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The Relationship Between Disordered Eating Attitudes, Nutritional Knowledge Levels, and Overweight and Obesity Among University Students: A Single-Center Study in Türkiye

Üniversite Öğrencileri Arasında Düzensiz Yeme Tutum Riski ve Beslenme Bilgi Düzeyinin Fazla Kilo ve Obezite İle İlişkisi: Türkiye'de Tek Merkezi Bir Çalışma

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ABSTRACT

Objective: This study aimed to examine the relationship between irregular eating attitudes and nutritional knowledge levels and obesity and overweight of university students studying at a university in Türkiye.

Materials and Methods: A three-part survey, consisting of socio-demographic information, the Eating Attitude Test-26, and the Nutrition Knowledge Scale, was applied. After the survey, the height and weight of all participants were measured. It was aimed to reach all students, but the survey form was applied to 628 students in total.

Results: The male students had higher average weight, height, and body mass index (BMI) values than the female students. The Eating Attitude Test-26 (EAT-26) score was significantly higher in the female students. The study showed that among the male students who were overweight and obese in terms of BMI, the probability of exceeding the EAT-26 cut-off limit was 4.25 times higher (OR=4.25 [1.38-7.33], p<0.001). Among the female students who were overweight and obese in terms of BMI, the probability of exceeding the EAT-26 cut-off limit was 3.92 times higher (OR=3.92 [2.44-8.04], p<0.001).

Conclusions: Disordered eating attitudes and poor nutritional knowledge levels were more common among those students who were overweight or obese.

Keywords: Eating disorders, nutritional knowledge, obesity, overweight, university students

ÖZ

Amaç: Bu çalışmada, Türkiye'de bir üniversitede öğrenim gören üniversite öğrencilerinin düzensiz yeme tutumları, beslenme bilgi düzeyleri ile fazla kilo ve obezite arasındaki ilişkinin incelenmesi amaçlanmıştır.

Materyal ve Metot: Sosyodemografik bilgiler, Yeme Tutum Testi-26 (YTT-26) ve Beslenme Bilgi Ölçeği'nden (BBÖ) oluşan üç bölümden oluşan bir anket uygulandı. Anketin ardından tüm katılımcıların boy ve kiloları ölçüldü. Tüm öğrencilere ulaşılması hedeflenmiş ancak anket formu toplamda 628 öğrenciye uygulanmıştır.

Bulgular: Erkek öğrencilerin ortalama ağırlık, boy ve beden kitle indeksi (BKI) değerleri kız öğrencilere göre daha yüksekti. EAT-26 puanı kız öğrencilerde anlamlı olarak yüksekti. Çalışma, BKI açısından fazla kilolu ve obez olan erkek öğrencilerde YTT-26 kesme sınırını aşma olasılığının 4,25 kat daha yüksek olduğunu gösterdi (OR=4,25 [1,38-7,33], p<0,001). BKİ açısından fazla kilolu ve obez olan kız öğrencilerde EAT-26 kesme sınırını aşma olasılığı 3,92 kat daha fazladır (OR=3,92 [2,44-8,04], p<0,001). BKİ açısından fazla kilolu ve obez olan kız öğrencilerde beslenme bilgi düzeyi 0,83 kat daha yüksekti (OR=0,83 [0,44-1,18], p=0,711).

Sonuç: Aşırı kilolu veya obez olan öğrencilerde düzensiz yeme tutumları ve zayıf beslenme bilgisi düzeyleri daha yaygındı.

Anahtar Kelimeler: Beslenme bilgisi, fazla kilo, obezite, üniversite öğrencileri; yeme bozukluğu

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INTRODUCTION

Obesity is one of the most important public health issues affecting the whole world today.[1] Although the etiopathogenesis of obesity has not been clearly defined, it is stated that age, income status, sociocultural factors, metabolic disorders, endocrine problems, and psychological problems have direct or indirect effects on the development of obesity.[2,3] Studies found that genetic predisposition and environmental conditions played an important role in the etiology of obesity.[4,5] Recent studies associated obesity and overweight with disordered eating attitudes and nutritional knowledge level.[6,7]

The prevalence of eating disorders is increasing in developed and developing countries, especially among young people.[8] University students, in particular, are the most commonly vulnerable group with disordered eating attitudes and behaviors.[9] Many of this age group are away from home and starting university education during this period of their lives, which increases the likelihood of many mental and behavioral disorders.[10] According to the American Psychological Association, eating disorders are defined as abnormal eating habits that can threaten people's health and even life.[11] Many people who cannot control their eating have overweight and obesity problems. Nutritional knowledge is an important tool to have healthy eating habits and to make food choices healthier. Basically, this situation is based on the Knowledge-Attitude-Behavior model.[12,13] Various study results using anthropometric measurements, such as body mass index (BMI), show that nutritional information is associated with obesity and cardiovascular disease risk.[14] In particular, education level is one of a number of factors that influence nutrition knowledge. Additionally, nutrition knowledge and attitude are interrelated, and both play a key role in influencing nutritional behavior.[15]

This study aimed to examine the relationship between irregular eating attitudes and nutritional knowledge levels and obesity and overweight of university students studying at a university in Türkiye.

MATERIALS AND METHODS

Ethical Considerations: The study was carried out by the Helsinki Declaration. For this study, permission was obtained from the Non-Interventional Clinical Research Ethics Committee of Gazi University (Date:10.01.2023, decision no: 2023 - 68). In addition, verbal permission was obtained from the participants.

Setting and Sample: This cross-sectional study was conducted with the students of the health sciences faculty of a foundation university in Ankara. There were 1217 students in total, and the sample selection method was not used. It was aimed to reach all students, but the survey form was applied to 628 students in total (participation rate %51.60). Women tend to favor health science faculties due to popular departments such as nursing and midwifery. Therefore, the number of female participants was higher in our sample group (66.5%). The survey was applied face-to-face between May and June 2023.

Data Collection: The data were collected by the researchers using a structured survey consisting of socio-demographic features, the Eating Attitude Test -26, and the Nutrition Knowledge Scale.

Eating Attitude Test-26 (EAT-26): The Turkish validity study of the scale developed by Garner et al. (1976) was carried out by Ergüney Okumuş and Sertel Berk (2016), and the Cronbach's Alpha was 0.75.[16] This scale consists of 26 items under three factors: bulimia and food preoccupation, dieting, and oral control. Except for item 26 (reverse scoring), 'always', 'usually' and 'often' were given 3, 2, and 1 points, respectively, and 0 points were given for 'sometimes', 'rarely' and 'never'. Therefore, the total score can vary between 0 and 78. An increase in the mean score indicates risky eating behavior. An individual with a score of ≥20 was classified as "at risk" for disordered eating attitudes and "non-risk" if below 20.[17]

Nutrition Knowledge Scale (NKS): The scale items developed by Öngün Yılmaz et al. are scored between 0 and 4 (strongly agree 4 and strongly disagree 0 points). 10 items of the scale (1, 5, 6, 9, 10, 16, 17, 21, 27, 28) are reverse scored because they represent false information about nutrition. The highest score that can be obtained from the scale, which is evaluated over the total score, is 126. It is evaluated that as the score obtained from the scale increases, the level of nutritional knowledge increases, and as the score decreases, the level of nutritional knowledge decreases. The Cronbach alpha value is 0.851. The mean NKS score is 77.89±10.23. Scores above this value are defined as a good nutritional knowledge level, and scores below this value are defined as a poor nutritional knowledge level.[18]

The researchers took anthropometric measurements and measured the participants' weight and height. Digital 100 gram sensitivity scales were used in the measurements. The height was measured according to the Frankfurt plane position with the head upright, eyes and ears parallel to the floor, legs straight and closed, arms at the sides, shoulders relaxed, and the heels, hips and shoulders against the wall. A non-stretch tape measure was used to determine the height. It took an average of 20 minutes for the participants to fill in the data collection form and realize the relevant measurements.

In defining obesity, the obesity classification of the WHO on the basis of the BMI was used. The BMI

value was calculated by dividing the person's weight in kilograms by the square of his/her height in meters (kg / m²). Values <25 were considered average weight, values between 25-29.9 were considered overweight, and values ≥30 were considered obese.[19]

Statistical Analysis: Data were analyzed with SPSS 21.0. Correlation analysis was performed to examine the relationship between EAT-26, NKS and BMI. To obtain valid results from the data, the quality of the data was first examined. To this end, the effects of lost data and endpoint values were studied to determine data loss. Since there were no lost values, Z scores were calculated over the total points to determine the remaining values. With regards to the Z scores, it was determined that all of the scores were in the range of +3 and –3. Since the data set showed normal distribution, parametric tests were started. Independent t-tests were performed to determine differences between groups. The strength of the association between the dependent variables (nutrition knowledge, attitudes and behaviors in disordered eating) and BMI was measured using chi-square tests and logistic regression analysis with a 95% confidence interval. Statistical significance accepted p-value < of 0.05.

RESULTS

When Table 1, which includes some characteristics of the participants, is examined, the average weight, average height and BMI of the male students were found to be higher than those of the female students (p<0.001). The EAT-26 score was significantly higher in the female students (p<0.001). The mean age of the participants was 21.14±1.83.

When Table 2 is examined, 23.09% of the total participants were in the overweight/obese group (Males: 33.81%, Females: 17.70%). The EAT-26 score of 38.02% of the male participants who were overweight/obese in terms of BMI was above 20, whereas the EAT-26 score of 41.89% of the female participants who were overweight/obese in terms of BMI was above 20. The logistic regression analysis revealed that among the male students who were overweight and obese in terms of BMI, the probability of the EAT-26 cut-off was 4.25 times higher (OR=4.25 [1.38-7.33], p<0.001). Among the female students who were overweight and obese in terms of BMI, the probability of the EAT-26 cut-off was 3.92 times higher (OR=3.92 [2.44-8.04], p<0.001).

Table 1. Descriptive characteristics of the participants of the study.

Parameters	Male (n = 210)	Female (n = 418)	Total (n = 628)	p-value
Age (year)	21.03±1.91	21.22±1.78	21.14±1.83	0.341
Weight (kg)	74.24±11.72	56.97±9.42	62.76±10.97	0.000*
Height (cm)	178.88±6.12	164.82±5.42	168.20±5.73	0.000*
BMI (kg/m2)	23.32±3.57	20.99±3.51	22.08±3.54	0.000*
EAT-26 score	23.15±4.82	27.23±8.05	24.89±6..03	0.000*
NKS score	77.35±9.18	78.25±11.5	77.89±10.23	0.289

*: p value <0.001; BMI: Body mass index; EAT-26: Eating Attitude Test-26; NKS: Nutrition Knowledge Scale.

Table 2. Relationship between overweight/obesity and the risk of disordered eating attitudes and behaviors among participants.

Participants	Parameters	Total n (%)	ED risk n (%)	χ2 (df)	p-value	COR (95% CI)	p-value
All of BMI category	Non-overweight/obese	483 (76.91)	109 (22.90)	31.08 (1)	0.000	Reference	0.000
	Overweight/obese	145 (23.09)	58 (40.00)			3.51 (2.57–8.11)	
Males of BMI category	Non-overweight/obese	139 (67.19)	33 (23.74)	16.71 (1)	0.000	Reference	0.000
	Overweight/obese	71 (33.81)	27 (38.03)			4.25 (1.38–7.33)	
Females of BMI category	Non-overweight/obese	344 (82.30)	76 (22.09)	24.51 (1)	0.000	Reference	0.000
	Overweight/obese	74 (17.70)	31 (41.89)			3.92 (2.44–8.04)	

ED: Eating Disorder; COR: Crude Odds Ratio; CI: Confidence interval.

When Table 3 is examined, the NKS score of 42.25% of the male participants who were overweight/obese in terms of BMI was below 78, and the NKS score of 21.62% of the female participants who were overweight/obese in terms of BMI was below 78. The logistic regression analysis showed that the probability of exceeding the NKS cut-off limit was 2.70 times higher among the male students who were overweight and obese in terms of BMI' (OR=2.70 [2.01-5.23], p<0.001).

According to Table 4, there is a positive correlation between BMI and EAT-26 score at a low level; There is a moderately negative and significant relationship between BMI and NKS, and a highly negative and significant relationship between EAT-26 and NKS.

Table 3. Relationship between overweight/obesity and the risk of nutrition knowledge scale.

Participants	Parameters	Total n (%)	NKS risk n (%)	χ2 (df)	p-value	COR (95% CI)	p-value
All of BMI category	Non-overweight/	483	121	17.77 (1)	0.000	Reference	0.000
	Overweight/obese	145	46 (31.72)			2.54 (1.66–4.81)	
Males of BMI category	Non-overweight/ obese	139 (67.19)	42 (30.22)	5.71 (1)	0.000	Reference	0.000
	Overweight/obese	71 (33.81)	30 (42.25)			2.70 (2.01–5.23)	
Female of BMI category	Non-overweight/ obese	344 (82.30)	79 (22.96)	0.88 (1)	0.857	Reference	0.711
	Overweight/obese	74 (17.70)	16 (21.62)			0.83 (0.44-1.18)	

NKS: Nutrition Knowledge Level; COR: Crude Odds Ratio; CI: confidence interval.

Table 4. Relationship between body mass index, eating attitude test-26 and nutrition knowledge scale.

		BMI	EAT-26
BMI	r	1	
	p		
EAT-26	r	0.391	1
	p	0.000	
NKS	r	-0.547	-0.757
	p	0.000	0.000

DISCUSSION AND CONCLUSION

This study examined the relationship between university students' disordered eating attitudes and nutritional knowledge levels and overweight and obesity. The findings revealed that almost a quarter of the university students in the study group were overweight and obese, and that this rate was higher in males. According to the report of the Turkish Statistical Institute, 55.2% of women and 57.0% of men living in Türkiye are in the overweight/obese group. [20] Since the average age of Türkiye is higher than the average age of university students, these rates may have been high. An increase in abdominal adipose tissue and fat accumulation in skeletal muscle are observed with advancing age.[21] In the study conducted by Sa et al. with university students in the United States, it was seen that about a quarter of participants were obese and that this rate was higher in men than in women. In the study of Tapera et al. conducted with university students in Botswana, the prevalence of overweight and obesity was found to be 37.8%, and the overweight and obese ratio of male students was higher than that of females.[22] Such inconsistency in prevalence estimates may be related to differences in sociocultural environments across countries. Thus, sociocultural, environmental, and psychological mechanisms associated with gender norms contribute to differences in obesity prevalence between men and women. There are region-specific customs, norms, and beauty standards that influence eating and physical activity behaviors.[23]

There are also gendered food preferences shaped by the sociocultural environment, such as women being more likely to prefer and consume foods high in sugar; This may be partly related to the gender targeting of food advertisements and the portrayal of certain foods as masculine or feminine.[23] Previous studies reported that female gender was typically associated with a higher likelihood of disordered eating.[6,24] In this context, our study supported the

literature, and the disordered eating score was higher in the female participants. At the same time, in our study, a positive relationship was found between eating attitude score and BMI. Therefore, the worse the eating attitudes and behaviors of university students, the greater the risk of becoming obese or overweight.

The participants with a high disordered eating score were found to be 3.5 times more likely to be overweight and obese. This rate was 4.25 times for the male participants and 3.92 times for the female participants. In this case, we can say that eating disorders affect men the most. The high rate of obesity in male participants in our study may be due to eating disorders. In the study conducted by Piko et al. with Hungarian university students, it was found that high disordered eating scores increased the risk of obesity 1.11 times.[24] In a study by Musaiger et al. on adolescents in seven Arab countries, excluding women in Kuwait and men in Palestine, obese adolescents had a disordered eating score and were two to three times more likely to be obese in both genders. In the same study, Libyan adolescents showed the highest association with obesity in both genders (OR = 3.54, 1.81-6.91, 95% CI and OR = 3.07, 1.88-5.03, 95% CI for males and females, respectively).[25] The fact that unhealthy eating habits are more common among college students can be attributed to students' greater exposure to junk food, inability to prepare healthy meals, irregular lifestyle, high alcohol consumption, and body image concerns. Incidences of eating disorders and food addiction are also higher among these individuals, as well as the risk of obesity.[26]

Nutritional knowledge, one of the factors affecting food choices, positively affects the adoption of healthy eating habits and reduces the risk of obesity.[27] Nutritional knowledge level can also be associated with anthropometric measures of obesity. Studies using anthropometric measurements found that nutritional knowledge was associated with BMI and waist circumference, which are indicators of comorbidities such as obesity and cardiovascular diseases.[28,29] This research supports the literature, and the risk of being overweight and obese was 2.54 times higher in the participants with low nutritional knowledge, and this risk was 2.70 times in the male participants. Additionally, as a result of the correlation test conducted in our study, a positive relationship was detected between BMI and nutrition knowledge level. According to Miller et al., when individuals receive accurate information about what they should eat and know the health effects of food consumption, they will modify their diets appropriately.[30] This study shows that inadequate nutrition knowledge triggers obesity.

Because of the cross-sectional design of the study, no causal relationship can be established, and the use of a self-reported questionnaire to examine attitudes toward eating disorders and knowledge of nutrition allows for some degree of self-report bias. Another limitation is that this study was conducted in a single center. Longitudinal studies with multicenter and large samples would be useful to establish a stronger relationship between nutritional knowledge, eating disorders and obesity. The strength of the study was that the age range was narrow and focused only on the 18-22 age range. Another strength was that overweight/obesity and both nutritional knowledge level and eating disorder were examined.

In conclusion, this study revealed that a significant relationship between BMI and disordered eating attitudes and nutritional knowledge levels among university students in Türkiye. Disordered eating behaviours and inadequate knowledge of nutrition were more common among students who were overweight or obese. This finding underscores the need for more information and public health awareness of the factors that influence eating behaviours and knowledge of malnutrition in this population. Individuals should be educated interactively about healthy nutrition, and the increase in the nutritional knowledge level of individuals should be transformed into behavioral changes by developing relevant health policies.

Ethics Committee Approval: For this study, permission was obtained from the Non-Interventional Clinical Research Ethics Committee of Gazi University (Date:10.01.2023, decision no: 2023 - 68). In addition, verbal permission was obtained from the participants.

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Coping Strategies and Their Effects on Quality Of Life of Cancer Patients during the COVID-19 Pandemic

COVID-19 Pandemisinde Kanser Hastalarının Başa Çıkma Stratejileri ve Yaşam Kalitesine Etkisi

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ABSTRACT

Objective: The study aimed to investigate the coping strategies employed by individuals diagnosed with cancer during the COVID-19 pandemic and the effects of these strategies on their quality of life.

Materials and Methods: The present descriptive and cross-sectional study analysed 131 patients from June 1 to July 1, 2021, through the social media networks of several cancer-related associations. Personal information form, coping strategies form and Duke Health Profile were used to collect data via Google forms.

Results: The participants employed the strategies of spiritual beliefs (94.7%), social/emotional support (92.4%) and positive reframing (91.6%) most among all coping strategies. The Duke Health Profile (general health) score of the participants was 57.43±16.20. Multiple linear regression analysis revealed that social/emotional support, hobbies, substance use, and behavioural disengagement coping strategies were effective on the general health score ($p<0.05$).

Conclusions: As a result, most of the patients use many coping strategies, and the coping strategies used seem to be effective in their quality of life. For this reason, oncology nurses should include practices to strengthen coping strategies in patient care.

Keywords: Cancer, coping strategies, COVID-19 pandemic, quality of life

ÖZ

Amaç: Bu araştırmada COVID-19 salgını sırasında kanser tanısı olan bireylerin kullandıkları başa çıkma stratejileri ve yaşam kalitesine etkisinin değerlendirilmesi amaçlanmıştır.

Materyal ve Metot: Tanımlayıcı ve kesitsel türde olan bu çalışma, 01 Haziran 2021- 01 Temmuz 2021 tarihleri arasında derneklerin sosyal medya ağları aracılığıyla 131 hasta ile yapılmıştır. Google formlar aracılığı ile kişisel bilgi formu, başa çıkma stratejileri formu ve Duke Sağlık Profili veri toplamada kullanılmıştır.

Bulgular: Katılımcıların sırasıyla fonksiyonel başa çıkma stratejilerinden en çok Spiritual beliefs (%94,7), Sosyal/ Emosyonel Destek (%92,4), Pozitif Yeniden Çerçeveleme (%91,6), Kabullenme (%87,8) stratejilerini, fonksiyonel olmayan başa çıkma stratejilerinden ise en çok Kendi kendine dikkat dağıtma (%84,0) stratejisini kullandıkları bulunmuştur. Katılımcıların Duke sağlık profili genel sağlık skoru 57,43±16,20 olarak belirlenmiş olup Sosyal/ Emosyonel Destek, Hobiler, Davranışsal Ayrılma başa çıkma stratejileri ile genel sağlık skoru arasında anlamlı bir ilişkinin olduğu görülmüştür.

Sonuç: Sonuç olarak, hastaların çoğu birçok başa çıkma stratejisini kullanmaktadır ve kullanılan başa çıkma stratejilerinin yaşam kalitesi üzerinde etkili olduğu görülmektedir. Bu nedenle Onkoloji hemşireleri hastanın bakımına başa çıkma stratejilerini güçlendirmeye yönelik uygulamaları da katmalıdır.

Anahtar Kelimeler: Başa çıkma stratejileri, COVID-19 pandemisi, kanser, yaşam kalitesi

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INTRODUCTION

The COVID-19 pandemic has affected several people worldwide, threatening their physical and mental health.[1] However, interestingly, people who were most affected and vulnerable to COVID-19 were those with comorbid conditions such as cancer, diabetes, and cardiovascular diseases.[2,3]

The COVID-19 pandemic has created many difficulties for individuals living with cancer. Alongside the physical health, the psychological health of patients whose treatments got interrupted, surgeries got cancelled, and regular oncological check-ups could not be undertaken were adversely affected.[4,5] Past studies have reported that people with cancer may face the worst consequences, including the higher risk of staying in the intensive care units due to the COVID -19 pandemic, the need for ventilation, and higher mortality relative to patients without cancer.[5-7]

Cancer is a dangerous disease that poses a risk to life and affects the quality of life. Individuals with cancer are affected by several symptoms related to the disease and the treatment. In addition to the pandemic, these individuals have to deal with several other problems, such as the risk of or fear of infection and postponing the current treatment.[8,9] Coping can be described as thoughts and behaviours used to manage a stressful situation. People living with cancer experience a variety of social and emotional concerns related to the disease, treatment, and prognosis since the time of diagnosis. They accordingly employ various coping strategies that can be beneficial or harmful regarding compliance and well-being.[8,10-12] While some coping strategies can be classified as functional, others can be classified as dysfunctional.[13-17] Strategies such as acceptance are believed to be positive as they are positively related to the quality of life; however, dysfunctional strategies such as denial and self-blame are negatively correlated with the quality of life.[16,18,19] Adopting certain coping strategies can affect the patient's perception of the disease and the decision related to treatment. This act may have a long-lasting effect on their treatment and survival outcomes.[16] Furthermore, coping strategies can alleviate the negative effects of stressful situations.[11,20]

The study aimed to determine the coping strategies and their effects on the quality of life of cancer patients during the COVID-19 pandemic.

MATERIALS AND METHODS

Ethical Considerations: This study was conducted following the principles of the Declaration of Helsinki in 2013 (The Code of Ethics of the World Medical Association (Declaration of Helsinki)).[21] Permission to use the Duke Health Profile was provided by George Parkerson. Ethics committee approval was received from Kütahya Health Sciences University Non-Interventional Clinical Research Ethics Committee (Date: 15.04.2021; decision No: 2021/07 -07), and consent from the participants who agreed to participate in the study was obtained before they filled out the forms.

Design and Study Population: This descriptive and cross-sectional study was conducted on 131 patients from June 1 to July 1, 2021. To determine the participants, e-mails were sent to three associations and members of these associations were invited to participate in the study. Cancer patients and patients with cancer in the past was eligible to become a member of these associations. After obtaining the ethics committee's approval, a consent form for participation in the study, a personal information form, a coping strategies form, and the Duke Health Profile prepared using Google Forms were distributed online through the social media networks of the accepting associations. The participants were automatically directed to information about the study, and they could provide their informed consent form by clicking on the research link. After the patients agreed to participate in the study, they were required to complete the relevant scales and forms. Patients aged ≥18 years who could read and understand the Turkish language, diagnosed with cancer, and willing to provide informed consent were included in the study. The research questions: 1) What are cancer patients' coping strategies in the COVID-19 pandemic? 2) How is the quality of life of cancer patients in the COVID-19 pandemic? 3) Is there a relationship between coping strategies and the quality of life of cancer patients in the COVID-19 pandemic?

Measurements

Personal Information Form: This form was prepared by the researcher based in the light of literature[5,18,22,23] and consisted of 12 questions on patients' sociodemographic and disease-related characteristics.

Coping Strategies Form: This form was prepared by the researcher based on the literatures,[5,18,22,24] and included 13 questions that aimed to determine the patients' coping strategies. These 13 questions are answered as yes or no. There are eight functional coping strategies, including social/emotional support, planning, positive reframing, humour, acceptance, spiritual beliefs, self-care, and hobbies. There are five dysfunctional coping strategies, including behavioural disengagement, substance use, self-blame, revealing, and distraction.

Duke Health Profile: The Duke Health Profile short version, which assesses the quality of life, was developed by Parkerson and colleagues.[25] The short version of the Duke Health Profile included 17 items to facilitate its application. Kuzu and colleagues confir-

med the scale's validity and reliability.[26] The 17-item Duke Health Profile included 11 subscales that assessed six functional and five dysfunctional health areas. While higher scores in the functional health areas indicated a higher quality of life, higher scores in the dysfunctional health areas indicated a lower quality of life. The health status scores for functional and dysfunctional health areas ranged from 0 to 100.[25,26] For physical, mental, social, general, self-esteem, and perceived health, 100 indicates the best health status, and 0 indicates the worst health status. For anxiety, depression, anxiety-depression, pain, and disability, 100 indicates the worst health status, and 0 indicates the best health status. The Cronbach alpha reliability coefficient of this scale, validated and reliable for the Turkish population, was found to be 0.73 for general health.[26] In this study, Cronbach alpha coefficient was 0.77.

***Statistical Analyses*:** Statistical Package for Social Sciences for Windows (version 22.0) was used for data analysis. Descriptive statistics for continuous variables were presented as mean ±standard deviation, whereas numbers and percentages were used to show categorical variables. Independent samples *t*-test and one-way analysis of variance were used to compare demographic variables and the coping strategies with the quality of life. The relationships among the demographic variables, the coping strategies, and the quality of life were examined by multiple linear regression analysis. $p<0.05$ was considered statistically significant.

RESULTS

The distribution of the participants' sociodemographic characteristics is provided in Table 1. Most participants were of mean age 51.16 ±13.79 years, female (60.3%), and married (85.5%). Nearly half (48.9%) of the participants had completed primary school, and 77.1% were unemployed. When the participants' economic situation was examined, 72.5% belonged to an income equal to their expenses. Of the participants, 59.5% lived in cities, and 90.8% resided with their families. Of the patients, 29.8% were diagnosed with breast cancer, and 58.8% were currently receiving treatment. The treatment of most participants (83.2%) was not postponed; however, surgical treatment of 4.6% and non-surgical cancer treatments of 12.2% were postponed. In addition, 91.6% of them were not diagnosed with COVID-19. The comparison of the sociodemographic characteristics of the participants with the Duke Health Profile general health score averages is shown in Table 1. When the mean scores of general health scores of the participants were compared by their gender, marital status, support status, education level, economic status, place of residence, current treatment, postponing treatment, and diagnoses with COVID-19, no statistically significant difference was noted ($p > 0.05$). When the participants' mean general health score points were compared according to their employment status, a statistically significant difference was noted ($t = 2.13$, $p = 0.04$), and the general health score of the unemployed individuals was found to be lower (Table 1).

Table 1. Sociodemographic and disease-related characteristics (n = 131).

Variable		n (%)	General Health Score M ± SD**	Test
Gender	Female	79 (60.3)	57.17 ± 16.00	t = −0.22
	Male	52 (39.7)	57.82 ± 16.65	p = 0.82
Marital Status	Married	112 (85.5)	57.44 ± 16.26	t = −0.02
	Single	19 (14.5)	57.37 ± 16.28	p = 0.99
Support Status	Alone	12 (9.2)	55.83 ± 17.53	t = −0.36
	Family	119 (90.8)	57.59 ± 16.13	p = 0.72
Education Level	Primary school	64 (48.9)	54.06 ± 16.32	F = 1.96 p = 0.12
	Middle school	17 (13.0)	61.57 ± 16.16	
	High school	28 (21.4)	59.29 ± 16.14	
	University and above	22 (16.8)	61.67 ± 14.83	
Economic Status	Income lower than expenses	18 (13.7)	56.85 ± 14.02	F = 0.43 p = 0.65
	Income equal to expenses	95 (72.5)	56.91 ± 16.65	
	Income higher than expenses	18 (13.7)	60.74 ± 16.27	
Employment Status	Employed	30 (22.9)	62.89 ± 17.01	**t = 2.13** **p = 0.04***
	Unemployed	101 (77.1)	55.81 ± 15.67	
Place of Living	City	78 (59.5)	57.14 ± 16.24	F = 1.05 p = 0.35
	District	31 (23.7)	60.54 ± 15.35	
	Village	22 (16.8)	54.09 ± 17.18	

*: $p < 0.05$; **: Data are expressed as Mean ± Standard deviation.

Table 1. Continue.

Diagnosis	Breast cancer	39 (29.8)	60.77 ± 15.34	Since the number of patients in the two groups was one, no comparison was made.
	Lung cancer	21 (16.0)	53.97 ± 15.69	
	Esophageal cancer	3 (2.3)	52.22 ± 17.10	
	Stomach cancer	8 (6.1)	51.67 ± 24.23	
	Colorectal cancer	6 (4.6)	57.78 ± 18.70	
	Pancreatic cancer	2 (1.5)	35.00 ± 2.36	
	Skin cancer and sarcomas	1 (0.8)	56.67 ± 0	
	Gynecological cancer	7 (5.3)	49.52 ± 17.37	
	Lymphoma	13 (9.9)	66.41 ± 13.71	
	Bone cancer	6 (4.6)	56.67 ± 18.86	
	Head and neck cancer	1 (0.8)	66.67 ± 0	
	Urological cancer	2 (1.5)	53.33 ± 14.14	
	Other	22 (16.8)	56.97 ± 13.99	
Receiving Treatment Currently	Yes	77 (58.8)	56.06 ± 16.12	t = −1.16 p = 0.25
	No	54 (41.2)	59.38 ± 16.27	
Status of Treatment Being Postponed	Surgical treatment was postponed	6 (4.6)	57.78 ± 15.44	F = 0.11 p = 0.89
	Non-cancerous surgical cancer treatment (chemotherapy, radiotherapy) was postponed	16 (12.2)	55.63 ± 13.54	
	Was not postponed	109 (83.2)	57.68 ± 16.70	
Status of Receiving COVID-19 Diagnosis	Yes	11 (8.4)	56.97 ± 18.10	t = −0.10 p = 0.92
	No	120 (91.6)	57.47 ± 16.10	
Age (Mean ± SD)**		51.16 ± 13.79		

*: $p < 0.05$; **: Data are expressed as Mean ± Standard deviation.

Several coping strategies were used when examining the participants' coping strategies. The functional coping strategies that were used the most included spiritual beliefs (94.7%), social/emotional support (92.4%), positive reframing (91.6%), acceptance (87.8%), hobbies (79.4%), planning (77.1%), and self-care (75.6%); the dysfunctional strategy that the participants used the most was self-distraction (84.0%). When the coping strategies and Duke Health Profile general health score were compared, a statistically significant difference was noted between the general health score of those who used planning, humour, self-care, hobbies, behavioural disengagement, and self-blame strategies and those who did not (t=3.37, p=0.00); t=0.36, p=0.02; t=2.80, p=0.00; t=6.69, p=0.00; t=−3.46, p=0.00; t=−3.26, p=0.00). The Duke Health Profile general health score of the participants was 57.43±16.20 (Table 2).

Table 2. Coping strategies of the study participants.

Coping Strategies			**n (%)**	**General Health** Score M ± SD	**Test**
Social/Emotional Support	Receive emotional and social support from others	Yes	121 (92.4)	56.91 ± 15.81	t = −1.27 p = 0.21
		No	10 (7.6)	63.67 ± 20.27	
Planning	Making plans to do something about the situation or to make it better	Yes	101 (77.1)	59.93 ± 15.01	**t = 3.37 p = 0.00****
		No	30 (22.9)	49.00 ± 17.45	
Positive Reframing	Trying to look at things on the positive side	Yes	120 (91.6)	57.83 ± 16.11	t = 0.94 p = 0.35
		No	11 (8.4)	53.03 ± 17.29	
Humour	Making jokes about events / using humour	Yes	74 (56.5)	60.32 ± 15.58	**t = 0.36 p = 0.02***
		No	57 (43.5)	53.68 ± 16.36	
Acceptance	Learning to accept what happens and live with it	Yes	115 (87.8)	58.35 ± 16.15	t = 1.75 p = 0.08
		No	16 (12.2)	50.83 ± 15.52	
Spiritual Beliefs	Trying to find comfort in prayer or spiritual beliefs	Yes	124 (94.7)	57.45 ± 16.39	t = 0.05 p = 0.96
		No	7 (5.3)	57.14 ± 13.53	
Self-Care	Doing practices related to self-care (such as doing sports, balanced diet, adequate sleep)	Yes	99 (75.6)	59.63 ± 15.49	**t = 2.80 p = 0.00****
		No	32 (24.4)	50.63 ± 16.71	
Hobbies	Spending time with hobbies (such as cooking, reading books, painting wood, making jewellery)	Yes	104 (79.4)	61.60 ± 14.10	**t = 6.69 p = 0.00****
		No	27 (20.6)	41.36 ± 13.69	

Table 2. Continue.

Behavioural Disengagement	Giving up dealing with what is going on	Yes	23 (17.6)	47.25 ± 15.06	**t = −3.46**
		No	108 (82.4)	59.60 ± 15.66	**p = 0.00****
Substance Use	Using substances such as cigarettes and alcohol to cope with the situation	Yes	13 (9.9)	49.74 ± 13.97	t = −1.82
		No	118 (90.1)	58.28 ± 16.26	p = 0.07
Self-Blame	Criticising and blaming oneself	Yes	34 (26.0)	49.90 ± 16.81	**t = −3.26**
		No	97 (74.0)	60.07 ± 15.21	**p = 0.00****
Revealing	Expressing negative emotions frequently	Yes	43 (32.8)	53.49 ± 18.70	t = −1.81
		No	88 (67.2)	59.36 ± 14.56	p = 0.08
Self-Distraction	Dealing with distractions so as not to overthink things	Yes	110 (84.0)	58.82 ± 15.05	t = 1.87
		No	21 (16.0)	50.16 ± 20.12	p = 0.07

*: p<0.05; **: p<0.01.

Multiple regression analysis for the demographic variables and the coping strategies affecting the participants' quality of life is shown in Table 3. As can be seen in Table 3, a significant relationship was noted between social/emotional support, hobbies, substance use, and behavioural disengagement coping strategies and the general health score; these coping strategies were 36% determinant in the quality of life ($R^2 = 0.36$, p = 0.00) (Table 3).

Table 3. Regression analyses of the coping strategies on the quality of life.

	Duke Health Profile (General Health Score)			
	R	**Adjusted R Square**	**F**	**p**
	0.69	0.36	3.99	**0.00****
	Beta	**Beta**	**t**	**p**
Age	−0.15	−0.13	−1.11	0.27
Gender	−3.30	−0.10	−1.09	0.28
Marital Status[b]	−2.51	−0.06	−0.57	0.57
Support Status[c]	−2.13	−0.04	−0.43	0.67
Education Level[d]	−3.56	−0.11	−1.19	0.24
Economic Status[e]	2.46	0.05	0.67	0.51
Employment Status[f]	−3.50	−0.09	−1.07	0.29
Place of Living[g]	−2.88	−0.09	−1.07	0.29
Receiving Treatment Currently[h]	0.79	0.02	0.30	0.76
Status of Treatment Being Postponed[i]	2.74	0.06	0.79	0.43
Status of Receiving COVID-19 Diagnosis[h]	1.96	0.03	0.44	0.66
Social/Emotional Support[h]	−12.14	−0.20	−2.39	**0.02***
Planning[h]	2.77	0.07	0.75	0.46
Positive Reframing[h]	−5.79	−0.10	−1.11	0.27
Humor[h]	3.44	0.11	1.33	0.19
Acceptance[h]	2.35	0.05	0.57	0.57
Spiritual Beliefs[h]	−5.49	−0.08	−0.93	0.36
Self-Care[h]	4.23	0.11	1.36	0.18
Hobbies[h]	12.95	0.33	3.51	**0.00****
Behavioral Disengagement[h]	−9.04	−0.21	−2.34	**0.02***
Substance Use[h]	−9.27	−0.17	−2.05	**0.04***
Self-Blame[h]	−3.62	−0.10	−1.19	0.24
Revealing[h]	−2.99	−0.09	−1.07	0.29
Self-Distraction[h]	5.71	0.13	1.43	0.16

*: p<0.05; **: p<0.01; [a]: Female; [b]: Married; [c]: Family; [d]: Primary school; [e]: Income lower than expenses; [f]: Unemployed; [g]: City; [h]: Yes; [i]: Was not postponed.

DISCUSSION AND CONCLUSION

This study examined the coping strategies of cancer patients during the COVID-19 pandemic and the effects of these strategies on their quality of life. Although the COVID-19 pandemic is causing widespread detrimental effects on mental health and quality of life, research examining effective coping strategies in mitigating these negative effects has been scarce.[27] The treatment of 16.8% of the study patients was postponed, which seems expected considering the measurements undertaken during the pandemic, including postponing nonemergency surgical treatments, hospitalisations of nonurgent cases and restricting visitors during the pandemic process. The study revealed that 91.6% of the patients were not diagnosed with COVID-19 because patients paid more attention to measurements such as following hygiene practices, wearing masks, and observing social distancing while receiving cancer treatments and trying to protect themselves from any potential health problems (such as infection) that may arise from the treatment. In this study, a comparison of the participants' sociodemographic characteristics and the Duke Health Profile general health score averages revealed that the employed status affected the general health score ($p = 0.04$), while the general health score of the unemployed individuals was lower. This result can be attributed to the fact that the socio-economic status of unemployed individuals could be better, which decreases their quality of life. In addition, considering similar studies, it can be thought that engaging in an occupation provides psycho-social well-being, especially for cancer patients.[28]

Our findings also showed that patients with cancer adopted several coping strategies during the COVID -19 pandemic, some of which affected their quality of life and became a large determinant of their quality of life (36%). Accordingly, spiritual beliefs, social/emotional support, positive reframing, acceptance, self-distraction, hobbies, planning, and self-care were found to be the most applied coping strategies. A review of the past studies on the subject indicated that similar to the present study, the strategies of taking action/positive framing, social/emotional support, acceptance, self-distraction, self-care, hobbies, planning, and religion were most frequently used.[5,8,11,12,22,23] On examining the results of the present study, the patients were noted to mostly use functional coping strategies (e.g., Spiritual Beliefs, Social/Emotional Support, Positive Reframing) that affected their quality of life. Although dysfunctional coping strategies seem beneficial for individuals in the short term, they adversely affect the patient's quality of life in the long term.[14-17] It was noted that patients' use of functional coping strategies was also reflected in their quality of life. Past studies have reported that the quality of life was generally better in patients who adopted functional coping strategies.[10,16,17,24,27,29] Based on regression analysis, a significant relationship was noted between social/ emotional support, hobbies, and behavioural disengagement coping strategies and the quality of life. While the quality of life general health score of a patient who used the hobbies coping strategy was better, the general health score of those who used behavioural disengagement and substance use coping strategies were worse; these results are consistent with those of the literature.[5,16,17,30] However, non -conforming to the literature, the general health scores of patients' quality of life using the Social/ Emotional Support coping strategy was the worst in the present study. This result can be attributed to the low number of patients ($n = 10$) who did not use this strategy. In addition, patients who showed fewer symptoms or side effects but had a better general condition may choose to receive less or no social/ emotional support. Importantly, this study was conducted online. Considering Turkiye's conventional structure, middle-aged and older patients may not perceive online access or establishing communication as a social/emotional support. Considering all these results, we believe that health professionals should review their coping strategies when evaluating patients' quality of life. While the coping strategies used by cancer patients were evaluated, functional coping strategies should be encouraged and supported. Oncology nurses should also consider practices to strengthen coping strategies when planning patient care.

It should be taken into consideration while assessing the results of this study that the study sample was an online sample consisting of individuals who had access to online sources. In addition, this study did not involve individuals who needed access to online resources and needed more knowledge and resources for coping strategies. In addition, the study results are based on self-reported responses of the participants. Thus, the present sample may not represent the general population as it was limited to people accessing the Internet and social media. Therefore, the generalizability of the results of the study may be limited.

In conclusion, the treatment of many patients was not postponed, and they were not diagnosed with COVID-19. Most patients adopted several coping strategies, mainly spiritual beliefs, social/emotional support, and positive reframing strategies. In addition, these coping strategies were effective in their quality of life. Our results should be evaluated in the context of individuals who had access to online sources, and it should be considered that the present study group had access to more information and resources for coping strategies. Therefore, it may be

recommended to develop programs to strengthen coping strategies for individuals who did not have access to online resources or who primarily employed dysfunctional coping strategies. Nurses need to identify and evaluate patients' coping strategies. In addition, nurses may need to plan programs to strengthen coping strategies for individuals who do not have access to online resources or who use more dysfunctional coping strategies. Oncology nurses can also consider practices to strengthen coping strategies while planning patient care.

Ethics Committee Approval: This study was conducted in accordance with the principles of the Declaration of Helsinki in 2013. Permission to use the Duke Health Profile was provided by George Parkerson. Ethics committee approval was received from Kütahya Health Sciences University Non-Interventional Clinical Research Ethics Committee (Date: 15.04.2021; decision no: 2021/07-07), and consent from the participants who agreed to participate in the study was obtained before they filled out the forms.

Conflict of Interest: No conflict of interest was declared by the authors.

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Determining Healthcare Seeking Behavior, Psychosocial Symptoms, and Distress Levels of Women with Gynecological or Breast Cancer During the COVID-19 Pandemic

Jinekolojik Kanser veya Meme Kanserli Kadınların COVID-19 Pandemisi Sırasında Sağlık Bakımı Arama Davranışı, Psikososyal Belirtileri ve Sıkıntı Düzeylerinin Belirlenmesi

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ABSTRACT

Objective: The study was conducted to determine the health-seeking behaviors, psychosocial symptoms and distress levels and related factors of women diagnosed with gynecological or breast cancer during the pandemic period.

Materials and Methods: This descriptive, cross-sectional study was completed with a total of 109 women who had ovary, endometrium, cervix, vagina, vulva, or breast cancer. The study was conducted between October and December 2020, and data were collected online using an information form, Distress Thermometer and The Brief Symptom Inventory.

Results: There was a decrease in the frequency of going to the hospital for diagnosis (54.8%), treatment (32.3%), and rehabilitation (58%) services during the COVID-19 pandemic process. Our study results indicated that 89% of women experienced distress, according to Distress Thermometer. The mean Brief Symptom Inventory scores were found to be statistically significantly higher in women who stated that they experienced distress, whose chemotherapy treatment was postponed, and who obtained more information from the Internet during this period.

Conclusions: This study highlighted the pandemic's impact on healthcare-seeking behaviors and distress experiences of women with gynecological or breast cancer. Our results indicate a restriction on receiving health services during this period in women. Also, our results showed that most women experienced distress.

Keywords: Breast cancer, COVID-19, gynecologic neoplasms, healthcare-seeking behavior, psychological distress

ÖZ

Amaç: Bu çalışmanın amacı pandemi sürecinde jinekolojik veya meme kanseri tanılı kadınların sağlık arama davranışları, psikososyal semptom ile distres düzeyleri ve ilişkili faktörleri belirlemektir.

Materyal ve Metot: Bu tanımlayıcı, kesitsel çalışma yumurtalık, endometrium, serviks, vajina, vulva veya meme kanseri olan toplam 109 kadınla tamamlanmıştır. Çalışma Ekim-Aralık 2020 tarihleri arasında gerçekleştirildi ve veriler bilgi formu, Distres Termometresi ve Kısa Semptom Envanteri kullanılarak çevrimiçi olarak toplandı.

Bulgular: COVID-19 pandemi sürecinde hastaneye tanı (%54,8), tedavi (%32,3) ve rehabilitasyon (%58) hizmetleri için başvurma sıklığında azalma olmuştur. Çalışma sonuçlarımız, Distres Termometresi'ne göre kadınların %89'unun distres yaşadığını göstermektedir. Distres yaşadığını ifade eden, kemoterapi tedavisi ertelenen, internetten bu süre içinde daha fazla bilgi edinen kadınlarda Kısa Semptom Envanteri puan ortalamaları istatistiksel olarak anlamlı derecede yüksek bulunmuştur.

Sonuç: Bu çalışma, pandeminin jinekolojik veya meme kanseri tanılı kadınların sağlık arama davranışları ve distres deneyimleri üzerindeki etkisini anlamaya yardımcı olmuştur. Sonuçlarımız bu dönemde kadınlarda sağlık hizmeti almada bir kısıtlama olduğunu göstermektedir. Ayrıca, sonucumuz çoğu kadının distres yaşadığını göstermektedir.

Anahtar Kelimeler: Meme kanseri, Covid-19, jinekolojik tümörler, sağlık arama davranışı, psikolojik sıkıntı

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INTRODUCTION

The COVID-19 pandemic, a global public health crisis, is continuing to cause significant mortality and morbidity rates.[1,2] In this process, while governments take serious measures to prevent the spread of the virus, health systems are struggling with the ever -increasing burden of new cases.[3] As a reflection of the situation, both the healthcare system and healthcare providers in Türkiye, like those in other countries, have allocated a considerable part of their capacity in the fight against the COVID-19 pandemic. For this reason, access to some healthcare services, such as cancer care, is either not possible or delayed. Routine surgical procedures worldwide have almost stopped, and screening programs and diagnostic services have also been hampered. This situation raises the ethical question of whether cancer procedures can be delayed or not.[4]

Patients with cancer are vulnerable because of the potential effects of the treatment as well as the weakening of the immune system by the disease. When the COVID-19 process is added, these patients have become even more vulnerable.[4] Due to the uncertainty of the COVID-19 process, the disruption of treatment and care services, and the postponement of surgical operations, patients with cancer unavoidably experience anxiety. Besides, social isolation and the 'need to stay home' lead to loneliness in patients with cancer, which is associated with a higher risk of mortality.[5] In this process, the onset of flexible working hours in the clinics performing oncological surgeries has raised concerns that the prognosis of women diagnosed with cancer might be affected badly and that the intraoperative complications might increase. Also, women are more hesitant about presenting to health services due to the risk of infection.[6] However, it has been reported that delaying curative surgery in those who have been diagnosed with gynecological cancer may have adverse outcomes for patients and affect survival significantly.[7] It has been reported that breast cancer screening reduces mortality rates and that the five-year survival rate of patients with breast cancer in developed countries is over 80%, depending on early diagnosis and treatment. It is stated that the disruptions that may occur in these processes will also affect the survival process of patients with breast cancer.[8,9]

Healthcare-seeking behaviors and even clinical outcomes of women diagnosed with cancer may be affected in this process. This study aimed to determine the change in the healthcare-seeking behaviors and distress levels of women with gynecological cancer or breast cancer during the pandemic.

