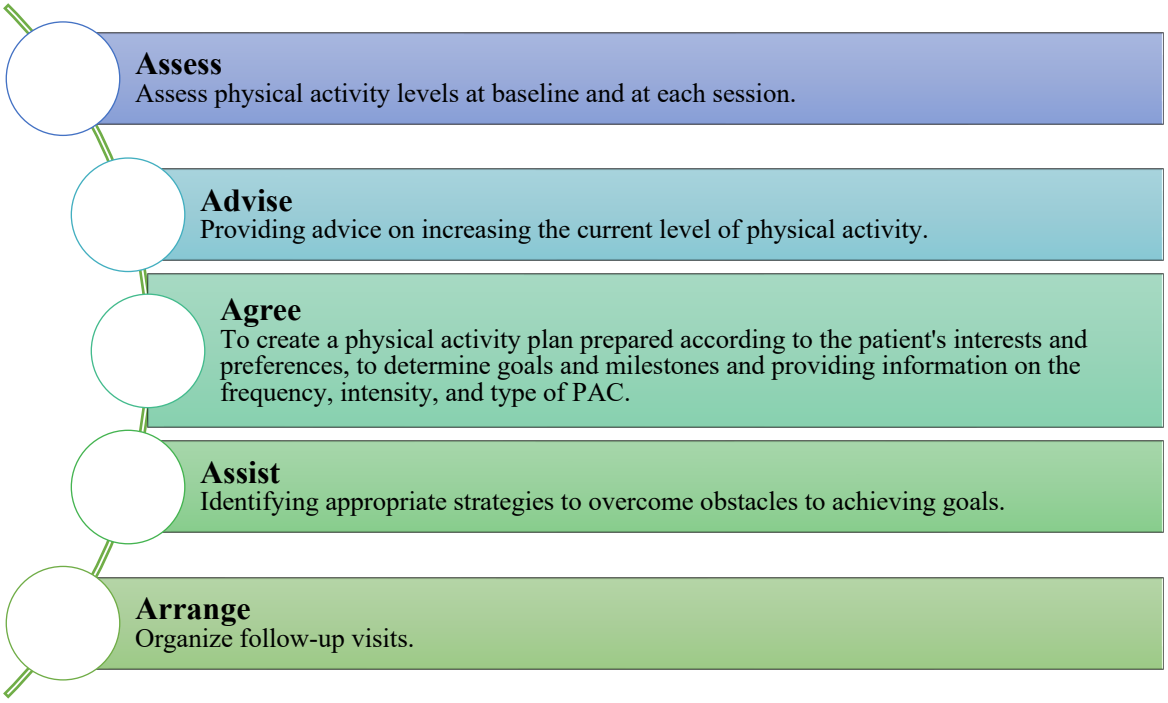


**Figure 2. The 5A framework and content used to provide PAC (Shuval et al., 2017).**

**Method of physical activity counseling**

PAC, defined as promoting physical activity through oral or written advice or guidance, can be carried out either face-to-face or over the phone (Otmanowski, 2020). In a review containing the results of 12 studies published by Otmanowski et al. in 2020, important points regarding PAC applications were emphasized (Otmanowski, 2020). Except for one study in the review, it was reported that PAC was given orally and the first counseling session was face-to-face in all studies (Otmanowski, 2020). In the study, which was not based on face to face oral advice, it was reported that PAC applications were made through a health coach accessed by tablet (Bickmore, 2013). In addition, it was reported that telephone interviews were used as a method after the first face-to-face counseling to ensure continuity in studies (Otmanowski, 2020).

**Period of physical activity counseling**

Another concept as important as effectiveness in PAC interventions is the "sustainability". According to our clinical observations, although the physical activity levels of individuals increase to the targeted levels during PAC interventions, they usually return to baseline in a long term. This can be interpreted as transforming the knowledge learned in PAC interventions into a lifestyle by gaining behavioral dimension is more valuable than short-term gains. There are limited studies in the literature showing that positive results continue 12 or more months after PAC (Rasinaho, 2012; Kerr, 2018). Otmanowski et al report that the most successful PAC interventions rely on structured care and behavior change strategies to achieve long-term results (Otmanowski, 2020). In addition, the US Preventive Services Task Force recommends that successful PAC interventions take 6-18 months with an average of 12 interviews in individuals diagnosed with cardiovascular disease (US Preventive Services Task Force, 2020).

**Frequency of physical activity counseling**

The development of technology has affected all areas of life as well as health services. For example, phone calls or web-based interviews are popular methods used to ensure sustainability after the first personal

consultation in PAC applications (Rasinaho, 2012, Hoekstraa, 2019). In a study published in 2019, Hoekstraa et al., studied PAC from a broad perspective in a prospective cohort study conducted with the participation of 18 rehabilitation centers (Hoekstraa, 2019). The frequency and duration of phone calls and the frequency of e-mail calls were evaluated in this study, in which they mentioned important points about the frequency of PAC interventions (Hoekstraa, 2019). The results of the study report that more intensive phone-based counseling is not associated with better behavior. (Hoekstraa, 2019). This study suggests that some changes should be made and flexible programs should be used with personalized strategies to encourage physical activity when applying PAC in different environments and conditions (Hoekstraa, 2019).

**Follow-up of physical activity counseling**

Monitoring of physical activity interventions is carried out by subjective and objective methods.

Advances in science and technology are facilitating the monitoring and evaluation of PAC interventions. The concept of Wearable Technology in Rehabilitation, whose popularity has increased in recent years, is gaining importance. Besides, it was emphasized that these technology-based methods, which are an innovative approach in health, can be useful tools to increasing motivation and participation to activity, in addition providing objective data on physical activity results. Otmanowski et al. reported that wearable technology equipments were used to provide motivation and record results in addition to counseling strategies in four studies (Otmanowski, 2020). In addition, in two studies in this review, it was reported that the participants did not maintain their step increase with wearable technological equipment without consultancy support (Bickmore et al., 2013; McMurdo et al., 2010). Rossen et al. mentioned important points regarding the use of technology in preventive health in individuals with Type 2 diabetes (Rossen, 2021). In their study, in which participants used a wearable activity tracker, a pedometer or a self-tracking website to objectively evaluate the daily step count, the number of steps was evaluated at 6 and 12 months (Rossen, 2021). In this study, which investigated behavior change and sustainability as a result of PAC and wearable technology interventions, it was reported that objective monitoring of the number of steps is a suitable method to increase physical activity (Rossen, 2021). In addition, the results have been interpreted that wearable activity trackers alone cannot provide behavioral change in the long term, and that professional guidance on physical activity can also be an effective approach.Wearable Device Application examples in literature are given in Figure 3 (Huifeng et al, 2020).

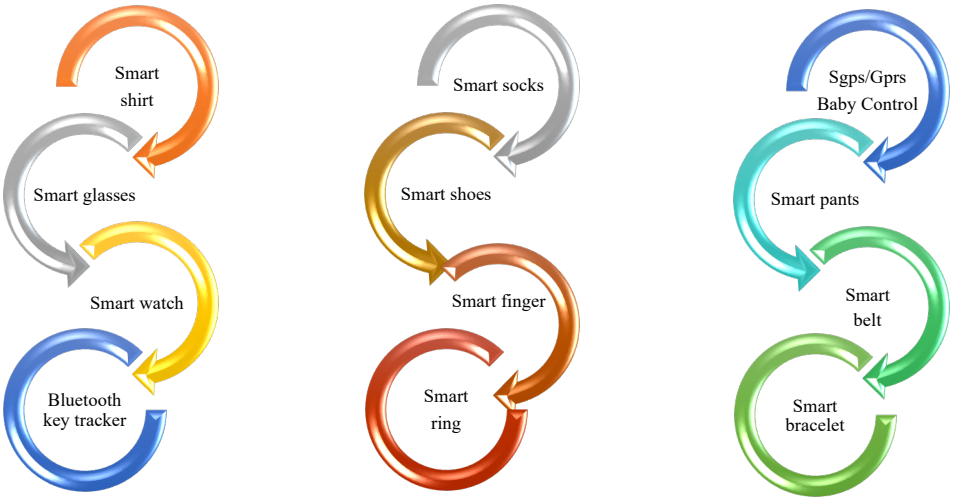


**Figure 3. Wearable device application examples (Huifeng et al., 2020).**

## CONCLUSION

There are many evidence-based studies on insufficient physical activity, which is one of the important problems of our time. PAC, which is one of these applications, is recommended by many health authorities. PAC, which appeals to everyone in the society and whose applications have been increasing in recent years, can be used in preventive health to increase the level of physical activity and prevent the risk of chronic diseases. It is recommended that physical activity level assessments be added to the basic assessments in preventive health services and effective PAC interventions should be planned by clinicians with the results obtained. Within the scope of effective PAC interventions in preventive health, measures can be taken for chronic diseases such as obesity, diabetes and cardiac diseases by providing individualized exercise recommendations and counseling to increase the level of daily life physical activity. Developments in technology affect health services can increase the effectiveness and applicability of the PAC concept, which is one of the preventive health applications. Technology-based approaches are valuable as they can obtain objective

data and increase efficiency by increasing the motivation of the participant, and consultants should be encouraged to use these methods. PAC interventions consist of components such as content, method, frequency, duration, and follow-up. Since PAC is one of the current applications that have been increasingly used in clinical practice in recent years, studies with
long-term follow-up and large sample groups are needed to determine the ideal approaches.

**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:** GT; **Material, methods and data collection:** GT; **Data analysis and comments:** GT; **Writing and corrections:** GT.

**REFERENCES**

American College of Sports Medicine. Exercise is Medicine. (2016). www.exerciseismedicine.org. (Accessed 28 July 2022).

Bandura A., Freeman W. H., Lightsey R. (1997). Self-Efficacy: The Exercise of Control. *Journal of Cognitive Psychotherapy*. Vol 13, Issue 2. https://doi.org/10.1891/0889-8391.13.2.158.

Bickmore TW, Silliman RA, Nelson K, Cheng DM, Winter M, Henault L, Paasche-Orlow MK. (2013). A randomized controlled trial of an automated exercise coach for older adults. J *Am Geriatr Soc. 61*(10):1676-83. https://doi.org/10.1111/jgs.12449.

Estabrooks PA, Glasgow RE, Dzewaltowski DA. (2003). Physical activity promotion through primary care. *JAMA*. Jun 11;289(22):2913-6. https://doi.org/10.1001/jama.289.22.2913.

Ferrucci L., Guralnik J. M., Studenski S., Fried L. P., Cutler G. B., Jr and Walston J. D. (2004). Designing randomized controlled trials aimed at preventing or delaying functional decline and disability in frail, older persons: a consensus report. Journal of the *American Geriatrics Society*, 52, 625–634. https://doi.org/10.1111/j.15325415.2004.52174.x

Fong DY, Ho JW, Hui BP, et al (2012). Physical activity for cancer survivors: metaanalysis of randomised controlled trials [serial online]. *BMJ*, 344:e70. doi: https://doi.org/10.1136/bmj.e70.

Hillsdon, M., Foster, C., Thorogood, M. (2005). Interventions for promoting physical activity. *The Cochrane database of systematic reviews,* (1), CD003180. https://doi.org/10.1002/14651858.CD003180.pub2

Füzéki E, Weber T, Groneberg D.A., Banzer W. (2020). Physical Activity Counseling in Primary Care in Germany—An Integrative Review, *Int. J. Environ. Res. Public Health, 17*, 5625. https://doi.org/10.3390/ijerph17155625.

Hébert ET, Caughy MO, Shuval K. (2012). Primary care providers' perceptions of physical activity counselling in a clinical setting: a systematic review. *Br J Sports Med. 46*(9):625-31. https://doi.org/10.1136/bjsports-2011-090734.

Herghelegiu A. M., Moser A., Prada G. I., Born S., Wilhelm M., Stuck A. E. (2017). Effects of health risk assessment and counselling on physical activity in older people: A pragmatic randomised trial. PLoS One. 12, e0181371.

Hoekstraa F, Hoekstraa T, Schans C, Hettingae F.J, Woudea L.H.V, Dekkerb R. (2019). The implementation of a physical activity counseling program in rehabilitation care: findings from the ReSpAct study, *Disability and Rehabilitation. 43*(12):1710-1721. https://doi.org/10.1080/09638288.2019.1675188

Huifeng W., Kadry S.N., Raj E.D. (2020). Continuous health monitoring of sportsperson using IoT devices based wearable technology. *Computer Communications, 160*, 588-595. https://doi.org/10.1016/j.comcom.2020.04.025.

ISPAH. International Society for Physical Activity and Health. ISPAH's Eigth Investments That Work for Physical Activity. Available online: https://www.ispah.org/resources/key-resources/8-investments/ (accessed on 28 July 2022).

Kanfer R., Kanfer F. (1991). Goal and self-regulation: Applications of theory to work settings. In M. M.L. Maehr & P. P.R. Pintrich (Eds.). *Advances in motivation and achievement. 7*, 287–326.

Kerr J., Rosenberg D., Millstein R. A., Bolling K., Crist K., Takemoto M., Godbole S., Moran K., Natarajan L., Castro-Sweet C., Buchner D. (2018). Cluster randomized controlled trial of a multilevel physical activity intervention for older adults. The International *Journal of Behavioral Nutrition and Physical Activity, 15*, 32. https://doi.org/10.1186/s12966-018-0658-4.

