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EVALUATION OF THE FREQUENT APPLICATIONS TO AN UNIVERSITY HOSPITAL EMERGENCY DEPARTMENT: A 1- YEAR REVIEW

*Bir Üniversite Hastanesi Acil Servisine Yapılan Sık Başvuruların Değerlendirilmesi: Bir
Yıllık İnceleme*

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ABSTRACT

ÖZ

Objective: Frequent use of emergency departments is an important problem that leads to decreased service quality and increased health costs in these departments. In the present study, the purpose was to analyze the demographic and clinical characteristics of “frequent users” in applications to emergency departments.

Material and Methods: In the study, the records of patients, who were aged 18 years and older and who applied to the emergency department of a university hospital in 2016, were analyzed retrospectively. Those who applied to the emergency department between 4 and 9 times were defined as “Low ED Users”, and those who applied for 10 or more were defined as “High ED Users”.

Results: In 1 year, a total of 86.287 applications were made to the emergency department by 54.258 patients, during which 5.26% (n=2859) of those who applied to the emergency department applied 4-9 times (Low ED Users) and 0.29% (n=162) applied 10 or more times (High ED Users). Applications made by frequent users (n=16.277) constituted 18.8% of all applications in a year. The most common reason for frequent users’ admission was upper respiratory tract infections and 44.3% of the frequent user referrals were young patients who were under the age of 30. It was found that the patients in the High ED Users group underwent more examination and treatment than the Low ED Users group, and the hospitalization rates were higher in the High ED Users group (p<0.001).

Conclusion: “Frequent applications” are made more by young individuals who are under the age of 30 and consist of health problems that do not require emergency care in general. This especially increases the need for medical resources.

Amaç: Sık kullanım, acil servislerde hizmet kalitesinin düşmesine ve sağlık giderlerinin artmasına yol açan önemli bir sorundur. Çalışmada, acil servislere yapılan başvurularda ‘sık kullanıcıların’ demografik ve klinik özelliklerinin analiz edilmesi hedeflendi.

Gereç ve Yöntemler: Çalışmada bir üniversite hastanesi acil servisine, 2016 yılı içerisinde 18 yaş ve üzerindeki hastalar tarafından yapılan başvurulara ait kayıtlar retrospektif olarak incelendi. Sık kullanıcılardan, 4-9 arasında acil servis başvurusu yapanlar “Acil Servisi Az Kullananlar”, 10 ve daha fazla sayıda başvuru yapanlar ise “Acil Servisi Çok Kullananlar” olarak nitelendirildi.

Bulgular: Bir yıllık dönemde acil servise 54.258 hasta tarafından 86.287 başvuru yapıldı. Bu dönemde acil servise başvuranların %5.26’sı (n=2.859) 4-9 kez (Acil Servisi Az Kullananlar), %0.29’u (n=162) ise 10 ve daha fazla kez (Acil Servisi Çok Kullananlar) başvurdu. Sık kullanıcıların yaptığı başvurular (n=16.277), bir yıl içinde yapılan tüm başvuruların %18.8’ini oluşturuyordu. Sık kullanıcıların en sık başvuru nedeni üst solunum yolu enfeksiyonları idi. Sık kullanıcı başvurularının %44.3’ü 30 yaş altı genç hastalardı. “Acil Servisi Çok Kullananlar” grubundaki hastalara “Acil Servisi Az Kullananlar” grubuna oranla daha fazla tetkik ve tedavi işlemi uygulandığı ve hastaneye yatış oranlarının “Acil Servisi Çok Kullananlar” grubunda daha yüksek olduğu belirlendi (p<0.001).

Sonuç: Sık başvurular özellikle 30 yaş altı genç bireyler tarafından daha fazla yapılmaktadır. Acil servislere yapılan ‘sık başvurular’ genel anlamda acil bakım gerektirmeyen sağlık sorunlarından oluşmaktadır. Bu durum özellikle tıbbi kaynak ihtiyacını da arttırmaktadır.

Keywords: Emergency medicine, frequent admission, frequent users

Anahtar Kelimeler: Acil tıp, sık başvuru, sık başvuranlar



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INTRODUCTION

The demand for emergency departments is increasing all over the world. A total of 144.8 million emergency department applications were made in 2017 In the United States of America, and it was recorded that the cost of the emergency department amounted to 76.3 billion dollars (1). Also, 23.4 million applications were made to emergency departments in 2016-2017 in the UK, which shows that emergency department applications increased by 22% compared to 2008 (2). It was determined that emergency department applications, which were 107.4 million in 2017, reached 93.5 million in 2020 and 129.5 million in 2021 in Turkey, and this increase was 38.4% between 2020-2021 (3).

As the number of accidents, injuries, and unavoidable emergencies increases, the number of emergency applications also increases at a similar rate. However, the increased non-urgent and recurrent admissions increase the burden of emergency departments further (4). Recurrent applications to emergency departments are defined as “frequent use of emergency departments”. Although there are different definitions in the literature, four or more applications per year are generally accepted as frequent use, and those of 10 or more are considered as “overuse” (5,6).

A proportional evaluation was made between frequent users and other patients in emergency department admissions in some previous studies and it was reported that approximately 3.5-29% of emergency department admissions were frequent users. It was also reported that approximately 12.1-67% of all applications to emergency departments were made by frequent users (7). The recurrent applications of frequent users to the emergency departments are considered to be the main reason for the higher ratios between the applications made to the emergency departments and the applicants. Frequent applications increase the workload of emergency departments and may cause crowding (4). Solutions can be made to reduce the frequency of admission by determining the reasons for frequent applications. For this reason, the purpose of the present

study was to examine the clinical and demographic characteristics associated with frequent admissions.

MATERIALS AND METHODS

It is a retrospective study conducted on all the emergency service visits of the year 2016 (01.01.2016-31.12.2016). The necessary information and data were recorded by using ICD-10 codes. The researchers examined patients who were aged 18 years and older. Patients, who were under the age of 18 and who applied for non-traumatic reasons, were excluded from the study because they were examined by the Pediatric Emergency Department in our hospital. The Adult Emergency Department accepts only patients who are under the age of 18 from the pediatric patient group who apply for trauma-related reasons. These patients under the age of 18 who applied for trauma were calculated only for the purpose of evaluating demographic data in the general population, but were not included in the frequent user patient group.

Patients who applied to the emergency department for 4 or more times were considered as frequent users. In this group of frequent users, those with 4 to 9 applications were defined as "Low ED users", and those with 10 or more applications were defined as "High ED users". The Hospital Information Management System (HIMS) was scanned retrospectively and the data on patients' complaints, chronic diseases, number of hospitalizations, examination, and treatment information were recorded. The Ethics Committee Approval was received from the Regional Ethics Committee to conduct the study (Protocol Number: 2017/92).

Place of Study

The study was conducted in the emergency department of a 3rd level hospital with an annual average of 70 thousand applications in the Black Sea Region of Turkey (8). The green, yellow, and red triage system is used in the emergency department of this university hospital.

Statistical Analysis

The descriptive data are given as numbers and percentages (%). The chi-square test was used in the analysis of the categorical data. The suitability for normal distribution was evaluated with the Kolmogorov-Smirnov Test. The data that did not conform to the normal distribution were analyzed by using the Kruskal Wallis and Mann-Whitney U-Test. The relationship between examination and treatment practices and age was evaluated with relationship analysis. The continuous variables were reported with Interquartile Ranges (IQR) and median values. The IBM SPSS Statistics 24.0 program was used in the analyses and statistical significance was accepted as $p < 0.05$ at the 95% confidence interval.

RESULTS

Demographic Characteristics of the Frequent User Population

A total of 86.287 applications made by 54.258 patients were evaluated during the study period. It was determined that 5.6% ($n=3.021$) of 54.258 patients who applied to the emergency department were frequent users. Demographic data of frequent users and percentages of chronic diseases are shown in Table 1. The number of applications according to the age range of frequent users is shown in Table 2. In the frequent user group, the most common chronic diseases were hypertension (10.3%; $n=312$), malignancy (9.5%; $n=289$), and heart failure (5.9%; $n=181$). No significant difference was detected between the genders in terms of the frequency of admission ($p=0.921$). A weak, significant, and positive relationship was detected between age and the frequency of admission ($r=0.068$, $p < 0.001$).

Table 1: Demographic characteristics of the frequent users population

<i>Demographics and medical history</i>	Frequent Users ($n=3021$) (5.6%)		<i>P</i> value
	High ED Users ($n=162$) (5.4%)	Low ED Users ($n=2859$) (94.6%)	
Age (year (range))	47.9 ±1.617 (18-92)	39.7 ±0.379 (18-97)	<0.001
Gender			
Male, n^a (%)	86 (53.1)	1323 (46.3)	0.921
Female, n^b (%)	76 (46.9)	1536 (53.7)	
Chronic disease, n (%)	104 (64.2)	939 (32.9)	
Number of applications, n (%)	2017 (12.4)	14260 (87.6)	

a, b, the two groups were not statistically significant when compared with the Mann-Whitney U test $p=0.921$.

Table 2: The number of applications of the frequent users according to age range ($n=16277$)

	<i>n</i> (%)	<i>M</i> *	<i>IQR</i> **	Mean rank	<i>p</i>
Low ED users					
≤30	6673 (40.9)	4	1	1411.87	
31-60	4613 (28.3)	4	2	1414.52	0.060
>61	2970 (18.2)	5	2	1496.99	
High ED users					
≤30	546 (3.3)	11	2	69.15	
31-60	867 (5.3)	12	4	92.55	0.025
>61	608 (3.7)	11	3	78.75	
Total frequent users					
≤30	7219 (44.3)	5	2	1462.81	
31-60	5480 (33.6)	5	2	1515.24	0.001
>61	3578 (21.9)	5	2	1611.34	

*: Median, **: Interquartile range, ED: Emergency department

The examination and treatment applications applied for frequent users are given in Table 3. It was determined that there was a statistically significant, positive, and weak relationship between the frequency of application of the laboratory testing ($r=0.394$, $p<0.001$), radiological imaging ($r=0.332$, $p<0.001$), IV drug

administration ($r=0.372$, $p<0.001$) and ECG ($r=0.441$, $p<0.001$) procedures and age ($p<0.05$). A statistically significant, negative, and weak relationship was found between the frequency of IM injections and age ($r=-0.204$, $p<0.001$).

Table 3: The examination and treatment modalities of the frequent users

<i>Examination Methods</i>												
	ECG				Lab				Radiology			
	M*	IQR**	Mean rank	p	M*	IQR	Mean rank	p	M	IQR	Mean rank	p
Low ED users	0	0	1489.77	0.000	2	2	1457.74	0.000	1	2	1464.72	0.000
High ED users	0	1	1885.73		6	5	2441.25		4	4	2327.77	
<i>Treatment Modalities</i>												
	IV treatment				IM treatment							
	M*	IQR	Mean rank	p	M	IQR	Mean rank	p				
Low ED users	1	1	1455.92	0.000	1	2	1487.19	0.000				
High ED users	5	4	2482.98		2	3	1931.19					

*:Median, **: Interquartile range, ECG: Electrocardiography, Lab: Laboratory, ED: Emergency department

Reasons for Frequent Users

The most common complaints in general admission are shown in Table 4, and the distribution of frequent users' complaints by age is shown in Table 5. The number of frequent users according to the shifts are shown in Figure 1.

Table 4: Admission complaints according to groups (n=86.287)

Complaint	General Population		Low ED users		High ED users	
	n	%	n	%	n	%
Upper respiratory tract diseases	16172	23.1	3092	21.7	279	13.8
Gastrointestinal complaints	11692	16.7	2566	17.9	344	17.1
Applications associated with nonspecific pain	6300	9.0	1895	13.3	304	15.1
Headache	2941	4.2	1101	7.7	97	4.8
Chest pain/cardiac complaints	2240	3.2	770	5.4	199	9.9
Fever	2871	4.1	695	4.9	109	5.4
Lower respiratory tract diseases	1680	2.4	595	4.2	140	6.9
Trauma-related applications	9312	13.3	681	4.8	35	1.8
Psychiatric complaints	910	1.3	372	2.6	68	3.4
Pregnancy-associated	1330	1.9	306	2.2	47	2.3
Cerebrovascular event	1400	2.0	130	0.9	20	0.9
Other	13162	18.8	2030	14.2	363	18.0
Unknown diagnosis	-	-	27	0.2	12	0.6
<i>Total</i>	<i>70010</i>	<i>100</i>	<i>14260</i>	<i>100</i>	<i>2017</i>	<i>100</i>

ED: Emergency department

Table 5: Distribution of complaints by age range of frequent users (n=16277)

Complaint	≤30 years	31-60 years	>60 years
	%	%	%
Upper respiratory tract diseases	31.1	17.1	5.5
Gastrointestinal complaints	19.1	18.1	15.1
Applications associated with nonspecific pain	13.1	16.1	9.7
Headache	7.5	8.1	7.0
Chest pain/ cardiac complaints	2.0	5.4	14.9
Fever	3.4	4.9	7.7
Lower respiratory tract diseases	1.2	3.9	12.2
Trauma-related applications	5.6	4.1	2.4
Psychiatric complaints	3.6	2.2	0.6
Pregnancy-associated	3.4	2.1	0
Cerebrovascular event	0.02	1.0	2.7
Other	9.98	16.2	22.2
Unknown diagnosis	31.1	17.1	5.5
<i>Total</i>	<i>100</i>	<i>100</i>	<i>100</i>

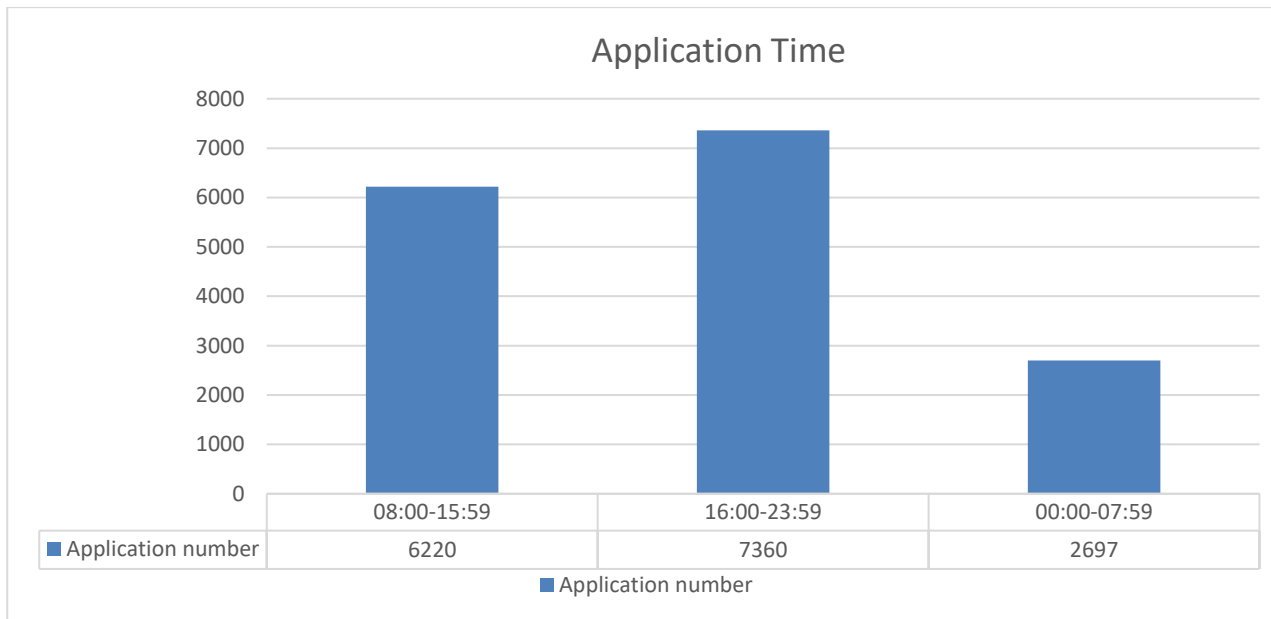


Figure 1: Frequent user application hours (n=16277)

Hospitalization Rates of Frequent Users

It was found that the rate of admissions that ended with hospitalization was 9.3% (n=188) in the high ED users group, 6.9% (n=994) in the low ED users group, and 7.3% (n=1182) in the common users. The median number of hospitalizations in the high ED users group was found to be 11 (IQR: 3) and 4 (IQR: 2) in the low ED users group. The difference between the groups was statistically significant (p<0.001). In terms of the number of hospitalizations, the rate of hospitalization

was found to be significantly higher in the 60 and over age group (Median: 1, IQR: 2) when compared to the other two groups (≤30 Median: 0, IQR: 0; 31-60 Median: 0, IQR: 1) (p<0.001) and no significant differences were detected between genders (p=0.693). It was determined that the median number of applications in the high ED users group was significantly higher than those in the low ED users group in the day shift (high ED users median: 5 IQR: 4; low ED users median: IQR: 2 p<0.001), evening shift (high

ED users median: 4 IQR: 3, low ED users median: 2 IQR: 2 $p < 0.001$), and night shift (high ED users median: 1.5 IQR: 2, low ED users median: 1 IQR: 1 $p < 0.001$).

DISCUSSION

In the literature, there is no generally accepted definition for the evaluation of applications made to emergency departments as “frequent” applications (9). In the study conducted by Chan et al., who evaluated five or more applications per year as frequent applications, 3.0% of the patients were found to be frequent users, and the applications made by frequent users were 14.6% of all applications (4). In the study conducted by Fuda et al., who used the same definition, the rate of frequent users was found to be 1%, and the rate of frequent users was 17.6% (10). Hardie et al., who considered four or more applications a year as frequent users, reported that frequent users accounted for 9.4% of all patients and 33.9% of all applications, and Boh et al. determined the rate of frequent users as 5.1% and the application rate to be 20.8%. It was found in this study that frequent users made up 5.6% of the patients and 18.8% of all referrals (11,12). Obtaining different results in studies by using the same definition seems to be associated with the prevalence of frequent use being affected by the health policies, and sociocultural and socioeconomic characteristics of countries.

Previous studies show that the rate of frequent use is high in elderly patients (7,13). However, Fuda et al. reported that the prevalence of frequent use was high in the 25-44 age range and in patients older than 65 years of age (10). Similarly, Milbrett et al. reported that the majority of frequent users were between the ages of 30-54 (14). It was determined in this study that the most frequent users who applied to the emergency department were patients who were younger than 30 years old. The university hospital where the study was conducted is located on the university campus and a significant proportion of the applications are university students. It is considered that this caused recurrent applications made by young patients.

It was reported that the prevalence of chronic diseases is high in the frequent user population and exacerbations of chronic diseases are among the important causes of these frequent admissions (4). In the study conducted by Boh et al., it was reported that 53.3% of frequent users had three or more chronic diseases (12). In this study, it was determined that 34.5% of frequent users had at least one chronic disease and the frequency of chronic disease was significantly higher in the High ED users group (64.2%) than in the Low ED users group (32.9%). The high frequency of chronic diseases in the high ED users group seems to be associated with the high average age of this group. It is considered that regular follow-up and control of chronic diseases will reduce frequent admissions. Right at this point, it is important to strengthen and activate primary health care services.

In the present study, it was found that IM treatment was applied more frequently in patients who were younger than 30 years of age, and IV treatment in patients aged 60 years and above. The fact that IV treatment was more common in elderly patients may be associated with the prevalence of chronic diseases in this patient group and the high level of urgency in admissions. The higher application rates of IM treatment in the group of patients under the age of 30 can be explained by the fact that applications in this group are mostly aimed at alleviating non-specific pain and symptoms. It was also seen in the study that emergency department resources such as examination and treatment applications were used more for the high ED users group. This is considered to be because of the higher average age of the high ED users group and the higher urgency level of their applications. Previous studies also show that frequent users usually apply to emergency departments because of health problems associated with chronic diseases and high urgency (12,15). However, there are also studies reporting that frequent admissions consist of inappropriate emergency department admissions (4). It was reported that the most common causes of frequent admissions are abdominal pain and chest pain, upper respiratory tract disease (URTI), pharyngitis, feeling unwell, social problems, and neurological diseases

(4,16,17). In this study, it was determined that the most common reason for admission in all patient groups (both frequent users and non-users) was URTI. The fact that the applications because of URTI do not require emergency intervention indicates that the majority of the applications are made for non-emergency reasons in patient groups with and without frequent users.

In the study conducted by Boh et al., approximately 47.5% of frequent admissions resulted in hospitalization (12). In the study conducted by Lacalle et al., the hospitalization rate in the high ED users group was found to be 15% (17). In this study, the hospitalization rate was 7.3%, while it was 9.3% in the high ED users group and 6.9% in the low ED users group for general admissions. The high rate of hospitalization in the High ED users group may be because it includes more elderly and chronically ill individuals compared to other groups. Also, the fact that the hospitalization rate of frequent users found in the study is lower than the rest of the world seems to be associated with the fact that the majority of frequent applications are for simple health problems.

Studies that investigated the hours of frequent users applying to the emergency department reported that these applications were often made in the evening times (18,19). Similarly, it was also found in this study that frequent users applied more in the evening hours. The reason for this may be the inability to benefit from family medicine and polyclinic services because of working during working hours. Also, the absence of alternative units providing service for simple health problems, apart from the emergency departments after working hours, is considered to be another factor that causes the intensification of emergency department applications during these hours.

Moore et al. reported that the majority of frequent users were male (15). On the other hand, studies are reporting that the majority of frequent users were women (10). Blank et al., on the other hand, reported no statistically significant differences between genders in terms of the frequency of admission (20). Although it was not statistically significant, it was found in this study that

female patients in the Low ED users group and male patients in the High ED users group were more.

The limitation of the study was that it had a retrospective design and limited data were presented on the patient group who were not frequent users. Also, the digital recording system used in the hospital where the study was conducted evaluated the individuals on the old records, not in the new records, if the same patient applied to the emergency department again within three days after the emergency department application. This is a limitation because it prevented the exact number of frequent users from being known. The fact that the study was conducted in one single center was another limitation. This eliminated the possibility of evaluating the effects that might arise from regional, cultural, and sociodemographic differences. Also, the fact that the hospital where the study was conducted was a 3rd level trauma center where complex patients were admitted more frequently might also have affected the results of this study.

Frequent admissions are mostly made by patients who are aged 30 and younger and for health problems that do not require emergency care (e.g., URTI). As a result of this, the rate of frequent admissions ending in hospitalization is low. In the High ED users group, the rate of use of emergency department resources such as diagnosis and treatment procedures is higher than in the low ED users group. Making primary healthcare services more effective, increasing social awareness, using integrated information and warning systems among health institutions by approaching the health system holistically not only in the hospital where the application is made, and taking administrative and professional measures will prevent frequent applications and abuse and reduce the number of frequent applications along with frequency-related problems.

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İSTANBUL'DA BİR ÜNİVERSİTE HASTANESİNDE ÇALIŞAN ASİSTAN HEKİMLERİN TÜKENMİŞLİK SEVİYELERİNİN İNCELENMESİ

Investigation of Burnout Levels of Resident Physicians Working at an University Hospital in Istanbul

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ÖZ

Amaç: Araştırmamızın amacı bir üniversite hastanesindeki asistan hekimlerin tükenmişlik düzeylerinin belirlenmesi; ayrıca asistan hekimlerin tükenmişlik düzeyinin yaş, cinsiyet, medeni durum, kronik hastalık, asistanlık süreleri, asistanlık branşı ve pandemide çalışmalarına ilişkin değişkenlere göre dağılımlarını incelemektir.

Gereç ve Yöntemler: Araştırmamıza katılmayı kabul eden 243 asistan hekime sosyodemografik özellikler ve çalışma şartlarına ilişkin sorular ile Maslach Tükenmişlik Envanterinden oluşan toplam 41 soruluk anket 7 Eylül 2020-29 Ekim 2020 tarihleri arasında çevrimiçi uygulanmıştır.

Bulgular: Pandemide çalışan katılımcıların 3.45±0.85 skor ortalamaya ile duygusal tükenmeyi daha fazla yaşadığı görülmektedir (p<0.001). Duyarsızlaşmada 2.44±0.66 ortalamaya ve kişisel başarıda azalma 2.81±0.55 değerlerine sahiptir. 'İşte çok fazla çalışıyor olmak', duygusal tükenmenin en yoğun hissedildiği alan olarak görülmektedir. Katılımcılardan 28 yaş altı olanların daha fazla duygusal tükenme ve duyarsızlaşma yaşadığı görülmektedir (p<0.05). Cinsiyete göre bakıldığında duygusal tükenmenin kadınlarda erkeklere göre istatistiksel olarak anlamlı şekilde daha fazla olduğu görülmüştür (p<0.05). Medeni duruma göre bekar katılımcıların duyarsızlaşma düzeyi daha fazla iken evli katılımcıların kişisel başarıda azalma düzeyinin daha fazla olduğu saptanmıştır (p<0.05). Duyarsızlaşma düzeyi en yüksek asistan hekimler, cerrahi bilimlerde çalışmaktadır. Kişisel başarıda azalma düzeyi en düşük asistan hekimler ise temel bilimlerde görev almaktadır. Kronik hastalığı olan asistan hekimlerin duygusal tükenme ve duyarsızlaşma düzeyinin daha fazla olduğu saptanmıştır.

Sonuç: Pandemide çalışan hekimler üzerinde Maslach tükenmişlik indeksi uygulanmış, tükenmişlik seviyeleri ve alt boyutlarında anlamlı veriler elde edilmiştir. Bu sayede bu alanda çalışan katılımcıların yaşadığı deneyimler üzerinde daha objektif bir bakış açısı oluşturulmuştur. Elde ettiğimiz veriler küresel ölçekte yaşanacak yeni bir pandemide çalışanların deneyimlerini iyileştirme konusunda taraflı açıklamalara kıyasla daha güçlü bir zemin oluşturacaktır.

Anahtar Kelimeler: Tükenmişlik, asistan hekim, çalışma şartları

ABSTRACT

Objective: The aim is to determine the burnout levels of resident physicians in a university hospital and to determine the relationship between gender, age, marital status, and the level of burnout in the departments involved in the pandemic.

Material and Methods: 41 questions, consisting of questions about demographics, working conditions during the pandemic and Maslach burnout scale were applied online to 243 residents who agreed to participate between 7 September 2020 and 29 October 2020.

Results: The participants who work in pandemic experience emotional exhaustion more with an average score of 3.45±0.85. Decrease in personal accomplishment had an average score of 2.81 and depersonalization had an average score of 2.44. Working too much at work was seen as the area where emotional exhaustion is felt most intensely. It was seen that those under 28 years of age experience more emotional exhaustion and depersonalization. It was observed that emotional exhaustion was significantly higher in women than in men. According to marital status, the depersonalization level of single participants was higher, while the level of decrease in personal accomplishment of married participants was higher. Resident physicians with the highest level of desensitization were in surgery while the the lowest decrease in personal accomplishment were seen in the ones who work in basic sciences. It was determined that the level of emotional exhaustion and depersonalization was higher in residents with chronic diseases.

Conclusion: The Maslach burnout index, which is known to be scientifically neutral, was applied to physicians working in the pandemic, and meaningful data were obtained in burnout levels and sub-dimensions. Thus a more objective perspective was created on the negative experiences of the participants working in this field. The data we obtain will provide a stronger basis for improving working conditions and the experience of employees in a new pandemic in future.

Keywords: Burnout, resident physicians, working conditions



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GİRİŞ

Tükenmişlik sendromu (Burnout) terimi, ilk kez 1974 yılında bir tıp kliniğinde gönüllü sağlık çalışanları arasında yapılan bir araştırmada ortaya çıkan yıpranmışlık, başarısızlık, enerji düzeyinin azalması, hayal kırıklığı durumunu tanımlamak için Herbert Freudenberger tarafından ortaya atılmıştır (1,2). Hastalığın tanımıyla birlikte birçok araştırma yapılmış ve hastalığın teşhisi ile ilgili olarak çeşitli tanı testleri geliştirilmeye başlanmıştır. Tükenmişlik düzeylerinin belirlenmesi amacıyla oluşturulan testlerden en önemlisi olan Maslach ölçeğini geliştiren Christina Maslach bu durumu "iş hayatı gereği yoğun duygusal isteklere maruz kalan ve sürekli olarak insanlarla yüz yüze olan kişilerde görülen fiziksel bitkinlik, uzun süren yorgunluk, ümitsizlik ve çaresizlik duygularının, yapılan işe, yaşama ve diğer insanlara karşı olumsuz davranışlarının yansımaları ile oluşan bir sendrom" olarak tanımlanmıştır (3). Tükenmişlik sendromu, Dünya Sağlık Örgütü tarafından da Uluslararası Hastalık Sınıflandırması listesine alınmıştır. Özellikle altından kalkamayacağı bir iş yoğunluğu ile çalışan kişiler ve yoğun stres altındaki insanlarda görülen tükenmişlik sendromunda bireyin kendini bu şartlar altında çalışmaya zorlaması sonucunda savunma mekanizmalarının çöküşü ile sendrom belirtileri görülmeye başlanır. Tükenmişlik sendromunun 3 ana boyutu şu şekildedir: Duygusal tükenme, duyarsızlaşma ve kişisel başarı hissini azaltması (yetersizlik). Duygusal tükenme, bireyin diğer kimselere verecek hiçbir şeyi kalmadığı ve duygusal kaynaklarının azaldığı durumu anlatır. Duyarsızlaşma diğerlerine ilgi göstermeme, uzaklaşma, aldırma gibi davranış biçimini anlatır. Kişisel başarıda azalma ise, iş sorumluluklarını yerine getirme ve çalışmada artık verimli olunmadığı duygusudur (1,3). Sağlık hizmetleri uygulamaları sırasında, görev tanımı ile ilgili karmaşalar, klinik çalışma zorlukları, zaman kısıtlamaları, rekabet eden talepler, iş süreçleri ve zamanlama üzerindeki kontrol eksikliği, liderlikle çatışan roller ve ilişkiler dahil olmak üzere sağlık çalışanları üzerinde baskı oluşturan çeşitli faktörler

mevcuttur. Bu faktörlerin etkisi altında sağlık çalışanları arasında %49-58 arasında tükenmişlik izlenebilmektedir (4). Sağlık çalışanları olarak hekimlerde de tükenmişlik sendromu görülebilmektedir. COVID-19 pandemisi sürecinde sağlık çalışanlarının mental durumunun ve zorluklarının monitörize edilmesi içinde bulunan kısıtlamalar ve ekstrem durumlar nedeniyle zor olmuştur. Raudenská ve ark. tarafından yapılan analizde sağlık çalışanlarında tükenmişlik ve posttravmatik stres bozukluğu gibi birçok mental yükün geliştiği belirtilmiş ve bunun nedenleri hastane kaynaklarının kısıtlılığı, hastalık geçirme riski, uzamış vardiyalar ve iş-yaşam dengesinin bozulması, ailenin ihmali ve güncel bilgiye ulaşım zorlukları başlıkları altında belirtilmiştir (5). Araştırmalar, hekimler arasında tükenmişlik sıklığının diğer kariyerlerdeki bireylere göre daha yüksek olduğunu bulmuştur (6,7). Sağlık çalışanlarının tükenme durumu yaşamaları kendi sağlıklarının yanı sıra hastalar, toplum ve sağlık sisteminin kendisi için bir risk olarak algılanmalıdır. Tükenmişlik sonucunda bireyler iş ve aile ortamından uzaklaşmakta, kişilerarası ilişkilerde uyumsuzluklar yaşamaktadır. Sağlık sorunları yaşamak ve psikolojik sorunlarla uğraşmak tükenmişliğin sonuçları arasındadır. Hem iş hem de sosyal yaşam üzerinde olumsuz etkileri olan tükenmişlik, bireysel ve örgütsel düzeyde mücadele edilmesi gereken bir olgu olarak görülmektedir (8). Araştırmamızın amacı bir üniversite hastanesindeki asistan hekimlerin tükenmişlik düzeylerinin belirlenmesi; ayrıca asistan hekimlerin tükenmişlik düzeyinin yaş, cinsiyet, medeni durum, kronik hastalık varlığı, asistanlık süreleri, asistanlıklarını yapmakta oldukları bölüm ve pandemide çalışmalarına ilişkin değişkenlere göre dağılımlarını incelemektir.

GEREÇ VE YÖNTEM

Çalışma, İstanbul'da Anadolu yakasında bir kamu üniversitesi hastanesinde çalışan asistan hekimler üzerinde tanımlayıcı bir çalışma olarak gerçekleştirilmiştir. Çalışma için Marmara Üniversitesi Tıp Fakültesi Klinik Araştırmalar Etik Kurulu'ndan 02.10.2020 tarih ve 09.2018.571 onay numarası ile etik

kurul onayı alınmıştır. Çalışma Helsinki Deklarasyonu'na uygun biçimde yürütülmüştür. Tüm evrene (toplam 602 asistan hekime) ulaşmak amaçlanmış, 243 asistan hekime (%40.5) ulaşılmıştır. Katılımcı seçimi gelişigüzel örnekleme ile gönüllülük esasına dayalı yapılmıştır. Asistan hekimlere sosyodemografik özellikler ve çalışma şartları ile ilişkili 9 açık uçlu, 7 evet- hayır, 3 çoktan seçmeli soru ve Maslach Tükenmişlik Envanteri'nden oluşan 22 soru olmak üzere toplam 41 sorudan oluşan anket, 7 Eylül 2020-29 Ekim 2020 tarihleri arasında çevrimiçi uygulanmıştır. Araştırma kapsamında çevrimiçi anket ile 243 asistan hekime ulaşılmıştır. Çevrimiçi platformda sorulara yanıt verme zorunluluğu getirilebildiği için ankette eksik ya da hatalı verilere rastlanmamıştır. Toplam 243 anket sonucu değerlendirilmiştir.

Tükenmişlik sendromu düzeyinin belirlenmesinde sıklıkla kullanılan veri toplama araçlarından biri olan "Maslach Tükenmişlik Envanteri" (MTE) (Maslach Burnout Inventory) Maslach ve Jackson tarafından 1981 yılında insana hizmet veren meslek gruplarında çalışan kişilerin üç alt boyutta tükenmişlik düzeylerini ayrı ayrı belirlemek için geliştirilmiştir (3). Ergin (1993) hekimlerin ve hemşirelerin tükenmişlik düzeylerini incelemek üzere MTE'yi Türkçe'ye uyarlamıştır (9). "Duygusal tükenme alt boyutu", "duyarsızlaşma alt boyutu" ve "kişisel başarıda azalma" alt boyutu olmak üzere üç alt boyutun bulunduğu 22 maddeden oluşan 5'li Likert tipi MTE'yi geliştirmişlerdir (3). Bireyin işindeki duygusal taleplere cevap veremeyecek hale gelmesi ölçeğin duygusal tükenme alt boyutunu; çalışan kişinin hizmet verdiği kişiler ile arasına mesafe koyması ve artık onları görmezden gelmesi duyarsızlaşma alt boyutunu; bireyin kendini yaptığı işte başarılı bulması ise kişisel başarı alt boyutunu meydana getirmektedir (3). Bu envanterde duygusal tükenme alt boyutu 9 madde, duyarsızlaşma alt boyutu 5 madde ve kişisel başarı alt boyutu ise 8 maddeden oluşmaktadır. Envanterin her bir maddesinden alınabilecek en düşük puan "1", en yüksek puan ise "5" olarak belirlenmiştir. Bu derecelendirmeye göre duyarsızlaşma ve duygusal

tükenme alt boyutları için "1-Hiçbir zaman", "2-Çok nadir", "3-Bazen", "4-Çoğu zaman", "5-Her zaman" iken kişisel başarı alt boyutu için "5-Hiçbir zaman", "4-Çok nadir", "3-Bazen", "2-Çoğu zaman", "1-Her zaman" olarak düzenlenen puanlama seçenekleri araştırmanın veri toplama sürecinde de aynı şekilde kullanılmıştır. Her alt boyut için ayrı puanlama elde edilmektedir. Duygusal tükenme ve duyarsızlaşma alt boyutlarındaki maddeler olduğu biçimde, kişisel başarı alt boyutundaki maddeler ise ters puanlanmış ve daha sonra toplanmıştır. Duygusal tükenme ve duyarsızlaşma alt boyutlarındaki yüksek puanlama ve kişisel başarı alt boyutundaki düşük puanlama yüksek tükenmişliğe işaret etmektedir.

Veriler değerlendirilirken öncelikle normal dağılıma uygunluk değerlendirilmiş olup Kolmogorov-Smirnov testi sonucuna bakılmış ve histogramlarla teyit edilmiştir. Kategorik değişkenler; sayı (n) ve yüzde (%) ile değerlendirilmiştir. İstatistiksel analizde normal dağılıma uymayan ölçümsel veriler için Mann Whitney-U ve Kruskal Wallis testleri kullanılmıştır. p değeri <0.05 olan durumlar istatistiksel olarak anlamlı kabul edilmiştir.

BULGULAR

Çalışmamızın amacı asistan hekimlerde Maslach tükenmişlik envanterine verilen cevaplardan elde edilen skorları değerlendirmek olup ulaşılan bulgular aşağıda verilmiştir.

Tablo 1'de araştırmaya katılan asistan hekimlerin bazı tanımlayıcı özelliklerinin frekans değerlerinin dağılımı gösterilmiştir. Tablo 1'de görüldüğü üzere katılımcıların %58.4'si (n=142) kadınlardan oluşmaktadır ve katılımcıların %53.1'u (n=129) 28 yaş ve üzerindedir (min=24, max=35). Bekar katılımcılar çoğunluktadır (%60.5). Tıbbi uygulama alanı olarak en yüksek katılımcı grubu dahili bilimler hekimleri olarak görülmüştür (%64.6). Hekimlerin %59.3'ünün (n=144) asistanlık süresi 23 aydan daha azdır.