MATERIALS AND METHODS

Ethical Committee Approval: This study was approved by the Ministry of Health Scientific Research Platform (2020-08-04T12_08_39) and the Gazi University Ethical Committee (Date: 24.09.2020, decision no: 91610558-604.01.02). In line with the Helsinki Declaration, the women were informed about the study, and their informed consent was obtained.

Study Design: The study used a descriptive, cross-sectional design. The paper is reported following the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement.

Population and Sampling: The population of the study consisted of women diagnosed with gynecological cancer or breast cancer in Türkiye. The sample size was calculated using the known population sampling calculation formula ($n = Nt^2pq / d^2 (N-1) + t^2pq$).[10] In this context, the Türkiye Cancer Statistics data, which represents the related Turkish population, were used as a reference.[11] Considering the pandemic process, the sample size (n) was calculated as 96 at a 90% confidence interval. The study was completed with a total of 109 women.

The inclusion criteria were women who were at least literate, volunteered to participate in the study, and had ovary, endometrium, cervix, vagina, vulva, or breast cancer.

Study Setting: The study was conducted online on social media platforms. The snowball method was used to spread the survey link created online. The questionnaire link was first shared on the researchers' individual social media accounts. Women who met the research criteria were invited to the research, and they were asked to share the link. The weblink to the questionnaire was shared on the Facebook® and Instagram® accounts of some cancer-related associations (such as Cancer Warriors Foundation, Breast Uterus Over - Cancer Warriors Foundation) and groups (such as Fight against Cancer, Dance with Cancer, Cancer Patients and Solidarity Group) that agreed to collaborate. The study data were collected between October and December 2020.

Data Collection Tools: An online questionnaire contained 18 items that aimed to collect data about the socio-demographic characteristics (age, education level, i.e.) of the participants and their healthcare-seeking behaviors during the pandemic process[4,6]. Besides, the Distress Thermometer and The Brief Symptom Inventory were included in the questionnaire to determine the women's distress levels.

The distress thermometer was developed by Roth, Kornblinth, Batel-Copel, et al. in 1998 to measure psychosocial distress in patients with cancer.[12] The distress scale is graded between 0 and 10 with the thermometer analogy. It is a visual analogue scale that individuals can apply themselves and consists of

only one question. There is a thermometer visual with numbers from 0 to 10 on the scale. Subjects express their distress through the numbers on this thermometer. 0 points indicate that the individual does not experience any distress at all, and 10 points indicate that the individual experiences distress at the upper limit. The validity and reliability study of the scale in our country was carried out by Özalp, Cankurtaran, Soygür, et al. in 2007, and its cutoff point was determined as 4.[13] Cronbach's alpha value of the scale in our study was found as .76.

The Brief Symptom Inventory (BSI) was developed by Derogatis (1992).[14] This is a Likert-type self-assessment scale that scans mental symptoms. The validity and reliability study of the scale in our country was carried out by Şahin and Durak in 1997.[15] The score range is between 0 and 212. It can be administered to adolescent and adult individuals and groups. There is no time limit for responding to the scale. BSI is a scale that consists of 53 questions defined by individuals and intended to recognize and measure various psychological symptoms. The scale consists of nine sub-dimensions: somatization, obsession-compulsion, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation, and psychoticism. There is a scoring key for each subscale based on the item numbers of the sub-dimensions. For each question, the individual marks one of the five options ranging from (0) "Not at all" to (4) "Extremely." Each item is given a score of 0-4 according to whether the individual has any psychological symptoms and the extent to which they are present. High total scores obtained from the scale indicate that symptoms are frequent.[15] Cronbach's alpha value of the scale in our study was found to be .96.

Statistical Analysis: The data stored in the e-mail account were transferred to the database of the SPSS 23.0 software package and evaluated. Descriptive statistics, such as frequency (n) and percentage distributions (%), t-test, one-way ANOVA, and Chi-square analyses, were employed to analyze the data. Statistical significance was accepted as $p<0.05$.

RESULTS

The women's mean age was 44.79±8.85. According to the findings, 74.3% of women had breast cancer, and 11% had cervical cancer. The mean duration of cancer diagnosis was 35.70±38.19 months. When the sources women used to get information about cancer from the internet were examined, it was found that 26.1% got information from doctor's pages (Table 1).

Table 1. Distribution of women's socio-demographic characteristics and cancer-related characteristics (n=109).

Characteristics		n (%)
Mean age (Mean±SD)		44.79±8.85 (Min:22; Max:66)
Level of education	Primary/Secondary education	27 (24.8)
	High school	28 (25.7)
	University and above	54 (49.5)
Employment	No	36 (33)
	Quitted working during the pandemic process	34 (31.2)
	Yes	23 (21.1)
	Retired	16 (14.7)
The longest place of residence during COVID-19	Metropolis	54 (49.6)
	Province	29 (26.6)
	County	19 (17.4)
	Town/village	7 (6.4)
Type of cancer	Breast cancer	81 (74.3)
	Cervical cancer	12 (11)
	Ovarian cancer	11 (10.1)
	Endometrial cancer	5 (4.6)
Duration of cancer/month (Mean±SD)		35.70±38.19 (Min:1; Max:224)
Membership of a cancer-related association	No	89 (81.7)
	Yes	20 (18.3)
Sources used to get information about cancer from the internet[a]	Doctor pages	62 (26.1)
	Social media (such as Instagram, Facebook)	55 (23.2)
	YouTube channels	38 (16)
	Hospital pages	37 (15.6)
	Blogs-forums	22 (9.3)
	Mobile apps	18 (7.6)
	Nursing pages	5 (2.2)

SD: standard deviation; Max: maximum; Min: minimum; [a]: n was multiplied because more than one option was marked.

According to the findings, 56.9% of the women stated a change in the frequency of going to the hospital / presenting to healthcare services during the pandemic. Also, there was a decrease in the frequency of going to the hospital for diagnosis (54.8%), treatment (32.3%), and rehabilitation (58%) services during the pandemic process. On the other hand, the planned doctor appointment of 28.1% was postponed/cancelled, the screening test of 26.8% was postponed, and the treatment of 25.6% was delayed. Of the participants, 46.8% experienced a restriction in presenting to the hospital related to their disease, and of the women who experienced restrictions, 32% experienced restrictions due to fear of COVID-19 transmission, 30.9% due to the inability to get an appointment, and 21.6% due to the conversion of the hospital into a pandemic hospital (Table 2).

Table 2. Examination of the change in women's healthcare-seeking behaviors during the COVID-19 pandemic.

Characteristics		**n (%)**
Change in the frequency of going to the hospital / presenting to health services	Yes	62 (56.9)
	No	47 (43.1)
Change in the frequency of going to the hospital for DIAGNOSIS (such as pap-smear, mammography)	Increased	8 (12.9)
	Decreased	34 (54.8)
	No change	20 (32.3)
Change in the frequency of going to the hospital for TREATMENT (such as chemotherapy, radiotherapy)	Increased	6 (9.7)
	Decreased	20 (32.3)
	No change	36 (58)
Change in the frequency of going to the hospital for REHABILITATION (physical therapy, nutrition, health education, i.e.)	Increased	2 (3.2)
	Decreased	36 (58)
	No change	24 (38.8)
Change in diagnosis, treatment, and rehabilitation processes for the disease	Yes	39 (35.8)
	No	70 (64.2)
Changes[a]	My scheduled doctor's appointment was postponed/ cancelled.	23 (28.1)
	My screening tests were delayed.	22 (26.8)
	My treatment (surgery, chemotherapy, radiotherapy, physical therapy, hormone therapy) was delayed.	21 (25.6)
	I could not get consultancy service on medication use, nutrition, sleep, sexuality, i.e.	11 (13.4)
	I presented to a private hospital because of the process in public hospitals.	5 (6.1)
Experiencing a restriction in presenting to the hospital related to the disease	Yes	51 (46.8)
	No	58 (53.2)
Reasons for restrictions	I did not apply due to the fear of getting coronavirus.	31 (32)
	The polyclinic/clinic that I was going to present to did not accept patients / I could not make an appointment.	30 (30.9)
	The hospital that I was going to present to became a pandemic hospital.	21 (21.6)
	I could not present to the hospital due to financial difficulties during the pandemic process.	8 (8.3)
	My wife, friends, and family did not allow me to present to the hospital because of the possibility of coronavirus transmission.	7 (7.2)

[a]: n was multiplied because more than one option was marked.

Before the pandemic period, health personnel (45%) ranked first, among women's cancer-related information sources; during the pandemic process, the internet (41.3%) rated first place (Table 3).

89% of the women were found to experience distress during the pandemic process. The mean BSI total score of the women was 58.31±42.28 (Table 4).

In women who experienced distress during the pandemic process, the mean BSI score was significantly higher than women who did not experience any distress (t=-4.691; p=0.000087). The mean BSI score of women whose chemotherapy treatment was delayed during the pandemic period was significantly higher than those whose treatment was not delayed (t=2.694; p=0.026). The mean BSI score of women who experienced restrictions in presenting to the hospital as it had become a pandemic hospital was significantly higher than those who did not experience such a restriction (t=2.440; p=0.018). The mean BSI score of women who obtained more information from the Internet during the pandemic process was significantly higher than the women who received less information (F=3.076; p=0.032) (Table 5).

Table 3. The distribution of the sources that women obtained the most information about cancer before and during the pandemic.[a]

Before the pandemic				During the pandemic			
Healthcare personnel	**The Internet**	**Television**	**Books, journals, articles**	**Healthcare personnel**	**The Internet**	**Television**	**Books, journals, articles**
n (%)	**n (%)**	**n (%)**	**n (%)**	**n (%)**	**n (%)**	**n (%)**	**n (%)**
49 (45)	45 (41.3)	39 (35.8)	32 (29.4)	43 (39.4)	45 (41.3)	38 (34.9)	34 (31.2)

[a]: n was multiplied because more than one option was marked.

Table 4. Examination of women's experience of distress during the COVID-19 pandemic process and the mean BSI scale scores.

Scales		**n (%)**
Distress Thermometer	<4 (No distress)	12 (11)
	≥4 (Presence of distress)	97 (89)
Mean BSI scale score (Mean±SD)		58.31±42.28
		(Min:4; Max:194)

SD: standard deviation; Max: maximum; Min: minimum.

Table 5. Mean BSI scores of women according to their characteristics relating to the pandemic.

		Mean ± SD	**F/t**	**p**
Distress status	<4 (No distress)	26.50±21.45	t=-4.691	**0.000087**
	≥4 (Presence of distress)	62.24±43.73		
Status of delays in chemotherapy	Yes	104.62±53.20	t=2.694	**0.026**
	No	51.74±31.23		
Experiencing restrictions in presenting to the hospital because it has become a pandemic hospital	Yes	72.47±44.44	t=2.440	**0.018**
	No	46.26±32.33		
Status of obtaining information from the Internet	More[1]	68.17±45.21	F=3.076 Post-hoc 1-3	**0.032**
	Much[2]	56.26±39.85		
	A little[3]	34.40±35.27		
	Very little[4]	63.16±43.86		

F: One-way ANOVA; t: T-test in independent groups.

DISCUSSION AND CONCLUSION

Some guidelines suggest that non-emergency treatments be delayed during the COVID-19 process, while the World Health Organization recommends maintaining primary healthcare services, including the field of oncology.[16]

The frequency of going to the hospital for diagnosis, treatment and rehabilitation services was found to decrease during the pandemic in our study. More than a quarter of the women stated that their planned doctor appointment was postponed/cancelled, and their screening tests were postponed. Also, about a quarter of them said their treatment was delayed. In studies conducted with gynecologist and oncologists from various countries, it has been stated that there is a change in diagnosis and follow-up processes and that these processes have generally been postponed.[17-19] In the literature, it has been seen that during the pandemic, there have been cancellations and delays in women's diagnostic processes, surgeries, treatment processes, scheduled doctor appointments, laboratory tests, and imaging applications.[5,6,19] Although our study results appear to be similar to those of the literature, different results have also been observed in the studies conducted. In a study conducted with women with gynecological cancer, 64% of the participants stated that their treatment continued as planned despite the pandemic.[20] In another study examining breast cancer surgery experiences, it was stated that surgical operations were performed by taking precautions, and postoperative follow-up was carried out by using telemedicine methods. As a result of the study, it was stated that the patients were not infected with COVID-19.[21] The reason for the different results in the literature may be because the studies were conducted in different countries.

The reasons for restrictions in presenting to health services in our study included the fear of COVID-19 transmission, not being able to get an appointment, and the conversion of the hospital that the participants would present to into a pandemic hospital. In a study conducted in the literature, participants stated that their breast examination was delayed because they were afraid of coronavirus transmission (81.9%) and could not get an appointment due to pandemic restrictions (12.1%).[22] In another study, 53.1% of the participants stated that they were afraid of getting infected with coronavirus during hospital treatment and follow-ups, and 73.2% of them thought that patients with cancer were at risk for COVID-19 infection and that they were susceptible to COVID-19.[20] Our study is similar to the literature in terms of the reasons for the restriction in presenting to health services during the pandemic process. While women received information primarily from health personnel before the pandemic, they started receiving information mainly from the Internet during the pandemic process. It was determined in a study that patients had difficulties in reaching the healthcare team during the pandemic.[23] As a result of our study, the reason for the change in women's information sources in favor of the Internet can be similarly considered to stem from the inability to reach healthcare personnel due to the changing health service delivery during the pandemic process. It is thought that the adoption of telemedicine applications as hospital procedures and their widespread use will both meet the information needs of patients and facilitate safe access to services.

The pandemic affects psychological symptoms such as stress, anxiety, and depression.[24] In our study, it was determined that 89% of women experienced distress. The mean BSI scores were found to be statistically significantly higher in women who stated that they experienced distress, whose chemotherapy treatment was postponed, who obtained more information from the Internet during this period, and who stated that they had limitations in presenting to the hospital during the pandemic process. Accordingly, it was found that these women experienced mental symptoms more frequently. In the literature, it was reported that 88.6% of the women were concerned, 51.4% experienced anxiety, and 26.5% experienced depression.[5] In another study, it was stated that 35.3% of the women with gynecological cancer had a high level of anxiety and that 30.6% had a high level of depression score during the pandemic. The inability to get services from health institutions and the postponement of the treatment plans increases the patients' anxiety level. In the same research, 71% of the participants stated that they feared that the disease would progress if their treatment or follow-up were cancelled/delayed.[20] Similarly, the women in our study stated that there were restrictions in getting health services. Although our study findings seem to be similar to those of the literature, a different result was reported in another study. In the study investigating the effect of delaying breast examinations on breast and emotional symptoms, it was reported that there was no change in emotional symptoms, such as depression, feeling under pressure, or insomnia during the COVID-19 process.[22] This may be because studies were conducted in different countries and with different patient groups. Considering that the pandemic process will not disappear in a short time, postponing the treatment and rehabilitation processes and not presenting to the hospital due to the fear of getting infected with COVID-19 are important issues because they will lead to the progression of cancer and cause patients to experience anxiety. Women who stated that they obtained more information from the Internet were found to experience more mental symptoms. This might be because they could not access correct information sources.

For this reason, considering the changes brought by the pandemic process, it is crucial to plan the health service delivery in a way that will not increase the anxiety and stress levels of patients.

In conclusion, our study found that during the COVID-19 pandemic process, women diagnosed with gynecological cancer or breast cancer experienced restrictions in accessing health services. There was a change in diagnosis-examination-treatment applications, existing conditions increased mental symptoms in women, and most women experienced distress. It is recommended that healthcare organizations should put alternative methods such as telehealth applications into practice so that susceptible and vulnerable patients with cancer can have uninterrupted access to treatment, healthcare, and counselling. It is also recommended that women diagnosed with breast or gynecological cancer be supported psychosocially during this process. The results obtained in the research are limited only to the women who participated in the study. Research data were obtained based on the participants' notifications and were not observed by the researchers. The strengths of our research are the use of valid and reliable measurement tools in the study and the fact that the data provides data regarding the period when the pandemic process peaked.

Ethics Committee Approval: This study was approved by the Ministry of Health Scientific Research Platform (2020-08-04T12_08_39) and the Gazi University Ethical Committee (Date: 24.09.2020, decision no: 91610558-604.01.02). In line with the Helsinki Declaration, the women were informed about the study, and their informed consent was obtained.

Conflict of Interest: No conflict of interest was declared by the authors.

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Comparison of Brain Natriuretic Peptide and Other Laboratory Parameters of Those Who Died from Coronavirus Disease and Those Who Were Discharged

Koronavirüs Hastalığı Nedeniyle Ölenlerle Taburcu Olanların Beyin Natriüretik Peptit ve Diğer Laboratuvar Parametrelerinin Karşılaştırılması

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ABSTRACT

Objective: In this study, we aim to compare the brain natriuretic peptide (BNP) of patients who were diagnosed with COVID-19 infection, who were hospitalized and discharged, and those who died.

Materials and Methods: The study was conducted on 474 patients diagnosed with COVID-19 disease. Information of 56 patients who died and 418 patients with COVID-19 who were discharged were obtained from the hospital information management system (HIMS) and analyzed retrospectively. The relationship between BNP, white blood cell (WBC), neutrophil (NEU), lymphocyte (LYM), platelet (PLT), Procalcitonin (PCT), High Sensitive Troponin I (hs Tn I), D-dimer and C-Reactive Protein (CRP) levels in deceased patients and discharged patients researched.

Results: There was no statistically significant difference in mortality between women and men (p=0.385). There was no statistically significant difference in BNP, WBC, NEU, LYM, platelet, PCT and hs Tn I values between those who died and those who were discharged. D-dimer and CRP values of those who died and discharged were statistically significant (p< 0.031 and 0.020, respectively).

Conclusions: Increased levels of CRP and D-dimer were found to be associated with mortality. More comprehensive studies are needed on this subject.

Keywords: Brain Natriüretik Peptide, C-Reactive Protein, Coronavirus infections, D-dimer

ÖZ

Amaç: Bu çalışmada amacımız, COVID-19 enfeksiyonu teşhisi alıp hastanede yatıp taburcu olanlar ile ölen hastaların beyin natriüretik peptidini (BNP) karşılaştırmaktır.

Materyal ve Metot: Çalışma COVID-19 hastalığı teşhisi konan 474 hasta üzerinde gerçekleştirildi. Ölen 56 hasta ile taburcu olan 418 COVID-19 hastasının bilgileri hastane bilgi yönetim sisteminden (HBYS) alındı ve geriye dönük olarak analiz edildi. Ölen hastalar ile taburcu olan hastalarda BNP, beyaz küre hücresi (WBC) , nötrofil (NEU), lenfosit (LYM), trombosit (PLT), Procalsitonin (PCT), Yüksek Duyarlı Troponin I (hs Tn I), D-dimer ve C-Reaktif Protein (CRP) düzeyleri arasındaki ilişki araştırıldı.

Bulgular: Kadınlar ile erkekler arasında mortalite açısından istatistiksel olarak anlamlı bir fark yoktu (p=0,385). Ölenler ile taburcu olanlar arasında BNP, WBC, NEU, LYM, trombosit, PCT ve hs Tn I değerlerinde istatistiksel olarak anlamlı fark yoktu. Ölenler ile taburcu olanların D-dimer (p<0,031) ve CRP (p<0,020) değerleri istatistiksel olarak anlamlı bulundu.

Sonuç: Artan CRP ve D-dimer düzeylerinin mortalite ile ilişkili olduğu bulundu. Bu konuda daha kapsamlı çalışmalara ihtiyaç vardır.

Anahtar Kelimeler: Beyin Natriüretik Peptid, C-reactive protein, D-dimer, koronavirus enfeksiyonları

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INTRODUCTION

COVID-19 appeared for the first time in Wuhan City, China. COVID-19 infection has been classified as a pandemic by WHO.[1] Common symptom of COVID-19 are fever, cough, shortness of breath, muscle aches, diarrhea, loss of smell and taste, and fatigue in most patients.[2] Approximately 15% of affected patients have acute respiratory distress syndrome (ARDS).[3] In the literature, patients with pre-existing Cardiovascular Diseases (CVD) and infected with COVID-19 have a more severe and higher mortality rate.[4]

Neutrophils, lymphocytes, and platelets are important blood cells that play a role in inflammation-related diseases. Today, it is used in many infectious and tumoral formations.[5]

C-reactive protein (CRP) is an acute phase reactant (APR). CRP was first detected in the serum of patients with pneumococcal pneumonia. APR concentration was increased in serum due to tissue damage and inflammation. Due to these properties, the increase in serum CRP levels a few hours after inflammation has led to this being one of the first biomarkers considered in COVID-19.[6]

The systemic values of D-dimer are used to evaluate the circulating fibrin cycle, and even a single measurement is sufficient to obtain information about the fibrinolytic status. D-dimer is generally used to evaluate coagulation and fibrinolysis activation.[7]

Procalcitonin (PCT) production, an undetectable or meagre amount of detectable protein in the blood of healthy individuals, can be stimulated by bacterial endotoxins, exotoxins, and some cytokines. It has been found that the most common increase in the serum in sepsis. Its early rise can be detected in a short time and quickly. This feature is a valuable parameter in the diagnosis and follow-up of sepsis.[8]

Troponins are found in skeletal and cardiac muscle structures together with tropomyosin. Troponins are structural proteins that regulate skeletal and cardiac muscle contraction.[9]

Cardiac complications are a common occurrence among hospitalized patients with COVID-19. BNP is secreted from the ventricle due to the tension of myocyte cells in the atrium and ventricle walls of the heart.[10] Natriuretic peptides are important biomarkers of myocardial stress. Natriuretic peptides are also frequently elevated in patients with severe respiratory disease. Typically, elevated cardiac filling pressures or elevation of BNP or NT-proBNP in the absence of clinical heart failure are associated with worse outcomes in patients with ARDS.[11]

This study aimed to determine the predictive value of BNP levels in people who recovered from COVID-19 infection and died.

MATERIALS AND METHODS

Ethical Approval: The study was approved by the Sakarya University Ethical Committee (Date: 04/09/2020, decision no: E.7734). And institutional permissions (Date: 02.06.2020) were obtained. In line with the Helsinki Declaration, the nurses were informed about the study, and their informed consent was obtained. After obtaining verbal consent from the nurses who volunteered to participate in the study, they were included in the study.

Study Group: A total of 474 patients who applied to our hospital's pandemic outpatient clinics and were diagnosed with COVID-19 and hospitalized in the COVID-19 service were included in this study. Of these patients, information on 56 patients who died due to COVID-19 and 418 patients who recovered were obtained from the hospital information management system and analyzed retrospectively. Diagnosis of COVID-19; clinical findings and computed tomography and SARS-CoV-2 RT-PCR. In our study, BNP, WBC, neutrophil (NEU), lymphocyte (LYM), platelet (PLT), D-dimer, C-reactive protein (CRP), Procalcitonin (PCT), and High Sensitive Troponin I (hs Tn I) parameters were evaluated.

Sample Collection, Nucleic Acid Isolation and Reverse Transcriptase PCR Reaction: Combined nasopharyngeal and oropharyngeal swab samples were placed in a viral transport medium immediately after taking with a dacron swab and were stored at 2-8°C and transported to the laboratory. The samples were sent to the laboratory following the infection prevention and control procedures, paying attention to the triple transport system and cold chain rules. After the samples were accepted in the microbiology laboratory, the samples were taken to the 3rd-level biosafe negative pressure room. Bio-Speedy® Viral Nucleic Acid Isolation Kit (bioeksen, Türkiye) was used for total nucleic acid isolation from samples. The isolation procedure was carried out with the manufacturer's recommendations.

Bio-Speedy® COVID-19 RT-qPCR Detection Kit (Bioeksen, Türkiye) was used for the RT-PCR study. PCR amplification and evaluation of results were performed following the manufacturer's recommendations.

Complete Blood Count, Biochemistry and Coagulation Parameters Analyses: CELLDYN 3700 (Abbott, USA) device for hemogram tests, DIAGON COAG XL (DIAGON, Hungary) device for D-dimer tests, Architect i2000 (Abbott, USA) device for hs

Tn I, and BNP tests, Cobas e 411 (Roche, USA) and BN II (Siemens, Germany) device were used for CRP tests.

Statistical analysis: Descriptive analyses were performed to provide information on the general characteristics of the study population. The distribution of data is too skewed to use a parametric test. Accordingly, the Mann-Whitney U test was used to compare the numeric variables. The numeric variables were presented as the median [interquartile range]. The chi-square test was used to compare the categorical variables between the two groups. The categorical variables were presented as the frequency (% percentage). The p-value of 0.05 was considered significant. Analyses were performed using SPSS statistical software (IBM SPSS Statistics, Version 23.0.)

RESULTS

Of the 474 patients in the study, 301 (63.5%) were male, and 39 (13%) of them died, while 262 (87.2%) were discharged. In addition, of 474 patients, 173 were women (36.5), and 17 (9.8%) of them died, while 156 (90.2%) were discharged. There was no statistically significant difference in mortality rate between women and men (p=0.385). There was no statistically significant difference in BNP, WBC, NEU, LYM, PLT, PCT and hs Tn I values of the patients who died and were discharged (p>0.05). A statistically significant difference was found between the D-dimer (died group: 3175 [6695], discharged group: 1925 [3907]) (p<0.031) and CRP (died group: 111.5 [115.65], discharged group: 95.05 [113.1]) (p<0.020) values of patients who died and were discharged (Table 1).

It was found to be statistically significantly higher in the group of patients who died and were discharged (p<0.05). Box plot comparison of CRP values of died and discharged patients is presented in Figure 1.

Table 1. Evaluated parameters of the patients included in the study (n=474).

Parameters	Ex (n=418) Median [IR]	Discharge (n=56) Median [IR]	*p*
Age	73.5 [15.5]	70 [16]	0.099
Female (n=173), n(%)	17 (9.8)	156 (90.2)	0.385
Male (n=301), n(%)	39 (13)	262 (87)	0.385
BNP (ng/L)	113.15 [447]	169.85 [388.2]	0.324
WBC (K/µL)	13.6 [7.1065]	12.1 [7.94]	0.354
NEU (K/µL)	12.95 [6.6695]	10.8 [7.56]	0.141
LYM (K/µL)	0.5895 [0.517]	0.5085 [0.513]	0.068
PLT (K/µL)	201 [123]	207 [120]	0.470
CRP (mg/dL)	111.5 [115.65]	92.05 [113.1]	**0.020**
D-Dimer (µgFEU/L)	3175 [6695]	1925 [3907]	**0.031**
PCT (ng/ml)	0.445 [1.386]	0.3635 [1.487]	0.364
Hs Tn I (ng/L)	55.8 [271.8]	113.9 [552]	0.283

IR: Interquartile range; BNP: Brain natriuretic peptide; WBC: White blood cell; NEU: Neutrophil; LYM: Lymphocyte; PLT: Platelet; PCT: Procalcitonin; hs Tn I: High sensitive troponin I and CRP: C-Reactive protein (CRP, p=.0.020, D-Dimer, p=0.031).

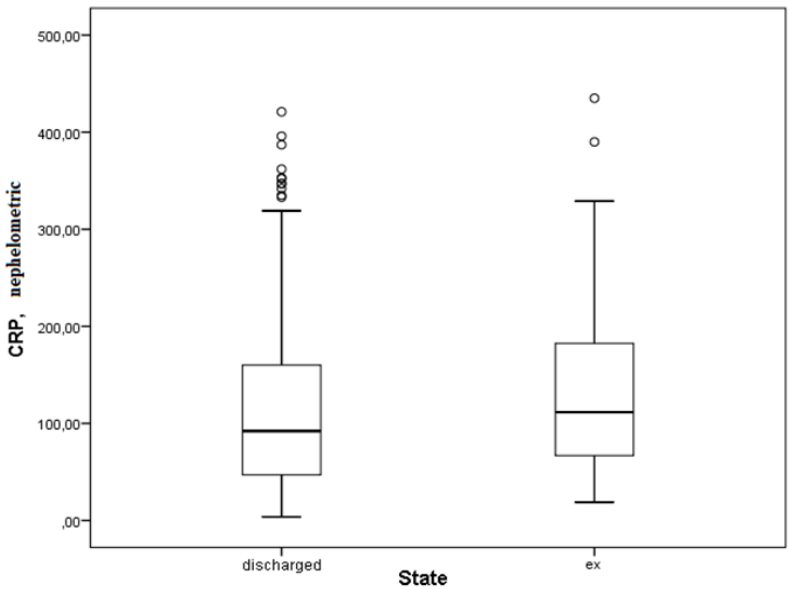

Figure 1. Comparison of the CRP values of those who died and those who were discharged patients.

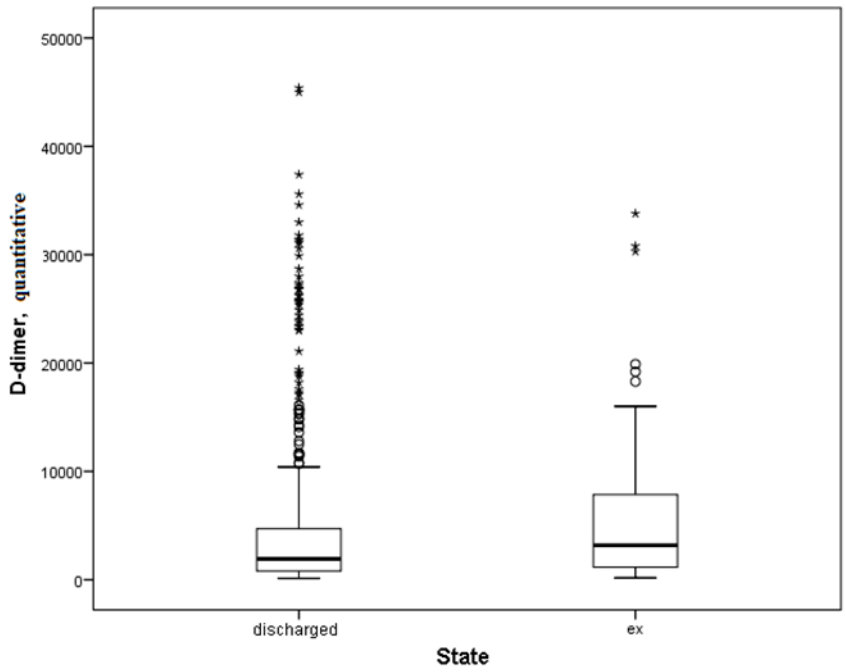

Figure 2. Comparison of the D-dimer values of those who died and those who were discharged patients.

It was found to be statistically significantly higher in the group of patients who died and were discharged ($p<0.05$). Box plot comparison of D-dimer values of died and discharged patients is presented in Figure 2.

DISCUSSION AND CONCLUSION

Considering the pathogenesis of COVID-19 disease, it is seen that it affects the respiratory tract and cardiovascular system and causes abnormalities in some blood parameters. In the study conducted by Yang et al. BNP, CRP, D-dimer, PCT, hsTn I, WBC, neutrophil, lymphocyte and thrombocyte parameters were determined in patients who were discharged after recovering from COVID-19 infection and died due to this disease. BNP, PCT, and CRP are the leading indicators of inflammatory severity in ICU cases. Deaths corresponding to worsening sepsis in these patients were significantly increased or detected at relatively high levels, which can lead to life-threatening organ dysfunction.[12] In our study conducted on patients discharged and who died with clinically severe COVID-19, elevated BNP, hs Tn I, and D-dimer levels were detected. In their study on COVID-19 patients, Tao et al. determined that CRP>77.35 mg/L, PCT>0.20 µg/L, and LDH>481 U/L are independent risk factors associated with death events. CRP, PCT and LDH levels were high in patients who died from COVID-19; found that it gradually decreased to normal levels in the discharged group. Therefore, monitoring of laboratory parameters has shown that it can predict prognosis in severe patients in clinical practice. They reported that the increased incidence of harmful arrhythmias and myocardial complications during illness in patients with high BNP and TnT levels played a more significant role in the fatal outcome of COVID-19 compared to the presence of underlying cardiovascular disease.[13] It revealed many risk factors associated with poor prognoses, such as assessment scores and high CRP, PCT, and LDH. Elevated CRP, PCT, and LDH values were elevated in patients who died but gradually returned to normal levels in patients discharged. Therefore, monitoring these laboratory parameters is essential in predicting prognosis in clinical practice for severe patients.[14,15]

When Bonetti et al. compared the laboratory parameters of patients hospitalized with COVID-19 and discharged patients, they found that CK, LDH, troponin, D-dimer and CRP levels increased in patients who died.[16] In patients who died from COVID-19, LDH, BNP, Hs-cTnT, Many laboratory indicators, such as D -dimer, CRP, and PCT, were significantly increased compared to recovered patients.[17] Tan et al. reported that CRP levels were significantly increased in 65.0% of hospitalized patients and PCT levels were significantly increased in 5.7%, and cox proportional risk model analysis showed that CRP and PCT were used to predict severity in COVID-19 patients. He reported that these parameters can be

used as independent factors.[18] COVID-19 patients have severe and adverse outcomes. In our study, in parallel with other studies, high values were obtained in other parameters, especially D-dimer and CRP. This shows that COVID-19 affects the whole body, especially the circulatory and respiratory systems.

In a study by Guan W. on 1099 people without the disease, PCT was shown to be low (<0.5 µg/L) in 96% of cases.[19] Huang et al. in their study found that high CRP, PCT, D-dimer and LDH levels are risk factors for poor prognosis in COVID-19.[20] Infection markers, CRP, LDH, and PCT, and D-dimer, which is one of the coagulation function tests, are positive with COVID-19 severity.[21] A meta-analysis showed that increased PCT values were associated with a ~5 -fold higher risk of severe COVID-19.[22] In a study conducted with COVID-19 patients, it was reported that high CK levels might be the only initial application of these patients. Total CK should be requested at the time of admission for each patient.[23] In our study, we found that BNP, CRP, D-dimer, PCT, and hs Tn I values were higher in patients who died due to COVID-19 infection than those who were discharged. In our study, it was determined that BNP, CRP, D-dimer, PCT and hs Tn I values were higher in patients who died due to COVID-19 infection compared to those who were discharged.

Terpos et al. reported in a study they conducted on COVID-19 patients that high CK levels may be the only first admission of these patients and total CK should be requested for each patient at the time of admission.[24] Pan et al. in their study of severe COVID-19 patients, found that neutrophils increased significantly, while lymphocytes, monocytes, and hematocrit decreased significantly.[25] Liao et al. in their study of severe COVID-19 patients, found that neutrophils increased significantly, while lymphocytes, monocytes, and hematocrit decreased significantly.[26] Ozdin et al. found an increase in neutrophil -lymphocyte ratios in their study on COVID-19 patients.[27] Shi et al. found that 11.4% of severe COVID-19 cases had leukocytosis and rates were higher than mild-to-moderate cases and that COVID-19 caused disseminated intravascular coagulation (DIC) with severe thrombocytopenia. they have done.[28] D-dimer elevation and thrombocytopenia, indicating activation of hemostasis and fibrinolysis, are associated with higher mortality in COVID-19 patients.[29,30] In our study, it was determined that WBC and Neutrophil values increased, while lymphocyte values decreased in patients who died from COVID-19 infection compared to those who were discharged. In our study, it was found that patients who died due to COVID-19 infection had a decrease in platelet values compared to those who were discharged. In our study, it was determined that there was a decrease in platelet values in patients who died due to COVID-19 infection.

Factors such as body mass index, cardiovascular disease status, end-stage renal disease and diabetes can affect BNP levels. The fact that the patients we included in the study consisted of patients diagnosed with COVID-19 and it was a retrospective study makes it difficult to reach these data. All these situations constitute the limitations of our study.

In conclusion, according to the results of our study, it was determined that advanced age, BNP, D-dimer, CRP, hs Tn I, WBC, neutrophil, lymphocyte and platelet increase were associated with mortality. These laboratory parameters are important in patient follow-up. More comprehensive studies are needed on this subject.

Ethics Committee Approval: The study was approved by the Sakarya University Ethical Committee (Date: 04/09/2020, decision no: E.7734). And institutional permissions (Date: 02.06.2020) were obtained. In line with the Helsinki Declaration, the nurses were informed about the study, and their informed consent was obtained. After obtaining verbal consent from the nurses who volunteered to participate in the study, they were included in the study.

Conflict of Interest: No conflict of interest was declared by the authors.

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Examination of Perception of Nursing Care and Quality of Recovery in Surgical Patients According to Some Variables

Cerrahi Hastalarının Hemşirelik Bakımı Algısı ve İyileşme Kalitesinin Bazı Değişkenlere Göre İncelenmesi

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ABSTRACT

Objective: The study aims to determine the relationship between the quality of care perception and healing quality levels of surgical patients and to determine the differences according to their characteristics.

Materials and Methods: The descriptive cross-sectional study was carried out on 237 patients treated in the surgical clinics of a university hospital from December 2021 to May 2022. Data were collected using a descriptive information form, the Patient's Perception of Nursing Care Scale, and the Quality of Recovery-40 Scale.

Results: The mean total score of the Patient's Perception of Nursing Care Scale was 71.45±9.81, and the mean total score of the Quality of Recovery-40 Scale was 106±15.95. The mean score of the physical independence subdimension of the Quality of Recovery-40 Scale was the highest (21.14±5.73), and the mean score of the pain subdimension was the lowest (9.32±3.57). There was statistically significant relationship between gender, having a companion, and Patient's Perception of Nursing Care Scale and between having a chronic disease and the Quality of Recovery-40 Scale.

Conclusions: It was found that the level of patient's perception of nursing care was high, the level of recovery quality was below average, and there was no relationship between the level of perception of nursing care.

Keywords: Nursing care, patient care, patient satisfaction, surgery

ÖZ

Amaç: Araştırmanın amacı cerrahi hastalarının bakım kalitesi algısı ve iyileşme kalitesi düzeyleri arasındaki ilişkinin belirlenmesi ve kişisel özelliklerine göre farklılıkların belirlenmesidir.

Materyal ve Metot: Tanımlayıcı-kesitsel tipte olan araştırma, Aralık 2021-Mayıs 2022 tarihleri arasında bir üniversite hastanesinin cerrahi kliniklerinde tedavi gören 237 hastası ile yürütüldü. Veriler, tanımlayıcı bilgi formu, Hastanın Hemşirelik Bakımını Algılayışı Ölçeği ve İyileşme Kalitesi-40 Ölçeği ile toplandı.

Bulgular: Hastaların Hemşirelik Bakımını Algılayışı Ölçeği toplam puan ortalaması 71,45±9,81, İyileşme Kalitesi -40 ölçek toplam puan ortalaması 106±15,95'tir. İyileşme Kalitesi-40 ölçeğinin Fiziksel Bağımsızlık alt boyut puan ortalamasının (21,14±5,73) en yüksek, ağrı alt boyut puan ortalamasının ise en düşük (9,32±3,57) olduğu saptandı. Hastaların cinsiyeti, refakatçi varlığı ile Hastanın Hemşirelik Bakımını Algılayışı Ölçeği arasında, kronik hastalık varlığı ile İyileşme Kalitesi-40 Ölçeği arasında istatistiksel olarak anlamlı ilişki vardır.

Sonuç: Hastaların hemşirelik bakımı algı düzeyinin yüksek, iyileşme kalitesi düzeyinin ortalamanın altında olduğu ve hastaların hemşirelik bakımını algılama düzeyleri ile iyileşme kalitesi arasında ilişki olmadığı belirlendi.

Anahtar Kelimeler: Cerrahi, hasta bakımı, hasta memnuniyeti, hemşirelik bakımı

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INTRODUCTION

Nursing care is the response of the nurse to the physical, psychological, emotional, social, and spiritual needs of patients to help them return to a healthy and normal life.[1] Patients' perceptions of the quality of care are the feelings and thoughts patients experience about the care nurses provide while hospitalized.[2] Measuring patients' perceptions of quality nursing care is key to identifying nursing care needs, evaluating the quality of nursing care, and providing excellent patient-centred care.[2,3]

One of the key elements in accelerating a patient's recovery is the quality of nursing care.[4,5] The process of recovering control over several functional domains, including physical, psychological, physiological, social, and economic factors, is known as postoperative recovery.[6] The process a patient goes through to regain their preoperative condition is defined from their perspective by the quality of their recovery.[6]

The patient's health state in the early postoperative period can be determined in large part by the patient's quality of recovery.[7] Quality of recovery is a multidimensional, patient-reported outcome.[8] In order to measure the quality of perioperative treatment, it is important to take into account both its economic and prognostic implications.[9] Recovery quality is a complicated concept that is significantly impacted by patient, physician, and institutional biases.[6] Patients' perceptions of the quality of recovery are strongly influenced by individual personality characteristics, level of knowledge about the recovery process, preparedness, coping strategies, and sense of security.[4] Successful recovery from surgery is a complex, multidimensional, and highly individualized process. Many barriers can interfere with this process, such as inadequate pain control, lack of or poor quality patient education, and lack of discharge management.[5] Patients consider effective communication, active patient involvement, and empathy from health professionals to be important determinants of the quality of their recovery.[6] For a thorough evaluation of recovery quality, developing a complex, patient-centered evaluation of the postoperative period is essential.[6] Healthcare workers can better support patients by identifying the elements that have a negative impact on patients' postoperative recovery quality and satisfaction.[10]

Studies about nursing care perception and surgery patients' levels of satisfaction have been published in the literature.[11-13] However, no research has yet looked at the relationship with patients' recovery quality.

In this context, this study aimed to identify the variables influencing surgery patients' perceptions of nursing care and the quality of their recovery.

MATERIALS AND METHODS

Ethics Committee Approval: The ethics committee approval was obtained from the Health Sciences Non-Interventional Ethics Committee of Balıkesir University (Date: 23.11.2021, decision no: 2021/33). The necessary institutional approval was obtained from the institution where the study would be conducted. Patients were informed that the researchers would keep all information written on the forms and that their answers would remain confidential and be used only for scientific purposes. Written and verbal informed consent was obtained from the patients, stating that they volunteered to participate in the study. The research was conducted following the Rules of the Helsinki Declaration.

Research Design: It is a descriptive and cross-sectional study.

Research Questions

1. What is the level of satisfaction with nursing care and the quality of recovery of surgical patients?
2. Is there a significant relationship between the patients' descriptive traits, their degree of nursing care satisfaction, and how well they recover?
3. Is there a significant relationship between surgical patients' recovery quality and their degree of nursing care satisfaction?

Place and Time of the Research: The study was conducted in the surgical clinics of a University Hospital in the Marmara region between 15.12.2021 -13.05.2022.

Population and Sample of the Study: The study population consisted of patients hospitalized in the surgical clinics of a University Hospital (Orthopedics and Traumatology, Urology, Cardiovascular Surgery, Otolaryngology, Neurosurgery, and General Surgery) and patients who underwent surgery. Power analysis was performed to determine the size of the study sample. The power analysis calculation used a power ratio of 90%, a 95% confidence limit, and an effect size of 0.2.[14] As a result of the calculation, the sample size was 216. Conscious volunteers, 18 years of age or older, able to understand verbal stimuli, had a hospital stay of at least two days, did not have a diagnosis of psychiatric disease, and agreed to participate in the study after being informed about the purpose of the study were included in the study. The people who were unconscious patients, who refused to participate in the study, were under 18 years of age, had a diagnosis of psychiatric disease, underwent day surgery or stayed overnight in the hospital, and were unable to understand verbal warnings were not included in the study. The sample group consisted of 237 patients who met the inclusion criteria between the study dates.

Data Collection Tools: In the study, "Descriptive

information form," "Patient's Perception of Nursing Care Scale," and "Quality of Recovery-40 Scale," which were created by the researchers in line with the literature, were used.

Descriptive Information Form: The form prepared by the researchers consisted of 9 questions related to descriptive characteristics, including the clinic where the patients were hospitalized, age, gender, marital status, educational status, place of residence, presence of chronic disease, presence of previous hospitalization and presence of a companion.[7,9-13]

Patient's Perception of Nursing Care Scale (PPNCS): The Turkish validity and reliability study of the Scale developed by Dozier et al. (2001) was conducted by Çoban et al. (2006).[9,15] The Scale is a 5-point Likert-type scale marked as agree=5, somewhat agree=4, undecided=3, disagree=2, and strongly disagree=1. A minimum score of 15 and a maximum score of 75 can be obtained from the Scale of 15 items. As the scale score increases, satisfaction with nursing care increases. The Cronbach α coefficient of the Scale is 0.92.[9] The Cronbach α reliability coefficient of this study was 0.99.

Quality of Recovery-40 Scale (QR-40): It was developed by Myles et al.,[16] and a Turkish validity and reliability study was conducted by Karaman et al.[17] The Scale comprises five sub-dimensions: Emotional state, physical comfort, patient support, physical independence, and pain. Consisting of 40 items, the Scale is calculated by scoring between 1 and 5. The total score on the Scale varies between 40-200. The higher the score, the better the patients' quality of recovery. The Cronbach α coefficient of the Scale is 0.93.[17] The Cronbach α reliability coefficient of this study was 0.87.

Statistical Analysis: The collected data were analyzed using the SPSS 25.0 package program. The Kolmogorov-Smirnov test was used to determine whether numerical variables were normally distributed, descriptive analyses (number, percentage, mean) were used to ascertain the descriptive characteristics of the study's participants and the scores from the scales, Pearson correlation analysis was used to examine the relationships between the measurements from the scales, and parametric (t-test, one -way ANOVA), and other comparative analyses were also used. A 95% confidence interval and a significance threshold of $p<0.05$ were used in the data analysis.

RESULTS

The mean age of the patients who participated in the study was 57.01±16.60 years; the number of men and women was almost the same, and the majority were primary school graduates (Table 1).