Kerse N., Elley C. R., Robinson E., Arroll B. (2005). Is physical activity counseling effective for older people? A cluster randomized, controlled trial in primary care. Journal of the American Geriatrics Society, 53, 1951–1956. https://doi.org/10.1111/j.1532-5415.2005.00466.x.

Kohl HW, Craig CL, Lambert EV, Inoue S, Alkandari JR, Leetongin G, Kahlmeier S. (2012). Lancet Physical Activity Series Working Group. The pandemic of physical inactivity: global action for public health. Lancet.380(9838):294-305. https://doi.org/10.1016/S0140-6736(12)60898-8

Lee IM, Shiroma EJ, Lobelo F. (2012). Effect of physical inactivity on major noncommunicable diseases worldwide: an analysis of burden of disease and life expectancy. Lancet, 380:219-229. https://doi.org/10.1016/S01406736(12)61031-9.9.

Marcus B. H., Williams D. M., Dubbert P. M., Sallis J.F., King A. C., Yancey A. K. (2006). Physical activity intervention studies: what we know and what we need to know: a scientific statement. *Circulation. Dec 12*;114(24):2739-52. https://doi.org/10.1161/CIRCULATIONAHA.106.179683.

McMurdo ME, Sugden J, Argo I, Boyle P, Johnston DW, Sniehotta FF, Donnan PT. (2010). Do pedometers increase physical activity in sedentary older women? A randomized controlled trial. *J Am Geriatr Soc. 58*(11):2099-106. https://doi.org/10.1111/j.15325415.2010.03127.x.

Morris JN, Heady JA, Raffle PA, Roberts CG, Parks JW. (1953). Coronary heart-disease and physical activity of work. Lancet.262(6795):1053-1057. https://doi.org/10.1016/s0140-6736(53)90665-5.

Moore SC, Lee IM, Weidrpass E, et al. (2016). Association of leisure-time physical activity with risk of 26 types of cancer in 1.44 million adults. *JAMA Intern Med, 176*:816-825. https://doi.org/10.1001/jamainternmed.2016.1548.

National Institute for Health and Care Excellence. (2013). Physical activity: brief advice for adults in primary care. nice.org.uk/guidance/ph44. Published 2013. www.nice.org.uk/guidance/ph44. Accessed 29 July 2022.

Office of Disease Prevention and Health Promotion, Physical Activity Guidelines Advisory Committee. Physical Activity Guidelines Advisory Committee Report, 2008. Washington, DC: US Department of Health and Human Services; 2008.

Otmanowski J.A., Chase J.A. (2020). Practical implications for providing physical activity counseling for the older adult: An integrative review, Journal of the American Association of Nurse Practitioners, 32 (2020) 511–519. https://doi.org/10.1097/JXX.0000000000000483

Physical Activity Strategy for the WHO European Region 2016–2025; World Health Organisation Regional Office for Europe: Copenhagen, Denmark, 2016; ISBN 9289051477.

Rasinaho M, Hirvensalo M, Törmäkangas T, Leınonen R, Lıntunen T and Rantanen T. (2012) Effect of physical activity counseling on physical activity of older people in Finland. *Health Promot Int. Dec;27*(4):463-74. https://doi.org/10.1093/heapro/dar057.

Rossen J, Hagströmer M, Yngve A, Brismar K, Ainsworth B, Johansson U. B. (2021). Process evaluation of the Sophia Step Study-a primary care based three-armed randomized controlled trial using selfmonitoring of steps with and without counseling in prediabetes and type 2 diabetes, *BMC Public Health, 21*:1191. https://doi.org/10.1186/s12889-021-11222-9.

Rossen J, Yngve A, Hagströmer M, Brismar K, Ainsworth B.E., Iskull C, Peter M, Johansson U.B. (2015). Physical activity promotion in the primary care setting in pre- and type 2 diabetes - the Sophia step study, an RCT, *BMC Public Health,15*:647. https://doi.org/10.1186/s12889-015-1941-9.

Shuval K, Leonard T, Drope J, Katz DL, Patel AV, Maitin-Shepard M, Amir O, Grinstein A. (2017). Physical activity counseling in primary care: Insights from public health and behavioral economics. *CA Cancer J Clin. 67*(3):233-244. https://doi.org/10.3322/caac.21394.

Tuomilehto J, Schwarz P, Lindstrom J. ( 2011). Long-term benefits from lifestyle interventions for type 2 diabetes prevention: time to expand the efforts. *Diab Care, 34 Suppl 2*:S210–214. https://doi.org/10.2337/dc11-s222.

US Preventive Services Task Force Recommendation Statement. (2020). Behavioral Counseling Interventions to Promote a Healthy Diet and Physical Activity for Cardiovascular Disease Prevention in Adults *With Cardiovascular Risk Factors. 324*, Number 20. https://doi.org/10.1001/jama.2020.21749.

Vries N. M., Staal J. B., van der Wees P. J., Adang E. M. M., Akkermans R., Olde Rikkert M. G. M., Nijhuis-van der Sanden M. W. G. (2016). Patient-centred physical therapy is (cost-) effective in increasing physical activity and reducing frailty in older adults with mobility problems: A randomized controlled trial with 6 months follow-up. *Journal of Cachexia, Sarcopenia and Muscle. 7*, 422–435. https://doi.org/10.1002/jcsm.12091.

Zethelius B, Gudbjornsdottir S, Eliasson B, Eeg-Olofsson K, Cederholm J. (2014). Swedish National Diabetes R. Level of physical activity associated with risk of cardiovascular diseases and mortality in patients with type-2 diabetes: report from the Swedish National Diabetes Register. *Eur J Prev Cardiol. 21*(2):244–51.

https://doi.org/10.1177/2047487313510893.

World Health Organization. Regional Office for Europe. (2013). Health 2020: a European policy framework supporting action across government and society for health and well-being (short version). World Health Organization. Regional Office for Europe.

https://apps.who.int/iris/handle/10665/131300.

World Health Organization. (2020). WHO guidelines on physical activity and sedentary behaviour: at a glance. World Health Organization.

https://apps.who.int/iris/handle/10665/337001.

**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.1025387

# COVID- 19 Pandemi Sürecinde Emzirmeyi Devam Ettirme ve Kadın Sağlığı Hemşiresinin Rolü

Mümüne DURMUŞ[1], Mizgin CEBE ERTAŞ[1], Emine GERÇEK ÖTER[2]

[1] Aydın Adnan Menderes Üniversitesi, Sağlık Bilimleri Enstitüsü
[2] Aydın Adnan Menderes Üniversitesi, Hemşirelik Fakültesi Doğum-Kadın Sağlığı ve Hastalıkları Hemşireliği

***Geliş Tarihi / Received:*** *18.11.2021,* ***Kabul Tarihi / Accepted:*** *26.09.2022*

**ÖZ**
Çin'de 2019 yılı sonlarında başlayan COVID-19 virüsü pandemi meydana getirmiştir. Yaşanan pandemi süreci emziren anne ve anne adaylarında endişeye neden olmuştur. Ancak anne sütünün zengin içeriğinin viral enfeksiyonlara karşı koruyucu rolü bilinmekle birlikte anne sütünden COVID-19 virüsünün bulaştığını kanıtlar nitelikte çalışma bulunmamaktadır. Bunlara ek olarak Dünya Sağlık Örgütü, Birleşmiş Milletler Çocuklara Yardım Fonu, Hastalık Kontrol ve Önleme Merkezi, Emzirme Tıbbı Akademisi, Amerikan Obstetrisyenler ve Jinekologlar Birliği, Kraliyet Obstetrisyenler ve Jinekologlar Birliği gibi çeşitli sağlık otoriteleri hijyen önlemleri alınarak doğrudan emzirmeyi önermektedir. COVID-19 sürecinde laktasyonun sürdürülmesine olan ihtiyaç artmıştır. Emzirme sürecinde önemli rolü olan kadın sağlığı hemşireleri anne ve bebeğini COVID-19 enfeksiyonundan korumak için gerekli önlemleri almalı, izolasyonu sağlamalı ve anne bebek arasındaki bağın önemli sağlayıcısı olan emzirmeyi mümkün olduğunda sürdürebilmeye destek olmalıdır.
**Anahtar Kelimeler:** COVID-19, Emzirme, Anne Sütü, Kadın Sağlığı Hemşiresi.

# The COVID-19 Breastfeeding Continuing in COVID-19 Pandemic Process and Role of the Women's Health Nurse

**ABSTRACT**
The COVID-19 virus, which started in China at the end of 2019 caused a pandemic. The pandemic process has caused concern in nursing mothers and expectant mothers. However, although the protective role of the rich content of breast milk against viral infections is known, there is no study that proves the transmission of COVID-19 virus from breast milk. In addition to these, various health authorities such as the World Health Organization, United Nations Children's Fund, Center for Disease Control and Prevention, Academy of Breastfeeding Medicine, American Association of Obstetricians and Gynecologists, Royal Association of Obstetricians and Gynecologists, recommend direct breastfeeding by taking hygiene measures. The need to maintain lactation has increased during the COVID-19 process. Women's health nurses, who have an important role in the breastfeeding process, should take the necessary precautions to protect the mother and her baby from COVID-19 infection, provide isolation and support breastfeeding, which is the important provider of the bond between mother and baby, as much as possible.
**Keywords:** COVID-19, Breastfeeding, Breast Milk, Women's Health Nurse.

***Sorumlu Yazar / Corresponding Author:*** Mümüne DURMUŞ, Adnan Menderes Üniversitesi, Hemşirelik Bölümü Aydın, Türkiye.
***E-mail****:* mmngumus42@gmail.com

***Bu makaleye atıf yapmak için / Cite this article:*** Durmuş, M., Cebe Ertaş, M., & Gerçek Oter E. (2024). COVID-19 pandemi sürecinde emzirmeyi devam ettirme ve kadın sağlığı hemşiresinin rolü. *Balıkesir Sağlık Bilimler Dergisi, 13*(1), 210-217. https://doi.org/10.53424/balikesirsbd.1025387

## GİRİŞ

2019 yılının Aralık ayında, Çin'in Wuhan kentinde ortaya çıkan ve şiddetli akut solunum sendromuna neden olan SARS-CoV-2 enfeksiyonu bir salgın haline gelmiştir ve dünya çapına yayılmıştır (Li ve ark., 2019; Zhu ve ark., 2019). Dünya Sağlık Örgütü (DSÖ) 30 Ocak 2020 tarihinde salgını Uluslararası Öneme Sahip Halk Sağlığı Acil Durumu olarak ilan etmiştir (World Health Organization [WHO], 2020). COVID-19 enfeksiyonu, hasta kişilerin hapşırma ve öksürmeleri ile ortaya çıkan damlacıkların başka bireyler tarafından solunması ile bulaşır. Ek olarak, hastaların solunum parçacıkları ile kontamine yüzeylere dokunduktan sonra ellerini yıkamadan ağız, yüz, göz veya buruna götürmesi ile de virüs alınabilir (T.C. Sağlık Bakanlığı, 2020).

COVID-19 enfeksiyonunda riskli gruplar arasında; çocuklar, bebekler, 65 yaş üstüne sahip bireyler, gebeler ve kronik hastalığa sahip olan bireyler yer almaktadır. Ancak, genel nüfusa göre bakıldığında, gebe kadınların COVID-19 enfeksiyonuna yakalanma ihtimali yüksek değildir (Royal College of Obstetricians and Gynaecologists [RCOG], 2021). Ancak başka kaynaklarda gebelerin bağışıklık sistemindeki doğal baskılanma nedeniyle daha fazla ve ölümcül olduğu açıklanmıştır. Gebelikte aşı uygulaması bilimsel araştırmalara güvenlik gerekçesi ile dahil edilememesi ya da geç bir dönemde dahil edilmesi nedeniyle dikkatle ele alınması gereken bir konudur. Hayati önemi yüksek olan bu pandemi sürecinde, tüm anne ve anne adayları bebeklerinin anne sütü alması ve emzirme hakkında endişeli hale gelmiştir (Hazar ve ark., 2020). COVID-19 enfeksiyonunun kontrol altına alınmaya çalışıldığı bu dönemlerde diğer sağlık hizmetlerine olan ihtiyaç giderek artış göstermiştir (T.C. Sağlık Bakanlığı, 2020).

Anne sütü ve emzirmenin hem yenidoğan hem de anne açısından sayısız faydaları olduğu bilinmektedir. Bu nedenle COVID-19 virüsünün anne sütünden bebeğe geçip geçmeyeceğini belirlemek amacıyla çeşitli araştırmalar yapılmıştır. Cheema ve arkadaşları tarafından Amerika'da (2020) yapılan ve COVID-19 pozitif, herhangi bir kronik hastalığı bulunmayan 9 gebenin dahil edildiği çalışmada; 9 gebenin de üçüncü trimesterde olup, doğumlarının sezaryen ile sonuçlandığı, gebelerin yedisinde yüksek ateş varlığının tespit edildiği belirlenmiştir (Cheema ve ark., 2020). Çin'in Wuhan kentinde COVID-19 tanısı olan gebelerle yapılan çalışmada, sezaryen doğum sonrası 6 gebeden amniyotik sıvı, kordon kanı, ilk emzirme sırasındaki kolostrum (ilk süt) ve yenidoğanlardan ise boğaz sürüntüsü alınmış, alınan örneklerde COVID-19 testinin negatif olduğu saptanmıştır (Chen ve ark., 2020). İstanbul'da 2021 yılında yapılan COVID-19 testi pozitif 10 annenin 9'unun semptom gösterdiği bir çalışmada ise doğumdan 15 gün sonra alınan anne sütü örneğinde SARS-CoV-2 antijeni hiçbir annenin sütünde saptanmamıştır. Ancak pozitif olan ve semptomları olan iki annenin sütünde IgM ve IgG antikorları tespit edilmiştir (Keskindemirci ve ark., 2021). Yapılan çalışmaların sonuçları arasında farklılık olsa da anne sütünden COVID-19 bulaşabileceğini ispatlar nitelikte çalışma bulunmamaktadır. Bunlara ek olarak DSÖ, Birleşmiş Milletler Çocuklara Yardım Fonu (United Nations International Children's Emergency Fund - UNICEF), Hastalık Kontrol ve Önleme Merkezi (CDC), Emzirme Tıbbı Akademisi (ABM), Amerikan Obstetrisyenler ve Jinekologlar Birliği (ACOG), Kraliyet Obstetrisyenler ve Jinekologlar Birliği Birliği (RCOG) gibi çeşitli sağlık kuruluşları ve tıp toplulukları hijyen önlemleri alınarak doğrudan emzirmeyi önermektedir (Academy of Breastfeeding Medicine [ABM], 2020; American College of Obstetricians and Gynecologists [ACOG], 2020; Centers for Disease Control and Prevention [CDC], 2020; WHO, 2021).