Tablo 1: Asistan hekimlerin kişisel özelliklerine göre dağılımı

Değişkenler	n(%)
Cinsiyet (n=243)	Kadın 142 (58.4)
	Erkek 101 (41.6)
Yaş (n=243)	<28 114 (46.9)
	≥28 129 (53.1)
Medeni durum (n=243)	Bekâr 147 (60.5)
	Evli 96 (39.5)
Tıp alanları (n=243)	Temel Bilimler 50 (20.6)
	Dâhili Bilimler 156 (64.2)
	Cerrahi Bilimler 37 (15.2)
Asistanlık süresi (n=243)	<23 ay 144 (59.3)
	≥23 ay 99 (40.7)
Pandemide çalışma durumu (n=243)	Evet 216 (88.9)
	Hayır 27 (11.1)
Pandemi ile ilgili çalışılan bölümler (n=243; birden çok seçenek işaretlenmiştir)	COVID-19 Servis 139 (57.2)
	COVID-19 Acil 118 (48.6)
	COVID-19 Yoğun Bakım 37 (15.2)
Pandemide çalışma süresi (n=200)	<3 ay 65 (26.7)
	≥3 ay 135 (55.6)
Pandemi sürecinde motivasyon kaynağı (n=243; birden çok seçenek işaretlenmiştir)	Aile 137 (56.4)
	Arkadaşlar 93 (38.3)
	İyileşen Hastalar 93 (38.3)
	Diğer 53 (21.8)
Kronik hastalık varlığı (n=243)	Evet 21 (8.6)
	Hayır 222 (91.4)

Kategorik değişkenler n(%) olarak verilmiştir.

Tablo 2’de Maslach Tükenmişlik Ölçeği’ne ait 3 alt boyutun ortalama değerlerine yer verilmiştir. Ortalamaların yüksek bulunması her 3 alt boyutta da tükenmişliğin arttığını göstermektedir. Katılımcıların 3.454±0.85 ortalama ile duygusal tükenmeyi diğer tükenme alt boyutlarından daha fazla yaşadığı görülmektedir (p<0.001). Oysa duyarsızlaşma alt boyutu 2.44±0.66 ortalama değerlerine sahiptir. Kişisel başarıda azalma alt boyutunda ise 2.81±0.55 olarak saptanmıştır.

Tablo 2: Tüm çalışma grubunda tükenmişlik alt boyutlarının skor ortalamaları

Alt Boyut	Ortalama±SS
Duygusal tükenme	3.45±0.85
Duyarsızlaşma	2.44±0.66
Kişisel başarıda azalma	2.81±0.55

Sürekli değişkenler ortalama±standart sapma olarak verilmiştir. SS: Standart sapma

Hekimlerin %8.6'sının (n=21) kronik hastalığı bulunmaktadır. Asistanların büyük çoğunluğu (%88.9) pandemi ile ilgili bir birimde görev almıştır. Pandemide görev alan asistan hekimler; %57.2 ile en çok COVID-19 servisinde çalışmıştır. Pandemi sırasında asistan hekimlerin %48.6'sı COVID-19 acilde, %15.2'si ise COVID-19 yoğun bakımında çalışmışlardır. Pandemide görev alan hekimlerin %55.6'sı pandemi ile ilgili bir birimde 3 ay ve daha fazla çalışmıştır. Pandemide çalışan 216 katılımcıdan 16'sından çalışma süresi ile ilişkili net bilgi alınmamıştır. Pandemi sürecinde asistan hekimlerin en büyük motivasyon kaynağının

aileleri olduğu görülmüştür (%56.4). Arkadaşlarının ve iyileşen hastalarının, asistanlar için eşit düzeyde motivasyon kaynağı olduğu saptanmıştır (%38.3).

Tablo 3'te Maslach Tükenmişlik Ölçeği sorularına katılımcıların verdiği yanıtların ortalama değerleri ve standart sapmaları gösterilmiştir. Duygusal tükenme alt boyutuna ait 9 soru arasında 14'üncü "işimde çok fazla çalıştığımı hissediyorum" en yüksek ortalama değerine sahiptir (4.03±1.02). İşte çok fazla çalışıyor olmak duygusal tükenmenin en yoğun hissedildiği madde olarak görülmektedir.

Tablo 3. Tüm çalışma grubunda Maslach tükenmişlik ölçeği'ne verilen cevaplara göre ortalama skorlar

	Alt Boyutlar ve Sorular	Ortalama±SS
Duygusal tükenme	1. İşimden soğuduğumu hissediyorum.	3.43±0.84
	2. İş dönüşü kendimi ruhen tükenmiş hissediyorum.	3.79±1.05
	3. Sabah kalktığımda, bir gün daha bu işi kaldıramayacağımı hissediyorum.	3.33±1.14
	6. Bugün insanlarla uğraşmak benim için gerçekten çok yıpratıcı.	3.37±1.16
	8. Yaptığım işten tükendiğimi hissediyorum.	3.64±1.08
	13. İşimin beni kısıtladığını hissediyorum.	3.72±1.18
	14. İşimde çok fazla çalıştığımı hissediyorum.	4.02±1.02
	16. Doğrudan doğruya insanlarla çalışmak bende çok fazla stres yaratıyor.	3.20±1.17
	20. Yolun sonuna geldiğimi, her şeyin bittiğini hissediyorum.	2.37±1.23
Duyarsızlaşma	5. İşim gereği karşılaştığım bazı kimselere, sanki insan değilmiş gibi davrandığımı hissediyorum.	1.84±0.93
	10. Bu işte çalışmaya başladığımdan beri, insanlara karşı sertleştim.	3.10±1.20
	11. Bu işin giderek beni katılaştırmasından korkuyorum.	3.32±1.23
	15. İşim gereği karşılaştığım insanlara ne olduğu umurumda değil.	1.96±1.04
	22. İşim gereği karşılaştığım insanların 3 problemlerinin, zaman zaman benden kaynaklandığını düşünüyorum	1.95±0.88
Kişisel başarıda azalma	4. İşim gereği karşılaştığım insanların ne hissettiğini anlarım.	2.15±0.84
	7. İşim gereği karşılaştığım insanların sorunlarına en uygun çözüm yollarını bulurum.	2.50±0.88
	9. Yaptığım iş sayesinde insanların yaşamına katkıda bulunduğuma inanıyorum.	2.42±1.01
	12. Çok şeyler yapabilecek güçteyim.	2.88±0.99
	17. İşim gereği karşılaştığım insanlarla aramda rahat bir hava yaratırım.	2.88±0.98
	18. İnsanlarla yakın bir çalışmadan sonra kendimi canlanmış hissederim.	3.53±0.92
	19. Bu işte birçok kayda değer başarı elde ettim.	3.19±0.98
21. İşimde duygusal sorunlara serinkanlılıkla yaklaşırım	2.91±1.00	

Sürekli değişkenler ortalama±standart sapma olarak verilmiştir. SS: Standart sapma.

Duyarsızlaşma alt ölçeğine ait 5 soru arasında 11. “Bu işin giderek beni katılaştırmasından korkuyorum” en yüksek ortalama değerine sahiptir. İş dolayısıyla katılma hissi duyarsızlaşmanın en yüksek düzeyde hissedildiği alan olarak görülmektedir (3.33±1.23).

Kişisel başarıda azalma alt boyutunda sorular tersten puanlandığından dolayı en olumsuz yanıt (hiçbir zaman) en yüksek puan ile incelenmiştir. Bu nedenle ortalama değer yüksek olması kişisel başarıda azalma olarak değerlendirilmektedir. Kişisel başarıda azalma alt boyutuna ait 8 soru arasında 18. “İnsanlarla yakın bir çalışmadan sonra kendimi canlanmış hissedirim” en öne çıkan ortalama değerine sahiptir (3.53±0.92). Kişisel başarıda azalmanın en çok öne çıktığı madde insanlarla çalışma sonrası canlı hissedememe olarak görülmüştür (3.53±0.92).

Tablo 4'te tükenmişlik alt boyutlarının bazı değişkenlere göre dağılımı incelenmektedir. Elde edilen verilere göre yaşın duygusal tükenme ve duyarsızlaşma alt boyutlarına göre dağılımlarında istatistiksel olarak anlamlı farklar olduğu görülmüştür (sırasıyla p=0.006 ve p=0.024). Katılımcılardan 28 yaş altı olanların daha fazla duygusal tükenme ve duyarsızlaşma yaşadığı görülmektedir. Cinsiyete göre bakıldığında duygusal tükenmenin kadınlarda erkeklere göre istatistiksel olarak anlamlı şekilde fazla olduğu görülmüştür (p=0.001). Medeni duruma göre incelendiğinde ise bekar katılımcıların duyarsızlaşma düzeyi daha yüksek iken; evli katılımcıların kişisel başarıda azalma düzeyinin daha fazla olduğu saptanmıştır (sırasıyla p=0.034 ve p=0.010).

Tablo 4: Çalışma grubunda klinik ve demografik değişkenlere göre tükenmişlik düzeyi değerleri

Değişkenler	n	Duygusal Tükenme	p değeri	Duyarsızlaşma	p değeri	Kişisel Başarı	p değeri
Yaş (n=243)	<28 Yaş	114	3.55±0.85	2.54±0.57	0.006	2.87±0.54	0.347
	≥28 Yaş	129	3.33±0.82	2.34±0.71		2.75±0.55	
Cinsiyet (n=243)	Kadın	142	3.63±0.77	2.42±0.62	0.001	2.86±0.54	0.229
	Erkek	101	3.15±0.86	2.45±0.71		2.74±0.55	
Medeni durum (n=243)	Bekar	147	3.36±0.93	2.48±0.69	0.099	2.75±0.58	0.010
	Evli	96	3.54±0.68	2.36±0.59		2.89±0.49	
Uzmanlık alanı (n=243)	Temel Bilimler	50	3.15±0.95	2.08±0.78	0.182	3.06±0.57	0.003
	Cerrahi Bilimler	37	3.59±0.72	2.56±0.65		2.70±0.40	
	Dahili Bilimler	156	3.48±0.82	2.52±0.58		2.75±0.55	
Asistanlık süresi (n=243)	0-23 Ay	144	3.55±0.77	2.54±0.57	0.013	2.82±0.55	0.509
	>23 Ay	99	3.25±0.91	2.42±0.77		2.82±0.55	
Kronik hastalık varlığı (n=243)	Evet	21	4.00±0.68	2.72±0.55	0.002	2.72±0.54	0.493
	Hayır	222	3.38±0.84	2.41±0.66		2.81±0.55	
Pandemide çalışma durumu (n=243)	Evet	216	3.48±0.85	2.46±0.68	0.008	2.83±0.56	0.99
	Hayır	27	3.06±0.65	2.19±0.33		2.66±0.40	
Pandemide çalışma süresi (n=200)	<3 Ay	65	2.45±0.66	2.93±0.59	0.126	3.54±0.88	0.311
	≥3 Ay	135	2.46±0.70	2.77±0.55		3.47±0.86	
Son 6 ayda çalışma saati artışı (n=243)	Evet	160	2.80±0.58	2.47±0.65	0.496	3.52±0.81	0.093
	Hayır	83	2.83±0.48	2.36±0.66		3.26±0.88	

İki grup arasında sürekli değişkenlerin karşılaştırmasında Mann-Whitney U, çoklu gruplar arasında sürekli değişkenlerin karşılaştırmasında Kruskal Wallis testi kullanılmıştır. p<0.05 anlamlı kabul edilmiştir.

Uzmanlık alanına göre tükenmişlik düzeyi değerlerine bakıldığında; duyarsızlaşma düzeyi en yüksek asistan hekimler cerrahi bilimlerde çalışmaktadırlar. Duyarsızlaşma düzeyi cerrahi bilimler ve dahili bilimlerde görev alan asistan hekimlerde benzer sonuçlar göstermekte, temel bilimlerle kıyaslandığında ise istatistiksel olarak anlamlı fark olduğu görülmektedir ($p=0.003$). Kişisel başarıda azalma puanı en yüksek asistan hekimler ise temel bilimlerde görev almaktadır- bu durum, temel bilimlerde çalışan asistanlarda kişisel başarıda azalma alt boyutunda daha az etkilenmeye işaret etmektedir, cerrahi ve dahili bilimlerde temel bilimlere kıyasla kişisel başarıda azalma daha öne çıkmaktadır ($p=0.003$). Cerrahi ve dahili bilimler asistan hekimleri arasında istatistiksel olarak anlamlı fark bulunmamıştır. Duygusal tükenme alt boyutu açısından 3 uzmanlık alanı arasında istatistiksel olarak anlamlı bir fark bulunmamıştır.

Asistanlık süresine göre ise 23 ay ve daha kısa süredir asistanlık yapan katılımcıların duygusal tükenme alt boyutunun istatistiksel olarak anlamlı düzeyde daha fazla olduğu görülmüştür ($p=0.013$). Kronik hastalığı olan asistan hekimlerin Duygusal tükenme ve duyarsızlaşma alt boyutunun kronik hastalığı olmayanlara kıyasla istatistiksel olarak anlamlı düzeyde daha fazla olduğu saptanmıştır (sırasıyla $p=0.002$ ve $p=0.047$). Benzer şekilde pandemi ile ilgili bölümlerde görev alan asistanların Duygusal tükenme ve duyarsızlaşma durumlarının pandemide görev almamış olan asistanlardan daha fazla olduğu anlaşılmaktadır (sırasıyla $p=0.008$ ve $p=0.002$). Pandemide çalışma süresi 3 aydan az olan asistan hekimler ile 3 ay ve daha fazla olan asistan hekimler arasında; ayrıca son 6 ay içerisinde çalışma süresinde artış olan asistanlar ile olmayan asistanlar arasında her tükenmişlik alt boyutlarının hiçbirinde istatistiksel olarak anlamlı farklar bulunmamıştır.

TARTIŞMA

Bu çalışmada İstanbul'da kamuya bağlı bir üniversite hastanesinde çalışmakta olan asistan hekimlerin tükenmişlik (duygusal tükenme, duyarsızlaşma, kişisel

başarıda azalma) düzeyleri ve ilgili değişkenler tanımlanmıştır. Araştırma sonucunda asistan hekimlerin tükenmişlik düzeyleri ortalamaları, duygusal tükenme alt boyutu için 3.45 ± 0.85 ; duyarsızlaşma alt boyutu için 2.43 ± 0.66 ve kişisel başarıda azalma alt boyutu için 2.81 ± 0.55 olarak bulunmuştur. Söz konusu ölçekte beş (5) en yüksek düzeyi ifade ettiğinden orta düzeyde tükenmişliklerinin olduğu söylenebilir.

Bizim çalışmamıza benzer şekilde Dikmetaş ve ark. tarafından On Dokuz Mayıs Üniversitesi Araştırma ve Uygulama Hastanesinde çalışan asistan hekimler arasında yapılan araştırmada asistan hekimlerin duygusal tükenme düzeyi 2.99, duyarsızlaşma düzeyi 2.95, kişisel başarıda azalma düzeyi 2.94 olarak bulunmuştur (10). Çok sayıda hasta, personel ve idareci ile olan ilişkileri onları tükenmişlik için önde gelen adaylar yapmaktadır. Düzenli olarak yüksek beklentiler, işte zaman kısıtlılığı ve sosyal destek eksikliği, başkalarının sağlığından sorumlu olma, hastaların ve yakınlarının saldırgan davranışları, kalabalık hizmet ortamında sık şikayetler gibi birçok sorunla da ilgilendikleri için hekimlerin tükenmişlik yaşama olasılığı daha yüksektir (11).

Tükenmişlik sendromunun gelişiminde sosyodemografik etmenler ve yapılan iş ile ilgili değişkenler etkili olabilmektedir. Çalışmamızda katılımcıların yaşına göre tükenmişlik düzeyleri açısından dağılıma bakıldığında istatistiksel olarak anlamlı bir ilişki saptanmış olup; daha genç olan asistan hekimlerin duygusal tükenmesinin ve duyarsızlaşma düzeylerinin daha fazla olduğu ortaya koyulmuştur. Benzer şekilde Aslan ve arkadaşlarının yaptığı çalışmada da yaş arttıkça duyarsızlaşma düzeylerinin azaldığı bulunmuştur (12). Kaya ve arkadaşlarının Keçiören'de birinci basamak sağlık kuruluşlarında çalışan sağlık personellerinde yaptığı araştırmada, yaş 39 ve üzeri olanların kişisel başarı puanınının 33 yaş altına göre daha düşük olduğu belirlenmiştir (13). Aynı doğrultuda olan bir diğer parametre ise asistanlık süresidir. Asistanlık süresi daha kısa olan hekimlerin duygusal tükenme düzeyleri de daha yüksek saptanmıştır ($p=0.013$). Bu durum genelde asistanlık

süresi daha kısa olan hekimlerin daha çok genç hekimler olabilmesi ile açıklanacağı gibi, hekimliğe yeni başlayan kişilerin iş yükünün daha fazla olmasına bağlı olabilir. Literatürde yaştan bağımsız olarak yeni başlayan asistanlarda tükenmişliğin daha fazla olduğunu bildiren çalışmalar mevcuttur(6,11,14,15). Asistanların klinik içi kıdemi arttıkça iş rutinine daha fazla adapte olabildikleri, tükenmişlikle başa çıkabilme yolları geliştirdikleri, başa çıkamadıkları durumlarda ise başka bir uzmanlık alanına geçiş yapmaları söz konusu olabilmektedir.

Bizim araştırmamızda kadınların duygusal tükenmeyi daha fazla yaşadığı ortaya çıkmıştır. Ergin ve arkadaşları, hekim ve hemşirelerde yaptığı çalışmada, cinsiyetin önemli bir tükenmişlik değişkeni olduğunu; duyarsızlaşma alt boyutunun iki cinsiyette farklı olmasa da kadınlarda duygusal tükenmenin daha fazla olduğunu, erkeklerin ise kişisel başarı duygusunda azalmayı daha fazla yaşadığını bildirmektedir (9). Sayıl ve arkadaşlarının hekim ve hemşirelerde yaptığı çalışmada; yine yapılan araştırma ile paralel olarak duygusal tükenme düzeyi kadınlarda daha yüksek seviyede görülmüştür (16). Aslan ve arkadaşlarının asistan hekimlerde yaptıkları çalışmada, erkek hekimlerde yaş ve çalışma yılıyla tükenmenin azaldığı saptanmıştır (14). Bazı makalelerde kadın hekimlerin hastalarına karşı daha duyarlı oldukları belirtilmekte olup bu da kadınların meslekte deneyimli olsalar da tükenmeyi yoğun olarak yaşamalarını açıklayabilir (15,17).

Bizim çalışmamızda hekimlerin tükenmişlik düzeylerinin medeni durumlarına göre dağılımları istatistiksel olarak anlamlı farklılıklar göstermektedir. Duyarsızlaşma, bekar olanlarda daha fazla görülürken, kişisel başarıda azalma evli olan hekimlerde daha yüksek saptanmıştır. Yapılan diğer çalışmalara bakıldığında aynı doğrultuda sonuçlar elde edilmiştir. Genç, bekar ve çocuğu olmayan hekimlerde; evli, yaşlı ve çocuklulara göre tükenmenin daha yüksek düzeylerde yaşandığı bildirilmektedir (18,19). Erol ve arkadaşlarının yaptığı çalışmada ise medeni duruma göre tükenmişlik düzeyi açısından anlamlı fark

saptanmamıştır (20). Çocuklu hekimlerde, özellikle de kadınlarda, evdeki ebeveyn rolü ve sorumluluğu ile hastanedeki rolü çatışmış olabileceğinden tükenmişliğe eğilim artmış da olabilmektedir ya da bu durum yaş faktörü ile dengelenebilmektedir (13,21).

Çalışmamızda cerrahi bilimler ile dahili bilimler kendi arasında incelendiğinde tükenmişlik düzeyleri açısından istatistiksel olarak anlamlı fark elde edilemezken; temel bilimler ile cerrahi ve dahili bilimler arasında istatistiksel olarak anlamlı fark bulunmuştur. Temel bilimlerde diğer bilimlere göre duyarsızlaşma daha az görülürken, kişisel başarıda azalma temel bilimlerde anlamlı şekilde farklı bulunmuştur. Benzer bir çalışmada nöbet sayısının ve günlük çalışma saatlerinin daha uzun olduğu cerrahi bölüm asistanlarında, duygusal tükenme düzeyinin anlamlı derecede yüksek olduğunu görülmektedir (22). Erol ve arkadaşlarının yaptıkları çalışmada, duyarsızlaşma düzeyinin asistan hekimlerde dâhili ve cerrahi bölümlere göre anlamlı derecede farklılık gösterdiğini bulmuşlardır (20).

Yapılmış olan çalışmalarda işyerinde tükenmişlik sendromuna yol açan en önemli stres etkeni olarak çalışma koşulları (iş yükü, günlük çalışma süresi, bakılan hasta ve tutulan nöbet sayısı, uyku düzensizliği) gösterilmektedir (5,22).

Çalışmamızda son zamanlarda birçok araştırmaya da konu olan pandemi ve tükenmişlik düzeyleri birlikte incelendiğinde istatistiksel olarak anlamlı fark saptanmıştır. Çalışmamızda pandemide çalışan hekimlerin, çalışmayan hekimlere göre duygusal tükenme ve duyarsızlaşma düzeylerinin daha yüksek olduğu görülmektedir. İtalya'da yapılan bir araştırmada COVID-19 hastalarının bakımıyla doğrudan ilgilenen hekimlerde, işle ilgili önemli psikolojik baskı ve sık görülen somatik semptomlar bildirilmiştir ve duygusal tükenme seviyeleri daha yüksek bulunmuştur (5). Yine İtalya'da yapılan çalışmalarda COVID-19 salgını öncesinde, sağlık hizmeti veren kişilerdeki tükenmişlik düzeylerinin SARS salgını sırasındakinden önemli ölçüde yüksek olduğu görülmüştür (23).

Bu çalışmada kronik hastalığı olan hekimlerin tükenmişlik düzeyleri incelendiğinde, kronik hastalığı

olmayan hekimlere göre duygusal tükenme ve duyarsızlaşma düzeylerinin istatistiksel olarak daha yüksek olduğu ortaya çıkmıştır. Kronik hastalığı olan kişilerin pandemi sürecinde daha riskli bir konumda olması psikolojik olarak bu kişileri olumsuz etkilemiş olabilir. Kilis 7 Aralık Üniversitesi'nde yapılan araştırmada COVID-19'un sağlık çalışanlarının kaygı düzeylerine etkisine bakılmıştır ve kronik hastalığı olan sağlık çalışanlarının herhangi bir kronik hastalığı olmayanlara göre kaygı düzeyleri anlamlı olarak daha yüksek bulunmuştur (24).

Çalışmamızın kısıtlılıkları arasında araştırmamızın koşullar nedeniyle kesitsel değil tanımlayıcı olarak tasarlanması, tükenmişlik düzeyi en yüksek düzeyde olabilecek katılımcıların araştırma popülasyonuna katılmadan önce işten ayrılmış olabilecekleri, -başka bir deyişle *healthy worker effect bias*-, cerrahi bilimlerde çalışan asistan hekimlerin çalışmamız içerisinde küçük bir grup oluşturması, katılımcıların soruları cevaplarken kişisel algılarına göre cevaplamaları nedeniyle objektif ve standart bir sonucun elde edilmesinin zor olması, tükenmişlik sıklığının değil, alt boyutların ortalama düzeylerinin bakılmış olması, ölçeğin dışındaki tükenmişlikle ilgili değişkenlerin hesaba katılmaması sayılabilir. Bu açıdan gelecekte niteliksel özellikte, hayaller, çoklu yorgunluklar, şiddet, alanından memnun olmamak, gelirden memnuniyet, tatil yapabilmek, bilimsel aktivitelere katılabilmek gibi değişkenleri de içeren daha kapsamlı bir çalışma yapılabilir.

Sonuç olarak araştırmamızda asistan hekimlerde tükenmişlik sendromu belirtilerini üç alt boyutta da görmekteyiz ancak çalışmamızın tasarımı niceliksel olduğu için bu sonuçlar ölçeğin verdiği sayısal çerçeveler içerisinde kalmaktadır. Tükenmişlik sendromu hekimin hata yapmasına neden olmakta ve bu hatalar da tükenmişliğin gelişiminde rol oynamaktadır. Bu durum hem hastalar hem de hekimler açısından olumsuz sonuçlara neden olmaktadır. Tükenmişlik düzeyinin azaltılması için çalışma ortamındaki koşulların düzeltilmesi, çalışma saatlerinin ve nöbet sayılarının azaltılması, hekimlerin motivasyonlarını yükseltecek uygulamalar yapılması gerekmektedir.

Hekimler üzerinde bilimsel tarafsızlığı bilinen Maslach tükenmişlik indeksi uygulanmış, tükenmişlik seviyeleri ve alt boyutlarında anlamlı veriler elde edilmiştir. Bu sayede bu alanda çalışan katılımcıların yaşadığı olumsuz deneyimler üzerinde daha objektif bir bakış açısı oluşturulmuştur.

Çıkar Çatışması Beyanı: Yazarlar arasında herhangi bir çıkar çatışması bulunmamaktadır.

Katkı Oranı Beyanı: Anafikir/Planlama: MSD, SD, NEL, SH, AŞD, HMM, İD, ŞE, ÖD, MK; Analiz/Yorum: MSD, SD, ÖD, MK; Veri Sağlama: MSD, SD, AŞD, HMM, İD, ŞE, ÖD; Yazım: MSD, SD, NEL, SH, AŞD, HMM, İD, ŞE, ÖD, MK; Gözden Geçirme ve Düzeltme: MSD, SD, NEL, SH, ÖD, MK; Onaylama: MSD, SD, NEL, SH, AŞD, HMM, İD, ŞE, ÖD, MK

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TURKISH VALIDITY AND RELIABILITY STUDY OF THE SOCIAL HEALTH SCALE

Sosyal Sağlık Ölçeğinin Türkçe Geçerlilik ve Güvenirlik Çalışması

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ABSTRACT

Objective: The study aims to establish the validity and reliability of the Social Determinants of Health Scale in Turkish.

Material and Methods: The study sample consisted of 434 university students, with data collection accomplished using the Social Health Scale. The research employed exploratory factor analysis, confirmatory factor analysis, and correlation analyses. The validity and reliability of the scale, values for CR, AVE, and Cronbach Alpha were calculated.

Results: Exploratory factor analysis results indicated that the Social Health Scale consists of four distinct dimensions: general social health, risky social behaviors, economic dimension, and isolation. The structure validity and model fit values of the scale were determined to be satisfactory.

Conclusion: The results of the study confirmed the validity and reliability of the Turkish version of the Social Health Scale, which comprises 14 items and four dimensions. This tool may be used to evaluate the social health levels of university students.

Keywords: Health, university students, social determinants, social health of students

ÖZ

Amaç: Bu çalışmada amaç sağlığın sosyal belirleyicileri ölçeğinin Türkçe geçerlilik ve güvenilirliğini yapmaktır.

Gereç ve Yöntemler: Çalışmaya 434 üniversite öğrencisi katılmıştır. Veri toplama aracı olarak sosyal sağlık ölçeği kullanılmıştır. Araştırmada açıklayıcı faktör analizi, doğrulayıcı faktör analizi ve korelasyon analizleri gerçekleştirilmiştir. Ölçeğin geçerlilik ve güvenilirliği için CR, AVE ve Cronbach Alpha değerleri hesaplanmıştır.

Bulgular: Sosyal sağlık ölçeğinin açıklayıcı faktör analizi sonucunda genel sosyal sağlık, riskli sosyal davranışlar, ekonomik boyut ve soyutlanma olmak üzere dört farklı boyutta dağılım gösterdiği görülmüştür. Ölçeğin yapı geçerliliği ve model uyum değerlerinin iyi düzeyde olduğu görülmüştür.

Sonuç: Sosyal sağlık ölçeğinin Türkçe versiyonunun, geçerli ve güvenilir olduğu sonucuna ulaşılmıştır. Sosyal sağlık ölçeği Türkçe versiyonu 14 madde ve dört boyuttan oluşmaktadır. Üniversite öğrencilerinin sosyal sağlık düzeylerini değerlendirmek amacıyla bu ölçek kullanılabilir.

Anahtar Kelimeler: Sağlık, üniversite öğrencileri, sosyal belirleyiciler, öğrencilerin sosyal sağlığı



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INTRODUCTION

In contemporary academic discourse, the multifaceted nature of health has garnered considerable attention. It is no longer solely equated with the absence of disease but is rather perceived as an intricate amalgamation of physical, psychological, and social facets. Within this spectrum, social health is delineated as the proficiency of individuals and broader communities to coexist harmoniously with their milieu. University scholars represent a pivotal demographic within the young adult category, warranting critical investigation regarding their health behaviors. Empirical studies focusing on the social health behaviors of these students are instrumental in shaping policies and initiating interventions targeting young adult health. Given the myriad challenges students grapple with during their seminal university tenure, explorations into their social health behaviors assume paramount importance at both micro (individual) and macro (societal) scales. Conforming to the World Health Organization's paradigm, social health is construed in the context of both individuals and collectives being adept at actualizing their aspirations, addressing their requirements, and acclimatizing to their surroundings (1). The domain of social health incorporates a plethora of determinants including, but not limited to, social support, social capital, and intricate social networks. The latter has empirically been established as playing a cardinal role in fostering health and holistic well-being (2). Social health behavior, in essence, embodies the proactive measures and strategies espoused by individuals to enhance or sustain their health. Such strategies encompass practices like consistent physical activity, adherence to a nutritious diet, maintaining a structured sleep cycle, and abstaining from tobacco consumption. Notably, university students may find it challenging to perpetuate these health behaviors owing to the dual pressures of academic rigor and social commitments. This realization has catalyzed an augmentation in research centered on university students' social health behaviors in recent epochs (3-11). Chen et al.'s inquiry delved into the potential

correlations between sustained social support and long-term health, specifically examining its implications for sleep quality and overarching health (12). The research outcomes underscored a positive nexus between robust social support and both optimal sleep patterns and general health. In a related study, Gao et al. probed the interrelation between psychological well-being and social support within a cohort of Chinese university students, elucidating that robust social support acts as a buffer, fortifying mental health (7). Extending this narrative, Huang and Wang embarked on a longitudinal study, extrapolating that fortified social support invariably amplifies the quality of life experienced by university students (8). In a detailed empirical investigation, Lipson et al. scrutinized the heterogeneity present in mental health outcomes and treatment uptake among students enrolled in various U.S. higher education institutions. Their findings underscored pronounced disparities in both mental health manifestations and treatment engagement across distinct universities (4). Delving into a related facet, Stallman and Ohan executed a comprehensive systematic review exploring the interventions for anxiety disorders among university students. Their synthesis of the extant literature identified cognitive behavioral therapy as a potent intervention strategy for alleviating anxiety symptoms within this demographic (5). Venturing into a socio-cultural perspective, Yu et al. embarked on an examination of the nexus between active social involvement and health appraisal among students in Chinese tertiary institutions. Their empirical evidence indicated that an active engagement in social activities concomitantly enhances positive health perceptions among these students (9). In addition, research has shown that social health is associated with various positive outcomes, such as increased life satisfaction, low stress levels, and improved mental health (13,14). In the context of university students, social health is particularly related to academic achievement and persistence (15). Studies indicate that social support from peers, family, and faculty is important in promoting students' academic achievement and helping

them cope with academic stress (16,17). Furthermore, social networks and social capital can provide students with valuable resources, such as information about job opportunities or academic programs, which can facilitate their transition to the workforce or graduate education (18). Social health behavior is a complex and multifaceted construct that has received increasing attention in the field of public health in recent years. In particular, university students are considered to be a population that is more vulnerable to poor social health outcomes. Studies have shown that university students are at risk of engaging in behaviors that can negatively impact their social health, such as unhealthy eating habits, lack of physical activity, and substance use. For example, a study conducted by Arnett found that university students reported higher rates of alcohol use and risky sexual behavior compared to their non-university attending peers (19). A study conducted by Maloney et al. found that perceived social norms were a significant determinant of excessive drinking behavior among university students, highlighting the importance of social influence in shaping social health behaviors (20). Interventions centered on enhancing social health behaviors have gained traction in the academic setting, particularly among university students. However, the efficacy of these initiatives can be heterogeneous. To illustrate, research spearheaded by Anderson et al. elucidated that a comprehensive intervention, characterized by personalized feedback mechanisms combined with social norm messaging, yielded discernible success in mitigating alcohol consumption and its adverse repercussions among university attendees (21). In summation, the dynamics of social health behaviors in the university student cohort present a matter of paramount public health significance. The intricate interplay between personal predispositions and the surrounding milieu accentuates the imperative for multifaceted intervention strategies that resonate with the distinct characteristics of this demographic. The current body of scholarly work accentuates that social health stands as an indispensable pillar within the broader framework of health and holistic well-being.

This is especially pertinent for university students, given the transitional and formative nature of their academic and social experiences. Hence, it becomes crucial to formulate and authenticate social health evaluative metrics that proficiently gauge the repercussions of interventions tailored to amplify social health within the university milieu.

This study aims to provide a measurement tool for examining the social health attitudes and behaviors of university students in Turkey by testing the validity and reliability of the social health scale developed by Johnson et al. in Turkish (22).

MATERIALS AND METHODS

Population and sample of the research

The population of this study consists of 11,457 students who are enrolled in xxx between 2022 and 2023. To determine the sample size, a confidence level of 95% and a margin of error of 5% were considered for a population size of 11,457. The calculated sample size was at least 385. Data were obtained from 434 students who participated voluntarily in the study. It was decided that this number was sufficient to represent the main population. The sampling method used in the study was convenience sampling. This method was preferred due to its ease, low cost, and ability to collect data quickly (23). Of the students who participated in the study, 66.4% (n=288) were female and 33.6% (n=146) were male. It was observed that 34.8% (n=151) of the students were in the health departments, and 65.22% (n=146) were in other different departments. In addition, regarding their economic status, 3.9% (n=17) stated that they were in very poor condition, 9.7% (n=42) were in poor condition, 65.4% (n=284) were in moderate condition, 18.2% were in good condition, and 2.8% (n=12) were in very good condition. It was found that 47.7% (n=207) of the students were in the first year, 33.4% (n=145) were in the second year, 12.0% (n=52) were in the third year, and 6.9% (n=30) were in the fourth year. Regarding their places of residence during their education, 65.2% (n=283) stayed in government dormitories, 3.2% (n=14) stayed in private dormitories,

10.4% (n=45) stayed in student housing, 3.2% (n=14) stayed in apartments, 15.4% (n=67) stayed with their families, and 2.5% (n=11) stayed in other different places.

Data collection tools

The data was collected via an online survey. The survey consisted of two parts; the first part included a demographic information form, and the second part included the social health scale. *Demographic Information Form:* This section was created by the researchers. It included five statements to determine the students' gender, grade level, department, income level, and place of residence during their education process.

Social Health Scale: The LIFESCREEN-C (TLS-C), is an 18-item self-report social health screening tool to assess college student's non-medical social health needs such as food insecurity, college student risky behaviors, stress, and health-promoting behaviors. The TLS-C includes three subscales: general social health needs (GSHN; 4 items), college student social health needs (CSHN; 11 items), and promotive social health factors (PSHF; 3 items). The TLS-C is dichotomous with a '1-Yes or 0-No' scale and to get a total score, the GSHN and the CSHN scales are summed, with higher scores indicating a higher severity of need. The PSHF scale indicates positive social health behaviors such as exercising and spirituality, and a high score on this scale indicates more positive social health behaviors (22).

Adaptation process of the scale

Permission was obtained from Kaprea F. Johnson via email for the Turkish adaptation of the Social Health Scale. The original version of the scale was in English and various steps were followed in its translation into Turkish. As the first step, the scale was translated into Turkish by the researcher and three academics who were proficient in English. These translations were compared and the translation that best expressed each item was selected. In the second step, the translated scale was administered to 37 students to examine its comprehensibility. Based on the data obtained, corrections were made to some items of the scale, and the scale was then ready for the administration phase.

Data analysis

The data collected within the scope of the study were coded using the SPSS 25 package program. Initially, missing data screening was performed for the data, and no missing values were found. Exploratory factor analysis and confirmatory factor analysis were conducted to test the structural validity of the scale. For the convergent validity of the scale sub-dimensions, CR and AVE values were examined, and Cronbach's alpha value was examined for reliability. Fit values were also checked for construct validity. Correlation analysis was conducted to determine the relationship between the sub-dimensions of the scale. The SPSS 25 and Amos 24 package programs were used for data analysis.

After the research objectives and data collection tools were determined, the ethical compliance of the study was ensured by applying to the Scientific Research and Publication Ethics Committee of the Artvin Çoruh University. The committee approved the ethical compliance of the study on 31.01.2023 with the approval number E-18457941-050.99-80533. The survey was conducted both online and face-to-face between 01.02.2023-10.03.2023. The research process was carried out following the principles of the Helsinki Declaration.

RESULTS

In the research, first of all, explanatory factor analysis was conducted regarding the social health scale. The data obtained are given in Table 1.

According to the given information, it has been decided that the data set is suitable for factor analysis due to the KMO value of the scale being greater than 0.70 and the p-value of Bartlett's Test of Sphericity being less than 0.05. It has also been determined that the sample size is sufficient (23). Furthermore, it has been observed that the originally three-dimensional social health scale, which has been translated into Turkish, shows a distribution of four dimensions. It has been found that the factor loadings of the scale items are greater than 0.500, indicating that the items explain the corresponding dimensions.