Table 1. Descriptive characteristics of the patients.

Descriptive characteristics		Data
Age, Mean ± SD		57.01 ± 16.60
Gender, n(%)	Female	119(50.2)
	Male	118 (49.8)
Educational Status, n(%)	Illiterate	17(7,2)
	Primary school graduate	130(54.9)
	Middle school	27(11.4)
	High school	45(19)
	University	18(7.6)
Marital status, n(%)	Married	195(82.3)
	Single	42(17.7)
Job, n(%)	Housewife	101(42.6)
	Officer	16(6.8)
	Employee	25(10.5)
	Retired	53(22.4)
	Other	42(17.7)
Previous hospitalization, n(%)	Yes	172(72.6)
	No	65(27.4)
Chronic Disease, n(%)	Exist	110(46.4)
	None	127(53.6)
Place of residence, n(%)	Village	66(27.8)
	District	85(35.9)
	City	86(36.3)
Clinic, n(%)	Cardiac surgery	61(25.7)
	Orthopedics	35(14.8)
	Urology	50(21.1)
	Obstetrics and gynecology	34(14.3)
	Neurosurgery	11(4.6)
	Ophthalmology	8(3.4)
	General surgery	19(8.0)
Companion, n(%)	Exist	219(92.4)
	No	18(7.6)
Companion stay time, n(%)	During certain hours	14(5.9)
	Continuous	205(86.5)

The mean PPNCS item score was 4.76±0.65, and the mean PPNCS score was 71.45±9.81. The mean QR-40 scale score of the patients participating in the study was 106 ± 15.95. When the QR-40 Scale sub-dimension mean scores were analyzed, the highest Physical Independence score (21.14±5.73) and the lowest Pain score (9.32±3.57) were found (Table 2). The correlation analysis found no correlation between the mean scores of the PPNCS and QR-40 Scale (Table 3).

Factors affecting the PPNCS and QR-40 scale were analyzed. It was found that there was a significant correlation between the gender, marital status, and presence of a companion, and the mean PPNCS, and between the presence of chronic disease and the mean QR ($p<0.05$) (Table 4). There was no significant correlation between the patients' education, occupation, hospitalization clinic, health insurance, place of residence, and presence of previous hospitalization and the mean of PPNCS and QR-40 ($p>0.05$).

Table 2. Mean scores of the scales and sub-dimensions.

Parameters		**Mean ± SD**	**Min-Max**
Scale	PPNCS	71.45±9.81	15-75
	QR-40	106±15.95	40-200
QR-40 Scale Sub-dimensions	Physical Independence (5 items)	21.14±5.73	5-25
	Patient Support (7 items)	29.21±5.24	7-35
	Emotional State (9 items)	22.22±4.66	9-45
	Physical Comfort (12 items)	26.19±4.79	12-60
	Pain	9.32±3.57	7-35

PPNCS: Patient's Perception of Nursing Care Scale; QR-40: Quality of Recovery-40 Scale.

Table 3. Correlation analysis results of the scales and sub-dimensions.

Scale/Sub-dimension		**PPNCS**
QR-40 Total Score	r	0.046
	p	0.480
Emotional State sub-dimension	r	0.006
	p	0.929
Physical Comfort sub-dimension	r	0.062
	p	0.868
Patient Support sub-dimension	r	0.071
	p	0.278
Physical Independence sub-dimension	r	0.071
	p	0.344
Pain sub-dimension	r	-0.023
	p	0.721

PPNCS: Patient's Perception of Nursing Care Scale; QR-40: Quality of Recovery-40 Scale.

Table 4. Comparison of some variables with the mean scores of the scales.

Parameters			**PPNCS**			**QR-40**		
		n	**Mean ± SD**	**Test**	**p**	**Mean ± SD**	**Test**	**p**
Gender	Female	119	72.8±8.32	t=2.192	0.002*	107.1±17.15	t=0.8064	0.162
	Male	118	70.1±10.9			106.3±14.70		
Education	Illiterate	17	70.5±12.04	F=1.33	0.259	100.3±19.26	F=1.328	0.260
	Primary school	130	71.5±9.79	1		108.0±15.49		
	Middle School	27	67.9±15.13			103.5±13.8		
	High School	45	73.2±5.27			106.4±18.47		
	University	18	72.3±4.52			109.7±10.37		
Marital Status	Married	195	72.1±8.65	t=2.172	0.000**	107.1±15.60	t=0.8064	0.162
	Single	42	68.5±19.75			104.9±17.55		
Chronic	Exist	110	71.7±8.84	t=0.456	0.369	105.7±19.27	t=-0.942	0.002*
Disease	No	127	71.2±10.60			107.6±12.38		
Health	Exist	223	71.5±9.48	t=0.798	0.121	106.9±16.1	t=0.619	0.920
Insurance	No	14	69.4±14.4			104.2±13.0		
Previous	Yes	172	71.4±10.18	t=0.136	0.713	106.4±16.8	t=3.818	0.056
hospitalization	No	65	71.5±8.83			107.6±13.2		
Companion	Exist	219	72.0±8.96	t=3.005	0.000**	106.1±16.29	t=-2.059	0.096
	No	18	64.8±16.07			114.16±1.90		

$p<0.05$; *: $p<0.01$; **: $p<0.00$; PPNCS: Patient's Perception of Nursing Care Scale; QR-40: Quality of Recovery-40 Scale

DISCUSSION AND CONCLUSION

Patient satisfaction is a key metric of nursing service quality. Determining the degree of patient satisfaction is a crucial step to enhance the quality of services and deliver services that meet patients' expectations.[18] In the study that looked at the factors influencing how surgical patients recover and how well they perceive their nursing care, patients expressed a high level of satisfaction with it. In the literature, similar to the study results, there are studies in which the perception of nursing care was found to be high,[10,11,18,20] as well as studies in which the satisfaction level was found to be moderate.[3,12,21,22] On the other hand, some studies have concluded that satisfaction with nursing services is very low.[2] The positive perception of nursing care by the patients increases their adaptation to their diseases and their coping power, thus shortening the hospital stay and reducing the cost of care.[1] In this context, the high satisfaction level in terms of nursing care in the research is considered a positive and important result.

Measuring the quality of postoperative recovery is an important patient-centered outcome.[23] The study found that patient's perceptions of the quality of recovery were below average. A study showed that the majority of surgical patients (48.5%) had moderate recovery quality levels after 24 hours.[24] Studies in the literature found higher levels of recovery quality than the study results.[7,17,25] In the studies of Xu et al.,[5] although the level of postoperative recovery was low, it was at a higher level compared to our research finding.

It was found that physical independence had the highest mean, and the pain subdimension had the lowest mean among the subdimensions of quality of recovery. In the study of Demirci and Yılmaz Şahin,[25] unlike the results of the research, the pain subdimension was found to be high, and the physical independence sub-dimension was found to be lower. Acute postoperative pain is associated with prolonged nociceptive recovery. Pain is of great importance in the postoperative recovery of surgical patients and remains one of the main concerns of patients. Good pain management has physical, psychological, and economic benefits and influences the quality of recovery by allowing earlier mobilization, fewer complications, and earlier return to daily activities.[4] The results of this study are considered important. They show that patients need support in pain control in the postoperative period.

When examining patients' characteristics that influence their perception of nursing care, female patients were more satisfied with nursing care. Studies have shown that there was no difference according to gender.[2,12,18,21] Hoxha et al.[26] similarly, no difference was found according to gender. In one study, men had higher mean scale scores than women. In the study, married people had higher levels of satisfaction with care. While there were similar results to the research findings,[1,18] Öztürk et al.[12] found no difference according to marital status. In the study, those with a companion had higher satisfaction with care. This is in line with studies that found that companion support affected perceptions of care.[2] Özsoy et al.[20] found in their study that having a companion did not affect the perception of care. Patients with companions may be more satisfied with their care because they meet some of the patient's needs, thus reducing their expectations of care. Determining patients' characteristics will guide nurses in planning nursing care to provide systematic, individualized, and holistic care. According to the study results, patients' characteristics should be considered when determining the needs of patients. In the study, no difference was found between health insurance and care satisfaction.

Hoxha et al.[26] showed that payment and costs for additional analyzes during hospitalization affect satisfaction. In the study, no difference was found in terms of care satisfaction and quality of recovery compared to previous hospitalizations.

Similar to the research findings, studies are showing that there is no difference between previous hospitalization and the perception of care.[2,21] This result can be interpreted as the past hospital experience of the patients does not affect their current satisfaction.

Quality of recovery is a complex structure affected by many individual and institutional factors.[6] In the study, it was observed that there was no relationship between patient-related personal characteristics and quality of recovery, and only those without chronic disease had higher levels of quality of recovery. In individuals with chronic diseases, delays in wound healing after surgical intervention and increased complications can frequently be observed.[27] Such conditions affect the level of quality of recovery of patients. In the study, the high quality of recovery in those who did not have chronic diseases may be associated with the absence of the effects of comorbid diseases.

In conclusion, the study found no relationship between the patient's degree of satisfaction with nursing care and the effectiveness of their recovery. The study's findings showed that surgery patients' satisfaction with nursing care is high, recovery quality is below average, and there is no correlation between nursing care perception levels and recovery quality. Depending on their features, patients' opinions of nursing care and the quality of their recovery varied. In this direction, patient satisfaction and experience should be evaluated regularly to provide individualized and holistic patient care and to increase the quality of nursing services. In-depth research should be conducted on the factors affecting the healing

quality of patients, and in-service training should be planned for patient care in the surgical process. Procedures and instructions on pain management should be established, especially in surgical units, and nurses should be supported to develop their knowledge and practices on pain management. To ensure patient satisfaction, which is an integral part of quality assessment, it is recommended to increase the awareness of nurses working at all levels on the subject. The research data is limited to the answers of the patients who were treated in the health institution where the research was conducted and accepted to participate in the study. Therefore, the research results cannot be generalized. Research can be performed in larger and larger samples to reflect patients treated in different institutions and different units. It is an important limitation of the study that the reasons for the quality of recovery, which is at a lower level compared to the literature, cannot be revealed in the research. In addition, the discussion section on the relationships between the personal characteristics of the patients and the quality of the recovery scale is limited due to the lack of literature in the relevant field. Conducting qualitative and interventional research with different sample groups, such as risky patient groups, may contribute to the creation of action plans.

Ethics Committee Approval: The ethics committee approval was obtained from the Health Sciences Non-Interventional Ethics Committee of Balıkesir University Health Sciences Non-invasive Research Ethics Committee (Date: 23.11.2021, decision no: 2021/33) . The necessary institutional approval was obtained from the institution where the study would be conducted. The research was conducted following the Rules of the Helsinki Declaration.

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Investigation of Rational Drug Use and Health Perception Levels of Caregivers for Individuals with Chronic Diseases: A Hospital Example

Kronik Hastalığı Olan Bireylere Bakım Verenlerin Akılcı İlaç Kullanımı ve Sağlık Algısı Düzeylerinin İncelenmesi: Bir Hastane Örneği

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ABSTRACT

Objective: This research aimed to determine the investigation of rational drug use and the health perception level of caregivers for individuals with chronic diseases.

Materials and Methods: This descriptive study was conducted at the public hospital in Şırnak city centre between December 2022 and February 2023. The sample of the study consisted of 242 caregivers. The research data were gathered from the socio-demographic characteristics form, the rational drug use scale, and the health perception scale. In addition to descriptive analysis, independent t-test, ANOVA, correlation, and regression analysis were used in statistical analysis.

Results: The average age of caregivers is 39.25±12.45, the average age of patients requiring care is 64.73±12.50, and the patient care duration is 3.39±2.03 years. Rational Drug Use Scale mean score was 37.29±5.62, Health Perception Scale mean score was 40.14±7.93, and there was a positive significant correlation between the Rational Drug Use and Health Perception mean scores ($p<0.01$). Their socio-demographic characteristics significantly affect caregivers' rational drug use and health perception ($p<0.05$).

Conclusions: It was determined that caregivers had a moderate level of rational drug use and health perception. As a result, caregivers are an essential component of healthcare services, and health education should be provided.

Keywords: Chronic diseases, caregivers, health perception, nursing, rational drug use

ÖZ

Amaç: Bu çalışma, kronik hastalığı olan bireylere bakım verenlerin akılcı ilaç kullanımı ve sağlık algı düzeylerinin incelenmesi amacıyla yapıldı.

Materyal ve Metot: Tanımlayıcı tipte olan çalışma, Aralık 2022-Şubat 2023 tarihleri arasında Şırnak şehir merkezindeki bir devlet hastanesinde gerçekleştirildi. Araştırmanın örneklemini, 242 bakım verici oluşturdu. Araştırma verileri sosyo-demografik özellikler formu, Akılcı İlaç Kullanımı Ölçeği ve Sağlık Algısı Ölçeği kullanılarak toplandı. İstatistiksel analizde tanımlayıcı analizin yanı sıra bağımsız t-testi, ANOVA, korelasyon ve regresyon analizi kullanıldı.

Bulgular: Bakım verenlerin yaş ortalaması 39,25±12,45, bakım gerektiren hastaların yaş ortalaması 64,73±12,50 yıl, hasta bakım süresi ise 3,39±2,03 yıldır. Akılcı İlaç Kullanımı Ölçeği puan ortalaması 37,29±5,62, Sağlık Algısı Ölçeği puan ortalaması 40,14±7,93 olup, Akılcı İlaç Kullanımı ile Sağlık Algısı puan ortalamaları arasında pozitif yönde anlamlı bir korelasyon vardı ($p<0,001$). Bakım vericilerin sosyo-demografik özellikleri akılcı ilaç kullanımını ve sağlık algısını önemli ölçüde etkilemektedir ($p<0,05$).

Sonuç: Bakım verenlerin akılcı ilaç kullanımı ve sağlık algısının orta düzeyde olduğu belirlendi. Sonuç olarak bakım vericiler sağlık hizmetlerinin vazgeçilmez bir bileşenidir ve sağlık eğitimi verilmelidir.

Anahtar Kelimeler: Akılcı ilaç kullanımı, bakım vericiler, hemşirelik, kronik hastalıklar, sağlık algısı

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INTRODUCTION

Chronic illnesses are recognised as one of the most significant barriers to sustainable development in the twenty-first century. Chronic illnesses, which account for more than two-thirds of all annual fatalities (nearly 41 million), are among the primary causes of disability worldwide.[1] Approximately 40 million caregivers, both official and unofficial, assist adults with limited daily tasks. However, most caregivers are unprepared to provide adequate support, and little is known about caregivers.[2] This state is difficult for nurses who have a close relationship with patients and caregivers and may cause difficulties in care treatments.[3] Because caregivers provide support to patients both in their daily needs and in-hospital services, their responsibilities may differ, which can lead to an additional workload.[4]

The predictive factors of caregiving burden are related to both the patient and the caregiver. Considering the contribution of medical and non-medical factors to health, a significant portion of the roles of caregivers who assist in healthcare activities involve medication management. This responsibility is the most common task reported by caregivers.[5] Promoting medication adherence in the medication regimen taken by caregivers highlights the importance of rational drug use.[6] Rational drug use is an important problem as it leads to unnecessary drug consumption exceeding 40% in our country, as well as in underdeveloped and developed countries.[7]

Health perception, an important aspect of rational drug use, is vital for psychological wellness and treatment maintenance. Health perception, which is directly relevant to the process both for the patient and the caregiver, is a subjective reflection of an individual's emotions and thoughts.[8] The literature states that the workload of caregivers may lead to them perceiving their health status as bad.[9]

Various studies have shown that caregiving is difficult and troublesome and that it negatively affects the caregiver's habits, lifestyle, and social environment.[9,10,11] Research conducted with both caregivers and non-caregiving family members has shown that the caregiver group is at higher risk compared to others, experiencing depression, emotional issues, and cognitive challenges.[9,10]

Rational drug use and health perception of caregivers, which constitute one of the important components of the health dimension, are very important. However, no study has been found in the literature examining the level of rational drug use and health perception of caregivers. However, nurses play an important role in determining rea drug use and health perception. [11]

This study aimed to examine the level of rational drug use and health perception of caregivers.

MATERIALS AND METHODS

Ethics Committee Approval: This study was approved by the Ethics Committee of Şırnak University (Date: 28/11/2022, decision no:2022-E.53117), institutional permission from the Local Health Authority (Date: 13/12/2022, decision no: E-51440246-856). Rules stated in the Helsinki Declaration were followed throughout the research process. The consent of the participants was obtained.

Study Design and Participants: This research was conducted according to the descriptive type. The scope of the study encompassed the caregivers of patients in a state hospital's internal illnesses, cardiology and physiology and rehabilitation clinic due to chronic illnesses located in a province centre. When calculating the sample size of the study through strength analysis, it was calculated to be 196 individuals at an error level of 0.05, 80% strength and 0.95 reliability range. Accordingly, the study survey was completed by 242 willing participants. The research was carried out between December 2022 and February 2023 in a public hospital in the Şırnak region. Research data was collected by researchers. The purpose of the study was explained to each caregiver by the researchers. The questionnaires were administered to caregivers who volunteered to participate in the study via face-to-face interviews in the clinical setting of the researchers. The questionnaires took about seven to ten minutes to complete. None of the caregivers sought to leave the research or refused to complete the questionnaire. *Inclusion Criterion:(*i) are aged 18 or over, (ii) have no hearing or seeing problems, (iii) have no verbal communication problems, (iv) are comfortable in a physical and psychological context, (v) took care of the patient through the illness process for a long time (at least 6 months), (vi) took care of patients that had chronic illnesses (heart failure, strokes, rheumatic illnesses, chronic obstructive pulmonary disease, cancer, diabetes), (vii) individuals that agreed to take part in the study. *Exclusion Criterion:* (i) had an illness duration shorter than 6 months, (ii) took care of disabled individuals, (iii) were unwilling to participate in the study.

Dependent and independent variable: The independent variables of this research are gender, age, age of the patient, marital status, child status, education status, work status, economic status, chronic illness story, regular medicine use, distance to a healthcare organisation, proper medicine use, closeness to the patient, living together with the patient, the existence of other people caring for the patient, caregiving experience status, applications in the caregiving process to the patient, care duration. The dependent variable is the Rational Drug Use Scale and Health Perception Scale.

Data collection: The data was acquired using the socio-demographic characteristics, Rational Drug Use Scale, and Health Perception Scale developed by researchers based on literature information. The researchers created an 18-question form based on their evaluation of the literature (age, age of the patient, education level, Duration of patient care, etc.) [6,7,11]

Rational Drug Use Scale: This scale, developed by Demirtaş et al.[12,] has 21 points. The scale's estimation point is 34 points, and persons with 35 points or higher are considered to know rational drug use. The Cronbach alpha value of the scale is 0.78. The Cronbach alpha value in our study is 0.76.

Health Perception Scale: This scale, developed by Diamond et al.[13] and subjected to a Turkish reliability and validity study conducted by Kadioğlu and Yildiz,[14] consists of 15 points and four subdimensions (control centre, self-realisation, certainty, importance of health). The lowest score that can be obtained from the scale is 15. The highest score is 75. The assessment comprises four distinct subcategories: Control Center (with a potential range of 5 to 25), Self-Awareness (ranging from 3 to 15), Certainty (ranging between 4 and 20), and Importance of Health (with scores varying from 3 to 15). The scale's Cronbach alpha value is 0.77. The Cronbach alpha value in our study is 0.82.

Statistical Analysis: The data from the study were analysed using the SPSS 22.0 package application. Numbers, percentage distribution, and standard deviation were used to show depicter variables. Normal distribution appropriateness was determined through the Kolmogorov-Smirnov Z test. Independent t-tests, one-way ANOVA, Pearson correlation, and regression tests were supplemented with descriptive statistics (such as percentage, frequency, mean, and standard deviation, as well as maximum and minimum) to assess the collected data in this study. Variables with a statistically significant level of $p<0.10$ in univariate analyses were compared using linear regression analysis. The significance value was admitted as $p<0.05$.

RESULTS

Among the caregivers who participated in the research, the average age of caregivers (39.25±12.45), the average age of patients requiring care (64.73±12.50), and the patient care duration is 3.39±2.03 years. 62.8% of caregivers are female, 39.2% of them are primary school graduates, 80.6% of them do not have any chronic illnesses, 82.6% of them do not regularly use a medicine, 33.1% of them are daughters of their respective caretakers, 81.0% of them live in the same environment as the patient, 56.6% do not have anyone else caring for the patient, 52.1% are experienced caregivers, and 40.5% assist the caregiver in more than one area (hospital processes, medication administration, nutrition support, housework, and personal sanitation and hygiene) (Table 1).

Table 1. Sociodemographic properties of caregivers.

Characteristics		n (%)
Gender	Female	152 (62.8)
	Male	90 (37.2)
Marital Status	Married	145 (59.9)
	Single	97 (40.1)
Child Status	Does not have children	104 (43.0)
	Does have children	138 (57.0)
Education Status	Illiterate	78 (32.2)
	Primary School	95 (39.2)
	Highschool and above	69 (28.6)
Work status	Working	33 (13.6)
	Not working	209 (86.4)
Economic Status	Bad	18 (7.5)
	Average	124 (51.2)
	Good	100 (41.3)
Chronic illness story	Exists	47 (19.4)
	Does not exist	195 (80.6)
Regular medicine use	No	200 (82.6)
	Yes	42 (17.4)
Distance to a healthcare organisation	<10 minutes	117 (48.3)
	<20 minutes	73 (30.2)
	> 20 minutes	52 (21.5)
Proper medicine use	No	54 (22.3)
	Yes	188 (77.7)

Table 1. Continue.

Closeness to patient	Sibling	26 (10.7)
	Partner	34 (14.0)
	Daughter	80 (33.1)
	Son	43 (17.8)
	Other (Caregivers, mother, or father)	59 (24.4)
Living together with the patient	Yes	196 (81.0)
	No	46 (19.0)
Existence of other people caring for the patient	Yes	105 (43.4)
	No	137 (56.6)
Caregiving experience status	Yes	126 (52.1)
	No	116 (47.9)
Applications in the caregiving process to the patient	Hospital processes + Medicine Getting + Shopping	17 (7.0)
	Cleanliness and hygiene + Housework	18 (7.4)
	Hospital Processes + Medicine Giving + Feeding + Personal Cleanliness and Hygiene + Housework	66 (27.3)
	Hospital Processes + Medicine Taking + Material Support	43 (17.8)
	Hospital Processes + Medicine Taking + Feeding + Personal Cleanliness and Hygiene + Housework + Material Support	98 (40.5)
Characteristics		**Mean±SD**
Age		39.25±12.45
Age of patient		64.73±12.50
Duration of patient care takes years		3.39±2.03
TOTAL		242 (100.0)

An examination of Table 2 reveals that caregivers' Rational Drug Use Scale total point averages and Health Perception total point averages show a weak positive association (r=0.341, p<0.01). Caregivers' Rational Drug Use Scale total point averages had a statistically significant weak positive connection (r=0.304, p<0.01; r=0.258, p<0.05) with their Health Perception Scale Certainty and Health Importance sub-dimensions. The overall point averages of caregivers on the Rational Drug Use Scale did not demonstrate a statistically significant difference with the sub-dimensions of the Health Perception Control Center and Self Awareness Scale (p> 0.05) (Table 2).

Table 2. The relationship between caregivers' Rational Drug Use Scale and the Health Perception Scale and its sub-dimensions points.

Scales and Their Sub-Dimensions	Mean±SD	Rational Drug Use Scale (37.29±5.62)
Health Perception Scale	40.14±7.93	r=0.341**
Control Center Dimension	13.10±4.46	r=-0.158
Certainty Dimension	11.24±3.40	r=0.304**
Health Importance Dimension	7.60±2. 92	r=0.258*
Self-Awareness Dimension	8.18±2.52	r=0.166

**p<0.01, *p<0.05, r: bivariate correlation

When the independent variables of the participants were compared with the Rational Drug Use score, it was found that men (t=-4.857, p=0.001), <25 age group (F=3.643; p=0.007), singles (t=-2.904; p=0.007), university students and above among those with education level (F=21.993; p=0.001), among those without children (t=2.963; p=0.003), among those employed (t=2.458; p=0.015), and among those with regular medication use (t=2.682; p=0.009). , the Rational Drug Use Scale score is statistically significantly higher in those who use medication with the recommendation of a physician (t = -3.142; p= 0.002) and in those who live with the patient (t = 1.977; p=0.049) (Table 3).

When the independent variables and the Health Perception score of the participants were compared, there was a significant difference between men (t=-3.017, p=0.003), patients aged <25 years (F=4.905; p=0.001), patients aged 31-40 years (F=6.815; p<0.001), among singles (t=-5.187; p=0.001), among those with university education or higher (F=14.003; p<0.001), among those without children (t=4.845; p<0.001), and among those taking medication with the recommendation of a physician (t=-4.522; p<0.001), the sons of the caregiver (F=6.544; p<0.001), and those whose care period was less than 1 year (f=2.396; p=0.038) had a statistically significant higher Health Perception Scale score (Table 3).

Table 3. The comparison of the socio-demographic characteristics of caregivers with the Rational Drug Scale and the Health Perception Scale (n=242).

Characteristics		Rational Drug Use Scale	Health Perception Scale
Gender	Female	36.47±5.05	38.32±7.08
	Male	38.80±6.22	43.21±8.35
	Test*	t=-4.857	t=-3.017
	p	**0.001**	**0.003**
Age	<25 age	39.41±6.40	42.95±6.70
	26-30 age	37.52±4.47	39.80±8.25
	31-35 age	36.55±5.41	37.50±8.98
	36-40 age	37.38±6.11	39.63±8.68
	>41 age	34.94±4.81	39.26±6.77
	Test**	F=3.643	F=4.905
	p	**0.007**	**0.001**
Age of patient	<30 age	33.50±1.22	38.67±1.63
	31-40 age	39.63±7.28	47.00±10.37
	41-50 age	40.11±7.25	41.67±5.98
	51-60 age	36.85±7.20	32.31±7.63
	|>61age	37.75±5.52	40.13±7.44
	Test**	F=1.612	F=6.815
	p	0.174	**0.001**
Marital status	Married	36.49±5.18	38.08±7.61
	Single	38.60±6.03	43.21±7.41
	Test*	t=-2.904	t=-5.187
	p	**0.004**	**0.001**
Child status	Does not have children	38.55±5.88	42.86±7.29
	Does have children	36.42±5.25	38.09±7.79
	Test*	t=2.963	t=4.845
	p	**0.003**	**0.001**
Educational status	Illiterate	36.86±4.04	39.72±6.49
	Primary School	39.06±5.81	43. 42±8.83
	Highschool and above	40.63±6.98	43.57±7.00
	Test**	F=10.138	F=14.003
	p	**0.001**	**0.001**
Work status	Working	39.55±5.62	42.42±6.34
	Not working	36.99±5.55	39.78±8.10
	Test*	t=2.458	t=1.793
	p	**0.015**	0.074
Regular medicine use	Yes	37.69±5.84	40.02±7.68
	No	35.67±4.08	40.71±9.09
	Test*	t=2.682	t=-0.519
	p	**0.009**	0.604
Proper drug uses	No	35.08±5.60	35.77±7.84
	Yes	37.90±5.53	41.27±7.43
	Test*	t=-3.142	t=-4.522
	p	**0.002**	**0.001**
Closeness to patient	Sibling	37.67±4.89	39.67±12.37
	Partner	33.50±1.00	32.25±2.50
	Daughter	43.50±3.54	37.53±0.07
	Son	39.42±7.35	45.77±8.14
	Other (Caregivers, mother, or father)	37.09±6.42	35.91±7.84
	Test**	F=1.201	F=6.544
	p	0.303	**0.001**
Living with patient	Yes	37.68±5.80	40.06±8.43
	No	35.87±4.54	40.46±5.34
	Test*	1.977	-0.304
	p	**0.049**	0.761
Number of caregivers	Yes	36.42±5.54	40.15±8.30
	No	37.97±5.58	40.01±7.67
	Test	-2.141	0.127
	p	**0.033**	0.899
Care duration	<1 years	39.02±6.26	42.38±8.04
	1-3 years	37.38±5.95	41.73±5.94
	3-5 years	38.32±5.03	42.08±6.83
	>5 years	36.58±3.75	39.95±6.65
	Test**	F=1.498	F=2.396
	p	0.191	**0.038**

*: Independent t test, **One Way ANOVA (Post Hoc Tukey); p<0.01

Variables that were statistically significant after univariate analysis underwent evaluation via linear regression analysis. The independent variables that were included are Gender, Age, Age of patient, Marital status, Child status, Education status, Regular drug use, Proper drug use, and Closeness to the patient. The results showed that these independent variables explained 12.1% of the change in Rational Drug Use and 24.8% of the difference in Health Perception (Adj.R^2:0.121, F=4.307 p<0.001; Adj.R^2: 0.248, F=8.939, p<0.001; respectively) (Table 4).

Table 4. Regression analysis of the sociodemographic characteristics of the caregivers and Rational Drug Use and Health Perception scale.

	Rational Drug Use Scale					**Health Perception Scale**				
	Unstandardised-Coefficients		**Standardised Coefficients**			**Unstandardised-Coefficients**		**Standardised Coefficients**		
	B	Std. Error	Beta	t	Sig.	B	Std. Error	Beta	t	Sig.
(Constant)	33.825	7.298		4.635	**0.001**	10.069	9.520		1.058	0.291
Gender	2.397	0.779	0.207	3.079	**0.002**	4.875	1.016	0.298	4.799	**0.001**
Age	-0.065	0.043	-0.144	-1.494	0.136	0.032	0.057	0.050	0.558	0.578
Marital status	-0.488	1.922	-0.043	-0.254	0.800	3.969	2.507	0.246	1.583	0.115
Child status	-0.096	1.943	-0.009	-0.050	0.960	.851	2.534	0.053	0.336	0.737
Education status	1.732	0.609	0.299	2.842	**0.005**	3.338	0.795	0.408	4.198	**0.001**
Regular drug use	-0.562	1.036	-0.038	-0.543	0.588	3.912	1.351	0.187	2.895	**0.004**
Proper drug use	-0.485	0.532	-0.078	-0.913	0.362	-0.813	0.693	-0.093	-1.173	0.242
Closeness to patient	-0.301	0.360	-0.086	-0.836	0.404	-0.322	0.469	-0.065	-0.687	0.493
	R	R^2	Adj. R^2	F	p	R	R^2	Adj. R^2	F	p
	0.396[a]	0.157	0.121	4.307	**0.001**	0.528[a]	0 .279	0.248	8.939	**0.001**

B: unstandardised coefficients; Std Error: standard error; Beta: standardised coefficients; R2: determination coefficient; Adj. $R^{2:}$ Adjusted determination coefficient, F: Anova; p<0.05.

DISCUSSION AND CONCLUSION

Caring for individuals with chronic illnesses for a long duration impacts caregivers' physical and mental health, psychological well-being, and medical status.[15] This state is very important both in terms of caregivers and the correct treatment of caretakers. This study was conducted to determine the relationship between rational drug use and health perception, and the results are discussed here in light of the relevant literature. In our study, it was determined that caregivers have a medium level of rational drug use. In another study researching the rational drug use of different generations, it was stated that the participants (n:407) demonstrated medium rational drug use levels.[16] A cross-sectional study conducted by Graham et al.[17] stated that the rational drug use levels of caregivers were found to be low. In the research conducted by Demirtaş et al.[18] the average score derived from the rational drug use scale was reported as 33.6±6.2, while in the study conducted by Işık,[19] the mean score on the rational drug use scale was 38.20±3.99. In the study conducted by Kuloğlu et al.[20] with 719 parents, it was determined that the participants' knowledge level regarding rational drug use was high. The conclusions of this finding are similar to the literature.

Another finding of the study is that individuals under 25, males, and those with a high school education or higher and with a single marital status tend to have higher scores on rational drug use. Demirtaş et al.[18] conducted a study on rational drug use in adults, which found that individuals under 30, women, and those with higher education had a higher incidence of rational drug use. Zheng et al.[21] concluded in their study that advanced age is a risk factor that decreases drug knowledge. On the other hand, Sema et al.[22] in their study, in which they evaluated rational drug use in two health centers using WHO/INRUD Essential Drug Use Indicators, it was stated that gender did not affect rational drug use. Differences in study results may be associated with regional differences in education and the roles attributed to women.

Another finding in our study determined that caregivers have a medium level of positive health perception. da Rocha et al.[23] determined that the caregivers of elderly individuals (n=30) feel a medium level of positive health perception. Or and Kartal[24] study stated that caregivers perceive their health status to be positive. Research findings have indicated a link between one's marital status and their self-reported health. Specifically, separated or married individuals are more likely to experience poor health

compared to never-married individuals.[25,26] Additionally, caregivers' positive health perceptions were associated with the presence of another caregiver, fewer caregiving hours, and living with the patient.[27,28] It has also been stated that as the duration of care increases, the well-being of the caregiver decreases, and low health perception negatively affects the well-being of the caregiver.[29] These results highlight the importance of psychosocial control in caregivers.

Caregivers' positive health perception and degree of participation in medication-related activities are also one of the most important factors affecting their performance. In our study, it was found that as caregivers' level of rational drug use increased, their perception of health increased. Kırılmaz and Doğanyiğit,[30] in their study examining the relationship between self-medication use and the health belief model (n=384), stated a positive and weak relationship between individuals' rational drug use and their health belief levels. In the literature, it was stated that those with good medication compliance had higher health perception scores.[28,29] The implications of this finding are similar to the literature.

In conclusion, it is observed that as caregivers' health perceptions increase, rational drug use also increases. Research findings also underscore the importance of considering sociodemographic factors in enhancing rational drug use and health perception among caregivers. For this reason, it may be recommended to periodically evaluate caregivers' rational drug use and health perceptions and provide health education. The current study has some strengths and limitations. The strengths of our study include the fact that no research includes Rational Drug Use and Health Perception, which are data collection tools in the study, together with caregivers, and that this study is a community-based study and has high generalizability. The limitation of the current study is that first since it was limited only to caregivers who applied to a public hospital in a certain region, other individuals in the region could not be visited. Secondly, caregivers' subjective data were included in the evaluation of the health perception and rational drug use scale. The results of the study can only be generalized to the region where the study was conducted.

Ethics Committee Approval: Our study was approved by the Şırnak University Ethics Committee (Date: 28.11.2022, decision no: 2022-E.53117), institutional permission from the Local Health Authority (Date: 13/12/2022, decision no: E-51440246-856).

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Diabetes Management and Problems Experienced by Patients with Type 1 Diabetes Mellitus During the COVID-19 Pandemic: A Qualitative Study

Tip 1 Diabetes Mellitus Hastalarının COVID-19 Pandemisi Döneminde Diyabet Yönetimi ve Yaşadığı Sorunlar: Kalitatif Çalışma

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ABSTRACT

Objective: A study was conducted to obtain information about problems in diabetes management experienced by patients with type 1 diabetes mellitus during the coronavirus disease (COVID-19) pandemic.

Materials and Methods: In this qualitative study, in-depth interviews were carried out with 43 patients with type 1 diabetes mellitus (25 women, 18 men) aged 18-34 years who volunteered to participate. Each interview lasted 30 to 35 minutes. The conventional content analysis of data was performed using Graneheim & Lundman method.

Results: The mean age of the participants was 26.05±8.01 years, the mean HbA1c level was 9.57±2.57%, and the duration of diabetes was 8.70±5.22 years. The study revealed 7 problem areas related to the patients' diabetes management during the COVID-19 pandemic: blood glucose control, dietary adherence, insulin dose adjustment, exercising, psychosocial problems, sleep problems, and compliance with COVID-19 preventive measures.

Conclusions: The study's results showed that during the COVID-19 pandemic, patients with type 1 diabetes mellitus experienced difficulties in diabetes management and negatively impacted psychosocially.

Keywords: COVID-19, qualitative research, type 1 diabetes mellitus

ÖZ

Amaç: Çalışma Yeni Koronavirüs Hastalığı (COVID-19) pandemisi sürecinde Tip 1 diyabetlilerin diyabet yönetimi ile ilgili yaşadıkları sorunlar konusunda bilgi edinmek amacıyla yapılmıştır.

Materyal ve Metot: Kalitatif türde olan bu araştırmada tip 1 diyabetli, çalışmaya katılmaya istekli, yaşları 18-34 arasında olan 43 (25 kadın, 18 erkek) hasta ile derinlemesine görüşme yapıldı. Her bir görüşme 30-35 dk. sürdü. Verilerin içerik analizi Graneheim & Lundman yöntemi kullanılarak gerçekleştirilmiştir.

Bulgular: Katılımcıların yaş ortalaması 26,05±8,01 yıl, HbA1c ortalaması %9,57±2,57 diyabet süresi 8,70±5,22 yıldır. Çalışmada COVID-19 pandemisi sürecinde diyabetlilerin diyabet yönetiminde yaşadıkları sorunlar ile ilgili 7 sorun alanı belirlendi. Bunlar; kan şekeri kontrolü, beslenmeye uyum, insülin dozunu ayarlama, egzersiz yapma, psikososyal sorunlar, uyku sorunları ve COVID-19 önlemlerine uyum idi.

Sonuç: Çalışmanın sonuçları Tip 1 diyabetli bireylerin COVID-19 pandemisi sürecinde diyabet yönetimini sağlama konusunda sorun yaşadıklarını ve psikososyal yönden olumsuz etkilendiklerini gösterdi.

Anahtar Kelimeler: Covid-19, kalitatif çalışma, tip 1 diabetes mellitus

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INTRODUCTION

Evidence indicates that COVID-19 is more severe in older adults, patients with chronic diseases such as diabetes, heart, lung, and kidney disease, and immunocompromised patients.[1,2-6] Furthermore, it has been shown that type 1 diabetes (T1DM) mellitus and poor glucose control are associated with a higher risk of contracting infections, especially in patients with high glycated hemoglobin (HbA1c) levels and/or insulin resistance due to impaired immunity.[7,8] Therefore, it is critical to take necessary isolation measures to prevent patients with diabetes from contracting COVID-19, as well as encourage adherence to diet, physical activity, and drug treatment during this period and reduce their fear and anxiety to facilitate diabetes management.

The effectiveness of drug therapy, physical activity, and diet programs in patients with diabetes is evaluated by regular health checks, and the necessary precautions are taken at this stage. These evaluations allow the healthcare team to make the arrangements needed for disease management.[9] During the pandemic, nationwide restrictions were implemented in Türkiye when case numbers increased, as in many countries worldwide. Citizens were instructed to "stay home" and were only allowed to leave the house to meet their basic needs. In addition, many hospital outpatient clinics were closed, and healthcare workers had to treat COVID-19 patients.[10] The Society of Endocrinology and Metabolism of Türkiye has recommended that patients with diabetes postpone their routine follow-up appointments, avoid presenting to health institutions unless there is an emergency, and contact health institutions or physicians and nurses primarily by phone if they think they have a disease-related emergency during the pandemic.[9]

In the management and follow-up of chronic diseases, both telemedicine initiatives and mobile health applications offered by telephone operators have had positive impacts on patient care, education, and treatment.[11]

This study was conducted to obtain information about the problems related to diabetes management faced by people with diabetes during the COVID-19 pandemic.

MATERIALS AND METHODS

Ethics Committee Approval: The study was approved by the Clinical Research Ethics Committee of the Istanbul Health Sciences University Kanuni Sultan Training and Research Hospital (Date: 17.05.2020, decision no: 17). The study was performed according to the Declaration of Helsinki.

Sample and Study Design: This qualitative study was conducted by telephone using a semi-structured interview form during the period of nationwide pandemic restrictions. The sample included 43 patients with T1DM who were between the ages of 18 and 34 years, were registered in the Kanuni Sultan Training and Research Hospital Internal Medicine Outpatient Clinic and Diabetes Education Unit and volunteered to participate in the study.

Data Collection Tools: After obtaining institutional permission, the patients enrolled in the center were contacted by phone and their verbal consent to participate in the study was obtained. Telephone interviews with consenting patients were performed using a semi-structured interview form between May 20 and June 30, 2020. The interview form included the following questions: *Can you tell us about your health concerns at the moment? Do you measure your blood glucose? Has there been a change in your diet, exercise habits and sleep pattern? Has there been a change in your blood glucose results? Have you made any changes in your medication use/ dosage during this period? Are you able to go to the hospital for your diabetes follow-up?, and What are you doing to protect yourself from Covid-19?* As it was not possible to carry out a community-based face-to-face survey during this period, a qualitative telephone interview study was conducted on young adults with T1DM. All interviews were conducted by a diabetes education nurse. The diabetes education nurse is the researcher who knows the patients and is responsible for their follow-up. The nurse received online training regarding the study questions and characteristics. Interviews were held with 3 to 4 patients a day, with each interview lasting 30 to 35 minutes. The interviews were recorded using an audio recorder. Information about the patients' medical history was obtained from their records.

Statistical Analysis: The conventional content analysis of data was performed using Graneheim & Lundman method (Table 1)**.** Each interview was independently transcribed by two researchers and the transcripts were analyzed manually using qualitative content analysis. Each statement was read several times, and the relevant parts were extracted. Each response was evaluated and categorized. Responses with the same meaning and content were grouped for each question. The researchers discussed the analyses, and all identified responses were reviewed, after which a final discussion was held among the team members. As a result, 7 problem areas were identified: blood glucose control, dietary adherence, insulin dose adjustment, exercise, anxiety/fear/anger, sleep problems, and compliance with COVID-19 preventive measures. The distribution of sociodemographic and disease characteristics of the participants was evaluated by means of percentages and means.

Table 1. Graneheim and Lundman's 5-step content analysis approach Graneheim and Lundman's steps.

1. Transcription: Implementing the interviews' texts
2. Meaning units: Reading the interviews to gain a general understanding
3. Abstraction: Determining the meaning of units and initial codes
4. Sorting the codes: Classifying similar initial codes into more comprehensive and general categories
5. Theme formulation: Introducing the categories' main theme

RESULTS

As seen in Table 2, the mean age of the participants with T1DM was 26.05±8.01 years, 58.1% were female and middle class, 69.8% were high school graduates, and 67.4% were single. The mean HbA1c level was 9.57±2.57%, and the duration of diabetes was 8.70±5.22 years.

The study revealed 7 problem areas related to the patients' diabetes management during the COVID-19 pandemic: (1) blood glucose control, (2) dietary adherence, (3) insulin dose adjustment, (4) exercising, (5) psychosocial problems, (6) sleep problems, and (7) compliance with COVID-19 preventive measures (Figure 1).

Table 2. Sociodemographic and disease-related characteristics (n=43).

Sociodemographic Characteristics		**n (%)**
Sex	Female	25 (58.1)
	Male	18 (41.9)
Age (years), mean±SD (range)		26.05±8.01 (18-47)
Fasting blood glucose, (mg/dl), mean±SD (range)		228.81±101.44 (104-584)
HbA1c, (%), mean±SD (range)		9.5±2.5 (6.5-15.8)
BMI, (kg/m^2), mean±SD (range)		23.69±4.31 (16.85-37.18)
Diabetes duration, (years), mean±SD (range)		8.70±5.22 (1-23)
Education level, n (%)	Middle school	13 (30.2)
	High school	30 (69.8)
Marital status, n (%)	Married	14 (32.6)
	Single	29 (67.4)
Occupation, n (%)	Homemaker	7 (16.3)
	Freelance/Self-employed	1 (2.3)
	Government employee	5 (11.6)
	Worker	5 (11.6)
	Student	25 (58.1)
Economic status, n (%)	High	18 (41.9)
	Middle	25 (58.1)

SD: Standard deviation; HbA1c: Glycated hemoglobin; BMI: Body mass index.

Figure 1. Themes related to diabetes management and problems experienced by patients with type 1 diabetes mellitus.

The problems identified in content analysis and the patients' statements are presented below.

Patients are asked to measure and record their preprandial and postprandial glucose levels. However, it was determined that all participants had major problems with blood glucose measurement during the COVID-19 pandemic. These problems included not measuring, having higher-than-expected blood glucose levels, and experiencing frequent episodes of hypoglycemia. Reasons stated for not measuring blood glucose were inability to obtain supplies or forgetting. During the COVID-19 pandemic, it was observed that there were problems with insulin dose adjustment, a practice that the patients have become accustomed to and that raised their self-awareness. It was understood from the patient statements that they took more or less insulin than necessary, and that some doses were skipped. Nearly all the patients reported changes in their usual diet. Problems such as overeating, skipping snacks, loss of appetite, and a change in eating patterns were described. Participants had problems due to being at home all the time and their lives becoming sedentary (Table 3).

Table 3. Problems with blood glucose measurements, adjusting insulin dose, dietary adherence and exercising during the COVID-19 Pandemic.

THEME	QUOTATIONS
Problems with blood glucose measurements	"*I ran out of strips, so I haven't been able to measure my blood sugar for a month. I couldn't get them because I couldn't go out" (female, age 21).* "*My levels are terrible, my blood sugar doesn't fall below 500, the lowest is 400... There are sudden ups and downs, and it's really hard on me" (female, age 30).* *"I am under a lot of stress because of the situation we are in, no matter how careful I am, my blood sugar is very high" (female, age 20).* "*My evening preprandial levels have risen into the 300 to 400s for the last two days" (female, age 18).* "*I've been stuck at home since COVID-19 started. My blood sugar falls to between 50 and 100. I go into hypoglycemia very often" (male, age 23).* "*Every day my blood sugar either falls too much or rises too much. I have this problem a lot these days" (male, age 18).*
Problems adjusting insulin dose	"*I increase the insulin dose according to the food I eat and the results. For example, if it turned out to be 400 and I needed to make 12, I'll make 14... I measure, and my blood sugar is low sometimes and high other times. I think being at home all the time has thrown everything off" (female, age 38).* *"Since I'm always at home, I can't wake up in the morning because I go to sleep late at night, I get up in the afternoon... then I can't do my morning insulin and my insulin hours get mixed up" (male, age 23).*
Problems with dietary adherence	"*I started to not be able to control my eating. I'm eating too much. I know you're not supposed to eat it, but I can't control it and then I throw my candy across the room" (female, age 21).* "*In these three months, I went from 55 kilos to 72 kilos. During this time, when I stay at home, I feel like eating constantly" (male, age 23).* "*My mealtimes have changed a lot; just so the day ends sooner, breakfast time is like 12" (female, age 27).*
Problems with exercising	*"I live an inactive life and am constantly at home, I'm feeling anxious, really, my health is not good" (male, age 38).* *"I am not active at home; to be honest I'm constantly sitting" (male, age 20).* *"I can't say that my health is good right now... I can't exercise" (female, age 21).*

All the participants stated that they had been negatively affected during the pandemic, that they experienced anxiety, that thoughts of their or their relatives' illness or death had an adverse impact on their daily lives, and that they had problems coping with these feelings. It was determined that anxiety, fear, and inability to control their anger were their main psychosocial problems. All the participants said they had sleep-related problems. This included the inability to fall asleep, going to bed late at night, having nightmares, waking up late in the morning and not feeling rested, and losing the feeling of waking up to a new day. Participants reported complying with COVID-19 precautions such as wearing a mask, practising hand hygiene, and following social distancing rules. They also mentioned never going out, not being able to socialize, and education being adversely affected (Table 4).