Yapılan çalışmalarda emziren annelerin virüs kapmaktan korktukları ya da sağlık profesyonellerine ulaşamadıkları için yüz yüze sağlık hizmetlerine erişemedikleri görülmektedir (Hull ve ark.,2020). Kadın sağlığı hemşireleri doğum sonu dönem ve yenidoğan bakımı üzerinde aktif rolleri olduğu için emzirme döneminde de aktif olarak rol oynamaktadır. Bu nedenle COVID-19 sürecinde de annelere kanıta dayalı ve bireyin gereksinimlerine uygun eğitim ve danışmanlık yapılmalı, bireyin kendi bakımı ile ilgili doğru karar almasına yardımcı olunmalı, klinik rehberler doğrultusunda bir bakım sağlanmalıdır (Partovi ve ark., 2014). Bu derlemenin amacı pandemiye sebep olan COVID-19 enfeksiyonunun emzirmeye olan etkisini ve kadın sağlığı hemşiresinin rolünü incelemektir.

### COVID-19 enfeksiyonu

SARS-CoV-2enfeksiyonu, 2019 yılının sonlarında Çin'de ortaya çıkarak tüm dünyaya yayılmıştır. İlk vakanın 1 Aralık 2019 yılında tespit edilmesinden itibaren hızlı vaka artışları yaşanmış ve 2020 yılında Nisan ayı sonları itibariyle tüm dünyada çok ciddi değerlere ve sayılara ulaşmıştır (Chen ve ark., 2020). Pandemi kavramı DSÖ'ye göre, yeni bir hastalığın dünya çapında yayılmasıdır (WHO, 2020). İki yüz on altı ülkeye yayılan COVID-19 virüsü, ülkemizde ise ilk kez 10 Mart 2020 tarihinde görülmüştür. DSÖ verilerine göre ise 1 Temmuz 2021 itibariyle dünya genelinde 2.6 milyon fazla yeni vaka, yaklaşık 54.000 yeni ölüm rapor edilmiştir (WHO, 2021). Çin, bu hastalığa şiddetli akut solunum sendromu (SARS-CoV-2), DSÖ (COVID-19) adını vermiştir (WHO, 2020). DSÖ Acil Durum Komitesi, yapılan çeşitli müzakerelerle 30 Ocak 2020 tarihinde COVID-19 virüsünü uluslararası halk sağlığı acil durumu olarak ilan etmiştir. Dünyanın birçok yerinde yeni salgınlar meydana gelmesiyle de 12 Mart 2020'de COVID-19 virüsünü pandemi durumu olarak ilan etmiştir (Muscogiuri ve ark., 2020). COVID-19 enfeksiyonunun en yaygın belirtilerine bakıldığında ateş, öksürük ve dispnedir. COVID-19 enfeksiyonunun daha ciddi seyirlerde ilerlediği vakalarda, böbrek yetmezliği, pnömoni, ağır akut solunum yolu enfeksiyonu ve ölüm gelişebilir (T.C. Sağlık Bakanlığı, 2020).

**COVID-19 sürecinde anne sütünün önemi ve emzirme**

DSÖ, anne sütünü hem anneler hem de bebekler için sayısız yararının olduğu ve bebekler için en uygun besin olarak tanımlamaktadır (WHO, 2018). Anne sütünün pek çok yararı olmasının dışında bebeği enfeksiyonlardan koruma, yenidoğan mortalitesini azaltma gibi viral enfeksiyon durumlarında önemli rolleri vardır. Anne sütünün içerisinde enfeksiyon önleyici ajanlar (lizozim, laktoferrin, immunoglobulin G (IgG), IgM, salgısal immunoglobulin G (sIgG) ve sIgA gibi immünoglobülinler vb.), inflamasyon önleyici ajanlar (epidermal büyüme faktörü gibi), immünomodülatörler ve bağışıklık hücreleri (lenfositler, nötrofiller, makrofajlar, kök hücreler) bulunmaktadır (Goldman, 2019). Anne sütünün içerisindeki bu bileşenler, bağışıklık sistemi eksik olan yenidoğanı destekleyerek viral enfeksiyonlara karşı korumakta ve enfeksiyon meydana getirebilecek patojenlerin gastrointestinal sisteme yerleşmesini önlemektedir (Andreas ve ark., 2015). Bebeğin ilk aşısı olma özelliğine sahip her annenin sütü içerik olarak kendi bebeğinin ihtiyaçlarına göre tasarlanmış (Hazar ve ark., 2020).

Emzirme anne sütünü bebeğe ulaştırmanın en doğal ve etkili yoludur. DSÖ doğumdan sonra ilk 6 ay sadece anne sütünü ve 2 yıl veya daha fazla sürede anne sütü ile birlikte beslenmenin tamamlanmasını önermektedir (WHO, 2018). Emzirme COVID-19 sürecinde devam eden hayati süreçlerden biridir. Emzirme fizyolojik olarak faydalarının dışında anne bebek etkileşimi, anne bebek bağlanması ve bebekte sağlıklı bir kişilik oluşması için önemli bir süreçtir (Halk Sağlığı Genel Müdürlüğü [HSG], 2019). Anneden fetüse COVID-19 virüsünün anne sütü yoluyla vertikal geçiş için yeterli kanıt yoktur ancak solunum damlacıkları virüsün bebeğe bulaşmasının başlıca yoludur (Chen H ve ark., 2020). Bu durum farklı görüşlere neden olmuştur. Bazı araştırmacılar pandemi dönemi sürecinde yenidoğanların en az iki hafta süreyle izole edilerek emzirmeyi önermemektedir (Chen D ve ark., 2020). Bazı araştırmacılar ise bu öneriyi desteklemeyerek, anne sütünün COVID-19 virüsü için bir aracı olmadığını, aksine içerdiği özgül antikorlar sayesinde COVID-19 enfeksiyonuna karşı koruyucu rol üstlenebileceğini savunmuşlardır (Davanzo R ve ark., 2020; Hudak ve ark., 2020). DSÖ, UNICEF, CDC, ABM gibi sağlık kuruluşları COVID-19 sürecinde anne sütü ile beslenmenin sürdürülmesini desteklemektedir (ABM, 2020; CDC, 2021; WHO, 2018). DSÖ yalnızca COVID-19 enfeksiyonunun zararlı etkilerini değil, ten tene temasın koruyucu etkileri, anne sütü almama ve bebek mamasının uygunsuz kullanımının zararlarını göz önünde bulundurarak önerilerde bulunmaktadır.

**COVID -19 ve emzirme ile ilgili çalışmalar**

Çin'in Wuhan kentinde COVID-19 tanısı olan gebelerle yapılan çalışmada, sezaryen doğum sonrası 6 gebeden kordon kanı, amniyotik sıvı, ilk emzirme sırasındaki kolostrum alınmış ve yenidoğanlardan ise boğaz sürüntüsü alınmış, alınan örneklerde COVID-19 testinin negatif olduğu saptanmıştır (Chen H ve ark., 2020). Bir olgu raporunda üçüncü trimesterinde COVID-19 enfeksiyonu olan gebenin doğum esnasında plasenta, amniyotik sıvı, kordon kanı, mide suyu ve boğaz bezlerinden örnekler alınmış ve alınan tüm örneklerde COVID-19 testinin negatif olduğu tespit edilmiştir (Wang ve ark.,2020).

COVID-19 virüsünün anneden yenidoğana doğum sonrası solunum yolu ile geçip geçemeyeceği endişe yaratmıştır (Chen ve ark., 2020). Hastalık Kontrol ve Önleme Merkezi, COVID-19 virüsüne yakalanan kadınların anne sütünde virüsün bulunmadığı ama ona direnç gösterecek antikorların bulunduğunu bildirmiştir (CDC, 2019). Schwartz ve arkadaşlarının COVID-19 tanılı 38 gebeyle yaptıkları çalışmada, COVID-19 virüsünün gebe ölümlerine neden olmadığı ve COVİD-19 virüsünün intravenöz yol aracılığı ile annelerden fetüslere bulaşmadığı saptanmıştır (Schwartz ve ark., 2020). Ancak başka bir araştırmada COVID-19 tanısı olan anneden doğan bebeğe yapılan tüm tetkiklerde vücudun savunma sistemlerinden olan IgM antikorunun COVID-19 virüsüne karşı daha yüksek değerlere olduğu sahip olduğu bulunmuştur (Dong ve ark., 2020). Asadi ve arkadaşlarının yapmış olduğu bir retrospektif bir çalışmada COVİD-19 tanılı ve üçüncü trimesterinde olan 9 gebeden amniyotik sıvı, kordon kanı ve anne sütün örnekleri alınmıştır ve alınan örneklerde SARS-CoV-2 saptanmadığı ve 6 yenidoğanın faringeal sürüntüsünde de testin negatif olduğu gösterilmiştir (Asadi ve ark., 2020). Bu çalışmaya karşın Wang ve arkadaşlarının yayımladığı bir olgu sunumunda, COVID-19 tanılı gebenin doğumundan sonraki otuz altı saatte yenidoğandan alınan faringeal sürüntü örneğinin pozitif çıktığı rapor edilmiştir. Çalışmanın sonucunda emzirmenin önerilmediği ve mastiti önlemek için sütün boşaltılması gerektiği belirtilmiştir (Wang ve ark., 2020). Yapılan diğer çalışmalarda ise COVID- 19 tanılı bir anneden doğan bebeğin, doğumdan 2 saat sonra savunma hücrelerine bakıldığında anormal sitokin değerlerinin ve antikor düzeylerinin yüksek olduğu bulunmuştur (Dong ve ark., 2020; Zeng ve ark., 2020). Chua ve arkadaşlarının (2020) yapmış olduğu çalışmaya göre COVID-19 tanısı olan annelere önerilerde bulunmuştur. Öneriler dahilinde COVID-19 tanısı olan annelerden doğan yenidoğanların en az iki haftaya kadar anneden ayrı bir odada tutulması ve annenin doğrudan emzirmemesi önerilmektedir (Chua ve ark., 2020). Hindistan'da yapılan bir prospektif çalışmada %9,4 vakada anneden bebeğe dikey geçiş bulunmuştur (Nayak ve ark., 2021). Çin'in Hubei eyaletinde yapılan bir çalışmada, 44 anneden COVID-19

semptomlarının başlangıcından itibaren 3-62 gün arasında örnekler toplanmıştır. Çalışmada otuz sekiz anne sütü örneğine antikor testi uygulanmış ve tümünde IgG antikoru negatif olarak tespit edilmiştir (Peng ve ark., 2020). Yapılan bir diğer çalışmada anne-bebek ikilisinin sağlık durumu ile anne sütü lökosit seviyeleri arasında güçlü bir ilişki olduğu gösterilmiştir (Hassiotou ve ark., 2013). İstanbul'da yapılan COVID-19 testi pozitif 10 annenin 9'unun semptom gösterdiği bir çalışmada 15 gün sonra alınan anne sütü örneğinde SARS-CoV-2 antijeni hiçbir annenin sütünde saptanmamıştır. Ancak pozitif olan ve semptomları olan iki annenin sütünde IgG ve IgM antikorları tespit edilmiştir. Yine aynı çalışmada 11 anne bebeğinin 7'sinin COVID-19 testi pozitif bulunmuştur (Keskindemirci ve ark., 2021). New York'ta yapılan kohort bir çalışmada, COVID-19 testi pozitif çıkan 116 annenin bebekleri incelenmiştir. Yenidoğanların 83'ü anneleriyle birlikte kalmış ve hiçbirinde COVID-19 görülmemiştir. Tüm annelerin emzirmelerine izin verilmiş, emzirmeye devam eden annelerin bebeklerinin hiçbirinin testi pozitif çıkmamış ve yenidoğanların hiçbirinde COVID-19 semptomları görülmemiştir. Bu çalışmanın sonuçlarında da ifade edildiği gibi eğer doğru hijyen önlemleri alınırsa COVID-19'un perinatal bulaşma olasılığı düşüktür ve bebek koruyucu stratejilerin iyi bir ebeveyn eğitimi ile sağlanması durumunda yenidoğanların anneleriyle aynı odada kalmaları ve emzirmeye devam etmelerinin güvenli olduğu belirtilmektedir (Salvatore ve ark., 2020). COVID-19 tanısı alan her anne emzirmeye ara vermemelidir. Emziren anne fiziksel ve ruhsal sağlığını hızlı bir şekilde iyileştirir be bebeğinin bağışıklık sağlayıcı bileşenlerden yararlanmasını sağlar ve bebeğini pek çok zararlı etmenlerden korur.