Table 1: Exploratory factor analysis for the social health scale

No	General Social Health	Risky Social Behaviors	Economic Dimension	Isolation
S1	0.649			
S2	0.513			
S3	0.536			
S4	0.672			
S6	0.665			
S9		0.529		
S10		0.787		
S11		0.686		
S12		0.640		
S14			0.858	
S15			0.884	
S5				0.536
S8				0.740
S18				0.500

Evaluation Criteria Extraction Method: Principal component analysis.
Rotation Method: Varimax with Kaiser normalization.
KMO: 0.766
Bartlett's test of sphericity: (Approx. chi-square: 1072.732 df: 91 p:0.000).
The eigenvalue is 7.312 and the explained variance is 52.214%.

Additionally, since the explained variance ratio is greater than 50.0%, it has been accepted that the dimensions represent the scale.

The items coded S7, S16, and S17 in the original scale were excluded from the Turkish version of the scale due to their factor loadings being less than 0.500. Additionally, item S13 was excluded from the scale because it showed distribution in two dimensions. As a result, the original English version of the scale with 18

items and 3 dimensions was reduced to a Turkish version with 14 items and 4 dimensions. The dimensions of the scale were named after a concept that represents the items grouped under each dimension.

To test whether the dimensions obtained from the exploratory factor analysis were internally consistent, a confirmatory factor analysis was conducted at the first level. The Amos output of the model is given in Figure 1.

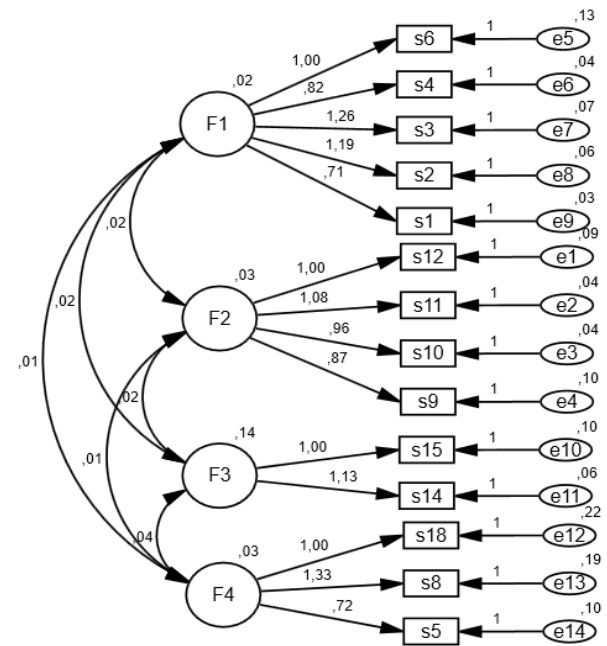


Figure 1: Amos output of confirmatory factor analysis of Social Health Scale

F1: General social health **F2:** Risky social behaviors
F3: Economic dimension **F4:** Social isolation.

The analysis conducted on the model presented in Figure 1 evaluated the goodness of fit indices of the model. Table 2 shows the lower and upper limits of some goodness of fit measures as well as the goodness of fit indices obtained from the scale.

Table 2: The goodness of fit indices for the social health scale model

Index Type	Model Fit Criterion	Good Fit	Acceptable Fit	Model	Result
Absolute Fit Indices	X ² /df	x ² /df ≤ 3	x ² /df ≤ 5	1.921	Good Fit
	GFI	0.90 ≤ GFI ≤ 1	0.85 ≤ GFI < 0.90	0.958	Good Fit
	RMSEA	0 < RMSEA ≤ 0.05	0.05 < RMSEA ≤ 0.08	0.046	Good Fit
	RMR	0 < RMR ≤ 0.05	0 < RMR ≤ 0.08	0.007	Good Fit
Increasing fit indices	CFI	0.95 ≤ CFI ≤ 1	0.90 ≤ CFI < 0.95	0.934	Acceptable Fit
	IFI	0.95 ≤ IFI ≤ 1	0.90 ≤ IFI < 0.95	0.936	Acceptable Fit
	TLI	0.95 ≤ TLI ≤ 1	0.90 ≤ TLI < 0.95	0.916	Acceptable Fit

Source:(24).

When Table 2 is examined, it can be seen that the values of CMIN, GFI, RMSEA, and RMR are in the range of perfect fit, while the values of CFI, IFI, and TLI are in the range of acceptable fit. Accordingly, it can be expressed that the factor structures of the four-dimensional social health scale are in harmony. In other words, the scale provides evidence of construct validity. Table 3 presents the factor loadings, standard errors, C.R values, and p values of the variables included in the scale.

Table 3: Regression weights

Variables	Dimensions	Estimate	S.E.	C.R.	P
S12 <---	F2	1.000			
S11 <---	F2	1.082	0.125	8.657	***
S10 <---	F2	0.962	0.115	8.383	***
S9 <---	F2	0.870	0.127	6.834	***
S6 <---	F1	1.000			
S4 <---	F1	0.822	0.140	5.884	***
S3 <---	F1	1.262	0.208	6.073	***
S2 <---	F1	1.187	0.194	6.112	***
S1 <---	F1	0.712	0.124	5.743	***
S15 <---	F3	1.000			
S14 <---	F3	1.133	0.152	7.481	***
S18 <---	F4	1.000			
S8 <---	F4	1.332	0.333	4.001	***
S5 <---	F4	0.719	0.195	3.686	***

The results of the confirmatory factor analysis conducted in the scope of the study are presented in Table 3. When the values are examined, it can be seen that the estimated coefficients ($p > 0.500$), standard error ratios, C.R values ($C.R > 1.96$) at 99% confidence level, and p-values ($p < 0.01$) for the observed variables are at acceptable levels. It was found that all t-values were greater than 1.96, indicating that the relationships between latent and observed variables were significant. Table 4 provides the CR, AVE, and Cronbach's alpha values of the sub-dimensions of the scale.

Table 4: CR, AVE, and Cronbach alpha values of scale sub-dimensions

Dimensions	CR (Composite Reliability)	AVE (Average Variance Extracted)	Cronbach Alpha a
General Social Health	0.746	0.373	
Risk Behaviors	0.759	0.445	0.722
Economic Dimension	0.879	0.551	
Isolation	0.623	0.362	

When Table 4 is examined, it can be seen that the general Cronbach Alpha value of the social health scale is 0.772. Since this value is between $0.70 \leq \alpha < 1.00$, it is decided that the scale is significantly reliable. According to Hair et al., when the AVE value is less than 0.50 but the CR is greater than 0.60, the construct validity is still achieved. Therefore, it can be stated that the sub-dimensions of the scale have construct validity and reliability (25).

To determine whether there is a significant relationship between the sub-dimensions of the social health scale in the study, a correlation analysis was conducted. According to the findings, all correlations between sub-dimensions were found to be statistically significant, with correlation coefficients ranging from 0.190 to 0.429. When evaluating the correlation coefficients, it can be concluded that there is no multicollinearity problem, as the tolerance values for all variables calculated are below 0.10 and the VIF values are below 10 (26).

DISCUSSION

According to the findings obtained in the study, it has been confirmed that the Turkish version of the social health scale developed by Johnson et al. has a good level of reliability and validity (22). These results demonstrate that a scale is an appropriate tool for measuring university students' social health behaviors in Turkey. It was observed that the distribution of the sub-

dimensions of the scale and its structural validation were ensured through exploratory factor analysis and confirmatory factor analysis. Furthermore, the CR, AVE, and Cronbach Alpha values obtained from the scale's sub-dimensions also indicate that the scale is valid and reliable.

In the research, the KMO test was conducted to determine whether or not to use exploratory factor analysis. The KMO test ascertains correlations between variables and the appropriateness of factor analysis (23). It is anticipated that the KMO test value will fall between 0 and 1. As the obtained KMO value approaches 1, it is understood that the application of factor analysis is suitable for the scale (25). It has been observed that the KMO value for the Turkish version of the Social Health Scale is appropriate for factor analysis. Johnson et al. found in their study on American students that the KMO value was at a sufficient level (22).

In the study, it was observed in the exploratory and confirmatory factor analysis that the factor loads were greater than 0.50 and are considered adequate within the scope of the literature (24). In the study where the original version of the scale was developed, Johnson et al. determined that the item load values were at an adequate level (22).

In the research, it was identified that the model fit values align very well and that the new version is structurally consistent (27). Johnson et al. stated in their study that model fit values respectively; a CFI greater than 0.95 (>0.095), a RMSEA less than .06 (<0.06), a WRMR less than .90 (<0.90), or no significant chi-square value (>0.05) are all indicators of a good model fit (22).

The original scale consists of three subscales, however, in this study, four subscales have emerged. According to Kline and DeVellis, changes in the number of dimensions of a scale can often occur due to the discovery of different sub-dimensions of the measured concept or the combination of conceptually similar dimensions (28,29). Therefore, the number of dimensions of a scale can differ in different languages and cultures, and it does not pose a problem.

The general social health dimension of the scale's subscales includes basic needs such as housing, food, and hygiene in daily life. The risky social behaviors subscale includes expressions that carry serious harm such as alcohol, sexuality, and drug use. The economic dimension includes statements that question the person's financial situation during university life. The isolation subscale covers questions that express situations such as stress, bad internet use, and inability to establish friendships.

It is anticipated that the Social Health Scale, which has been introduced into the Turkish literature through this study, will contribute more to the literature with further research. Additionally, it is expected that examining the social health behaviors of immigrants, health department students, and students from different departments will provide different insights. The information obtained through the scale is important in terms of providing ideas for social and health policies aimed at young people and presenting evidence-based information.

However, there are some limitations to this study that should be acknowledged. First, the sample size was relatively small compared to the total population, which may limit the generalizability of the findings. Second, the study only assessed the validity and reliability of the scale in the Turkey population, and further research is needed to determine its applicability in other cultural and linguistic contexts. Finally, the study did not assess the sensitivity of the scale to changes over time, which may limit its usefulness in longitudinal studies.

In conclusion, the present study provides evidence for the validity and reliability of the translated scale in the Turkey population. The findings of this study have important implications for researchers and practitioners interested in measuring the construct of interest in the Turkey context. Further research is needed to determine the applicability of the scale in other cultural and linguistic contexts and to assess its sensitivity to changes over time.

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YOUTUBE™ QUALITY AS A RESOURCE ON RATIONAL USE OF ANTIBIOTICS IN THE COMMUNITY: A REMEDIAL APPROACH TO ANTIMICROBIAL MANAGEMENT

Toplumda Akılcı Antibiyotik Kullanımı Hakkında Bir Kaynak Olarak Youtube™ Kalitesi: Antimikrobiyal Yönetimine İyileştirici Bir Yaklaşım

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ABSTRACT

Objective: Infections for which antibiotics were influential in the past, cannot be adequately treated today and the evolution of microorganisms with multiple antibiotic resistance is due to the irrational use of antibiotics. The study aims to help develop effective drug information systems for rational antibiotic use and enable patients to make informed treatment decisions.

Material and Methods: A search of YouTube™ was performed using the three keywords 'correct antibiotic use', 'wrong antibiotic use', and 'antibiotic resistance'. Video lengths, dates of upload, numbers of total views, likes, dislikes, and comments were collected. The study viewed and analyzed the top 90 directly relevant videos for each of our search terms. Two pharmacologists independently evaluated the videos. For each video viewed, the following information was analyzed: the video's title, the date it was uploaded, the source and location of the video, the number of views the video has received overall, its duration, the number of likes and dislikes, and the number of comments.

Results: 90 of the top 422 videos from the YouTube™ search results after evaluation were added to the study for additional examination. The mean DISCERN and JAMA scores were 46.42±10.91 and 2.29±0.58, respectively. There was a high correlation between the videos evaluated according to DISCERN and JAMA scales.

Conclusion: YouTube™ videos can be used as a valuable source for rational antibiotic use. This inclusion of antimicrobial resistance topics in social media could be a cornerstone in the worldwide fight against antimicrobial resistance if tested extensively in field conditions and used in the public interest on a larger scale.

Keywords: Drug resistance, microbial, antimicrobial drug resistance, drug use

ÖZ

Amaç: Antibiyotik kullanımı enfeksiyon hastalıklarının tedavisinde devrim niteliğinde bir dönüşüm oluştursa da hastalıklardaki artışa paralel olarak uygunsuz ve akılcı olmayan kullanım sonucu antimikrobiyal direnç sorununu da beraberinde getirmiştir. Çalışma, akılcı antibiyotik kullanımı için etkili ilaç bilgi sistemlerinin geliştirilmesine yardımcı olmayı ve hastaların bilinçli tedavi kararları vermesini sağlamayı amaçlamaktadır.

Gereç ve Yöntemler: "Doğru antibiyotik kullanımı", "Yanlış antibiyotik kullanımı" ve "Antibiyotik direnci" üç anahtar kelime kullanılarak bir YouTube™ araması yapıldı. Video uzunlukları, yükleme tarihleri, toplam görüntüleme sayıları, beğeniler, beğenmemeler ve yorumlar toplandı. Çalışma, arama terimlerimizin her biri için doğrudan alakalı en iyi 90 videoyu inceledi ve analiz etti. Video bağlantıları daha sonra analiz edilmek üzere kaydedildi. Videolar, altyazısız, İngilizce dilinde, müzik ya da anime hayvan gibi görüntüler içermeyen videolar arasından seçilmiştir. Bununla birlikte tüm seçilen videoların, halkı doğru bilinçlendiren ve reklam amaçlı bilgiler içermeyen videolar olmasına öze gösterildi. İki farmakolog bağımsız olarak videoları değerlendirdi. Görsütülen her video için şu bilgiler analiz edildi: videonun başlığı, yüklendiği tarih, videonun kaynağı ve konumu, videonun toplam izlenme sayısı, süresi, beğeni ve beğenmeme sayısı ve yorum sayısı DSÖ (Dünya Sağlık Örgütü) kılavuzu tarafından hazırlanan 10 soru, seçilen videolardaki tıbbi bilgileri değerlendirmek için kullanılan en kaliteli DISCERN ve JAMA ölçekleri kullanılarak puanlandı.

Bulgular: Değerlendirme sonrası YouTube arama sonuçlarında en çok görüntülenen 422 videodan 90 tanesi inceleme için çalışmaya eklendi. Ortalama etkileşim oranı 0.58 idi. Ortalama DISCERN ve JAMA puanları sırasıyla 46.42±10.91 ve 2.29±0.58 idi. DISCERN ve JAMA ölçeklerine göre değerlendirilen videolar arasında yüksek korelasyon vardı.

Sonuç: YouTube™ videoları, akılcı antibiyotik kullanımı için yararlı bir kaynak olarak kullanılabilir. Antimikrobiyal direnç konularının sosyal medyada bu şekilde yer alması, saha koşullarında kapsamlı bir şekilde test edilmesi ve daha geniş ölçekte kamu yararına kullanılması halinde antimikrobiyal dirence karşı dünya çapında mücadelede bir mihenk taşı olabilir.

Anahtar Kelimeler: İlaç direnci, mikrobiyal, antimikrobiyal ilaç direnci, ilaç kullanımı.



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INTRODUCTION

A drug is described as "a substance or product used or intended to be utilized to modify or assess physiological systems or pathological situations for the benefit of the recipient" by the World Health Organization (WHO) (1). WHO drew attention to the Rational Use of Medicines (RDU) studies for the first time in 1985. It defined RDU as a set of rules that require patients to take medication according to their clinical needs, at a dose and timeframe sufficient to meet their personal needs, at the lowest cost to themselves and society. However, it has been reported that more than half of drugs worldwide are inappropriately prescribed, prepared, sold and misused by patients (1-4). In addition to being beneficial for human health by treating diseases when used correctly, the drug has an important place in human and public health because it is a substance that can create life risks when used incorrectly (5). Giving information about their treatment by allocating enough time for the patients, eliminates the negative habits about drugs. Eliminating the lack of knowledge contributes to the correct use of drugs (6,7). Rational Use of Medicines practice consists of planning, execution and monitoring procedures that ensure the effective, safe and economical use of drugs. For this process to work properly, it requires raising awareness of the pharmaceutical industry, healthcare professionals, especially physicians and pharmacists, and society, under the control of the state (8). The main principle in RDU; is the necessity of using the medicine rationally and correctly, at the right time, in the required quality, in the required dose, according to the condition of the disease and the patient (9). Irrational drug use is an important health problem that brings an economic burden to society and the patient as a result of bacterial resistance to antibiotics, ineffective treatment and drug side effects (10). The main problems generally identified in research on irrational drug use include overprescribing drugs, misuse of drugs, unnecessary use of expensive drugs, unnecessary consumption of antibiotics, or recommending unnecessary injections (11). Studies have shown that people are mostly in the

habit of taking medications such as painkillers and antibiotics at home (12-14). Antibiotics are either used in off-label viral diseases or unconsciously used at inappropriate times and doses. As a result, the development of resistance to antibiotics is induced in microorganisms (15). Inappropriate use of antimicrobials can be summarized as taking insufficient doses for non-bacterial infections, excessive use of injections rather than oral formulations, and non-prescription according to clinical guidelines. Self-medication and off-dosage regimen practices, which generally deviate from the prescription drug package insert lead to overuse of antibiotics. RDU covers many stages from drug production, distribution, prescription and disposal. When evaluated from this point of view, many methods can be a solution to the mistakes made in the use of drugs. The most important of these, are educational activities. Both health workers and the public need to be aware of this issue. Another method to be implemented involves information campaigns and promotional activities with the main purpose of raising awareness. Developed countries follow programs such as follow-up, which includes basic protocols for medical management and guidelines for prescribing, to prevent the irrational use of antibiotics (16-19). Compliance with the guidelines developed for rational antibiotic use prevents excessive antibiotic consumption (20-22). Ineffective and irrational drug use is a serious problem and has an important place in health expenditures all over the world. People across the world have a propensity to self-medicate and suggest to one another. Antibiotic overuse and misuse can result in the development of bacterial resistance and raise the cost of healthcare services. Additionally, a variety of pharmacological side effects are seen (23,24). Irrational antibiotic use is a common problem in Turkey. Surveillance studies found that between 40 and 60% of antibiotics were used inappropriately (25-27). The present research examined YouTube videos on careful antibiotic usage for public health to determine their use and potential efficacy as a public education tool.

MATERIALS AND METHODS

The video searching was performed using the search terms "correct antibiotic use," "wrong antibiotic use," and "antibiotic resistance," in order to find the videos pertinent to educating the general public about rational antibiotic use on YouTube on August 24, 2022 (www.youtube.com); which resulted in a total of 422 videos. According to research, most studies that utilize YouTube as a search engine, are watched in the top 60-200 videos and first for search phrases, and 95% of users who search YouTube online only watch the 60 videos that come initially during a search (28). Therefore, we watched and analyzed the first 90 videos directly related to the topic for each of our search terms. Video links were recorded for later analysis. The videos were screened to exclude those that were not in English, lacked subtitles and headings, were not medically related, duplicated, contained agricultural or animal antibiotics, were music videos or otherwise not intended to educate the general public, were commercials, lacked information, or were shorter than five minutes. Two pharmacologists (S.K. and G.A.) independently evaluated the videos. DISCERN and JAMA scores were averaged for the two investigators' divergent assessments. For each video, the following information was analyzed: The video's title, the date it was uploaded, the source and location of the video, the number of views the video has received overall, its duration, the number of likes and dislikes, and the number of comments. Health universities or health professional organizations, TV stations or news organizations, health information websites, and individual users with a medical identity were all classified as download sources. The 10 questions prepared by the WHO drugs evaluation indicator guide were scored using the highest quality DISCERN and JAMA scales, which are used to evaluate the medical information in selected videos. The DISCERN scoring system consists of 16 questions (29-31). Each question should be scored between 1-5, within the scores of 16-75. There are three sections to measure treatment information, reliability, and general information quality. A higher score on the scale

indicates higher information quality. The scores were classified as 'excellent' and 'good', between 75 and 63 points, "very good" between 51-62 points, "moderate" between 39-50 points, "weak" between 28-38 points, and "very weak" below 28 points are (30).

The JAMA rating system is one of the top scales for assessing medical information. Each of the 4 different criteria in each question is worth 1 point. The highest quality is indicated with a score of 4 (31).

In addition, the popularity of the videos was calculated one by one using the formula 'Video Power Index (VPI): (Likes-Dislikes) x100/Total views (32).

According to the WHO recommendation, the usefulness of each film in educating the public about ethical antibiotic use practices was evaluated on a scale of 0 to 10 (Table 1). Videos rated 0 as not helpful, 1 to 3 rated as less valuable, 4-7 rated videos as 'moderately useful', and 8-10 rated as very useful. When researchers disagreed on how to categorize or score videos, they discussed the matter until they agreed by reading the relevant guidelines and literature. This research does not include human subjects, human material, or human data. The study is exempt from ethical approval as it is observational and uses publicly available data.

The videos that did not meet the exclusion factors were included in the study. Attention should be paid to the choice of keywords to ensure that the community can access information on correct and rational drug use while avoiding incorrect content. In addition, content published for advertising purposes and not prepared by health professionals, and videos that may be found too long and boring for the audience were excluded because they did not serve the purpose.

Table 1: Usefulness score used to evaluate videos.

Questions	Score
Antibiotics are not used in the treatment of diseases of viral origin. Does it state that antibiotics are used for the treatment of bacterial diseases?	1
Are antibiotics said to be of no use in non-microbial diseases?	1
It is said that antibiotics are not used for pain relief or fever reduction.	1
Is it given that only the physician can recommend the antibiotic and that it is undesirable to use the antibiotic for longer than the recommended time as well as to stop it before the time recommended by the physician?	1
Is it shared that the wrong use of antibiotics outside of the doctor's control or recommendation may cause the existing disease not to improve or worsen?	1
Is it said that unconscious use of antibiotics, such as self-medication, can lead to treatment failure called antibiotic resistance, and that additional health problems may arise, as well as diseases that do not get better?	1
Does the video encourage rational drug use? Will this publication affect the consumer positively?	1
Is it stated by whom the publications were made? Is it reliable (Ministry of Health, the pharmaceutical company?) Does it comply with legislation and guidelines?	1
Is it said that medicines should only be obtained from pharmacies?	1
Are there health professionals in the content of the broadcast?	1
Total Score 0= not useful; scores 1–3 = slightly useful; scores 4–7 = moderately useful; scores 8–10 = very useful.	

Statistical analysis

All statistical analyses in the study were performed using IBM SPSS Statistics version 20 (SPSS Inc., Chicago, IL, USA). The continuity of the variables was examined using the Kolmogorov-Smirnov and Shapiro-Wilk tests. Mann-Whitney U and Kruskal-Wallis analyzes were used to compare more than two groups that did not show normal distribution. Multiple regression analysis was performed to measure independent variables. Results were considered statistically significant when the p-value was less than 0.05.

RESULTS

After evaluation, 90 of the top 422 videos from the YouTube search results were added to the study for additional examination. Most of the excluded videos were non-medical content 242 (73%), ads 12 (3.7%), videos without any information 33 (10%), commercial for-profit companies 17 (5.3%), non-English videos, 7 (2.1%), and videos shorter than 5 minutes 19 (5.9%) were also excluded. Healthcare professionals contributed a significant percentage (42.2%) of the videos, while individual users uploaded 27.8% of them.

Of the remaining videos 8.9% were uploaded by educational institutions, 1.1% by hospitals, 18.9% by news outlets and media featuring healthcare professionals, and 1.1% by medical providers (Figure 1). The average length of the videos was 2.04±1.3 minutes. The average number of views of the videos was 41.934±14.9206. The average viewing rate was 1024.12. The mean interaction rate was 0.58 (ranging from 0.53 to 24.12). The mean DISCERN and JAMA scores were 46.42±10.91 and 2.29±0.58, respectively. There was a high correlation between the videos evaluated according to DISCERN and JAMA scales ($r=0.612$, $p<0.001$). According to the average DISCERN scores, the quality of the videos was determined to be extremely poor at 2%, poor at 15%, fair at 68%, good at 11% and exceptional at 4%. In 18% of the movies, the average JAMA score was 2, in 65%, it was between 2 and 3, and in 17% it was over 3 (Figure 2). Many of the videos (51.1%) were rated as being just slightly beneficial overall by the JAMA scale. While 25 videos (27.8%) found it useful, 3 videos (3.3%) were very useful, and 16 videos (17.8%) did not provide useful information. The most watched video was a healthcare institution video that lasted 0.15 seconds and

was watched nearly 1 million times in three years, describing the misuse of antibiotics. No significant correlation was found between the number of views and VPI scores ($p=0.698$), engagement rate ($p=0.247$) and viewing rate ($p=0.771$). However, no relationship was found between the video source and the number of views ($p=0.465$), view rate ($p=0.286$), or engagement rate

($p=0.521$). No statistically significant correlation was found between VPI scores and DISCERN or JAMA scaling scores ($p>0.05$). Considering the video length (video duration), there was a statistically significant correlation between both DISCERN scores ($r=0.533$, $p<0.001$) and JAMA scores ($r=0.542$, $p<0.001$).

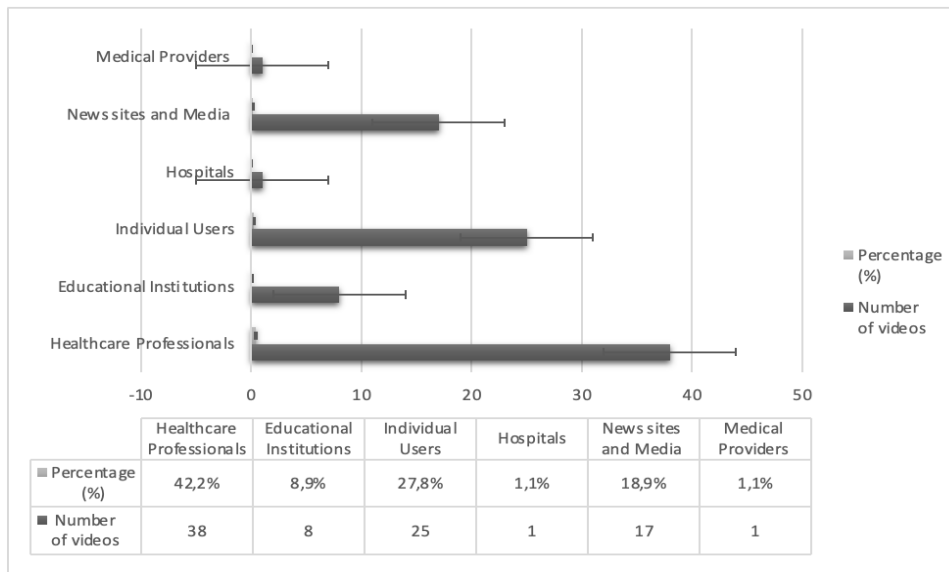


Figure 1: Source of upload of videos

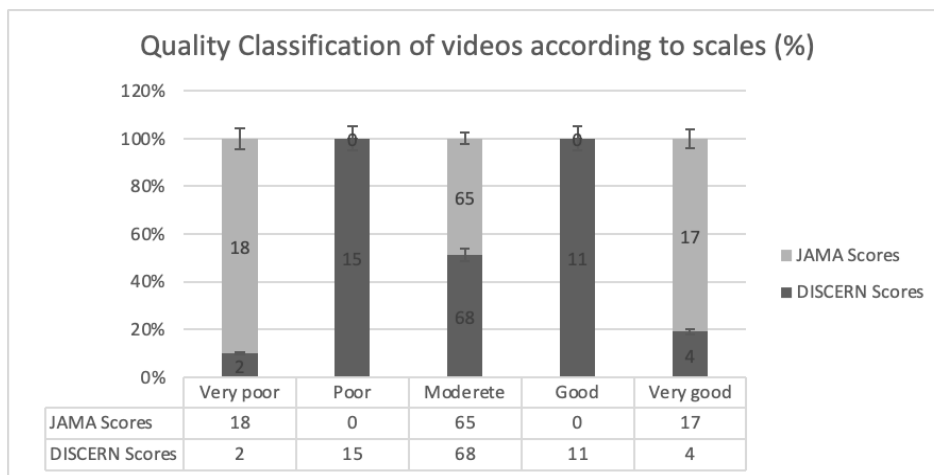


Figure 2: Videos evaluated according to DISCERN and JAMA scales

DISCUSSION

The internet, which has entered our daily lives, maintains its feature of being a useful information and communication source that is of great interest (33). According to surveys found in prior studies, patients rely on health data obtained from internet-based sources (34). Considering all these data, YouTube is an

important platform as a potential source of information. However, it has the disadvantage that the reliability of the information given is questionable. Misleading videos can be uploaded to this platform from many professions or individually on any subject. As a result, medical information on the internet must be trustworthy. Studies published in the literature to date have evaluated

the quality and accuracy of videos on the internet using some scoring systems to ensure information reliability (30,31,35). According to the literature, this study is the first to examine the accuracy and informational value of YouTube videos about appropriate drug use. Our study is significant for public health because it is the first in the literature to examine the information content and validity of videos published on YouTube about rational drug use, even though many scoring systems are used to assess the quality and accuracy of videos on the internet. In this study, it was investigated whether the information found in YouTube videos varied in terms of quality, dependability, and validity depending on the video's source. Most of the drug usage films on YouTube were of mediocre quality. Videos from the health channels were noticeably better quality than other videos. Our working premise was that reputable organizations would pioneer high-quality videos and produce YouTube videos with a medical theme for the general audience. However, only 31.1% of the videos had a very broad educational scope. Most YouTube users watched medium-quality videos provided by individual and media websites and left a few comments. The VPI of videos originating from news channels and media did not correlate with DISCERN or JAMA scores. Studies have reported that the higher the video quality, the shorter the video duration (36,37). Although there are studies that weakly correlate video quality with video length, our study found no association between video durations and VPI or video ratio. Videos in which information is told in the form of stories attract more viewers. In our study, there was a strong link between DISCERN scores and movie length. The most popular scales in the literature JAMA and DISCERN were used to evaluate YouTube videos about prudent antibiotic usage, and the analyzed films displayed a substantial correlation with both scales. The mean DISCERN score of the videos was 46.42 ± 10.91 and the JAMA score was 2.29 ± 0.58 out of 4.0. These average values are close to our expectations. Considering the distribution of the quality of the videos according to the DISCERN scoring system, only 11% got 'good' and 68% got a 'medium'

score. It was interesting to see that, on both measures, the quality of the videos uploaded from health channels was superior to that of other significant news channels. While the healthcare practitioner or organization should be concerned about the lack of a connection between the public's response to videos and the caliber of the films, the research's findings provide some insight into the value of education on social media.

In the long term, increased usage of social media provides an opportunity to raise awareness about the prevention of disease, rational antibiotic use, and antibiotic resistance through various online movies, games, and photographs. The study's weakness is that the search terms employed can influence the recovery of relevant data. The content of YouTube videos changes almost every second, leading to an increase in content. Because the sensitivity and specificity of the results may vary depending on the time frame examined. Finally, it should be noted that antibiotic resistance is a serious issue and an unavoidable fact. Videos on YouTube might be a good resource for logical antibiotic usage. Public health and pharmacology experts must raise the standard of instruction they offer. For this reason, the only way to prolong the life of patients in need of antibiotics without developing resistance to antibiotics is to use them rationally, in line with appropriate guidelines, by providing reliable and sufficient information flow for the public.

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YOĞUN BAKIM ÜNİTESİNDEN İZOLE EDİLEN KARBAPENEM DİRENÇLİ PSEUDOMONAS VE KLEBSIELLA SUŞLARININ SEFTAZİDİM/AVİBAKTAM DUYARLILIKLARININ SAPTANMASI

*Determination of Ceftazidime/Avibactam Susceptibilities of Carbapenem-Resistant
Pseudomonas and Klebsiella Strains Isolated From Intensive Care Unit*

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ÖZ

Amaç: Giderek artan antibiyotik direnci ile, *Pseudomonas aeruginosa* ve *Klebsiella spp.* gibi gram negatif patojenlerin tedavisi zorlaşmakta, mortalite ve morbidite artmaktadır. Bu nedenle dirençli suşlara etkili olabilecek yeni antibiyotikler geliştirilmektedir. Seftazidim/avibaktamın serin karbapenemaz üreten Gram negatif bakterilerde etkinliği kanıtlanmıştır. Bu çalışmada yoğun bakımdaki hastalardan izole edilen karbapenem dirençli *Pseudomonas aeruginosa* ve *Klebsiella spp.* suşlarında seftazidim/avibaktam, aminoglikozid (amikasin) ve florokinolon (siprofloksasin) duyarlılığının değerlendirilmesi amaçlanmıştır.

Gereç ve Yöntemler: Eylül 2022-Haziran 2023 tarihleri arasında yoğun bakım ünitesinde yatan hastalardan izole edilen *Klebsiella spp.* ve *Pseudomonas spp.* suşlarından karbapenem dirençli olan 43 izolat çalışmaya dahil edildi. Disk difüzyon testi ile seftazidim/avibaktam duyarlılıklarına bakıldı. European Committee on Antimicrobial Susceptibility Testing kriterlerine göre yorumlandı. İstatistiksel analiz için the statistical package for the Social Sciences version 24.0 (IBM SPSS Inc, Chicago) kullanıldı.

Bulgular: Karbapenem dirençli 33 *Klebsiella spp.* ve 10 *Pseudomonas spp.* suşunun tümünde seftazidim/avibaktam duyarlılığı saptandı. *Klebsiella spp.* ve *Pseudomonas spp.* suşlarında aminoglikozit (amikasin) direnci sırasıyla %42.4 ve %50, florokinolon (siprofloksasin) direnci ise sırasıyla %6 ve %40 olarak belirlendi.

Sonuç: Komplike üriner sistem enfeksiyonu, komplike intraabdominal enfeksiyonlar, sağlık bakımı ilişkili pnömoni ve ventilatör ilişkili pnömonilerin tedavisinde kullanımı önerilen seftazidim/avibaktamın çalışmamızda saptanan duyarlılık paterni nedeniyle karbapenemaz üreten suşlarda (metallobetalaktamazlar hariç) birincil tedavi seçeneği olması önerilmektedir.

Anahtar Kelimeler: Seftazidim/avibaktam, karbapenemaz, antibiyotik direnci

ABSTRACT

Objective: Increasing antibiotic resistance makes treatment of Gram-negative pathogens such as *Pseudomonas aeruginosa* and *Klebsiella spp.* difficult and increases mortality and morbidity. Therefore, new antibiotics that can be effective against resistant strains are being developed. The efficacy of ceftazidime/avibactam has been proven in Gram negative bacteria producing serine carbapenemase. In this study, we aimed to evaluate ceftazidime/avibactam, aminoglycoside, fluoroquinolone susceptibility in carbapenem-resistant *Pseudomonas aeruginosa* and *Klebsiella spp.* isolated from intensive care unit patients.

Material and Methods: Between September 2022 and June 2023, 43 carbapenem resistant *Klebsiella spp.* and *Pseudomonas spp.* strains isolated from patients hospitalized in the intensive care unit were included in the study. Ceftazidime/avibactam susceptibilities were determined by disk diffusion test. The results were interpreted according to the European Committee on Antimicrobial Susceptibility Testing criteria. The statistical package for the Social Sciences version 24.0 (IBM SPSS Inc, Chicago) was used for statistical analysis.

Results: Ceftazidime/avibactam susceptibility was detected in all 33 carbapenem-resistant *Klebsiella spp.* and 10 *Pseudomonas spp.* strains. Aminoglycoside resistance in *Klebsiella spp.* and *Pseudomonas spp.* was 42.4% and 50%, respectively, and fluoroquinolone resistance was 6% and 40%, respectively.

Conclusion: Ceftazidime/avibactam, which is recommended for the treatment of complicated urinary tract infections, complicated intra-abdominal infections, healthcare-associated pneumonia and ventilator-associated pneumonia, is recommended to be the primary treatment option for carbapenemase-producing strains (except metallobetalactamases) due to the susceptibility pattern found in our study.

Keywords: Ceftazidime/avibactam, carbapenemase, antibiotic resistance



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GİRİŞ

Enfeksiyon hastalıklarında antibiyotiğe direnç nedeniyle gelişen tedavi yanıtınlığı ve buna bağlı ölüm oranları her geçen gün daha da artmaktadır (1). *Pseudomonas aeruginosa* ve *Klebsiella spp.* gibi gram negatif fırsatçı patojenler sağlık hizmetleriyle ilişkili enfeksiyonlara sebep olurlar ve özellikle bağışıklık sistemi baskılanmış bireylerde görülen bu enfeksiyonlar patojenlerin dirençli olması halinde yüksek morbidite ve mortalite gösterir (2).

Bakterilerde görülen intrinsek faktörler, gen mutasyonları ve gen transferleri antibiyotiklere karşı direnç gelişmesinde önemli rol oynar (3). Karbapenemler dirençli Gram negatif bakterilerde önemli bir tedavi seçeneği olsa bile karbapenem dirençli suşların sıklığı artmaktadır. *Pseudomonas* suşlarında görülen dış membran porin OprD'yi kodlayan gen mutasyonu, efflux pompaları karbapenem direncinden sorumludur (2). Karbapenem direncine ek olarak MDR ve XDR fenotipik özelliğe sahip kolonilerin metallobetalaktamazları (MBL) ve aminoglikozit modifiye edici enzimleri de üretebildiği bilinmektedir (4).