Table 4. Psychosocial, sleep problems and compliance with COVID-19 measures during the COVID-19 Pandemic.

THEME	QUOTATIONS
Psychosocial problems	*"To be honest, how to put it... I mean, I have to do something, but I can't leave the house, I'm overwhelmed, I'm afraid that I will get infected. I am overwhelmed by everything and worried about not being able to go out and go to my check-ups" (male, age 22).* *"I mean, people inevitably get stressed, they're afraid... After all, no matter how much we're at home, it is not clear where this virus will come from" (female, age 20).* *"I try to manage my blood sugar according to the problem or crisis of that moment… I am much more pessimistic than before, I have no hope anymore" (male, age 25).* *"Being in a bad way psychologically affects my diabetes... I get very aggressive during the day, I get angry at everything and I can't help it" (male, age 21).*
Sleep problems	*"I used to sleep so well, I was going to bed at 10 o'clock, getting up at 6 in the morning, going to school. Now in this quarantine, damn it, I can't get to sleep until 5, I toss and turn" (female, age 20).* *"I can't sleep at night at all. My blood sugar is too high in the morning because I can't sleep" (male, age 23).* *"My sleep pattern is nonexistent in these last months. I am already really afraid of the pandemic. I always have bad dreams, so I could not sleep at all. I am so bad right now, it's really hard" (female, age 36). "I usually sleep around 7:30 in the morning, my sleep schedule is generally messed up, I never sleep at night" (female, age 20).*
Compliance with COVID-19 measures	*"I am always at home during this time, I never go out. There aren't many people coming and going at home. [We put on] our mask, our gloves; when we get groceries, we bring them home and soak them in vinegar water in the packages, then rinse them and put them in the cupboards" (male, age 38).* *"Mask, then visor, then when we come home, we wash our hands and faces. I take necessary precautions" (male, age 32).* *"I try not to go out, I'm always at home. My mother stopped sending me to school as soon as the virus appeared, just in case. After all, we are a young group and our immunity is very low" (female, age 20).* *"I usually don't let anyone in the house because I have diabetes, and I never go out" (male, age 18).*

DISCUSSION AND CONCLUSION

It has been established that diabetes leads to increased risk of severe pneumonia and sepsis secondary to viral infection and is present in approximately 20% of these patients.[12,13] Although there are many uncertainties, understanding the problems people with diabetes face in managing their disease and providing them with the necessary care are among the primary goals. In a UK study reporting 23,804 in -hospital COVID-19 fatalities, 1.5% had T1DM, 32% had type 2 diabetes mellitus, and the risk of in-hospital death was 3.5-fold higher in T1DM and 2.03-fold higher in type 2 diabetes when compared with patients without diabetes.[14] This requires patients with T1DM to monitor their blood glucose, adhere to drug therapy, manage their diet, and exercise regularly to protect their short- and long-term health and quality of life.[15]

Effective self-disease management likely improves glycemic control and thus reduces the risk of diabetes-specific disability and complications.[9] In this study, we determined that patients had difficulty managing their diabetes during the COVID-19 pandemic in terms of diet adherence, performing regular insulin injections, exercising, and measuring blood glucose. In the study by Pal et al.,[16] 90% reported a reduction in physical activity and 72% experienced worsening of glycemic control post-lockdown. This clearly demonstrates that people with diabetes need to be monitored and supported during the pandemic. The high HbA1c levels in the participants included in this study are an important indicator that they had problems managing their diseases before the COVID -19 pandemic as well. An extensive survey conducted in Pakistan demonstrated low knowledge regarding COVID-19 in the general population, highlighting the need for greater awareness of COVID-19 and its health impacts.[17] Establishing a valid relationship between diabetes and COVID-19 is imperative in the treatment of patients. It can be considered an encouraging finding that all participants in this study complied with COVID-19 preventive measures.

As the COVID-19 pandemic has swept the globe, the frightening mortality rates in some countries have contributed to the emergence of many psychological problems, including anxiety, depression, and stress.[18] In this study, all the participants reported frequently experiencing feelings of anxiety, fear, and anger. The inability to cope with these emotions may lead to problems such as anxiety and depres-

sion. The psychological impact of pandemic-induced restrictions can lead to symptoms such as confusion, anger, and post-traumatic stress symptoms.[19,20] In a survey of 1210 people in China during the COVID-19 outbreak, half of respondents rated the psychological impact of the outbreak as moderate to severe, 17% reported moderate to severe depressive symptoms, 29% reported moderate to severe anxiety symptoms, and 8% reported moderate to severe stress levels.[21]

All the participants in this study reported having sleep problems. Lifestyle changes are an important factor affecting circadian rhythm. Disruptions in circadian rhythm affect individuals in both physical and social terms.[22] The bidirectional and time-dependent physiological relationship between sleep and glucose control is of clinical importance for patients with T1DM.[23] The HbA1c values of adults with T1DM who slept less than 6.5 hours were found to be significantly higher than those who slept longer.[24] Our study group reported not being able to fall asleep, going to sleep very late at night, having nightmares, waking up late in the morning and not feeling rested, and losing the feeling of waking up to a new day during the COVID-19 pandemic. These problems may have resulted in poor glycemic control.

In conclusion, the results of this study show that patients with T1DM have problems sustaining disease management during the COVID-19 restrictions and that all patients were negatively affected during his period. The patients mainly reported issues related to diet, blood glucose measurement, insulin dose adjustment, and exercise. In addition, psychosocial effects were a significant issue, and sleep emerged as another critical problem area. The results of this study demonstrate essential reasons why people with diabetes require follow-up and support during the COVID-19 pandemic. There are several limitations in our study. Participants were chosen from a group of volunteers who might share diverse opinions and experiences. Therefore, the outputs of the survey may express something other than the fixed results. Data that were used carry the potential of subjectivity, considering that they were collected through intensely interrogated meetings with participants - which allowed them to share their emotions and personal opinions. The study was conducted on a period during the COVID-19 pandemic. The results may vary at the following stages of the pandemic or under different circumstances. Generally, high HbA1c rates were observed among the participants. This observation might show that the participants' already existing troubles in navigating Diabetes. Therefore, the outputs may not be suited for adaptation to the whole population with Diabetes. Sample with a broader sense, long-term observations in various periods and under different circumstances can help us to understand the difficulties T1DM patients were faced better.

Ethics Committee Approval: The study was approved by the Clinical Research Ethics Committee of the Istanbul Health Sciences University Kanuni Sultan Training and Research Hospital (Date: 17.05.2020, decision no: 17). The study was performed according to the Declaration of Helsinki.

Conflict of Interest: No conflict of interest was declared by the authors.

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Anatomical Variations in Fissure of the Lung on Computed Tomography

Bilgisayarlı Tomografide Akciğer Fissüründeki Anatomik Varyasyonlar

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ABSTRACT

Objective: Lung fissures embryologically separate the bronchopulmonary segments from each other. We aimed to detect anatomical variations in fissures in patients who underwent thoracic computed tomography (CT).

Materials and Methods: All the patients underwent a thoracic CT examination between July 1 - July 15, 2022. The patients' gender, lung fissures continuity, accessory fissures presence, and variation side were recorded. The frequency of fissures was compared between the genders using the chi-square test.

Results: The study included a total of 352 patients (211 men, 141 women). A total of 105 variations were detected in 95/352 (26.99%) of the patients, 61/211 (28.91%) were male, 34/141 (24.11%) were female. The right oblique fissure was incomplete in nine (2.6%), and the right horizontal fissure was incomplete in 14 (4%) patients and absent in 14 (4%). The left oblique fissure was observed to be incomplete in 16 (4.5%) patients. A total of 52 (14.8%) accessory fissures were detected.

Conclusions: In the literature, a wide variety of fissure variations have been reported. Due to this diversity, having good knowledge of the fissure anatomical architecture is essential when performing surgical procedures and interpreting radiological images to clinically identify the location of bronchopulmonary segments.

Keywords: Anatomic variation, computed tomography, lung fissure

ÖZ

Amaç: Akciğer fissürleri embriyolojik olarak bronkopulmoner segmentleri birbirinden ayırırlar. Bu nedenle biz de toraks bilgisayarlı tomografi (BT) çekilen hastalarda fissürlerdeki anatomik varyasyonları bulmayı amaçladık.

Materyal ve Metot: Çalışmamıza 01 -15 Temmuz 2022 tarihleri arasında toraks BT tetkiki çektiren tüm hastalar dahil edilmiştir. Hastaların cinsiyetleri, akciğer fissürlerinin devamlılık durumu, aksesuar fissür varlığı ve varyasyonun tarafı kaydedildi. Cinsiyetler arası fissür sıklığı ki-kare testi kullanılarak değerlendirilmiştir.

Bulgular: Çalışmamıza toplamda 352 hasta (211 erkek, 141 kadın) dahil edildi. hastaların 95/352 (%26,99) tanesinde 105 varyasyon tespit edildi bunların 61/211'i (%28,91) erkek, 34/141'i (%24,11) kadındı. Sağ oblik fissür dokuz (%2,6) hastada inkomplet; sağ horizontal fissür 14 (%4) hastada inkomplet, 14 (%4) hastada ise yoktu. Sol oblik fissür 16 (% 4,5) hastada inkomplet olarak izlendi. Toplamda 52 (%14,8) aksesuar fissür tespit edildi.

Sonuç: Literatürde çeşitli fissür varyasyon sıklığı bildirilmiştir. Bu çeşitlilik nedeniyle, cerrahi işlemler yapılırken ve radyolojik görüntüleri klinik olarak yorumlarken bronkopulmoner segmentlerin yerini tespit etmek için fissür anatomik yapısını iyi bilmek önemlidir.

Anahtar Kelimeler: Anatomik varyasyon, bilgisayarlı tomografi, akciğer

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INTRODUCTION

The lungs are the main respiratory organs covering most of the thoracic cavity. The lungs have a half-conical shape and comprise an apex, a base, three faces, and three borders. The lung consists of three lobes on the right (superior, middle, and inferior) and two lobes on the left (superior and inferior). Lung lobes are separated from each other by fissures on both sides.[1] Lung fissures embryologically separate the bronchopulmonary segments from each other. Fissures show continuity in the interlobar plane in adult life. Horizontal fissures can be detected in 60% of anterior-posterior frontal chest radiographs. The oblique fissure is usually visible on the lateral radiograph. In addition, high-resolution computed tomography (CT) shows this fissure as a curved band from the lateral to the hilum.[1,2]

Anatomically, contrary to classical knowledge, fissures show a wide variety of variations. Accessory fissures are usually detected at the borders between the broncho-segments. Common accessory fissures are the superior accessory fissure (SAF), inferior accessory fissure (IAF), and left horizontal fissure (LHF). SAF separates the superior segment in the lower lung lobe from other lung lower lobes, IAF separates the small infra-cardiac lobe from other lung lower segments, and LHF separates the lingula from the different left upper lobe segments.[3] In addition to the presence of variations, the continuity of existing fissures also varies. Fissures that exist in classical anatomy are sometimes partially present and sometimes absent.[4] With the increasing use of imaging methods, there has also been an increase in the rate of fissure variation detection and identification of fissure types.[5,6] Cadaver studies and imaging studies have reported the presence of lung fissure variations at different rates. The detection of anatomical variations in fissures, especially with CT used for lung imaging, is important in pre-surgical planning. The absence of a fissure or presence of extra fissures may cause technical difficulties in separating the lobes and increase the risk of postoperative air leak, blood loss, and bronchopleural fistula formation.[6,7]

Therefore, in this study, we aimed to identify anatomical variations in fissures in patients who underwent thoracic CT and compare the frequency of these variations between the genders.

MATERIALS AND METHODS

Ethics Committee Approval: The study was approved by the Ethics Committee of the Yıldırım Beyazıt University, Yenimahalle Training and Research Hospital (Date: 31.08.2022, decision no: E-2022-52), and performed by Helsinki Declaration.

Participants: All patients who underwent a thoracic CT examination 16-slice device (Alexion, Toshiba, Tokyo, Japan) for any reason at our hospital between July 1, 2022, and July 15, 2022, were included in the study. Patients whose thoracic CT was not of diagnostic quality and those with a history of lung surgery and or major pulmonary trauma were not included in the study. In all patients, reconstructed images in 1-mm axial, 3-mm coronal and 3-mm sagittal sections were examined. The patients' gender was recorded. In addition, the presence of normal and accessory fissures was noted. Lastly, the sides of the fissures (right oblique, right horizontal, and left oblique) and their continuity (complete, incomplete, and absent) were evaluated.

Data Analysis: Patients' ages were noted as mean and standard deviation. The numbers of different fissure variations in both lungs were recorded, and their percentages within the total population were expressed. The numbers of fissure variations were recorded for both genders. Chi-square tests were used to test the frequency of all fissure variations and the total number of accessory fissures between genders. SPSS (version 23) software package was used for statistical analysis.

RESULTS

During the study period, a total of 368 thorax CT examinations were undertaken. Of these, 14 were not included in the study since they were not of the diagnostic quality to evaluate fissures, one was excluded due to a history of surgery, and another due to previous trauma. The remaining 352 patients, 211 men and 141 women were included in the sample. The mean age was 38.34±13.18 years for all the patients, 37.53±13.06 years for the men, and 39.55±13.31 years for the women. A total of 105 variations were detected in 95/352 (27%) of the patients, of whom 61/211 (28.9%) were male and 34/141'i (24.1%) were female. In six male and four female patients, there were two variations, one in each lobe (Table 1).

Table 1. Distribution of patient information.

	Male	Female	Total
Patient, n (%)	211 (59.9)	141 (40.1)	352 (100)
Age, (year) mean±SD	37.53 ± 13.06	39.55 ± 13.31	38.34 ± 13.18
Fissure Variation, n (%)	61/211 (28.91)	34/141'i (24.1)	95/352 (27)
Accessory Fissure, n (%)	35 (16.6)	17 (12.1)	52 (14.8)

SD: Standard Deviation.

Of all the variations, 71 (67.6%) were on the right side, and 34 (32.4%) were on the left. The right oblique fissure was complete in 343 (97.4%) patients and incomplete in nine (2.6%) (Figure 1), and the right horizontal fissure was complete in 324 (92%) patients, incomplete in 14 (4%) and absent in 14 (4%). The left oblique fissure was complete in 336 (95.5%) patients and incomplete in 16 (4.5%) patients when evaluating the fissure variations in the left lung in detail (Table 2).

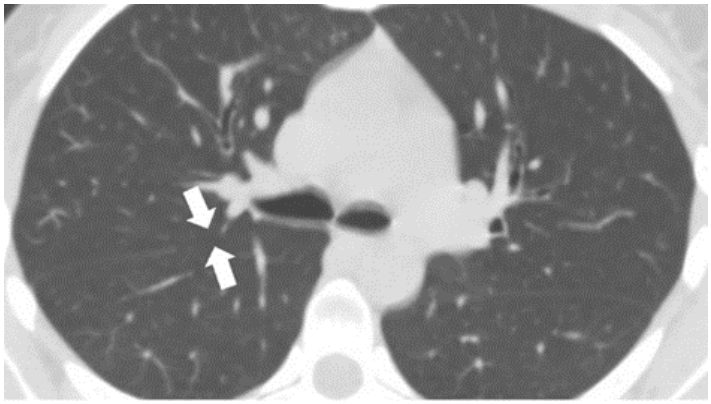

Figure 1: Thorax computed tomography image in the axial section showing an incomplete oblique fissure (arrows) in the right lung.

Table 2. Fissure variations in both lungs.

		Complete	Incomplete	Absent	Accessory
		n (%)	n (%)	n (%)	n (%)
Right	**Oblique**	343 (97.4)	9 (2.6)	0	34 (9.7)
	Horizontal	324 (92)	14 (4)	14 (4)	-
Left	**Oblique**	336 (95.5)	16 (4.5)	0	18 (5.1)

A total of 52 (14.8%) accessory fissures were found when the frequency of these fissures was assessed, with 35 (9.9%) in male patients and 17 (4.8%) in female patients. In 26 patients, an inferior accessory fissure was detected, and in 14 patients, a superior accessory fissure was detected. Both fissures were predominantly found on the right side. In our study, more rarely, the left horizontal fissure, accessory fissure between the right middle lobe medial and lateral segments (Figure 2), and accessory fissure between the right anterobasal and laterobasal segments variations were detected. Accessory fissure variations were found in 34 (9.7%) cases on the right lung and 18 (5.1%) cases on the left lung (Table 3).

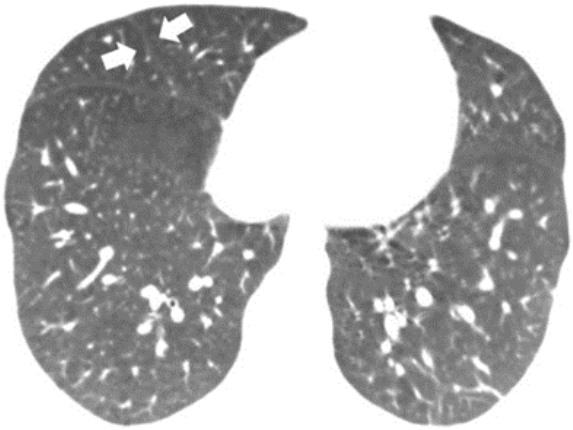

Figure 2: Axial section image showing an accessory fissure (arrows) between the lateral and medial segments in the middle lobe of the right lung.

Table 3. Incidence of accessory fissures.

	Total n (%)	Right n (%)	Left n (%)	Men n (%)	Women n (%)	p- values
Superior accessory fissure	15 (4.3)	14 (4)	1 (0.3)	12 (3.4)	3 (0.9)	0.105
Inferior accessory fissure	26 (7.4)	18 (5.1)	8 (2.3)	16 (4.5)	10 (2.8)	0.556
Left horizontal fissure	9 (2.6)	-	9 (2.6)	6 (1.7)	3 (0.9)	0.677
Accessory fissure between the right antero-basal and laterobasal segments	1 (0.3)	1 (0.3)	0	0	1 (0.3)	-
Accessory fissure between the right middle lobe medial and lateral segments	1 (0.3)	1 (0.3)	0	1 (0.3)	0	-
Total	52 (14.8)			35 (9.9)	17 (4.8)	0.139

DISCUSSION AND CONCLUSION

In the literature, it has been reported that the absence of fissures or presence of incomplete fissures may result from their partial obliteration, and fissures may form due to the non-obliteration of normally obliterated spaces.[8] As the utilisation of current imaging studies continues to rise, our understanding of anatomical variations and incidental findings is expanding.[3,6] However, data on lung fissures are mostly from cadaver studies, and there are fewer studies conducted with CT.[3-7] Technological advancements have made CT scans increasingly valuable in assessing these variations. This is due to their ability to produce thinner sectional images, examine various planes, and enable the evaluation of larger sample sizes.[9-12]

The rates of incomplete fissures reported in radiology studies in the literature show significant variations, ranging from 8.4-85% for right oblique fissures, 6.3-74% for left oblique fissures, and 0.5-90% for horizontal fissures.[6,9-12] In cadaver studies, the frequency of variations in fissure continuity has been shown to range from 6 to 60% for the right oblique fissure, 12 to 42.5% for the left oblique fissure, and 8 to 83.4% for the horizontal fissure.[4,13-15] As seen in both cadaver and CT studies, there are significant differences in the reported rates. It should be kept in mind that these rates may vary according to the population evaluated. In our study, the rate of incompleteness was calculated as 2.6% for the right oblique fissure, 4.5% for the left oblique fissure, and 4% for the right horizontal fissure. These rates are lower than reported in previous studies. One reason for this discrepancy is that the section thickness was 5 mm in previous radiological studies. At the same time, our study used 1-mm and 3-mm sections, which may have provided more accurate results in evaluating fissure continuity. Similar to our study, a recent CT study reported lower rates for incomplete fissures (8.4% for the right oblique fissure, 6.3% for the left oblique fissure, and 0.5% for the right horizontal fissure).[6]

Data on the absence of fissures also vary in the literature. In some studies, the absence of fissures was not mentioned, and the rate was not reported.[5] In other studies reporting these rates, the right oblique fissure was absent in 0-12.5% of cases, the left oblique fissure in 0-10.7%, and the right horizontal fissure in 0-34.62%.[5,16-19] In a CT study, only the right horizontal fissure was found to be absent, and this was detected at a rate of 0.4%.[6] In our study, we did not detect the absence of the right oblique or left oblique fissure in any of the patients, while the right horizontal fissure was absent at a rate of 4%.

In the literature, variations of SAF, IAF, LHF, accessory fissures located between the anterobasal and laterobasal segments (ALAF), those located between the medial and lateral segments of the middle lobe (MLAF), and those located between the superior and inferior lingular segments, and azygos fissures have been described.[20] In our study, accessory fissures were detected in 26.99% of the patients. In two previous CT studies, accessory fissures were reported at a rate of 7.3% and 32%.[6,20] In studies conducted with cadavers, accessory fissures varied between 0 and 66.6%.[16,21,22]

In our study, the most common accessory fissure was IAF with a frequency of 7.4%. The rate of IAF was previously reported as 9.03% by Arıyürek et al.[20], 12% by Yıldız et al.[23], and 3.92% by Manjunath et al.[6], who all noted that this was the most common accessory fissure. In addition, IAF was found more frequently on the right side in all three studies.[6,20,23] These findings support our study. We observed that 5.1% of IAFs were on the right, and 2.3% were on the left. SAF is the second most common variation and can be seen in both lungs. SAF partially or completely separates the lower lobe superior segment from other basal segments, and as a result, the dorsal lobe is formed.[24] In a cadaver study, Deve reported this variation at a rate of 22% in the right lung and 8.7% in the left lung.[25] Similar-

ly, Langlois and Henderson [26] reported the presence of SAF as 17.5% on the right and 2% on the left. In our study, we found the presence of SAF on the right in 4% of the patients and on the left in 0.3%. Similar to the literature, SAF variation was higher on the right, but its frequency was lower than reported in previous studies. Another frequently reported fissure is LHF, which is a common lung fissure form that divides the left upper lobe into two almost equal parts. The lower part of the fissure is called the left middle lobe.[27] LHF has been reported to have a 7.5-29.62% frequency in cadaver studies.[5,13] In our study, we determined the rate of LHF as 2.6%. In another study conducted with CT, the rate of LHF was lower at 1.3%.[6] In our study, the total variation and presence of accessory fissures were higher on the right than on the left. Literature studies also support this finding. In addition to these fissures, one ALAF and one MLAF were found in our study. MLAF divides the right middle lobe into two. This variation has rarely been reported in case reports or some studies. In a study conducted with high-resolution CT, Arıyürek et al.[20] reported this variation in three (2%) patients. In another study, this variation was observed in six (5%) of the 115 patients.[23] In the same study, ALAF was found in one patient.[23] In our study, we did not detect any other subsegmental accessory fissures. In addition, there was no patient with the azygos fissure described in some studies.

Accessory fissures and fissure variations are usually detected incidentally and do not cause any symptoms. However, accessory fissures may not always be reported in CT imaging. Some parts' thickness can sometimes be misidentified due to different morphologies and planar orientations. In imaging methods, lung fissures can be used as a sign, especially to identify pulmonary lesions, and the completeness of a fissure may be important for treatment planning in patients with these lesions. Evaluating our data considering the literature, it is remarkable that fissure variations can be incidentally detected in healthy populations, regardless of the reason for the CT examination. The frequency and types of these variations markedly differ in the literature. Various genetic and environmental factors can be cited as the main reason for these differences.[16] These fissure variations have been reported to represent the side of a spectrum compatible with life. At the other end of the spectrum are various anomalies, such as agenesis and hypoplasia. Advanced levels of these anomalies are seen together with cardiovascular abnormalities.[28,29] Although the exact etiology remains unclear, it has been reported that vitamin A deficiency, viral infections, genetic factors, and embryological neuronal crest damage may cause delays in lung development at various levels, as well as agenesis, hypoplasia, and variations.[27]

In conclusion, the most common variations in our study were the incompleteness of the right horizontal fissure and left oblique fissure, and the absence of the right horizontal fissure. The most common accessory fissure was the right IAF. When evaluated with previous studies, various variations are reported with varying frequencies. Due to this diversity, having good knowledge of the lobar and fissure anatomical architecture is essential when performing surgical procedures and interpreting radiological images to clinically identify the location of bronchopulmonary segments and determine the localization of variations. There are certain limitations to our study, with the most important being the limitations of CT itself. Although we evaluated thin CT sections in three planes, we may have overlooked some fissure variations. Therefore, we may not have been able to make a precise assessment as in cadaver studies. However, our design provided an advantage in terms of reaching more patients than cadaver studies. Another limitation can be considered as the evaluation of CT images by a single radiologist, even if he is experienced in thoracic CT.

Ethics Committee Approval: The study was approved by the Ethics Committee of the Yıldırım Beyazıt University, Yenimahalle Training and Research Hospital (Date: 31.08.2022, decision no: E-2022-52), and performed by Helsinki Declaration.

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The Evaluation of Urinary System Ultrasonography, Uroflowmetry, and Voiding Diary Results in Children with Daytime Urinary Incontinence

Gündüz İdrar Kaçırması Olan Çocukların Üriner Sistem Ultrasonografisi, Üroflowmetri ve İşeme Günlüğü Sonuçlarının Değerlendirilmesi

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ABSTRACT

Objective: The study aimed to examine the results of urinary system ultrasonography, uroflowmetry, and voiding diary for children with daytime urinary incontinence.

Materials and Methods: Patients aged 5-17 with daytime urinary incontinence were retrospectively analysed. Urinary system ultrasonography, uroflowmetry, and a two-day voiding diary were recorded. Comorbid diseases and surgeries were determined using a detailed history.

Results: Of the 1805 patients included in the study, 1039 (57.6%) were female, 766 (42.4%) were male, and the mean age was 7.9±2.8 years. Abnormal USG findings were detected in 385 (21.3%) patients. The highest bladder capacity detected in the voiding diary was below the expected bladder capacity in 41.2% of the patients; in comparison, the bladder capacity measured in the uroflowmetry was low in 65.4%. Constipation was the most common in the gastrointestinal system diseases group. In previous surgery, adenoidectomy was the most common procedure.

Conclusions: We suggest that these patients should be evaluated not only with bladder USG but also with upper urinary system USG. Pathology can also be detected in the upper urinary system. We think that a well-structured voiding diary provides sufficient data regarding bladder volume instead of bladder volume measured by bladder ultrasonography and/or uroflowmetry.

Keywords: Bladder capacity, children, ultrasonography, uroflowmetry, voiding diary

ÖZ

Amaç: Gündüz idrar kaçırma şikayeti ile başvuran çocuk hastalarda üriner sistem ultrasonografisi, üroflowmetri ve işeme günlüğü sonuçlarını incelemeyi amaçladık.

Materyal ve Metot: Çalışmada 5-17 yaş arası gündüz idrar kaçırması olan hastalar retrospektif olarak incelendi. Üriner sistem ultrasonografisi, üroflowmetri ve iki günlük işeme günlükleri kaydedildi. Ayrıntılı öykü ile ek hastalıkları ve ameliyatları belirlendi.

Bulgular: Çalışmaya alınan 1805 hastanın 1039'u (%57,6) kız, 766'sı (%42,4) erkekti ve yaş ortalaması 7,9±2,8 idi. Hastaların 385 (%21,3)'inde anormal USG bulgusu saptandı. İşeme günlüğünde tespit edilen en yüksek mesane kapasitesi, hastaların %41,2'sinde beklenen mesane kapasitesinin altındaydı; karşılaştırıldığında, üroflowmetrede ölçülen mesane kapasitesi %65,4 oranında düşüktü. Gastrointestinal sistem hastalıkları grubundan en sık kabzılık görüldü. Geçirilmiş cerrahi işlem olarak en sık adenoidektomi saptandı.

Sonuç: Bu hastalarda üst üriner sistemde de patoloji saptanabilmektedir bu nedenle, sadece mesane USG ile değil, detaylı üst üriner sistem USG ile de değerlendirilmesi gerektiğini düşünüyoruz. Ayrıca, iyi yapılandırılmış bir işeme günlüğünün, mesane ultrasonografisi ve/veya üroflowmetri ile ölçülen mesane hacmi değerlerine kıyasla daha yeterli veri sağladığını düşünmekteyiz.

Anahtar Kelimeler: Çocuk, işeme günlüğü, mesane kapasitesi, ultrasonografi, üroflowmetri

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INTRODUCTION

Daytime urinary incontinence is a common condition in children. It has been reported to affect 17-22% of children.[1] Contrary to adult population, where incontinence is always considered a pathological condition, incontinence should be evaluated in children by the developmental age and early urological history of the patient.[2]

In the literature, there are studies in which patients with daytime urinary incontinence are generally evaluated only by bladder ultrasonography.[3,4] The number of studies including detailed urinary system ultrasonography, simultaneous uroflowmetry and evaluation with voiding diary is limited. There is sufficient literature on the diagnosis and treatment approaches of urinary incontinence and bladder dysfunction.[5]

The anomalies detected by a detailed evaluation of the upper urinary system of children with daytime urinary incontinence and the data on bladder function of a well-structured voiding diary were the findings that caught our attention. Based on this, the study aimed to analyse retrospectively and evaluate the results of patients with daytime urinary incontinence symptoms followed by a single pediatric urologist.

MATERIALS AND METHODS

Ethical Status: Our study was approved by the Ethics Committee of the Health Sciences University Umraniye Training and Research Hospital (Date: 04.08.2022, decision no: B.10.1.TKH.GP.0.01/246). Informed consent was not obtained because of the retrospective observational design.

Patients: Patients aged 5-17 years who were followed up with symptoms of daytime urinary incontinence from the Pediatric Urology outpatient clinic of Umraniye Training and Research Hospital between 2017 and 2022 were retrospectively analysed. Patients with daytime urinary incontinence symptoms were included in the study. Patients with nocturnal monosymptomatic enuresis and urinary and/or neuronal disorders affecting urinary continence or who had undergone surgical procedures were excluded from the study. The age, gender, and symptoms of the patients were determined. Urinary system ultrasonography, bladder-volume value from uroflowmetry parameters, complete urinalysis, and two-day voiding diary were recorded in all patients. Detailed anamnesis revealed the associated diseases and surgeries they underwent.

Analysis: All data were analysed retrospectively. Expected bladder capacity (BMC) was calculated according to the International Pediatric Continence Society (ICCS) formula [BMR = [30 x (age in age+1) mL].[6,7] The highest voiding volume detected in the voiding diary of the patients and the bladder volume measured in the uroflowmetric study performed when the children's voiding sensation was evident were evaluated. All ultrasounds were performed by who is an expert radiologist in pediatric sonography. All ultrasounds were performed using one sonography equipment of Toschiba Applio 500. Bladder wall thickness (BWT) in all cases was calculated in both posterior and lateral walls. The mean of these two measurements was assumed to be BWT. Electromyography (EMG) uroflowmeter was used in some selected patients. The EMG probe was not used in all patients due to its cost. Therefore, the evaluation of EMG uroflowmetry was not included in the study.

Statistical Analyses: In our study, simple statistics were used, and the mean±SD and % values of the groups were obtained from the statistical calculation in the Microsoft Excel Worksheet.

RESULTS

A total of 1805 patients were identified. Of these patients, 1039 (57.6%) were female, and 766 (42.4%) were male. The mean age of the patients was 7.9 ± 2.8 years. While the number of patients with only daytime urinary incontinence was 366 (20%), the number of patients with both night and daytime incontinence was 1439 (79.7%) (Table 1).

Table 1. Age, gender, and incontinence status of the patients.

Characteristics		n (%)	Age
Gender	Male	766 (42.4)	7.5 ± 2.3
	Female	1039 (57.6)	8.3 ± 3.1
	Total	1805 (100)	7.9 ± 2.8
Only daytime incontinence	Male	117 (6,4)	8.4 ± 2.9
	Female	249 (13,7)	9.2 ± 3.4
	Total	366 (20)	8.9 ± 3.2
Day and night time incontinence	Male	649 (35.9)	7.2 ± 2.0
	Female	790 (43,7)	8.0 ± 2.9
	Total	1439 (79,7)	7.7 ± 2.6

Urinary system ultrasonography was performed in all patients. Urinary system pathology was seen in 385 (21.3%) patients. These findings were increased bladder wall thickness, hydronephrosis, bladder trabeculation, duplex system anomaly, kidney stone, kidney cyst, bladder diverticulum, and horseshoe kidney. These findings are listed in the first column of the table below, from most common to rarest. The increase in bladder wall thickness was most common in patients with daytime and nocturnal incontinence, while it was second only in patients with daytime incontinence. Conversely, hydronephrosis was most common in patients with only daytime urinary incontinence, followed by increased bladder wall thickness. In some patients, more than one urological finding was detected (Table 2). Patients with hydronephrosis without an obstructive pattern and duplex system anomalies were followed up conservatively. Vesicoureteral reflux was detected in 23 patients. Subureteric injection was performed in 4 patients, and open ureteroneocystostomy in 2 patients. Extracorporeal Shock Wave Lithotripsy (ESWL) was performed in 5 of the patients with kidney stones. Patients with kidney cysts were also followed conservatively. All patients with additional findings were followed up in the pediatric nephrology clinic. The mean increase in BWT was 4.1 mm. Grade 2 hydronephrosis was reported in one-third of the patients with hydronephrosis, and grade 1 hydronephrosis in two-thirds. No spinal anomaly or infravesical obstruction was detected in patients with trabeculation in the bladder. No urinary anomaly was observed in any of the patients with kidney stones.

Table 2. Urinary system ultrasound findings.

Total patients with Urinary System pathology on USG (n:385; 21.3)			
USG	**Number of Patients (n)**	**Only daytime incontinence (n)**	**Day and nighttime incontinence (n)**
BWT-increase	155	22	133
Hydronephrosis	140	36	104
Trabeculation	59	9	50
Duplex system	22	6	16
Kidney stone	13	2	11
Kidney cyst	13	2	11
Diverticulum	6	1	5
The horseshoe kidney	1	0	1

BWT: Bladder wall thickness.

A daily voiding diary was performed, and the volume of urination detected in the diary was evaluated. In 41.2% of the patients, bladder capacity was below the expected bladder capacity; in 51.6%, it was equivalent to the expected bladder volume, and in 7.2%, the expected bladder closure was above the expected bladder capacity (Table 3). The bladder volume detected in the first uroflowmetry examination was low at 65.4%, equivalent to the expected bladder volume in 21.8% and high in 12.7% of the patients (Table 3).

Table 3. Uroflowmetry and voiding diary bladder-volume values.

Characteristics		**UFM / Voiding Diary Value**			
		n (%)	**Age Average ± SD**	**Male n (%)**	**Female n (%)**
UFM	Under	1181 (65.4)	8.0 ± 2.7	526 (68.7)	655 (63.0)
	No change	394 (21.8)	7.7 ± 2.9	171 (22.3)	223 (21.5)
	Above	230 (12.7)	8.3 ± 3.0	69 (9.0)	161 (15.5)
Voiding Daily	Under	743 (41.2)	8.1 ± 2.7	324 (42.3)	419 (40.3)
	No change	932 (51.6)	7.8 ± 2.9	400 (52.2)	532 (51.2)
	Above	130 (7.2)	8.2 ± 2.9	42 (5.5)	88 (8.5)

UFM: Uroflowmetry.

According to the data obtained from the detailed anamnesis, 401 (22.2%) patients had associated disease. The most common comorbidity was in the gastrointestinal tract. Constipation was the most common in this group, followed by celiac disease and gastroesophageal reflux (GER), while autism and hyperactivity disorder were the second most common neuropsychiatric diseases. On the other hand, it has been noted that other system diseases, such as rheumatologic, allergic, and cardiovascular systems, are quite common (Table 4).

There was a history of previous surgery in 198 (11%) patients. The most common was adenoidectomy, the second most common was inguinal hernia repair, and the third most common was tonsillectomy. Two patients were treated with local alternative medicine practices. Since a patient can undergo more than one surgical procedure, the data in the table represent the number of patients undergoing surgical procedures (Table 5).

Table 4. Associated diseases.

Disease Group		n	Female (n)	Male (n)
Gastrointestinal	(GER, Celiac Disease) + Constipation	146 [(20)+126]	60 [(7)+53]	86 [(22)+64]
Neurological-Psychiatric	Autism, hyperactivity	114	53	61
Genitourinary	VUR, ovarian cyst, undescended testicle	83	45	38
Rheumatological	FMF, Behçet Disease, JIA	58	34	24
Allergic	Eczema and allergic rhinitis	25	9	16
Cardiac	Aortic stenosis, ASD	18	8	10
Endocrinological	DM, Hypothyroidism	10	6	4

GER: Gastroesophageal reflux; VUR: Vesicoureteral reflux; FMF: Familial Mediterranean Fever; JIA: Juvenile Idiopathic arthritis; ASD: Atrial septum defect; DM: Diabetes mellitus.

Table 5. Previous surgical procedures.

Total patients who underwent surgery (n:198; 11%)			
Surgery Group	**n**	**Surgery Group**	**n**
Adenoidectomy	57	Hypospadias	7
High Ligasyon	49	ASD repair	6
Tonsillectomy	38	Subureteric injection	4
Orchiopexy	19	Frenuloplasty	3
Appendectomy	13	UNC	2
Tympanoplasty	10	Cupping	2
Eye surgery	10	Dental surgery	2
Arm fracture	10	Pyeloplasty	1

ASD: Atrial septum defect; UNC: Ureteroneocystostomy.

DISCUSSION AND CONCLUSION

In our study, it was found that hydronephrosis, increase in bladder wall thickness and trabeculation were the most common and various anomalies accompanied by ultrasound of the entire urinary system performed on the patients. When the bladder volume measurements detected in the voiding diary and uroflowmeter were evaluated, it was seen that the voiding diary could be more meaningful and reliable for assessing bladder capacity. With a detailed history, it has been observed that the associated diseases may be neuropsychiatric, rheumatological and allergic diseases apart from the gastrointestinal system.

Evaluation of children with daytime urinary incontinence is discussed in an overview without breaking down into lower urinary tract dysfunction (LUTD) subgroup classifications. By definition, it is a condition characterised by lower urinary tract symptoms such as urinary incontinence, frequent urination, urgency, and weak urine flow without significant uropathy or an underlying neurological disorder.[10]

The diagnosis of urinary incontinence, a broader definition of lower urinary tract dysfunction, is mainly based on a comprehensive assessment of the patient's clinical history. Frequency, sense of urgency, when and how incontinence occurs, febrile urinary tract infection history and toilet position should all be evaluated. It is necessary to focus on the history of the child, such as drugs used for treating urinary incontinence and previous surgical procedures.

In this group of patients, a physical examination should be performed, and especially attention should be paid to examining the lumbosacral and urogenital

genital regions.

Urinary incontinence, enuresis, urgency, pelvic pain, and urine flow pattern are important. Lower urinary tract dysfunction can be triggered when girls unconsciously try to control urine flow with the pelvic floor to prevent their legs and toilet rim from getting wet. None of the symptoms described above are expected to occur in children over 5 years of age.

Daytime urinary incontinence is common in the pediatric population, but it is difficult to determine the exact prevalence because bladder control develops gradually during childhood. In our patient group, there were more female patients (57.6%) than males. In our series, the mean age of female patients was 8.3 years, and that of male patients was 7.5 years. In a UK study, the prevalence of incontinence decreased from 15.5% at age 4.5 to 4.9% at age 9.5. In a Korean cohort of children aged 5-13, daytime incontinence was 11.2%, and impingement incontinence was 16.8%.[9] The prevalence of urinary incontinence decreased from 31% at age 5 to 13.7% at age 9.[10] Differences in prevalence may also be due to cultural differences.

The highest prevalence of functional urinary incontinence is at age 7; girls of all age groups are more affected than boys.[11] The prevalence is higher in girls than boys, possibly due to anatomical differences.[12]

In patients presenting with urinary incontinence, bladder USG imaging is a noninvasive and practical procedure. In our study, unlike the literature highlights, all our patients were evaluated with USG of the urinary system together with the bladder. In this evaluation, it was seen that the second most common urinary pathology after the increase in bladder wall thickness (40.2%) was hydronephrosis (36.3%), which is a finding of the upper urinary system. Later, duplex system abnormalities, kidney stones, kidney cysts and horseshoe kidney anomalies were detected, respectively. Only in patients with daytime urinary incontinence was the most common finding of hydronephrosis (9.3%). In comparison, the increase in bladder wall thickness (5.7%) was the second most common finding of urinary system pathology. The bladder wall thickness measured on an empty bladder should be <3 mm.[13] Studies supplemented in the literature are usually in the form of an evaluation of the bladder with USG. Oktay et al.[4] demonstrated anatomical changes in pediatric incontinent patients' lower urinary tract structures. They also emphasised that these differences should be considered in diagnosing, following up, and treating patients with urinary incontinence. Another study showed a good reliability of bladder ultrasonography in children aged 7.3±1.1 years regarding bladder volume measurement.[5] An increase in bladder wall thickness, a common result in our series, has been extensively studied in the literature as a prognostic factor in children with lower urinary tract symptoms.[14,15] However, there are reports stating that factors such as bladder volume at the time of measurement and the probe's location can affect bladder wall thickness measurements.[5]

In all our patients (school-age children), two-day urine measurements were performed on weekends to make the follow-up of the parents more reliable and to facilitate the application. In 51.6% of the patients, the highest volume measured daily was similar to the expected bladder capacity. However, on the other hand, it was found to be less than the expected bladder volume in 41.2% of the patients. In 130 patients (7.2%), it was higher than the expected bladder closure site. How long to keep a voiding diary is controversial. Recent studies have shown that a two-day bladder diary provides similar data as one for 3 days.[16] While the maximum voiding volume in the bladder log is the maximum value of the voiding volume during the working period, the exact performance of the bladder at a given bladder capacity is unknown. The literature evaluating the maximum bladder capacity measured by a urine diary in children with daytime incontinence is scarce. Some authors argue that uroflowmetry and PVR measurement are more appropriate tools to investigate bladder performance in healthy children because keeping a voiding diary is difficult and time-consuming.[17] Our study presents the bladder performance of children with daytime incontinence in their natural lives with high patient numbers and carefully made urination diary data. Therefore, although the uroflowmetry measurement values in the hospital environment give us critical ideas, we think that the measurement in the urine diary better reflects the child's bladder performance. In approximately 50% of our patients, the measured bladder capacity was below and above the expected bladder capacity. We think that this difference should be considered in treatment planning and evaluation of bladder wall thickness by ultrasonography.

We know that the parameters obtained from uroflowmetry depend on bladder capacity. It was observed that the bladder capacity was equivalent to the expected capacity in 21.8% of the patients but below the expected bladder capacity in 65.4%. In a large-scale study of uroflowmetry in children, the lowest acceptable age-specific bladder capacity for interpreting the uroflowmetry test was recommended as age×5+50 mL in years.[17] As stated in this study, voided volume is important for a healthy UFM assessment. In addition, there are reports that the repetition of the uroflowmetric study does not increase the method's effectiveness in assessing the voiding function in children.[18] We know that bladder volume measurement is important when

evaluating UFM results, so we think that evaluating bladder volume together with urine diary measurement will help us more in the diagnosis and treatment process rather than UFM repeat.

The most common associated diseases detected in our patients were the gastrointestinal system. Constipation had the highest number of patients, with 126 (31.4%). It is strongly associated with constipation, recurrent urinary tract infection, vesicoureteral reflux, and dysfunctional voiding.[19] In a study of 234 children with chronic constipation and urinary incontinence, it was reported that 89% of the children improved their daytime wetting after their constipation was treated, and chronic urinary tract infections and infections were regressed in all children with anatomically normal urinary tract.[20]

In our series, the most common comorbidities after constipation were autism and hyperactivity disorder. Autism was found in 25 of 114 patients, and hyperactivity was found in the rest of them. The studies have reported that children with improved psychiatric disorders also improved their compliance with LUTD treatment.[21] However, we would like to state that rheumatological (14.4%), cardiac 6.2%, allergic (4.4%), and endocrinological (2.4%) diseases, which have yet to be emphasised much in the literature, are also seen in substantial numbers.

In conclusion, we think that ultrasonographic evaluation in this patient group should include not only the bladder but also the upper urinary system. According to the results we obtained in our study, various renal anomalies, including the upper and lower urinary system, can be detected. With this information, the treatment stages of the patient can be planned more effectively. Another issue to keep in mind is that different comorbidities can be seen in these patients, apart from the diseases we know. Regarding the treatment plan, we would like to state that it is valuable to consider the urination diary, USG, and UFM measurements together. We think that the measurement in a well-prepared voiding diary provides more adequate and reliable data than the bladder volume measured by ultrasonography and/or uroflowmetry. The weaknesses of our study are the evaluation of only the bladder volume parameter from the uroflowmetry parameters, the absence of EMG, and the evaluation of all patients with daytime urinary incontinence without lower urinary system dysfunction classification.

Ethics Committee Approval: Our study was approved by the Ethics Committee of the Health Sciences University Ümraniye Training and Research Hospital (Date: 04.08.2022, decision no: B.10.1.TKH.GP.0.01/246). Informed consent was not obtained because of the retrospective observational design.

Conflict of Interest: No conflict of interest was declared by the authors.

Author Contributions: Concept – SY; Supervision – Zİ, SY; Materials – SY; Data Collection and/or Processing – SY, Zİ; Analysis and/or Interpretation – SY, Zİ; Writing –SY, Zİ.

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Health Effects of Smartphones in 14-19 Age Young People

Akıllı Telefonların 14-19 Yaş Gençlerde Sağlık Açısından Etkileri

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ABSTRACT

Objective: Mobile technologies have been rising and expanding rapidly since the COVID-19 pandemic. This study aims to determine high school students' smartphone use and related health problems (attention deficit, kyphosis, myopia) with a new approach.

Materials and Methods: Using smartphones in high school students, including the ages of 14-19, and its effects on health were examined by creating two groups over the Google form survey system (Group I: Less than three hours and Group II: three hours or more). This descriptive study was conducted between November 10 and December 16, 2022. Cronbach's alpha (α = 0.84) value was calculated with the SPSS 25.0 program to observe the reliability of the questionnaire.