**Tablo 1. COVID-19 ve emzirme ile ilgili çalışmalar.**

| Yazar ve Yılı | Ülke | Yöntem | Çalışmanın amacı | Sonuç |
|---|---|---|---|---|
| Chen ve ark., 2020 | Çin | Deneysel bir çalışma n:6 | COVID-19 tanısı alan gebelerden alınan kordon kanı, amniyotik sıvı, kolostrum ve yenidoğandan alınan boğaz sürüntüsünde COVID-19 virüsünün etkisini değerlendirmek | COVID-19 tanısı olan gebelerin ve yenidoğanların örneklerinde COVID-19 virüsüne ait bulgular saptanmamıştır. Sezaryen doğum sonrası 6 gebeden kordon kanı, amniyotik sıvı, ilk emzirme sırasındaki kolostrum alınmış ve yenidoğanlardan ise boğaz sürüntüsü alındığında COVID-19 testinin negatif olduğu saptanmıştır |
| Wang ve ark., 2020 | Çin | Olgu raporu | COVID-19 tanısı alan gebede plasenta, amniyotik sıvı, kordon kanı, mide suyu ve boğaz bezleri örneklerinde COVID-19 virüsünün etkisini değerlendirmek | COVID-19 enfeksiyonu olan gebeden alınan örneklerde COVID-19 virüsü bulunmamıştır. Doğum esnasında plasenta, amniyotik sıvı, kordon kanı, mide suyu ve boğaz bezlerinden örnekler alınan tüm örneklerde COVID-19 testinin negatif olduğu tespit edilmiştir |
| Schwartz ve ark., 2020 | Çin | Kesitsel bir çalışma n:38 | COVID-19 virüsünün gebelik sonuçları üzerindeki etkilerini gözden geçirmektedir | 38 gebeyle yaptıkları çalışmada, COVID-19 virüsünün gebe ölümlerine neden olmadığı ve COVID-19 virüsünün intravenöz yol aracılığı ile annelerden fetüslere bulaşmadığı saptanmıştır |
| Dong ve ark., 2020 | Çin | Olgu raporu | COVID-19 tanısı alan bir anneden doğan bebeğe COVID-19 virüsüne karşı antikorun yüksek olup olmadığını değerlendirmek | COVID-19 tanısı olan anneden doğan bebeğe yapılan tüm tetkiklerde vücudun savunma sistemlerinden olan IgM antikorunun COVID-19 virüsüne karşı daha yüksek değerlere olduğu sahip olduğu bulunmuştur |
| Asadi ve ark., 2020 | İran | Retrospektif Çalışma n:9 | COVID-19 tanısı alan gebelerden alınan amniyotik sıvı, kordon kanı, anne sütü ve yenidoğanın farengeal sürüntüsünde COVID-19 virüsünün etkisini değerlendirmek | COVID-19 tanılı ve üçüncü trimesterinde olan 9 gebeden amniyotik sıvı, kordon kanı ve anne sütün örnekleri alınmıştır ve alınan örneklerde COVID-19 saptanmadığı ve 6 yenidoğanın farengeal sürüntüsünde de testin negatif olduğu gösterilmiştir |

**Tablo 1 (devam). COVID-19 ve emzirme ile ilgili çalışmalar.**

| Yazar ve Yılı | Ülke | Yöntem | Çalışmanın amacı | Sonuç |
|---|---|---|---|---|
| Wang ve ark., 2020 | Çin | Olgu sunumu | COVID-19 tanısı alan gebelerden doğan yenidoğanların faringeal sürüntüsünde belirli bir süreden sonra COVID-19 virüsünün var olup olmadığı belirlemek | COVID-19 tanılı gebenin doğumundan sonraki otuz altı saatte yenidoğandan alınan faringeal sürüntü örneğinin pozitif çıktığı rapor edilmiştir. |
| Dong ve ark., 2020 | Çin | Olgu sunumu | COVID-19 tanısı alan bir anneden doğan bebeğin COVID-19 virüsüne karşı savunma hücrelerinin yüksek olup olmadığını değerlendirmek | COVID-19 tanılı bir anneden doğan bebeğin, doğumdan 2 saat sonra savunma hücrelerine bakıldığında anormal sitokin değerlerinin ve antikor düzeylerinin yüksek olduğu bulunmuştur |
| Peng ve ark., 2020 | Kore | Deneysel bir çalışma n:44 | COVID-19 tanısı alan annelerden sütlerinin içeriğinde antikorların olup olmadığını tespit etmek | COVID-19 tanılı 44 anneden 3-62 gün arasında süt örnekleri toplandığında otuz sekiz anne sütü örneğine antikor testi uygulanmış ve tümünde IgG antikoru negatif olarak tespit edilmiştir |
| Keskindemirci ve ark., 2021 | Türkiye | Kesitsel bir çalışma n:10 | COVID-19 tanısı olan annelerden sütlerinin içeriğinde SARS-CoV-2 antijeninin olup olmadığını tespit etmek | COVID-19 testi pozitif 10 anneden doğumdan 15 gün sonra alınan anne sütü örneğinde SARS-CoV-2 antijeni hiçbir annenin sütünde saptanmamıştır |
| Salvatore ve ark., 2020 | İngiltere | Kohort çalışma n:116 | COVID-19 tanısı olan annelerin ve onlarla kalan bebeklerin COVID-19 görülme olasılıklarının olup olmadığını saptamak | COVID-19 testi pozitif çıkan 116 annenin bebekleri incelendiğinde bebeklerin 83'ü anneleriyle birlikte kalmış ve hiçbirinde COVID-19 görülmemiştir |

**COVID-19 ve emzirme sürecinde kadın sağlığı hemşiresinin rolü**

COVID-19 virüsünün meydana getirdiği pandemi tüm dünyada evrensel bir halk sağlığı problemi oluşturmuştur. Sürecin getirdiği belirsizlik ve değişen bilgiler nedeniyle sağlık profesyonelleri zor durumda kalmaktadır. Emziren anneler ve anne sütü alan bebekler gibi özel ilgiye ihtiyacı olan gruplar bu süreçten olumsuz etkilenmektedir (Başer ve ark., 2020). Örneğin, Tekirdağ'da 2020 yılında yapılan bir çalışmada COVID-19 temaslı annelerin %54.5' inin sadece anne sütü vermeye devam ettiği, COVID-19 pozitif anne grubunda bu oran %17.6 bulunmuştur. Anne sütü vermeyi bırakan anne oranı ise %47.1 olarak rapor edilmiştir (Nalbantoğlu ve ark., 2020). Bu sonuçlar salgın hastalıklar gibi kriz durumlarına anne sütü ve emzirmeyi korumaya olan ihtiyacı yansıtmaktadır. Yaşanan bu salgın sürecinde anneye ve emzirilen bebeğe destek olunmalı, sağlık personelleri tarafından doğru hijyen önlemleri alınıp ve aynı zamanda kurum yöneticileri tarafından da gerekli önlemlerin alınması sağlanmalıdır. Bebek koruyucu stratejilerin iyi bir ebeveyn eğitimleri ile sağlanması durumunda anneleriyle aynı odada kalmaları ve emzirmeye devam etmelerini sağlamalıdır. Kadın sağlığı hemşirelerinin sağlık eğitimi ve danışmanlık, profesyonel rol, iletişim ve kişilerarası rol, bakım verici rol gibi birçok rolü vardır. Kadın sağlığı hemşireleri doğum sonu dönem ve yenidoğan bakımı üzerinde aktif rolleri olduğu için emzirme döneminde de aktif olarak rol oynamaktadır. Bu nedenle COVID-19 sürecinde de annelere kanıta dayalı ve bireyin gereksinimlerine uygun eğitim ve danışmanlık yapmalı, bireyin kendi bakımı ile ilgili doğru karar almasına yardımcı olmalı, klinik rehberler doğrultusunda bir bakım sağlamalıdır (Partovi ve ark., 2014).

Kadın sağlığı hemşireleri COVID-19 pandemisinde öncelikle, COVID-19 olduğundan şüphe duyulan bir annenin bebeğine virüsü bulaştırmasını önlemek için gereken tüm önlemleri almasını sağlamak için danışmanlık yapmalıdır (Hazar ve ark., 2020). COVID-19 olduğundan şüphelenilen veya pozitif olan anneler uygun bir desteğe erişemediklerinden dolayı çocuklarını emzirmek istemeyebilmektedir, sağlık uzmanları gerektiğinde hastaları profesyonel emzirme desteğine yönlendirmeli veya laktasyonun yeniden kurulmasını sağlamalıdır. Emziren annelere memeden beslenirken, süt sağarken veya biberonla beslerken alması gereken önlemler hakkında danışmanlık yapmalıdır (CDC, 2021). Emziren bir anne ve bebeğini hastanede aynı odada tutmanın mümkün dolduğu durumlarda anneye gerekli izolasyon ve hijyen koşulları öğretilmelidir (ABM, 2020).

Anne ve bebeğin geçici ayrılığının düşünüldüğü durumlarda durumun risk ve yararlarını sağlık uzmanları ve anne birlikte tartışmalı, geçici ayrılık

kararı annenin istekleri doğrultusunda verilmelidir (CDC, 2020). Annenin bebeğini emzirmesinin mümkün olmadığı durumlarda hemşireler anne sütünün sağılarak bebeğe verilmesi konusunda anneyi teşvik etmelidir. Anne sütünün nasıl sağılacağı; anne tercihi, hijyen koşulları gibi birçok faktöre bağlı olsa da anneye elle sağma mutlaka öğretilmeli, pompa kullanımı gerekli olan durumlarda gerekli hijyeni sağlama koşulları anneye öğretilmelidir (Karabayır ve ark., 2020). Hastaneye kabul sürecinden itibaren bireyler taburculuk ve evde izlem dahil tüm süreçte anne, baba ve diğer bakımda rol alanlar koruyucu yaklaşımlara, izolasyon önlemlerine, bireysel ve çevre hijyenine ve temas kurmaya ilişkin eğitilmelidir (Acavut ve ark., 2020). Bunların dışında sağlık uzmanları anneye psikososyal destek sağlamalı, endişelerini gidermeli, ekipman ve malzemelerin dezenfeksiyonunu sağlayarak bulaş riskini minimuma indirmeli veya ortadan kaldırmalıdır (Çuvadar ve ark., 2020). Tüm bunları sağlayabilmek için anne ve bebeğe kanıta dayalı ve kaliteli bir bakım, multidisipliner bir ekip yaklaşımı sergilenmesi önemlidir (Favre ve ark., 2020).

## SONUÇ

COVID-19 pandemisi tüm dünyada yaşamın doğal sürecini etkileyen bir kriz meydana getirmiştir. Bu krizden emzirme süreci de olumsuz etkilenmiştir. Anneler ve sağlık hizmeti veren profesyoneller özellikle kadın sağlığı hemşireleri durum karşısında ne yapmaları gerektikleri konusunda çaresiz kalmaktadır. Yapılan çalışmaların bir kısmı annelere emzirmemelerini söylese de anne sütünden COVID-19 bulaşabileceğini ispatlar nitelikte çalışma bulunmamaktadır. DSÖ, CDC gibi sağlık otoriteleri COVID-19 sürecinde emzirmeye devam edilmesini önermiş, COVID-19 sürecinde anneler, sağlık çalışanları ve kurumlar için rehberler hazırlamışlardır. Bunlara ek olarak DSÖ emzirmenin yararlarının göz önünde bulundurulmasını vurgulamıştır. Emzirmenin anne ve bebek için faydaları paha biçilemezdir. Anne gerekli önlemleri alarak emzirmeye devam etmeli, emziremeyecek durumda ise sağarak bebeğinin anne sütü almasını sağlamalıdır. Bu süreçte kadın sağlığı hemşireleri anneye destek olmalı, süreci anne ile birlikte karar vererek yönetmeli ve emzirmenin devamlılığını sağlamalıdır. Hastaneye kabul sürecinden, taburculuk ve evde izlem dâhil tüm süreçte anne ve bebeğe bulaş riskini minimuma indirecek önlemleri almanın yanı sıra aileye psikososyal olarak da destek olmalıdır. Özellikle COVID-19 gibi pandemi süreçlerinde halk sağlığı politikalarının uygulanarak kurumsal, yönetimsel ve ekip çalışması dinamiklerinin de işlemesi sözü edilen sağlık hizmeti uygulamalarının aksamadan gerçekleştirilmesine büyük katkı sağlayacaktır. Anne ve çocuk sağlığı göstergelerinin sürdürülebilir kalkınma hedefleri çerçevesinde sağlanabilmesinde önemli rol oynayan hemşireler ve ebelerin bu süreçte desteklenmelerinin mesleki rollerini gerçekleştirmelerinde çok önemli bir husus olduğu belirtilmektedir. Özellikle anneyle yakın iletişimi sağlayan hemşire ve ebeler pandemi sürecinde emzirmenin başlatılması ve devam ettirilmesi ve ilk altı ay sadece anne sütüyle beslenmenin sağlanması noktasında anahtar kişilerdir.

**Çıkar Çatışması**

Yazarlar, bu makalenin araştırılması, yazarlığı ve/veya yayınlanması ile ilgili olarak herhangi bir potansiyel çıkar çatışması beyan etmemiştir.