Yeni bir non-β-laktam diazabisikloktan olan β-laktamaz inhibitörü avibaktam (AVI), A, C ve D sınıfı serin β-laktamazlara geri dönüşümlü kovalent bileşikler oluşturarak enzim aktivitesini inhibe etmektedir (5). Ancak Zn varlığı ile karakterize MBL'ler AVI tarafından inhibe edilmezler. Bu nedenle serin karbapenemaz üreten Gram negatif bakterilerde seftazidim/avibaktam (CAZ/AVI) etkinliği kanıtlanmış bir tedavidir (6). Ancak klinik kullanımı artıktıca ekspresyonu artmış β-laktamaz varyantları, dış membran proteinlerinde (OMP) mutasyonlar, karbapenemaz üreten *Klebsiella* suşlarında görülen seftazidime affinitesi artmış hidroliz enzimleri tedaviye karşı gelişen direnç mekanizmalarını oluşturmaktadır (7-9).

Karbapenem dirençli Gram negatif bakterilerin lokal epidemiyolojisini anlamak için çeşitli çalışmalar yapılmaktadır (10). Bu çalışmada amacımız hastanemiz yoğun bakımından gelen örneklerde bulunan

karbapenem dirençli Gram negatif bakterilerin CAZ/AVI, aminoglikozit ve florokinolon (siprofloksasin) duyarlılıklarını değerlendirmektir.

GEREÇ VE YÖNTEM

Bu çalışmada Eylül 2022-Haziran 2023 tarihleri arasında yoğun bakım ünitesinde yatan hastalardan laboratuvarımıza gönderilen 859 adet kan, idrar ve trakeal aspirat gibi klinik örneklerde üreyen 252 bakteri izolatu retrospektif olarak incelendi. Bu izolatlardan 53 tanesi *Klebsiella spp.* ve *Pseudomonas spp.* suşlarına aitti. Suşların BD Phoenix™ otomatize tanımlama ve antibiyotik duyarlılık testi sonuçları retrospektif taranarak ertapenem, imipenem veya meropenemden en az birine karşı direnç saptanan 43 suş karbapenem dirençli kabul edilerek çalışmaya dahil edildi. Bu izolatların florokinolon (siprofloksasin) ve aminoglikozit (amikasin) duyarlılıkları BD Phoenix™ otomatize bakteri identifikasyon ve antibiyotik duyarlılık testi sonuçları retrospektif olarak taranarak kaydedildi. İzolatlara ait dondurulmuş stoklar kültürlendi ve her numunede 10⁸ CFU/ml bakteri elde edebilmek için 0.5 Mcfarland bulanıklık derecesinde steril serum fizyolojik içerisinde süspansiyonları hazırlandı (11). Disk diffüzyon testi için Müller Hinton Agara süspansiyonlar steril pamuklu çubuklar ile ekildi. Steril pensetle seftazidim/avibaktam diskleri yerleştirildi ve 24 saat boyunca 35± 2°C' de inkübe edildi. İnhibisyon zonlarının çapları cetvelle ölçüldü ve European Committee on Antimicrobial Susceptibility Testing (EUCAST) kriterlerine göre yorumlandı (12). Çalışma iki kez tekrarlandı.

İstatistiksel analiz için the statistical package for the Social Sciences version 24.0 (IBM SPSS Inc, Chicago) kullanıldı. Tanımlayıcı istatistiksel analiz için frekans hesaplandı ve yüzde değeri kullanıldı. Suşlar arasındaki antibiyotik duyarlılığı Ki-kare testi ile karşılaştırıldı. Sonuçlar %95 güven aralığında değerlendirilerek anlamlılık düzeyi p<0.05 olarak belirlendi.

Bu çalışma Kırıkkale Üniversitesi Tıp Fakültesi girişimsel olmayan araştırmalar etik kurulu tarafından

onaylanmıştır (Tarih: 27.09.2023, karar no: 2023.09.09).

BULGULAR

Retrospektif olarak taranan 53 suşun 42 tanesi *Klebsiella spp.*, 11 tanesi *Pseudomonas spp.* idi. *Klebsiella* suşlarının %78.5'i (n=33), *Pseudomonas* suşlarının %90.9'u (n=10) olmak üzere toplamda %81.13 (n=43) karbapenem direnci mevcuttu. Suşların

aminoglikozit grubundan amikasin, florokinolon grubundan siprofloksasin ve CAZ/AVI duyarlılıkları Tablo 1'de verildi. Çalışmaya dahil edilen karbapenem dirençli tüm suşlarda CAZ/AVI duyarlılığı saptandı. İki bakteri arasında aminoglikozit duyarlılıklarında anlamlı fark saptanmadı (p=0.676). *Pseudomonas* türleri anlamlı olarak siprofloksasine daha duyarlı bulundu (p=0.007). Bakterilerde karbapenem direncine en sık florokinolon (siprofloksasin) direncinin eşlik ettiği saptandı (%86.1).

Tablo 1: Türlerle göre saptanan antibiyotik dirençleri.

	Aminoglikozit (Amikasin) n (%)	Florokinolon (Siprofloksasin) n (%)	Seftazidim/Avibaktam n (%)
<i>Klebsiella spp</i>	19 (%57.5)	31 (%93.9)	0 (%0)
<i>Pseudomonas spp</i>	5 (%50)	6 (%60)	0 (%0)
Toplam	24 (%55.8)	37 (%86)	0 (%0)

TARTIŞMA

Bu çalışmada bir üniversite hastanesinin yoğun bakım ünitesinde yatan hastalarda etken olarak kabul edilen 43 adet karbapenem dirençli gram negatif bakterinin CAZ/AVI ve diğer antibiyotik gruplarına yönelik duyarlılık oranları saptanmıştır.

Xin Liao ve arkadaşlarının yaptığı çalışmada %87.5 olarak saptanan karbapenem direnç oranlarının yıllara göre artış göstermediği azalma eğiliminde olduğu gösterilmiştir (13). Çalışmamızda bu oran %81.13 olarak saptanmıştır. Ancak aynı çalışmada florokinolon direnci %20 olarak saptanmış ve ampirik tedavide kullanımı önerilmiş olsa da çalışmamızda bulduğumuz %86.1 oranında florokinolon direnci nedeniyle ampirik tedavi seçeneği arasında florokinolon kullanımını önermemekteyiz. Gram negatif bakterilerde florokinolon kullanımına bağlı çoklu ilaç direnci gelişimi görüldüğü için florokinolon kullanımından kaçınma ve diğer ampirik ajanlara dönmenin en güvenilir yaklaşımlardan biri olduğu düşünülmektedir (14). Amikasin direnci de özellikle *Pseudomonas* suşlarında saptanan çoklu ilaç kullanımına bağlı stres evrim teorisini destekler niteliktedir. Lucchetti-Miganeh ve arkadaşlarının yaptığı bir çalışmada hastane

ortamında antibiyoterapi kullanımının tetiklediği *Pseudomonas* direnç evrimi gösterilmiştir (15).

Yatan hastalarda yapılan bir çalışmada geniş spektrumlu antibiyotik kullanımının azalması, antibiyotik verilme süresinin kılalmasını bakterilerde direnç gelişiminin önüne geçtiği saptanmıştır (16). Seftazidim/avibaktamın alternatif bir terapötik ajan olarak kullanılmasını takiben klinik pratikte CAZ/AVI dirençli suşların çoğalmasına neden olduğu gösterilmiştir (8). Wang ve arkadaşlarının yaptığı çalışmada dünya çapındaki sörveyans verileri incelenmiş ve sadece *Pseudomonas aeruginosa* için %2-18.8 arasında CAZ/AVI'ye yönelik direnç saptanmıştır (17). Bilgin ve arkadaşlarının yaptığı çalışmada karbapenem dirençli 46 *Klebsiella* suşunda %13 CAZ/AVI direnci saptanmıştır (18). Shields ve arkadaşlarının yaptığı çalışmada hastalarda enfeksiyona neden olan meropenem dirençli karbapenemaz üreten *Klebsiella spp.* tedavisinde CAZ/AVI kullanımından sonra aynı hastaların tekrarlayan enfeksiyonlarında CAZ/AVI dirençli meropenem duyarlı *Klebsiella spp.* saptanması CAZ/AVI'nın antibiyotik direnç geni üzerinde hem olumlu hem olumsuz etkilerini göstermektedir (8,19). Çalışmamızda ise CAZ/AVI'ye bağlı direnç saptanamamasının Arcari ve arkadaşlarının yaptığı çalışmadaki gibi daha önce bu antibiyotikle

karşılaşmamış naiv suşlara bağlı olduğu düşünülmektedir (20).

Hoşbul ve arkadaşlarının yaptığı 100 pseudomonas suşuna ait duyarlılık sonuçları sırasıyla kolistin ve CAZ/AVI için %100 ve %90 olarak saptanmıştır (21). Amerika Birleşik Devletleri Gıda ve İlaç İdaresi (FDA) ve Avrupa İlaç Ajansı (EMA) tarafından komplike üriner sistem enfeksiyonu, komplike intraabdominal enfeksiyonlar, sağlık bakımı ilişkili pnömoni ve ventilatör ilişkili pnömonilerin tedavisinde kullanımı önerilen CAZ/AVI'ların meropenem, kolistin ve tigesiklin kombinasyonları ile tedaviye göre daha düşük mortalite oranına sahip olduğu bilinmektedir (22-24). Camargo ve arkadaşları ile Wu ve arkadaşlarının yaptığı çalışmalarda kolistin ve karbapenem kombinasyonu dahil alternatif tedavilere cevap vermeyen olguların CAZ/AVI ile başarılı bir şekilde tedavi edildiği ve mikrobiyolojik kür elde edildiği gözlemlenmiştir (25,26). Bu nedenle çalışmamızda saptanan duyarlılık paterni nedeniyle karbapenemaz üreten suşlarda (metallobetalaktamazlar hariç) birincil tedavi seçeneği olması önerilmektedir. Köle ve arkadaşlarının Klebsiella suşları ile yaptığı çalışmada CAZ/AVI+meropenem ile CAZ/AVI+kolistin kombinasyonlarında da invitro antibakteriyel sinerjistik etki saptanmıştır (27). Seftazidim/avibaktam ile kolistin, meropenem gibi eski antibiyotiklerin akılcı kullanımı enfeksiyon kontrolü ve akılcı ilaç yönetiminin önemli kısmını oluşturmaktadır (28). Bu nedenle yapılacak in vivo çalışmalar ile farklı direnç genlerine sahip bakterilerde CZA/AVI'nin kombinasyonları ile antimikrobiyal aktivitesinin değerlendirilmesi önerilir. Çalışmamızın en önemli sınırlaması antibiyotik duyarlılıkları değerlendirilirken polimeraz zincir reaksiyonu veya tüm genom dizilimi gibi moleküler test kullanılmadığı için genotip analizinin yapılamamasıdır. Daha önce CAZ/AVI kullanımı olmayan tek merkezli bir çalışma olması nedeni ile CAZ/AVI'ye yönelik gelişen ve gelişebilecek direnç mekanizmaları değerlendirilememiştir. Çalışmaya sadece karbapenem direncine sahip olan bakteri suşlarının seçilmesi çalışmaya dahil edilen bakteri tür sayısını azaltmıştır.

Bu nedenle *E. coli*, *E. aeruginosa* gibi diğer enterobakterlerin direnç oranları bilinmemektedir.

Yerel epidemiyoloji ve antibiyoterapi duyarlılıklarının sürveyansı ile ampirik tedavi seçeneklerinin belirlenmesi enfeksiyonla mücadelede önemli bir basamağı oluşturur. Dar spektrumlu antibiyotik kullanımının artması antibiyotik kullanımına bağlı gelişen direnç mekanizmalarını da en aza indirir. Antibiyotik dirençlerinin düzenli olarak incelenmesi gelecekteki antibiyotik tercihlerimizi belirlemesi açısından önem arz etmektedir.

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YENİDOĞANLARDA ROTASYONEL TROMBOELASTOGRAFİ İLE UMBİLİKAL VENÖZ KATETER İLİŞKİLİ TROMBOZ GELİŞİM RİSKİNİN DEĞERLENDİRİLMESİ

Evaluation of Umbilical Venous Catheter-Related Thrombosis Risk by Rotational Thromboelastography in Newborns

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ÖZ

Amaç: Yenidoğan döneminde tromboz gelişimi riski yüksektir ve en sık nedeni ise kateter ilişkili trombozlardır. Hangi bebeklerin daha riskli olduğunu önceden tespit etmeyi sağlayan bir yöntem henüz mevcut değildir. Çalışmanın amacı, umbilikal venöz kateter takılan yenidoğanlarda, rotasyonel tromboelastografi kullanarak kateter ilişkili tromboz gelişme riskinin öngörülebilirliğini araştırmaktır.

Gereç ve Yöntemler: Yenidoğan yoğun bakım ünitesinde izlenen, umbilikal venöz kateter takılan ve umbilikal kateterin bir haftadan uzun kalacağı öngörülen hastalar çalışmaya dahil edilmiştir. Kateter takılmadan önce hastalardan kan örneği alınarak rotasyonel tromboelastografi ile analizler yapılmıştır. Hastalar, bu sonuçlardan haberi olmayan bir radyolog tarafından kateter çıkarıldıktan sonra tromboz açısından Doppler ultrasonografi (USG) ile değerlendirilmiştir.

Bulgular: Çalışmaya dahil edilen hastaların ortalama gebelik yaşı 36.5±1.73 hafta, doğum ağırlığı ortanca değeri 3005 (IQR 1335) gramdır. Ekstrinsik rotasyonel tromboelastografi (EXTEM) ölçümlerinde; ortalama koagülasyon zamanı (CT) 160±92 sn, ortalama maksimal pıhtı sağlamlığı (MCF) 5±1.15 mm, fibrinojen rotasyonel tromboelastografi (FIBTEM) ölçümlerinde ortalama MCF 5±1.15 mm saptanmıştır. Kateter çıkarıldıktan sonra hastaların hiçbirinde umbilikal vende tromboz saptanmamıştır.

Sonuç: Daha önceki veriler ışığında EXTEM’de CT’nin <40 sn, EXTEM’deki MCF’nin >68 mm ve FIBTEM’deki MCF’nin >24 mm olmasının tromboz riskini gösterdiği bilinmektedir. Çalışmada tromboz saptanmaması; bu belirteçlerin riski doğru öngörebildiğini desteklemektedir.

Anahtar Kelimeler: Yenidoğan, tromboelastografi, venöz tromboz

ABSTRACT

Objective: Development of thrombosis in the neonatal period is high and one of the most common causes is catheter-related thrombosis. There is not yet a method that allows to detect which babies are more risky beforehand. The aim of the study is to investigate the predictability of the risk of developing catheter-related thrombosis using rotational thromboelastography in neonates with umbilical venous catheters.

Material and Methods: Patients who were followed up in the neonatal intensive care unit, had an umbilical venous catheter and were predicted to stay longer than one week were included in the study. Before the catheter was inserted, blood samples were taken from the patients and analyzed by rotational thromboelastography. After catheter removal, patients were evaluated by Doppler ultrasonography (USG) for thrombosis by a radiologist who was unaware of these results.

Results: The mean gestational age of the patients included in the study was 36.5±1.73 weeks, and the median birth weight was 3.005 (IQR 1335) grams. In the measurements made for extrinsic rotational thromboelastometry (EXTEM); the mean coagulation time (CT) was 160±92 sec, the mean maximum clot firmness (MCF) was 5±1.15 mm, in measurements made for fibrinogen rotational thromboelastometry (FIBTEM); The mean MCF was 5±1.15 mm. No umbilical vein thrombosis was detected in any of the patients after the catheter was removed.

Conclusion: In the light of previous data, it is known that CT<40 sec in EXTEM, MCF >68mm in EXTEM, and MCF >24mm in FIBTEM indicate the risk of thrombosis. No thrombosis was detected in the study; supports that these markers can accurately predict risk.

Keywords: Newborn, thromboelastography, venous thrombosis



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GİRİŞ

Yenidoğanlarda tromboz gelişme riski, özellikle kritik hastalarda önemli ölçüde artmış durumdadır. Bu durum; sepsis, inflamasyon, hipotansiyon, hipoksi ve küçük çaplı damarlarda intravasküler kateter kullanımı gibi risk faktörlerinin yanı sıra, gelişimsel hemostatik farklılıklarla da ilişkilidir (1). Son yıllarda tromboz sıklığında artış tespit edilmektedir. Verilere göre, 1990-1993 yılları arasında venöz tromboemboli insidansı; hastaneye yatış başına 5.3 ve genel olarak 10.000 çocukta 0.07 olarak belirlenmiştir (2-4). Amerika Birleşik Devletleri'nde, Pediatrik Sağlık Bilgi Sistemi veritabanının retrospektif bir kohort çalışmasında ise venöz tromboemboli insidansının, 2001'de hastaneye yatış başına 34 iken 2007'de 58'e yükseldiği rapor edilmiştir (3,4). Üstelik, bu veri tabanında 28 günden daha küçük yaşta olan hastalar ele alındığında insidans yaklaşık olarak 10.000 hastaneye yatış başına 75'e yükselmektedir (4).

Umbilikal venöz kateter, yenidoğan yoğun bakım ünitelerinde sıkça kullanılan santral damar yolu seçeneğidir. Ağrısız bir işlem olması, yüksek konsantrasyonda total parenteral nutrisyon verme olanağı sağlaması, kan alınması için kullanılabilmesi açısından kıymetli bir yöntemdir. Ancak, yenidoğanda görülen trombozların en sık nedenlerinden biri de kateter ilişkili trombozlardır. Kateterler, damar duvarını hasarlayarak, kan akımını bozarak, damar endoteline zarar veren antibiyotik gibi maddelerin infüzyonuna bağlı olarak veya kateterin yapıldığı maddenin direkt trombojenik etkisiyle tromboza neden olur. Tromboz sonrası uzun dönem takibinde en önemli problem portal hipertansiyondur ve ciddi mortalite ve morbidite sebebi olabilir (5,6). Tromboz gelişen hastalara üç ay antitrombotik tedavi verilmesi gerekir (7). Tedavide yenidoğanlarda genellikle oral formu bulunmayan, cilt altı enjeksiyon yoluyla uygulanan düşük moleküler ağırlıklı heparin kullanılmaktadır (1). Hem aile ve çocuğun yaşam kalitesi bozulmakta hem de mali bir yük getirmektedir.

Yenidoğanlardaki tromboz sıklığını değerlendiren çok sayıda çalışma vardır. Van Elteren ve arkadaşlarının

4734 yenidoğanı değerlendirdiği bir çalışmada 34 bebekte (%0.7) klinik tromboz saptanmıştır (8). Nowalk-Göttl'ün yaptığı çalışmada ise; semptomatik tromboz insidansı 100.000 canlı doğumda 5.1 olarak bulunmuştur (5,9). Umbilikal venöz kateterizasyon uygulanan yenidoğanların portal ven trombozu açısından değerlendirildiği çalışmalarda ise umbilikal venöz kateter uygulanan bebeklerde portal ven trombozu %0-43 arasında değişen oranlarda saptanmıştır (6,10). Kateter süresi, kateterin yanlış yerleştirilmesi ve kateterden kan ürünü verilmesi tromboz riskini artırmaktadır. Tromboz yerleşim yeri sıklıkla duktus venozus ile umbilikal venin birleşme yeri olan sol intrahepatik portal vendir. Portal ven trombozu olan olguların yaklaşık %20'sinde trombositopeni, %7'sinde karaciğer enzimlerinde yükselme görülür. Tromboz sonrası portal hipertansiyon gelişebilir. Portal hipertansiyon, mortalite ve morbiditeye sebep olabilecek ciddi bir sorundur (11). Güncel literatür verileriyle hangi hastada umbilikal venöz kateter ilişkili tromboz gelişme riskinin yüksek olduğunu belirleyip önlem almak mümkün değildir.

Tromboelastografi, koagülasyon sırasında viskoelastik değişikliklerin kaydedilerek grafik haline getirilmesi işlemidir. Rotasyonel tromboelastograf (ROTEM®) cihazı hemostazisin yatak başı ölçülebilmesini; pıhtı oluşumu, formasyonu ve stabilitesini, trombin üretimini, trombosit işlem ve sayısını, fonksiyonel fibrinojen bileşeninin kalitatif analizini ve fibrin polimerizasyon sürecinin hızlı bir şekilde değerlendirilebilmesini sağlar (12). Grafikler ile pıhtı süresi ('*clot time*'; CT), maksimum pıhtı sağlamlığı ('*maximum clot firmness*'; MCF) ölçülmekte ve bu ölçümler tromboz riski ile ilişki göstermektedir. Trombodinamik potansiyel indeks (TPI) ise $(100 \times \text{MCF}) / (100 - \text{MCF}) / \text{CT}$ formülüyle hesaplanmakta ve pıhtı gücü ile onu oluşturmak için harcanan zaman arasındaki ilişkiyi göstermektedir. Bu değerler ekstrinsik rotasyonel tromboelastografi (EXTEM), intrinsik rotasyonel tromboelastografi (INTEM) ve fibrinojen rotasyonel tromboelastografi (FIBTEM) için ayrı ayrı hesaplanmaktadır. INTEM, intrinsik pıhtılaşma yolağı, EXTEM ekstrinsik

BULGULAR

Çalışmaya alınan hastaların ortalama gebelik yaşı 36.5±1.73 hafta, doğum ağırlığı ortanca değeri 3005 (IQR 1335) gramdır. Ön çalışmaya dört hasta dahil edilmiştir ve hepsinin yenidoğan yoğun bakım servisine yatış endikasyonu solunum sıkıntısıdır. Ortalama umbilikal venöz kateterin takılı kalma süresi 5.75±3.5 gündür. Kateter çıkarıldıktan ortalama 5.2±4.3 gün sonra kontrol doppler ultrasonografi (USG) yapılmıştır. Hastaların USG incelemeleri sonucunda tromboz saptanmamıştır.

Ortalama maksimal pıhtı elastisitesi (MCE) EXTEM için 4.72±1.11, INTEM için 10.85± 3.15, FIBTEM için 5.27±1.28 olarak saptanmıştır.

EXTEM için yapılan ölçümlerde; CT ortalama 160±92 sn, A10 ortalama 4±2.16 mm, A15 ortalama 3.75±1.89 mm, A20 ortalama 3.25±0.95 mm, A25 ortalama 3.75±1.89 mm, MCF ortalama 5±1.15 mm, LI30 ortalama %58.75±1.15 ve ML ortalama %69±16 olarak saptanmıştır.

INTEM için yapılan ölçümlerde; CT ortalama 140.5±102.9 sn, A10 ortalama 7.5±2.6 mm, A15 ortalama 9±2.44 mm, A20 ortalama 9.25±2 mm, A25 ortalama 8.75±2.87 mm, MCF ortalama 9.75±2.6 mm, LI30 ortalama %84.75±11.4 ve ML ortalama %63.25±29.8 olarak bulunmuştur.

FIBTEM için yapılan ölçümlerde; CT ortalama 150±256 sn, A10 ortalama 3.75±0.95 mm, A15 ortalama 4±1.41 mm, A20 ortalama 4.25±1.25 mm, A25 ortalama 4.25±1.25 mm, MCF ortalama 5±1.15 mm, LI30 ortalama %85.75±13.9 ve ML ortalama %78±12.7 olarak tespit edilmiştir.

TARTIŞMA

Bu çalışmada umbilikal venöz kateteri olan yenidoğanların rotasyonel tromboelastografi yöntemi kullanılarak EXTEM, INTEM ve FIBTEM ölçümleri yapılmış, kateter çıkarıldıktan sonra hastalar tromboz açısından değerlendirilmiş, ROTEM değerleri ve tromboz riski arasındaki ilişki araştırılmıştır. Çalışmaya alınan hastaların sonuçları tromboza yatkınlık göstermemektedir ve hiçbir hastada tromboz tespit

edilmemiştir.

Yenidoğan döneminde rotasyonel tromboelastografi kullanımı, hemostatik durumun hızlı ve yatak başında belirlenmesine yönelik uygunluğu ile araştırmacılar için ilgi çekici hale gelmiştir. Erişkin ve pediatrik yaş gruplarında tedavi stratejileri ve transfüzyon kararlarında da rotasyonel tromboelastografi kullanımının artması, ilgiyi daha da artırmaktadır (12). ROTEM çalışmaları ile sağlıklı yenidoğanlarda referans aralıkları araştırılmıştır (12). Daha sonraki çalışmalar ise ölçümlerin patolojik durumlar ile ilişkilendirilmesine yöneliktir. Örneğin, kanaması olan kritik yenidoğanlarda yapılan bir çalışmada EXTEM A5 ve A10'nun platelet sayısı ile en güçlü korelasyonu gösterdiği ve kanamanın en güçlü tahmin edicilerinin onlar olduğu; respiratuvar distresi olan yenidoğanlardaki bir başka çalışmada RDS'nin hipokoagulabilite ile ilişkili olduğu ve sağlıklı yenidoğanlar ile karşılaştırıldıklarında daha fazla hiperfibrinolitik potansiyelleri olduğu; hipoksik yenidoğanların dahil edildiği bir başkasında sağlıklı yenidoğanlara göre hipokoagulabilitelerinin olduğu ve bunun da perinatal hipokside pıhtılaşma bozukluğunun erken saptanmasında bir rolü olabileceği gösterilmiştir (17-19). Daha fazla hasta sayısına ulaşılan bir çalışmada ise 423 kritik yenidoğan hasta incelenerek, hastalık başlangıcına ilişkin EXTEM hipokoagulabilite profilinin hastane içi mortalite için bağımsız bir risk faktörü olduğu saptanmıştır (20).

Koagülasyon zamanı (CT) test başlangıcından sonra pıhtı sağlamlık amplitüdü 2 mm'ye ulaşana kadar geçen süre olarak tanımlanır (21). CT trombin oluşumunun hızını yansıtır ve esas olarak pıhtılaşma faktörlerinden (kullanılan teste bağlı olarak ekstrinsik veya intrinsik), antikoagülanlardan ve fibrinin ürünlerinin konsantrasyonlarından etkilenir. Bir çalışmada zamanında doğan bebeklerde ortanca CT değerleri 194 sn, prematüre bebeklerde 185 sn. olarak bildirilmiştir (22). Erişkinlerde ise 293 sn ile daha uzundur. Bir başka çalışmada ise term yenidoğanlar için ortanca CT değerleri (2.5 ile 97.5 persentil değerleri) 52 (38-78), 48 (36-85) ve 191 (134-270) sn (sırasıyla

EXTEM, FIBTEM ve INTEM için) şeklinde bulunmuştur (12). Bizim çalışmamızda ise sırasıyla 160, 140, 150 sn şeklindedir. İlk çalışma ile paralellik gösterirken, diğerleri ile göstermemektedir. Bu durum yenidoğan dönemi referans değerlerinin çalışmalar arasında tutarlılığının az olduğunu göstermektedir. Ayrıca, çalışmadaki hastaların solunum sıkıntılarının (ikisinin pnömoni, birinin respiratuvar distress sendromu, bir diğerinin laringomalazi tanısı mevcut) bu farklılıklara neden olabileceğini düşündürmektedir.

MCF (maksimum pıhtı sağlamlığı) milimetre olarak gösterilir ve ulaşılan maksimum amplitüdü tanımlar. Pıhtının amplitüdü, pıhtının mekanik kuvvetini yansıtır ve esas olarak trombosit sayısı ve trombosit fonksiyonuna, fibrin konsantrasyonuna ve fibrin polimerizasyonuna, faktör XIII aktivitesine ve kolloidlere bağlıdır (21). Tromboz ile ilişkili komplikasyonu olan 35 hasta ile 34 sağlıklı kontrolün karşılaştırıldığı bir çalışmada özellikle EXTEM ve INTEM'deki CFT ve MCF değerleri trombotik komplikasyonları göstermede anlamlı bulunmuştur (23). MCF eşik değeri >68 mm olmasının %94 sensitivite ve spesifitesi olduğu gösterilmiştir. Bizim çalışmamızda EXTEM MCF ortalama 5 mm, INTEM MCF ortalama 9,75 mm olarak bulunmuştur. Hiçbir hastada eşik değeri geçmemiş ve de sonuçta hiçbir hastada trombotik komplikasyon saptanmamıştır. FIBTEM MCF için eşik değeri >24 mm gösterilmiş ama bu ölçümde sensitivite %77 ve spesifite %88 olarak değerlendirilmiştir (23). Bizim çalışmamızda FIBTEM MCF değeri ortalama 5mm'dir ve bu eşik değeri aşan bir hasta da yoktur.

Şiddetli kanama sırasında karar vermeyi hızlandırmak için, CT yerine 5 veya 10 dakika sonraki pıhtı sağlamlığının amplitüdü (sırasıyla A5 veya A10) giderek daha fazla kullanılan ölçümlerdir. A5 henüz bazı ülkelerde mevcut değildir. Bizim çalışmamızda da kullanılamamıştır. A5 ve A10, MCF ile oldukça koreledir ve test başladıktan 10-15 dakika sonra değerlendirme yapmaya olanak sağlar. EXTEM ve INTEM'deki A10 ve A5 trombosit sayısı ve fibrinojen konsantrasyonu ile; FIBTEM'deki A10 ve A5 plazma

fibrinojen konsantrasyonu ile korelasyon gösterir. Pıhtı sağlamlığının ölçümündeki düşüklük artmış fibrinolizisi göstermektedir. Normal pıhtıda EXTEM A10, 40-60 mm arasındadır (12,21). Bizim çalışmamızda ise bu süre ortalama sadece 4 mm'dir. Normal aralığın altında olduğu görülmektedir. Bu durumun yöntem ile ilişkili olabileceği düşünülmüştür. Diğer taraftan EXTEM A10'un <40 mm olmasına, FIBTEM A10 <10mm olması eşlik ediyorsa, fibrinojen eksikliği ile FIBTEM A10 \geq 10 mm eşlik ediyorsa trombositopeni ile uyumludur. Bizim çalışmamızda FIBTEM A10 ortalama 3.75 (\pm 0.95) mm olarak bulundu. Bu bulgular fibrinojen eksikliği ile uyumlu gibi görünmektedir. Fakat aksine yenidoğan döneminde fibrinojen düzeylerinin erişkine göre daha yüksek olduğu bilinmektedir (24). Bu nedenle elde edilen bulgular, bu gözlem ile uyuşmamaktadır.

Pıhtı lizisini gösteren belirteçler ML (maksimal lizis) ve LI30'dir (30. dakikadaki lizis indeksi) ve fibrinolitik enzimlerin, fibrinolitik inhibitörlerin ve faktör XIII'in aktivitesi hakkında bilgi sağlarlar. Çalışma sırasında ölçülen ML, MCF ile en düşük amplitüd arasındaki fark olarak tanımlanır ve MCF'nin yüzdesi olarak gösterilir. LI30 CT'den 30 dakika sonra hâlâ mevcut olan MCF yüzdesini gösterir. EXTEM ve FIBTEM'de ölçülen LI30 değerleri için referans aralıkları erişkinler için %94-100 arasındadır (21). Bizim çalışmamızda sırasıyla ortalama %58 ve %85 bulundu ve normal düzeylerin altındaydı.

ROTEM ile genel olarak yüksek tromboz riski EXTEM'deki CT'nin <40 sn., EXTEM'deki CFT'nin <50 sn, EXTEM'deki MCF'nin >68 mm, FIBTEM'deki MCF'nin >24 mm ve LI60'ın \leq %3 olması ile ilişkilidir (21). Bu çalışmada EXTEM'de CT ortalama 160 sn, EXTEM'de MCF ortalama 5 \pm 1.15 mm, FIBTEM'te MCF ise ortalama 5 \pm 1.15 mm olarak saptandı. EXTEM'de CFT ve LI60 değerleri ise ölçülemedi. Literatürdeki bilgiler ışığında, ulaşılan sonuçlar tromboz riskini göstermemekteydi. Bizim çalışmamızda da tromboz saptanmaması literatürdeki bulguları desteklediğini düşündürmektedir. Fakat diğer taraftan tromboz saptanan ve saptanmayan hastalar arasında

ölçümlerde bir karşılaştırılma yapılamadı. Çünkü tromboz saptanan hasta mevcut değildi ve hasta sayısı azdı. Bu durum çalışmanın en önemli kısıtlılığını oluşturmaktadır. Yenidoğan dönemindeki referans değerlerinin farklılığı dikkat çeken ikinci bulguydu. Bu konu ile ilgili daha geniş popülasyonu içeren hasta sayılarına ve daha standardize uygulamalara ihtiyaç vardır.

Sonuç olarak, elde edilen bulgular, rotasyonel tromboelastografi yöntemi kullanılarak yapılan ölçümlerin umbilikal venöz kateter takılan yenidoğanlarda kateter ilişkili tromboz riskinin öngörülebilirliğinin belirlenmesinde yararlı olabileceğini desteklemektedir. Hasta sayısının artırılması planlanmaktadır.

Çıkar Çatışması Beyanı: Yazarlar arasında herhangi bir çıkar çatışması bulunmamaktadır.

Katkı Oranı Beyanı: Anafikir/Planlama: MB, HTC; Analiz/Yorum: GK, HTC; Veri Sağlama: MB, GK; Yazım: GK, HTC; Gözden Geçirme ve Düzeltme: GK, MB, HTC, Onaylama: GK, MB, HTC

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AİLE SAĞLIĞI MERKEZİNE BAŞVURAN HASTALARDA GELENEKSEL VE TAMAMLAYICI TIP KULLANIMI VE ETKİLEYEN FAKTÖRLER

Use of Traditional and Complementary Medicine in Patients Applying to the Family Health Center and Affecting Factors

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ÖZ

Amaç: Geleneksel ve tamamlayıcı tıp (GETAT) uygulamaları kullanımına ilişkin daha fazla bilgiye ihtiyaç vardır. Bu araştırmanın amacı; Türkiye'nin Bitlis ilinde yaşayan bireylerin GETAT kullanım sıklığı ve etkileyen faktörleri saptamaktır.

Gereç ve Yöntemler: Bu araştırma tanımlayıcı tipte kesitsel bir çalışmadır. Araştırma, 15 Mart-15 Mayıs 2018 tarihleri arasında Türkiye'de Bitlis ilinde bir Aile Sağlığı Merkezine çeşitli nedenlerle başvuran 18 yaş üstü (kadın=276, erkek=187) toplam 463 katılımcı ile yapılmıştır.

Bulgular: Araştırmaya katılan bireylerin yaş ortalaması 29.25±11.32'dir. (18-95 yaş aralığı) Geleneksel ve tamamlayıcı tıp içinde en sık kullanılan on yöntemin sıklıkları; %28.9'u bitkiler, %28.7'si dua, namaz, %21.4'ü besin desteği, %10.8'i masaj terapisi, %9.5'i müzik terapisi, %4.8'i kupa çekme, %4.3'ü sülük tedavisi, %4.1'i homeopati, %3.6'sı yoga, %3.7'si akupunktur şeklindedir. Cinsiyet, kronik hastalığı olma ve meslek ile GETAT yöntemini doktora bildirme durumu arasındaki fark istatistiksel olarak anlamlıdır. Sağlığını değerlendirme, düzenli ilaç kullanma ile GETAT yönteminin yan etki durumu arasındaki fark istatistiksel olarak anlamlıdır. Düzenli ilaç kullanma ile GETAT yönteminin kullanılma nedeni arasındaki fark istatistiksel olarak anlamlıdır.

Sonuç: Geleneksel ve tamamlayıcı tıp uygulamaları sağlık sistemine tam olarak entegre olmayıp kullanım ve yan etkiler kayıt altına alınmamaktadır. Uygulamalar sağlık sistemine entegre edilmeli, eğitilmiş uygulayıcılar tarafından yapılmalı ve denetime tabi olmayan uygulamaların önüne geçilmelidir.

Anahtar Kelimeler: Geleneksel ve tamamlayıcı tıp uygulamaları, aile sağlığı merkezi, bitkisel tedavi

ABSTRACT

Objective: Further information is needed about the use of traditional and complementary medicine (TCM) practices. The purpose of this study is to determine the frequency of use of traditional and complementary medicine by individuals living in Bitlis, Turkey and the affecting factors.

Material and Methods: This is a descriptive cross-sectional study. The research was conducted with (female=276, male=187) 463 people aged 18 and over who applied to a family health center in Bitlis, Turkey, for various reasons, between 15 March to 15 May 2018.

Results: The mean age of the individuals participating in the study was 29.25±11.32 (range 18-95 years). The frequencies of the ten most frequently used methods in TCM; 28.9% were herbs, 28.7% prayer, 21.4% nutritional support, 10.8% massage therapy, 9.5% music therapy, 4.8% cupping, 4.3% leech therapy, 4.1% homeopathy, 3.6% yoga, 3.7% acupuncture. The difference between gender, having a chronic disease and profession and reporting the traditional and complementary medicine method to the doctor is statistically significant. The difference between health assessment, regular drug use and the side effect status of the TCM method is statistically significant. The difference between the regular use of medicine and the reason for using the traditional and complementary medicine method is statistically significant.

Conclusion: Traditional and complementary medicine practices are not fully integrated into the health system and use and side effects are not recorded. Practices should be integrated into the health system and performed by trained practitioners, and practices that are not subject to supervision should be avoided.