Results: A total of 242 students participated in the survey study. The average age of the students is 15.94. The age of using a smartphone for the first time was lower in Group II compared to Group I (p=0.013). In Group II, distance vision impairment (myopia) (p=0.047), attention deficit (DI) (p=0.001) and postural impairment (kyphosis) (p=0.004) were found to be significantly higher.

Conclusions: Although using smartphones for educational purposes is seen as favourable in high school students, they cannot ignore the health problems (myopia, kyphosis, lack of attention) caused by them.

Keywords: Attention deficit, kyphosis, myopia, smartphones

ÖZ

Amaç: Mobil teknolojiler, COVİD-19 pandemisinden bu yana hızla yükseliyor ve genişliyor. Bu çalışma, lise öğrencilerinde akıllı telefon kullanımı ve buna bağlı sağlık sorunlarının (dikkat eksikliği, kifoz, miyop) yeni bir yaklaşımla belirlenmesini amaçlamaktadır.

Materyal ve Metot: 14-19 yaş dahil olmak üzere lise öğrencilerinde akıllı telefon kullanımı ve sağlık üzerine olan etkileri, Google form anket sistemi üzerinden, iki grup oluşturularak, incelenmiştir (Grup I: Üç saatten az ve Grup II: Üç saat ve üzeri). Tanımlayıcı tipteki bu araştırma 10 Kasım -16 Aralık 2022 tarihleri arasında gerçekleştirilmiştir. Anketin güvenirliğini gözlemlemek için SPSS 25.0 programı ile Cronbach's alpha (α = 0,84) değeri hesaplanmıştır.

Bulgular: Anket çalışmasına toplam olarak 242 öğrenci katılmıştır. Öğrencilerin yaş ortalaması 15.94'tür. Grup II'de ilk kez akıllı telefon kullanma yaşı Grup I'e göre daha düşüktü (p=0,013). Grup II'de; uzağı görme bozukluğu (miyopi) (p=0,047), dikkat eksikliği (DE) (p=0,001) ve postür bozukluğu (kifoz) (p=0,004) anlamlı olarak daha yüksek bulundu.

Sonuç: Lise öğrencilerinde akıllı telefonların eğitim amaçlı kullanımı olumlu olarak görülse de yol açtığı sağlık sorunları (miyop, kifoz, dikkat eksikliği) göz ardı edilemez.

Anahtar Kelimeler: Akıllı telefon, dikkat eksikliği, kifoz, miyopi

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INTRODUCTION

It is seen that smartphones are used seriously by individuals of all ages in our country. Additionally, It is stated that this use has reached the level of addiction, especially among young people.[1] On the other hand, the contribution of the coronavirus disease (COVID-19) to this increase in recent years worldwide and, of course, in our country, cannot be ignored. For example, social media, education, telemedicine consultations and others are the first examples that come to mind.[2] It should be considered that the abnormal increase in mobile device use in children has essential adverse health consequences. On the other hand, it should not be forgotten that smartphone applications do a great job in the fight against COVID-19.[3-4] Technology advancements have led to increased handheld devices, presenting slightly different visual challenges than desktop displays.[5] This increase has led to more research to understand better the symptoms of health problems associated with using mobile devices.[6,7] These health problems occur broadly, including all pathological symptoms (psychiatric, orthopaedic, ocular, and others) from young to advanced ages.[8,9] With the widespread use of smartphones, significant increases were observed in usage times.[10] Of course, there were symptoms brought about by this increase in smartphones. Among these, some ocular symptoms and related health problems draw attention.[11] Another symptom detected in research on smartphone use is posture and position disorder. Ergonomic risk assessment studies have been conducted, especially in the upper extremities.[12] Studies are ongoing to evaluate the possible harmful effects of long-term smartphone use on spinal posture and to develop preventive measures.[13] In addition, one health problem arising from excessive use of mobile devices is sleep disorders and related distractions. In this context, Understanding the role of sleep and inner perception may further elucidate the sleep-health link.[14] Many hormonal changes can underlie emotional disorders.[15] The effect of night sleep on serotonin and melatonin hormones is so essential that there are many dietary recommendations to balance these two hormones. Because these two hormones positively contribute to antioxidant capacity and good mood, that is good behaviour.[16-18] Poor sleep quality, for example, sleeping with the smartphones active, can produce many distractions and behavioural disorders. Excessive use of mobile devices can cause sleep disturbances, and daily life problems may occur due to this situation.[19]

Our research will create awareness in society, especially among young people, about achieving a healthy life. In addition, we would like to point out that Our study brings a new perspective to this issue by using the term "double-edged sword" for smartphone usage.

MATERIALS AND METHODS

Ethics Committee Approval: Ethical approval for the research was obtained from the Ethics Committee of Sakarya University, Medical Faculty (Dated 5.11.2022, decision no: E-12833-118), and the Declaration of Helsinki conducted the study.

Study Design: We conducted a cross-sectional study of 14 questions (Appendix 1) using an electronic questionnaire (Google form) from students from three private high schools in Sakarya, Türkiye. The surveys were filled online between November 10, 2022, and December 16, 2022.

Data Collection: We compared the negative health consequences of smartphones in two groups according to students' usage hours (Group I: Less than three hours and Group II: three hours or more). Before the questionnaires were filled, the school administration and families were interviewed, and the correct data flow was ensured. It was emphasised that for the participants to mark the clinical symptoms, they must have previously been diagnosed by the relevant physician.

Statistical Analysis: Statistical analysis and study findings were evaluated with the Independent Samples t-test, Fisher's exact test and Pearson X2 Test using the SPSS 25.0 program and $p<0.05$ was accepted for significance.

RESULTS

There were 242 students in this study, with a mean age of 15.9 years. 170 (70.2%) are boys, and 72 (29.8%) are girls (Table 1. The distribution of students according to the duration of smartphone use was de) terminated as Group I: 82 people, Group II: 159 people. While 235 (97.1%) of the students had their smartphones, 7 (2.9%) did not have a smartphone. While the mean age of starting to use a smartphone was 10.95 in Group I, it was 9.89 in Group II (Independent Sample Test, $p=0.013$). While 231 (95.5%) participants had a smartphone usage restriction at school, 8 (3.3%) did not. Again, while 63 (26%) of the students had a family restriction on smartphone use, 175 (72.3%) did not. While 192 (79.3%) of them knew conscious use of smartphones, 49 (20.2%) did not (Figure 1).

Table 1. Socio-demographical characteristics of students.

	14	15	16	17	18	19	Missingg	Total
%	12.4	23.666	29.333	22.77	9.1	0.8	2.1	100
N	30	57	71	55	22	2	5	242

Gender of the Students

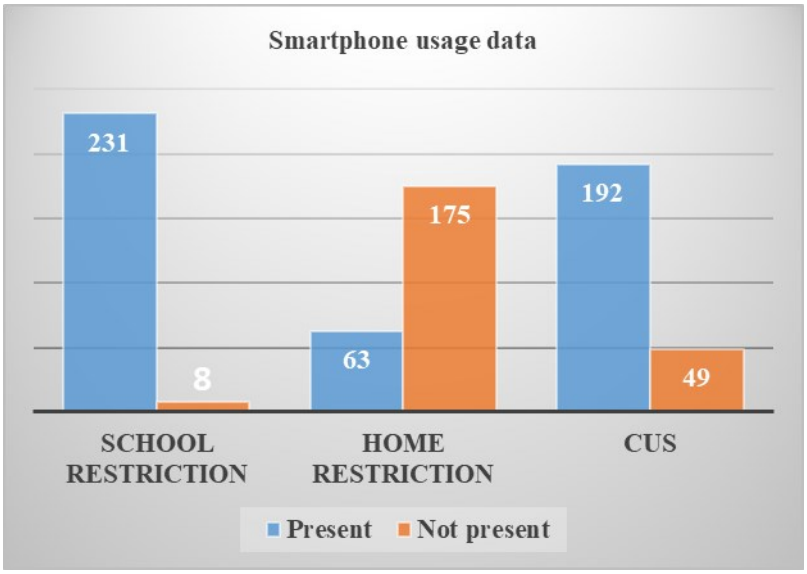

Figure 1. Smartphone usage data among high school students.
CUS: Conscious use of the smartphone.

The evaluation of the participants according to their smartphone usage time is shown in Figure 2. There was a statistically significant difference between Group I and Group II. Like Group I and II data, Myopia was 22 and 63; AD: was 34 and 101; Kyphosis was found as 18 and 67, respectively.

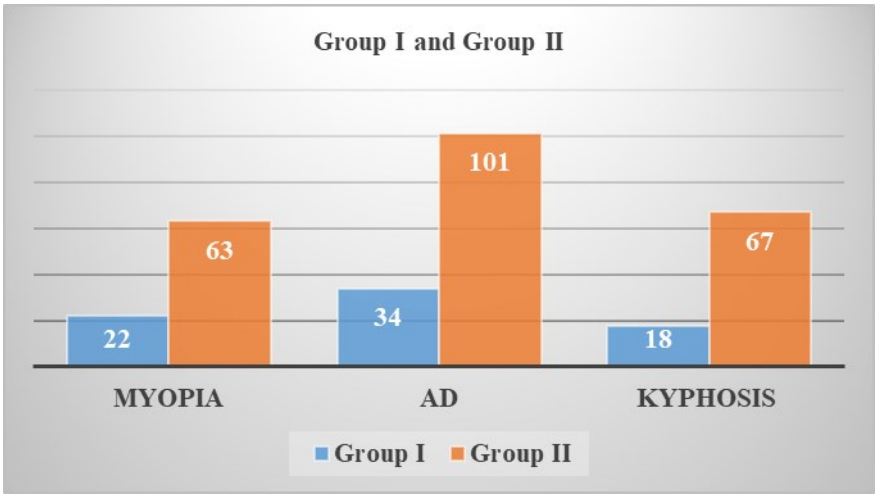

Figure 2. Evaluation of the participants according to their smartphone usage time.
AD: Attention deficit; Group I: less than three hours; Group II: equal to or more than three hours. Group I and II data were determined as Myopia: 22 and 63; AD: 34 and 101; Kyphosis: 18 and 67, respectively. There was statistical significance between the groups ($p<0.05$).

As seen in Table 2, there was no significant relationship between students' school success and the duration of smartphone use. In groups, distance vision impairment (UGB, myopia), near vision impairment (hyperopia), blurred vision, dry eye, itching in the eye, watering in the eye, redness, headache, not being able to sleep at night, napping during the day in the classroom, distraction, forgetfulness, postural disorders (kyphos) were detected at different rates.

Table 2. Comparison of symptom rates related to smartphone use between Group I and Group II students.

Symptoms	Group I n (%)	Group II n (%)	OR	CI (%95)	p
Myopia	22(29.3%)	63(41.7%)	1.73	0.95-3.12	0.047*
Hyperopia	5(6.9%)	8(5.8%)	0.82	0,26-2.59	0.47
Blurred vision	18(24.3%)	32(22.4%)	0.89	0.46-1.73	0.43
Dry eye	11(15.3%)	20(14.2%)	0.97	0.41-2.03	0.49
Itchy eyes	19(26%)	42(29.4%)	1.18	0.62-2.22	0.36
Watery eyes	18(25%)	42(29.4%)	1.25	0.65-2.37	0.36
Eye redness	20(27.4%)	44(31.2%)	1.2	0.64-2.24	0.34
Headache	42(56%)	93(64.6%)	1.43	0.81-2.53	1.37
NSN	27(37.5%)	71(48.6%)	1.57	0.89-2.81	0.08
SDC	31(43.1%)	70(49%)	1.27	0.71-2.24	0.25
AD	34(45.9%)	101(70.1%)	2.76	1.55-4.94	0.001*
Forgetfulness	30(40.5%)	71(48.6%)	1.39	0.79-2.45	0.16
Kyphosis	18(26.1%)	67(45.9%)	2.4	1.28-4.5	0.004*

OR: Odds ratio; CI: Confidence Interval; NSN: Not being able to sleep at night; SDC: Sleeping during day in class; AD: Attention deficit. Group I: less than three hours; Group II: equal to or more than three hours. *: There was statistical significance between the groups ($p<0.05$).

DISCUSSION AND CONCLUSION

This study aims to identify students' health problems, especially ocular symptoms, regarding smartphone use. As smartphones apply quickly in the community, especially with the contribution of the COVID-19 process, further attention is needed. We should also evaluate the use of the phrase "double-edged knife in our study from this perspective. So, using this expression, We mean that it is beneficial if used appropriately and harmful if misused. Although the term "double-edged sword" has been used in many studies, our results show that we are using it for the first time for smartphones.[20-22.]

One study examined smartphone addiction symptoms, important lifestyles, and other variables.[23]According to the survey's findings, 35.9% of the participants felt tired during the day due to smartphone use late at night, 38.1% agreed that their sleep quality decreased, and 35.8% slept less than four hours due to multiple smartphone use.[23] In another study on smartphone use among university students, sleep quality and depression were examined.[24] Although they examined university students, we examined high school students; in both studies, daily smartphone usage time was relatively high (7.85 ± 4.55 hours). On the other hand, it would not be an objective approach to state the purely negative aspects of smartphone use. For example, in an experimental study on 44 students for the feasibility of smartphone application and social media-based intervention, it was seen that health education tips were applied 1-3 times a week. The study also stated that a well-integrated social media-based intervention could engage students and improve selected health behaviours and outcomes.[25] Therefore, it is inevitable that smartphones, our research subject, will make a similar positive contribution. However, users must comply with the duration and healthy physical position conditions; otherwise, many health problems, predominantly ocular, await them. Indeed, in a study examining smartphone use from the perspective of myopia, Primary, secondary, and higher education students were evaluated through a questionnaire. In this study, which included 418 students, it was shown that there is a relationship between myopia and smartphone data usage.[26] Similar findings were obtained in our study. Considering the ocular health risks associated with myopia, further investigation of this relationship is recommended in both studies. It was revealed in a study conducted in the years when the use of mobile devices was not expected that young people spending more time in the open area reduced the occurrence of myopia.[27] Similarly, our study used smartphones indoors, and myopia was significantly higher in group II. A new study investigating the relationship between smartphone use and refractive error was conducted on 525 young people aged 12 to 16.[28] The study found that Dutch teenagers spent about 4 hours a day on their smartphones, and with 20-minute episodes of continuous use, those with low exposure to the outdoors had more myopia defects.[28] From this point of view,

it was suggested that frequent breaks in open spaces should be a recommendation for young people to use smartphones. Young people have been suggested to go out more often to open spaces while using smartphones.

A study of adolescents with low back pain and normal adolescents using smartphones in sitting posture evaluated the relationship between changes in thoracolumbar kyphosis, lumbar lordosis, and pelvic asymmetry.[29] The study instructed them to sit in a height-adjustable chair with their hips and knees bent 90° for 30 minutes. Subsequently, thoracic kyphosis and lumbar lordosis angles increased as sitting time increased in both groups.[29] According to their results, smartphone use caused posture disorders, just like our findings. On the other hand, while mobile devices were accused of causing kyphosis, Android-based smartphones were used to measure thoracic kyphosis.[30]

In conclusion, although smartphones help students access information, long-term use in closed environments can harm their health. Myopia, kyphosis and AD come to the fore among these health problems. On the other hand, providing information and awareness training to students for the intended and correct use of mobile technology, in general, will solve many problems before they begin. While the mobile phone usage information of the students participating in the research was collected retrospectively, it was necessary to determine how long they had been using it (for example, how many years they had been using it). In addition, if students using smartphones indoors were examined, and another group (control) using smartphones outdoors had been created, reaching more accurate results would have been possible.

Ethics Committee Approval: The study was obtained from the Sakarya University Faculty of Medicine Ethics Committee (dated 5.11.2022, E-12833-118), and the Declaration of Helsinki conducted the study.Informed Consent. The electronic questionnaire (Google Drive) filled out by the students of three private high schools in Sakarya, Türkiye, was used as a data source.

Conflict of Interest: No conflict of interest was declared by the authors.

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Appendix 1. Questions.

1. Write your age (indicate as a number, for example, 12)
2. Student gender
   - ☐ Girl
   - ☐ Male
3. Please specify your school.
   - ☐ Kindergarten
   - ☐ Primary school
   - ☐ Middle school
   - ☐ High school
4. Write your height and weight values (Example: Height 110cm, Weight 45 kg)
5. Do you have your mobile device (cell phone or tablet)?
   - ☐ Yes
   - ☐ No
6. At what age did you start using a mobile device (cell phone or tablet)? (specify with a number, for example,
7. Is using mobile devices (cell phones or tablets) allowed at school?
   - ☐ Yes
   - ☐ No
8. Does your family restrict mobile device use at home?
   - ☐ Yes
   - ☐ No
9. How many hours a day do you use a mobile device?
   - ☐ Less than half an hour
   - ☐ Half an hour or less than 1 hour
   - ☐ 1 hour or less than 2 hours
   - ☐ 2 hours or less than 3 hours
   - ☐ 3 hours or less than 4 hours
   - ☐ 4 hours or more
10. How is your school success?
    - ☐ Very good
    - ☐ Good
    - ☐ Middle
    - ☐ Bad
11. Do you have any information about the effects of mobile devices on health and how they are used correctly? (e.g. distance from the eye, time of talking on the phone, distance from the body)
    - ☐ Yes
    - ☐ No
12. Where did you learn about healthily using mobile devices?
    - ☐ From my teacher
    - ☐ From my family
    - ☐ By reading it myself
    - ☐ Other
13. For what purpose do you often use your mobile phone? (You can choose more than one option.)
    - ☐ Social media (such as Facebook and Twitter)
    - ☐ Watching videos online (like Youtube)
    - ☐ Distance education activities (such as watching lectures and exams)
    - ☐ Watching movies and music videos loaded on the phone
    - ☐ For communication purposes
14. Please mark any eye, sleep or posture (hunchback) disorders you have had or are continuing today.x

    I have never had it | I have had it/I am fine | It is still ongoing
    - ☐ Difficulty seeing far
    - ☐ The problem with near vision
    - ☐ Blurred vision
    - ☐ Dry eyes
    - ☐ Itchy eye
    - ☐ Watery eyes
    - ☐ Eye redness
    - ☐ Headache
    - ☐ Not being able to sleep at night
    - ☐ Sleeping during the day in class
    - ☐ Attention deficit
    - ☐ Forgetfulness
    - ☐ Posture disorder (kyphosis)

xNOTE: For participants to mark the clinical symptoms in survey question 14 as having experienced or continuing, they must be diagnosed by a physician beforehand.

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Determinants of Cancer-Related Online Information-Seeking Intentions of Cancer Patients Receiving Chemotherapy

Kemoterapi Alan Kanser Hastalarının Kanserle İlgili Çevrimiçi Bilgi Arama Niyetlerinin Belirleyicileri

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ABSTRACT

Objective: In this research, we aimed to determine the factors affecting cancer patients' intention to seek cancer-related information online.

Materials and Methods: The research was carried out in the context of the cross-section approach and relational survey model among the general survey models. Data were collected by a face-to-face survey from people treated at Sakarya University Faculty of Medicine, Oncology Department between April and November 2021. Total of 240 people voluntarily participated in the research, including 140 females (Age:47.10±10.78) and 100 males (Age:53.88±13.58) diagnosed with cancer in the 18-84 age range (Age:49.93±12.45).

Results: As a result of the stepwise regression analysis, the factors of attitude, ISA, and ISQ had a statistically significant positive effect on the patient's intention to search for health information on the Internet, whereas facilitating conditions did not have a statistically significant effect.

Conclusions: It is anticipated that the research results will provide guidance for understanding and successfully managing the information-seeking behaviours of cancer patients.

Keywords: Information-seeking behaviour, Internet use, cancer patients

ÖZ

Amaç: Bu araştırmada, kanser hastalarının internet üzerinden kanserle ilgili bilgi arama niyetlerini etkileyen faktörlerin belirlenmesi amaçlanmaktadır.

Materyal ve Metot: Araştırma, genel tarama modellerinden kesit alma yaklaşımı ve ilişkisel tarama modeli bağlamında gerçekleştirilmiştir. Veriler Nisan-Kasım 2021 tarihleri arasında Sakarya Üniversitesi Tıp Fakültesi Onkoloji Bölümü'nde tedavi gören kişilerden yüz yüze anket tekniği ile toplanmıştır. Araştırmaya 18-84 yaş aralığında (Yaş: 49,93 ± 12,45) kanser teşhisi alan 140 kadın (Yaş: 47,10 ± 10,78) ve 100 erkek (Yaş: 53,88 ± 13,58) olmak üzere 240 kişi gönüllü olarak katılmıştır.

Bulgular: Gerçekleştirilen aşamalı regresyon analizi sonucu hastaların internetten sağlık bilgisi arama niyeti üzerinde, tutum, bilgi kaynağı erişilebilirliği ve bilgi kaynağı kalitesi faktörlerinin istatistiksel olarak anlamlı pozitif etkisi olduğu, buna karşın kolaylaştırıcı koşulların istatistiksel olarak anlamlı bir etkisinin olmadığı belirlenmiştir.

Sonuç: Araştırma sonuçlarının kanser hastalarının bilgi arama davranışlarının anlaşılmasına ve başarılı bir şekilde yönetilebilmesine rehberlik sunacağı öngörülmektedir.

Anahtar Kelimeler: Bilgi arama davranışı, internet kullanımı, kanser hastaları

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INTRODUCTION

Cancer, a group of diseases resulting from the abnormal proliferation of cells in the human body, is one of the chronic diseases that is becoming increasingly common as one of the leading causes of death worldwide.[1,2] In fact, the IARC 2020 World Cancer Statistics report estimated 19.3 million new cancer diagnoses and 10 million cancer deaths globally.[3] In Türkiye, cancer ranks as the second leading cause of death among adults.[4] When individuals are diagnosed with cancer, they often seek more information about the illness, hoping to gain a sense of control and understanding regarding the disease, available treatment, and other options.[5]

Health information-seeking is a goal-oriented activity that critically evaluates the usefulness and reliability of each piece of information obtained from various sources, such as disease risks, actively and intentionally.[6-8] Although the increase in Internet use facilitates access to information, studies have emphasised the concerns about accessing accurate and reliable information about health and the harmful effects of this information in the diversity of data on the Internet.[9-11] Moreover, the resources used in searching for information about health/disease are changing from healthcare professionals to digital resources.[2,12,13]

The information needs of cancer patients have been addressed in various categories, including the nature of the disease, progress and prognosis of the disease, side effects of treatment, social life, self-care problems, and sexual concerns.[13] This, in turn, contributes to their ability to manage their health or support the health of those around them. It strengthens their decision-making processes and aids them in their interactions with healthcare professionals.[10,14,15]

Previous research has identified critical variables influencing cancer information-seeking.[16,17] Lwoga et al. adopted the factors of attitude, facilitating conditions,[18,19] information resource quality (ISQ), and information resource accessibility (ISA).[9,20] Attitude refers to an individual's general emotional reaction towards a particular phenomenon.[18] Studies have shown that attitude can predict the intention to use the Internet for health information-seeking.[9,21] Facilitating conditions are related to individuals' perceptions of the available resources and support to engage in a particular behaviour. According to Marton, ISQ is associated with relevance and reliability, influencing information-seeking behaviour.[20] On the other hand, ISA is tied to the ease with which individuals can physically and cognitively understand the obtained information.

This research aimed to assess the effects of potential factors (attitude, facilitating conditions, ISQ, and ISA) on the intention of cancer patients receiving chemotherapy to seek information on the disease through the Internet.

MATERIALS AND METHODS

Ethical Considerations: The research was carried out by the Principles of the Declaration of Helsinki after the necessary permissions were obtained from the Sakarya University Faculty of Medicine Clinical Research Ethics Committee (Date:22/07/2020, decision no:174).

Type of Research*:* The research was conducted in the context of a cross-section approach and relational survey model among the general survey models.

Research Group and Procedure*:* The research group consisted of 140 female and 100 male participants diagnosed with cancer in the 18-84 age range (Age:49.93±12.45). Data were collected by face-to-face survey technique, under a doctor's supervision and permission, from people treated in the Oncology Department of Sakarya University Faculty of Medicine in April-November 2021. After briefly explaining the research, 240 (54%) of the people contacted completed the survey. Other contacts (46%) were excluded from the research because they did not want to participate, did not use the Internet, or did not complete the questionnaire. In the research, the participants were asked to confirm their demographic information and clinical status previously collected by the panel to ensure data quality. The questionnaire took 8-12 minutes to complete, and the informed consent process was completed by all participants included in the research.

Data Collection: The research data were collected with a descriptive information form and a questionnaire including 30 items to determine the participants' information-seeking behaviour and intention to use the Internet to access this information. The scales for measuring the intention to seek information about the disease and its determinants were brought together as a result of the literature review. Accordingly, attitudes (5 items), facilitating conditions (4 items),[9,18] ISA (5 items), ASQ (3 items),[9,20] and intention to search for information on cancer from the Internet (6 items)[21] a total of 23 items were included in the questionnaire form. Except for the descriptive information form, all items were scored on a 5-point Likert type.

Statistical Analysis*:* After the data obtained were coded into the IBM SPSS program, descriptive statistics, Chi-square test for determining significant differences between variables, Pearson correlation analysis for determining relationships, and searching for information on cancer from the Internet. Multiple linear regression analyses were used to evaluate the predictors of intention. Whether the data satisfied the normality condition was examined with skew-

ness and kurtosis values, and all values met the criteria[22] of being between ±2. Before the multiple linear regression analysis, in order to determine whether there is multi-collinearity in the data pattern, the binary correlations for the three regression models were less than 0.80, the tolerance values were greater than 0.20, the variance inflation factor was less than 10, and the highest Condition Index value was determined to be less than 30.[23,24] Durbin-Watson (DW=1.837) coefficient values were 1.5-2.5, and no autocorrelation problem existed between variables.[23] There were no extreme/outlier values.[25] It was determined that the scales' Cronbach Alpha internal consistency coefficients took a value between 0.951 and 0.714.

RESULTS

It was seen that 95% of the patients evaluated the quality of the health service provided as excellent, and 91.7% were satisfied with the service provided (Table 1). In addition, it was determined that there was no statistical difference between females and males in terms of the quality of health services provided (χ^2=0.361, p>0.05) and satisfaction levels from these services (χ^2=0.399, p>0.05). Similarly, there was no statistical difference between patients aged ≤50 years and ≥51 years in terms of satisfaction levels (χ^2=0.024, p>0.05) from the services provided.

Table 1. Difference analysis of quality of health services provided and satisfaction of health services provided.

		Quality of health services provided			Satisfaction of health services provided		
		Deficient	**Perfect**	**p**	**Dissatisfied**	**Satisfied**	**p**
Gender	Female	6(2.5)	134(55.8)	0.562	13(5.4)	127(52.9)	0.639
	Male	6(2.5)	94(39.2)		7(2.9)	93(38.8)	
Age	≤50	2(0.8)	122(50.8)	-	10(4.2)	10(4.2)	0.876
	≥51	10(4.2)	106(44.2)		114(47.5)	106(44.2)	

Notes N=240*:* f(%).

Whereas 65% of the patients requested detailed information about their disease and wanted to decide their disease in this context, 19.6% of them wanted limited information about their disease and left the decision to their doctors. As a result, only 15.4% of patients wanted to receive positive information about their disease (Table 2). It was determined that there was no statistical difference between females and males (χ^2=3.742, p>0.05) and patients ≤50 years and ≥51 years (χ^2=4.560, p>0.05) in terms of the type of information requested.

Table 3 compares female and male patients ≤50 years and ≥51 years of age according to the patient's intention to search for information about the disease on the Internet and the factors affecting this intention. There was a statistically significant difference between males and females regarding their attitudes towards searching for information about the disease on the Internet (t=-2.673, p<0.01). Accordingly, males ($\bar{x}$=2.84±0.97) exhibited more positive attitudes than females ($\bar{x}$=2.53±0.86) in terms of their attitudes towards searching for information on the Internet about the disease. On the other hand, no statistically significant difference was found between males and females in terms of other factors (p>0.05). Similarly, when the age variable was taken into account, no statistically significant difference was found between patients aged ≤50 years and ≥51 years in terms of the intention to seek information about the disease and the factors affecting this intention (p>0.05).

Table 2. Difference analysis of information request.

		Gender		Age	
		Female	**Male**	**≤50**	**≥51**
I want all the information about my disease and want to reach a decision.	f	98	58	84	72
	%	40.8%	24,2%	35%	30%
I just want to receive positive information about my disease.	f	18	19	22	15
	%	7.5%	7,9%	9.2%	6.3%
I only want limited information and would prefer the doctor to decide.	f	24	23	18	29
	%	10.0%	9,6%	7.5%	12.1%
	p	0.154		0.102	

Table 3. Difference analysis of variables.

Variables			Attitude		Facilitating conditions		Information source quality		Information source accessibility		Usage intention of Internet	
		n	*t*	p	*t*	p	*t*	p	*t*	p	*t*	p
Gender	Female	140	-2.673	0.008	-1.264	0.208	0.237	0.813	1.397	0.164	-0.049	0.961
	Male	100										
Age	≤50	124	-1.863	0.064	-0.462	0.645	0.558	0.577	1.945	0.053	0.815	0.416
	≥51	116										

When Table 4 was examined, a mediate level statistically significant relationship was detected between the intention to seek information about the disease from the Internet and attitude (r=0.562, p<0.01), facilitating conditions (r=0.446, p<0.01), and ISA (r=0.410, p <0.01). Additionally, a low-level statistically significant relationship was determined between the intention to seek information about the disease and ISQ (r=0.290, p<0.01).

The stepwise regression method was used to determine the variables that significantly contribute to predicting the intention to search for information about the disease and the contribution of each of these variables to the total variance explained. At the end of the three models put forward by applying this method, the total variance ratio of the intention to search for online information was reached (Table 5).

Table 4. Correlations between variables.

Variables		Facilitating conditions	Information source quality	Information source accessibility	Usage intention of Internet
Attitude	r	0.510**	0.257**	0.191**	0.562**
Facilitating conditions	r	1	0.218**	0.327**	0.446**
Information source quality	r		1	0.139*	0.290**
Information source accessibility	r			1	0.410**

Notes: n=240; **: p< 0.01; *: p< 0.05.

Table 5. Regression analysis results on predictors of usage intention of the Internet.

Model	Factors	β	Std. Error	β	t	p
1	(Constant)	1.471	0.173		8.484	0.000
	Attitude	0.646	0.062	0.562	10.479	0.000
2	(Constant)	-0.084	0.298		-0.281	0.779
	Attitude	0.577	0.058	0.502	9.885	0.000
	Information source accessibility	0.486	0.078	0.315	6.198	0.000
3	(Constant)	-0.414	0.324		-1.280	0.202
	Attitude	0.542	0.059	0.471	9.119	0.000
	Information source accessibility	0.468	0.078	0.303	6.002	0.000
	Information source quality	0.159	0.064	0.127	2.482	0.014

Dependent Variable: Usage intention of internet

Model 1: F= 109.799**, R^2= 0.316 $_{adj}R^2$= 0.313

Model 2: F= 82.740**, R^2= 0.411 $_{adj}R^2$= 0.406

Model 3: F= 58.414**, R^2= 0.426 $_{adj}R^2$= 0.419

**p<.01

Three significant models were obtained as a result of stepwise regression analysis. It was determined that the attitude factor included in the regression equation in the first model explained 31.3% of the usage intention of Internet variance (F=109.799, p<0.01. $_{adj}R^2$=0.313). In other words, the strongest predictor of usage intention of the Internet was determined as an attitude factor. In the second regression model, the ISA factor was added to the model after the attitude factor, and the usage intention of Internet explained variance increased from 31.3% to 40.6% with the addition of this variable to the model (F=82.740, p<0.01, $_{adj}R^2$=0.406). In this context, the ISA factor contributes 9.3% to the variance explained. In the third regression model, besides the attitude and ISA factors, the ISQ factor was added to the model, and it was determined that these factors explained 41.9% of the usage intention of Internet total variance (F=58.414, p<0.01, $_{adj}R^2$=0.419). ISQ, the last factor added to the model, contributed 1.3% to the explained variance. Furthermore, the effect of each factor on the model was significant, and Beta values were positive. The obtained findings showed that as attitude, ISA, and ISQ scores increase, usage intention of Internet score will also increase.

DISCUSSION AND CONCLUSION

In this research, we determined the effects of attitude, facilitating conditions, ISQ, and ISA on the intention to seek information about the disease from the Internet.

It was determined that the participants received chemotherapy treatment for fourteen different cancer types. The three most common cancer types were breast cancer 36.25%, lung cancer 14.58%, and colon cancer 12.8%. In this context, breast cancer in females and lung cancer in males are the most common cancer types, and this situation is consistent with Türkiye's most common cancer types.[26] It was determined that the participants' quality of the health services offered and their satisfaction with these services did not differ depending on gender and age. Again, although there was no difference in gender and age, it was seen that patients wanted to have detailed information about their health status and a say in the decisions to be taken in this context. Finally, it could be stated that the participants' attitudes towards information-seeking behaviour on the Internet differ in favour of males; in other words, males exhibited a relatively more positive attitude. However, the participants' intentions to search for information on the Internet and other factors affecting these intentions did not differ depending on gender and age. In light of the explanations, it has been determined that the research participants have similar characteristics, especially in the health services provided and their tendency to seek health information.

The findings revealed a positive relationship between the intention to search for information about the disease from the Internet and attitude, facilitating conditions, ISA, and ISQ. As a result of the stepwise regression analysis performed in this context, three models were obtained, and it was determined that the model with the highest explained variance rate was the third model. According to Model 3, attitude, ISA, and ISQ tended to increase participants' Internet use intention to obtain cancer information. In contrast, facilitating conditions were not included in the model.

The findings reveal that attitude towards technology plays an essential role in participants' intention to use the Internet to search for cancer information. Attitude is a critical determinant of intention.[27] In a study conducted with a sample of HIV patients, it was reported that the attitude factor significantly affects disease-related Internet use intention.[9] Mayer et al. state that the Internet has become essential for exchanging cancer information and support.[14] In this context, it is predicted that patients with a positive attitude towards the effects and benefits of online information resources will be more likely to use the Internet to access information. For this reason, it is crucial to inform and guide patients about the importance of Internet-based information to increase Internet use related to these diseases/health conditions.

Information resource availability is the second strongest predictor of the intention to search for information about the disease online. In other words, the positive effect of ISA on the information-seeking intentions of the patients is supported. Previous studies have revealed that ISA has a significant impact on Internet use/intent to use the Internet to search for health information.[9,20,28] The results obtained in this research supported the results of previous studies. This may mean that cancer patients need tools like the Internet and digital equipment for information-seeking intentions and behaviours.[19] Access to a sufficient number of information resources, such as technical support, online tutorials, and promotions on health-related topics/concepts, which may be necessary to support the information-seeking experience of cancer patients, is crucial to improve the intention to search for information on disease/health from the Internet.

The positive effect of the ISQ on the information-seeking intentions of the patients is another important finding of the research. This finding supports Leung's study, which revealed that Internet use is positively associated with the quality of online health information.[29] ISQ is related to relevant websites' availability, ease of use, and reliability.[14,20] Similarly, Lwoga et al. state that health-related web-

sites should be simple, user-friendly, and easy to use.[9] For this reason, considering the potential of directing users, it is crucial that Internet resources related to cancer contain accurate and reliable information about the subject sought. Consistent and reliable interaction between the Internet information provider and the patient can allow the resource to be designed according to the information patients need and increase its use.

In conclusion, information sources are differentiated due to technological developments, and access to these sources is diversified. These developments also place changes in health systems, placing more responsibility on patients to participate actively in decision-making and disease management.[14] The present research revealed the effects of three main factors (attitude, ISA, and ISQ) as determinants of information-seeking behaviours of cancer patients on the Internet. In this context, it guides understanding and successfully managing the information-seeking behaviours of today's cancer patients. It also expands the literature on patients' information-seeking behaviours and the factors affecting these behaviours. However, it is possible to state that the study's findings should be evaluated within the framework of certain limitations. As Lwoga et al. stated, advanced-stage patients who could provide crucial information on the subject could be excluded from this research.[9] However, research data were limited to cancer patients receiving chemotherapy treatment in a public hospital. Therefore, it is impossible to predict whether similar patterns will be observed in a larger cancer patient group or individuals living with different diseases and how information needs, or behaviours will change over time. In this context, conducting longitudinal and/or mixed-method studies is recommended to provide a deep definition and explanation of the research context.

Ethics Committee Approval: Our study was approved by the Sakarya University Faculty of Medicine Clinical Research Ethics Committee (Date: 22/07/2020, decision no: E.6607). The study was carried out by the Helsinki Declaration.

Conflict of Interest: No conflict of interest was declared by the authors.

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Investigation of Protein Expressions of PLA2G7, UCP2 and NEDD4L Genes Associated with Fat Droplet Formation in Prostate Cancer

Prostat Kanserinde Yağ Damlacık Oluşumu ile İlişkili PLA2G7, UCP2 ve NEDD4L Genlerinin Protein Ekspresyonlarının Araştırılması

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ABSTRACT

Objective: Prostate cancer (PCa) is characterised by dysregulated lipid metabolism. PCa cells store lipids as lipid droplets and use them to facilitate proliferation and growth. In this study, we aim to investigate the expression levels of PLA2G7, UCP2 and NEDD4L proteins, which are involved in lipid droplet metabolism, in PC3 (advanced metastatic) and DU145 (intermediate metastatic) PCa cells.

Materials and Methods: DU145 and PC3 cells were cultured in a high-glucose DMEM medium containing 10% FBS, 1% penicillin-streptomycin, and 1% non-essential amino acid. The expression levels of PLA2G7, UCP2, and NEDD4L protein were assessed with ELISA assay.

Results: There was no significant difference in the protein level of PLA2G7 between the PC3 and DU145 cells ($p>0.05$), while the protein level of UCP2 increased in the PC3 cell line significantly ($p<0.05$). The protein level of NEDD4L decreased significantly in the DU145 cell line when compared to the PC3 cell line ($p<0.05$).

Conclusions: As a result of this study, the UCP2 gene might play a role in the progression of prostate cancer, and there could be a relationship between NEDD4L and cell proliferation control.

Keywords: Lipid droplet, NEDD4L, PLA2G7, Prostate cancer, UCP2

ÖZ

Amaç: Prostat kanseri (PCa) düzensiz lipid metabolizması ile karakterize edilen bir kanserdir. PCa hücrelerinin; lipitleri lipid damlacıkları şeklinde depoladığı ayrıca proliferasyon ve büyümeyi kolaylaştırmak amacıyla membran sentezi için yapıtaşı olarak kullandığı gözlemlenmiştir. Bu çalışmada amacımız PC3 ve DU145 prostat kanseri hücre hatlarında lipid damlacık metabolizmasında görev alan PLA2G7, UCP2 ve NEDD4L proteinlerinin ekspresyon seviyelerini incelemektir.

Materyal ve Metot: Prostat kanseri hücre hatları orta seviye metastatik DU145 ve ileri metastatik PC3 %10 FBS, %1 penisilin-streptomisin, %1 non-esansiyel amino-asit içeren yüksek glukoz DMEM besi yerinde çoğaltılmıştır. Daha sonra PLA2G7, UCP2 ve NEDD4L proteinlerinin ekspresyon düzeyleri ELISA testi ile incelenmiştir.

Bulgular: Bu çalışmada, PC3 ve DU145 hücrelerinde PLA2G7 protein seviyeleri açısından anlamlı bir fark olmadığı ($p>0,05$) ancak UCP2 protein seviyelerinin PC3 hücrelerinde anlamlı derecede arttığı gösterilmiştir ($p<0,05$). Bunun aksine NEDD4L protein seviyeleri DU145 hücre hattında anlamlı derecede düşmüştür ($p<0,05$).

Sonuç: Çalışmanın sonucunda, UCP2'nin prostat kanserinin ilerlemesinde rolü ve NEDD4L ile hücre proliferasyonu kontrolü ile arasında bir ilişki olabilir.

Anahtar Kelimeler: Lipid damlacığı, NEDD4L, PLA2G7, Prostat kanseri, UCP2

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INTRODUCTION

PCa is a slow-growing and hormone-dependent cancer. It uses lipid oxidation for energy.[1] Normal cells can organise intracellular lipid levels by regulating lipid uptake of synthesis and degradation. In contrast, cancer cells can get more lipids and raise lipid synthesis owing to increased energy demand. When cellular lipids are in excess amount, they can be converted to triglycerides and cholesterol esters in the ER and stored as lipid droplets (LD). Lipids stored in LD are broken down to meet the cell's energy needs in starvation.[2] LD controls both the uptake of lipids and their use in response to cellular needs.[3]

There are genes involved in the regulation of these processes. In this study, PLA2G7, UCP2 and NEDD4L genes that play a role in the regulation of these processes were examined. Phospholipase A2 Group 7 (PLA2G7), a 45 kDa monomeric protein, is also named lipoprotein-associated phospholipase A2 (LpPLA2) because two-thirds of the enzyme circulates in theplasma bound to LDLs and the remaining is associated with HDLs and other lipoproteins.[4]PLA2G7 contributes to creating the pool of free fatty acids required for LD synthesis.[5] Uncoupling Proteins (UCPs) are proteins belonging to the carrier family SLC25 (The solutioncarrier family 25) located in the mitochondrial inner membrane.[6] They dissipate oxidationenergy in the form of heat by functioning as separating oxidative phosphorylation from ATPproduction. Uncoupling Protein 2 (UCP2) is a member of UCPs and plays a role in LDformation due to its relation with fatty acid synthase (FASN). FASN is responsible for LD accumulation in the cell.[7] In addition, it is known that inhibition of UCP-2 leads to down-regulation of FASN. So, UCP-2 is thought to have essential roles in LD formation.[2]

Neural precursor cells expressed developmentally downregulated gene 4-like (NEDD4L) is an E3 ubiquitin ligase regulating ubiquitination and protein degradation.[8] Spartin protein, which is involved in the turnover of LD and disruption of the epidermal growth factor receptor, interacts with NEDD4L and organises lipid droplet metabolism.[9]

The study aims to show the relationship of these proteins with increased metastasis potential by showing the expression levels of PLA2G7, UCP2 and NEDD4L proteins, which are involved in LD metabolism in PC3 and DU145 prostate cancer cell lines.

MATERIALS AND METHODS

Ethics Committee Approval: Ethics committee approval is not required for studies to be conducted on commercially available human cadavers, cadaver parts and other biological materials. Since a commercially available cell line was used in our study, ethics committee approval was not required.

***Culture of Cells*:** The human prostate carcinoma cell line PC3 and DU145 were obtained from Muğla Sıtkı Koçman University Research Laboratories Center Coordinators andYeditepe University Department of Genetics and Bioengineering, respectively. Cells were cultured in high glucose DMEM containing 10% FBS, 1% penicillin-streptomycin and 1% non-essential amino acid (L-glutamine) and were passaged when they reached 80-90% confluency.

Cell Lysate Preparation: Firstly, the medium in the flask was removed and washed with PBS. Then, the collected trypsinised cells were centrifuged at 1000 rpm at +4 °C for 5 minutes and later on, the supernatant was removed. After that, the cells were kept at -80°C for 5 minutes andat 37°C for 5 minutes, respectively. This process was repeated 3 times. Finally, the bursted cellmixture was centrifuged at 1500 rpm for 10 min at +4 °C. The supernatant was collected in aneppendorf tube, and the ELISA protocol was applied.

Elisa Test: For ELISA experiments, the NEDD4L ELISA kit (ShanghaiCoon Koon Biotech Co., Ltd., 20522), UCP2 ELISA kit (ShanghaiCoon Koon Biotech Co., Ltd., 13901), and Lipoprotein-associated phospholipase A2 (Lp-PLA2) ELISA kits (ShanghaiCoon Koon Biotech Co., Ltd., 12314) were used.

While applying the ELISA protocol, 50µL standard solution, 10 µL of sample and 40 µL of sample diluent were added to the wells, respectively. They were incubated at 37°C for 60 minutes. After incubation, chromogen A and chromogen B solutions were added and incubatedagain at 37°C for 15 minutes. Finally, 50 µL of stop solution was added, and the measurement was made at 450 nm absorbance in the Epoch Reader Spectrophotometer device.

Statistical Analysis: GraphPad Prism 9 program was used for statistical analysis. Comparisonswere made using the unpaired t-test. The significance level was accepted as $p<0.05$.

RESULTS

ELISA tests were used to determine the level of each protein (PLA2G7, UCP2 and NEDD4L)in PC3 and DU145 prostate cancer cells. The expression level of PLA2G7 protein was found to be 2,18 ng/mL in the PC3 cell line, while it was 3,11 ng/mL in the DU145 cell line. There was no statistically significant difference in PLA2G7 level between the two cell lines ($p>0.05$)(Figure 1).

The expression level of protein UCP2 was found to be 221,3 pg/mL in the PC3 cell line, whileit was 39,3 pg/mL in the DU145 cell line. It was deter-

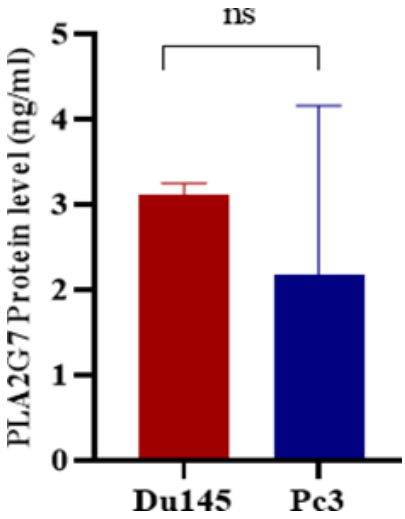

Figure 1. The expression level of PLA2G7 protein in DU145 and PC3 cells (ns:p> 0.05).

mined that the expression level of UCP2protein was higher in PC-3 cells than in DU145 cells ($p<0.05$) (Figure 2).

The expression level of NEDD4L protein was found to be 0,76 ng/mL in the PC3 cell line, whileit was 1,4 ng/mL and was found in the DU145 cell line. The expression level of NEDD4L protein was found to be higher in DU145 cells than in PC3 cells ($p<0.05$) (Figure 3).