**Yazar Katkıları**

**Planı, tasarımı:** MD, MCE, EGÖ; **Gereç yöntem ve veri toplama:** MD, MCE, EGÖ; **Veri analizi ve yorumlar:** MD, MCE, EGÖ; **Yazma ve düzeltmeler:** MD, MCE, EGÖ.

## KAYNAKLAR

Academy of Breastfeeding Medicine (ABM). (2020). ABM Statement on Coronavirüs 2019 (COVID-19). https://www.bfmed.org/abm-statement-coronavirus adresinden alındı.

Acavut, G., Pay, R. E., Ulubay, M. & Evliyaoğlu, Ö. (2020). COVID-19 pandemisinin maternal-neonatal etkileri ve yönetimi. *Türk Kadın Sağlığı ve Neonatoloji Dergisi*, *2* (3), 96-104.

American College of Obstetricians and Gynecologists. (ACOG). (2020). COVID-19 FAQs for Obstetrician- Gynecologists, Obstetrics. https://www.acog.org/clinical-information/physician-faqs/COVID-19-faqs-for-ob-gyns-obstetrics

Andreas, N., Kampmann J. B., & Le-Doare K. M. (2015). Human breast milk: a review on its composition and bioactivity. *Early Human Development*. *91*(11), 629-635. https://doi.org/10.1016/j.earlhumdev.2015.08.013

Asadi, L., Tabatabaei, R. S., Safinejad, H., & Mohammadi, M., (2020). New corona virus (COVID-19) management in pregnancy and childbirth. *Arch Clin Infect*. 15(COVID-19): 1-13. https://doi.org/10.5812/archcid.102938

Başer, A., Sezer, H., & Şahin, H. (2020). Covid-19 Pandemi Sürecinde Anne Sütü ve Emzirme Eğitimi Yönetimi. İzmir Demokrasi Üniversitesi Diş Sağlığı Kongresi.

Centers for Disease Control and Prevention (CDC). (2020). Considerations for Inpatient Obstetric Healthcare Settings. https://www.cdc.gov/coronavirus/2019ncov/hcp/inpatient-obstetric-healthcare-guidance.html

Centers for Disease Control and Prevention (CDC). *Breastfeeding and Caring for Newborns*. Centers for Disease Control and Prevention. (2021a). https://www.cdc.gov/coronavirus/2019-ncov/need-extra-precautions/pregnancybreastfeeding.html

Centers for Disease Control and Prevention (CDC). Care for breastfeeding people. (2021b). https://www.cdc.gov/coronavirus/2019-ncov/hcp/care-for-breastfeeding-women.html

Cheema, R., Partridge, E., Kair, L. R., Kuhn-riordon, K., M., Silva, A., I., Bettinelli, M. E., Chantry, C. J., Underwood M. A., Laksminrusimha, S., & Blumberg, D. (2020). Protecting breastfeeding during the COVID-19 pandemic. *American Journal of Perinatology.* 10(1055):0040. https://doi.org/10.1055/s-0040-1714277

Chen, N., Zhou, M., & Dong, X., (2020). Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: A descriptive study. *The Lanset. 395*(10223):507-513.

Chen, D., Yang, H., Cao, Y., Cheng, W., Duan, T., & Fan, C., (2020). Expert consensus for managing pregnant women and neonates born to mothers with suspected or confirmed novel coronavirus (COVID-19) infection. *International Journal of Gynecology and Obstetrics. 149*(2)*:* 130-136.

Chen, H., Guo, J., Wang, C., Luo, F., Yu, X., Zhang, W., Li, J., Zhao, D., Xu, D., Gong, Q., Liao, J., Yang, H., Hou, W., & Zhang, Y., (2020). Clinical characteristics and intrauterine vertical transmission potential of COVID-19 infection in nine pregnant women: a retrospective review of medical records. *The Lancet. 395*(10226): 809–815.

Chua, M. S. Q., Lee, J. C. S., Sulaiman, S., & Tan, H. K. (2020). From the frontline of COVID-19–how preparedare we as obstetricians: a commentary. *International Journal of Obstetrics and Gynaecology.* 1471-528.

Çuvadar, A., & Özcan, H. (2020). COVİD -19 enfeksiyonunda emzirme ve ebelik Bakımı. *Sağlık Akademisyenleri Dergisi.* 7(2): 137–140. https://doi.org/10.58830/ozgur.pub72.c111

Davanzo, R., Guido, M., & Sandri, F. (2020). Breastfeedingand coronavirus disease-2019. Ad interim indications of the Italian society of neonatology endorsed by the union of european neonatal&perinatal societies*. Maternal and Child Nutrition.* 16(3):1-8. https://doi.org/10.1111/mcn.13010

Dong, Y., Mo, X., Hu, Y., Qi, X., Jiang, F., Jiang, Z., & Tong, S. (2020). Epidemiology of COVID-19 among children in China. *Pediatrics.* 145(6):1-10.

Favre, G., Pomar, L., Qi, X., Nielsen-Saines, K., Musso, D., & Baud, D., (2020). Guidelines for pregnant women with suspected SARS- CoV-2 infection. *The Lancet Infectious Diseases. 20*(6), 652–653.

Goldman, A. S., (2019). Future research in the immune system of human milk. *TheJjournal of Pediatrics.* 206: 274-279. https://doi.org/10.1016/j.jpeds.2018.11.024

Halk Sağlığı Genel Müdürlüğü (HSG). (2019). Emzirme. Halk Sağlığı Genel Müdürlüğü. https://sagligim.gov.tr/bebeksagligi/emzirme.html adresinden alındı.

Hassiotou, F., Hepworth, A. R., Metzger, P., Tat Lai, C., Trengove, N., Hartmann, P., & Filgueira, L., (2013). Maternal and infant infections stimulate a rapid leukocyte response in breastmilk. *Clinical and Translational Immunology.* 2(4): 1-10.

Hazar, H. U., & Gökay, D. (2020). COVID- 19 sürecinde anne sütü ve emzirme. *Hemşirelik Bilimi Dergisi*. 3: 30-37.

Hudak, M. L., Cummings J., & Kimberlin, D. W., (2020). Initial guidance: management of ınfants born to mothers with COVID-19. American Academy of Pediatrics Committee on Fetus and Newborn, Section on Neonatal Perinatal Medicine, and Committee on Infectious Diseases. https://www.tn.gov/content/dam/tn/health/documents/cedep/novel-coronavirus/AAP_COVID-19-Initial-Newborn-Guidance.pdf

Hull, N., Kam, R. L., Gribble, K. D., & Hull, N. (2020). Providing breastfeeding support during the COVID- 19 pandemic: Concerns of mothers who contacted the Australian breastfeeding association. *MedRxiv.* 1-32.

Karabayır, N., Sapmaz, S., & Gökçay, G. (2020). COVID-19 ve anne sütü ile beslenme. *The Journal of Child.* 20(2): 72-75.

Keskindemirci, G., Karabayır, N., İstanbullu Tosun, A., Hançerli Törün, S., Altay, C., Sebirli, M., Kaba, Ö., Kibar, B., & Gökçay,G. (2021). Severe acute respiratory syndrome Coronavirus-2 antigens and antibodies in breast milk. *İstanbul Tıp Fakültesi Dergisi.* 0(0): 01-06.

Muscogiuri, G., Pugliese, G., Barrea, L., Savastano, S., & Colao, A., (2020). Commentary: Obesity: The achilles heel" for COVID-19? *Metabolism.* 108: 154-251. https://doi.org/10.1016/j.metabol.2020.154251.

Nalbantoğlu, A., Nalbantoğlu, B., & Gökçay, G. (2020). Covid-19 enfeksiyonu seyrinde annelerin emzirme ve anne Sütü hakkında bilgi ve tutumları. *Namık Kemal Tıp Dergisi.* 8(3): 314-320.

Nayak, M. K., Panda, S. K., Panda, S. S., Rath, S., Ghosh, A., & Mohakud, N. K. (2021). Neonatal outcomes of pregnant women with COVID-19 in a developing country setup. *Pediatrics & Neonatology*. xxxx: 1-7.

Partovi Meran, H. E., & Hotun Şahin, N. (2014). Kadın sağlığı alanında uzman hemşirelik eğitimi ve uzman hemşirelik rolleri: Amerika Birleşik Devletleri örneği. *Kashed. 1*(1): 1-14.

Peng, S., Zhu, H., Yang, L., Cao, L., Huang, X., & Dynes, M. (2020). A study of breastfeeding practices, SARS-CoV-2 and its antibodies in the breast milk of mothers confirmed with COVID-19. *The Lancet Regional Health-*Western Pacific. 4.

Royal College of Obstetricians & Gynaecologists (RCOG). (2021). Coronavirus (COVID-19) Infection in Pregnancy. https://www.rcog.org.uk/globalassets/documents/guidelines/2020-07-24

Salvatore, C. M., Han, J. Y., Acker, K. P., Tiwari, P., Jin, J., Brandler, M., Cangemi, C., Gordon, L., Parow, A., DiPace, J., & DeLaMora, P. (2020). Neonatal management and outcomes during the COVID-19 pandemic: an observation cohort study. *The Lancet Child and Adolescent Health. 4*(10): 721-727. https://doi.org/10.1016/s2352-4642(20)30235-2

Schwartz, D. A. (2020). An analysis of 38 pregnant women with COVID-19, their newborn infants, and maternal-fetal transmission of SARS-CoV-2: maternal coronavirus infections and pregnancy outcomes. *Archives of Pathology & Laboratory Medicine. 144*(7): 799-805. https://doi.org/10.5858/arpa.2020-0901-sa

T.C. Sağlık Bakanlığı. (2020). COVID-19 (SARS-CoV2 Enfeksiyonu) Rehberi Bilim Kurulu Çalışması. https://covid19.saglik.gov.tr/Eklenti/39551/0/covid19rehberigenelbilgilerepidemiyolojivetanipdf.pdf

Wang, X., Zhou, Z., Zhang, J., Zhu, F., Tang, Y., & Shen, X. (2020). A case of 2019 Novel Coronavirus in a pregnant woman with preterm delivery. *Clinical Infectious Diseases. 71*(15): 844-846. https://doi.org/10.1093/cid/ciaa200

**OLGU SUNUMU / CASE REPORT**
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.1127240

# Clinical Manifestation and Diagnosis of a Thyroid Adenoma in a 3-year-old Horse

Erdem GÜLERSOY[1] Adem ŞAHAN[1] Oğuz ÖZALCANAT[2]

[1] Harran University, Veterinary Faculty, Department of Internal Medicine
[2] Jockey Club of Turkey

***Geliş Tarihi / Received:*** *7.06.2022,* ***Kabul Tarihi / Accepted:*** *16.08.2022*

**ABSTRACT**
Hyperthyroidism in horses is a rare disorder in young horses that causes diverse findings such as weight loss, tachypnea, aggression, change in appetite and cachexia. In this report, the clinical manifestation and methods that used in the diagnosis of thyroid adenoma are presented. It was learned that a 3-year-old male Thoroughbred horse became aggressive and had been losing weight despite an adequate diet and appetite. During the inspection, a palpable, painless and moving mass was detected caudal to the larynx, on the left side. For further diagnosis, hemogram, serum biochemistry, urine dipstick analysis and ultrasonographic examination were performed. In serum biochemistry, high HDL, LDH, triglyceride, AST, direct bilirubin, creatine kinase and fT3; low TSH, fT4 and ferritin levels were determined. Ultrasonographic examination revealed that the left thyroid tissue was 2.83 cm x 4.81 cm in size. In the microscopic examination of the aspirate, it was observed that follicles were rich in cytoplasm and surrounded by cuboidal epithelial cells of varying sizes. Dilatation was observed in some follicles, while others were small or even atrophic. As a result, high fT3 and low TSH levels were consistent with the fact that the gland was overactive, the circulating thyroid hormone level was high, and the pineal gland produced less TSH by the feedback mechanism, all of which indicated hyperthyroidism. In addition, it was concluded that thyroid adenoma can also be seen in young horses, may cause clinical symptoms, ultrasonographic examination, microscopic examination of the aspirate and comprehensive serum biochemistry analysis are sufficient for diagnosis.
**Keywords:** Fine needle aspiration, Serum biochemistry, Diagnosis, Ultrasound.

## 3 Yaşındaki Bir Atta Tiroid Adenomunun Klinik Belirtileri ve Tanısı

**ÖZ**
Atlarda hipertiroidizm, zayıflama, taşipne, agresyon, iştahta değişim ve kaşeksi gibi çeşitli bulgulara sebep olan, genç atlarda nadir bir bozukluktur. Bu olgu sunumunda, tiroid adenomunun klinik tablosu ve tanısında kullanılan metotlar sunuldu. 3 yaşlı erkek Safkan atın dengeli besleme ve iştaha rağmen kilo kaybettiği ve agresifleştiği öğrenildi. İnspeksiyon sırasında larinksin kaudalinde, sol tarafta, palpe edilebilir, ağrısız ve hareketli bir kitle belirlendi. Daha ileri tanı için hemogram, serum biyokimyası, idrar dipstick analizi ve ultrasonografik muayenesi yapıldı. Serum biyokimyasında HDL, LDH, trigliserit, AST, direkt bilirubin, kreatin kinaz ve fT3 düzeyleri yüksek; TSH, fT4 ve ferritin düzeyleri ise düşük bulundu. Ultrasonografik muayenede ise sol tiroid dokusu 2.83 cm x 4.81 cm boyutundaydı. Aspiratın mikroskobik muayenesinde değişken boyutlarda küboidal epitel hücreleri ile çevrelenmiş sitoplazmadan zengin foliküller gözlendi. Bazı foliküllerde dilatasyon gözlenirken bazıları küçük hatta atrofikti. Sonuç olarak elde edilen yüksek fT3 ile düşük TSH düzeyleri, bezin aşırı aktif olduğunu, dolaşımdaki tiroid hormonu seviyesinin yüksek olduğu ve epifiz bezinin feedback mekanizması ile daha az TSH ürettiği, tüm bu durumun hipertiroidizmi gösterdiği gerçeği ile uyumluydu. Ayrıca tiroid adenomunun genç atlarda da görülebileceği, klinik semptomlara sebep olabileceği, ultrasonografik muayene, ince iğne aspirasyon tekniği ile alınan aspiratın mikroskobik muayenesi ile birlikte kapsamlı serum biyokimyası analizinin tanı için yeterli olduğu kanısına varıldı.
**Anahtar Kelimeler:** İnce iğne aspirasyonu, Serum biyokimyası, Tanı, Ultrason.