Keywords: Traditional and complementary medicine practices, family health center, herbal medicine



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GİRİŞ

Geleneksel ve tamamlayıcı tıp (GETAT), insanlar tarafından yüzyıllar boyunca klasik tıbbın dışında düzensiz olarak kullanılan yöntemler olup bu kavrama yönelik ilk uzmanlaşma; bilinen en uzun GETAT yöntemi olan “homeopati” ile ilişkili çalışmalar yapan tıp diplomasına sahip Samuel Hahnemann (1755-1843) tarafından yapılmıştır (1). Dünya Sağlık Örgütü (DSÖ), geleneksel tıp terimini; “Farklı kültürlerden gelen teori, inanç ve deneyimlere dayanan, açıklanması beklenmeyen, beden ve ruh hastalıklarından korunma, teşhis, tedavi ve iyileştirmeye yönelik tüm bilgi, beceri ve uygulamalar” olarak tanımlamaktadır. Tamamlayıcı veya alternatif tıbbi ise “Bir ülkenin geleneklerinden ya da konvansiyonel tedaviden bağımsız olan ve sağlık hizmetleri içinde tam olarak bulunmayan kapsamlı bir sağlık bakım uygulaması grubu” olarak tanımlamıştır. Dünya Sağlık Örgütü, 2014 yılı 67. Dünya Sağlık Asamblesi’nde geleneksel tıp ile ilgili stratejisini başlatmış ve ülkeleri bu yönde politika ve düzenlemeler yapmaya teşvik etmiştir (2). Dünya Sağlık Örgütü, 2019 yılında GETAT küresel raporunu yayımlamış ve bu raporda 2014 yılından bu yana Türkiye’de devam eden gelişmelere de yer vermiştir (3). Türkiye’de GETAT uygulamalarına ilişkin yapılan düzenlemeler sırasıyla, “Akupunktur Tedavi Yönetmeliği” (1991), “Akupunktur Tedavisi Uygulanan Özel Sağlık Kuruluşları ile Bu Tedavinin Uygulanması Hakkında Yönetmelik” (2002), “Geleneksel Bitkisel Tıbbi Ürünler Yönetmeliği” (2010), “Geleneksel ve Tamamlayıcı Tıp Uygulamaları Yönetmeliği” (2014) şeklindedir (4). Bu yönetmeliğe göre yeni yasal çerçevede T.C. Sağlık Bakanlığı tarafından eğitim programları, sertifika, uygulama yetkisi ve 15 uygulamayı içeren konularda (akupunktur, fitoterapi, apiterapi, homeopati, hipnoz, sülük tedavisi, kupa tedavisi, osteopati, kayropratik, refleksoloji, müzikoterapi, proloterapi, larva tedavisi, mezoterapi ve ozon tedavisi) düzenlemeler yapılmıştır (5). Literatürdeki bir çalışmada, sağlıkta eğilimin konvansiyonel tıptan GETAT yöntemleri lehine olduğunu bildirmektedir (6). Türkiye’de Anadolu’da şifa bulmak amacıyla yüzyıllardır kullanılan

uygulamaların da içinde bulunduğu birçok yöntemin; yasal düzenlemelerle, eğitim ve sertifikalandırma program ve merkezleri ile T.C. Sağlık Bakanlığı denetiminde olması, yasal çerçeve kapsamına girmesi konvansiyonel tıbbın tek yöntem olarak görülmeyip GETAT yöntemleri lehine bir gelişme olarak görülebilir.

Bu araştırma Türkiye’nin Bitlis ilinde yaşayan bireylerin Geleneksel ve Tamamlayıcı Tıp kullanım sıklığını, Tamamlayıcı ve alternatif tedaviye yönelik tutum ve davranışlarını saptamak amacıyla yapılmıştır.

GEREÇ VE YÖNTEM

Bu araştırma tanımlayıcı tipte kesitsel bir çalışmadır. Araştırmanın evrenini 15 Mart 2018-15 Mayıs 2018 tarihleri arasında Türkiye’nin doğu bölgesinde yer alan Bitlis il merkezinde bulunan 4 nolu Aile Sağlığı Merkezine (ASM) çeşitli nedenlerle (muayene, aşı, danışma vb.) başvuran bireyler oluşturmaktadır. Belirtilen süre içinde ASM’ye başvuran ve *çalışmaya katılmayı kabul eden* 18 yaş ve üstü (kadın=276, erkek=187) toplam 463 kişi araştırma kapsamına alınmıştır. Araştırmanın yapılması için Bitlis İl Sağlık Müdürlüğü’nden 29.12.2017 tarih ve 75384813 sayılı, Bitlis Eren Üniversitesi Etik Kurulu’ndan 01.03.2018 tarih ve 2018/3-II sayılı karar numarasıyla gerekli kurumsal ve etik izinler alınmıştır. Çalışmaya katılan bireylerden Helsinki Deklarasyonu’na uyularak sözlü ve yazılı onam alınmıştır.

Çalışmaya Dahil Edilme Ölçütleri

Çalışmaya konuşma ve duyma problemi olmayan, bilişsel olarak yeterli (herhangi bir zihinsel engeli olmayan ve herhangi bir psikiyatrik rahatsızlığı olmayan), ASM’ye muayene, aşı, danışma, enjeksiyon gibi herhangi bir nedenle başvuran 18 yaş ve üstü kadın ve erkek bireyler dahil edilmiştir.

Çalışmadan Dışlanma Ölçütleri

Çalışmaya konuşma ve duyma problemi olan, bilişsel açıdan yeterli olmayan (zihinsel engeli veya herhangi bir psikiyatrik rahatsızlığı olan), çalışmaya katılmaya gönüllü olmayan ve 18 yaş altında olan bireyler dahil edilmemiştir.

Veri Toplama Araçları

Anket Formu

Çalışmada kullanılan anket formunda; çalışmaya katılan bireylerin yaş, cinsiyet, medeni durumu, eğitim durumu gibi sosyo-demografik özelliklerine yönelik sorulara ek olarak Geleneksel ve Tamamlayıcı Tıp ile ilgili tutum ve davranışlara yönelik sorularla birlikte toplam 25 soru mevcuttur.

İstatistiksel Analiz

Katılımcılardan elde edilen veriler SPSS 26.0 paket programı kullanılarak analiz edilmiştir. Verilerin değerlendirilmesinde tanımlayıcı istatistikler için frekans ve yüzde kullanılmıştır. Kategorik değişkenlerin (cinsiyet ile etkili olan tedavi; cinsiyet, meslek grubu ve kronik hastalık varlığı ile GETAT yöntemini doktora bildirme durumu) karşılaştırılmasında Pearson ki-kare testi kullanılmıştır. Tüm değerlendirmelerde $p < 0.05$ değeri anlamlı kabul edilmiştir.

BULGULAR

Araştırma grubunun sosyo-demografik özellikleri Tablo 1'de sunulmuştur. Araştırmaya katılan bireylerin yaş ortalaması 29.25 ± 11.32 'dir (18-95 yaş aralığı). Araştırma grubundaki bireylerin %52.1'i bekâr, %47.9'u evli, %10.8'i okur-yazar değil iken, %48.1'i üniversite ve üstü eğitim almıştır (Tablo 1).

Katılımcıların GETAT kullanım özellikleri Tablo 2'de verilmiştir. Araştırmaya katılan bireylerin %28.9'u bitkileri, %28.7'si dua, namazı, %21.4'ü besin desteğini, %10.8'i masaj terapisini, %9.5'i müzik terapisini, %4.8'i kupa çekmeyi, %4.3'ü sülük tedavisini, %4.1'i homeopatyi, %3.6'sı yogayı, %3.7'si akupunkturu, %2.6'sı ozon uygulamasını, %2.6'sı enzim tedavisini, %2.6'sı hipnozu, %2.2'si refleksolojiyi %1.7'si larva uygulamasını, %1.3'ü fitoterapiyi, %1.3'ü mezoterapiyi, %1.1'i proloterapiyi, %0.6'sı apiterapiyi, %0.6'sı osteopatyi, %0.6'sı kayropratiği, %0.4'ü tai chiyi kullandığını ifade etmiştir. Araştırma grubunun %88.6'sı kayropratik, %87.3'ü osteopati, %86.2 mezoterapi, %86.2 proloterapi, %85.5'i fitoterapi, %85.1'i apiterapi, %83.3'ü refleksoloji, %81.2'si larva uygulaması,

%78.4'ü ozon uygulaması, %71.1'i homeopati, %64.8'i akupunktur, %53.8'i müzik terapisi, %49.7'si hipnoz, %47.5'i kupa çekme, %47.3'ü sülük tedavisi uygulamalarını duymadığını ifade etmiştir.

Tablo 1: Araştırma grubunun sosyo-demografik özellikleri

	n	%
Cinsiyet		
Kadın	276	59.6
Erkek	187	40.4
Yaş Grubu		
18-24	198	42.8
25-34	154	33.3
35-44	60	13.0
45+	51	11.0
Medeni durum		
Evli	222	47.9
Bekâr	241	52.1
Eğitim durumu		
Okur-yazar değil	50	10.8
İlkokul	35	7.6
Ortaokul	45	9.7
Lise	110	23.8
Üniversite ve üstü	223	48.1
Meslek		
Memur	126	27.2
Öğrenci	94	20.3
Serbest meslek	81	17.5
Ev hanımı	80	17.3
İşçi	48	10.4
Çalışmayan	34	7.3
Çocuk sahibi olma		
Var	201	43.4
Yok	262	56.6
Kendi ifadesine göre sağlığı		
İyi	263	56.8
Orta	146	31.5
Kötü	54	11.7
Kronik hastalık		
Var	111	24.0
Yok	352	76.0
Düzenli kullanılan ilaç		
Var	60	13.0
Yok	403	87.0
Sigara kullanma		
Evet	141	30.5
Hayır	295	63.7
Bıraktım	27	5.8
Alkol kullanma		
Evet	50	10.8
Hayır	398	86.0
Bıraktım	15	3.2
Toplam	463	100.0

Tablo 2: Katılımcıların GETAT kullanım özellikleri (n=463, %=100)

GETAT yöntemleri	Kullandım		Bilgim var		Bilgim yok	
	n	%	n	%	n	%
Bitkiler	134	28.9	194	41.9	135	29.2
Dua-namaz	133	28.7	172	37.2	158	34.1
Besin desteği	99	21.4	188	40.6	176	38.0
Masaj terapisi	50	10.8	204	44.1	209	45.1
Müzik terapisi	44	9.5	170	36.7	249	53.8
Kupa çekme	22	4.8	221	47.7	220	47.5
Sülük tedavisi	20	4.3	224	48.4	219	47.3
Homeopati	19	4.1	115	24.8	329	71.1
Yoga	17	3.6	223	48.2	223	48.2
Akupunktur	17	3.7	146	31.5	300	64.8
Ozon uygulaması	12	2.6	88	19.0	363	78.4
Enzim tedavisi	12	2.6	126	27.2	325	70.2
Hipnoz	12	2.6	221	47.7	230	49.7
Refleksoloji	10	2.2	67	14.5	386	83.3
Larva uygulaması	8	1.7	79	17.1	376	81.2
Fitoterapi	6	1.3	61	13.2	396	85.5
Mezoterapi	6	1.3	58	12.5	399	86.2
Proloterapi	5	1.1	59	12.7	399	86.2
Apiterapi	3	0.6	66	14.3	394	85.1
Osteopati	3	0.6	56	12.1	404	87.3
Kayropratik	3	0.6	50	10.8	410	88.6
Taichi	2	0.4	72	15.6	389	84.0

GETAT: Geleneksel ve Tamamlayıcı Tıp

Katılımcıların tedavi etkililik, başvurduğu yöntem nedeni, tedaviden fayda görme ve yöntemlerin yan etki varlığı durumlarının dağılımı Tablo 3’de verilmiştir. Araştırmaya katılan bireylerin %52.7’si tıbbi tedavi ve GETAT’ın birlikte daha etkili olduğunu, %54.9’u GETAT’a tıbbi tedaviyle birlikte kullanıp hastalıktan

tamamen kurtulmak için başvurduğunu, %62.2’si GETAT’ın kısmen yararlı olduğunu, %50.3’ü GETAT’ın yan etkisinin olmadığını, %47.3’ü kullandığı GETAT yöntemini doktoruna bildirmediğini ifade etmiştir (Tablo 3).

Tablo 3: Araştırma grubunun tedavi etkililik, başvurduğu yöntem nedeni, tedaviden fayda görme ve yöntemlerin yan etki varlığı durumlarının dağılımı

	n	%
Hangi tedavi daha etkili		
Tıbbi tedavi	173	37.4
Geleneksel ve Tamamlayıcı Tıp	46	9.9
Her ikisi birlikte	244	52.7
Geleneksel ve Tamamlayıcı Tıp Uygulamalarına neden başvuru yapıldığı		
Tıbbi tedavinin başarısına inanmadığım için	19	4.1
Tıbbi tedaviyle birlikte kullanıp hastalıktan tamamen kurtulmak için	254	54.9
Cevrenin etkisiyle	84	18.1
Çaresizlik	27	5.8
Kullanmadım	79	17.1
Geleneksel ve Tamamlayıcı Tıp Uygulamalarından fayda görme		
Tamamen iyi geliyor	59	12.7
Kısmen yararlı oluyor	288	62.2
Fayda görmedim	37	8.0
Kullanmadım	79	17.1
Kullanılan yöntemin yan etki varlığı		
Var	50	10.8
Yok	233	50.3
Fikrim yok	101	21.8
Kullanmadım	79	17.1
Kullanılan yöntemi doktoruna bildirme		
Evet	244	52.7
Hayır	219	47.3
Toplam	463	100.0

Katılımcıların cinsiyetine göre hangi tedavinin daha etkili olduğunu düşünme durumlarının karşılaştırılması Tablo 4’de sunulmuştur. Araştırmaya katılan kadınların %32.2’si, erkeklerin ise %44.9’u tıbbi tedavinin daha etkili olduğunu belirtmiştir. Erkeklerin %45.5’i,

kadınların ise %57.6’sı her iki tedavinin birlikte daha etkili olduğunu ifade etmiştir. Kadın ve erkekler arasındaki bu farkın istatistiksel olarak anlamlı olduğu tespit edilmiştir (p=0.019).

Tablo 4: Araştırma grubunda cinsiyet ile hangi tedavinin daha etkili olduğu durumlarının karşılaştırılması

	Tıbbi tedavi		Geleneksel ve Tamamlayıcı Tıp		Her ikisi birlikte		Toplam		İstatistik
	n	%	n	%	n	%	n	%	
Kadın	89	32.2	28	10.1	159	57.6	276	100.0	X ² =7.947 p=0.019 df=2
Erkek	84	44.9	18	9.6	85	45.5	187	100.0	
Toplam	173	37.4	46	9.9	244	52.7	463	100.0	

X²: ki kare testi, df: serbestlik derecesi, p≤0.05

Katılımcıların cinsiyet, meslek grubu ve kronik hastalık varlığı ile GETAT yöntemini doktora bildirme durumlarının karşılaştırılması Tablo 5'de sunulmuştur. Araştırmaya katılan kadınların %58'i, erkeklerin ise

%44.9'u kullandığı GETAT yöntemini doktoruna bildirdiğini ifade etmiştir. Cinsiyet ile GETAT yöntemini doktora bildirme durumu arasındaki fark istatistiksel olarak anlamlıdır ($p=0.006$).

Tablo 5: Araştırma grubunda cinsiyet, meslek grubu ve kronik hastalık varlığı ile Geleneksel ve Tamamlayıcı Tıp yöntemini doktora bildirme durumlarının karşılaştırılması

GETAT yöntemini doktora bildirme	Evet		Hayır		Toplam		İstatistik
	n	%	n	%	n	%	
Cinsiyet	Kadın	160	58.0	116	42.0	276	100.0
	Erkek	84	44.9	103	55.1	187	100.0
Kronik hastalık	Var	173	49.1	179	50.9	352	100.0
	Yok	71	64.0	40	36.0	111	100.0
Meslek	İşçi*	18	37.5	30	62.5	48	100.0
	Serbest meslek	35	43.2	46	56.8	81	100.0
	Öğrenci	49	52.1	45	47.9	94	100.0
	Memur	71	56.3	55	43.7	126	100.0
	Ev hanımı	48	60.0	32	40.0	80	100.0
	Çalışmayan	23	67.6	11	32.4	34	100.0
Toplam	244	52.7	219	47.3	463	100.0	

*Farkı oluşturan grup

X²: ki kare testi, df: serbestlik derecesi, $p \leq 0.05$

Kronik hastalığı olanların %49.1'i, kronik hastalığı olmayanların %64'ü kullandığı GETAT yöntemini doktoruna bildirdiğini belirtmiştir. Kronik hastalığa sahip olma durumu ile GETAT yöntemini doktora bildirme durumu arasındaki fark istatistiksel olarak anlamlıdır ($p=0.006$).

Çalışmayan bireylerin %67.6'sı, ev hanımlarının %60'ı, memurların %56.3'ü, öğrencilerin %52.1'i, serbest meslek yapanların %43.2'si ve işçilerin %37.5'si kullandığı GETAT yöntemini doktoruna bildirdiğini ifade etmiştir. Meslek ile GETAT yöntemini doktora bildirme arasındaki fark istatistiksel olarak anlamlı olup işçilerin kullandıkları GETAT uygulamalarını diğer

gruplardan düşük düzeyde doktoruna bildirdiği tespit edilmiştir ($p=0.025$).

Bu çalışmada sağlığını kötü olarak değerlendirenlerin %63'ü, orta olarak değerlendirenlerin %42.5'i, iyi olarak değerlendirenlerin %52.1'i kullandıkları GETAT yönteminin yan etkisi olduğunu düşünmediğini ifade etmiştir. Sağlığını orta olarak değerlendiren bireyler sağlığını iyi veya kötü olarak değerlendirenlere göre daha yüksek düzeyde GETAT yöntemlerinin yan etkileri olduğunu ifade etmiştir. Sağlığını değerlendirme ile GETAT yönteminin yan etkisi olduğunu düşünme durumu arasındaki fark istatistiksel olarak anlamlıdır ($p=0.016$).

Düzenli ilaç kullananların %63.3'ü, düzenli ilaç kullanmayanların %48.4'ü kullandıkları GETAT yönteminin yan etkisi olmadığını düşündüklerini ifade etmiştir. Düzenli ilaç kullanma ile GETAT yönteminin yan etki durumu arasındaki fark istatistiksel olarak anlamlıdır (p=0.002).

Bu çalışmada düzenli ilaç kullananların; %8.3'ü tıbbi tedavinin başarısına inanmadığı için GETAT yöntemini tercih etmekte iken, tıbbi tedaviyle birlikte kullanıp hastalıklardan tamamen kurtulmak için tercih edenler %61.7, çevrenin etkisiyle tercih edenler %23.3 ve çaresizlik nedeniyle tercih edenler %3.3 oranındadır. Düzenli ilaç kullanmayanların; %3.5'i tıbbi tedavinin başarısına inanmadığı için GETAT yöntemini tercih ettiğini belirtmekte iken, tıbbi tedaviyle birlikte kullanıp hastalıklardan tamamen kurtulmak için tercih edenler %53.8, çevrenin etkisiyle tercih edenler %17.4 ve çaresizlik nedeniyle tercih edenler %6.2 oranındadır. Düzenli ilaç kullanma ile GETAT yöntemini kullanma nedeni arasındaki fark istatistiksel olarak anlamlıdır (p=0.011). Düzenli ilaç kullananların %21.7'si GETAT yönteminden tamamen fayda gördüğünü, %66.7'si kısmen fayda gördüğünü, %8.3'ü fayda görmediğini belirtmiştir. Bu oranlar düzenli ilaç kullanmayanlarda sırasıyla; %11.4, %61.5, %7.9'dur. Düzenli ilaç kullanma ile GETAT yönteminden fayda görme arasındaki fark istatistiksel olarak anlamlıdır (p=0.007).

TARTIŞMA

Çalışmamız bulgularına göre katılımcıların en sık kullandığı GETAT yöntemi bitkilerdir. Katılımcıların GETAT amacıyla sıklıkla kullandıkları yöntemler sırasıyla; bitkiler, dua-namaz, besin desteği, masaj terapisi, müzik terapisi, kupa çekme, sülük tedavisi, homeopati, yoga ve akupunktur şeklindedir.

Katılımcıların bilgi sahibi olmadıkları GETAT yöntemleri en sık bilinmeyenden en aza sırasıyla; kayropratik, osteopati, mezoterapi, proloterapi, fitoterapi, apiterapi, refleksoloji, larva uygulaması, ozon uygulaması, homeopati, akupunktur, müzik terapisi, hipnoz, kupa çekme, sülük tedavisidir.

Avrupa'da bir yıllık süre içinde GETAT kullanma sıklığı %9.8-76.0 olarak bildirilmiştir (7). Türkiye'de kanserli hastalarda GETAT kullanımını araştıran bir literatür taramasında ise GETAT kullanma sıklığı %22.1-%84.1 olarak bildirilmiştir (8). Dünya Sağlık Örgütü 2019 Geleneksel ve Tamamlayıcı Tıp Küresel Raporu'nda; üye ülkeler arasında en sık kullanımdan en az kullanıma doğru GETAT yöntemlerini sırasıyla akupunktur, bitkisel ilaçlar, yerli GETAT yöntemleri, homeopati, Çin tıbbi, natüropati, kayropratik, osteopati ve ayurveda tıbbi, Unani tıbbi ve diğer uygulamalar olarak bildirmiştir (3). Çalışmamızda da bu raporla benzer şekilde GETAT yöntemleri arasında bitkilerin sık kullanıldığı görülürken; raporda belirtilenin aksine akupunktur, homeopati, kayropratik, osteopati gibi yöntemlerin daha az kullanıldığı görülmüştür. Türkiye'de 0-15 yaş çocukların ebeveynleriyle yapılan bir çalışmada, ailelerin en sık kullandığı yöntem %31 oranı ile bitki çayları olarak bildirilmiştir (9). Hekimlerde yapılan bir çalışmada en çok kullanılan üç yöntem; %46.5 oranı ile yoga ve meditasyon, %44 akupunktur ve %40.4 müzik terapisi şeklinde olup; bu GETAT yöntemlerinin kullanımı çalışmamızda oldukça düşük bulunmuştur (10). Türkiye'de hemşirelik öğrencilerinin GETAT yöntemleri hakkında bilgi sahibi olup olmadığının incelendiği bir çalışmada; çalışmamızla benzer şekilde öğrencilerin kayropraksi, homeopati ve fitoterapiyi yüksek oranda bilmedikleri, ancak çalışmamızda daha sık bilinen yoga, müzik terapisi, besin desteği gibi yöntemlerin bilinme oranlarının da oldukça düşük olduğu görülmektedir (11). Çalışmamızda küresel olarak kullanılan GETAT yöntemlerinin kullanım ve bilinme oranı düşüktür. Literatürde bulunan bazı çalışmalarda çalışmamızda sık kullanılmayan bazı GETAT yöntemlerinin sık kullanıldığı ve çalışmamızda yüksek oranda bilinen bazı yöntemlerin ise daha az bilindiği görülmektedir. Bunun nedeni bölgesel ve kültürel farklara ek olarak bireylerin kültüründe yüzyıllardır kullanılan kökleşmiş bazı yerel GETAT uygulamalarının daha fazla rağbet görmesi ve bireylerin şifa bulma konusunda bilindik, denenmiş ve iyi sonuçlar alınmış yöntemlere yönelmesi, yeni

yöntemlere açık olmama durumu ve diğer uygulamalar hakkında yeterince bilgi ve kanıt sahibi olmamaları olabilir.

Türkiye’de tıp fakültesi öğrencileriyle yapılan bir çalışmada öğrencilerin beşte biri GETAT yöntemi kullandığını, öğrencilerin yarısından fazlası GETAT yöntemini endişe gidermek için kullandığını, yaklaşık yarısı GETAT yöntemlerinin yararlı olduğunu ifade etmiştir (12). Çalışmamızda tamamen yararlı ve kısmen yararlı görme oranı birlikte ele alındığında dört kişiden üçü GETAT’ı yararlı bulmakta olup bu oran oldukça yüksektir. Bu çalışmada katılımcıların yarısı kullandığı GETAT yöntemini doktoruna bildirmemektedir Türkiye’de kanser hastalarında yapılan bir çalışmada hastaların yarısından fazlası kullandığı GETAT yöntemini doktoruna bildirmediğini ifade etmiş olup bu oran çalışmamız bulgularıyla benzer özelliktedir (13). Türkiye’nin İzmir ilinde yetişkinlerde yapılan başka bir çalışmada ise kullandığı GETAT yöntemini doktora bildirmeme oranı %25.7 olarak saptanmış olup bildirmeme oranı çalışmamıza göre oldukça düşüktür (14). Türkiye’de akne vulgaris tanısı alan hastalarda yapılan bir çalışmada; GETAT uygulayan hastalarda yöntemi doktora bildirme oranı %2.8 olup bu çalışmaya göre bildirim oldukça düşüktür (15). İzmir ilinde yapılan çalışmada bildirim daha yüksek olması, çalışmaların yapıldığı bölgelerdeki örneklem gruplarının sağlık sosyal belirleyicileri açısından farklı özelliklere sahip olmasından kaynaklanabilir. Akne vulgarisli hastalarda yapılan çalışmada bildirim çalışmamıza göre düşük çıkması çalışmanın belirli bir hastalığa yönelik yapılmasından kaynaklanabilir.

Akne vulgaris tanısı alan hastalarda yapılan çalışmada hastalarda fayda görme oranı %46.7, yan etki olduğunu ifade edenlerin oranı %10.8’dir. Bahsedilen çalışmada tercih edilen tedavilerin dağılımı ise %35.4 oranında modern tıp, %50 oranında hem modern tıp hem de GETAT yöntemleri, %14.6 oranında ise sadece GETAT yöntemidir (15). Yurtdışında yapılan bir çalışmada bütün GETAT yöntemlerinin etkili ve güvenli olmadığı, kullanılan GETAT yöntemlerinin yan etkileri olabileceği, bu yöntemlerinin sağlık hizmetleriyle ve

bilgilendirme eşliğinde verilmesi gerektiği vurgulanmıştır (16). Yurtdışında yapılan başka bir çalışmada ise bireylerin GETAT yöntemlerini güvenli (%86.9) ve etkili (%93.7) buldukları saptanmıştır (17). Trinidad ve Tobago’da sağlık çalışanlarıyla yapılan bir çalışmada, doktorların %51.9’u ve eczacıların %63.3’ü kombinasyon tedavisinin sadece geleneksel tedavi kullanımından daha etkili olduğunu bildirmiştir (18). Hindistan’da yapılan bir çalışmada bireylerin GETAT’ı tercih etme nedenleri; tam iyileşme (%25), kolay bulunabilirlik (%17) ve yan etki olmaması (%30) olarak bildirilmektedir. Aynı çalışmada, kadınların erkeklere göre yüksek oranda GETAT’ın modern tıptan daha güvenli olduğunu bildirdiği ($p \leq 0.05$) ve çalışmaya katılan tüm bireylerde GETAT’ın modern tıptan daha güvenli bulunma oranının %25 olduğu saptanmıştır (19). Bireylerin GETAT yöntemlerinden fayda gördüklerini ifade ettikleri araştırmalar mevcuttur (20, 21). Türkiye’de kronik hastalığı olmayan çocuklarla yapılan bir çalışmada GETAT’ı tedavinin başarısızlığından dolayı kullananların oranı %35.4, GETAT’tan tam fayda görenlerin oranı %22.9, kısmen fayda görenlerin oranı %58.3, GETAT’ın yan etkisi olduğunu bildirenlerin oranı ise %11.3’tür (22). İtalya’da yapılan bir derleme çalışmasında doktorların sık sık GETAT ile ilişkili sorularla karşılaştıkları fakat eğitim ve deneyimlerinin yetersiz olmasından dolayı bu sorulara tarafsız ya da olumsuz yanıtlar verme ve GETAT’ı hastalarla tartışmaktan kaçınma ihtimaline değinilmektedir (23). Literatürde yer alan yurt içi ve yurt dışı çalışmaların bulguları çalışmamız bulgularıyla benzeşmekte olup ulaşılabilen birçok çalışmada; bireylerin GETAT’ın yan etkileri ya da ilaç etkileşimleri ile ilgili bilgi sahibi olmadıkları, Geleneksel ve tamamlayıcı tıp kullanımına bireysel karar verdikleri ve kullanımda herhangi bir sınırlama olmadığı, karşılaştıkları sağlık çalışanları ve özellikle doktorlarla GETAT konusunda tatmin edici bir bilgi alışverişi yapılmadığı görülmektedir.

Bu bilgiler ışığında GETAT kullanımının ödemesinin sağlık sigortası kapsamına alınması, GETAT yöntemi uygulayıcılarının eğitimi ve sertifikalı olması,

denetimin olmadığı uygulamaların önlenmesi ve ilgililere bildirim, GETAT yöntemlerinin yan etkilerinin hastalarca hekimlere bildirim ve hekimlerin buna yönelik sorgulama yapması, kullanılan GETAT yöntemlerinin ve yan etkilerinin hasta bilgi sistemlerine kayıt edilmesi gereklidir. Ayrıca GETAT yöntemlerinin kullanıcılarına ve sağlık profesyonellerine, kapsamlı tanıtım ve gerekli bilgileri içeren eğitimler sağlanmalıdır. Geleneksel ve tamamlayıcı tıp kullanıcılarına kullandıkları yöntemin uygulama şeklinden, yan etki göstermesine kadar birçok konuda danışmanlık verilerek yönlendirmelerin sağlanması ve sağlık hizmetine entegre olmayan kullanımların önlenmesi sağlanmalıdır. Sağlık profesyonellerine ve özellikle hekimlere hastalarıyla GETAT'ı danışabileceği, tartışabileceği düzeyde bir profesyonel ve standart prosedür sunulmalıdır. Türkiye'de GETAT yöntemlerinin etkililiği, ilaç etkileşimleri, yan etkileri, tıbbi tedavi ile birlikte kullanımına yönelik daha detaylı bilimsel çalışmalara ihtiyaç vardır.

Araştırmanın tek merkezde yapılması, belirli bir zaman diliminde yapılması ve ülkeye genellenemeyecek olması bu çalışmanın sınırlılığdır. Bu çalışmanın güçlü yanlarından biri; toplumdaki bireylerin halihazırda kullandıkları çeşitli GETAT yöntemlerini, ne amaçla kullandıklarını, GETAT yöntemleri ve tıbbi tedavi yaklaşımlarına ilişkin düşüncelerini literatüre kazandırmasıdır. Böylelikle sağlık profesyonellerinin toplumdaki bireyler tarafından yaygın şekilde kullanılan GETAT yöntemlerine ilişkin farkındalıklarının artırılması ve bu yöntemlerin denetimli bir şekilde kullanılması ve sağlık sistemine entegre edilmesinde yeni stratejiler ve yaklaşımlar geliştirilmesine katkı sağlanacağı düşünülmektedir.

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VULVOVAJİNAL KANDİDİYAZISLI HASTALARDAN İZOLE EDİLEN CANDIDA TÜRLERİNDEKİ INT, HWP, PLB, SAP VE ALS GENLERİNİN MOLEKÜLER TESPİTİ

Molecular Detection of INT, HWP, PLB, SAP and ALS Genes in Candida Species Isolated from Patients with Vulvovaginal Candidiasis

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ÖZ

Amaç: Vulvovajinal kandidiyazis, kadınların yaklaşık %75'inde yaşamları boyunca en az bir kez görülen yüzeysel mantar enfeksiyonudur. Bazı genler, *Candida* türlerinin vajina mukozasına ve epitel hücrelerine yapışmasında ve patogeneğinde rol oynamaktadır. Bu çalışmanın amacı, vulvovajinal kandidiyazisli hastalardan izole edilen *Candida* suşlarındaki HWP1 (hifal duvar proteini), ALS1 (agglutinin benzeri sekans), SAP1 (sekrete aspartil proteaz), PLB1 (fosfolipaz B), INT1 (integrin A) genlerinin sıklığının araştırılmasıdır.

Gereç ve Yöntemler: Çalışmaya moleküler teknik kullanılarak tanımlanan 100 vajinal *Candida* izolatu dahil edildi. İzole edilen tüm *Candida* suşlarında, enfeksiyon da önemli rol oynayan INT1, HWP1, PLB1, SAP1 ve ALS1 genlerinin varlığı PCR yöntemi kullanılarak araştırıldı.

Bulgular: SAP1, INT1 ve HWP1 virülans genleri *Candida* suşları arasında en yaygın, PLB geni en az tespit edilen gen olmuştur. *Candida albicans* suşlarında SAP1 (%93.0) geni en çok saptanan virülans geni olurken, bunu HWP1 geni (%86) takip etmiştir. Benzer şekilde non-albicans *Candida* türlerinde saptanan virülans genleri arasında SAP1 geni (%86) en fazla saptanan virülans geni olmuştur. Farklı *Candida* türlerinin %95'inde VVK'ya neden olabilecek en az iki virülans faktörü tanımlanmıştır.

Sonuç: Bu çalışmada elde edilen sonuçlar, vulvovajinal kandidiyazis enfeksiyonu sırasında ekspres edilen INT, HWP, PLB, SAP ve ALS genlerinin, *Candida* suşlarının vajinaya adezyonuna ve biyofilm oluşumuna katkıda bulunmuş olabileceğini düşündürmektedir.

Anahtar Kelimeler: *Candida*, vulvovajinal kandidiyaz, virülans genleri, adezyon.

ABSTRACT

Objective: Vulvovaginal candidiasis is a superficial fungal infection that occurs in approximately 75% of women at least once in their lifetime. Some genes are involved in the adhesion and pathogenesis of *Candida* species to the mucosa and epithelial cells of the vagina. The aim of this study was to investigate the frequency of HWP1 (hyphal wall protein), ALS1 (agglutinin-like sequence), SAP1 (secreted aspartyl proteases), PLB1 (phospholipase B), INT1 (integrin A) genes in *Candida* strains isolated from vulvovaginal candidiasis patients

Material and Methods: The study included 100 vaginal *Candida* isolates identified by using molecular technique. The presence of INT1, HWP1, PLB1, SAP1 and ALS1 genes, which play an important role in infection, were investigated using PCR method in all isolated *Candida* strains.

Results: SAP1, INT1 and HWP1 virulence genes were commonly found in *Candida* strains, while the PLB gene was least detected. The SAP1 (93.0%) gene was the most detected virulence gene, followed by the HWP1 gene (86%) in *Candida albicans* strains. Similarly, among the virulence genes in non-albicans *Candida* strains, the SAP1 gene (86%) was the most detected virulence gene. At least two virulence factors have been identified that can cause VVC in 95% of the different *Candida* species.

Conclusion: The results obtained in this study suggests that INT, HWP, PLB, SAP and ALS genes expressed during vulvovaginal candidiasis infection may have contributed to the adherence of *Candida* strains to the vagina and biofilm formation.

Keywords: *Candida*, vulvovaginal candidiasis, virulence genes, adhesion.



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GİRİŞ

Candida cinsleri insanlarda, hayvanlarda ve çeşitli ortamlarda bulunabilen, kadınlarda ise vajinal lümeninde asemptomatik olarak kolonize olan bir maya mantarı cinsidir (1). *Candida* ve *Lactobacillus* cinsi mikroorganizmalar, konak vajen florasında bir dengeye sahiptir (2). Bu dengenin bozulması halinde vulvovajinal kandidiyazis (VVK) adı verilen *Candida* türlerine bağlı enfeksiyonlar ortaya çıkabilmektedir (3). *Candida* cinsi mayaların virülans faktörleri hastalığın patogeneğinde oldukça aktif rol oynamaktadır. Bu virülans faktörleri arasında adezyon, konak tanıma biyomolekülleri (adezinler) ile konak savunmasından kaçma, konak dokuda biyofilm oluşumu, proteinazlar ve lipazlar gibi dokuya zarar veren hidrolitik enzimlerin üretimi yer almaktadır (4).

Konak hücre yüzeyine adezyon, insan dokularına fungal kolonizasyonunda ilk adımı oluşturmaktadır. Epitel hücrelerine adezyon işlemi, genel olarak diğer hücrelerin yüzeyindeki amino asit ve şeker tamamlayıcı reseptörlere spesifik olarak bağlanan adezin adı verilen özel yüzey proteinleriyle sağlanmaktadır. *Candida* türlerinin adezyonuna ve endotelial hücrelere bağlanmasına aracılık eden aglütinin benzeri sekans (ALS) gen ailesi başta *C. albicans* (1-7,9) olmak üzere *C. parapsilosis*, *C. tropicalis*, *C. dubliniensis*, *C. guilliermondii* ve *C. lusitaniae*'de tanımlanmıştır. Bu gen adezyonun yanı sıra hif oluşumu için de oldukça önemlidir (5-7).

Hücre duvarı proteini 1 (HWP1), maya benzeri hif mantarlarında bulunan önemli virülans faktörlerinden birisidir. Bu protein, konak epitelinin yüzeyindeki çeşitli proteinlere bağlanmada rol oynayan önemli bir adezyon faktörüdür (8). Bir diğer virülans faktörü olan Integrin benzeri protein 1 (INT1), mantarın epitel hücrelerine adezyonuna ve filamentöz büyümesine katkıda bulunmakta olup ayrıca hücre dışı sinyallere yanıt olarak morfolojik değişikliği azaltabilmektedir (9).

Maya mantarlarının patojenitesinden sorumlu olan diğer virülans faktörleri ise proteaz ve fosfolipaz gibi hücre dışı hidrolitik enzimlerdir. Bu enzimler konak dokularına adezyonda, penetrasyonda, invazyonda ve

konaka dokularının yıkımında önemli bir rol oynamaktadır. Bu enzimler, bu işlevi konağa ait hücre zarı bileşenlerini etkisiz hale getirerek sağlamakta ve bu sayede konağa invazyonu kolaylaştırmaktadır (10).