DISCUSSION AND CONCLUSION

Cancer cells require adaptation across multiple metabolic processes to provide the energy needed for their enhanced rate of proliferation. Irregularity in lipid metabolism is one of the metabolic changes in cancer.[10] These changes are involved in several mechanisms, including LD accumulation, increased lipid uptake, de novo lipid synthesis, and regulation of lipolysis. LD is involved in the proliferation, growth and stress response of cancer cells [11]. Lipid

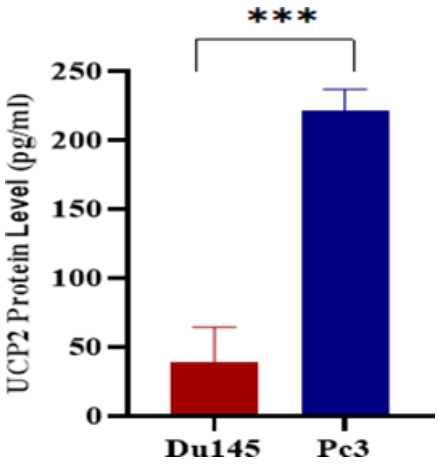

Figure 2. The expression level of UCP2 protein in DU145 and PC3 cells (***: p≤ 0.001).

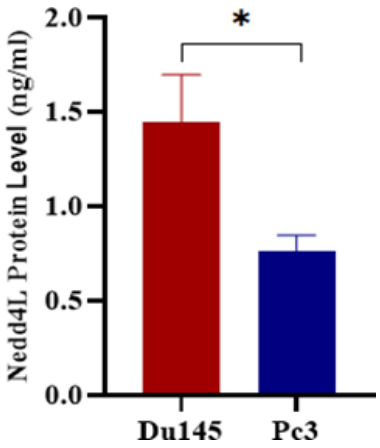

Figure 3. The expression level of NEDD4L protein in DU145 and PC3 cells (*: p≤ 0.05).

accumulation in LD is a hallmark of prostate cancer cells.[12] In this study, the expression levels of PLA2G7, UCP2 and NEDD4L proteins were investigated.

Lipoprotein-associated phospholipase A2, or platelet -activating factor (PAF), contributes to thecreation of the pool of free fatty acids required for LD synthesis.[5] Scientific research on this subject has shown that LD causes tumour development in tumours such as breast cancer, ovariancancer and multiple myeloma.[13] The expression of PLA2G7 is related to hormone receptor negativity and poor prognosis, especially in metastatic breast cancer. It has been shown to support metastasis and invasion, as well as its role in the regulation of epithelial-mesenchymaltransition (EMT) in breast cancer. Also, inhibition of PLA2G7 expression resulted inreduced vimentin expression, enhanced E-cadherin expression, and reduced cell invasion.[14] Substrate hydrolysis catalysed by PLA2G7 also generates platelet-activating factor (lysoPAF)/lyso phosphatidylcholine (lysoPC) and oxidised fatty acids. Stafforini et al. have reported that PLA2G7 has pro-inflammatory and pro-oxidative activities.[15] In addition, it contributes to the formation of the pool of free fatty acids needed for LD synthesis.[5] Vainio et al. indicated that PLA2G7 is a new biomarker in 50% of primary prostate cancers and 70% ofmetastatic prostate cancers. It has also been associated with aggressive prostate cancer.[16] Benliet al. found higher PLA2G7 activity in prostate cancer patients than in the control group.[13] Kispert reported that increased PLA2G7 expression reduces the motility of tumour cells.[17] In our study, it was found that the expression level of PLA2G7 protein was lower in the PC3 celllinet than in the DU145 cell lines, but it was not statistically significant ($p>0.05$).

UCP2 is a mitochondrial transporter that is associated with the changes in cell proliferation [18].Recent advances in cellular glucose and lipid metabolism research described UCP2 as an important regulator of cellular fuel utilisation and lipid metabolism.[7] Pecqueur et al. showed that the inactivation of UCP2 caused a decrease in mitochondrial fatty acid oxidation and an increase in glucose metabolism.[19] Esteves et al. demonstrated that targeting mitochondrial function through UCP2 could reverse reprogramming, leading to a return toward less glycolysis and higher oxidative phosphorylation capacity.[20] In the research by Burch et al., higher UCP2 expression levels were found in non-malignant RC77N/E and malignant RC77T/E cells from prostate adenocarcinoma cells. As a result of RT-PCR sequencing and Western Blotanalysis, the expression level of UCP2 protein was found to be considerably increased in malignant RC77T/E cells compared to non-malignant RC77N/E cells.[21] In our study, it was determined that the level of UCP2 in PC3 cells was higher than in DU145 cells ($p<0.05$). Increased UCP2 level suggests that it might promote tumour growth and metastasis in prostate cancer. In addition, these results show that this protein can be used as a potential new drug targetand biomarker.

NEDD4L is an E3 ubiquitin ligase that has been reported to attend cellular procedures by regulating substrate ubiquitination and protein degradation.[8] Until today, many E3 ubiquitin ligases, including NEDD4L, were identified as the regulators of lipid mechanism.[22] In the studyby Hooper et al., spartin protein, which is involved in the turnover of lipid droplets and disruption of the epidermal growth factor receptor, has been shown to interact with E3 ubiquitin ligases belonging to the NEDD4 family.[23] In addition, in the study by Alberts et al., it has beenreported that spartin activates NEDD4 family ligases for the ubiquitination and degradation oflipid droplet proteins like adipophilin.[9] Hu et al. evaluated radical prostatectomy (RP) samples from 56 patients with clinically localised PCa and benign prostatic hyperplasia (BPH) samples from 31 patients in terms of NEDD4L expression. They reported that NEDD4L is considerablydecreased in PCa in comparison with benign prostate tissue. In the same study, 86% of cancers with a Gleason score ≥ 8 had negative NEDD4L expression.[24] In our research, it was determinedthat the expression level of NEDD4L protein in DU145 cells was higher than in PC3 cells ($p<0.05$). These results show that regulation of NEDD4L expression may play a role in the development of prostate cancers.

In conclusion, it was aimed to show the expression levels of PLA2G7, UCP2 and NEDD4L proteins, which are involved in LD formation and storage in prostate cancer. It was determinedthat the expression level of PLA2G7 protein did not have a statistically significant difference. Therefore, further research is needed in the PLA2G7. It was determined that the expression level of UCP2 protein in PC3 cells was higher than in DU145 cells. As the expression level ofUCP2 protein increases in association with advanced tumour aggressiveness, examination of serum UCP2 protein can inform clinicians about disease progression. It can be thought that UCP2 protein might support the progression of the disease in prostate cancer and could also betherapeutic in targeted therapies against altered tumour metabolism. In addition, the expression level of NEDD4L protein in DU145 cells was higher than in PC3 cells. The decreased expression level of NEDD4L protein in PCa, especially in more aggressive cells, suggests a relationship between the control of cell proliferation and the NEDD4L protein. The expressionlevel of NEDD4L protein might be a prognostic marker for prostate cancer development. Detailed

investigations should be conducted to comprehend the role of NEDD4L in tumorigenesis better. A better understanding of NEDD4L's involvement in prostate cancer progression could provide more effective clinical therapy.

Ethics Committee Approval: An ethical approval for the study is not required. In this study, secondary cell culture was used.

Conflict of Interest: No conflict of interest was declared by the authors.

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The Relationship Between Nomophobia with Physical Activity and Sleep Quality In Community-Dwelling and Non-Frail Older Adults

Toplumda Yaşayan ve Kırılgan Olmayan Yaşlı Yetişkinlerde Nomofobi ile Fiziksel Aktivite ve Uyku Kalitesi Arasındaki İlişki

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ABSTRACT

Objective: Lack of physical activity, sleep problems and nomophobia are serious problems in adults. This study aimed to investigate the relationship between nomophobia with physical activity and sleep quality in non-frail older adults living in the community.

Materials and Methods: The participants' fragility status was determined using the "Tilburg Frailty Indicator Survey," while nomophobia levels were assessed with the "Nomophobia Questionnaire," physical activity levels were measured using the "International Physical Activity Questionnaire-Short Form," and sleep quality was evaluated with the "Pittsburgh Sleep Quality Index (PSQI).

Results: A total of 158 participants, 73 (46.8%) male and 85 (53.2%) female, were included in the study. While 5 (3.2%) of the participants were not nomophobic, 153 (96.8%) had nomophobia. 29 (18.4%) of the participants had no sleep problems, and 129 (81.6%) had sleep problems. As a result of the analysis, a weak negative correlation (r: -0.338, p<0.001) was found between physical activity and nomophobia. A positive and negligible correlation was observed between use of sleep medication, daytime dysfunction sub-scales, total PSQI scores and nomophobia (r:0.167-r:0.193, p<0.05).

Conclusions: It was determined that as nomophobia increased in non-frail adult people, their physical activity levels decreased, and their sleep quality was negatively affected.

Keywords: Physical activity, non-frail adult, mobile phone addiction, sleep quality

ÖZ

Amaç: Yaşlı bireylerde fiziksel aktivite eksikliği, uyku problemleri ve nomofobi ciddi sorunlardır. Bu çalışmada toplum içinde yaşayan kırılgan olmayan yaşlılarda nomofobinin fiziksel aktivite ve uyku kalitesi ile ilişkisinin araştırılması amaçlanmıştır.

Materyal ve Metot: Katılımcıların kırılganlık durumlarını belirlemek amacıyla "Tilburg Kırılganlık Göstergesi Anketi" kullanılırken, nomofobi düzeyleri "Nomofobi Anketi" ile, fiziksel aktivite düzeyleri "Uluslararası Fiziksel Aktivite Anketi-Kısa Formu " ile ve uyku kalitesi ise "Pittsburgh Uyku Kalitesi İndeksi (PUKİ)" ile değerlendirildi.

Bulgular: Çalışmaya 73 (%46,8) erkek ve 85 (%53,2) kadın olmak üzere toplam 158 katılımcı dahil edildi. Katılımcıların 153'ü (%96,8) nomofobik iken, 5'i (%3,2) nomofobi yaşamamaktaydı. Katılımcıların 29'u (%18,4) uyku problemleri yaşamazken, 129'u (%81,6) uyku problemleri yaşıyordu. Yapılan analiz sonucunda, fiziksel aktivite ile nomofobi arasında negatif yönlü zayıf bir ilişki (r: -0,338, p<0,001) bulundu. Aynı zamanda, uyku ilacı kullanımı, gündüz işlevselliği alt ölçekleri, toplam PUKİ puanları ile nomofobi arasında pozitif ve ihmal edilebilir bir ilişki gözlendi (r:0,167-r:0,193, p<0,05).

Sonuç: Sonuç olarak, kırılgan olmayan erişkin bireylerde nomofobi arttıkça, fiziksel aktivite düzeyleri azalmakta ve uyku kaliteleri olumsuz etkilenmektedir.

Anahtar Kelimeler: Fiziksel aktivite, kırılgan olmayan yaşlı bireyler, mobil telefon bağımlılığı, uyku kalitesi

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INTRODUCTION

In recent years, determining adult individuals who are frail or have the risk of frailty and developing appropriate treatment and approach methods for them have been one of the basic issues of geriatrics. Frailty is defined as a syndrome covering dysfunction of immunity, endocrine, stress, and energy regulation systems and is characterised by a decrease in individuals' strength, endurance, and physiological functions.[1] All these lead to an increase in individuals' risk of falling and getting injured and a decrease in their physical activity levels.[2,3]

For frail adult individuals, their mobile phones have an important place in establishing communication with their environment. Research has shown that older adults use their mobile phones more to establish communication with their family members, peers, and caregivers, meet their needs, and maintain their social interaction.[4] Although it provides an advantage from a social perspective, excessive use of technology can sometimes bring pathological consequences. "Nomophobia" is one of these pathological consequences. Nomophobia is the total nervousness, anxiety, and restlessness symptoms displayed by individuals separated from their mobile phones.[5] Although recent research has demonstrated that university students are the population most affected by nomophobia, this situation also affects the elderly.[6,7] These situations that can be solved individually in the young population bring along the fear of losing communication in the adult when combined with the medico-social problems caused by advanced age.[8] In individuals who socialise through their mobile phones, a decrease in physical activity appears inevitable.[9] This digital disorder leads to psychological, behavioral, and cognitive diseases that cause an inactive lifestyle, obesity, and insomnia.[10] Sleep quality is rather important for better cognitive and emotional functions. Overusing smartphones has been listed among the factors that negatively affect sleep.[11] Only a few studies have examined the relationship between nomophobia and insomnia, but these studies have been conducted on young adults.[11,12]

Although nomophobia has been examined in young individuals, its impact on the elderly is unknown. Therefore, this study aims to investigate the association between nomophobia and physical activity and sleep quality among non-frail elderly adults. According to our hypothesis, an increase in nomophobia levels will be correlated with a decrease in physical activity levels and a negative impact on sleep quality.

MATERIALS AND METHODS

Ethics Committee Approval: The study was approved by the KTO Karatay University Faculty of Medicine Non-Pharmaceutical and Medical Device Studies Ethics Committee (Date: 17.06.2022, decision no: 2022/051). Informed consent was obtained from the participants before the study, and the Declaration of Helsinki was complied with at all stages of the study.

***Study design and participants*:** The study was conducted with non-frail adult volunteers aged 65 and overusing smartphones between June and July 2022. The study's data were collected through Google Forms, which is an effective method of data collection, and the participants were community-dwelling individuals.

The study sample was calculated using G*Power (Version 3.0.10; Franz Foul, Universitat Kiel, Germany). As a result of the power analysis, the sample size was calculated as at least 156 individuals in each group, with a Type I error of 0.05 and a power of 85%. Two hundred eighteen people participated in the study, but 60 older adults got more than 5 points from the Tilburg Frailty Indicator (TFI) questionnaire. So, 158 non-frail older adults formed the sample of the study.

The study's inclusion criteria were being over 65 years old, living in a community, getting less than 5 points on TFI questionnaire, and using a smartphone. The study's exclusion criteria were living in a nursing home, having any problem that prevents physical activity, and having any diagnosed sleep problem.

Sociodemographic Data Form: Sociodemographic and clinical characteristics of the participants, such as age, marital status, living environment, number of children, chronic diseases, education level and the type of phone (smartphone or not), were questioned.

The Tilburg Frailty Indicator Questionnaire: The Tilburg Frailty Indicator questionnaire was used for assessing multidimensional frailty among community-dwelling older people. The scale has Turkish validity and reliability.[13] It is a 25-item scale including two parts. While ten questions in the first part examine chronic diseases and sociodemographic characteristics, 15 questions in the second part examine frailty's physical, psychological, and social components. Scoring on the scale is over 15 points, and a score of 5 and above is considered frailty.[13]

Nomophobia Questionnaire: A 7-point Likert-type Nomophobia scale consisting of 20 questions developed by Yildirim and Correia [14] was used to evaluate the nomophobia levels of the participants. The scale consists of four sub-dimensions: "not being able to communicate", "losing connectedness", "not being able to access information", and "giving up convenience". The value of "1" on the scale represents the statement of "strongly disagree", and the value of "7" represents the statement of "strongly agree". The

nomophobia levels of the participants are calculated by taking the sum of the scores obtained from the scale. It is accepted that those with a total score of less than 20 do not have nomophobia, those with a score between 21 and 59 have mild nomophobia, those with a score between 60 and 99 are considered moderate, and those with a score between 100 and 140 have extreme nomophobia.

International Physical Activity Questionnaire – Short Form: The International Physical Activity Questionnaire Short Form (IPAQ-SF) was used to assess the participants' physical activity. The Turkish validity and reliability of the questionnaire was performed by Saglam et al.[15] The form consists of seven questions that provide information about the number of days in which the participant did high, moderate and low-intensity activities in the last seven days, the time allocated for activities and the time spent sedentary.[15]

Pittsburgh Sleep Quality Index (PSQI): The Pittsburgh Sleep Quality Index was used to determine the participants' sleep quality. Agargun et al. performed its Turkish validity and reliability.[16] PSQI is a Likert scale of 19 questions that evaluates seven subparameters (subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleep medications, and daytime dysfunction). Scoring: 0 if it never happened, one if it is less than once a week, two if it is 1-2 times a week, and three if it is three or more times a week. Although high values indicate that sleep quality is impaired, a general score of 5 and above indicates that sleep quality is clinically impaired.[16]

Statistical Analysis: Statistical Package for the Social Sciences software version 25 (IBM Corp., Armonk, NY, USA) was used to analyse the data. Kolmogorov-Smirnov tests were used to test the suitability of the data for normal distribution. Spearman correlation analysis was used for the data that did not fit the normal distribution. Results were given as mean ± standard deviation (X ± SD), number (n), and percentage (%). The relationship between nomophobia and physical activity and sleep was analysed with the Spearman correlation test (negligible (0 - .20), weak (0.21 -0.40), moderate (0.41-0.60), strong (0.61-0.80), or very strong (0.81-1.00)). All statistical analyses were evaluated at a $p<0.05$ significance level.[17]

RESULTS

The study was conducted with 158 participants aged 65-87 years. All our participants were using smartphones. 112 (70.9%) participants had a chronic disease, and 46 (29.1%) had no chronic disease. The mean Nomophobia value of the participants was 58.82 ± 28.34. While 5 (3.2%) of the participants were not nomophobic, 77 (48.7%) had mild, 64 (40.5%) had moderate, and 12 (7.6%) had high nomophobia. The mean PSQI value of the participants was 6.82 ± 2.96. 29 (18.4%) of the participants had no sleep problems, and 129 (81.6%) had sleep problems. The sociodemographic and clinical characteristics of the participants are given in Table 1.

Table 1. Sociodemographic and clinical characteristics of the participants.

Characteristics		**Data**
Age (year), X±SD		69.80 ± 4.24
BMI (kg/m^2), X±SD		27.76 ± 4,25
Gender, n (%)	Male	73 (46.2)
	Female	85 (53.8)
Chronic Disease, n (%)	Yes	112 (70.9)
	No	46 (29.1)
Nomophobia scores, X±SD		58.82 ± 28.34
Nomophobia levels, n (%)	Not	5 (3.2)
	Mild	77 (48.7)
	Moderate	64 (40.5)
	High	12 (7.6)
The Tilburg Frailty Indicator Questionnaire, X±SD		3.03 ± 1.25
Sleep problems, n (%)	Yes	129 (81.6)
	No	29 (18.4)
PSQI-subscales, X±SD	Subjective sleep quality	1.19 ± 0.58
	Sleep latency	1.77 ± 0.89
	Sleep duration	0.91 ± 0.85
	Habitual sleep efficiency	0.28 ± 0.54
	Sleeping disturbances	1.78 ± 0.78
	Use of sleep medications	0.18 ± 0.61
	Daytime dysfunction	0.72 ± 0.81
	Total score	6.82 ± 2.96

X: mean; SD: standard deviation; BMI: body mass index; kg: kilogram; m: meter; n: number; %: percentage; PSQI: Pittsburgh Sleep Quality Index.

The mean IPAQ-SF value of the participants was 1043.39 ± 862.81 MET.min/week. As a result of the analysis, a negative correlation (r: -0.338, p<0.001) was found between physical activity and nomophobia. A positive and significant correlation was observed between use of sleep medication, daytime dysfunction sub-scales, total PSQI scores and nomophobia (p<0.05) (Table 2).

DISCUSSION AND CONCLUSION

In the study, the relationship of nomophobia with physical activity and sleep quality in non-frail elderly living in the community was examined, and nomophobia was detected in most adults. In addition, a negative relationship was found between nomophobia and physical activity level and sleep quality, and it was concluded that as nomophobia increased, physical activity decreased. In the case of nomophobia, individuals tend to limit their physical activity due to excessive phone use.

The decrease in physical capacity that develops along with ageing results in less participation of geriatric individuals in social activities. It is known that health and happiness, especially in elderly individuals, depend on their social and emotional relations with family members/friends.[18] Especially among

Table 2. Relationship between nomophobia and sleep quality.

	Nomophobia	Subjective sleep quality	Sleep latency	Sleep duration	Habitual sleep efficiency	Sleeping disturbances	Use of sleep medications	Daytime dysfunction	Total PSQI score
Nomophobia	1								
Subjective sleep quality	0.104	1							
Sleep latency	0.060	0.170*	1						
Sleep duration	0.069	0.226**	0.067	1					
Habitual sleep efficiency	0.134	0.387**	0.379**	0.288**	1				
Sleeping disturbances	0.030	0.430**	0.201*	0.076	0.289**	1			
Use of sleep medications	0.179*	0.105	0.021	0.055	-0.024	0.063	1		
Daytime dysfunction	0.193*	0.375**	0.140	0.167*	0.162*	0.415**	0.219**	1	
Total score	0.167*	0.608**	0.539**	0.450**	0.552**	0.665**	0.249**	0.651**	1

*: p<0.05; **: p<0.001, PSQI: Pittsburgh Sleep Quality Index.

geriatric individuals, amidst the challenges brought about by ageing, establishing human relationships through mobile telephones is considered easier and more accessible, and the fear of being deprived of the mobile phone over time can lead to the development of emotions of not reaching/being deprived of loved ones.[19] Due to the developing nomophobia, decreasing physical activity levels and functionalities in daily life becomes inevitable.[20] Excessive use of smartphones leads to mental exhaustion, decreased physical activity levels, decreased cardiovascular fitness, decreased muscular mass, and increased fatty tissue.[21-22] In addition to excessive use of smartphones, a decrease in physical activity is observed as the level of nomophobia increases.[23] However, these studies have usually been conducted on young adults, and no study that examined the relationship between nomophobia and physical activity in geriatric individuals was encountered in the literature. The present study supports the literature related to young adults. The present study also determined that as nomophobia increased in geriatric individuals, physical activity decreased. We believe that in addition to the decrease in physical capacity developing with age in geriatric individuals, making calls through smartphones, sending and receiving messages, downloading applications, using these applications frequently, and spending time in the internet environment encourage a sedentary life. Technology can positively affect the quality of life by reducing social isolation feelings.[18] However, the negative effects of internet use for a long time are also known. Excessive internet use brings along problems such as depression, anxiety, and social isolation, as well as leading to sleep problems.[10]

In the present study, it was determined that as nomophobia increased in non-frail adult individuals living in a society, their sleep quality decreased. Quality sleep is necessary for all individuals' health and quality of life, but it can be affected by environmental factors, general health conditions, and social life. Today, excessive use of mobile phones is one of the significant environmental factors that could affect sleep quality.[24] It was found that the electromagnetic radiation emitted from mobile phones had a negative effect on sleep electroencephalograms and prevented melatonin secretion.[25] Especially nomophobic individuals may habitually use their smartphones late at night. A decrease in sleep quality causes individuals to feel tired all day and prevents housework, spare time activities, and sports habits.[26] Using smartphones until late at night leads to insomnia, and the electromagnetic waves that one is exposed to reduce rapid eye movement sleep latency.[27,28] Additionally, excessive use of smartphones and social media deteriorates sleep quality and leads to sleep problems.[29,30] When the literature is reviewed, it is seen that studies that examined the relationship between nomophobia and sleep were conducted on young adults. In the present study, in support of the literature, we found that, similar to young adults, an increase in nomophobia among geriatric individuals was associated with decreased sleep quality. We believe that sleep quality decreased in aged individuals participating in our study due to the effects of the electromagnetic field and melatonin hormone.

In conclusion, it was determined that as nomophobia increased in non-frail adult people, their physical activity levels decreased, and their sleep quality was negatively affected. This study has provided valuable insights into the relationship between nomophobia, physical activity, and sleep quality among non-frail older adults. The results of this study have confirmed our initial hypothesis that higher levels of nomophobia are associated with decreased physical activity levels and poorer sleep quality in this population. The findings align with existing literature regarding the detrimental impact of excessive technology use on health outcomes, extending this understanding to the unique context of older adults. Additionally, identifying these associations highlights the importance of addressing the challenges posed by technology dependence in geriatric care and public health interventions.

The present study has limitations. The study's limitations are that it was not questioned how long and when the participants used their smartphones daily, and current chronic diseases were not included in the analysis. Using the nomophobia measurement tool in this study as a subjective measure implies that participants' self-assessments might be influenced by their judgments when evaluating their own experiences. This circumstance could complicate the objective assessment of nomophobia levels. Similarly, measurements of physical activity and sleep quality should also be considered as relying on participants' subjective perceptions.

To increase physical activity levels and improve sleep quality in geriatric individuals, it is recommended that social responsibility programs that will decrease the duration of smartphone use and get these individuals to gain fun and sustainable exercise habits should be disseminated. It is also recommended that the situations of geriatric individuals living in nursing homes and society should be compared in future studies. The findings of this study carry implications for clinical practitioners working with older adults. Clinicians should assess and address nomophobia as a potential barrier to physical activity engagement and sleep quality. Incorporating questions about technology use and dependency during routine assessments can help identify at-risk individuals. Furthermore, the findings of this study can guide the development of programs and policies

to manage technology use habits and nomophobia levels of elderly individuals.

Ethics Committee Approval: The study was approved by the KTO Karatay University Faculty of Medicine Non-Pharmaceutical and Medical Device Studies Ethics Committee (Date: 17.06.2022, decision no: 2022/051).

Conflict of Interest: No conflict of interest was declared by the authors.

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Patients' Perceptions of the Increase in Severity of Obsessive-Compulsive Disorder Symptoms during the COVID-19 Pandemic

COVID-19 Pandemisi Sırasında Obsesif-Kompulsif Bozukluk Belirtilerinin Şiddetindeki Artışa İlişkin Hastaların Algısı

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ABSTRACT

Objective: This study aimed to examine how patients with obsessive-compulsive disorder perceived changes in their symptoms during the COVID-19 pandemic and what factors influenced those changes.

Materials and Methods: The sample of the study consists of 262 individuals diagnosed with obsessive-compulsive who were reached through social media between 08.04.2021 and 08.10.2021. A descriptive information form and a 41-item questionnaire based on the Padua Inventory were used to collect the data.

Results: During the pandemic, anxiety about not being able to access cleaning products and doctors/therapists was high in the patients who reported a rise in disease symptoms. During the pandemic, 79% of the sample reported an increase in symptoms of obsessive-compulsive disorder.

Conclusions: It is essential to conduct regular screenings of patients with obsessive-compulsive disorder by the psychiatric nurses in the rehabilitation services team. These patients should be encouraged to express their concerns, and any psychological stress or distress should be identified. When necessary, patients should be referred to secondary care services for further assistance.

Keywords: Anxiety, COVID-19, obsessive-compulsive disorder, padua inventory

ÖZ

Amaç: Bu çalışmanın amacı, obsesif kompulsif bozukluğu olan hastaların COVID-19 pandemisi sırasında semptomlarındaki değişiklikleri nasıl algıladıklarını ve bu değişiklikleri hangi faktörlerin etkilediğini incelemektir.

Materyal ve Metot: Çalışmanın örneklemini 08.04.2021-08.10.2021 tarihleri arasında sosyal medya aracılığıyla ulaşılan 262 obsesif-kompulsif tanılı birey oluşturmaktadır. Verilerin toplanmasında tanımlayıcı bilgi formu ve 41 maddelik Padua Envanteri kullanılmıştır.

Bulgular: Pandemi süresince hastalık belirtilerinde artış olduğunu bildiren hastaların temizlik ürünlerine ulaşamama ve doktor/terapiste ulaşamama kaygısı yüksekti. Pandemi sırasında, örneklemin %79'u obsesif-kompulsif bozukluk semptomlarında artış olduğunu bildirmiştir.

Sonuç: Obsesif-kompulsif bozukluğu olan hastaların rehabilitasyon hizmetleri ekibindeki psikiyatri hemşireleri tarafından düzenli olarak taranması önemlidir. Bu hastalar endişelerini ifade etmeye teşvik edilmeli ve herhangi bir psikolojik stres veya sıkıntı tanımlanmalıdır. Gerektiğinde, hastalar daha fazla yardım için ikinci basamak sağlık hizmetlerine yönlendirilmelidir.

Anahtar Kelimeler: Anksiyete, COVID-19, obsesif-kompulsif bozukluk, padua envanteri

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INTRODUCTION

Changing living conditions due to COVID-19 have led to concerns that are not limited to physical health. Due to measures such as quarantine, closure of national and international borders, and social isolation, the economic, educational and mental health fields have also been affected.[1] In particular, infected individuals, individuals with chronic diseases, psychiatric patients, and healthcare professionals experienced greater vulnerability to the negative consequences of the pandemic.[2] People in this group are at risk of experiencing psychological distress, symptoms of depression, anxiety disorders and symptoms of post-traumatic stress disorder.[3-4] During the pandemic, in which more importance has been placed on hygienic practices, individuals with obsessive-compulsive disorder (OCD) have emerged as a group that needs specific attention due to the nature of the disease.[5]

Individuals with OCD have obsessions that affect their functionality and compulsions that aim to neutralize the strain brought on by these obsessions.[6] In order to try to suppress the fear of contamination, one of the most common obsessions, individuals engage in ritualistic practices such as excessive hand washing and cleaning.[7] It has been suggested that the severity of symptoms of individuals with contamination-related obsessions and washing-related compulsions have increased during the pandemic. Although some studies have argued that symptom severity has grown,[8,9] there are also studies stating that it has not changed.[10,11] Moreover, the washing behaviors that have become a ritual for these individuals, or the desire to maintain social distance, have themselves become part of the rules that national and international organizations and official institutions have standardized for protection from coronavirus.[12] Contrary to this transformation, which could be considered as providing an opportunity, excessive exposure to the media discourse about coronavirus and concerns about not being able to obtain cleaning products can negatively affect the mental health of individuals.[8,12]

Although there are some studies on the severity or consequences of symptoms in the international literature, no studies have addressed the relationship between symptom severity and sociocultural factors (access to health services, government guidelines).[13,14]

The study aimed to screen patients with OCD as to whether they perceived their symptoms had increased during the pandemic and to investigate what factors were associated with OCD symptom severity scores.

MATERIALS AND METHODS

Ethics Committee Approval: The study was approved by the Sakarya University Non-Interventional Research Ethics Committee (Date: 07/04/2021, Decision no: 267). In addition, this study was performed according to the principles expressed in the Declaration of Helsinki. Since the study was related to COVID-19, scientific research approval was also obtained from the Ministry of Health of the Republic of Türkiye.

Design: The data for this descriptive-cross-sectional study were collected online between 08.04.2021 and 08.10.2021 via Google Forms.

Participants: The study included 266 people who were reached through their social media accounts, diagnosed with OCD and voluntarily agreed to participate in the study. Four people were excluded from the study due to incomplete data. Individuals over the age of 18 and diagnosed with OCD were included in the study. The power analysis of the study was carried out with G*POWER 3.1.9.7. When the effect size is .694, and the alpha is .05, the sample size is 262, and the power is .99. According to this power level, the sample size was considered sufficient.[15]

Measures: In the study, Descriptive Information Form and the 41-item Padua Inventory (PI), which measures the distribution and severity of obsessive-compulsive symptoms based on self-report, were used as data collection tools. The voluntary participation of the participants in the study was confirmed electronically.

The Descriptive Information consisted of three parts and 24 items. The first part covered the sociodemographic characteristics of the participants, the second covered the disease and treatment information (medication, therapy), and the third covered statements about the pandemic.

Padua Inventory (PI), which measures the distribution and severity of obsessive-compulsive symptoms, was developed by Sanavio in 1988 as a 60-item original scale. It was converted into a 41-item short form by van Oppen in 1992. It consists of five sub-dimensions: cleaning, rumination, impulses, control, and precision.[16] The reliability and validity study of the Turkish version of the scale was carried out by Besiroğlu et al.[17] In this study, the Cronbach's alpha reliability coefficient of the scale was found to be .95, and the Cronbach's alpha reliability coefficients of the sub-dimensions ranged from .82 to .92.

Data Analysis: The study data were analyzed using the IBM SPSS Statistics 25 software. The Shapiro-Wilk test was used to determine the distribution normality of the data. In order to determine the normal

distribution, it was accepted that the skewness and kurtosis coefficients should be within ±1 limits, and the skewness and kurtosis indices should be within ±1.96 limits.[17] Parametric tests were used in the normally distributed data set. A multiple linear regression model was used to determine pandemic-era experiences affecting the severity of OCD symptoms. Six models were created between the pandemic experiences and the PI total score: control, precision, impulses, rumination, and cleaning subdimensions. Normality and multicollinearity assumptions were assessed prior to analysis. Statistical significance was accepted as $p \leq 0.05$.

RESULTS

The mean age of the participants was 26.34±3.58 (min: 19; max: 37); 91.6% were female, 88.5% were single, and 91.6% lived in a nuclear family. While the rate of non-working participants was 64.1%, 80.2% reported that their income level was medium. While 13.7% of the participants reported that they had a chronic disease (asthma, diabetes, hypertension), 22.9% (n=60) reported that they had a mental disorder accompanying OCD, and 3.44% (n=9) reported that they had a diagnosis of multiple diseases. A total of 53 patients were receiving psychotropic medications and 31 were receiving psychotherapy, and only 10 were receiving both psychotherapy and psychotropic drugs. Therefore, only 74 of the 262 patients (about one-third) were receiving treatment. It was found that 22.1% (n=58) of the participants had COVID-19, and 1.1% had a history of hospitalization due to COVID-19.

Table 1 shows the effects of the COVID-19 pandemic on the individuals with OCD. While 64.1% of the participants reported that they were worried about not being able to access doctors/therapists/treatment services adequately during the pandemic period, 74.4% reported that they did not feel safe in relation to society's compliance with hygiene and social distancing rules. Among the participants, 79% stated that their obsessive and compulsive symptoms increased during the pandemic.

Table 1. Descriptive information about the effect of the COVID-19 pandemic on individuals with OCD.

Variables		n (%)
Did you think you would have trouble obtaining cleaning/hygiene products?	Yes	94 (35.9)
Have you had any concerns about not being able to access doctors/therapists/ treatment services in an adequate way?	Yes	168 (64.1)
Does society's compliance with hygiene and social distancing rules make you feel safe?	Yes	67 (25.6)
What kind of change do you think has occurred in your obsessive and compulsive symptoms during the pandemic?	Increased	207 (79.0)
	Not increased	55 (21.0)
How do the individuals you have a close relationship with (family, friends, etc.) assess your OCD symptoms?	Increased	163 (62.2)
	Not increased	99 (37.8)

Table 2 shows the relationship between demographic variables and increase and not increase in OCD symptoms in the population under study. There was a statistically significant relationship between medical treatment and OCD symptoms, so people who do not receive psychotropic medications have reported an increase in OCD symptoms (17.4% vs. 82.6%) (p value<0.05).

However, there was no statistically significant relationship between gender, marital status, education, income status, presence of chronic disease, comorbid psychiatric disorders, psychotherapy and COVID-19 with the increase and not increase in OCD symptoms (p-value> 0.05)

Table 2. The relationship between demographic variables and increase and not increase in OCD symptoms.

Variable		OCD symptoms		p- value*
		Increased n (%)	Not Increased n (%)	
Gender	Female	193 (93.2)	47 (85.5)	0.096
	Male	14 (6.8)	8 (14.5)	
Marital Status	Single	183 (88.4)	49 (89.1)	0.887
	Married	24 (11.6)	6 (10.9)	
Educational status	High school graduate	7 (3.4)	0 (0.0)	0.372
	Bachelor's degree	98 (47.3)	28 (50.9)	
	Postgraduate (Master's;doctorate)	102 (49.3)	27 (49.1)	

*Chi-square test

Table 2. Continue.

Income Status	High (income more than expenses)	21 (10.1)	5 (9.1)	0.941
	Moderate (income equivalent to expense)	165 (79.7)	45 (81.8)	
	Low (income less than expenses)	21 (10.1)	5 (9.1)	
Employment Status	Employed	73 (35.3)	21 (38.2)	0.689
	Unemployed	134 (64.7)	34 (61.8)	
Presence of	Yes	27 (13.0)	9 (16.4)	0.514
Chronic Disease	No	180 (87.0)	46 (83.6)	
Co-Morbid	Yes	46 (22.2)	12 (21.8)	0.555
Psychiatric Disorders	No	161 (77.8)	43 (78.2)	
Psychotropic	Yes	36 (17.4)	17 (30.9)	**0.024**
Medications	No	171 (82.6)	38 (69.1)	
Psychotherapy	Yes	27 (13.0)	5 (9.1)	0.426
	No	180 (87.0)	50 (90.9)	
Had COVID-19	Yes	41 (19.8)	17 (30.9)	0.060
	No	166 (80.2)	38 (69.1)	

*Chi-square test

Table 3 shows the comparison of the Padua inventory sub-dimension and total scores according to increased and not increased OCD symptoms. Participants who reported increased OCD symptoms were found to be associated with the Padua inventory total score and sub-dimensions of cleaning and control obsessions (p-value < 0.05).

Multiple regression analysis was used to evaluate the effect of demographic, clinical and pandemic-associated factors variables on the PI total scores. For model 1, concerns about not being able to obtain cleaning/hygiene products and access doctor/ therapist positively while spending 1-3 hours with media about the pandemic negatively explain 20% of the PI total score variance. The calculated p-values for model 1 showed that the results were statistically significant for the concern about not being able to obtain cleaning/hygiene products, access doctors/therapists and spend 1-3 hours with media about the pandemic (p<0.005) (Table 4).

Table 3. Comparison of Padua inventory sub-dimension and total scores according to increased and not increased OCD symptoms.

Quantitative variable		n	Mean±SD	p- value*
Cleaning	Increased	207	24.67±9.64	0.000
	Unchanged/Decreased	55	18.76±9.01	
Rumination	Increased	207	25.57±9.18	0.095
	Unchanged/Decreased	55	23.20±10.01	
Impulses	Increased	207	9.67±6.70	0.397
	Unchanged/Decreased	55	8.82±6.37	
Control	Increased	207	18.10±8.24	0.000
	Unchanged/Decreased	55	12.95±6.88	
Precision	Increased	207	8.65±6.37	0.023
	Unchanged/Decreased	55	6.78±5.017	
Total	Increased	207	86.66±30.82	0.000
	Unchanged/Decreased	55	70.51±25.02	

*Independent sample t-test

Table 4. Multiple linear regression analysis results for the effect of experiences during the pandemic on obsessive-compulsive symptoms.

Dependent Variable	Independent Variable	B	Standard Error	Beta	t	p	VIF	F	Model (p)	R^2_{adj}	Durbin Watson
PI Total Score	Constant	99.93	20.64		4.84	0.000		2.66	0.00	0.20	0.65
	Concern about obtaining cleaning products	14.46	4.79	0.23	3.01	0.003	1.46				
	Concern about accessing doctors/therapists	14.67	4.82	0.22	3.04	0.003	1.35				
	Spending 1-3 hours with media about the pandemic	-15.52	6.73	-0.17	-2.30	0.022	1.37				

PI: Padua Inventory; B: Unstandardized coefficients; Beta: Standardized coefficients; VIF: Variance inflation factors; F: Anova; R^2adj: Adjusted R-squared

Multiple regression analysis was used to evaluate the effect of demographic, clinical and pandemic-associated factors variables on the cleaning sub-dimension total scores. For model 2, concerns about not being able to obtain cleaning/hygiene products while receiving psychotherapy treatment and spending 1-3 hours with media about the pandemic negatively explain 20% of the cleaning sub-dimension total score variance. The calculated p-values for model 2 showed that the results were statistically significant for the concern about not being able to obtain cleaning/hygiene products, receiving psychotherapy treatment and spending 1-3 hours with media about the pandemic ($p<0.005$) (Table 5).

Table 5. Multiple linear regression analysis results for the effect of experiences during the pandemic on cleaning sub-dimension.

Dependent Variable	Independent Variable	B	Standard Error	Beta	t	p	VIF	F	Model (p)	R^2_{adj}	Durbin Watson
Cleaning sub-dimension	Constant	32.24	6.43		5.01	0.000		2.66	0.000	0.20	1.35
	Receiving psychotherapy treatment	-4.83	2.04	-0.17	-2.37	0.019	1.297				
	Concern about obtaining cleaning products	5.76	1.49	0.29	3.85	0.000	1.461				
	Spending 1-3 hours with media about the pandemic	-4.78	2.098	-0.17	-2.28	0.024	1.371				

PI: Padua Inventory; B: unstandardized coefficients; Beta: standardized coefficients; VIF: variance inflation factors; F: Anova; R^2adj: adjusted R-squared

DISCUSSION AND CONCLUSION

Our study aimed to investigate demographic data and factors affecting the perceptions of changes in symptoms of adults with OCD during the pandemic period. Many studies have reported that COVID-19 has increased the overall severity of symptoms, although 79% of people diagnosed with OCD themselves reported that their symptoms had worsened.[8,12,18] Also, results of a longitudinal study of adolescents and adults with OCD found that OCD symptoms also worsened during the pandemic.[5,19] These results confirm our study's hypothesis.

Specific psychotherapy and psychotropic medications, especially serotonin reuptake inhibitors, are the gold standard treatment for OCD.[20] In our study, individuals who received psychotropic medications reported that they did not experience increased OCD symptoms. While medical treatment affected the increase in OCD symptoms, taking psychotherapy was not effective. This may be due to the small number of people receiving psychotherapy. While OCD symptoms were found to worsen in non-clinical studies,[21,22] were found to be unchanged in clinical studies in which patients were followed up regularly.[10,23] It is noteworthy that the worsening is relatively low in clinical samples. According to these data, follow-up interviews in the sample may have made people feel more secure, making them less anxious.[23]

In our study, individuals who reported an increase in OCD symptoms had significantly higher scores on cleaning, control and precision. Fontenelle and Miguel (2020) stated that the most common obsessions of OCD are fear of contamination and washing compulsions in their study titled The Effects of COVID-19 on the Diagnosis and Treatment of OCD. In the study by Jelinek (2021), the negative effects of the COVID-19 pandemic were more pronounced in people compelled to wash. An obsession with contamination can lead to a compulsion to clean.[12] People may believe that by cleaning objects or rooms in a particular order or frequency, they can avoid or recover from contamination or infection. Precision obsessions include counting and repetitive behaviors. The frequent repetition of care given to patients in the hospitals increased the need for patients to know that they were well, causing them to perceive taking temperature and saturation as repetitive behavior patterns and thus increasing OCD symptoms.[25] In accordance with the treatment protocol of Türkiye, regular and repeated administration of 200 mg Favipiravir doses applied as eight tablets in the morning and evening on the first day and three tablets in the morning and evening on the second-fifth days, or the loading and maintenance doses of other drugs used, may also cause the patient to experience

an increase in OCD symptoms related to counting.[26] According to other important findings obtained in our study, there was no statistically significant relationship between "gender, marital status, education status, income status, presence of chronic disease, co -morbid psychiatric disorder", and OCD symptoms decreased or remained unchanged. While the gender variable was not considered a distinguishing factor affecting OCD symptoms and severity in our study, Abba-Aji et al. found that males had more obsessive and compulsive symptoms.[18] In studies conducted in Canada and Saudi Arabia during the pandemic, it was concluded that adults with a high level of education experienced more intense cleaning obsessions and compulsions related to microbes and contamination.[7,18] This may be related to the relationship between knowing the ways to access instructions regarding COVID-19, understanding and interpreting them, and higher education levels.[19]

Anxiety, an emotion experienced by many people during the pandemic, also emerges in individuals diagnosed with OCD. The current study determined that anxieties about not being able to obtain cleaning/hygiene products and access doctors/therapists were positive predictors of the severity of symptoms related to obsessions and compulsions. Similarly, a study conducted on medical school students in China showed that both anxiety and fear contributed significantly to "Yale-Brown Obsessive-Compulsive Scale" scores.[27] Curfews and stockpiling of products may have created concerns about obtaining these products in the OCD group with contamination obsessions and washing compulsions, where cleaning products are much more critical. The fact that individuals avoid visiting the doctor for fear of contagion leads to concerns about accessing health services.[28] The fact that hospital units only work with coronavirus patients during the pandemic, except for urgent and necessary interventions, the inability to intervene in the patient group with mental health problems, or the perceived high risk of contamination may have caused the OCD patients to feel unsafe. In our study, exposure to media related to the pandemic for 1-3 hours was found to be a negative predictor of symptom severity. Increasing media images of repetitive washing of hands and news media reporting disasters related to the pandemic lead to worsening symptoms.[8] However, limiting the increased media about the pandemic to 1-3 hours may have negatively predicted the increase in symptom severity. In our study, it was observed that patients receiving psychotherapy were a negative predictor of symptom severity. Although hospital-based mental health services were disrupted during the pandemic period, internet-based psychotherapy was provided.[8] Ensuring continuity may have reduced anxiety and depression in the OCD patient group by acting as a protective function against the harmful effects of the pandemic. Receiving psychotherapy may have negatively predicted the severity of symptoms by protecting the patient group from co-morbid mental problems.

In conclusion, the results of our study revealed that the gender variable did not affect the increase in OCD symptoms. However, an increase in education level also increased the experience of cleaning obsessions and compulsions related to microbes and contamination. At the same time, anxiety about not being able to obtain the cleaning products and access a doctor/therapist during the quarantine period were important factors that increased OCD symptoms. During this period, it is important that individuals diagnosed with OCD, a population that constitutes a particularly vulnerable group, should not be ignored; their concerns should be noted, and they should be supported psychologically. In this context, psychiatric nurses should play an active role in developing and implementing mental health intervention programmes to protect psychological well-being. In centres where rehabilitation services are provided, patients diagnosed with OCD should be screened regularly, patients with OCD and their families should be encouraged to express their concerns and fears about the pandemic, symptoms of psychological stress and distress should be followed up, and they should be referred to treatment services when necessary. The limitations of the study include the fact that the change in symptom severity was monitored only by self-report, patients could not be followed longitudinally over different periods, the survey questions were online, and the participation of groups in which women were more sensitive to the issue.

Ethics Committee Approval: Our study was approved by the Sakarya University Non-Interventional Research Ethics Committee (Date: 07/04/2021, Decision no: 267). The study was conducted in accordance with the principles of the Declaration of Helsinki.

Conflict of Interest: No conflict of interest was declared by the authors.

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Clinical Outcomes of Patients with Osteoporotic Thoracolumbar Fracture Treated with Percutaneous Vertebroplasty and Balloon Kyphoplasty

Perkütan Vertebroplasti ve Balon Kifoplasti ile Tedavi Edilen Osteoporotik Torakolomber Kırığı Olan Hastaların Klinik Sonuçları

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ABSTRACT

Objective: We aimed to evaluate the clinical outcomes of vertebroplasty (VP) or kyphoplasty (KP) in patients with vertebral body fractures due to osteoporosis.

Materials and Methods: We retrospectively analysed 26 patients who underwent VP and KP for thoracolumbar osteoporotic fracture. Two groups were formed according to the procedure. While VP was applied to 14 cases, KP was applied to 12 cases. The cases were evaluated radiologically with Magnetic Resonance Imaging (MRI), Computed Tomography (CT), and X-ray radiography. Before and after treatment, the Oswestry Disability Index (ODI) was used to compare daily activities, while the visual analogue scale (VAS) measured resting pain.