***Sorumlu Yazar / Corresponding Author:*** Adem ŞAHAN, Harran University, Veterinary Faculty, Department of Internal Medicine, Şanlıurfa, Türkiye.
***E-mail:*** ademsahan@harran.edu.tr

***Bu makaleye atıf yapmak için / Cite this article:*** Gülersoy, E., Şahan, A., & Özalcanat, O. (2024). Clinical Manifestation and Diagnosis of a Thyroid Adenoma in a 3-year-old Horse. *BAUN Health Sci J,13*(1), 218-222. https://doi.org/10.53424/balikesirsbd.1127240

## INTRODUCTION

Thyroid dysfunction in adult horses is rare in general and its diagnosis is difficult due to its wide variety of clinical findings (Hines, Gay, & Talcott, 1997). The reason for this difficulty is that many endogenous and exogenous factors affect thyroid function. Also, serum thyroid hormone levels vary widely and basal levels can be misleading. Thus, many euthyroid horses are diagnosed as hypothyroid. In addition to the difficulty of diagnosis, it has been reported that 750 thousand American dollars are spent annually for the treatment of thyroid disorders (Sojka, 1995). Hyperthyroidism in horses is relatively rare and there are few reported cases in the literature. Clinical findings of hyperthyroidism include weight loss, tachypnea, bad coat structure, behavioral changes, changes in appetite, and cachexia (Breuhaus, 2011). Most cases of hyperthyroidism in horses are caused by an adenoma of the thyroid gland. However, adenomas and hyperplasia are not uncommon in older horses, and most thyroid tumors do not cause changes in serum thyroid hormone levels. Therefore, enlarged thyroid glands alone are not an indication for initiating treatment of hypo- or hyperthyroidism (Costello, Firshman, Brown, Maher, & Tadros, 2019).

Since the clinical manifestations of hyperthyroidism are non-specific, it should be differentiated from other common diseases such as muscle disorders causing weight loss, gastrointestinal absorptive disorders, liver disease, cardiac disorder, dental disease and malnutrition (Tsang & Houlden, 2009). Diagnostic suspicion of hyperthyroidism can be confirmed by the presence of consistent clinical findings, persistently elevated serum thyroid elevation, fine needle aspirate or biopsy examination, ultrasonographic examination of the thyroid gland, and non-suppression of T3 and T4 levels following T3 suppression testing (Costello et al., 2019). In this report, the clinical manifestation of thyroid adenoma, which is common in elderly horses and is generally inactive and does not cause clinical symptoms, and the methods that used in the diagnosis in a 3-year-old Thoroughbred horse are presented.

## CASE DESCRIPTION

A 3-year-old male Thoroughbred horse, who had been suffering from weight loss for the last 3 months despite adequate and balanced nutrition and appetite, was admitted to the Animal Hospital of Faculty of Veterinary Medicine, Harran University. In the anamnesis, it was learned that the horse did not have a previous disease history, had recently become aggressive, and the consumption of water (average 50-55 liters/day) and feed (5.5-6 kg commercial ration and 12-13 kg hay/day) had increased. The clinical examination revealed an evident muscle wasting and weak body condition score (3/9). Physical examination findings were within reference (respiratory rate: 22/minute, body temperature: 38.2 °C, capillary refill time: <3 seconds) except tachypnea (76 bpm). During the inspection, a palpable, painless and moving mass was detected caudal to the larynx, on the left side, almost between the 3rd and 6th tracheal rings (Figure 1 A, B). No swelling or palpable tissue was observed on the right side. Palpation of the trachea was painless and no abnormal sound was detected during lung auscultation. On auscultation from the right fossa paralumbalis region, caecal contraction sounds were determined to be normal. Urine dipstick (Kruuse Vet-10 Urine Strips, Denmark) analysis results were normal. No dental equilibration was needed as the horse was routinely checked.

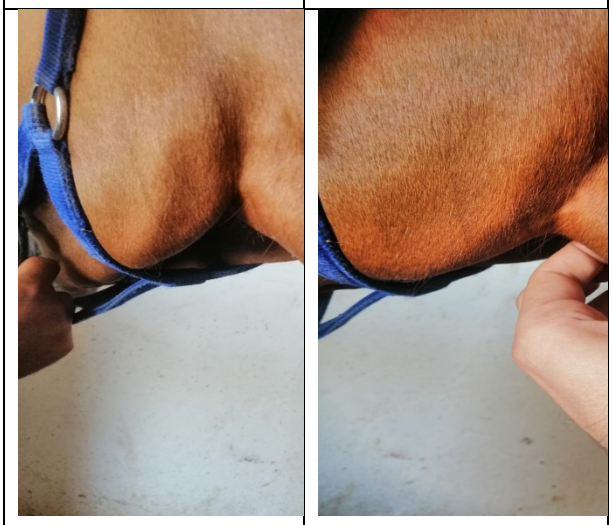


**Figure 1. Appearance of the mass detected between the 3rd and 6th tracheal rings (A, B)**

Serum biochemistry including hormone level measurements (from the serum samples obtained after a 5-minute centrifugation at 5000 g following a 1-hour clotting time using anticoagulant-free gel tubes) and hemogram analysis (using tubes with $K_3$EDTA) were performed from the venous blood sample taken with the jugular venepuncture technique with minimal patient stress. Published reports were used for reference values (Lumsden, Rowe, & Mullen, 1980), and in cases where data were not available, in-house laboratory test values were used. No remarkable abnormal results were detected in the hemogram analysis (Sysmex poch-100i, Sysmex®). In serum biochemistry analysis (Noahcali-100 Automatic Biochemistry Analyzer®), it was determined that high density lipoprotein (HDL) (46.2 mg/dL), LDH (228 U/L), triglyceride (24.6 mg/dL), AST (270 U/L), direct bilirubin (0.32 mg/L). dL), creatine kinase (134 U/L) and fT3 (7.32 pmol/L) levels were high whereas TSH (0.006 ng/mL), fT4 (8.96 pmol/L) and ferritin (0.5 mg/dL) levels were low (Table 1). Cervical, thoracic and abdominal ultrasonographic examinations (Mindray z-60®) were performed. The liver was normal in size and shape, although slightly hyperechoic. No abnormalities were observed in other abdominal organs. No abnormal bronchogram was detected in thoracic ultrasonography. In the cervical ultrasonographic examination, a focal and spherical mass with a size of 2.83 cm x 4.81 cm, consistent with the thyroid tissue, was

detected on the left side (Figure 2). The right thyroid tissue was 2.1 x 2.4 cm in size. Fine-needle aspiration from the hyperplasic thyroid gland was performed for diagnostic purposes, under the guidance of ultrasound and within the framework of the rules of asepsis and antisepsis. In the microscopic examination of the aspirate taken (Diff-Quick staining, x1000 magnification, light microscope, Olympus, BX-51®), follicles which were rich in cytoplasm surrounded by cuboidal epithelial cells of variable size were observed. Dilatation was observed in some follicles, while others were small or even atrophic. Large follicles had intraluminal papillary protrusions. The colloid structure of the small follicles had disappeared. Diffuse perifollicular hyperplasias were observed in clusters in C cells. Additionally, interstitial fibrosis was detected (Figure 3). Functional thyroid adenoma was diagnosed as a result of physical, laboratory, ultrasonographic and microscopic examinations of fine needle aspirate.

**Table 1.** Serum biochemistry results.

| Parameters | Measured Values | Reference* |
|---|---|---|
| **HDL↑** | **46.2 mg/dL** | **19.44-24.84** |
| Iron | 10.38 µmol/L | 8.6-21.8 |
| Potassium | 4.54 mmol/L | 3.5-5.5 |
| **LDH↑** | **228 U/L** | **21-141** |
| LDL | 19.2 mg/dL | 46.8-54.24 |
| Magnesium | 2.2 mg/dL | 2.2-2.7 |
| Sodium | 135.8 mmol/L | 135-149 |
| Phosphorous | 2.80 mg/dL | 0.8-1.3 |
| Total protein | 57.2 g/L | 62.5-70 |
| **Triglyceride ↑** | **24.6 mg/dL** | **0.18-7.74** |
| **TSH↓** | **0.006 ng/mL** | **0.02-0.97** |
| Amylase | 3 U/L | 1-144 |
| **AST↑** | **270 U/L** | **80-250** |
| ALT | 6.7 U/L | 1-60 |
| ALP | 114 U/L | <250 |
| **Direct bilirubin↑** | **0.32 mg/dL** | **0.04-0.16** |
| Total bilirubin | 2.76 mg/dL | 2.4-5 |
| Calcium | 2.91 mmol/L | 2.5-4 |
| Chlorine | 99.5 mmol/L | 90-105 |
| **Creatine kinase↑** | **134 U/L** | **<50** |
| Creatinine | 112 µmol/L | 90-200 |
| **Ferritin↓** | **0.5 ng/mL** | **1.19-1.85** |
| **fT3↑** | **7.32 pmol/L** | **1.7-5.2** |
| **fT4↓** | **8.96 pmol/L** | **7-47** |
| GGT | 20 U/L | <40 |
| Glucose | 88.9 mg/dL | 70-120 |

HDL: High density lipoprotein, LDH: Lactate dehydrogenase, LDL: Low density lipoprotein, TSH: Thyroid stimulating hormone, AST: Aspartate aminotransferase, ALT: Alanine aminotransferase, ALP: Alkaline phosphatase, fT3: Free triiodothyronine, fT4: Free thyroxine, GGT: Gamma glutamyl transferase. *(Lumsden et al., 1980).

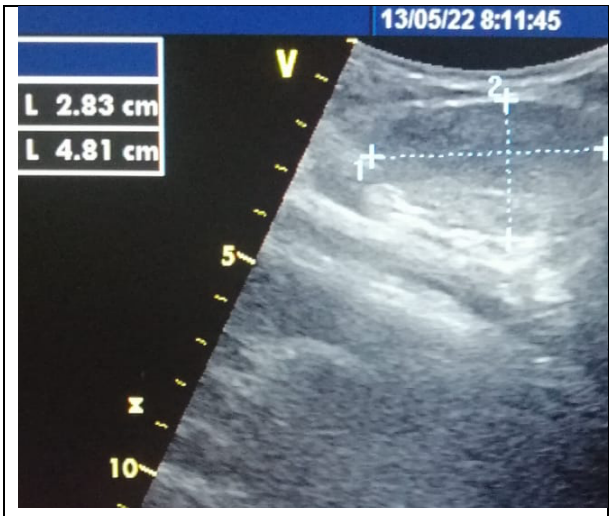


**Figure 2. Ultrasonographic image of the hyperplasic thyroid gland (7.5 MHz, microconvex probe).**

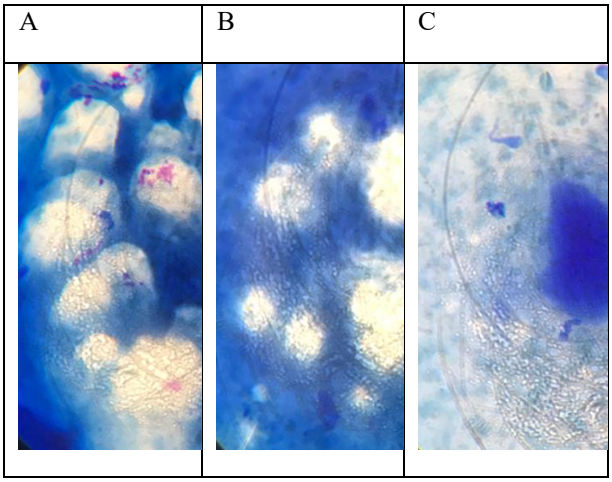


**Figure 3. Microscopic image of the thyroid aspirate taken by the fine needle aspiration technique (Diff-Quick, x1000 magnification, light microscope).**

(A) C-cell adenoma with small clusters and nests of tumor cells separated by fine fibrous stroma. The cells have abundant amphophilic cytoplasm. Residual follicles are still present from the original thyroid tissue.

(B) C-cell adenomas were discrete, expansile proliferations of clusters and lobules of fairly well differentiated C-cells, causing mild compression of adjacent thyroid gland follicular parenchyma.

(C) A focal proliferation of C cells is present. Contiguous nests of C cell surrounded by small follicles. High nuclear-to-cytoplasmic ratio is present in this focal proliferation.