Sekretuar aspartil proteazlar (SAP), *Candida* cinsi mayalarda bulunan geniş bir SAP gen ailesi tarafından kodlanan önemli bir hidrolitik enzim grubudur. Bu gen ailesi başta *C. albicans* olmak üzere (SAP1-10), *C. dubliniensis*'te (SAP 1-7), *C. tropicalis*'te (SAP1-4), ayrıca *C. parapsilosis*'te (SAP1-3) tanımlanmıştır. Bu gen ailesi *Candida* cinsi mantarların enfeksiyonunda oldukça önemli olup, artmış adezyon ve fenotipik değişkenlikte, hematogen yolla oluşan kandidiyazisin ilerlemesinde ve konakçı dokulara invazyonda önemli rol oynamaktadır (6,11,12).

Hidrolazlar, ayırdıkları ester bağına göre A, B, C ve D olmak üzere dört sınıfa ayrılan fosfolipaz grubunu meydana getirmektedir. *Candida* türlerinin hemen hemen çoğu, bu dört sınıfa ait fosfolipazları sentezleme yeteneğine sahiptir. Fosfolipaz enzimleri, hücre zarlarının fosfolipidlerini hidrolize ederek konak hücrenin lizisinin indüklenmesine ve doku penetrasyonuna katkıda bulunmaktadır. Bu nedenle fosfolipaz enzimleri mantar enfeksiyonunun ilerlemesi ile doğrudan ilişkilidir (6,13).

GEREÇ VE YÖNTEM

Bu çalışmaya daha önce Tokak ve ark. (14) tarafından VVK şüpheli hastalardan izole edilen ve genotipik olarak tanımlanan 100 *Candida* suşu dahil edildi. Çalışma için KTO Karatay Üniversitesi İlaç ve Tıbbi Cihaz Dışı Araştırmalar Etik Kurulundan onay alınmıştır (Sayı: E-41901325-200-50504, Tarih: 30.12.2022). Verilerin değerlendirilmesinde SPSS 24 (IBM SPSS Statistics for Windows, Version 25.0. Armonk, NY: IBM Corp.) istatistik paket programı kullanılmıştır. İstatistiksel anlamlılık düzeyi $p < 0.05$ olarak kabul edildi.

DNA İzolasyonu ve Virülans Genlerinin PCR Yöntemiyle Belirlenmesi

Çalışmada izole edilen *Candida* suşlarından DNA izolasyonu, High Pure PCR Template Hazırlama Kiti

(Roche Diagnostic, ABD) kullanılarak üretici firmanın talimatlarına göre yapıldı. Çalışmada kullanılan primer sekansları ve ürün boyutları Tablo 1’de verildi. PCR, MgCl₂ içermeyen 10x PCR tamponundan 2.5 µl, 2.5 mM MgCl₂, her bir deoksiniüksit trifosfattan (dNTP’ler) 1 µl, her primerden 0.4 µl (10mM), 0.08 µl Taq polimeraz (Thermo Scientific, ABD), 1.25 µl kalıp DNA ve 25 µl’ye kadar steril distile su eklenerek, 25

µl’lik reaksiyon karışımında gerçekleştirildi. PCR reaksiyonları Tablo 1’de verilen koşullarda gerçekleştirildi. Amplikonlar etidyum bromür (0.5 µg/mL TAE) ile boyandı ve ardından %1.5’lik agaroz jel üzerinde yürütüldü. Jel görüntüleme sistemi (Major Science, ABD) ile fotoğraflandı.

Tablo 1: Oligonükleotid primer dizisi ve PCR amplifikasyonu için PCR protokolü

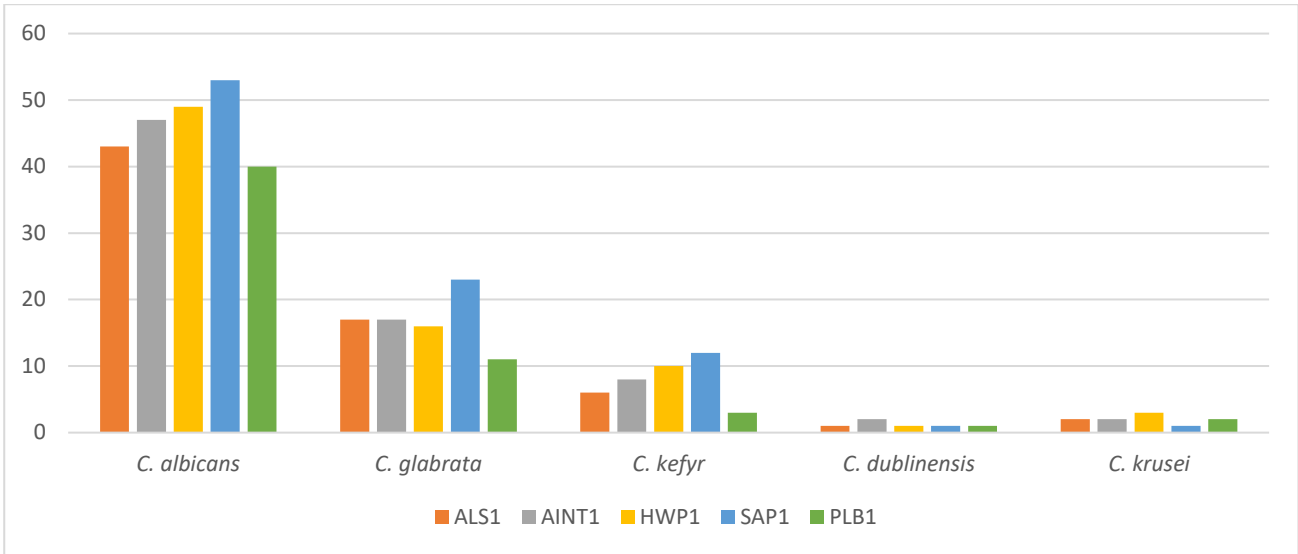
Genler	Primer dizi	Ürün boyutu (bp)	PCR protokolü
HWP1	F-ATGACTCCAGCTGGTTC	572 bp	94 °C-4 dk
	R-TAGATCAAGAATGCAGC		94 °C-30 s 52 °C-1 dk 72 °C-2 dk
ALS1	F-ACTAGTGAACCAACAAATACCAGA	318 bp	72 °C-5 dk
	R-CCAGAAGAAACAGCAGGTGA		94 °C-2 dk 94 °C-4 dk 52 °C-1 dk 72 °C-2 dk
INT1	F-AAGCTCTGATACCTACACTAGCGA	239 bp	72 °C-5 dk
	R- GTTAGGTCTAAAGTCGAAGTCATC		92 °C-5 dk 92 °C-1 dk 65 °C-1 dk 72 °C-1 dk
SAP1	F-GCTCTTGCTATTGCTTTATTA	253 bp	72 °C-5 dk
	R- CATCAGGAACCCATAAATCAG		95 °C-5 dk 95 °C-4 dk 49 °C-1 dk 72 °C-1 dk
PLB1	F-ATGATTTTGCATCATTTG	751 bp	72 °C-5 dk
	R-AGTATCTGGAGCTCTAC		94 °C-5 dk 94 °C-1 dk 47 °C-1 dk 72 °C-1 dk

BULGULAR

Bu çalışmaya, VVK’lı hastaların vajinal sürüntü örneklerinden izole edilen ve moleküler yöntemle tanımlanan 100 *Candida* türü dahil edilmiştir. Çalışmaya dahil edilen izolatların %57’si (57) *C. albicans*, %26’sı (26) *C. glabrata*, %12’si (12) *C. kefir*, %3’ü (3) *C. krusei* ve %2’si (2) *C. dubliniensis*’i içermektedir.

Çalışmaya dahil edilen *Candida* suşları arasında en yüksek HWP1 gen frekansı *C. krusei*’de (%100) bulunmuş olup, bunu *C. albicans* (%86) izlemiştir. İzole edilen *Candida* suşları arasında ALS1 virülans geninin

varlığı en yüksek oranda *C. albicans* (%75.4), *C. krusei* (%66.7) ve *C. kefir* (%66.7)’de bulunmuştur. SAP1 geninin varlığı en yüksek oranda *C. albicans* (%93) suşlarında saptanmış, bunu %88.5 ile *C. glabrata* izlemiştir. Non-albicans *Candida* (NAC) suşları arasında INT1 gen oranı *C. dubliniensis* (%100) suşlarında en yüksek oranda bulunurken bu oran *C. albicans* suşlarında %86 olarak belirlenmiştir. Son olarak, *Candida* suşları arasında PLB1 virülans geninin varlığı en yüksek oranda *C. kefir*’de (%100) saptanmış olup, bunu %70.2 lik oranla *C. albicans* izlemiştir (Şekil 1).



Şekil 1: Candida suşları arasında virülans genlerinin dağılımı

TARTIŞMA

Candida türlerinin genital sistem mukozasındaki patojenitesi VVK'ya neden olmaktadır. Yapılan çalışmalar son yıllarda VVK'lı hasta sayısında önemli bir artış olduğunu göstermektedir (15). *C. albicans* türlerinin farklı konaklardaki enfeksiyonunda çeşitli virülans faktörleri önemli rol oynamaktadır. Bu virülans faktörleri arasında maya ve hif formları arasındaki morfolojik geçiş, hücre yüzeyinde adezinlerin ekspresyonu ve invazyon, tigmotropizm, biyofilm oluşumu, fenotipik değişim ve hidrolitik enzimlerin salgılanması yer almaktadır (4).

Adezinler, *C. albicans*'ın inert polimerlere veya insan hücrelerinin yüzeyindeki proteinlere bağlanmasına aracılık eden mantar yüzey molekülleridir (16). Adezin moleküllerini kodlayan genler arasında ALS1, HWP1 ve INT1 gibi genler yer almaktadır (17).

HWP1 geni taşıyan *Candida* türleri vajinal mukozaya yerleşme ve burada kalma yeteneğine sahiptir. Nas ve ark.'nın yapmış olduğu bir çalışmada VVK'lı olan doğum öncesi ve üreme çağındaki kadınlardan almış olduğu vajinal sürüntü örneklerinden izole edilen suşlardaki HWP1 geninin sırasıyla %60 ve %73'ünde eksprese edildiğini bildirmiştir (18). Perez ve ark., 264 kadın hastadan alınan vajinal sürüntü örneğinde *C. albicans* türünün HWP1 gen sıklığını %75 olarak bulmuşlardır (19). Çalışmamızda adezin genlerinden

biri olan HWP1 geninin sıklığı *C. albicans* suşlarında %86, NAC suşlarının ise %69.8 olarak bulunmuştur.

ALS genleri tarafından kodlanan ALS proteinleri, *C. albicans*'ın hücre yüzeyinde yaygın olarak dağılmakta olup, bu proteinler konak-patojen etkileşiminde önemli bir rol oynamaktadır (20). Roudbarmohammadi ve ark., üreme çağındaki VVK'lı kadınlardan alınan vajinal sürüntü örneklerinde *C. albicans* suşlarının ALS1 gen sıklığını %75 olarak saptamışlardır (21). Başka bir çalışmada *C. albicans* suşlarında ALS1 gen sıklığı %100 olarak bildirilmiştir (22). Çalışmamızda ALS1 geninin sıklığı *C. albicans* izolatlarında %75.4 iken, NAC suşlarında ise bu oran %60.5 olarak saptanmıştır. INT1, *Candida* türlerinin epitel hücrelerine adezyonuna katkıda bulunan virülans genleri arasında önemli bir yere sahiptir. Shrief ve ark., tarafından yapılan bir çalışmada *C. albicans* suşlarında INT1 gen frekansı %72 olarak bulunmuştur (23). Çalışmamızda INT1 gen frekansı *C. albicans* izolatlarında %82.5, NAC suşlarında ise %67.4 olarak bulunmuştur.

Proteinazlar, kollajen, müsin ve keratin gibi konak epitelyal ve mukozal bariyer proteinlerini bozan önemli bir hidrolitik enzim grubudur. Bu enzimler komplemanların, antikorların, sitokinlerin vb. immün sistem elemanlarının parçalanmasıyla *Candida* mayalarının konak hümmoral ve hüccresel bağışıklığına direnmesine yardımcı olmaktadır (24).

Lian ve Lui, VVK klinik bulgu ve semptomları olan hastalarda yaptıkları çalışmada *C. albicans* suşlarının 16'sının (%75) SAP1 genine sahip olduğunu bildirmişlerdir (25). VVK'lı kadınlar üzerinde yapılan başka bir çalışmada izole edilen *Candida* türlerinin %98.3'ünde SAP1 geni saptanmıştır (26). Çalışmamızda 57 *C. albicans* izolatından 53 (%93) izolatın ve NAC suşlarından 37 (%86) izolatın SAP1 genini taşıdığı saptanmıştır.

PLB1 genleri *Candida* türlerinin tutunmasında ve invazyonunda gerekli olan, konakçı hücre zarının bozulmasına ve hatta yırtılmasına neden olan virülans genleridir (27). Lotfali ve ark. çalışmalarına dahil ettikleri hastaların vajinal örneklerinden izole edilen *C. albicans* türlerinde PLB1 geni sıklığını %53.3 olarak saptanmıştır (28). Perez ve ark.'nın VVK'lı kadınlar üzerine yaptığı çalışmada ise *C. albicans* türlerinin %100'ünde PLB1 genini saptanmıştır (29). Çalışmamızda PLB1 sıklığı *Candida* türleri arasında farklılık göstermiş olup PLB1 geni sıklığı *C. albicans* suşlarında %70, NAC suşlarında ise %39.53 olarak saptanmıştır.

Çalışmamızın bazı sınırlılıkları bulunmaktadır. Bunlar; I. Bu çalışmada *Candida* suşlarının sahip olduğu ALS1, HWP1, INT1, PLB1 ve SAP1 genleri PCR yöntemi ile belirlenmiş olup, gen ekspresyon çalışması yapılmamıştır.

II. Çalışmaya dahil edilen *Candida* suşlarının ALS (1-7, 9), SAP (1-10) ve PLB (1-4) ailelerinde yer alan genlerden sadece bir tanesi üzerinde durulmuştur.

III. Çalışmamızın küçük örneklem boyutuna sahip olması nedeniyle, elde edilen sonuçlar ile ilgili genelleme yapılamamıştır.

Candida türlerinin fırsatçı patojene dönüşmesi genellikle vajinal ortamdaki değişikliklere bağlı olarak gerçekleşmektedir. Yapılan son çalışmalar ile VVK gelişiminin patogenezi anlamada önemli ilerlemeler kaydedilmiştir. Bu çalışmalar *Candida* türlerinin neden olduğu vajinal enfeksiyonların patogenezinin, bazı virülans genlerinin diferansiyel ekspresyonu ile ilişkili olabileceğini bildirmektedir. Yapılan çalışmalarda

virülans genleri daha çok *C. albicans* suşlarında araştırılmış olup NAC suşlarında ise araştırılmamıştır. Çalışmamızda *C. albicans* suşlarında saptanan INT, HWP, PLB, SAP ve ALS genlerinin saptanma oranı diğer çalışmalar ile uyumlu bulunmuştur. NAC suşlarında bulmuş olduğumuz yüksek virülans oranı ise yapılacak olan çalışmalarda bu suşların da göz ardı edilmemesini göstermektedir. Bu çalışmada sunulan sonuçlar VVK enfeksiyonu esnasında INT, HWP, PLB, SAP ve ALS genlerinin eksprese edildiğini göstermektedir, bu da virülans genlerinin farklı kombinasyonlarının *Candida* suşlarının vajinaya tutunmasına ve VVK enfeksiyonuna katkıda bulunduğunu düşündürmektedir. Bununla birlikte, virülans genlerinin moleküler mekanizmasını ve bunların enfeksiyon bölgesine katkısını karakterize etmek için daha fazla numuneyi içeren ileri düzey çalışmalar yapılması kanaatindeyiz.

Çıkar Çatışması Beyanı: Yazarlar arasında herhangi bir çıkar çatışması bulunmamaktadır.

Katkı Oranı Beyanı: Anafikir/Planlama: ST, İHK, EGM.; Analiz/Yorum: ST, İHK, EGM, FB; Veri Sağlama: JEH, FET; Yazım: ST, EGM, FB; Gözden Geçirme ve Düzeltme: İHK, JEH, FET; Onaylama: ST, İHK.

Destek / Teşekkür Beyanı: Çalışmada hiçbir kurum ya da kişiden finansal destek alınmamıştır.

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DETECTION OF EPSTEIN-BARR VIRUS GENOME IN PEDIATRIC PATIENTS WITH LEUKEMIA AND HODGKIN LYMPHOMA: VIRAL ETIOLOGY IN PEDIATRIC CANCERS IN TÜRKİYE

Lösemi ve Hodgkin Lenfomalı Pediatrik Hastalarda Epstein-Barr Virüsü Genomunun Tespiti: Türkiye’de Pediatrik Kanserlerde Viral Etiyoloji

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ABSTRACT

Objective: Cancer is a pervasive disease characterized by its widespread occurrence and challenging treatment process. While numerous agents, including viruses, have been identified as potential causes of cancer in both adults and children, the complete pathogenesis of cancers remains incompletely elucidated. This study aimed to examine the presence of four viral agents, namely Human T-cell Lymphotropic Virus Type 1 (HTLV-1), Epstein-Barr Virus (EBV), Kaposi’s Sarcoma-Associated Herpesvirus (KSHV), and Human Parvovirus B19 (HPV B19), in blood samples obtained from pediatric patients (n=64) diagnosed with B cell acute lymphoblastic leukemia (ALL), T cell ALL, Hodgkin lymphoma, and patients with relapsed leukemia and lymphoma.

Material and Methods: The whole blood samples collected from the patients during the pre-treatment and post-treatment periods underwent polymerase chain reaction (PCR) and real-time PCR to identify the presence of the viral genomes of HTLV-1, EBV, KSHV, and HPV B19. The samples that tested positive were subsequently subjected to Sanger sequencing, followed by phylogenetic analysis.

Results: Among a total of 64 samples analyzed, HTLV-1, KSHV, and HPV B19 were found to be negative. However, EBV genome was detected in six samples (9.37%) from patients with ALL and Hodgkin lymphoma, comprising both pre-treatment (n=3) and post-treatment (n=3) cases. Subsequent sequencing and alignment of the positive EBV samples with other EBV sequences deposited in GenBank revealed a high degree of similarity.

Conclusion: Our findings suggest that EBV may be one of the viral agents implicated in pediatric cancer cases involving leukemia and Hodgkin lymphoma. Therefore, it is recommended to consider testing for the presence of EBV genome in these patient populations within the context of Türkiye. This information contributes to a better understanding of the viral etiology underlying pediatric cancers, enabling the development of targeted diagnostic and therapeutic strategies in the future.

Keywords: Human T-cell lymphotropic virus type 1, Epstein-Barr virus, Kaposi’s sarcoma associated herpesvirus, human parvovirus B19, acute lymphoblastic leukemia, Hodgkin lymphoma

ÖZ

Amaç: Kanser, yaygın görülmesi ve zorlu tedavi süreci ile karakterize yaygın bir hastalıktır. Virüsler de dahil olmak üzere birçok etken hem yetişkinlerde hem de çocuklarda kanserin potansiyel nedenleri olarak tanımlanmış olsa da kanserlerin patogenezi tam olarak aydınlatılmamıştır. Bu çalışma, B hücreli akut lenfoblastik lösemi (ALL), T hücreli ALL, Hodgkin lenfoma tanısı almış ve lösemi ile lenfoma nükseden pediatrik hastalardan elde edilen kan örneklerinde (n=64), insan T-hücreli lenfotropik virüs tip 1 (HTLV-1), Epstein-Barr virüsü (EBV), Kaposi sarkom ilişkili herpesvirüs (KSHV) ve insan parvovirus B19’un (HPV B19) varlığını incelemeyi amaçlamıştır.

Gereç ve Yöntemler: Hastalardan hem tedavi öncesi hem tedavi sonrası dönemlerinde tam kan örnekleri alınmış ve bu örneklerde HTLV-1, EBV, KSHV ve HPV B19 viral genom varlığını tespit etmek için polimeraz zincir reaksiyonu (PCR) ve gerçek zamanlı PCR yapılmıştır. Pozitif örneklerden Sanger sekanslama ile sekans analizi yapılmış ve filogenetik analizler gerçekleştirilmiştir.

Bulgular: Toplam 64 örnek analiz edildiğinde, HTLV-1, KSHV ve HPV B19’un negatif olduğu belirlenmiştir. Ancak, EBV genomu ALL ve Hodgkin lenfoma hastalarından altı örnekte (%9.37) tespit edilmiştir; bu örnekler hem tedavi öncesi (n=3) hem de tedavi sonrası (n=3) vakalarda saptanmıştır. Pozitif EBV örneklerinin sekanslama sonrasında ve GenBank’ta bulunan diğer EBV dizileri ile hizalanması, birbirleri ile yüksek derecede benzerlik gösterdiğini ortaya koymuştur.

Sonuç: Bulgularımız, EBV’nin, lösemi ve Hodgkin lenfomalı pediatrik kanser vakalarında etkili olan viral ajanlardan biri olabileceğini düşündürmektedir. Bu nedenle, Türkiye’deki bu hasta popülasyonunda EBV genomunun varlığını test edilmesi önemli olabilecektir. Bu veri, pediatrik kanserlerin temelindeki viral etiyojijiyi daha iyi anlamamıza ve gelecekte hedefe yönelik tanı ve tedavi stratejilerinin geliştirilmesine yardımcı olacaktır.

Anahtar Kelimeler: İnsan T-hücreli lenfotropik virüs tip 1, Epstein-Barr virüsü, Kaposi sarkom ilişkili herpesvirüs, insan parvovirus B19, akut lenfoblastik lösemi, Hodgkin lenfoma



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INTRODUCTION

Childhood cancer stands as a prominent cause of mortality within the pediatric population, and globally, leukemia, lymphoma, and central nervous system tumors emerge as the most prevalent malignancies among children (1). According to the Centers for Disease Control and Prevention, malignant neoplasms account for 18.8% and 16.2% of total deaths among children aged 5-9 and 10-14 years, respectively, in the United States in 2010 (2). The etiology of cancer involves a significant contribution of various viruses, including Human T-cell leukemia virus type 1 (HTLV-1), Epstein-Barr virus (EBV), Kaposi's sarcoma-associated herpesvirus (KSHV), human papillomaviruses, hepatitis C virus, hepatitis B virus, simian vacuolating virus 40, BK virus, and JC virus (3). Furthermore, human parvovirus B19 (HPV B19) has been associated with specific cancer types including acute leukemias (4).

HTLV-1 is correlated with a spectrum of clinical presentations, encompassing adult T-cell lymphoma (ATL), lymphoma, HTLV-1-associated myelopathy (HAM), tropical spastic paraparesis (TSP), distinctive dermatological lesions, lymphadenopathy, hepatosplenomegaly, and uveitis (5,6). EBV is responsible for a spectrum of illnesses, encompassing Hodgkin's lymphoma, stomach cancer, nasopharyngeal carcinoma (NPC), Burkitt lymphoma, diffuse large B-cell lymphomas, infectious mononucleosis, and a variety of other malignancies originating from both lymphoid and epithelial sources (7). KSHV is linked to conditions including Kaposi sarcoma, non-Hodgkin B-cell lymphomas, and multicentric Castleman's disease (8). HPV B19 significantly impacts the erythroid progenitor cells in human bone marrow, leading to temporary erythropoiesis suppression and severe complications in individuals with hematologic disorders and immunodeficiency. Chronic HPV B19 infection is observed in both adult and pediatric patients with acute lymphocytic leukemia (ALL) (4,9). These viruses are associated with various diseases, including lymphomas and other malignancies. Their infection can lead to the

development of cancerous conditions in affected individuals.

The principal aim of this study was to assess the existence of HTLV-1, EBV, KSHV, and HPV B19 within whole blood samples collected from pediatric cancer patients in Türkiye. Furthermore, we aimed to explore the potential influence of immunosuppressive cancer treatments on the presence of viral genomes.

MATERIALS AND METHODS

Samples

Children between the ages of 2-16, applied to the Department of Hematology of Ankara Children's Health and Diseases Hematology Oncology Training and Research Hospital between the years of 2010-2017, who have symptoms such as paleness, fever, vomiting, excessive fatigue, loss of appetite and excessive weight loss were taken in the present study. A total of 32 patients were included to the study, who are diagnosed B cell acute lymphoblastic leukemia (ALL) (n=9), T cell ALL (n=6), Hodgkin lymphoma (n=8), relapsed from leukemia and lymphoma disease (n=9). The laboratory diagnosis of ALL and Hodgkin's lymphoma is conducted through routine diagnostic procedures such as staining, immunohistochemistry and flow cytometry at the Ankara Children's Health and Diseases Hematology Oncology Training and Research Hospital (10-12). Leukemia patients were tested for the EBV by ELISA or PCR in an external private diagnostic laboratory and Hodgkin lymphoma patients were subjected to EBV assessment using immunohistochemistry in the hospital. All results of the patients were negative for EBV (data not shown). When the diagnosis was confirmed, two sets of whole blood samples were collected from each of the 32 patients: the initial sampling occurred prior to the commencement of treatment when patients were newly diagnosed (pre-treatment period, n=32), while the subsequent sampling took place on the 33rd day of the treatment regimen (post-treatment period, n=32). The therapies of the ALL and Hodgkin lymphoma patients are maintained according to the ALL IC-BFM 2009 protocol, and

ABVE-PC protocol, respectively (13,14). The study protocol was approved by the Clinical Research Ethics Committee of the Ankara Children's Health and Diseases Hematology Oncology Training and Research Hospital (Date:21.03.2016, Number:2016-011).

DNA Isolation

DNA isolation from samples was performed using the PureLink Genomic DNA Mini Kit (K182002, Invitrogen, CA, USA). In brief, 200 µl of whole blood sample, 20 µl proteinase K and 20 µl RNase were mixed in a sterile microcentrifuge tube. The mixture was slightly vortexed and allowed to stand at the room temperature for 2 minutes. Then 200 µl lysis solution is added to the mixture, vortexed and incubated at 55 °C for 10 minutes in a water bath (BM15, Nüve, Türkiye). 200 µl of 100% ethanol was added to the mixture and vortexed. The prepared lysate was transferred to the purification column. The tubes were centrifuged at 10,000 × g for 1 minute (5417R, Eppendorf, Germany). After centrifugation, the column was placed in a new collection tube. 500 µl of wash solution 1 was added into the column and centrifuged at 10,000 × g for 1 minute. After centrifugation, the column was placed in a new collection tube. 500 µl of wash solution 2 was added into the column and centrifuged for 3 min at 13,000 × g. The column was placed in a sterile 1.5 ml microcentrifuge

tube and 200 µl elution buffer was added to the column tube and incubated for 1-2 min at room temperature. Thereafter, the column tube was centrifuged at 10,000 × g for 1 min. DNA samples collected in the microcentrifuge were stored at -20 °C for further analyses.

Polymerase Chain Reaction (PCR)

To investigate the presence of EBV, KSHV, HPV B19, and HTLV-1 genomes in the samples, PCR was performed. The human glyceraldehyde-3-phosphate dehydrogenase (GAPDH) gene was used as a housekeeping gene in PCR. To amplify the viral genes and GAPDH, the primer pairs shown in Table 1 were used and the PCR mix was optimized as containing DNA sample, 10 pmol forward and reverse primer, 1.25 mM dNTP, 5× PCR buffer, 50 mM MgCl₂, 2.5 U Taq DNA polymerase in total 50 µl volume. The PCR conditions used for amplification are summarized in Table 2. The PCR products were analyzed by 1.2% agarose gel electrophoresis including ethidium bromide and visualized by UV transilluminator (Illuminx, Nyxtechnik, USA). The positive DNA controls for each virus were kindly provided by Düzen Laboratory (Ankara, Türkiye).

Table 1: Targeted genes and virus-specific primer sequences investigated in the study

Target / Gene	Sequence	Product	Reference
KSHV / ORF73	F: 5'-GGTGATGTTCTGAGTACATAGCGG-3' R: 5'-CCGAGGACGAAATGGAAGTG-3'	143 bp	(34)
EBV / gp220	F: 5'-CCTTAGGAGGAACAAGTCCC-3' R: 5'-GGCTGGTGTACCTGTGTTA-3'	239 bp	(35)
HPV B19 / NS1	F: 5'-CCACTATGAAAAGTGGCAATA-3' R: 5'-GCTGCTTTCCTGAGTTCTTCA-3'	154 bp	(36)
HTLV-1 / Pol	F: 5'-CCCTACAATCCAACCAGCTCAG-3' R: 5'-TGGAGTAACTACTAGGTTAG-3'	668 bp	(37)
Human / GAPDH	F: 5'-AGGGCTGCTTTTAACTCTGGT-3' R: 5'-CCCACCTTGATTTTGGAGGGA-3'	204 bp	(38)

KSHV: Kaposi's sarcoma associated herpesvirus, EBV: Epstein-Barr virus, HPV B19: Human parvovirus B19, HTLV-1: Human T lymphotropic virus, GAPDH: Glyceraldehyde-3-phosphate dehydrogenase, F: Forward, R: Reverse, bp: Base pair.

Table 2: The PCR conditions optimized for detection of viral agents

Virus	Denaturation	Amplification	Final elongation	No of amplification cycles
KSHV	95 °C 2 min	95 °C 30 s 54 °C 30 s 72 °C 30 s	72 °C 5 min	× 40
HPV B19	95 °C 2 min	95 °C 30 s 53 °C 30 s 72 °C 30 s	72 °C 10 min	× 35
EBV	95 °C 2 min	95 °C 20 s 59 °C 20 s 72 °C 20 s	72 °C 5 min	× 40
HTLV	95 °C 2 min	95 °C 20 s 58 °C 20 s 72 °C 20 s	72 °C 10 min	× 36

KSHV: Kaposi's sarcoma associated herpesvirus, EBV: Epstein-Barr virus, HPV B19: Human parvovirus B19, HTLV-1: Human T lymphotropic virus.

Real-time PCR

Real-time PCR mix contained DNA, 2× SYBR Green master mix (04707516001, Roche, Germany), 0.5 pmol forward and reverse primers, and PCR grade water up to a volume of 20 µl. The reactions were carried out on LightCycler 96 real-time PCR instrument (Roche,

Mannheim, Germany) and each reaction condition were optimized for the viral agents (Table 3). A total of 38 cycle amplifications were performed in all reactions. After the amplification, Cq values, amplification curves and melting curve analysis of the samples were evaluated using LightCycler 96 software 1.1.

Table 3: The real-time PCR conditions optimized for detection of viral agents

Viruses	Preincubation	3-step amplification	Melting
KSHV	95 °C 10 min	95 °C 10 s 54 °C 10 s 72 °C 10 s	95 °C 10 s 65 °C 60 s 97 °C 1 s
HPV B19	95 °C 10 min	95 °C 10 s 53 °C 10 s 72 °C 10 s	95 °C 10 s 65 °C 60 s 97 °C 1 s
EBV	95 °C 10 min	95 °C 10 s 59 °C 10 s 72 °C 10 s	95 °C 10 s 65 °C 60 s 97 °C 1 s
HTLV	95 °C 10 min	95 °C 10 s 54 °C 10 s 72 °C 10 s	95 °C 10 s 65 °C 60 s 97 °C 1 s

KSHV: Kaposi's sarcoma associated herpesvirus, EBV: Epstein-Barr virus, HPV B19: Human parvovirus B19, HTLV-1: Human T lymphotropic virus

Cloning and plasmid isolation

To validate the EBV presence and acquire the viral genomic sequence, EBV gp220 gene was initially cloned using the TA cloning kit (K2040, Invitrogen, CA,

USA) according to manufacturers' instructions. Transformation of the recombinant plasmid DNA into *E. coli* was done using the heat shock method. Each media containing transformed *E. coli* was inoculated on

LB agar containing 100 µg/ml ampicillin and the plates were incubated overnight at 37°C. Colonies on LB agar were checked by PCR screening method to determine whether EBV gp220 gene was successfully cloned (15,16). The plasmid DNAs from positive colonies were isolated using the PureLink HiPure Plasmid Midiprep kit (K210005, Invitrogen, California, USA) according to manufacturers' instructions. The isolated plasmid DNA was suspended in 200 µl of TE buffer and stored at -20 °C.

Sequencing and Phylogenetic Analysis

Three out of the positive 6 samples and one EBV positive control sample were sequenced by RefGen Biotechnology (Ankara, Türkiye) with Sanger sequencing using EBV-specific primers (Table 1). The consensus viral sequences and other EBV genome sequences from the GenBank database were aligned using the MUSCLE algorithm in MEGA 7 software. Phylogenetic analysis was performed using MEGA 7 software and a phylogenetic tree was created using the neighbor-joining method, the p-distance nucleotide substitution model, and bootstrap analysis with 500 replicates.

Statistical Analysis

The McNemar test was used for statistical analyses in IBM SPSS Statistics 21 software (Chicago, U.S.A.) to assess pre- and post-treatment EBV positivity status

within groups and in all patients. Results were considered statistically significant at $p<0.05$.

RESULTS

A total of 64 whole blood samples of 32 patients who were diagnosed as B cell ALL (n=9), T cell ALL (n=6), Hodgkin lymphoma (n=8), relapsed from leukemia and lymphoma disease (n=9) were investigated for genome presence of HTLV-1, EBV, KSHV and HPV B19 by both conventional PCR and real-time PCR. According to PCR and real-time PCR results, HTLV-1, KSHV and HPV B19 were not detected in any of the samples.

Among investigated viral agents, only EBV was positive in 6 patients by both PCR and real-time PCR (Figure 1). EBV positivity was determined in 2 patients who had ALL, 1 patient who had Hodgkin's lymphoma, and 3 patients who had relapses (Table 4). Whole blood samples (n=64) were taken in both pre-treatment (n=32) and post-treatment (n=32) periods from all patients. Out of the 6 patients with a positive EBV genome, 3 were during the pre-treatment phase, and the remaining 3 were in the post-treatment phase. However, none of these patients showed positivity in both the pre-treatment and post-treatment periods (Table 4). No statistically significant difference was found ($p>0.05$) for pre- and post-treatment EBV positivity status within groups and in all patients.

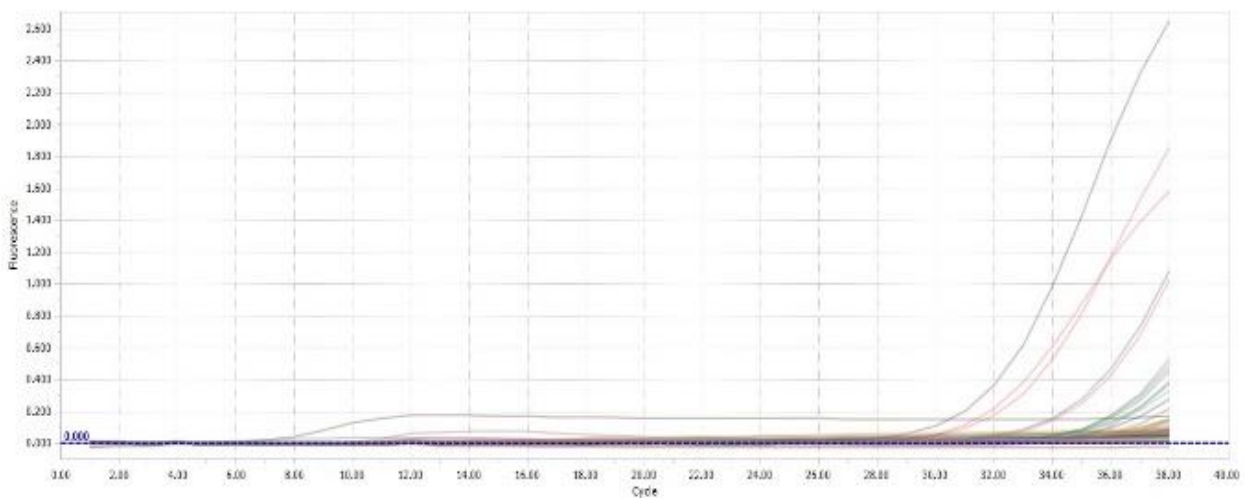


Figure 1: Real-time PCR amplification curve graphic of Epstein-Barr virus positive samples and positive controls.

Table 4: Diagnosis, sampling time, and EBV-positivity status of the patients

Diagnosis	Patients	Pre-treatment	Post-treatment
T cell ALL	1	Negative	Negative
	2	Negative	Negative
	3	Negative	Negative
	4	Negative	Positive
	5	Negative	Negative
	6	Negative	Negative
B cell ALL	7	Negative	Negative
	8	Negative	Negative
	9	Negative	Negative
	10	Negative	Negative
	11	Negative	Negative
	12	Negative	Negative
	13	Negative	Negative
	14	Positive	Negative
	15	Negative	Negative
Hodgkin's lymphoma	16	Negative	Negative
	17	Negative	Negative
	18	Positive	Negative
	19	Negative	Negative
	20	Negative	Negative
	21	Negative	Negative
	22	Negative	Negative
	23	Negative	Negative
Leukemia or lymphoma relapses	24	Negative	Positive
	25	Negative	Negative
	26	Negative	Positive
	27	Negative	Negative
	28	Negative	Negative
	29	Negative	Negative
	30	Positive	Negative
	31	Negative	Negative
	32	Negative	Negative

The cloning of the gp220 gene of the EBV isolates obtained from this study was confirmed by PCR and real-time PCR (Supplementary Figure 1). After confirmation of cloning the samples were sequenced. The EBV gp220 sequences obtained from this study are deposited to GenBank with accession numbers of MT445990-MT445992 for EBV isolates Azkur/Türkiye/2, Azkur/Türkiye/3, and Azkur/Türkiye/4, respectively. Azkur/Türkiye/1 (GenBank accession number MT445989) is the EBV positive control for sequencing and confirmation.