Results: VP and KP were applied to 22 female and 4 male cases. Preoperative VAS scores were similar in both groups and were not statistically significant (p=0.995). Preoperative ODI scores were similar in both groups and were not statistically significant (p=0.842). Cement leakage without the neurological deficit was observed in 5 patients.

Conclusions: The effects of VP and KP procedures on VAS and ODI scores are similar. However, economically, the cost of KP is relatively high compared to VP. The study suggests using VP due to its low cost and clinically similar results on VAS and ODI scores compared to KP.

Keywords: Kyphoplasty, osteoporosis, pain, vertebral compression fracture, vertebroplasty

ÖZ

Amaç: Bu çalışma ile osteoporoza bağlı olarak vertebra korpus fraktürü gelişmiş hastalara uygulanan vertebroplasti (VP) veya kifoplastinin (KP) klinik sonuçlarını değerlendirmeyi amaçladık.

Materyal ve Metot: Kliniğimizde torakolomber osteoporotik kırık nedeniyle VP ve KP uygulanan 26 hasta retrospektif incelendi. Yapılan yönteme göre iki grup oluşturularak VP 14 olguya ve KP 12 olguya uygulandı. Olgular radyolojik olarak Magnetik Rezonans Görüntüleme (MRG), Bilgisayarlı Tomografi (BT) ve X-ray radyografi ile değerlendirildi. Hastaların istirahat ağrıları visual analog skala (VAS) kullanılarak; günlük yaşam aktiviteleri ise Oswestry Disabilite İndeksi (ODİ) kullanılarak tedavi öncesi ve tedavi sonrası karşılaştırıldı.

Bulgular: Torakolomber vertebra korpus kırığı olan 22 kadın ve 4 erkek vakaya VP ve KP uygulandı. Ameliyat öncesi VAS skorları her iki grupta da benzerdi ve istatistiksel olarak anlamlı değildi (p=0,995). Ameliyat öncesi ODI skorları her iki grupta da benzerdi ve istatistiksel olarak anlamlı değildi (p=0,842). 5 hastada nörolojik defisit yapmayan sement kaçağı görüldü.

Sonuç: VP ve KP prosedürlerinin VAS ve ODİ skorları üzerindeki etkileri benzerdir. Ancak ekonomik olarak KP'nin maliyeti VP'ye göre nispeten oldukça yüksektir. Mevcut çalışma, VP'nin KP ile karşılaştırıldığında düşük maliyeti ve VAS ve ODI skorlarında klinik olarak benzer sonuçlara sahip olması nedeniyle VP'nin uygulanmasını önermektedir.

Anahtar Kelimeler: Ağrı, kifoplasti, osteoporoz, vertebral kompresyon kırığı, vertebroplasti

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INTRODUCTION

Osteoporotic fractures generally affect patients over 65 and are frequently seen at the thoracolumbar junction and lower levels.[1] The treatment aims to provide anatomical reduction, prevent spinal deformity, reduce pain, restore vertebral height, and enable the patient to return to daily activities early with early mobilisation.[2,3]

The management options for spinal fractures are limited.[4,5] Cement augmentation of painful osteoporotic compression fractures consists of percutaneous stabilisation of the vertebral bodies with polymethyl methacrylate, an alternative treatment to open surgery.[6] Percutaneous vertebroplasty (VP) and percutaneous balloon kyphoplasty (KP) are the strengthening of the vertebrae that have weakened due to various reasons and lost their height by percutaneous injection of polymethylmethacrylate (PMMA).[7,8] While VP is performed with cement augmentation, KP is performed with cement augmentation and an inflatable balloon tamp. These minimally invasive techniques have become widely used by many spine surgeons. Both VP and KP might enhance bone strength, effectively relieve fracture pain, and allow rapid mobilisation of the patient in the elderly, often high-risk patient population for anaesthesia.[9-11] VP was first applied to the C2 vertebra by Galibert and Deramond in 1987.[12] Later, it was involved in compression fractures due to various pathologies.[13] It has developed over time and has begun to be used in materials that contribute to the restoration and alignment of the corpus, such as KP.[13-16]

Both VP and KP are applied in painful osteoporotic and osteolytic thoracolumbar vertebral fractures, in osteoporotic vertebral fractures whose pain does not go away after 3 weeks of non-surgical treatment, in patients with early mobilisable pneumonia, deep vein thrombosis, and analgesic intolerance. They are applied in diagnosing and treating osteolytic primary vertebral tumours and metastatic vertebral tumours.[13-16]

In the current study, patients with osteoporotic vertebral corpus fracture in the thoracolumbar region underwent VP or KP for various reasons (trauma, weight lifting, sudden flexion). The clinical and radiological results before and after the operation were evaluated. We aimed to assess the effectiveness of both methods on clinical outcomes.

MATERIALS AND METHODS

Ethical Status: Ethics committee approval was obtained from the Medipol University Faculty of Medicine Ethics Committee (Date: 10.08.2023, decision no: 655). The study was conducted in accordance with the principles of the Declaration of Helsinki.

Design: This study prospectively collected data in an institutional database between February 2017 and May 2022. In the current study, all patients were selected consecutively. A cohort of 26 consecutive patients who underwent VP or KP due to thoracolumbar osteoporotic fractures that occurred owing to various reasons (trauma, weight lifting, sudden flexion) were evaluated retrospectively. Two groups were formed according to the procedure in which VP was applied to 14 cases, and KP was applied to 12 cases.

Procedure: The cases were evaluated radiologically with Magnetic Resonance Imaging (MRI), Computed Tomography (CT), and X-ray radiography (Figure 1a). All surgeries were performed by the same surgeon. Operations were performed under local anaesthesia and sedation in operating room conditions. The patients were positioned to prone and the surgical area was covered with sterile drapes after positioning, images were taken with C-arm fluoroscopy, and the application was performed bilaterally transpedicularly. An amount of cement ranging from 4 to 10 cc was injected into the vertebral body (Figure 1b). The cases were mobilised 6 hours after the operation. Control radiographs were taken routinely (Figure 1c). All patients underwent radiological evaluation. All patients who should be quickly mobilized with physical therapy were referred to the relevant departments to treat general osteopenia and osteoporosis.

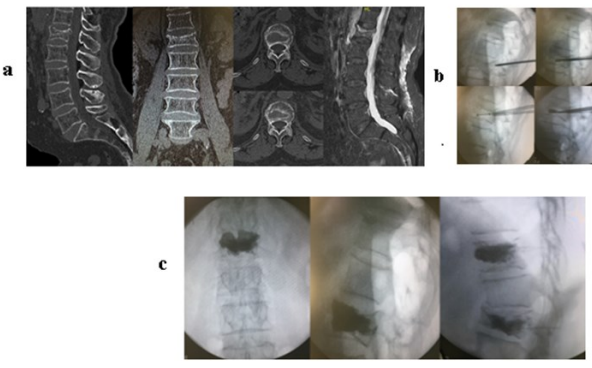

Figure 1. Procedures.

a: Preoperative CT and MRI images of L1 fracture;
b: The stages of the Kyphoplasty operation with C-arm fluoroscopy images;
c: X-ray images of the case who underwent Vertebroplasty

Outcome Measures: The visual analogue scale (VAS) values for resting pain of the patients and the evaluations using the Oswestry Disability Index (ODI) for activities of daily living were compared using preoperative and postoperative scores. The ODI has ten sections: pain, personal care, lifting, walking, sitting, standing, sleeping, sex life, social life, and travelling. [17]

Statistical Analysis: CSS (Number Cruncher Statistical System) 2007 Statistical Software (Utah, USA) program was used for statistical analysis. We expressed nominal data as frequencies or percentages and quantitative data as mean ± SD. The Shapiro-Wilk test was performed to test the normality of study data. Groups were compared using the independent t-test for normally distributed continuous variables. The Chi-square test was used to analyse qualitative comparative parameters. A P-value of ≤ 0.05 was considered statistically significant.

RESULTS

VP and KP procedures were performed on 26 patients with thoracolumbar vertebral corpus fractures. The mean follow-up period was 16 months (12-30). The mean time between trauma and surgery was 1.1 months (1 week-2 months) (Table 1).

Table 1. The mean follow-up period and procedure time.

Period	Time
Follow-up period, month	16 (12-30)
Procedure time, month	1.1 (1 week-2 months)

VP was applied to 14 cases, and KP was applied to 12 cases. The mean age of the cases in VP was 72±6,51 years. The mean age of the cases in KP was 73.38±5.23 years. In the thoracic region, there were 4 (28.6%) fractures in VP and 4 (33.3%) in KP procedure. In the lumbar region, there were 10 (71.4%) fractures in VP and 8 (66.7%) in KP procedure. Of the patients who underwent VP, 12 were female (85.7%) and 2 were male (14.3%). Of the patients who underwent KP, 10 were female (83.3%), and 2 were male (16.7%). The main symptoms of the cases were low back and back pain, and were evaluated with VAS. Preoperative VAS scores were similar in both groups and were not statistically significant (p=0.995). The comparison of the VAS scores of both groups at the postoperative 1st, 3rd, and 12th months was not statistically significant (p=0.131, p=0.994, p=0.314, respectively). However, the preoperative VAS values of the groups were 1st, 3rd, and 12th month comparisons showed statistically significant improvement (VP: p=0.001 and KP: p=0.001). Preoperative ODI scores were similar in both groups and were not statistically significant (p=0.842). The comparison of the ODI scores of both groups at the postoperative 1st, 3rd, and 12th months was not statistically significant (p=0.210, p=0.501, p=0.189, respectively). Nevertheless, the preoperative ODI scores of the groups were 1st, 3rd, and 12th month comparisons demonstrated statistically significant improvement (VP: p=0.001 and KP: p=0.001) (Table 2).

As a complication, cement leakage without neurological deficit was observed in 5 patients (Figure 2). Preoperative mean VAS values of cases with cement

Table 2. Comparison of cases who underwent vertebroplasty and kyphoplasty.

Parameters		VP (n=14)	KP (n=12)	p
Age, mean±SD		72±6,51	73.38±5.23	0.274
Sex, n (%)	Female	12 (85.7)	10 (83.3)	0.544
	Male	2 (14.3)	2 (16.7)	0.544
Region n (%)	Thoracic	4 (28.6)	4 (33.3)	0.492
	Lumbar	10 (71.4)	8 (66.7)	0.519
VAS, mean±SD	Preoperative	8.6±1.6	8.6±1.0	0.995
	1st month	3.5±1.0	3±1.0	0.131
	3rd month	3±1.0	2±2.0	0.994
	12th month	1.5±2.0	1±2.0	0.314
	p	0.001	0.001	
ODI, mean±SD	Preoperative	47.33±22.34	45.08±17.35	0.842
	1st month	28.5±9.42	21.42±15.38	0.210
	3rd month	21.83±8.63	16.5±7.13	0.501
	12th month	11.5±8.14	9.82±4.93	0.189
	p	0.001	0.001	

VAS: Visual analogue scale; ODI: Oswestry Disability Index; VP: Vertebroplasty; KP: Kyphoplasty.

leakage were 8.3±1.2, and ODI valueswere 46.8±19.2. At 1 month postoperatively, VAS was recorded as 2.2±0.8 (p=0.001) and ODI as 27.2±6.8 (p=0.001) (Table 3). It was observed that cement leakage did not affect the VAS value and ODI scores.

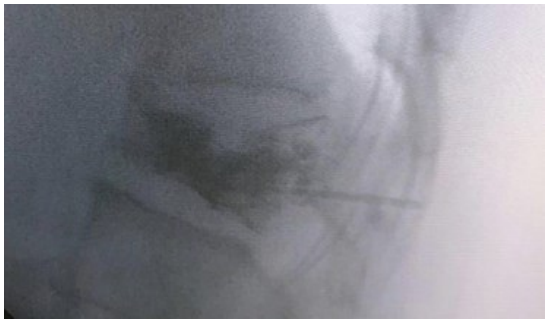

Figure 2. Leakage along the tube in the area where cement was placed.

Table 3. Cases that encounter cement leakage.

Parameters	Preoperative	1st month	p
Cement leakage VAS, mean±SD	8.3±1.2	2.2±0.8	p=0.001*
Cement leakage ODI, mean±SD	46.8±19.2	27.2±6.8	p=0.001*

VAS: Visual analogue scale; ODI: Oswestry Disability Index; *: Statistically significant.

DISCUSSION AND CONCLUSION

The major finding of this study was that VP or KP can be preferred as a minimally invasive procedure in treating patients with osteoporotic vertebral fractures. The effects of both procedures on VAS and ODI scores are similar. These applications can increase patients' quality of life and enable them to return to their daily activities quickly. Performing the procedures with local anaesthesia is advantageous for the advanced age group.

Vertebral fractures are usually seen after accelerated movement based on trauma and osteoporosis. Fractures may also be secondary to primary or metastatic cancer or rarely seen due to hemangiomas.[11,13-16] Some researchers have reported that STIR sequences effectively detect acute and subacute fractures in MRI imaging.[18] We performed VP and KP procedures after seeing acute and subacute fractures in preoperative MRI images in all our patients.

VP and KP are minimally invasive surgical techniques that can increase the mechanical stability of the vertebral lesion by injecting filling materials into the fractured vertebra.[20-23] Filling materials used in VP and KP include injectable PMMA, composite bone cement, biodegradable bone cement, calcium phosphate cement (CPC), and others.[7] Different filling materials affect the biomechanical properties of vertebral bodies and cause various biomechanical effects on adjacent vertebral bodies.[7,19] PMMA was applied in the present study.

Treatment with VP or KP operations applied to patients who complain of pain due to vertebral fracture but do not have neurological loss is quite effective.[24,25] The procedure can be performed with local or general anaesthesia.[9,14,16] In the current study, all patients were operated under local anaesthesia and sedation. Therefore, complications that may arise from general anaesthesia are avoided. In addition, nerve monitoring, especially in thoracic vertebra applications, will help us to detect possible complications more quickly.

Vertebroplasty is not an uncomplicated procedure.[24,26] Mild complications from VP and KP procedures; a temporary increase in pain and transient hypotension, moderate; severe infection and leakage of cement into the foraminal, epidural, or dural space; It is severe like cement leakage in paravertebral vessels and can lead to pulmonary embolism, cardiac perforation, cerebral embolism, and even death.[26-30] In the present study, cement leaked into the disc space in four patients, and there was a procedural cannula trace in one patient. Control with C-arm fluoroscopy at every stage of the procedure and checking with contrast material before cement application will minimise possible complications. In addition, the amount and consistency of cement is also important. An experimental study showed that high-

viscosity cement used in VP is less prone to leakage than KP made with low-viscosity cement.[6] Although special attention is paid to the time required for the cement to begin to solidify, it should not be forgotten that cement leakage may occur depending on the structure and aetiology of the fracture.[29] These leaks that might impact clinical outcomes can be seen in VP and KP.[15] The present study demonstrated that VAS and ODI scores obtained from cases with cement leaks did not affect clinical improvement.

VP or KP has been reported as a low-risk procedure that increases physical movement capacity and significantly reduces pain. However, some studies indicate that both methods give the same results, and some results report that one is better than the other.[5,8,13,24,25] The current study demonstrated that the values of VAS and ODI scores for preoperative and postoperative months were similar in both groups and were not statistically significant. However, according to the preoperative values, we found that both methods caused statistically significant improvements. It would be right to remember that the present study was on osteoporotic fractures, and the results may be different in oncological fractures. According to the current study, both methods of treating osteoporotic vertebral corpus fractures effectively increase the quality of life and rapidly meet daily needs.

Clinical success has yet to be achieved in cases of KP performed more than 6 months later. Publications suggest that VP should be preferred instead of KP in patients with a fracture age of over 3 months.[22,23] Studies report that the effect of procedures performed for 6 weeks or longer is the same as placebo as the application period gets longer.[10] Conversely, studies report that KP is successful in patients with painful osteoporotic spine fractures whose fracture age is at least 12 months.[21] In the present study, the patient group who applied between 1 week and 2 months after the onset of the complaints and the procedures performed in an average of 1.1 months may affect successful and good results.

Some studies in the literature showed that patients treated with VP or KP are less likely to die after treatment than patients treated without surgery.[16] The advanced age of the patient group and the high incidence of complications due to immobilisation necessitate treatment for osteoporotic vertebral corpus compression fractures.[4] Therefore, VP and KP performed under local anaesthesia with the percutaneous method allow rapid mobilisation and effective pain control.[1-6] In the current study, the patient was discharged in 1.5-2 days due to mobilisation 6 hours after the procedure and an average of 1 night's observation unless there was another health problem preventing mobilisation.

In the literature, some reports demonstrated that VP proved the procedure's lower cost than KP.[2,3] The cost of KP in minimally invasive procedures in treating patients with osteoporotic vertebral fractures was found to have higher values when we compared it with the low cost of VP management in the present study.

In conclusion, the effects of VP and KP procedures on VAS and ODI scores are similar. However, economically, the cost of KP is relatively high compared to VP. The study suggests using VP due to its low cost and clinically similar results on VAS and ODI scores compared to KP. There were several limitations to this study. The first one is that the follow-up period of 16 months is relatively short for assessing the clinical outcomes. Moreover, the present study did not search for the value of the injected cement during the procedure in either method.

Ethics Committee Approval: This study was planned following the Helsinki Principles, and ethical approval was obtained from the Medipol University Non-Interventional Research Ethics Committee (Date:10/08/2023, decision no: 655).

Conflict of Interest: No conflict of interest was declared by the authors.

Author Contributions: Concept – GB, AÇ; Supervision – GB, AÇ; Materials – GB, AÇ; Data Collection and/or Processing – GB, AÇ; Analysis and/or Interpretation – GB, AÇ; Writing– GB, AÇ.

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Neurochemical Effects of the Adipokinetic Hormone/Red Pigment Concentrating Hormone Family of Peptides in MK-801-Induced Schizophrenia Rat Model

Adipokinetik Hormon/Kırmızı Pigment Konsantre Hormon Peptid Ailesinin MK-801'in İndüklediği Şizofreni Sıçan Modelinde Nörokimyasal Etkileri

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ABSTRACT

Objective: Adipokinetic hormone (AKH) plays a role in sugar and lipid metabolism in insects. Previous studies of AKH showed memory improvements in a schizophrenia rat model that displayed memory impairment and reduced depression in a rat olfactory bulbectomy model. In this study, we investigated the effects of the adipokinetic hormone/red pigment-concentrating hormone (AKH/RPCH) family of peptides on brain neurotransmitter levels and brain neurochemistry in a schizophrenia rat model.

Materials and Methods: We administered AKH/RPCH peptides for 4 days sub-chronically, both in naive rats and also in the MK-801-induced schizophrenia rat model. Liquid chromatography-mass spectrometry apparatus was used for targeted and untargeted analysis of rat neurochemistry.

Results: Increased brain glutamate levels characteristic of MK-801 peptide-treated rats were significantly reduced by AKH. Furthermore, AKH also increased brain dopamine levels in both naive and MK-801 rats. Metabolomic studies have shown that AKH affects lipid and glutamate metabolism, while hypertrehalosaemic hormone plays a role in sugar metabolism and inflammation.

Conclusions: According to our results, AKH might affect dopaminergic and glutamatergic systems and reverse the effects of MK-801, possibly affecting NMDA receptors.

Keywords: Adipokinetic hormone, neurochemistry, neurotransmitters, schizophrenia

ÖZ

Amaç: Adipokinetik hormon (AKH) böceklerde şeker ve lipid metabolizmasında rol oynar. Önceki çalışmalarda AKH sıçan şizofeni modelinde belleği ve sıçan olfaktör bulbektomi modelinde depresyonu düzelttiği gösterilmiştir. Bu çalışmada, adipokinetik hormon/kırmızı pigment konsantre edici hormon (AKH/RPCH) ailesi peptidlerinin sıçan şizofreni modelinde beyin nörotransmitter seviyesi ve beyin nörokimyası üzerine etkisi araştırılmıştır.

Materyal ve Metot: Peptidleri hem naif sıçanlarda hem de MK-801 ile indüklenmiş sıçan şizofreni modelinde 4 gün boyunca subkronik olarak uyguladık. Likid kromatografi-kütle spektrometri cihazı nörokimyanın hedeflenmiş ve hedeflenmemiş analizi için kullanıldı.

Bulgular: AKH anlamlı olarak MK-801 uygulanmış sıçanlarda artmış beyin glutamat seviyesini düşürmüştür. AKH ayrıca hem naif sıçanlarda hem MK-801 uygulanmış sıçanlarda beyin dopamin seviyesini artırdı. Metabolomik çalışmalar adipokinetik hormonun lipid ve glutamat metabolizmasını etkilediğini, hipertrehalosemik hormonun ise şeker metabolizması ve enflamasyonda rol oynadığını gösterdi.

Sonuç: Sonuçlarımıza göre AKH dopaminerjik ve glutamaterjik sistemi etkileyebilir ve MK-801'in etkilerini muhtemelen NMDA reseptörleri üzerinden tersine çeviriyor olabilir.

Anahtar Kelimeler: Adipokinetik hormon, nörokimya, nörotransmitter, şizofreni

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INTRODUCTION

Adipokinetic hormone (AKH) and hypertrehalosaemic hormone are the members of the adipokinetic hormone/red pigment concentrating hormone (AKH/RPCH) family of peptides. They are secreted from the corpora cardiaca of insects, which is a special region found in the brain of the insect family.[1,2] This region of insects is the analog region of the hypothalamus-hypophysis system found in human beings. AKH/RPCH peptides consist of a small amino acid chain starting with pyroglutamic acid and ending with an amide. These peptides especially play a role in the lipid and sugar mobilisation of insects. It is known that AKH has more function in lipid metabolism, while hypertrehalosaemic hormone plays a role in sugar metabolism.[1,2] These peptides support the energy needed for the flight and locomotion of insects. In previous studies, these peptides were also suggested to function in the human neuronal system.[3] In the literature, it is also mentioned that AKH receptors also function similarly to gonadotropin-releasing hormone receptors.[4] This peptidergic system was also found in rat brains.[5]

In addition to these, in recent studies, we showed that the AKH/RPCH peptide family might exert improving effects on depression, anxiety, pain and locomotor disorders and also had neuroprotective and improving effects on memory in MK-801-induced schizophrenia and olfactory bulbectomy of depression-models.[6-9] The current invention relates to the investigation of the effects of these peptides on brain neurotransmitter levels and neurochemistry after 4 days of subchronic injection in the MK-801-induced rat schizophrenia model.[10]

Adipokinetic hormone (AKH) plays a role in sugar and lipid metabolism in insects. Previous studies of AKH show memory improvements in a schizophrenia rat model that displays memory impairment and reduced depression in a rat olfactory bulbectomy model. In this study, we investigated the effects of the adipokinetic hormone/red pigment-concentrating hormone (AKH/RPCH) family of peptides on brain neurotransmitter levels and brain neurochemistry in a schizophrenia rat model.

MATERIALS AND METHODS

Ethics Committee Approval: All procedures respected the Guidelines of the European Union (86/609/EU) and the National Committee for the Care and Use of Laboratory Animals, Czech Republic. (Date:17/10/2016, decision no: 59449/2016-MZE-17214).

Animals: Male Long Evans rats obtained from the Academy of Science, Prague, were used in this study. Rats were kept at standard laboratory conditions, including 21°C temperature and 12/12 light/dark cycle, for two weeks before starting the experiments and during the experiments.

Experimental Groups and Drug Administration: Long Evans rats were treated with Anax imperator AKH (Ani-AKH) (1 and 2 mg/kg) (n=8), Libellula auripennis AKH (Lia-AKH) (1 and 2 mg/kg) (n=8), Phormia-Terra hypertrehalosemic hormone (Pht-HrTH) (1 and 2 mg/kg) (n=8), MK-801 (0.15 mg/kg) (n=8), Ani-AKH (2 mg/kg)+MK-801 (0.15 mg/kg) (n=8), Lia-AKH (2 mg/kg)+MK-801 (0.15 mg/kg) (n=8), Pht-HrTH (2 mg/kg)+MK-801 (0.15 mg/kg) (n=8) or vehicle (control group=saline with 15% DMSO) (n=8) for 4 days (subchronically) in a volume of 2 ml/kg body weight. The doses of the drugs were chosen according to previous studies.[6,7]

Drugs: (+)-MK-801 maleate (5S,10R)-(+)-5-methyl-10,11-dihydro-5H-dibenzo (a, d)-cyclo-hepten-5,10-imine maleate) was obtained from Tocris Bioscience, United Kingdom. Anax imperator AKH (Ani-AKH), Libellula auripennis AKH (Lia-AKH) and Phormia-Terra hypertrehalosemic hormone (Pht-HrTH) were purchased from TRC (Toronto/Canada). MK-801 was dissolved in saline, while AKH was dissolved in saline mixed with 15% DMSO. Saline with 15% DMSO was used as a control group.

Liquid Chromatography-Mass Spectrometry (LC-MS)

Targeted Analysis

Reagents: Dopamine (DA), 5-hydroxy tryptamine (5-HT), γ-aminobutyric acid (GABA), and glutamate (Glu) were purchased from Sigma–Aldrich (USA). LC-MS grade acetonitrile and methanol were obtained from Honeywell-Research Chemicals (France). High-purity water was provided by a Milli-Q system, Aqual Elga Flex3. LC-MS grade formic acid was purchased from Sigma–Aldrich (USA).

Sample Preparation for Targeted LC-MS/MS Analysis: Whole rat brains were weighed directly after the sacrification and deeply frozen (-84°C) immediately. After thawing was added ice-cold methanol to each sample (for 1g of tissue 4 mL of liquid), and each sample was homogenised, vortex-mixed (1 min) and underwent the centrifugation (18.000 x g for 10 min at 0°C). The supernatant was transferred and evaporated to dryness by SpeedVac (Hanil Modul 4080C). The dry residue was reconstituted in 100 µl of methanol, and the aliquot of 10 µl was injected into the LC-MS system for analysis.

LC-MS/MS Conditions: LC-MS/MS was run on an AB SCIEX QTRAP 6500 spectrometer equipped with an ESI ion source and a Thermo Scientific Ultimate 3000 HPLC system with an autosampler. The analytes were separated on a Phenomenex Kinetex C18 column (2.1 mm x 50 mm, 1.7 µm) used at 30° C. The mobile phase consisting of 0.1% formic acid

in water (Solvent A) and methanol (Solvent B) was used with a gradient elution: 0–1.5 min, 2% B; 7 min, 98% B; 8.5 min, 98% B; 10 min, 2% B, 11.5 min, 2% B; at a flowrate of 0.37 mL/min. MS acquisition of 5-HT, GABA, Glu and DA was performed in electrospray positive ionisation multiple reaction monitoring (MRM) mode.

Untargeted Analysis

Reagents: LC-MS grade acetonitrile and methanol were obtained from Honeywell-Research Chemicals (France). High-purity water was provided by a Milli-Q system, Aqual Elga Flex3. LC-MS grade formic acid was purchased from Sigma–Aldrich (USA).

Sample Preparation for Untargeted LC-MS/MS Analysis: Whole rat brains were weighed directly after the sacrificial and deeply frozen (-84°C) immediately. After thawing was added ice-cold methanol to each sample (for 1g of tissue 4 mL of liquid), and each sample was homogenised, vortex-mixed (1 min) and underwent the centrifugation (18.000 x g for 10 min at 0°C). The supernatant was transferred and evaporated to dryness by speedvac (Hanil Modul 4080C). The dry residue was reconstituted in 100 µl of methanol, and the aliquot of 10 µl was injected into the LC-MS system for analysis.

LC-MS/MS Conditions: LC-MS/MS was run on an AB SCIEX Triple TOF 5600 spectrometer equipped with an ESI ion source and a Thermo Scientific Ultimate 3000 HPLC system with an autosampler. The analytes were separated on a Phenomenex Kinetex C18 column (3 mm x 150 mm, 2.6 µm) used at 30°C. The mobile phase consisting of 0.1% formic acid in water (Solvent A) and methanol (Solvent B) was used with a gradient elution: 0–4.5 min, 20% B; 17.5 min, 99% B; 25.5 min, 99% B; 27 min, 20% B, 30 min, 20% B; at a flowrate of 0.5 mL/min. MS acquisition was performed in electrospray positive ionisation.

Statistical Analysis: The results of the neurotransmitters were evaluated by one-way ANOVA followed by Tukey's post-hoc test when significant differences were detected. The data were expressed as the mean values ± SEM (standard error mean). The differences were considered to be statistically significant when p was less than 0.05. The results of the untargeted analysis were evaluated by the software called Metaboanalyst. This analysis includes identifying metabolites, quantifying their abundance, and mapping them to known metabolic pathways. Additionally, it helps in understanding the interactions between metabolites and their impact on various biological processes, making it a crucial component in systems biology research.

RESULTS

There was a significant difference between the groups when effect of hormones on glutamate levels in the brain of rats after 4 days of subchronic injections is evaluated in Ani-AKH, Lia-AKH and Pht-HrTH groups [F (4.33)=19.85; p<0.0001; F (4.33) =13.78; p<0.0001; F(4.32)=18.83; p<0.0001; respectively]. Glutamate levels were significantly increased in MK-801 0.15 mg/kg group (p<0.001), Ani-AKH 2 mg/kg (p<0.01), Pht 1 mg/kg (p<0.01) and 2 mg/kg (p<0.001) groups compared to the control group. Ani 2 mg/kg (p<0.001), Lia 2 mg/kg (p<0.01) and Pht-HrTH 2 mg/kg (p<0.001) significantly decreased the increased glutamate levels in the MK-801 alone group when combined together (Fig.1).

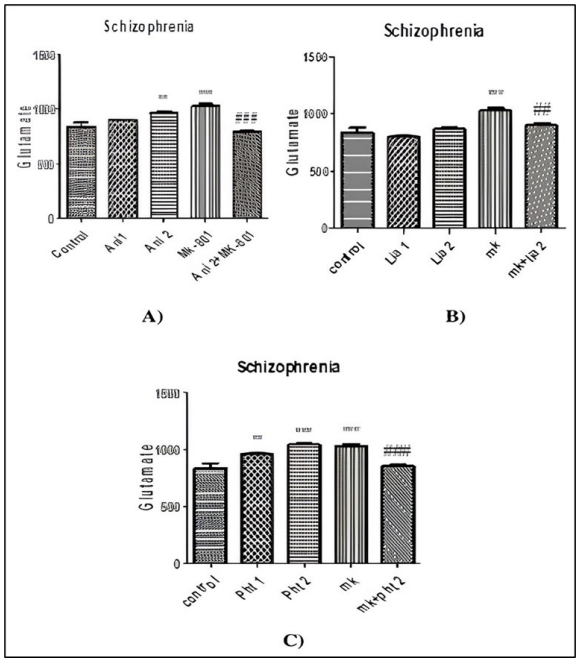

Figure 1. Glutamate levels in the brain of rats after 4 days of intraperitoneal (i.p.) administration.

**: p<0.01; ***: p<0.001; ##: p<0.01; ###: p<0.001; Ani 1: Anax imperator AKH 1 mg/kg; Ani 2: Anax imperator AKH 2 mg/kg; MK-801: MK-801 maleate (5S,10R)-(+)-5-methyl-10,11-dihydro-5H-dibenzo (a, d)-cyclo-hepten-5,10-imine maleate; Lia 1: Libellula auripennis AKH 1 mg/kg; Lia 2: Libellula auripennis AKH 2 mg/kg; Pht 1: Phormia-Terra hypertrehalosemic hormone 1 mg/kg; Pht 2: Phormia-Terra hypertrehalosemic hormone 2 mg/kg.

Figure 1 illustrates glutamate levels in the brain of rats after intraperitoneally (i.p.) administration for 4 days in all groups in the schizophrenia model of Long-Ewans rats. The data are indicated as the means ± standard error of the mean. (**p<0.01, ***p<0.001 compared to control group; ##p<0.01, ###p<0.001 compared to MK-801 group) (Fig.1).

There was a significant difference between the groups when effect of drugs on GABA levels in the brain of rats after 4 days of subchronic injections is evaluated in Ani-AKH, Lia-AKH and Pht-HrTH groups [F (4.33)=45.41; p<0.0001; F (4.33)=16.61; p<0.0001; F (4.32)=27.41; p<0.0001; respectively]. GABA levels were significantly increased in Ani-AKH 1 mg/kg (p<0.001), Pht 1 and 2 mg/kg groups (p<0.001) while significantly decreased in Lia-AKH 1 mg/kg group (p<0.001) compared to the control group. Also, Ani 2 mg/kg (p<0.001) and Lia 2 mg/kg (p<0.01) significantly decreased GABA levels compared to the MK-801 alone group (Fig.2).

Figure 2 illustrates GABA levels in the brain of rats after intraperitoneally (i.p.) administration for 4 days in all groups in the schizophrenia model of Long-Ewans rats. The data are indicated as the means ± standard error of the mean. (***p<0.001 compared

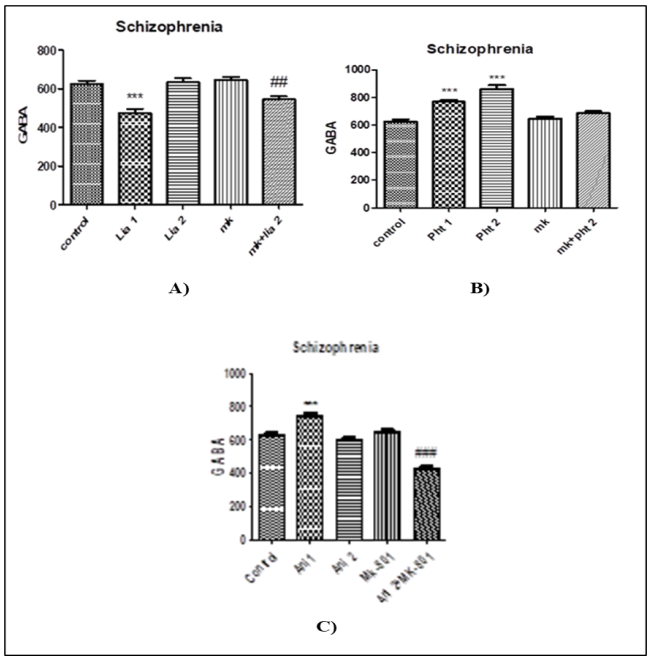

Figure 2. GABA levels in the brain of rats after 4 days of intraperitoneal (i.p.) administration.

***: p<0.001; ##: p<0.01; ###: p<0.001; Ani 1: Anax imperator AKH 1 mg/kg; Ani 2: Anax imperator AKH 2 mg/kg; MK-801: MK-801 maleate .(5S,10R)-(+)-5-methyl-10,11-dihydro-5H-dibenzo (a, d)-cyclo-hepten-5,10-imine maleate; Lia 1: Libellula auripennis AKH 1 mg/kg; Lia 2: Libellula auripennis AKH 2 mg/kg; Pht 1: Phormia-Terra hypertrehalosemic hormone 1 mg/kg; Pht 2: Phormia-Terra hypertrehalosemic hormone 2 mg/kg; GABA: γ-aminobutyric acid.

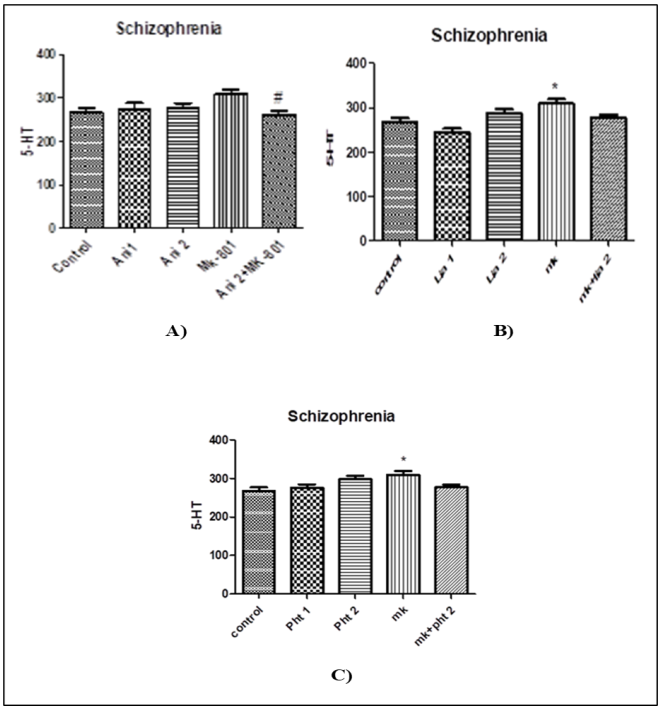

Figure 3. 5-HT levels in the brain of rats after 4 days of intraperitoneal (i.p.) administration.

*: p<0.05; #: p<0.05; Ani 1: Anax imperator AKH 1 mg/kg; Ani 2: Anax imperator AKH 2 mg/kg; MK-801: MK-801 maleate (5S,10R)-(+)-5-methyl-10,11-dihydro-5H-dibenzo (a, d)-cyclo-hepten-5,10-imine maleate; Lia 1: Libellula auripennis AKH 1 mg/kg; Lia 2: Libellula auripennis AKH 2 mg/kg; Pht 1: Phormia-Terra hypertrehalosemic hormone 1mg/kg; Pht 2: Phormia-Terra hypertrehalosemic hormone 2 mg/kg; 5-HT: 5-hydroxy tryptamine.

to control group; ##p<0.01, ###p<0.001 compared to MK-801 group) (Fig.2).

There was a significant difference between the groups when the effect of drugs on 5-HT levels in the brain of rats after 4 days of subchronic injections is evaluated in Ani-AKH, Lia-AKH and Pht-HrTH groups [F (4.33)=2.83; p=0.03; F (4.33)=7.99; p=0.0001; F(4.32)=3.64; p=0.01; respectively]. 5-HT levels were increased in the MK-801 group (p<0.05) compared to the control, while this effect was reversed by the Ani-AKH 2 mg/kg (p<0.05) group (Fig.3).

The figure illustrates 5-HT levels in the brain of rats after intraperitoneally (i.p.) administration for 4 days in all groups in the schizophrenia model of Long-Ewans rats. The data are indicated as the means ± standard error of the mean. (*p<0.05 compared to control group; #p<0.05 compared to MK-801 group) (Fig.3).

There was a significant difference between the groups when the effect of drugs on dopamine levels in the brain of rats after 4 days of subchronic injections is evaluated in Ani-AKH, Lia-AKH and Pht-HrTH groups [F (4.33)=117.6; p<0.0001; F (4.33) =168.7; p<0.0001; F (4.32)=245.5; p<0.0001; respectively]. Dopamine levels were significantly decreased in the MK-801 0.15 mg/kg group (p<0.001) while significantly increased in Ani-AKH 1 mg/kg (p<0.001), Lia 2 mg/kg (p<.001), Pht 1 mg/kg (p<0.001) and 2 mg/kg (p<0.001) groups compared to the control group. Ani 2 mg/kg (p<0.001), Lia 2 mg/kg (p<0.001), and Pht-HrTH 2 mg/kg (p<0.001) significantly increased decreased dopamine levels in the MK-801 alone group (Fig.4).

Figure 4 illustrates dopamine levels in the brain of rats after intraperitoneally (i.p.) administration for 4 days in all groups in the schizophrenia model of Long-Ewans rats. The data are indicated as the means ± standard error of the mean. (***p<0.001 compared to control group; ###p<0.001 compared to MK-801 group) (Fig.4).

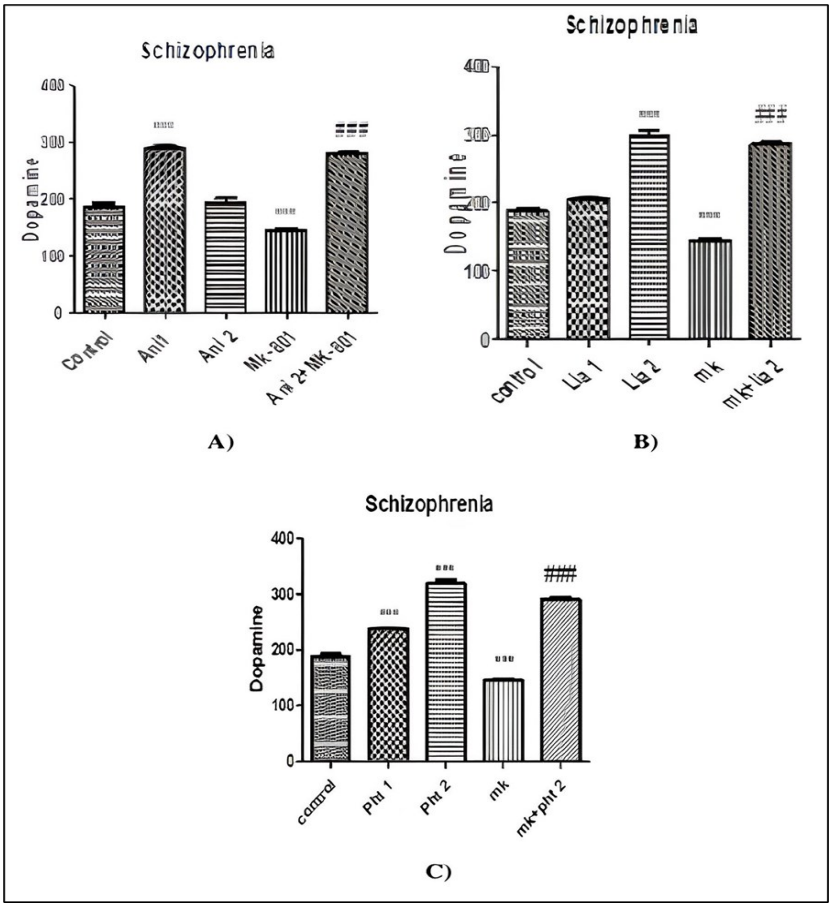

Figure 4. Dopamine levels in the brain of rats after 4 days of intraperitoneal (i.p.) administration.

***: p<0.001; ###:: p<0.001; Ani 1: Anax imperator AKH 1 mg/kg; Ani 2: Anax imperator AKH 2 mg/kg; MK-801: MK-801 maleate (5S,10R)-(+)-5-methyl-10,11-dihydro-5H-dibenzo (a, d)-cyclo-hepten-5,10-imine maleate; Lia 1: Libellula auripennis AKH 1 mg/kg; Lia 2: Libellula auripennis AKH 2 mg/kg; Pht 1: Phormia-Terra hypertrehalosemic hormone 1 mg/kg; Pht 2: Phormia-Terra hypertrehalosemic hormone 2 mg/kg.

There was a significant difference between control and MK-801 groups in pathways steroid hormone biosynthesis (p=0.004), fatty acid biosynthesis (p=0.006), sphingolipids metabolism (p=0.009), primary bile acid biosynthesis (p=0.03), D-glutamine and D-glutamate metabolism (p=0.04) (Fig 5a). There was a significant difference between control and Ani-AKH administered groups in pathways steroid biosynthesis (p=0.01), purine metabolism (p=0.02), alanine aspartate and glutamate metabolism (p=0.04), arginine and proline metabolism (p=0.04), tyrosine metabolism (p=0.06) (Fig 5b). There was a significant difference between control and Lia-AKH administered groups in pathways aminoacyl-tRNA biosynthesis (p=0.01), steroid biosynthesis (p=0.01), arachidonic acid metabolism (p=0.04), biosynthesis of unsaturated fatty acids (p=0.07) (Fig 5c). There was a significant difference between control and Pht-HrTH administered groups in pathways alanine, aspartate and glutamate metabolism (p=0.009), purine metabolism (p=0.01), sphingolipid metabolism (p=0.02), porphyrin metabolism (p=0.02), histidine metabolism (p=0.03) (Fig 5d). There was significant difference between MK-801 and MK-801+Ani-AKH 2 mg/kg groups in pathways aminoacyl-tRNA biosynthesis (p=0.009), biosynthesis of unsaturated fatty acids (p=0.01), valine leucine and isoleucine biosynthesis (p=0.01), D-glutamine and D-glutamate metabolism (p=0.01), steroid biosynthesis (p=0.01) (Fig 5e). There was a significant difference between MK-801 and MK-801+Lia-AKH 2 mg/kg groups in pathways aminoacyl-tRNA biosynthesis (p=0.008), steroid biosynthesis (p=0.01), alanine aspartate and glutamate me-

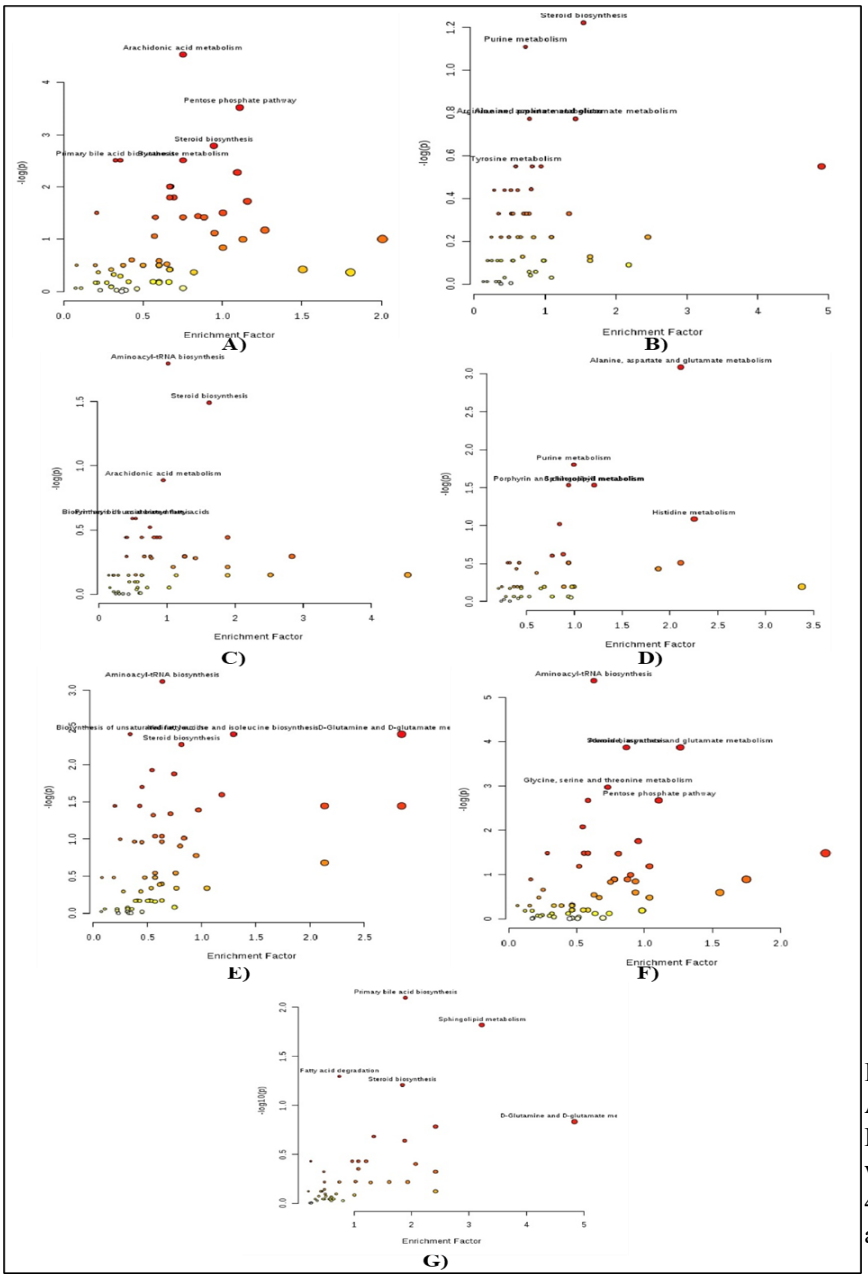

Figure 5. Effects of Ani-AKH, Lia-AKH and Pht-HrTH on metabolomic pathways in the brain of rats after 4 days of intraperitoneal (i.p.) administration.

tabolism (p=0.01), glycine serine and threonine metabolism (p=0.01), pentose phosphate pathway (p=0.01) (Fig 5f). There was a significant difference between MK-801 and MK-801+Pht-HrTH 2 mg/kg groups in pathways arachidonic acid metabolism (p=0.01), pentose phosphate pathway (p=0.01), steroid biosynthesis (p=0.01), primary bile acid biosynthesis (p=0.02), butanoate metabolism (p=0.02) (Fig 5g).