## DISCUSSION

Investigating thyroid dysfunction in horses compared to other types of animals is difficult due to the multisystemic and non-specific effects of thyroid

hormones, the low specificity of available function tests and the wide variety of extra-thyroidal factors that may cause dysfunction (Mooney & Murphy, 1995). In the previous reports, it has been reported that T4 levels are low in Thoroughbred horses at rest, and measurement of T4 level has been reported to be useful for the evaluation of thyroid function in Thoroughbred horses. In a more recent study, it was determined that thyroid hormone levels in Thoroughbred horses are lower than the reported reference values (Breuhaus, 2011; Mooney & Murphy, 1995). Although thyroid gland enlargement due to thyroid adenoma has been considered clinically insignificant in young horses until now, it can cause important clinical findings when it causes excessive thyroid hormone secretion in older horses (Tsang & Houlden, 2009).

Ultrasonographic examination of the thyroid gland is useful in evaluating the structure of the mass and evaluating the hypertrophy and atrophy of the thyroid and surrounding tissues. The normal equine thyroid gland is typically moderately echogenic and homogeneous. The thyroid gland is highly vascular and close to several large arteries and nerves. Therefore, it is important to evaluate the laryngeal function endoscopically before and after the operation in horses that will undergo thyroidectomy (Costello et al., 2019). In the present report, ultrasonographic examination revealed that the thyroid gland had a unilateral solid structure and some cystic areas, and these findings were consistent with the findings of adenomatous hyperplasia. In addition, increased echogenicity of the left thyroid lobe was interpreted as increased fibrosis. The intact capsular structure was compatible with the non-invasive neoplastic process (Tan, Davies, Crisman, Coyle, & Daniel, 2008). In the mammalian thyroid gland, the irregularly distributed cells are called parafollicular cells or C (calcitonin) cells. Abnormal proliferation of these cells can be classified as hyperplasia, adenoma and adenocarcinoma. In hyperplasic cases, the focal accumulations are smaller than the colloid-filled follicles, whereas in adenoma cases the lesions are nodular. Although the etiology of thyroid gland adenoma has not been fully elucidated, it has been reported that age, hypercalcemia, and calcitonin stimulating drugs may be effective (Capen, 2002). The characteristics of the thyroid lesion detected in the present report were unilateral, well circumscribed, and encapsulated, which were consistent with adenoma. In addition, the detected high fT3 and low TSH levels were consistent with the fact that the gland is overactive, the circulating thyroid hormone level is high, and the pineal gland produces less TSH with the feedback mechanism, all of which indicate hyperthyroidism (Tan et al., 2008).

Hypoferremia in horses may be due to two pathological conditions. These are; inflammation and iron deficiency. High ferritin level in cases of hyperthyroidism is directly related to the effect of thyroid hormones on ferritin synthesis. Low ferritin level in the present report may be associated with impaired iron utilization by erythropoietic cells along with normal hemogram findings (Kubota, Tamura, Kurabayashi, Shirakura, & Kobayashi, 1993).

Hyperbilirubinemia in horses, similar to other mammals, occurs when bilirubin formation exceeds excretion. However, unlike other domestic animals, anorexia contributes to hyperbilirubin formation in horses (Stockham, 1995). In addition, cholestasis may develop in cases of thyrotoxicosis, and the hypermetabolic state in hyperthyroidism may increase hepatic oxygen consumption without increasing hepatic blood flow. Elevated direct bilirubin levels in the present report may be associated with anorexia and increased hepatic oxygen consumption (Bal & Chawla, 2010).

In cases of hypothyroidism, HDL levels may be normal or increased. This finding is associated with a decrease in cholesteryl-ester transfer protein and hepatic lipase activities regulated by thyroid hormones (Duntas, 2002). Similarly, hypothyroidism is also associated with high triglyceride levels. In the present report, high HDL and triglyceride levels, which are detected in contrast to other reports of hyperthyroidism cases, may be related to hepatic lipase-mediated HDL2 catabolism and not yet increased CEPT-mediated cholesteryl ester transfer. In addition, high HDL level may be associated with anti-atherogenic function (Sigal et al., 2020).

Enzymes such as AST, LDH and creatine kinase, which have similar diagnostic importance in horses, are frequently used in serum biochemistry analyses and are generally used in the detection of hepatocellular diseases and muscle damage. The main sources of these enzymes are hepatocytes and skeletal or cardiac muscle fibers (Stockham, 1995). High AST, LDH and creatine kinase levels in the present report were associated with increased protein catabolism and the presence of hypermetabolic state in cases of hyperthyroidism (Ranka & Mathur, 2003).

In this report, although lack of echocardiographic examination of the heart and biopsy of hyperplasic thyroid gland can be counted as limitations, comprehensive serum biochemistry analysis along with the selected examination methods and techniques were sufficient for the diagnosis.

## CONCLUSION

As a result, it was concluded that thyroid adenoma can also be seen in young horses, may cause clinical symptoms, and ultrasonographic examination, microscopic examination of the aspirate obtained by fine needle aspiration technique along with comprehensive serum biochemistry analysis are sufficient for diagnosis.

**Acknowledgement**

The authors thank to their faculties and institutions.

**Conflict of Interest**

None.

**Author Contributions**
**Plan, design:** EG, AŞ; **Material, methods and data collection:** OÖ; **Data analysis and comments:** EG, AŞ; **Writing and corrections:** EG, AŞ, OÖ.

**REFERENCES**


Bal, C., & Chawla, M. (2010). Hyperthyroidism and jaundice. *Indian Journal of Nuclear Medicine: IJNM: The Official Journal of the Society of Nuclear Medicine, India, 25*(4), 131. https://doi.org/10.4103/0972-3919.78244

Breuhaus, B. A. (2011). Disorders of the equine thyroid gland. *Veterinary Clinics: Equine Practice, 27*(1), 115-128. https://doi.org/10.1016/j.cveq.2010.12.002

Capen, C. (2002). Tumors of the endocrine glands. *Tumors in domestic animals*, 607-696. https://doi.org/10.1002/9780470376928.ch13

Costello, J., Firshman, A. M., Brown, J. C., Maher, M., & Tadros, E. M. (2019). Response to thyrotropin-releasing hormone (TRH) in a horse with hyperthyroidism associated with a functional thyroid adenoma. *The Canadian Veterinary Journal, 60*(11), 1189.

Duntas, L. H. (2002). Thyroid disease and lipids. *Thyroid, 12*(4), 287-293. https://doi.org/10.1089/10507250252949405

Hines, M., Gay, C., & Talcott, T. (1997). Congenital hypothyroidism and dysmaturity syndrome of foals: diagnosis and possible risk factors. *Proceedings 15th American College of Veterinary Internal Medicine, Lake Buena Vista. Lakewood (CO): ACVIM*, 363-364.

Kubota, K., Tamura, J., Kurabayashi, H., Shirakura, T., & Kobayashi, I. (1993). Evaluation of increased serum ferritin levels in patients with hyperthyroidism. *The clinical investigator, 72*(1), 26-29. https://doi.org/10.1007/BF00231112

Lumsden, J., Rowe, R., & Mullen, K. (1980). Hematology and biochemistry reference values for the light horse. *Canadian Journal of Comparative Medicine, 44*(1), 32.

Mooney, C. T., & Murphy, D. (1995). Equine hypothyroidism: the difficulties of diagnosis. *Equine Veterinary Education, 7*(5), 242-245. https://doi.org/10.1111/j.2042-3292.1995.tb01237.x

Ranka, R., & Mathur, R. (2003). Serum creatine phosphokinase in thyroid disorders. *Indian Journal of Clinical Biochemistry, 18*(1), 107-110. https://doi.org/10.1007/BF02867676

Sigal, G. A., Tavoni, T. M., Silva, B. M., Khalil-Filho, R., Brandão, L. G., Baracat, E. C., & Maranhão, R. C. (2020). Subclinical hyperthyroidism: status of the cholesterol transfers to HDL and other parameters related to lipoprotein metabolism in patients submitted to thyroidectomy for thyroid cancer. *Frontiers in Endocrinology, 11*, 176. https://doi.org/10.3389/fendo.2020.00176

Sojka, J. E. (1995). Hypothyroidism in horses. *The Compendium on continuing education for the practicing veterinarian (USA)*.

Stockham, S. L. (1995). Interpretation of equine serum biochemical profile results. *Veterinary clinics of North America: equine practice, 11*(3), 391-414. https://doi.org/10.1016/S0749-0739(17)30307-3

Tan, R. H., Davies, S., Crisman, M. V., Coyle, L., & Daniel, G. B. (2008). The use of propylthiouracil for treatment of hyperthyroidism in a horse. *Journal of veterinary internal medicine, 22*, 1253-1258. https://doi.org/10.1111/j.1939-1676.2008.0169.x

Tsang, W., & Houlden, R. L. (2009). Amiodarone-induced thyrotoxicosis: a review. *Canadian Journal of Cardiology, 25*(7), 421-424. https://doi.org/10.1016/S0828-282X(09)70512-4

OLGU SUNUMU /CASE REPORT
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.1184383

# Radiology Findings in a Case of Acute Methanol Intoxication Complicated with Intracranial Haemorrhage

Adil AYTAC[1], Erdoğan BULBUL[2], Bahadır CAGLAR[3]

[1] Balikesir District Susurluk State Hospital
[2] Balıkesır University, Faculty of Medicine, Department of Radiology
[3]Balıkesır University, Faculty of Medicine, Department of Emergency

***Geliş Tarihi / Received*** *05.10.2022,* ***Kabul Tarihi / Accepted:****25.10.2022*

**ABSTRACT**

**Objective:** Methanol intoxication is rare and it can be fatal. This case report aimed to describe the radiological findings in acute methanol intoxication complicated with intracranial haemorrhage in a young patient. A 32-year-old man applied to emergency department with a major complaint of nausea, vomiting, double vision, and confusion. Glascow coma score (GCS) was 7 at the initial referral. Laboratory tests showed high anion gap metabolic acidosis. Acute methanol intoxication was diagnosed by aid of the patient anamnesis. Diffusion-weighted MRI (DW-MRI) showed similar diffusion restriction lesions in the putamen and cingulate gyrus of both cerebral hemispheres. The patient had a cardiac arrest during follow-up in the emergency department. He was converted to sinus rhythm with the interventions, intubated, and taken to the intensive care unit. GCS reduced to 3 during follow- up at the 4th day. Cerebral intraparenchymal haemorrhage at the level of left basal ganglia was observed in the brain computed tomography (CT). He was operated however remained comatose after the operation and died at the 8th day of admission. Possibility of methanol intoxication should be included in the differential diagnosis in patients with altered consciousness, vision disturbances and a high anion gap admitted to the emergency service. DW-MRI may be helpful in diagnosis by detecting symmetrical diffusion restrictions at the basal ganglia. Additionally radiologic methods like CT can be used to determine complications such as bleeding that may occur during the follow-up of the cases.

**Keywords:** Methanol Intoxication, Putamen, Diffusion Restriction, MRI, Cerebral Haemorrhage.

# İntrakraniyal Kanama ile Komplike olan Bir Akut Metanol İntoksikasyonu Vakasında Radyolojik Bulgular

**ÖZ**

**Amaç**: Metanol intoksikasyonu nadir görülen bir antitedir ve ölümcül olabilir. Bu olgu sunumunda, intrakraniyal kanama ile komplike olan metanol intoksikasyonlu genç hastada radyolojik bulguların tanımlanması amaçlanmıştır. Otuz iki yaşındaki bir erkek hasta bulantı, kusma, çift görme ve bilinç bulanıklığı ana şikayetleri ile acil servise başvurdu. İlk başvuruda Glascow koma skoru (GKS) 7 idi. Laboratuvar testlerinde yüksek anyon açıklı metabolik asidoz görüldü. Hastanın anamnezi ile birlikte akut metanol intoksikasyonu tanısı konuldu. Difüzyon ağırlıklı MRG (DA-MRG) incelemesinde, her iki putamen ve singulat girusta benzer difüzyon kısıtlılığı görüldü. Hastanın acil servisteki takibi sırasında kardiyak arrest gelişti. Yapılan müdahalelerle sinüs ritmine döndürülüp, entübe edilerek yoğun bakıma alındı. Takibinin 4. gününde GKS 3'e düştü. Beyin bilgisayarlı tomografisinde (BT) sol bazal ganglion seviyesinde intraparankimal hematom izlendi. Hasta opere edildi ancak ameliyattan sonra da komada kaldı ve yatışının 8. gününde kaybedildi. Acil servise bilinç değişikliği, görme bozukluğu ile başvuran ve yüksek anyon açığı olan hastalarda metanol intoksikasyonu olasılığı ayırıcı tanıda yer almalıdır. DA-MRG'de, bazal ganglionlarda simetrik difüzyon kısıtlamaları görülmesi ayırıcı tanıda yardımcı olabilir. Ayrıca olguların takibinde oluşabilecek kanama gibi komplikasyonları belirlemek için BT gibi radyolojik yöntemler kullanılabilir.