Sequence and phylogenetic analysis of the EBV positive 3 samples revealed that the obtained isolates were similar. The samples (namely; Azkur/Türkiye/2, Azkur/Türkiye/3, and Azkur/Türkiye/4) have similarity between 91.9-98.03% to each other (Table 5).

Table 5: The percentage matrices of the Epstein-Barr virus isolates obtained from this study. The matrices were conducted with Clustal Omega 2.1.

	Türkiye_3	Türkiye_2	Türkiye_4
Türkiye_3	100.00	93.60	91.90
Türkiye_2	93.60	100.00	98.03
Türkiye_4	91.90	98.03	100.00

EBV Türkiye isolates were phylogenetically close to Chinese EBV isolate which is from gastric carcinoma (KX674064.1), and three EBV saliva isolates from United Kingdom (MG298920.1, MG298921.1, MG298927.1). EBV Türkiye isolates have phylogenetically distance to Canadian EBV isolates which are gained from gastric adenocarcinoma (MG021308.1, MG021310.1, MG021311.1) (Figure 2).

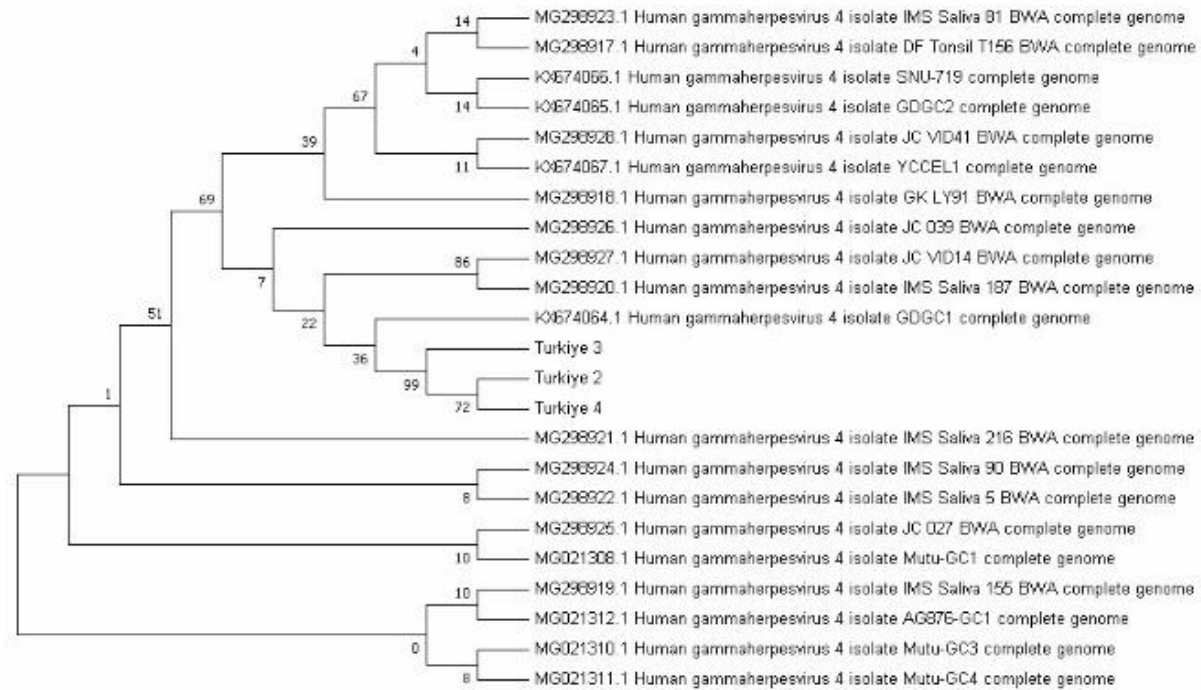


Figure 2: The phylogenetic tree of EBV positive samples obtained from this study.

DISCUSSION

The present investigation encompassed four viral agents, utilizing whole blood samples gathered from pediatric cancer patients in both the pre-treatment and post-treatment periods. This selection of viral agents was informed by scientific literature and International Agency for Research on Cancer (IARC) reports, classifying HTLV-1, EBV, and KSHV as Group 1 agents due to their recognized potential to cause cancer in humans (17). Our findings suggest a potential involvement of EBV as a viral agent in pediatric cancer cases, encompassing leukemia and Hodgkin lymphoma. Considering the Turkish context, it is recommended to consider assessing the presence of the EBV genome. Despite sporadic instances of HTLV-specific antibody responses detected in merely two healthy blood donors, the genomic presence of HTLV has yet to be ascertained within the afflicted patient population in Türkiye. In Türkiye, Kaposi's sarcoma presence has been only shown in pediatric liver transplant recipients (18-20). HPV B19 seroprevalence in central Türkiye was reported as 20.7% in pediatric patients (21). HPV B19 DNA had been detected in the bone marrow aspiration sample of an 8-year-old patient with pre-B cell ALL and

anti-HPV B19 IgM positivity had been reported in two children with pre-B cell ALL in Türkiye (22,23). Our study revealed no indications of HTLV, KSHV and HPV B19 genome presence in pediatric individuals diagnosed with ALL or lymphoma, highlighting the need for future research efforts to encompass a more diverse and extensive patient cohort within the Turkish context to enhance our understanding of these viral infections in pediatric cancer patients.

In Türkiye, EBV positivity had been reported in pediatric patients with Burkitt's lymphoma and non-Hodgkin lymphomas (24,25). In the current study, out of the 64 samples analyzed, the EBV genome was identified in 6 samples (9.37%). Specifically, one patient with T-cell ALL, one patient with B-cell ALL, one patient with Hodgkin's lymphoma, and three patients with relapses demonstrated positive EBV results in both PCR and real-time PCR analyses (Table 4). In a study conducted in Türkiye, EBV positivity was reported as 30.2% in pediatric patients with primary immunodeficiency and most of them were diagnosed with lymphoma (26). The relatively small patient cohort in this study may explain the lower EBV positivity among pediatric cancer patients in Türkiye.

Sequence and phylogenetic analysis of the EBV samples from this study have high similarity (91.9-98.03%) (Table 5). According to the phylogenetic tree, EBV Türkiye isolates were close to Chinese and English EBV isolates which are from gastric carcinoma and saliva samples (Figure 2). The EBV isolates in this study were from whole blood samples of pediatric cancer patients. On the other hand, only the gp220 gene of EBV was cloned and sequenced in the present study. Sequences of other genes or whole genome of EBV isolates could be gained in further studies.

Studies have demonstrated that elevated plasma levels of EBV DNA have predictive utility in assessing NPC risk, treatment response to EBV-associated non-Hodgkin lymphoma, prediction of biological and clinical characteristics of Hodgkin lymphoma, and persistent infection in the early treatment of lymphoma (27-31). It is demonstrated that the quantitative surveillance of EBV-DNA levels, commencing at the outset and continuing throughout EBV-associated lymphoproliferative disease (EBV-LPD) therapy, has the potential to serve as a potent instrument for fine-tuning and choosing treatments in individuals with EBV-LPD (32). In this study, we did not perform quantitative real-time PCR to measure EBV DNA levels in plasma samples. Nonetheless, the findings of the aforementioned researches suggest a requirement for extensive investigations aimed at determining the plasma EBV DNA load across diverse cohorts of cancer patients in Türkiye.

EBV reactivation can be induced by various factors, with immunosuppressants being the most relevant reason for viral reactivation (33). In our study, three patients who tested negative during the pre-treatment period became EBV-positive after receiving treatment that included immunosuppressant agents. This observation could be interpreted as viral reactivation attributed to the use of immunosuppressants. Nevertheless, the underlying cause behind the transition from pre-treatment EBV positivity to post-treatment EBV negativity in the three patients remains elusive.

The results of this study indicated that vigilant monitoring of viral agents, particularly EBV, is imperative throughout the pre-treatment and post-treatment phases in pediatric cancer patients in Türkiye to comprehensively assess the treatment process and establish effective treatment protocols. Given the sample size of this study, it is advisable that future research endeavors encompass a broader patient cohort, potentially involving diverse cancer types, to further enhance the scope and depth of the investigations.

Conflict of Interest: The authors have indicated no conflicts of interest regarding the content of this article.

Researchers' Contribution Rate Statement: Concept/Design: AKA, YK; Analysis/Interpretation: AKA, YK, HMÖ; Data Collection: AKA, YK, HMÖ, EA; Writer: AKA, YK, HMÖ, EA; Critical Review: AKA; Approver: AKA, YK, HMÖ, EA

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ETIOLOGICAL FEATURES OF CASES WITH CHEST PAIN IN THE PEDIATRIC CARDIOLOGY OUTPATIENT CLINIC

Göğüs Ağrısı ile Çocuk Kardiyoloji Polikliniğine Başvuran Vakaların Etiyolojik Özellikleri

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ABSTRACT

Objective: Chest pain in children, especially in adolescence, constitutes a significant proportion of the presentations to pediatric cardiology clinics. We aimed to determine the frequency of chest pain causes in the pediatric age group and the importance of echocardiography.

Material and Methods: We retrospectively examined the etiological and epidemiological characteristics of patients with chest pain who were admitted to Kırıkkale University Medical Faculty Hospital Pediatric Cardiology Clinic and Pediatric Emergency Service between 2014 and 2019.

Results: One thousand hundred sixty-four patients were enrolled in this study. The mean age of the patients was 12.9±2.0 years (range 10-17 years). Echocardiographic evaluation was performed in 87.9% (n=1023) of 1164 patients. In 769 (75.2%) patients, there was no cardiac abnormality. Mitral valve prolapse (MVP) was detected in 164 (16.0%) patients. Out of these patients, 116 (11.3%) also had mitral insufficiency (MI). There was a female preponderance (117/164, 71.4%) among the patients with MVP. Patients with normal echocardiography findings, were compared with patients who had MVP+MI with respect to mean hemoglobin, mean corpuscular volume, Creatine kinase, Creatine kinase-MB, troponin, pro-B-type natriuretic peptide, and C-reaktif protein levels. There was no significant difference between these groups with respect to these parameters.

Conclusion: We showed that MVP/MI is the most common cause of cardiac related chest pain in children. Therefore, chest pain, especially with physical examination findings, such as a murmur, should be evaluated by a pediatric cardiologist, ideally by echocardiography.

Keywords: Chest pain, mitral valve prolapse, cardiac markers

ÖZ

Amaç: Göğüs ağrısı çocuk popülasyonunda, özellikle adölesan dönemde çocuk kardiyoloji polikliniğine başvurularda önemli bir şikâyet bulgusudur. Çalışmanın amacı, göğüs ağrısı şikâyeti ile başvuran hastaların etiyolojik özelliklerinin sıklığını belirlemek bu konuda ekokardiyografinin önemini değerlendirmektir.

Gereç ve Yöntemler: 2014-2019 yılları arasında Kırıkkale Üniversitesi Tıp Fakültesi Hastanesi Çocuk Kardiyoloji Kliniği'ne göğüs ağrısı şikâyeti ile başvuran hastaların etiyolojik ve epidemiyolojik özelliklerini retrospektif olarak inceledik.

Bulgular: Bu çalışmaya bin yüz altmış dört hasta dahil edildi. Hastaların yaş ortalaması 12.9±2.0 (dağılım 10-17) idi. 1164 hastanın %87.9'una (n=1023) ekokardiyografik değerlendirme yapıldı. 769 (%75.2) hastada kardiyak anormallik yoktu. Mitral valv prolapsusu (MVP) 164 (%16.0) hastada saptandı. Bu hastaların 116'sında (%11.3) ayrıca mitral yetmezlik (MY) vardı. (117/164 (%71.4)). MVP'li hastalarda kadın üstünlüğü vardı (117/164, %71.4). Ekokardiyografi bulguları normal olan hastalar, ortalama hemoglobin (Hb), ortalama eritrosit hacmi (MCV), CK, CK-MB, Troponin, Pro-BNP ve CRP düzeyleri açısından MVP+MI olan hastalarla karşılaştırıldı. Bu parametreler açısından bu gruplar arasında anlamlı fark yoktu.

Sonuç: Çocuklarda kardiyak ilişkili göğüs ağrısının en yaygın nedeninin MVP/MI olduğunu gösterdik. Bu nedenle özellikle üfürüm gibi fizik muayene bulgusu olan göğüs ağrısı, bir pediatrik kardiyolog tarafından ideal olarak ekokardiyografi ile değerlendirilmelidir.

Anahtar Kelimeler: Göğüs ağrısı, mitral valv prolapsusu, kardiyak belirteçler



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INTRODUCTION

Chest pain in children, especially in adolescence, constitutes a significant proportion of presentations to pediatric cardiology and pediatric emergency clinics (1). Chest pain causes restriction of activities and absenteeism from school in children, and anxiety in families, although there is no organic etiology in most cases. Unlike in adults, chest pain rarely relates to cardiac disease in children. However, certain disorders such as myocarditis, hypertrophic cardiomyopathy, and myocardial ischemia that can cause chest pain can lead to sudden death (2,3). Although serious cardiac disorders are rare in children, pediatric patients cannot fully describe and localize their pain, which may lead to the performance of expensive cardiac tests to exclude cardiac chest pain (4). Investigation of cardiac disorders using electrocardiography (ECG), echocardiography (ECHO), telecardiography, and cardiac enzymes may sometimes be exaggerated (5,6). In this study, we retrospectively examined the etiological and epidemiological characteristics of patients with chest pain to determine the respective frequencies of chest pain causes; we also aimed to investigate the importance and the role of echocardiography and markers of myocardial injury, including creatine kinase (CK), creatine kinase myocardial band (CK-MB), and troponin (Tn) levels in making the diagnosis of cardiac chest pain.

MATERIALS AND METHODS

This study included children with chest pain aged between 10-18 years who were admitted to Kırıkkale University Medical Faculty Hospital Pediatric Cardiology Clinic between 2014-2019. The Kırıkkale University School of Medicine Ethics Committee approved the study (Date: 8.1.2020, Number: 2019.12.07). In practice, almost all patients with chest pain who were referred from the emergency or pediatric polyclinic were seen by a pediatric cardiologist at our hospital. The inclusion criterias were: patients who presented due to chest pain and do not have any pre-existing chronic diseases such as cardiovascular, metabolic, or systemic illnesses. Patients for whom no

other system-related cause could be found to explain chest pain were included in the idiopathic chest pain group. Patients with known cardiac disease and insufficient data were excluded from the study. We recorded the demographic data of the patients, such as age and gender, as well as the results of the tests and studies to evaluate chest pain, including electrocardiography, echocardiography, complete blood count, and biochemical analysis.

Echocardiography was performed using “Vivid 3 Expert” and “Vivid 7 Pro ECO” devices of General Electric Medical Systems (United States) and probes of 3, 5, 7 MHz. All measurements were performed by the same pediatric cardiologist (CS). In the measurements, images were taken in subcostal, parasternal long axis, short axis, apical four-chamber, five-chamber, and suprasternal positions, and hemodynamic functions were evaluated with M-mode, 2-dimensional and Doppler echocardiographic examinations. In addition, a tissue Doppler study was performed. American Society of Echocardiography recommendations were taken as a reference for all measurements (7).

All possible heart conditions such as patent foramen ovale (PFO), patent ductus arteriosus (PDA), myocarditis, pericarditis or valve pathologies were reviewed in echocardiograph

Statistical analysis

SPSS (Statistical Package for the Social Sciences) version 20.0 software (SPSS Inc.) was used to analyze the study data. The categorical variables were expressed as frequency and percentage, and continuous variables as mean and standard deviation (SD). The student's t test was used for data with standard variables to compare means, and the Mann-Whitney-U test was used to compare non-normally distributed pairwise means.

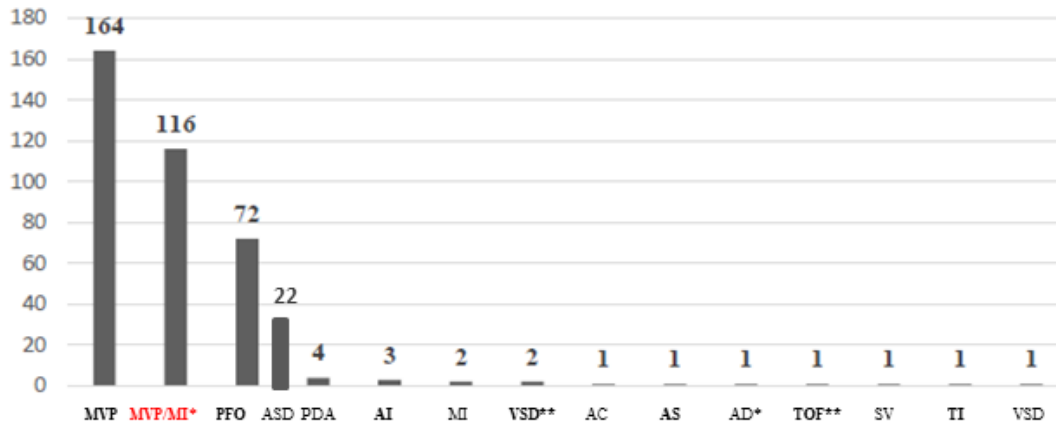
RESULTS

One thousand hundred sixty-four patients were enrolled in this study. The mean age of the patients was 12.9±2.0 years (range 10-17 years). Fifty-two point six percent of the patients were female. The month with the highest number of patient presentations was February (12.1%) , and July was the month with the lowest number of

patient presentations (5.3%). The rate of admission to the pediatric emergency service due to chest pain was 0.84%. Echocardiographic evaluation was performed in 1023 of 1164 patients (87.9%). In 769 patients (75.2%) there was no cardiac abnormality. Mitral valve prolapse (MVP) was detected in 164 (16.0%) patients. Out of these patients, 116 (11.3%) had also mitral insufficiency (MI). In addition, 72 (7.0%) patients had patent foramen ovale (PFO), 22 (2.1%) patients had atrial septal defect (ASD), and 4 (0.4%) patients had patent ductus

arteriosus (PDA) (Figure 1). The remaining disorders found in the patients were aortic insufficiency (n=3), isolated mitral insufficiency (n=2), operated ventricular septal defect (n=2), aortic coarctation (n=1), aortic stenosis (n=1), operated aortic dilation (n=1), operated Tetralogy of Fallot (n=1), single ventricle (n=1), tricuspid insufficiency (n=1), and ventricular septal defect (VSD) (n=1). The majority of those who had MVP were female (117/164, 71.4%).

Figure 1: Distribution of the echocardiography findings



MVP: Mitral valve prolapse, MI: Mitral insufficiency PFO: Patent foramen ovale, AI: Aort insufficiency, VSD: Ventricular septal defect, AC: Aort coarctation, AS: Aort stenosis AD: Aort dilatation, TOF: Tetralogy of Fallot, SV: Single ventricle, TI: Tricuspid insufficiency

*Patients who had MVP and MI

**Operated

Patients with normal echocardiography findings (n=769, 75.2%) were compared with patients with MVP+MI (n=116, 11.3%) with respect to mean hemoglobin (Hb), mean corpuscular volume (MCV), CK, CK-MB,

troponin, Pro-BNP, and CRP levels (Table 1). There was no significant difference between these groups with respect to these parameters.

Table 1: Comparison of laboratory finding of MVP/MI and normal patients

Parameter	Patients with MVP/MI (N=116)	Patients with without cardiac origin (N=769)	p
Mean Hb*	13.6±1.2	13.8 ±1.2	0.156
Mean MCV*	85.3±5.8	83.3 ±5.4	0.070
Median ProBNP** (min-max)	34.9 (6.2-499.7)	37.2 (5-704)	0.442
Median Troponin I** (min-max)	0.01 (0.003-0.103)	0.005 (0.003-35.3)	0.501
Median CK-MB** (min-max)	18 (7.6-100)	20.2 (3.3-274)	0.140
Median CK** (min-max)	87.2 (34-5.294)	99 (25-2.967)	0.080

Hb: Hemoglobin, MCV: Mean corpuscular volume, ProBNP: Pro-B-type natriuretic peptide, CK: Creatine kinase

*Student's t test

** Mann Whitney U test

Table 2: Distribution of the etiologies of chest pain

Etiologies of chest pain	N (%)*
Non cardiac	1000 (85.9)
Idiopathic	485 (41.7)
Musculoskeletal system pain	168 (14.4)
Psychogenic	110 (9.5)
Respiratory system	157 (13.5)
Gastrointestinal system	80 (6.9)
Cardiac origin (MVP)	164 (14.1)
MVP/MI	116 (9.9)

*n/Total patient number (1164)

MVP: Mitral valve prolapse, MI: Mitral insufficiency

DISCUSSION

Although parents of children presenting with chest pain may be excessively concerned about cardiac causes, chest pain in children is usually caused by non-cardiac causes (8). In contrast to the known relationship between chest pain with angina pectoris and myocardial infarction in adult patients, previous studies have shown that heart-related disorders are seen in as low as 1-5% of the pediatric patients (9-12).

When the previous studies were examined, it was seen that the rates of admission to the pediatric emergency service with chest pain ranged from 0.25% to 5.2% (13,14). In our study, the rate of admission to the pediatric emergency service with chest pain was 0.84%. Since children who present with chest pain are often referred to pediatric cardiology outpatient clinics without a detailed evaluation, to relieve families' concerns and mitigate the malpractice risk, the frequency of admission to pediatric cardiology outpatient clinics for chest pain has gradually increased (15,16). Sudden deaths in athletes, which have increased in recent years, cause anxiety in both families and physicians. Therefore, the evaluation of chest pain requires further testing, which may lead to excessive and unnecessary use of resources (17). In addition the psychological effect of unnecessary testing or long-term follow-up for inconsequential diagnoses is another handicap.

Studies have shown that the incidence of chest pain is generally equal in male and female genders, which is in accordance with our findings (13,14). Studies have also

shown that chest pain is more common in the pubertal period (18,19). Aygün et al. found a mean age of 7.82 years for patients with chest pain, as opposed to 12.02±3.16 years in our study (20). Psychological problems during puberty may be the reason for chest pain. They also found that there was an increase in patient admissions during the winter months, as we demonstrated in our study. We believe that infections in winter and during the semester break may lead to an increased admission rate.

When no explanation is found for chest pain it is called idiopathic chest pain. Although, in our study, the rate of idiopathic chest pain was consistent with the literature, Saleeb et al. showed a lower rate (1%) of cardiac origin of chest pain in 3700 pediatric patients (21). The rate of non-cardiac pain etiologies was as follows: 52.1% idiopathic, 36.4% musculoskeletal, 6.5% respiratory, 0.9% psychogenic, 2.9% gastrointestinal (21). We thought that the difference could be attributed to varying lifestyles and living conditions in these two different societies, especially in terms of their impact on psychogenic, gastrointestinal and musculoskeletal systems. The relatively high number of cardiac origin pain in our study compared to the Saleeb study could be attributed to the high rate of application to clinic in their study.

The relationship between pain with meals and an epigastric indigestion history should be questioned. Previous studies prospectively showed that 33.3% of the patients who were admitted to the cardiology outpatient clinic due to chest pain had also epigastric tenderness (22,23). Ninety-three point two percent of these patients had positive endoscopic findings, including various degrees of gastritis (23).

Chest pain was classified as psychogenic unless an organic cause could be identified. Psychogenic chest pain can occasionally result from anxiety or a conversion disorder triggered by stress factors (24). Aygün et al. found that psychogenic causes of chest pain constitute 28.4% of all chest pain episodes (20). Therefore, it should be first questioned whether there is any stress factor in a patient. However, since our study

was retrospective, Beck depression scale and anxiety scales could not be performed for anxiety disorder, attention deficit hyperactivity disorder, and behavioral disorders. We found a rate of 9.5% for psychological causes using patient history alone.

Respiratory system disorders causing chest pain are mainly pneumonia, asthma, pneumothorax, pulmonary embolism, and pleural effusion, among others (25). In a previous study, the prevalence of respiratory disorders in patients with chest pain was 12% (26). In our study, the corresponding figure was similar, i.e. 13.5% when patients with fever, cough and abnormal respiratory findings were excluded.

Cardiac disorders are the most feared causes of chest pain in children. Studies have shown that cardiac problems are a rare cause of chest pain in childhood, with a prevalence of 1-5% (9-12). Unlike previous studies on the subject, our study included patients with MVP, resulting in a higher rate of cardiac disease among our patients compared to the literature. Although the true frequency of MVP is unknown, it has been reported as 0.3-21% (27). Like previous studies, there was a female preponderance in MVP patients. MVP should be considered especially in female patients who present with complaints of chest pain and palpitation (28). The diagnostic criteria we based on for MVP, include the late systolic posterior displacement on M-mode, bulging into the left atrium on 2D long-axis view, and thickening of the mitral leaflets (29). However postmortem data showed that the sensitivity and specificity of echocardiography in diagnosing MVP was 88 percent and 82 percent, respectively (30).

The most common complication of MVP is mitral regurgitation. Chest pain associated with MVP+MI reportedly causes more frequent pain. In a study, 67.3% of patients with MVP also had mitral insufficiency (31). Similarly, 70.7% of our MVP patients had MI. Patients with MVP do not need routine antibiotic prophylaxis for bacterial endocarditis; however, it should be considered for patients who also have MI (32). Systolic murmur (midsystolic/pansystolic) is an important physical examination sign for MVP/MI (33). Therefore, a careful

auscultation at the first stage of the evaluation of a patient with chest pain is an important criterion for patient referral to a pediatric cardiologist.

Biochemical tests (cardiac enzymes) are requested from patients presenting with chest pain, and such patients are usually referred to a pediatric cardiologist for echocardiography without a detailed evaluation. As shown in our study, most chest pain episodes are of non-cardiac origin. However, cardiac enzymes did not rule out or in cardiac disease. As we showed in our study there was no significant difference between normal patients and patients with MVP/MI regarding the mean cardiac enzyme level. The prevalence of MVP in the general population is 4 to 5% (33). Thus, compared to the normal population, our patient population had a higher prevalence of MVP/MI (11.3%) but with chest pain.

Our study had some limitations. The first of them is its retrospective nature, and the second one is the inaccessibility of the information about the chest pain characteristics and the status of murmur presence. In addition, the high rate of MVP in comparison to the literature may be caused by the high rate of echocardiographic examination for chest pain. Besides fear of malpractice accounts for the increased use of echocardiography in our study. In addition myocarditis which is an important cause of chest pain, was not encountered in our cases, since most of the patients were outpatients.

In this study, we showed that the rate of chest pain associated with the heart is low in children (9.9%) and we found that MVP/MI was the most common cause of cardiac related chest pain in our study population. Therefore, especially chest pain with physical examination findings, such as a murmur, should be evaluated by a pediatric cardiologist, ideally by echocardiography.

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THE AMELIORATING EFFECTS OF BILBERRY ON METHOTREXATE-INDUCED INTESTINAL INJURY

Metotreksatın İndüklediği İntestinal Hasar Üzerine Yaban Mersininin İyileştirici Etkileri

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ABSTRACT

Objective: Methotrexate (MTX) is a folic acid analogue chemotherapeutic used in the treatment of some malignant tumors and autoimmune diseases. In addition to its antitumoral properties, it can also exhibit toxic effects on the kidney and intestines. Bilberry (BB) fruit is a potent natural antioxidant rich in anthocyanidins. The purpose of this study was to investigate the potential ameliorating effects of BB against MTX-induced intestinal damage using biochemical and histological methods.

Material and Methods: Twenty-one adult female Sprague Dawley rats were divided into three equal groups. No procedure was performed on the control group (ControlG), while the MTX group (MTXG) and MTX+BB extract group (MTX+BBG) received a single intraperitoneal dose of 30 mg/kg MTX on the first day of the experiment. MTX+BBG also received 200 mg/kg BB extract by oral gavage once daily for five days starting on the first day of the experiment. Half the intestinal tissues removed from the duodenal region at the experiment were used for biochemical evaluation, and the other half for histological examination.

Results: Malondialdehyde (MDA), total oxidant status (TOS), oxidative stress index (OSI), and 8-oxo-2'-deoxyguanosine (8-OHdG) values were all higher in MTXG intestinal tissues than in ControlG. MDA, TOS, OSI, and 8-OHdG values were lower in MTX+BBG than in MTXG. In addition, caspase-3 levels in MTXG were higher than those in both ControlG and MTX+BBG, while total antioxidant status (TAS) values were lower. In terms of histology, villous hemorrhage, inflammatory cell infiltration, fusion, and degeneration in the villus epithelium were present in MTXG intestinal tissue, and the total damage score was also high. Improvement in all these parameters was present in MTX+BBG.

Conclusion: Orally administered BB extract can improve MTX-induced intestinal damage through its antioxidant and anti-inflammatory effects.

Keywords: Antioxidant, intestine, methotrexate, oxidative stress, bilberry.

ÖZ

Amaç: Metotreksat (MTX), bazı malign tümörlerin ve otoimmün hastalıkların tedavisinde kullanılan folik asit analogu bir kemoterapötiktir. Antitümoral etkilerinin yanında karaciğer, böbrek ve bağırsaklar üzerine toksik etkiler de gösterebilir. Yaban mersini (YM), güçlü ve doğal bir antioksidan olan antosiyaninlerden zengin bir meyvedir. Bu çalışma; MTX ile indüklenen intestinal hasara karşı YM ekstraktının olası iyileştirici etkilerini biyokimyasal ve histolojik olarak araştırmayı amaçlamaktadır.

Gereç ve Yöntemler: Çalışmada kullanılan 21 adet Sprague Dawley ırkı erişkin dişi sıçan, 3 eşit gruba ayrıldı. Kontrol grubu (KontrolG)'na hiçbir işlem uygulanmadı. MTX grubu (MTXG)'na ve MTX+YM ekstraktı grubu (MTX+YMG)'na deneyin ilk günü tek doz 30 mg/kg MTX intraperitoneal olarak uygulandı. MTX+YMG'na, ilave olarak deneyin ilk gününden itibaren 5 gün, günde bir kez oral gavaj ile 200 mg/kg YM ekstraktı uygulandı. Deney sonunda duodenal bölgeden alınan intestinal dokuların yarısı biyokimyasal, diğer yarısı histolojik olarak değerlendirildi.

Bulgular: MTXG bağırsak dokularında; malondialdehid (MDA), total oksidan kapasite (TOS), oksidatif stres indeksi (OSI) ve 8-oxo-2'-deoxyguanosine (8-OHdG) değerleri KontrolG'na göre yüksekti. MTX+YMG'nun MDA, TOS, OSI ve 8-OHdG değerleri ise MTXG'na göre azalmıştı. İlave olarak MTXG'nun Kaspaz 3 seviyesi hem KontrolG'na hem MTX+YMG'na göre yüksek; total antioksidan durum (TAS) seviyeleri ise düşüktü. Histolojik olarak MTXG bağırsak dokusunun villuslarında hemoraji, inflamatuvar hücre infiltrasyonu, füzyon ve villus epitelinde dejenerasyon vardı ve total hasar skoru da yüksekti. MTX+YMG'nda ise tüm bu patolojilerde hafifleme mevcuttu.

Sonuç: Oral olarak uygulanan YM ekstraktı; antioksidan ve antiinflamatuvar etkileri ile MTX'in indüklediği bağırsak hasarını iyileştirebilir.

Anahtar Kelimeler: Antioksidan, bağırsak, metotreksat, oksidatif stress, yaban mersini.



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INTRODUCTION

Gastrointestinal toxicity is one of the toxic effects, which still cannot be fully prevented, of several chemotherapeutics, including methotrexate (MTX) (1). MTX is an antimetabolite chemotherapeutic used in the treatment of autoimmune diseases such as rheumatoid arthritis, vasculitis, and psoriasis, in addition to several malignant diseases (2,3). A structural analogue of folic acid, MTX blocks the enzyme dihydrofolate reductase and leads to the death of cancer cells by impairing DNA and RNA synthesis in the cell (3,4). However, similarly to other chemotherapeutics used in the treatment of cancer, MTX can damage healthy cells in the organism as well as cancerous cells (1). In addition to its therapeutic effects, MTX can also therefore exhibit undesirable toxic effects in several tissues, including the liver, kidneys, and intestines (5-8). Several studies have shown that MTX causes pathologies such as increased oxidative stress in the intestines, apoptosis, epithelial damage, inflammation, and mucositis (7,9-12). Although the mechanism involved in these toxic effects is not fully understood, it has been attributed to MTX impairing the synthesis of DNA and RNA in intestinal cells, its increasing reactive oxygen species (ROS) that give rise to oxidative stress, and thus resulting in a decrease in cell numbers and disruption in the mucosal epithelium (2).

Bilberry (BB, *Vaccinium myrtillus*) otherwise known as whortleberry, is a blue-back fruit, and a source of natural antioxidants that can be consumed in various forms: fresh, dry, tinned, or as alcoholic or non-alcoholic beverages (13,14). It contains numerous antioxidant compounds, including quercetin, resveratrol, catechins, vitamin C, phenolic acid, and anthocyanins (13,15). Due to these compounds, and particularly anthocyanins, BB exhibits antioxidant and anti-inflammatory effects (13,16,17).

To the best of our knowledge, no previous studies have investigated the effects of BB against MTX-induced intestinal damage. The purpose of this research was therefore to investigate the protective effects of BB, with

its antioxidant and anti-inflammatory properties, against intestinal damage induced with MTX in rats.

MATERIALS AND METHODS

Animal rights were respected in accordance with the principles of the Guide for the Care and Use of Laboratory Animals. Approval for the study was granted by the Karadeniz Technical University Animal Experiments Local Ethics Committee, Türkiye, under number 2022/50. Twenty-one adult female Sprague Dawley rats were randomly assigned to three groups of seven animals each. Throughout the experiment, all rats were housed in the same room in a laboratory at a mean temperature of $22\pm 2^{\circ}\text{C}$, $50\%\pm 5$ relative humidity, and a 12-hour dark:light cycle. No procedure was performed on the control group (ControlG), while the MTX group (MTXG) and MTX+BB extract group (MTX+BBG) received a single intraperitoneal dose of 30 mg/kg MTX on the first day of the experiment (7). MTX+BBG also received 200 mg/kg BB extract once daily for five days starting on the first day of the experiment by oral gavage.

BB Extract preparation

Bilberry fruits, collected from a rural area of Trabzon province in Türkiye, were first dried for 20 days at 45°C and then powdered using a laboratory mill (Retsch ZM200, Haan, Germany). Next, 3 g of powder was mixed with 30 mL pure ethanol and vortexed. The ethanolic mixture was then incubated for 24 hours at 45°C with continuous shaking at 150 rpm, and was then centrifuged at 1800xg for 10 min. The resulting supernatant was first passed through filter paper, then passed through a 0.2- μm filter, and stored in the dark at 4°C for use in the experiment (18).

Tissue collection

On the sixth day of the experiment, all rats received 10 mg/kg xylazine hydrochloride (Rompun: Bayer, Leverkusen, Germany) and 50 mg/kg ketamine hydrochloride (Ketalar: Pfizer, İstanbul, Türkiye) via the intraperitoneal route for deep anesthesia. A midline abdominal incision was then made, through which the duodenal region of the small intestine was excised, after

which all rats were sacrificed by exsanguination. One part of the intestinal tissue was washed with saline solution and stored in micro-volume tubes at -80°C for biochemical evaluation, while the other part was stored in 10% formalin in glass jars for histopathological examination.

Histological evaluations

Tissues kept in 10% formalin solution for fixation were subsequently dehydrated by being passed through increasing alcohol series. They were then rendered transparent with xylene and embedded in paraffin. Serial sections 5 µm in thickness were taken from the paraffin blocks using a microtome (Leica RM 2255, Leica Instruments, Nussloch, Germany). These were stained with hematoxylin-eosin (HE) and Masson's trichrome and covered. These stained sections were next subjected to histopathological examination under a light microscope (Olympus BX 51, Japan) and photographed using a digital camera (Olympus, DP 71, Japan) integrated with the microscope. Five randomly selected areas on each section were scored semiquantitatively from 0 to 3 in terms of each of the following pathological changes; superficial epithelial degeneration, villus fusion, hemorrhage, and inflammatory cell infiltration (in other words, inflammation) (0: none, 1: mild, 2: moderate, and 3: severe) (7). Increases in connective tissue and collagen were also evaluated qualitatively in sections stained with Masson's trichrome.

Biochemical analysis

Biochemical parameters were measured from supernatants obtained following the homogenization in phosphate buffer and centrifugation of the duodenal tissues. Protein levels in tissue samples were determined using an appropriate protein assay kit (Thermo Scientific Pierce BCA Protein Assay Kit, catalogue no. 23227, Rockford, IL, USA) in line with the manufacturer's instructions. The levels of biochemical parameters in tissues measured using ELISA kits were expressed as mg/protein by proportioning the calculated sample protein quantities. Tissue malondialdehyde (MDA) and 8-oxo-2'-deoxyguanosine (8-OHdG) levels

were determined using ELISA kits (YLBiont, catalogue no. YLA0029RA and catalogue no. YLA0061RA, respectively, Shanghai, PRC) as recommended by the manufacturer. The results were expressed as nmol/mg protein and ng/mg protein, respectively. Total oxidant status (TOS) and total antioxidant status (TAS) in tissue specimens were determined using colorimetric kits (Rel Assay Diagnostics, catalogue no. RL0024 and RL0017, respectively, Gaziantep, Türkiye). The results were expressed as µmol H₂O₂ equivalent/L and mmol TE/L units. OSI values were calculated using the formula $OSI = [(TOS, \mu\text{mol H}_2\text{O}_2 \text{ equivalent/L}) / (TAS, \mu\text{mol TE/L})] \times 100$ (19). Tissue specimens' superoxide dismutase (SOD) and caspase-3 levels were measured using ELISA kits (YLBiont, catalogue no. YLA0115RA and YLA0017RA, respectively, Shanghai, PRC). The results were expressed as ng/mg protein.