DISCUSSION AND CONCLUSION

AKH/RPCH peptides have many functions, including metabolic, behavioural, developmental or reproductive in insects. In our previous studies, we investigated behavioural effects of AKH in animal depression, anxiety, schizophrenia, olfactory bulbectomy and posttraumatic stress disorder models,[8,9] and now we investigated the effect of these peptides on neurotransmitter levels in schizophrenia model in rat brain after 4 days of subchronic injection. We found that Ani-AKH, Lia-AKH and Pht-HrTH significantly reversed increased brain glutamate levels in MK-801-administered rats. All the hormones increased dopamine levels both in naive and MK-801-administered rats. Ani-AKH and Pht-HrTH also enhanced GABA levels in naive rats, while there was a partial increase effect of Pht-HrTH on 5-HT levels compared to the control group.

The N-methyl-D-aspartate (NMDA) receptor is one of the subgroups of glutamate receptors. It was shown that NMDA receptor antagonists like ketamine, phencyclidine or MK-801 may be used to induce schizophrenia models in rodents.[8] MK-801 disturbs memory in different learning and memory tasks and produces disturbing effects on rodent behaviour.[8] In this study, we used MK-801 to create an animal model which exerts symptoms of schizophrenia.

In the literature, it was found that pyroglutamyl peptides starting with pGlu possess antidepressant, anxiolytic and analgesic effects in animal models.[11] In previous studies, pGlu showed nootropic effects; it reversed memory disturbance in the scopolamine-induced Alzheimer model, increased cholinergic activity and also prevented dementia in old rats. Pyroglutamyl peptides may play a role in the effect mechanism of AKH. It was also found that AKH/RPCH peptides improved memory impairments in MK-801-induced schizophrenia models, showing that they may affect NMDA receptors. In the literature, it was demonstrated that pyroglutamic acid transport to the brain and functions in glutamate storage, and also acts to oppose the action of glutamate and may have a partial agonistic effect on the glutamatergic system.[12] Effect of pyroglutamyl peptides and AKH on NMDA receptors should be investigated to enlighten the effect mechanism of AKH on the glutamatergic system. Also, in this study, the increasing effect of AKH on dopamine and GABA levels in rat brains may cause the behavioural effects of AKH, which we observed in previous studies.[9]

According to our untargeted analysis, primary bile acid biosynthesis, sphingolipid metabolism, fatty acid degradation, steroid biosynthesis, D-glutamine, and D-glutamate metabolism cause metabolic pathway changes in the schizophrenia model compared to the control group. The untargeted analysis found that Ani-AKH mainly affects steroid biosynthesis and purine metabolism; Lia-AKH mostly affects aminoacyl-tRNA biosynthesis and steroid biosynthesis, while Pht-HrTH may mostly affect alanine, aspartate and glutamate metabolism when compared to the control group. Ani-AKH and Lia-AKH mainly affected aminoacyl-tRNA biosynthesis, steroid biosynthesis and glutamate metabolism. In contrast, Pht -HrTH mainly affected arachidonic acid metabolism, pentose phosphate pathway and steroid biosynthesis in the schizophrenia model.

According to these results, our metabolomic study points to changes in lipid metabolism, phospholipids, glycerophospholipids, bile acids and glutamate pathways in plasma in the rat schizophrenia model. Ani-AKH and Lia-AKH seem to have more effect on lipid and glutamate metabolism, while Pht-HrTH plays a role in sugar metabolism, inflammation and changes in energy metabolism. These results support the physiological function of these hormones because it is known that AKH plays more of a role in lipid metabolism. In contrast, the hypertrehalosaemic hormone plays more of a role in sugar metabolism.[9]

In conclusion, other neurobiological features of schizophrenia are alteration in glutamatergic and dopaminergic systems, and all three hormones reversed MK-801-induced changes in these neurotransmitter systems. AKH may affect the dopaminergic and glutamatergic system and reverse the effects of MK-801, possibly affecting NMDA receptors. However, further studies investigating the role of AKH on NMDA receptors should be conducted to elucidate the underlying mechanisms of its effects.

Ethics Committee Approval: All procedures respected the Guidelines of the European Union (86/609/EU) and the National Committee for the Care and Use of Laboratory Animals, Czech Republic. (Date:17/10/2016, decision no: 59449/2016-MZE-17214).

Conflict of Interest: No conflict of interest was declared by the authors.

Author Contributions: Concept – ŞNBB, OM; Supervision – ŞNBB, OM, PT; Materials – ŞNBB, OM, PT, PÇ, DRB, DK, KV; Data Collection and/or

Processing – ŞNBB, OM, PT, PÇ, DRB; Analysis and/or Interpretation – ŞNBB, OM, PT, PÇ, DRB, DK, KV; Writing – ŞNBB, OM.

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Determination of Mercury, Cadmium, Arsenic Levels and Their Relationship with Seizure Duration in Children with Simple Febrile Seizures

Basit Febril Nöbetli Çocuklarda Civa, Kadmiyum, Arsenik Düzeyleri ve Nöbet Süresi ile İlişkilerinin Belirlenmesi

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ABSTRACT

Objective: Heavy metals may cause neuronal damage by inducing oxidative stress. This study aims to investigate the levels of mercury, cadmium, and arsenic in children with febrile seizures and their correlation with seizure duration.

Materials and Methods: The study was conducted on 40 children who experienced simple febrile seizures and 30 children who had a fever but did not experience seizures. The study analyzed complete blood count, serum high-sensitive C-reactive protein, albumin, whole blood mercury, cadmium, and arsenic levels. The analysis was conducted six hours after the seizure for those who experienced seizures and six hours after the onset of fever for those who did not experience seizures.

Results: Our study found that the patient group had significantly higher levels of arsenic in their blood compared to the control group. At the same time, there was no significant difference in the levels of mercury and cadmium. However, we could not establish any relationship between the seizure duration and the heavy metals levels.

Conclusions: While mercury and cadmium levels are normal in children with simple febrile seizures, arsenic levels are high. However, the levels of all three heavy metals have no relationship with the duration of seizures.

Keywords: Arsenic, cadmium, mercury, simple febrile seizure

ÖZ

Amaç: Ağır metallerin oksidatif stresi tetikleyerek nöronal hasara katkıda bulunmaları muhtemeldir. Bu çalışmanın amacı, basit febril nöbet geçiren çocuklarda civa, kadmiyum ve arsenik düzeylerinin saptanarak nöbet süresi ile ilişkilerinin belirlenmesidir.

Materyal ve Metot: 40 basit febril nöbetli çocukta nöbet sonrası altıncı saatte, 30 ateşli ancak nöbeti olmayan çocukta ise ateş şikayetinin başlangıcından altı saat sonra tam kan sayımı, serum high sensitive c reaktif protein, albümin, tam kan civa, kadmiyum ve arsenik düzeyleri çalışılmıştır.

Bulgular: Çalışmamızda ağır metallerden civa ve kadmiyum kan düzeylerinde kontrol grubuna göre anlamlı fark bulunmazken, arsenik düzeyleri hasta grubunda anlamlı şekilde yüksek bulunmuştur. Ağır metallerin nöbet süresi ile ilişkisi saptanmamıştır.

Sonuç: Basit febril nöbetli çocuklarda civa ve kadmiyum düzeyleri normal iken arsenik düzeyleri yüksektir. Ancak her üç ağır metal düzeyinin de nöbet süresi ile ilişkisi bulunmamaktadır.

Anahtar Kelimeler: Arsenik, basit febril nöbet, civa, kadmiyum

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INTRODUCTION

A febrile seizure is the most common type of seizure in children.[1] It is classified into two categories - simple and complex, based on their clinical characteristics. Simple febrile seizures are generalized seizures that last less than 15 minutes and do not reoccur within 24 hours. On the other hand, complex febrile seizures are focal seizures that last longer than 15 minutes or reoccur more than once within the first 24 hours.[2]

Complex febrile seizures in early childhood are known to have a high risk of recurrence and increase the likelihood of developing afebrile seizures in the future.[3] Although considered benign during early childhood, it has been reported that the risk of developing epilepsy in the future is slightly higher than the average population, even in cases of simple febrile seizures.[1]

Seizures can cause damage to neurons through a critical mechanism. When a seizure occurs, excessive amounts of calcium enter the cell through N methyl D aspartate and voltage-dependent channels. This leads to high levels of calcium inside the cell, which triggers various biochemical processes and stimulates the production of reactive oxygen molecules (ROS).[5]

Oxidative stress, which occurs with the increase in reactive oxygen molecules, leads to deterioration in cellular communication and some other cellular functions.[6] The degree of oxidative stress is related to the body's antioxidant capacity.[7] Heavy metals are important factors that trigger oxidative stress and lead to a decrease in antioxidant capacity.[8] These heavy metals, which are likely to be exposed to environmentally in children, trigger oxidative stress by reducing antioxidant capacity.[9-12]

Febrile seizures in patients exposed to arsenic, mercury, or cadmium are likely to trigger oxidative stress earlier and more severely due to low levels of antioxidants. This study aims to determine the levels of heavy metals in children with simple febrile seizures and their correlation with the duration of the seizures.

MATERIALS AND METHODS

Ethical Committee Approval: The study was conducted in the Pediatric Emergency Unit of Sakarya Training and Research Hospital between 01.08.2017 and 01.08.2018, and approval was received from the Sakarya University Faculty of Medicine Ethics Committee (Date: 29.05.2017, decision no: 16214662/050.01.04/48). The study was carried out in accordance with the International WHO Declaration of Helsinki.

Study Population: In our study, 40 patients aged between 8 and 59 months who were admitted to the Pediatric Emergency Department and diagnosed with simple febrile seizures were compared with 30 controls of similar age who had fever but did not have febrile seizures.

The study recorded demographic data of the patients, such as their exposure to cigarette smoke in their living environment, the way their house was heated, drinking water sources, weekly fish consumption, and shift duration information.

Collection of Samples: The patient group had their complete blood count (CBC), serum high-sensitive C-reactive protein (hs-CRP), albumin, whole blood mercury, cadmium, and arsenic levels studied six hours after the seizure, while the control group had these measurements taken six hours after the onset of fever complaint. Since it was thought that consent from the families could not be obtained during admission to the hospital, the samples were taken at the sixth hour.

Analysis Methods: To analyze arsenic, mercury, and cadmium levels in whole blood, blood samples were collected from the subjects using 10mm EDTA-containing trace element tubes from BD Vacutainer (New Jersey, USA). An automated complete blood count device (Celldyn 3400, Abbott Diagnostics, USA) was used to measure the WBC count. At the same time, serum hs-CRP was analyzed using a BN II analyzer from Siemens Healthcare Diagnostics Products GmbH (Marburg, Germany). Serum albumin was studied using a fully automatic autoanalyzer (AU 5800, Beckman Coulter, Tokyo, Japan). Whole blood arsenic, mercury, and cadmium levels were analyzed using the Inductively Coupled Plasma Mass Spectrometry (ICP-MS) method (Agilent 7700 series, Tokyo, Japan).

Statistical Analysis: The statistical analysis was carried out using the SPSS software (IBM SPSS Statistics, Version 22.0 Armonk, NY: IBM Corp.). Categorical variables are presented as numbers (n) and percentages (%). The Student's t-test or Mann-Whitney U test was used for comparison between two groups, whereas ANOVA was used for more than two groups when the data showed normal distribution. For non-normal distribution data, the Kruskal-Wallis test was used to compare more than two groups. The Chi-Square test was used for comparison between groups consisting of categorical variables. The Spearman linear correlation coefficient was calculated to determine the relationship between numerical variables. A significance level of $p< 0.050$ was considered.

RESULTS

Our study did not find any difference in heavy metal exposure risk between the patient and control groups based on their drinking water source, weekly fish

consumption, heating style of the house, and smoking status at home. The patient and control groups also did not show any significant differences in WBC, hs-CRP, albumin, mercury, and cadmium levels. However, we observed significantly higher arsenic levels in the patient group (Table 1).

In the study, it was observed that there was no difference in the blood mercury levels of people who consumed fish less than once a week and those who consumed fish 1-2 times a week (0.27 [0.11-0.77] µg/L, 0.27 [0.11-0, 75] µg/L, 0.34 [0.16-0.73] µg/L, respectively) (p = 0.689) (Figure 1).

Blood cadmium levels were measured in individuals who were exposed to cigarette smoke at home (0.33 [0.13-1.12] µg/L) as well as those who were not (0.23 [0.11-2.26] µg/L). There was no significant difference in blood cadmium levels between those who were exposed to stove smoke (0.24 [0.11-1.11] µg/L) and those who were not (0.24 [0.11-2.26] µg/L) (p=0.08, p=0.760, respectively) (Figure 2).

Table 1. Comparison of demographic, environmental, acute phase reactants, and heavy metal levels in patients and controls.

Variable		Febrile Seizures (n=40)	Control (n=30)	p-value
Age (months), Median (Min-Max)		23.50 (8-78)	29.50 (4-71	0.850[a]
Genders, n (Female/Male)		16/24	12/18	1[b]
Smoking at home, n (%)	Yes	18 (45)	10 (33)	0.320[b]
	No	22 (55)	20 (77)	
The shape of the house heating, n (%)	Stove (solid fuel	19 (48)	12 (40)	0.530[b]
	Heating (natural gas)	21 (52)	18 (60)	
Drinking water supply, n (%)	Company's water	14 (35)	16 (54)	0.260[b]
	Pet bottle-demijohn water	20 (50)	12 (40)	
	Natural spring water	6 (15)	2 (6)	
Fish consumption, n (%)	No	13 (33)	16 (53)	0.110[b]
	Once a week	22 (55)	9 (30)	
	Two or more a week	5 (12)	5 (17)	
WBC (mm^3), Median (Min-Max)		9445(4040-32000)	8600 (3500-16800)	0.530[a]
hs-CRP (mg/L), Median (Min-Max)		1.07 (0.10-3.48)	0,55 (0.32-2.72)	0.920[a]
Albumin (g/dL), Median (Min-Max)		4.10 (3.40-4.80)	4,21 (3.80-4.50)	0.400[a]
Mercury(mg/L), Median (Min-Max)		0.30 (0.11-0.75)	0.23 (0.11-0.77)	0.400[a]
Cadmium (mg/L), Median (Min-Max)		0.24 (0.11-1.20)	0.21 (0.11-2.26)	0.450[a]
Arsenic(mg/L), Median (Min-Max)		1.17 (0.13-6.55)	0.57 (0.16-2.67)	**0.020[a]**

WBC: White blood cell; hs-CRP: High sensitivity c-reactive protein; The results shown as median (minimum-maximum) or frequency; [a]: Mann Whitney U; [b]: Chi-square; Mercury, cadmium and arsenic normal range: 0-10mg/L, 0-4.9mg/L, 0-12mg/L, respectively; p-value<0.05 was considered significant.

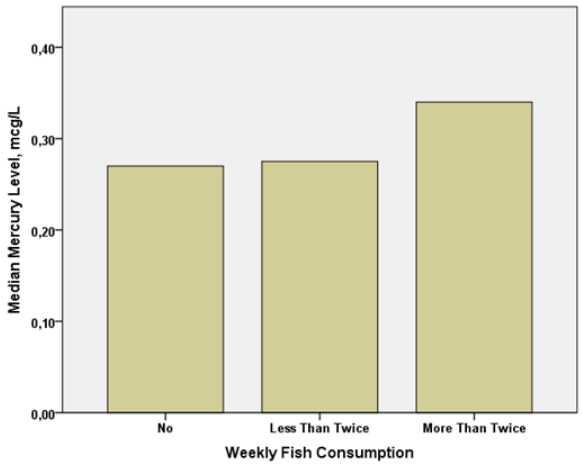

Figure 1. Blood mercury levels according to weekly fish consumption.

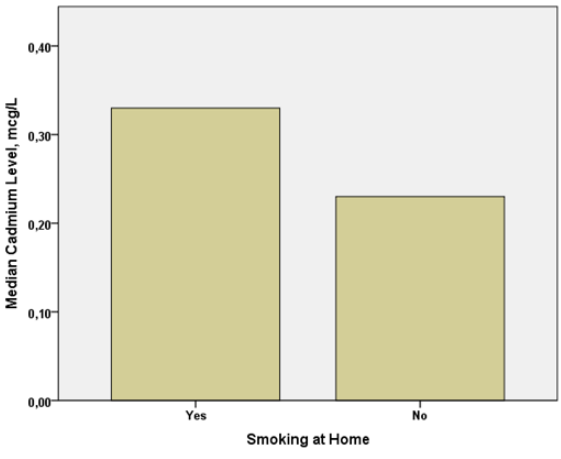

Figure 2. Blood cadmium levels according to exposure to smoking.

Blood arsenic levels were measured in drinking water from city tap water (1.02[0.13-3.72] µg/L), demijohn or plastic bottle (0.79[0.15-6.55] µg/L) and natural spring water (1.02[0.18-2.72] µg/L). No significant differences were found between the sources of water (p=0.920) (Figure 3).

Our study found that 32 out of 40 patients (80%) with simple febrile seizures had a seizure duration of less than 5 minutes, while 8 patients (20%) had a seizure duration longer than 6 minutes. However, we did not find any significant correlation between seizure durations and levels of mercury, cadmium, and arsenic, as shown in Table 2.

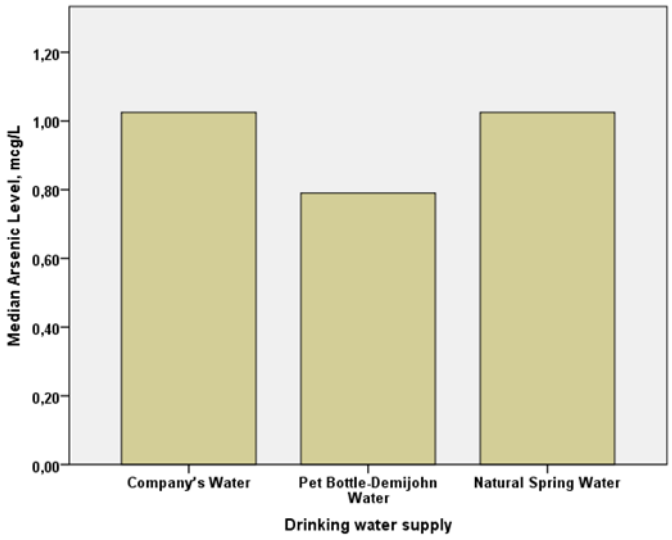

Figure 3. Blood arsenic levels according to drinking water.

Table 2. Correlation analysis between seizure durations and heavy metal levels.

Parameters	Seizure duration	
	rho	p-value
Mercury	-0.072	0.692
Cadmium	-0.016	0.928
Arsenic	0.010	0.957

Spearman correlation analysis was performed.

DISCUSSION AND CONCLUSION

Our study found that although there was no noticeable variance in mercury and cadmium blood levels compared to the control group, patients showed significantly higher arsenic levels. Individuals with febrile seizures experience high oxygen consumption and resulting oxidative stress due to increased metabolic brain activity during the seizure.[7] It has been reported that heavy metals can cause oxidative reactions in biological macromolecules, and metal-related toxicity may lead to oxidative tissue damage.[9,11,12] Redox-active metals such as iron, copper and chromium participate in the redox cycle. In contrast, redox-inactive metals such as arsenic, mercury and cadmium consume antioxidants and enzymes, particularly those containing thiols.[12-14] When arsenic, mercury, and cadmium interact with the carboxyl and sulfhydryl groups of proteins, they increase the production of free radicals, especially ROS. Consequently, it has been reported that metal-induced oxidative stress is a significant factor in the toxic effects of heavy metals.[15-18]

It has been reported that exposure to mercury can occur not only through environmental pollution caused by electronic waste but also through the consumption of fish and ready-made foods containing high fructose corn syrup.[19] Our study did not find any difference in blood mercury levels based on fish

consumption. Mercury not only increases the amount of glutamate and aspartate in the extracellular fluid, thereby sensitizing neurons to excitotoxicity but also causes oxidative cytotoxicity.[20-22] It binds to the carboxyl and sulfhydryl groups of proteins, producing free radicals. Furthermore, it reduces antioxidant levels and disrupts the balance between oxidant and antioxidant capacity.[16,18] In our study, blood mercury levels were found to be expected in both the patient and control groups, and there was no significant difference between them (Table 1). No significant relationship was found between blood mercury levels and seizure duration (Table 2).

Cadmium is a heavy metal that can be harmful to the human body. It is present in cigarette smoke, contaminated food and beverages, and industrial waste produced by batteries or electronic devices.[23,24] Exposure to cadmium can cause the production of free oxygen radicals and inactivate cystine residues containing proteins.[11] Inhaling cigarette smoke is the most significant route of exposure to cadmium. It can damage the vascular endothelium, increase blood-brain barrier permeability, and exacerbate the effects of toxic agents on the brain.[25,26] Cadmium exposure can also lead to the production of various free radicals, such as superoxide, hydroxyl, and nitric oxide.[27] In an animal study, it has been shown to increase lipid peroxidation while decreasing levels of antioxidant enzymes.[18] However, in our study, we found that blood cadmium levels in the patient group were within normal limits and did not differ from the control group. We also found that there was no difference in blood cadmium levels based on exposure to cigarette smoke or stove smoke.

Exposure to arsenic can happen through various sources, such as water, soil, food, and air. It is essential to be cautious and aware of the potential risks associated with exposure to arsenic.[9] In our study, we didn't find any significant difference in the blood arsenic levels of people depending on their drinking water sources (Table 1). Although, the reason behind the high levels of blood arsenic in the patient group is yet to be determined. However, it's worth noting that none of the patients had a blood arsenic level above the normal range (1.17 [0.13-6.55] µg/L [N:0-12µg/L]). Moreover, we found no correlation between blood arsenic levels and seizure duration (Table 2). It's important to note that blood arsenic levels only indicate recent exposure to arsenic and not long-term exposure.

In conclusion, this study significantly found arsenic levels in simple febrile seizures and those without seizures in pediatric patients. However, no difference was found in mercury and cadmium levels. Additionally, there was no correlation between seizure duration and these levels. However, there is a need to do more research to expand upon these findings. The study can serve as a valuable reference point for future investigations.

Ethics Committee Approval: Our study was approved by the Sakarya University Faculty of Medicine Ethics Committee (Date: 29.05.2017, decision no: 16214662/050.01.04/48). The study was carried out following the international declaration, guidelines, etc.

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Analysis of the Escalation in Radiological Imaging: Underlying Factors and Consequences

Radyolojik Görüntülemelerdeki Artışın Analizi: Altta Yatan Faktörler ve Sonuçları

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ABSTRACT
Since the discovery of X-rays, radiological examinations have held a crucial role in diagnosis. With the progression of technology over time, the diversity and applications of imaging methods have expanded significantly. In recent years, there has been a notable increase in the use of radiological examinations. This surge can have adverse effects in various domains, primarily impacting healthcare and the economy. In order to cope with the numerical increase in radiological imaging, excessive or unnecessary imaging should be taken under the spotlight. In this review, the reasons and consequences of the increase in the number of radiological examinations will be revealed.
Keywords: Computed tomography, magnetic resonance imaging, number of radiological examinations, radiological imaging, unnecessary imaging

ÖZ
Radyolojik tetkikler X ışınının keşfedilmesinden bu yana tanıda önemli bir yer tutmaktadır. Günümüze kadar olan süreçte ilerleyen teknoloji ile birlikte görüntüleme yöntemlerinin çeşitliği ve kullanım alanları genişlemiştir. Son yıllarda radyolojik tetkiklerin kullanımında sayısal olarak artış olduğu görülmektedir. Bu artış başta sağlık ve ekonomi olmak üzere birçok alanda olumsuz sonuçlar doğurabilmektedir. Radyolojik görüntülemelerdeki sayısal artışla baş edebilmek için aşırı sayıda ya da gereksiz yapılan görüntülemeler mercek altına alınmalıdır. Bu derlemede radyolojik tetkik sayısındaki artışın sebep ve sonuçları ortaya konulacaktır.
Anahtar Kelimeler: Bilgisayarlı tomografi, gereksiz görüntüleme, manyetik rezonans görüntüleme, radyolojik görüntüleme, radyolojik tetkik sayısı

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INTRODUCTION

Radiology has evolved tremendously since the discovery of X-ray. Advancements in the field of radiology have paved the way for new imaging modalities such as Computed Tomography (CT), Ultrasound Imaging (USI), Doppler Ultrasound, and Magnetic Resonance Imaging (MRI). In the subsequent years, the existing imaging modalities have undergone technological advancements, enabling faster and higher-resolution imaging. Initially employed for diagnostic purposes, radiological imaging has progressively found utility in post-treatment monitoring, cancer screening, and treatment procedures with imaging guidance. With the growth in technological innovations, accessibility, and expanding applications, the number of radiological imaging procedures has surged in recent times.[1,2]

The escalating demand for radiological examinations, coupled with the rapid increase in the volume of imaging studies, has led to an imbalance between the available resources and the rising need for such procedures. This imbalance involves not only the optimal staffing of radiologists, technicians, nurses, and other healthcare professionals but also non-personnel factors like economic resources, equipment availability, accessibility, radiation dosage, and more. This review aims to address the excessive utilization of radiological examinations in recent years, specifically focusing on USI, Doppler USI, CT, and MRI. The review will discuss the reasons behind the overuse or unnecessary application of these imaging modalities and the resulting

adverse consequences.

QUANTITATIVE ASSESSMENT OF THE UPTREND IN RADIOLOGY REQUESTS

The increase in radiological examinations is a multidimensional issue of concern to radiology professionals and patients. The numbers of USI, CT, and MRI examinations are on the rise worldwide. The utilization of USI is experiencing a rapid surge owing to factors such as its bedside applicability, repeatability, cost-effectiveness, and fast execution. With technological advancements, CT imaging has gained advantages such as reducing motion artefacts due to shorter scanning times, providing excellent visualization of contrast agents, and presenting anatomy exceptionally. On the other hand, MRI offers advantages like not containing ionizing radiation, good visualization of soft tissues, enabling functional and metabolic imaging such as diffusion, perfusion, spectroscopy, and utilizing contrast agents that are safer compared to iodinated contrasts.[3] A study published by Larson et al. in 2011 highlighted that the number of CT scans performed in emergency departments in the United States increased six-fold between 1995 and 2007, reaching 16.2 million scans.[4] With the increased accessibility of MRI, its utilization has also surged. Global publications emphasize the excessive rise in musculoskeletal MRI examination numbers. It has been reported that the rate of requesting MRI examinations without proper indication in patients presenting with back pain ranges from 35% to 70%, and even if the initial scan is normal, the examination is repeated on average after 2 years.[1,5,6] The increase in the number of examinations has brought up the issue of unnecessary utilization of radiological imaging. Studies have demonstrated that the rate of unnecessary requests for radiological examinations falls within the range of 10% to 40%.[3]

Organization for Economic Co-operation and Development (OECD) data emphasize the high number of MR and CT scans globally.[7] In a report published by the Turkish Society of Radiology (TSR) in 2018, Türkiye ranks first in terms of the number of MRI scans and 9th in CT scans, based on OECD data. According to the report, there are 144 MRI scans per 1000 people in Türkiye (compared to the OECD average of 57 scans), and 245 CT scans per 1000 people (compared to the OECD average of 143 scans). Furthermore, the report indicates that the number of radiologists per capita in Türkiye is relatively low, with around 5 radiologists per 100.000 people, which is half to one-third of the levels in most European countries. The need for more radiologists in proportion to the high number of scans underscores an overwhelming workload. This situation is quantified by data indicating that in some institutions, radiologists are obliged to interpret 200-300 scans per day, and the time dedicated to each examination has dropped below 5 minutes.[7] The potential adverse consequences brought forth by all these data will be discussed later.

CAUSES OF EXCESSIVE OR UNNECESSARY IMAGING REQUESTS

With the advent of technological advancements, the utilization of advanced diagnostic imaging modalities has been on the rise globally. The escalation in the number of diagnostic imaging studies may be attributed to various factors. These factors encompass the increasing average age of the population, technological advancements, an increase in imaging indications, augmented accessibility to imaging devices, and an upsurge in the number of radiologists. Clinicians assume a fundamental role in the requisition of radiological examinations, thereby rendering the conduct of clinicians a pivotal determinant in the workload of radiology. The utilization patterns of imaging modalities by clinicians are influenced by factors such as patient expectations, indecision or suspicion, time constraints during examinations, defensive medicine practices, payment systems, and more. These factors can vary across countries and even institutions.[8]

The European Referral Guidelines for Imaging highlights key contributors to excessive radiological test requests, including redundant test repetitions, inadequate reliance on non-imaging tests for patient management, overutilization of imaging, incorrect radiological test requisitions, insufficient knowledge about test indications, and the clinicians' sense of security both for themselves and the patients.[8]

The American Board of Radiology Foundation has also identified factors contributing to excessive radiological test requests. These factors include the fear of malpractice, reimbursement issues, physician self-referral for diagnostic imaging, the need for repeat imaging due to inadequate quality, patients' requests for imaging, lack of knowledge, and non-adherence to guidelines.[3]

One contributing factor behind excessive test requests is reimbursement concerns. Due to higher reimbursements for radiological tests compared to other services, clinicians outside of radiology may request more tests to increase their revenue.[9] Self-referral involves non-radiologist physicians ordering and interpreting diagnostic imaging studies in their clinics. Examples include obstetricians and gynecologists performing USI and Doppler USI, orthopedists requesting extremity radiographs and musculoskeletal MRIs, and various departments conducting procedures with imaging guidance.[9]

Patients, often armed with preconceived notions based on their research, may seek specific diagnostic

imaging modalities before even visiting a clinician. However, patients can misinterpret or overlook their clinical conditions while researching, and the reliability of the sources they access can be questionable. Consequently, patients who encounter alarming information may request imaging from clinicians to either reach a definitive conclusion or rule out concerning conditions. Factors contributing to unnecessary radiological test requests include the need to ensure patient satisfaction, challenges in providing detailed explanations during brief consultation times, patients' concerns about their conditions triggering malpractice fears in clinicians, and the risk of violence directed towards healthcare professionals.[10]
A study by Studdert et al. emphasized that radiological tests ordered due to malpractice concerns are more prevalent than other forms of defensive medicine practices.[10]
Repeating radiological tests is another factor contributing to unnecessary test requests. Test repetition can arise from various reasons, such as inadequate image quality necessitating a repeat scan for proper diagnosis. In some cases, incomplete knowledge about which test to order and limited communication between clinicians and radiologists can lead to redundant test requests. Instances of imaging being performed on the wrong anatomical region or opting for contrast imaging instead of non-contrast when it's not required can also occur. Furthermore, performing contrast imaging unnecessarily, while not directly related to unnecessary radiological tests, can lead to extra costs within the field of radiology.
The report by the Turkish Society of Radiology in 2018 also analyzed the number of radiological tests, and the primary factors contributing to excessive test requests in Türkiye were outlined in the following five points:[7]

1. Insufficient clinician-to-population ratio leading to shortened consultation times,
2. The necessity of ensuring patient satisfaction and meeting healthcare service expectations,
3. A low number of radiologists per population,
4. Patients' requests for radiological tests from clinicians,
5. Defensive medicine (clinicians resorting to imaging methods to achieve quick and secure diagnoses due to limited consultation times) and the risk of violence towards healthcare professionals.

RISKS AND ADVERSE OUTCOMES RESULTING FROM EXCESSIVE OR UNNECESSARY IMAGING REQUESTS

With the increasing number of radiological tests, one of the primary challenges that emerge is the potentially harmful effects stemming from ionizing radiation. It is well-established that these detrimental effects are contingent upon the dosage and duration of exposure to X-rays. Within radiological imaging, the primary concern lies in the radiation dosage, with a particular focus on its potential to induce the development of cancer. Notably, the escalated risk is primarily attributed to the exponential rise in usage, notably in CT imaging due to its comparatively higher dosage. The advent of multidetector CT technology has led to the utilization of imaging techniques such as CT angiography, cardiac CT, and dynamic contrast-enhanced CT, contributing to increased dosage exposure.[3] Moreover, available data has demonstrated that the widespread adoption of CT for cancer screening could potentially elevate the risk of cancer at the population level as well.[11]
The utilization of intravenous (IV) iodinated contrast agents for various purposes in CT imaging has also become more prevalent with the increasing number of CT scans. The widespread use of contrast agents not only carries economic implications but also gives rise to potential consequences that could negatively impact public health. Hypersensitivity reactions, for instance, are one such consequence, occurring at a rate of approximately 5-12%, with a mortality rate of around 1 in 75.000. This range of reactions encompasses a broad clinical spectrum, from urticaria to anaphylaxis. Contrast-induced nephropathy and thyrotoxicosis are also undesirable clinical conditions associated with contrast agents.[3]
Radiological examinations hold a significant place within countries' healthcare expenditures. With the increasing number of diagnostic tests, their share in healthcare spending has also risen.[9] However, whether this escalated cost translates into an improvement in the quality of healthcare services is a subject of debate. A study conducted in the United States revealed that regions with higher imaging utilization and expenditures did not necessarily yield better patient outcomes compared to regions with lower utilization.[12] Moreover, certain studies have indicated that high-tech imaging modalities contribute significantly less (20-50%) to patient outcomes.[9]
Considering the time invested by radiologists in unnecessary test interpretations and the overutilization of imaging equipment, the cost-effective utilization of healthcare spending can diminish. On the other hand, unnecessary tests may lead to false positive results, resulting in additional secondary tests and interventions, thereby imposing an extra burden on healthcare expenditures. In conclusion, the volume of imaging tests has become a crucial factor in controlling healthcare costs.
In recent years, technological advancements and the widespread adoption of imaging modalities have contributed to enhancing patients' quality and duration of life.[9] However, the excessive or unnecessary use of these modalities can also yield adverse outcomes concerning the quality of healthcare services.

The time loss incurred by these examinations, the reduction in report quality due to the workload on radiologists, and unnecessary interventions resulting from false-positive diagnoses all contribute to a decline in service quality. The excessive increase in the number of radiological tests unnecessarily intensifies the workload of radiologists during both regular and on-call hours. Consequently, this situation leads to professional burnout among radiologists and radiology technicians. A recent study conducted in Western Europe revealed a dramatic rise in radiology on-call duty intensity over the past 15 years, primarily attributed to the surge in CT requests in emergency departments.[13] The extended working hours and lack of sufficient rest for radiologists, the necessity to expedite report interpretations within shorter timeframes, and the inability to communicate with clinicians in complex cases all can result in diagnostic errors. The decline in service quality has adverse implications for patients who benefit from these services. The time wasted and anxiety caused by unnecessary tests, radiation exposure, and secondary tests or interventions all contribute to reduced patient satisfaction and confidence. Moreover, for patients with serious health issues or urgent imaging needs, access to imaging examinations can become challenging due to the heightened workload, potentially leading to delays in diagnosis.

Excessive or unnecessary radiological tests pose professional risks for radiologists. The demand for radiological images to be reported in a timeframe shorter than what is appropriate can lead to diagnostic errors and expose radiologists to significant legal risks.[7] The increase in workload also brings about consequences such as fatigue, stress, burnout, decreased job satisfaction, and a propensity to leave the profession. Additionally, the escalation in radiation exposure potentially carries health risks, the most serious of which is the risk of developing cancer. On the other hand, a review stated that there is no evidence to support an increased cancer risk among radiologists working over the past 30-40 years.[14] Another study comparing cancer incidence and mortality rates of radiologists who worked after 1940 with those of psychiatrists and the general population found that they were not significantly elevated.[15] However, the rapidly increasing number of tests in recent years raises questions on this matter and necessitates further investigation.

Due to the increased workload of radiologists, there is a reduction in the time allocated to fundamental imaging techniques such as X-rays or complex procedures like interventional radiology.[7] Basic imaging methods like X-ray, commonly used as a primary diagnostic tool, provide crucial insights into certain clinical conditions. Initiating radiological imaging with more advanced techniques can lead to missed diagnostic clues from X-ray images that are not examined or reported due to radiologists' workload. Neglecting both practical evaluations of X-rays and utilizing diagnostic hints can lead to the unnecessary use of advanced imaging methods, thus increasing costs. Additionally, this circumstance can compromise healthcare quality by delaying diagnoses. Interventional radiology, an increasingly popular field for diagnosing and treating diseases, has been impacted by the growing workload of radiologists. Especially in hospitals lacking interventional radiology units, the increased workload hinders radiologists from employing interventional techniques.

In conclusion, the escalation in radiological imaging poses challenges that demand a concerted effort from the medical community and policymakers. By addressing the underlying factors driving excessive requests, implementing evidence-based guidelines, and fostering collaborative practices, we can strike a balance between the benefits of advanced imaging techniques and the judicious use of resources. In doing so, we can ensure the delivery of high-quality healthcare services while minimizing the potential drawbacks associated with the escalating demand for radiological examinations.

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Hospital Dietary Services

Hastane Diyet Hizmetleri

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ABSTRACT
A hospital's dietary service plays a crucial role in improving the health of hospitalized patients and enhancing the hospital's reputation. To ensure a high-quality dietary service, careful planning, proper layout, systematic menu planning, and sufficient assistance and supervision during meal offerings are essential. The dietician or food service manager is responsible for ensuring that patients receive a well-prepared, balanced diet in an aesthetically pleasing manner. The individual in charge of dietary services oversees inpatient catering, diet counselling, and commercial catering. Additionally, they are responsible for education, training, and research.
Keywords: Balanced diet, diet, dietary services, dietician, food service manager

ÖZ
Bir hastanenin diyet hizmeti, hastanede yatan hastaların sağlığının iyileştirilmesinde ve hastanenin itibarının arttırılmasında çok önemli bir rol oynamaktadır. Yüksek kaliteli bir diyet hizmeti sağlamak için dikkatli planlama, uygun düzen, sistematik menü planlaması ve yemek sunumları sırasında yeterli yardım ve denetim esastır. Diyetisyen veya yemek servisi yöneticisi, hastaların iyi hazırlanmış, dengeli ve estetik açıdan güzel bir beslenme almalarını sağlamaktan sorumludur. Diyet hizmetlerinden sorumlu kişi, yatan hasta ikramlarını, diyet danışmanlığını ve ticari ikram hizmetlerini denetler. Bununla birlikte, eğitim, öğretim ve araştırmadan da sorumludurlar.
Anahtar Kelimeler: Dengeli beslenme, diyet, diyet hizmetleri, diyetisyen, yemek servisi yöneticisi

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Dear Editor,

Dietary services play an essential role in supporting the recovery of ailing patients. These services involve providing nutritious, balanced, and palatable meals, as well as educating patients and their attendants about the benefits of a balanced diet. The dietician or food service manager is responsible for ensuring that each patient receives a properly prepared balanced diet as advised by the treating physician and served in an aesthetically pleasing manner. Additionally, these services cater to the needs of outpatients by providing diet and food counselling.

Hospitalized patients often struggle with poor appetite, as indicated by a study revealing that 23% of inpatients consume less than 25% of the provided food.[1] There are many factors associated with inadequate food intake among inpatients, such as lack of feeding aid, inability to provide daily healthy meals, and missing meals due to clinical investigations.[2] A study by Kontogianni et al. suggested that 58% of inpatients did not consume all the food they were served.[3] Approximately half the hospitalised patients are dissatisfied with the hospital's dietary services and prefer to consume home food rather than food from the hospital. Also, hospital dietary services play a crucial role in improving patient satisfaction.

Reduced Intake: Difficulties faced by the patient in eating and swallowing, a sense of loneliness, feeling insecure, stressed and delayed mealtimes may contribute to reduced food intake during hospitalization.[4] Illness-induced loss of appetite and prolonged hospital stay have been studied as essential factors causing reduced food intake in hospitalized patients.[5]

Measures to Improve Food Intake: It has been shown that improved meal-ordering systems, service styles, and meal delivery systems improve food intake in hospitalized patients. The use of electronic menus (E-menus) was an effective way to obtain information about food preferences, contributing to greater satisfaction among inpatients.[6] The bedside meal-ordering system showed improved food intake and patient satisfaction compared to traditional paper menu systems.[7] Room service increases patient satisfaction and food intake while reducing food waste and cost.[8] In-patients preferred the trolley sys-

tem over the pre-plated meal system because the temperature was more controlled.[9] Protected mealtimes, mealtime environment, and mealtime assistance have been proven to be successful interventions to improve patients' overall food intake.[10] Food intake among elderly patients improved in the presence of meal assistants.[11] A study by Markovski et al. suggested that the dining room environment may positively impact food intake.[12] A broader and diverse menu, high-quality taste, specific ingredient details and better presentation improve patient satisfaction with hospital food services.[13] A study by Navarro et al. compared the use of orange (experimental) and white (control) napkins on the inpatients' meal intake. It showed increased food intake among patients with an orange napkin.[14] Use of an indirect calorimeter and resting energy expenditure device calculates the patient's actual caloric requirements and may be of help in planning hospital diets.

Role of Dietary Services: The food service manager is responsible for working out requirements of food items, selection, procurement, receipt, inspection, verification, proper storage, menu planning, and supervising food preparation and distribution of warm, palatable, presentable food to the patients. The functions of those in charge of dietary services include inpatient catering, diet counselling, commercial catering, education, training, and research.[15]

Inpatient Catering: It provides meals to hospitalized patients, including a balanced diet with adequate calories.

Diet Counselling**:** Patients with diabetes, hypertension, anemia, protein-energy malnutrition, and cardiovascular diseases are referred from Specialist outpatient departments or, before being discharged from the hospital, seek dietary consultation for calculating their caloric and protein requirements as per their height, weight, hemoglobin levels, blood sugar levels and renal function tests.

A low-calorie, low-fat diet is recommended for patients with fatty liver. A diet low in sodium content, including grains, fruits and vegetables, dairy, lean meat, nuts and seeds, and legumes, is beneficial in hypertensives. We need to manage insulin levels in Polycystic ovarian disease, so meals should be moderate in complex carbohydrates like brown rice and oats. Emphasis on clean, whole foods and restricting processed foods, sodium, red meat, sugar and alcohol should be recommended in heart patients. The Mediterranean diet is heavily plant-based, with a foundation of vegetables, fruits, whole grains, beans, nuts, and seeds and should be advised in diabetic patients.

Commercial Catering: Medical, paramedical, support staff, attendants, and visitors of the hospital require drinking water, snacks, beverages and meals, which are catered by the staff canteen run by a third party under the administrative control of hospital authorities to supervise the hygiene, sanitation and quality of food services provided.

Education, Training and Research: The dietician can educate the nursing assistants, cooks, residents and technicians regarding types of food, their caloric content, protein value and a balanced diet. They can further impart knowledge about special diets recommended for diabetes, renal diseases, liver diseases and anemia. The training module should include issues of sanitation, anti-rodent measures to be followed in grocery and vegetable storerooms, food safety, healthy cooking, adoption of anti-fly standards and pilferage control in the kitchen.

Food Service Manager: The food service manager or the dietician plays a pivotal role in managing the hospital's dietary services. They need to ensure the regular cleanliness of the food preparation area, as well as the utensils, crockery, and cutlery used for food preparation and serving. Periodic health inspections and maintenance of health record cards for the cooks and staff working in food preparation and distribution areas need to be monitored. They need to wear an apron and cap while preparing food and need to have 2 to 3 sets of such uniforms. The menu needs to be displayed, and food preparation as per the given menu needs to be monitored. The food service manager needs to frequently visit the store where dry and fresh rations are stored to ensure proper storage and prevent pilferage. He needs to maintain records of procurement of food items and monitor costs. He is supposed to inspect bins, racks, cupboards, and refrigerators for proper maintenance and cleaning. Anti-rodent measures should be ensured. Food from the cookhouse should be tasted periodically to confirm that the patients are being provided with a healthy, palatable and presentable meal.

The National Health Mission of India has issued guidelines for the implementation of dietary services in district hospitals, recommending having a dietary service department comprising of a Medical Officer, nurse, purchase officer, and a dietician, which should meet periodically to discuss the dietary services and their interaction with the community and organize awareness programs for the community on the importance of nutrition and healthy eating habits.

In conclusion, "Let food be thy medicine and medicine be thy food" is a well-known statement of Hippocrates. Hospital food service can make a difference and improve patients' food intake, satisfaction, nutritional status and quality of life. Most hospitalized patients have a loss of appetite, physical difficulties in eating, or unavailability of food between meals and missing meals due to a critical investigation or a therapeutic procedure. Most post-operative

patients are recommended to be kept nil per oral for about 4 to 6 hours to prevent nausea and vomiting due to anesthetic drugs, which leads to many patients feeling hungry at some point during their hospital stay. Improved meal-ordering systems, service styles, and meal delivery systems have been shown to improve food intake in hospitalized patients. A broader and diverse menu, high-quality taste, specific ingredient details, and better presentation improve patients' food intake while admitted to the hospital. The food service manager is responsible for the work.

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