**Anahtar Kelimeler**: Metanol Intoksikasyonu, Putamen, Difüzyon Kısıtlılığı, MRG, Beyin Kanaması.

***Sorumlu Yazar / Corresponding Author:*** Adil Aytac, Radiologist-Medical Doctor, Balikesir District Susurluk State Hospital, Balikesir, Turkey.
***E-mail:*** dradilaytac@gmail.com

***Bu makaleye atıf yapmak için / Cite this article:*** Aytaç, A., Bulbul, E., & Caglar, B. (2024). Radiology findings in a case of acute methanol intoxication complicated with intracranial haemorrhage. *BAUN Health Sci J, 13*(1), 223-226. https://doi.org/10.53424/10.53424/balikesirsbd.1184383

## INTRODUCTION

Methanol is a quite poisonous fluid and has similar physical properties to ethanol. (Camurcuoglu et all 2022). Methanol intoxication often emerge as a result of counterfeiting drinking alcohol, mistakenly use of industrial products. (Sahar M et all 2016). Taken into to body methanol is converted to formic acid and lactic acid, because of these metabolites formed emerge to serious metabolic acidosis. Methanol intoxication causes various clinical symptoms by affecting important structures related to the central nervous system. (Hyun Jim Kim et all, 2017). Radiologic imagings are able to indicate detrimental effects of methanol in CNS therefore cross sectional imaging is very significant for the management of methanol intoxication. In these patients, putaminal necrosis, subcortical white matter, gray matter, optic nerve and cerebellum involvements are often presented. (Raisa F et all 2021; Gök M et all, 2017). In this case report, the radiologic findings of acute methanol intoxication and its complication in a young man were described.

## CASE PRESENTATION

A 32 year-old man admitted to emergency department with a major complaints of nausea, vomiting, double vision, and confusion. The patient did not have a chronic disease and no history of drug use. He had a history of acute wild spirit intake 24 hours prior to the admission. In the physical examination, the patient's Glasgow Coma Scale (GCS) was 7. At first an arterial blood gas analysis showed a high anion gap metabolic acidosis (ph 6.98, $HCO_3$ 5.3, $CO_2$ 19.8, $pO_2$ 129). Residual blood methanol level could not be measured. The patient was treated with $Na_2CO_3$, ethanol and hemodialysis. Non-contrast brain CT that as the initial imaging modality performed approximately 24 hours after the methanol ingestion was normal (Figure 1).

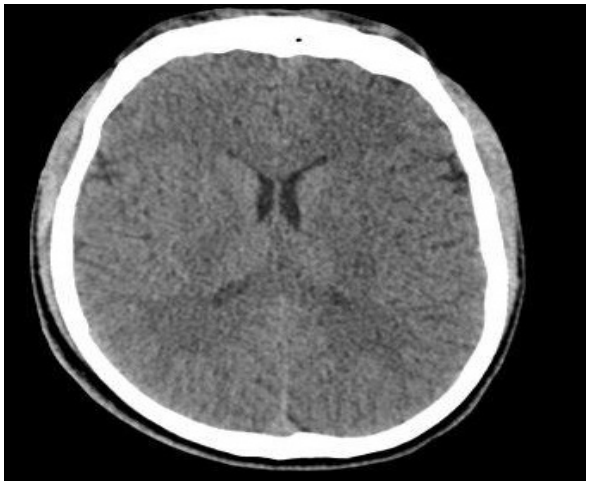

**Figure 1: There was no distinguishable abnormality found in the axial plane non-contrast brain CT image at the level of basal ganglia.**

Diffusion- weighted MRI (DW-MRI) examination performed immediately after non- contrast brain CT. DW-MRI showed symmetrical well defined marked diffusion restriction in bilateral putamen which appears hyperintense in DW images and suppressed in ADC map. In addition, two focal focus showing diffusion restriction in the bilateral cingulat gyrus were observed (Figure 2).

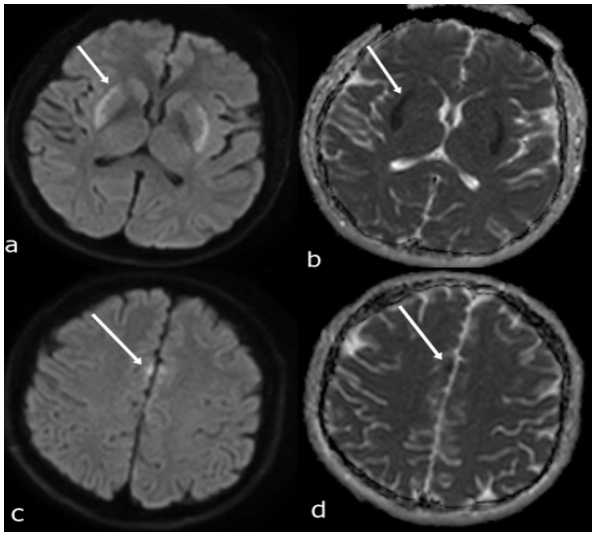


**Figure 2: MRI shows marked diffusion restriction (arrows) which appears hyperintense in DW image and suppressed in ADC at the both putamens (a,b) and cingulate gyri (c,d).**

Cardiac arrest became during follow-up in the emergency department cardiopulmonary resuscitation was performed. Ventricular fibrilation current was observed on the monitor. He was defibrillated with 200 joules. The patient returned to sinus rhythm after 15 minutes. He was intubated and taken to intensive care unit (ICU). During the follow-up GCS reduced to 3 on the 4th day in the ICU. Parenchymal hemorrhage was observed in the brain CT at the 4 level of left basal ganglia (Figure 3). The patient was operated due to intracranial high pressure. After operation, the patient remained comatose and died 8th day of admission.

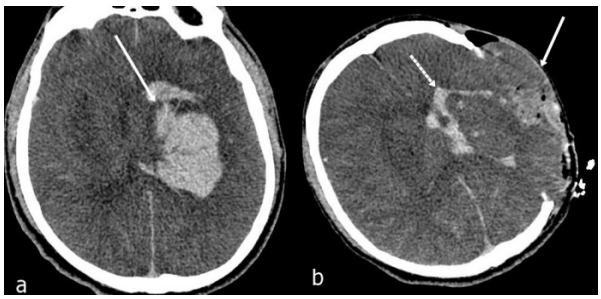


**Figure 3: The preoperative CT shows the paranchymal hemorrage (arrow) the level of left basal ganglia (a). External brain herniation (dashed arrow) is seen after craniectomi in postoperative CT image (b).**

## DISCUSSION

Acute methanol intoxication due to oral ingestion of methanole may be as a result of an accident or suicide attempt (Sahar M et all 2016). Methanol is found in numerous industrial materials used in daily life in plenty of countries. (Hyun Jim Kim et all, 2017; Gök M et all, 2017). As less as 4 ml of methanol lead to blindness, almost 15 ml-30 ml of methanol and blood levels of 1500 mg/l are adequate to lead to death. (Raisa F et all 2021). Clinical signs emerge within 12-24 hours. In this time, happen for convert of methanol in the liver to its more harmful products and the simultaneous emerge of acidosis. Methanol is metabolized to toxic components resulting in varied clinical symptoms (Rumitha Kayastha et all,2022). These symptoms range from nonspecific findings such as headache and dizziness to death. (Camurcuoglu et all 2022; Sahar M et all 2016; Hyun Jim Kim et all, 2017; Raisa F et all 2021; GöK M et all, 2017; Mehdi Mesri et all, 2021; Rumitha Kayastha et all, 2022; Nirdesh Jain et all 2013; Zeinali M et all, 2021; Dipoce J et all, 2012).

Methanol intoxication typical of influence to the putamen, optic nerves and retina bilaterally. In addition may be influence the other basal ganglia nuclei, cerebellum and subcortical white matter. The damage to basal ganglia may be derived from direct effect of toxic metabolite of methanol, formic acid, and the neural cells. Also, basal ganglia are more susceptible to acidosis in proportion to the rest of the brain. High metabolic demand of putamen or its microvascular structure may be cause more vulnerable to the toxic effects of formic acid. The myelinoclastic influence of the formic acid is supposed to be liable for optic nerve lesions or axonal damage. Complications such as permanent blindness due to optic nerve damage, parkinsonism due to basal ganglia damage, cerebral hemorrhage due to dialysis or heparin use, transverse myelitis and polineuropathy due to metabolic acidosis are possible to develop (Camurcuoglu et all 2022, Raisa F et all 2021, Mehdi Mesri et all, 2021, 5 Nırdesh Jain et all 2013, Zeinali M et all, 2021). Methanol intoxication can be uncommonly affect of cerebral and cerebellar hemispheres. Intraventricular hemorrhage, diffuse cerebral edema and optic nerve necrosis may be lead to. There are rare cases of subarachnoid hemorrhage also reported. (Raisa F et all 2021). Diffusion restriction in methanol intoxication occurs due to necrosis. (Matthew P. Quinn et all 2020). There are many neurodegenerative, genetic, toxic, metabolic and genetic diseases that affect the basal ganglia symmetrically. Diseases such as hypoglycemic brain injury, carbon monoxide poisoning, hypoxic-ischemic encephalopathy, hyperammonemia, Wilson, Leigh, which causes restricted diffusion in the basal ganglia, should be considered in the differential diagnosis. But, diffusion MRI examination, showed symmetrical diffusion restriction in the dorsolateral putamen suggests methanol toxicity. (Matthew P. Quinn et all 2020). Radiological (MRI) findings in related to methanol intoxication are typical and contain putaminal necrosis (Non-hemorrhagic or hemorrhagic), white matter (subcortical and deep), cortical (cerebral and cerebellar) and midbrain lesions, hemorrhage (Intraaxial-ventricular), enhancement of necrotic lesions. (Nırdesh Jain et all 2013). Unlike the cases in the literature, there was cingulate gyrus involvement found in DW-MRI in this case.

In treatment, intravenous ethanol is administered to decrease the formation of methanol metabolites. For balance of metabolic acidosis preferred to intravenous sodium bicarbonate, gastric lavage and hemodialysis. Fomepizole and folinic acid are supportive methods (Camurcuoglu et all 2022, Raisa F et all 2021, Mehdi Mesri et all, 2021, Zeinali M et all, 2021). In this patient, $Na_2CO_3$ treatment was started in the emergency room. Haemodialysis and general supportive treatment were applied in the intensive care unit. However, the patient died due to the development of intracerebral hemorrhage in the follow-up.

## CONCLUSION

Possibility of methanol intoxication should be included in the differential diagnosis in patients with altered consciousness, vision disturbances and a high anion gap admitted to the emergency service. DW-MRI may be helpful in diagnosis by detecting symetrical diffusion restrictions at the putamen. Additionally radiologic methods like CT can be used to determine complications such as bleeding that may occur during the follow-up of the cases.

### 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:** AA, EB; **Material, methods and data collection:**AA, EB, BÇ; **Data analysis and comments:** AA, EB, BÇ; **Writing and corrections:** AA, EB

## REFERENCES

Camurcuoglu E, & Ahmet Mesrur Halefoglu (2022), CT and MR Imaging Findings in Methanol Intoxication Manifesting with BI Lateral Severe Basal Ganglia and Cerebral Involvement, *Journal of the Belgian Society of Radiology.* *106*(1): 66, 1–4, https://doi.org/10.5334/jbsr.2836

DiPoce J & Guelfguat M (2012). Radiologic Findings in Cases of Attempted Suicide and Other Self-Injurious Behavior. *Radiographics.* *32*(7):2005-24. https://doi.org/10.1148/rg.327125035

Gök M, Özüm Tunçyürek, Ersen Ertekin &Yelda Özsunar Dayanır (2017), Imaging Findings for Methanol Intoxication, *The Journal of Kafkas Medical Sciences. 7*(1):158–161 https://doi.org/10.5505/kjms.2017.91259

Hyun Jin Kim,Moon Kyung Sunwoo, Jang Han Lee , Yong Sun Choi & Dae Yoon Kim (2017), Methanol-Induced Encephalopathy*:* a Case Report*, iMRI 21*:61-64*,* https://doi.org/10.13104/imri.2017.21.1.61

Matthew P. Quinn, Lulu Bursztyn &Manas Sharma (2020) Putaminal Diffusion Restriction in a Case of Methanol Toxicity with Clinical Recovery, *Canadian Journal of Neurological Sciences, 47(1):*115 – 116. https://doi.org/10.1017/cjn.2019.303

Mehdi Mesri, Mohammad Javad Behzadnia & Mohammad Nikpoor et all (2021), Cerebral Methanol Intoxication: A Case Report with Literature Review, *Canadian Journal of Medicine, 3:* 195-201. *https://doi.org/*10.33844/cjm.2022.60611

Nirdesh Jain, Dandu Himanshu. S Shailendra Prasad & Verma,Anit Pariharb (2013), Methanol poisoning: characteristic MRI findings, Ann Saudi *Med. Annals of Saudi Medicine. 33(1): 68–69, https://doi.org/*10.5144/02564947.2012.26.5.1114

Raisa Faizan, Ashok kumar & Imtiaz Ali Panhwar et all (2021), MRI brain, featuring methanol intoxication: a rare case report, *31 (4):*247-249.

Rumita Kayastha Riwaz Acharya & Subodh Shrestha (2022), MRI findings in a case of acute methanol intoxication, *URL: https://www.eurorad.org/case/17772,* https://doi.org/10.35100/eurorad/case.17772, ISSN:1563-4086

Sahar M. Elkhamary, Dalia Fahmy & Alberto Galvez-Ruiz et all (2016), Spectrum of MRI findings in 58 patients with methanol intoxication: Long-term visual and neurological correlation, *The Egyptian Journal of Radiology and Nuclear Medicine. 47*(3*):*1049-1055 https://doi.org/10.1016/j.ejrnm.2016.06.011

Zeinali M, Motamed MR & Almasi Dooghaee M (2021). A Case Report of Putaminal Hemorrhage Due to Methanol Toxicity; is Hemodialysis the Offender? *Asia Pacific Journal of Medical Toxicology. 10*(2):74-76. https://doi.org/10.22038/APJMT.2021.18235