Statistical analysis

Statistical analyses were performed on SPSS version 22.0 software. Parametric data were analyzed using ANOVA and the post-hoc Tukey test, and non-parametric data using the Kruskal-Wallis test. The results were expressed as mean±standard deviation (SD), median (minimum-maximum) and p values p<0.05 were regarded as statistically significant.

RESULTS

Biochemical analysis results

The ANOVA test revealed significant differences between the groups in all biochemical parameters (p<0.05) apart from SOD values (p=0.93). The post-hoc Tukey test used for pairwise group comparisons showed that MDA, TOS, OSI, and 8-OHdG values were significantly higher in MTXG than in ControlG (p<0.001, p=0.003, p<0.001, and p=0.01, respectively). Similarly, MTXG caspase-3 levels were higher than those in ControlG and MTX+BBG (p=0.04 and p=0.014, respectively). MDA, TOS, OSI, and 8-OHdG values decreased in MTX+BBG compared to MTXG (p=0.005, p=0.02, p=0.001, and p=0.01, respectively). MTXG TAS values were significantly lower than those

of both ControlG and MTX+BBG ($p < 0.001$ and $p = 0.03$, respectively) (Table 1).

Table 1: Biochemical analysis results of tissues

	ControlG	MTXG	MTX+BBG	p (ANOVA)
MDA (nmol/mg protein)*	4.09±1.40	7.95±1.26**	5.02±1.76***	<0.001
8-OHdG (ng/mg protein)*	0.12±0.04	0.20±0.04**	0.11±0.02***	0.008
SOD (ng/mg protein)*	0.52±0.24	0.48±0.18	0.49±0.10	0.93
TAS (mmol TE/L)*	1.75±0.35	1.02±0.20**	1.42±0.23***	<0.001
TOS (µmol H₂O₂ equivalent/L)*	8.82±3.27	17.9±4.39**	11.03±1.92***	0.003
OSI*	0.51±0.23	1.82±0.58**	0.81±0.42***	<0.001
Caspase-3 (ng/mg protein)*	0.10±0.05	0.18±0.06**	0.09±0.03***	0.011

MDA: Malondialdehyde, 8-OHdG: 8-oxo-2'-deoxyguanosine, SOD: Superoxide dismutase, TAS: Total antioxidant status, TOS: Total oxidant status, OSI: Oxidative stress index. ControlG: Control group, MTXG: Methotrexate group, MTX+BBG: Methotrexate+bilberry extract group, Data expressed as mean±SD and p values $p < 0.05$ were regarded as statistically significant.

* mean ± standart deviation

** $p < 0.05$ compared with ControlG according to post-hoc Tukey test.

*** $p < 0.05$ compared with MTXG according to post-hoc Tukey test.

Histopathological results

Villi, covered with striated border single layer of prismatic epithelium and goblet cells between them, extended into the lumen in the form of finger-like projections were present in ControlG. Brunner's glands were visible in the tunica submucosa (Figure 1A, and D).

In MTXG, however, the villus structure was impaired, with shortening and blunting of the villus tips. The Kruskal Wallis test revealed significant differences between the groups in all histological parameters ($p < 0.05$). The post-hoc Dunn's test used for pairwise group comparisons revealed the increase of villous hemorrhage, inflammatory cell infiltration, fusion, and

degeneration in the villus epithelium in MTXG compared to ControlG, and the total damage score was higher ($p = 0.001$, $p < 0.01$, $p = 0.002$, $p = 0.004$, and $p = 0.001$, respectively) (Figure 1B and E). In MTX+BBG, all these pathological findings and total damage scores decreased compared to MTXG, although statistical significance was only present in the hemorrhage parameter ($p = 0.02$) (Figure 1C and F) (Table 2). No significant difference was observed between the groups in terms of collagen and connective tissue density in Masson trichrome stained sections (Figure 1A, B and C).

Table 2: Histopathological damage score results of tissues

	Control	MTXG	MTX+BBG	p (Kruskal Wallis)
Epithelial degeneration*	1 (0-2)	2 (2-3)**	2 (1-2)	0.002
Villous fusion*	0 (0-1)	2 (2-3)**	1 (0-2)	<0.001
Hemorrhage*	0 (0-1)	1 (1-2)**	0 (0-1)***	<0.001
Inflammation*	0 (0-1)	2 (2-3)**	1 (0-1)	<0.001
Total score*	1 (1-3)	8 (7-9)**	5 (4-7)	<0.001

ControlG: Control group, MTXG: Methotrexate group, MTX+BBG: methotrexate+bilberry extract group. Data expressed as median (min-max) and p values $p < 0.05$ were regarded as statistically significant.

* Median (minimum-maximum)

** $p < 0.05$ compared with ControlG according to post-hoc Dunn's test.

*** $p < 0.05$ compared with MTXG according to post-hoc Dunn's test.

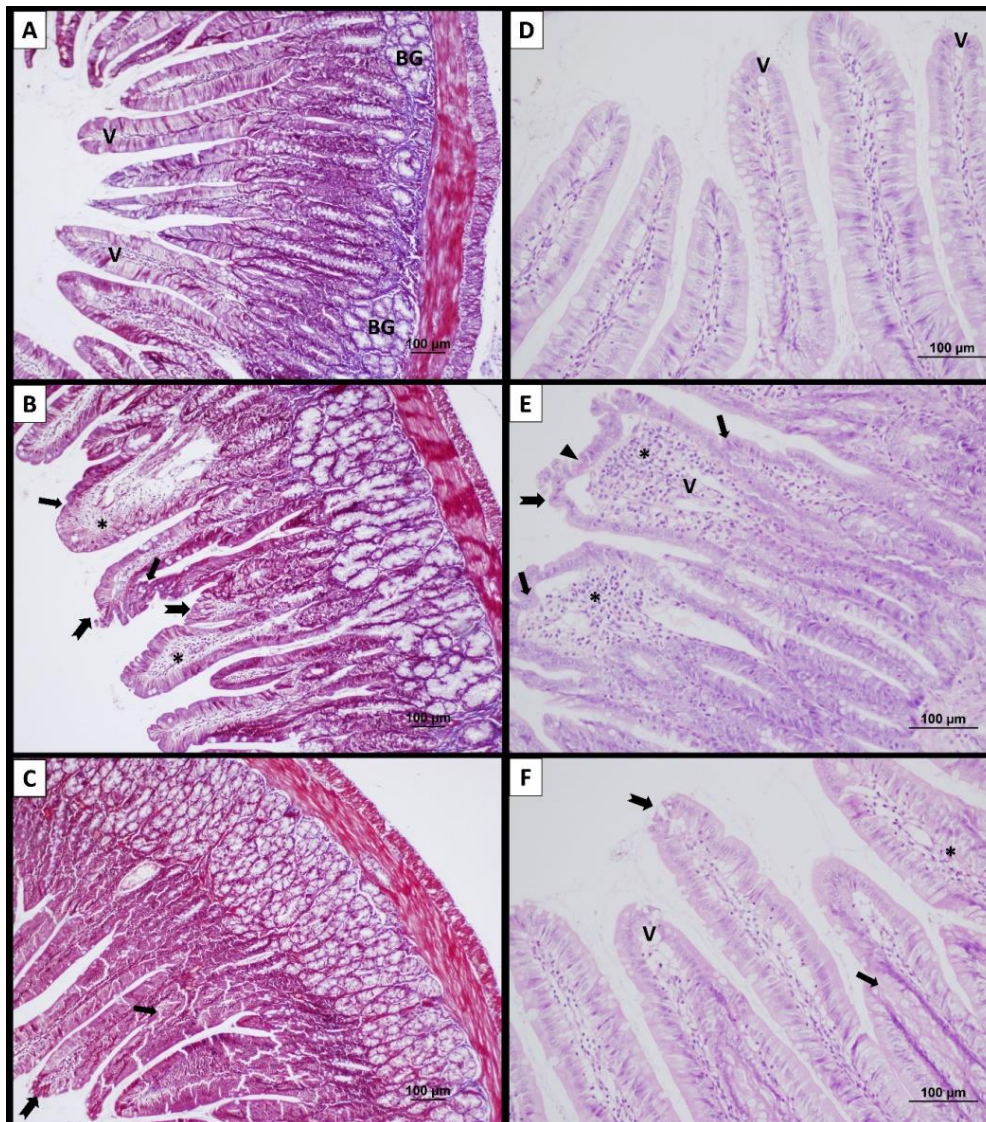


Figure 1: ControlG (A and D); Normal villi (V) covered by a regular epithelium and Brunner's glands (BG) in the tunica submucosa. MTXG: (B and E); villous fusion (arrow), hemorrhage (arrowhead), inflammatory cell infiltration (star), and degeneration in the villus epithelium (notched arrow). MTX+BBG (C and F); the villus (V) structure is much improved, and decreases can be seen in villous fusion (arrow), hemorrhage, inflammatory cell infiltration (star), and degeneration in the villus epithelium. (A, B and C; Masson's trichrome x100 and D, E and F; HE x200). ControlG: Control group, MTXG: methotrexate group, MTX+BBG: Methotrexate+bilberry extract group, HE:Hematoxylin-eosin.

DISCUSSION

Inflammation of and damage to the intestinal mucosa, some of the side-effects of chemotherapy in the gastrointestinal tract, not only reduce tolerance to treatment, but can also lead to several undesirable outcomes, including mortality (20). Similarly to various other chemotherapeutics, MTX can also produce toxic effects in the gastrointestinal system. Various studies have shown that MTX leads to pathologies including shortening of intestinal villi, fusion, edema,

hemorrhage, inflammation, epithelial degeneration, and impairment of the mucosal barrier (7,12,21).

Consistent with the previous literature, we also detected marked villous fusion, epithelial degeneration, hemorrhage, and inflammatory cell infiltration in MTXG in the present study (21,22). The apoptosis marker caspase-3 also increased in MTXG, again in agreement with the literature (4,9). In addition, and consistent with other studies, TOS and OSI indicating oxidative stress increased in MTXG, while TAS, showing tissue antioxidants, decreased (4). The increase

in MDA, which shows the damage caused by ROS in membrane lipids, as well as in 8-OHdG, showing the damage caused by DNA (23), in MTXG, also suggested that MTX causes oxidative stress in intestinal tissue. Oxidative stress is one of the irreducible factors inducing apoptosis in tissues (24). For these reasons, we concluded that the increase in apoptosis in MTXG might be associated with DNA damage induced by MTX, as well as to oxidative stress resulting from increased ROS induced by MTX (20). Overproduction of ROS is known to be capable of causing inflammation in addition to cell damage (25). We therefore concluded that inflammation in MTXG might also be associated with oxidative stress in the intestines caused by MTX (11,22).

Bilberry has been reported to reduce oxidative stress developing in tissues such as the kidney, ovary, and retina in various experimental models (17,26,27). In addition, Jaksevic et al. reported that BB reduced oxidative stress-related intestinal inflammation and mucosal damage resulting from ischemia-reperfusion, and Widen reported that it ameliorated gingival inflammation (28,29). Similarly in the present study, the decrease in oxidative stress indicators and inflammation MTX+BBG tissues may be associated with the powerful antioxidant and anti-inflammatory properties of BB (15). The decreases in caspase-3, which was elevated in MTXG, and in histologically detected mucosal damage in MTX+BBG can also be attributed to BB reducing oxidative stress.

In conclusion, MTX can lead to tissue damage in the small intestine by inducing oxidative stress inflammation, and apoptosis. Bilberry can reduce intestinal damage caused by MTX through its antioxidant, anti-inflammatory, and antiapoptotic mechanisms. Although further studies are now needed its efficacy and effect mechanisms, due to its ease of oral use BB may represent an oral supplement capable of use in preventing the toxic intestinal effects of MTX.

Conflict of Interest: The authors have indicated no conflicts of interest regarding the content of this article.

Researchers' Contribution Rate Statement:
Concept/Design: GK, GB, SK and SD;

Analysis/Interpretation: GK, GB, NTA, SD and YA;
Data Collection: GK, GB, SK, NTA and SD
Writer: GK, GB, SK and SD;
Critical Review: GK, SK, SD and YA;
Approver: GK, SK, GB, NTA, SD and YA.

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Ethics Committee Approval: All experimental techniques utilized in this work were reviewed and approved by Karadeniz Technical University Animal Experiments Local Ethics Committee, Türkiye (number 2022/50).

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IMPACT OF PSYCHODRAMA ON EMOTIONAL AWARENESS AND PSYCHOLOGICAL WELL-BEING IN UNIVERSITY STUDENTS

*Psikodramanın Üniversite Öğrencilerinin Duygusal Farkındalık ile Psikolojik İyi Oluş
Düzeyine Etkisi*

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ABSTRACT

Objective: The aim of this study is to determine the effect of psychodrama on emotional awareness and psychological well-being of university students.

Material and Methods: The study was a pretest, posttest intervention study with a control group. The study group included a total of 38 university students, 18 experimental students and 20 control group students. The researchers performed an eleven-session psychodrama group activity on the experimental group. However, they did not intervene in the control group. The researchers collected the data by distributing data collection tools (Information Form, the Emotional Self-Awareness Scale and the Psychological Well Being Scale) to the students before and after the psychodrama study.

Results: The study found that the psychodrama group activity had a great impact on the psychological well being and emotional self-awareness level of the experimental group students ($p<0.001$). The interaction effect was significant for the total scores of the scales ($p<0.05$). In the experimental group, it was observed that there was an increase in the scores against time in both scales. The effect size of this change is large ($\eta^2=0.267$, $\eta^2=0.528$).

Conclusion: After the psychodrama group, it was observed that there was an increase in the psychological well-being and emotional awareness skills of the participants.

Keywords: Psychodrama, emotional awareness, psychological well-being

ÖZ

Amaç: Bu araştırmada psikodramanın üniversite öğrencilerinin duygusal farkındalık ile psikolojik iyi oluş düzeyine etkisini belirlemek amaçlandı.

Gereç ve Yöntemler: Araştırma, kontrol gruplu bir ön test, son test müdahale çalışması olarak planlandı. Çalışma grubunu, 18 deney ve 20 kontrol grubu olmak üzere toplam 38 üniversite öğrencisi oluşturdu. Deney grubuna 11 oturumluk psikodrama grup etkinliği uyguladı. Kontrol grubuna ise herhangi bir müdahalede bulunmadı. Araştırmacılar, psikodrama çalışması öncesi ve sonrasında öğrencilere veri toplama araçlarını (Bilgi Formu, Duygusal Öz Farkındalık Ölçeği ve Psikolojik İyi Olma Ölçeği) dağıtarak verileri topladı.

Bulgular: Psikodrama grup etkinliğinin deney grubu öğrencilerinin psikolojik iyi oluşları ve duygusal öz-farkındalık düzeyleri üzerinde büyük bir etkiye sahip olduğunu bulundu ($p<0.001$). Etkileşim etkisi, ölçeklerin toplam puanları için anlamlıydı ($p<0.05$). Deney grubunda her iki ölçekte de zamana karşı alınan puanlarda artış olduğu görülmüştür. Bu değişikliğin etki büyüklüğü büyüktür ($\eta^2=0.267$, $\eta^2=0.528$).

Sonuç: Psikodrama grubundan sonra katılımcıların psikolojik iyi oluş ve duygusal farkındalık becerilerinde artış olduğu gözlemlendi.

Anahtar Kelimeler: Psikodrama, duygusal farkındalık, psikolojik iyi oluş



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INTRODUCTION

Emotions play a key role in reinforcing psychological health or solving psychological issues. In addition, the success of individuals in relationships requires them to be aware of emotions (1). Emotional awareness denotes identification of one's own and other people's emotions and awareness regarding emotional experiences (2). Emotional awareness includes realizing the importance of one's own and other people's emotions, and determining, discerning and evaluating the premises of emotions. This is a prerequisite for emotional regulation (3). It increases the opportunity for a person to express his/her desires and emotions (4). The person with a higher level of emotional awareness will have a higher level of understanding of his/her environment (5) and coping with problems (6). Individuals with a higher level of emotional awareness will experience more positive emotions, have a higher level of self-respect, be more extrovert, be less socially anxious, have more life satisfaction and determine the positive or negative impacts of experiences than those with a lower level of emotional awareness (1,7). A meta analysis study found that anxious young people had difficulty in understanding emotions, were less aware of their emotions and accepted them less, had a harder time expressing their emotions and thus, reported less self-efficacy (8). Emotional awareness and expression of emotions are related to mental health and psychological well-being of young people, as well as health, search for help, family and peer relations. Lower emotional awareness is a risk factor for the health and social relations of young people (9).

Emotional awareness is correlated with mental health and psychological well-being. Psychological well-being is one of the core concepts of positive psychology and it comprises the goals of a person in life, his/her awareness of his/her potential and quality of his/her relations with other people (10). Individuals can develop a positive sense of self, arrange his/her needs, desires and environment, establish secure and positive relationships with other people, understand life, act autonomously and independently and realize and develop his/her present

capacity through psychological well-being (11). Individuals with a higher level of psychological well-being will trust themselves and other people and be more responsible. As they have a positive functionality, they will be able to develop and reinforce their own potential, have life goals and establish positive relationships with other people (12).

Developed by J.L. Moreno, psychodrama is a psychotherapy method based on dramatizing incidents, emotions and thoughts and roleplaying (13). In psychodrama, learning occurs by experiencing cognitive, affective and behavioral goals. Therefore, psychodrama sessions aim to create catharsis, acquire insight, have emotional awareness, develop logical thoughts, enable learning and create a behavioral change (14-16). In psychodrama sessions, group members spontaneously dramatize incidents in their lives, as well as their present emotions and thoughts. This aims to generate a solution to existing problems of individuals and raise their awareness (17). A study conducted by Albal et al. evaluated the impact of psychodrama on emotional awareness and communication skills and they conclude that psychodrama could be used in raising emotional awareness (18). We aimed to evaluate the impact of group activity performed by using experiential psychodrama technics on emotional awareness and psychological well-being in university students.

MATERIALS AND METHODS

Ethical approval was obtained from the Health Sciences Scientific Research Ethics Committee of Necmettin Erbakan University (Date:07.07.2021; number 12/67). The study was an interventional study with a pretest-posttest control group. The study had two hypotheses. The first hypothesis was that psychodrama would increase emotional awareness in students. The second hypothesis was that psychodrama would increase psychological well-being in students. The researchers conducted the study between August and September 2021.

Study Sample

The researchers conducted the study with university students aged 18 to 25 years. In order to determine the study group, the researchers announced the study to the university students via social media. The researchers informed the students that the psychodrama sessions were to take place online due to the pandemic restrictions. They also informed the students of the goals, hours and time of the psychodrama group and how the group sessions would be carried out. Following the psychodrama sessions, the researchers were to record the process for each session in written form. The students who agreed to take part in the psychodrama group activity, volunteered to share their experiences and were older than 18 years formed the experimental group, while the students who only agreed to take part in the survey study formed the control group. In addition, the study excluded the students who had been diagnosed with a mental disorder and were taking any psychotropic medicine. In psychodrama applications, the number of groups is planned to be 15-20 for the application to be effective (14). The researchers specified the number of people to take part in the psychodrama sessions to be 20 each, by the nature of the application. However, two students from the experimental group left the application. The research was conducted with 18 experimental and 20 control groups. The power of the study was 80%.

Data Collection Tools

The researchers conducted the psychodrama applications in an online medium and collected the data via an internet-based survey (Google Forms) before and after the application.

Information Form: A form of five questions questioning the age, grade, gender, accommodation and department of students.

The Emotional Self-Awareness Scale (ESAS-10): The researchers measured the emotional self-awareness level using the ESAS-10, developed by Cooper & Sawaf (1997) (19). Tatar et al. adapted the scale into Turkish and examined its psychometric properties (2). According to the data acquired, the ESAS-10 was found

to be valid and reliable. The five point scale (strongly inappropriate, slightly appropriate, a little appropriate, mostly appropriate, fully appropriate) had ten items. Reverse items in the scale were items 2, 4, 6, 8 and 10. The scale was created for individuals aged 18 to 66 years. The Cronbach's Alpha of the scale was 0.87 (2). The present study found the Cronbach's Alpha to be 0.81.

The Psychological Well-Being Scale (PWBS): Diener et al created the scale and Telef adapted it into Turkish (20,21). The seven point Likert scale had eight items and a single factor. The lowest and highest possible scores to be obtained from the scale were 8 and 56, respectively. A high score obtained from the scale indicated that the person had many psychological resources and power. The Cronbach's Alpha of the scale was 0.80 (21). The present study found the Cronbach's Alpha to be 0.70.

Psychodrama Interventions

The researchers conducted psychodrama sessions for the students to acquire role flexibility, identify their own and other members' emotions via catharsis and develop their psychological well-being. They conducted the sessions online two hours a week under the guidance of a psychodrama therapist and an assistant for eleven weeks. After each session, the researchers recorded the sessions in written form without specifying any names by using the nicknames picked by the students themselves during the first week. However, the researchers made no intervention in the control group. As the psychodrama was based on spontaneity and action, the admin performed warmup games aimed at self-identification and identification of emotions and psychological well-being, as well as protagonist-centered studies which developed during the group activities. The researchers made the psychodrama interventions according to the warmup, action and sharing phases. The warmup phase had warmup games (22). The researchers arranged the studies in accordance with the online medium.

Psychodrama Process

In the present study which was grounded on emotional awareness and psychological well-being, the researchers shaped the sessions according to the overall purpose of the study and the needs of the group members.

Session 1: The researchers gave theoretical information to the group members about psychodrama. Then the researchers specified the group process and group rules and all group members shared their expectations from this process with the group in turn. The researchers obtained informed consent form from the participants via an online form. In this session, the group members played an empathic introduction game by telling the meaning and story of their names in order to know each other and create a group cohesion. They also played a warmup game (social atom activity for the members to realize their social bonds) which included the separation of the participants and other family elders into regions according to their places of birth in order to observe the common grounds related to the sociometric structure.

Session 2: This session started by sharing the summary of the previous session and experiences and emotions of the group members in the past week. The students played a warmup game called "A letter to the past". The researchers performed a protagonist activity aimed at a specific student's letter.

Session 3: This session asked the participants to dream about a fairy tale they liked or were influenced by and then draw his/her favorite part of the fairy tale. During the study, the researchers performed a protagonist activity aimed at a specific student's favorite part of the fairy tale. Following the protagonist activity of the participant, the group members shared their own processes besides the fairy tale activity.

Session 4: The participants shared their birth stories from a psychodramatic aspect. They shared their stories by associating the senses of courage, spontaneity and affinity in life and the state of feeling good with the moment of birth. One of the participants stated that he/she was too affected by his/her gender and being a twin and wanted to talk about it.

Session 5: The researchers performed a social role atom activity for the participants. The activity stressed the social role the participants had to play in life the most by centering the role, as well as other roles they were influenced by.

Session 6: The participants played a warmup game for their neglected emotions. They expressed when they experienced that neglected feeling for the first time and why they stopped feeling it. All participants talked to the people who they thought had caused that neglected feeling by changing roles via the empty chair technic.

Session 7: In this session, a voluntary member stated that he/she had been touched by the neglected feelings activity that had been performed during the previous week. He/she indicated that he/she always thought about a certain incident in his/her childhood and wanted to share this with the group. He/she stated that he/she still felt regret and anger about his/her childhood and wanted to share it with other people. He/she reanimated the incident via role play. The protagonist was encouraged to express the emotions he/she could not express via group experience. In the sharing phase, the group members shared similar experiences and emotions and gave feedback to the protagonist. In the session, the members realized that even if we ignored our emotions, they continued to affect us. The members shared things related to this.

Session 8: The researchers asked the participants to think about a positive quality they had. Then the researchers asked the participants to share that quality with the group based on a memory without mentioning the name of the quality. The group members tried to guess this positive quality. The researchers performed a protagonist activity with a member who stated that he/she was negatively affected by a quality that he/she thought was positive.

Session 9: The researchers asked the participants to close their eyes and specify a photo frame from their life. The members were randomly separated into groups of two in an online medium. The researchers asked the members to share that photo frame from their life with their partner in the groups. Following the activity, the

members shared with each other within the group. The researchers performed a protagonist activity with a member who shared a memory from when he/she was five years old. In this session, the group members shared similar memories from their childhood after the protagonist’s activity. In addition, they realized how these memories affected their present life.

Session 10: In this session, the participants played a game called “You have got a package in the mailbox”. The researchers asked the participants to dream of a package that would make them feel good and roleplay it.

Session 11: The researchers stressed the experiences of the group members in the psychodrama via a closing spectrogram and received feedback. The group members evaluated the session processes. They expressed what the psychodrama activities had so far added to them in terms of sensuality and state of feeling good. They shared the changes and awareness occurring in themselves.

Statistical Analysis

In order to reveal the similarities between the categorical sociodemographic characteristics of the experimental and control groups, the chi-square test and continuous variables were tested. In the relevant literature, results regarding kurtosis and skewness values of variables

between +2.0 and -2.0 are considered normal distribution (23). It was determined that the research variables showed normal distribution. The evaluation of the data, the researchers used the dependent and independent samples t-test to analyze the PWBS and ESAS-10 scores of the students and the repeated measures variance analysis to evaluate the influence quantity of the program. The researchers calculated the influence quantity values via Cohen (1988) which provided comparisons for identifying small ($\eta^2=0.01$), medium ($\eta^2=0.06$) and big ($\eta^2=0.14$) influences (24,25). The researchers tested the results at $p<0.05$ significance level.

RESULTS

The sociodemographic characteristics of the participants in the experimental and control groups are given in Table 1. The mean of the participant’s age in the experimental group was 20.33 ± 0.91 , and for the participants in the control group, it was 21.75 ± 13.23 . It was found that there was no significant difference between the groups in terms of the sociodemographic characteristics of the participants in the experimental and control groups, such as age, gender, grade level, and education department ($p>0.05$) (Table 1).

Table 1: Comparison of similarity between groups before the research.

Characteristic	Experimental	Control	Test value and significance	
	N (%)	N (%)	X ²	p
Gender				
Female	17 (94.4)	16 (80.0)	1.310	0.198
Male	1 (5.6)	4 (20.0)		
Department				
Nursing	16 (89.9)	18 (90.0)	0,108	0.914
Other	2 (11.1)	2 (10.0)		
Class				
2	11 (61.1)	14 (70.0)	1.053	0.299
3	6 (33.3)	5 (25.0)		
4	1 (5.6)	1 (5.0)		
Age				
	M (SD)	M (SD)	t	p
	20.33 (0.91)	21.75 (3.23)	1.798	0.81

X²=Chi-squared test, t= Independent t test, SD: Standard deviation

In the experimental group, the mean PWBS score was 45.72 ± 2.24 before the psychodrama group activity and

50.44 ± 53.20 after the activity. There was a statistically significant difference between the mean PWBS scores

of the experimental group students at a high level ($p < 0.001$). In the experimental group, the mean ESAS-10 score was 37.40 ± 5.90 before the psychodrama group activity and $46.60.44 \pm 2.37$ after the activity. There was a statistically significant difference between the mean ESAS-10 scores of the experimental group students at a high level ($p < 0.001$). In the control group, the mean PWBS score was 45.80 ± 6.10 before the psychodrama group activity and 44.05 ± 7.00 after the activity. There was no statistically significant difference between the

mean PWBS scores of the control group students ($p = 0.532$). In the control group, the mean ESAS-10 score was 39.20 ± 5.36 before the psychodrama group activity and 36.95 ± 7.59 after the activity. There was no statistically significant difference between the mean ESAS-10 scores of the control group students ($p = 0.095$). There was a significant difference between the PWBS and ESAS-10 first and last measurement scores of the experimental and control group students ($p = 0.004$; $p < 0.001$) (Table 2).

Table 2: Intragroup and intergroup comparison of the mean PWBS and ESAS-10 scores of the experimental and control group members before and after the psychodrama.

Scales	Group	Pretest			Posttest			Test value and significance
		Min.	Max.	M(SD)	Min.	Max.	M(SD)	
PWBS	Experimental	41	52	45.72(2.24)	43	55	50.44(53.20)	$t = -5.228, p < 0.001$
	Control	30	54	45.80(6.10)	29	56	44.05(7.00)	$t = 0.636, p = 0.532$
		$t = -0.051, p = 0.960$			$t = 3.107, p = 0.004$			
ESAS-10	Experimental	27	50	37.40(5.90)	41	50	46.60.44(2.37)	$t = -7.246, p < 0.001$
	Control	30	50	39.20(5.36)	24	50	36.95(7.59)	$t = 2.1756, p = 0.095$
		$t = -0.992, p = 0.328$			$t = 5.436, p < 0.001$			

t=Independent t test; t=Paired samples t test; * $p < 0.05$ is statistically significant, Min:Minimum, Max: Maximum, M: Mean, SD: Standard deviation, PWBS: The psychological well being scale, ESAS: The emotional self-awareness scale

The researchers evaluated the time*group interaction of the measurements obtained in the study via the repeated measures two-way variance analysis. They found the impact of the PWBS and ESAS-10 according to time and group to be significant ($p < 0.05$). In addition, the psychodrama group activity had a great impact (Table 3).

Table 3: Change in the ESAS-10 and PWBS in time.

Scales		Groups	Time	Groupsx Time
PWBS	F-value	4.497	6.923	13.138
	p	0.041*	0.012*	0.001*
	η^2	0.108	0.161	0.267
ESAS-10	F-value	6.078	14.968	40.274
	p	0.018*	$< 0.001^*$	$< 0.001^*$
	η^2	0.141	0.294	0.528

F=The repeated measures variance analysis; * $p < 0.05$ is statistically significant; 95% confidence interval of partial η^2

PWBS: The psychological well being scale, ESAS: The emotional self-awareness scale

DISCUSSION

It is noteworthy to be aware of emotions in order to arrange life and relationships. As emotional awareness includes having information about a specific emotion, it adds a value to the individual in coping with stress and making sense of incidents. It does not seem to be possible for an individual without emotional awareness to realize his/her inner world, evaluate his/her desires and needs and display appropriate behaviors for his/her emotions. The present study found that the psychodrama application was an effective method for raising emotional awareness. A study stated that psychodrama helped nursing students understand and recognize themselves, express their emotions, show empathy towards other people and develop their creativity (15). Another study found that psychodrama helped university students solve their emotional problems and interpersonal conflicts (26). Dogan et al. concluded that psychodrama helped students develop self-awareness

and empathy (27). Kaya et al. evaluated the impact of the psychodrama group application on subjective well-being of nursing students and they found that psychodrama had a significant impact on students to recognize themselves and their emotions and create a life purpose (28). Studies conducted with other groups also found similar results. Şener et al. found that psychodrama helped university students with alexithymia recognize and express their emotions (29). Boroomandian et al. stated that the interaction and psychodrama oriented group therapy helped adolescents for development of emotional awareness (30). Pairing, role changing and mirroring techniques used in psychodrama may help all group members understand themselves and other people better (27). In the sharing phase of the psychodrama session, individuals share what emotions are evoked by their stage roles and what these roles remind in their lives. This will help all group members feel, examine and arrange their own emotions. By this way, psychodrama may raise emotional awareness in all group members (29).

Psychological well-being enables an individual to think that life has a meaning and make his/her own decisions. In addition, it is a noteworthy concept for the individual to complete his/her personal development and acquire autonomy. One of the significant findings in the present study was that psychodrama had an impact on psychological well-being. Albayrak et al. examined the impact of psychodrama on well-being of university students and found that the psychodrama program increased psychological well-being levels (31). These results were in agreement with the current study. Mosavi H et al. determined the effectiveness of psychodrama on social anxiety, self-respect and psychological well-being of students diagnosed with social anxiety disorder found that psychodrama decreased social anxiety and increased self-respect and psychological well-being (32). Kaya and Deniz's study stated that the psychodrama group therapy was a practicable method for developing the psychological well-being level of university students (33). A study conducted by Kaya et al. examined the impact of the psychodrama group

application on the psychological well-being and self-acceptance level of nursing students and they found that the application increased the mean psychological well-being scores of the nursing students (34). The literature had findings which were not in agreement with the our study result. A psychodrama group application performed by Atintaş and Şimşek with university students concluded that the application had no significant impact on the psychological well-being of students (35). A systematic review stated that there was a need for more research in order to understand the potential advantages of psychosocial well-being (36). In conclusion, the present study found that psychodrama was an effective method for emotional awareness and psychological well-being of university students. In line with these results, it is recommended to use psychodrama in preventive mental health services.

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AN ANALYSIS OF INJURIES DUE TO TRACTOR ACCIDENTS: A TEN YEAR RETROSPECTIVE STUDY

Traktör Kazasına Bağlı Yaralanmaların Analizi: On Yıllık Retrospektif Çalışma

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ABSTRACT

Objective: Although tractors are highly inadequate in terms of safety equipment compared to other vehicles, they are still frequently employed for agricultural activities and even human transportation. This study investigated patients presenting to the emergency department (ED) due to tractor accidents.

Material and Methods: Tractor accidents occurring over a ten year period were examined retrospectively. Victims' demographic data, the cause of the accident, trauma scores (Glasgow Coma Score, Injury Severity Score, Revised Trauma Score and Pediatric Trauma Score), injury localizations, imaging results, and clinical outcomes were recorded.

Results: One hundred sixty-five patients were included. Their mean age was 46.48±23.24 years, 82.4% were men, and 41.8% were tractor drivers. The most frequent cause of accidents was "falling from the tractor". The thorax was the most frequently injured anatomical region. Rates of head and thoracic injury were significantly higher in drivers compared to passengers (p=0.005 and p=0.039, respectively). The post-accident exitus rate was 3.6%. The incidence of abdominal and pelvic injuries was significantly higher in the exitus group than in the survivors (p=0.018 and p=0.015, respectively). Glasgow Coma Score and Revised Trauma Score levels were significantly lower in the exitus group than in the survivors (p<0.001 and p=0.001, respectively), while Injury Severity Score levels were significantly higher (p<0.001). Positive correlation was determined between mortality and abdominal and pelvic injury (r=0.184, p=0.018 and r=0.189, p=0.015, respectively).

Conclusion: Based on our study findings, tractor accidents frequently seen involve middle-aged men, and the thorax is the most commonly injured region. Exitus victims were exposed to greater trauma energy, and mortality was correlated with abdominal and pelvic injury.

Keywords: Emergency department, tractor accident, trauma

ÖZ

Amaç: Traktörler, güvenlik donanımı bakımından diğer araçlara göre çok daha yetersiz olsa da tarımsal faaliyetlerin yanı sıra insan taşımacılığı için de sıkça kullanılır. Bu çalışmada, traktör kazası nedeniyle acil servise başvuran hastalar incelenmiştir.

Gereç ve Yöntemler: On yıllık dönem içerisinde gerçekleşen traktör kazaları retrospektif olarak incelendi. Kazazedelerin demografik verileri, kazanın oluş mekanizması, travma skorları (Glasgow Koma Skoru, Injury Severity Score, Revize Travma Skoru, Pediatrik Travma Skoru), anatomik yaralanma bölgeleri, görüntüleme sonuçları ve klinik sonuçlarını kaydedildi.

Bulgular: Çalışmaya 165 hasta dahil edildi. Bunların yaş ortalaması 46.48±23.24/yıl, %82.4'ü erkek ve %41.8'i şofördü. En sık izlenen kaza mekanizması "traktörden düşme" idi. Toraks, en fazla yaralanan anatomik bölgeydi. Şoförlerde kafa ve toraks yaralanması oranı, yolculardan anlamlı olarak daha fazlaydı (Sırasıyla p=0.005; p=0.039). Kaza sonrası kazazedelerin %3.6'sı eksitus oldu. Eksitus olanlardaki batın ve pelvis yaralanması oranı, yaşayanlardan anlamlı olarak daha fazlaydı (Sırasıyla p=0.018; p=0.015). Eksitus olanların Glasgow Koma Skoru ve Revize Travma Skoru düzeyi yaşayanlardan anlamlı olarak daha düşük (Sırasıyla p<0.001; p=0.001); Injury Severity Score düzeyi ise anlamlı olarak daha yüksekti (p<0.001). Mortalite ile batın ve pelvis yaralanması arasında pozitif korelasyon olduğu saptandı (Sırasıyla r=0.184, p=0.018; r=0.189, p=0.015).

Sonuç: Çalışmamızın sonuçlarına göre, traktör kazaları sıklıkla orta yaş erkeklerde izlenmekte olup, toraks en fazla yaralanan bölgedir. Ölen kazazedeler daha fazla travma enerjisine maruz kalmış ve mortalitenin batın ve pelvis yaralanmasıyla ilişkili olduğu saptanmıştır.

Anahtar Kelimeler: Acil servis, traktör kazası, travma



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INTRODUCTION

Tractor accidents represent only a small part of all traffic accidents (1). However, they are frequently seen in countries with significant agricultural sectors, and are one of the “agriculture-related occupational hazards” in the USA and Canada (2,3). Their different design to that of other vehicles, the disproportion in size between the front and rear wheels, the lack of accident-prevention systems, inadequate safety equipment, and the uneven nature of and obstacles on the terrain on which they are employed all facilitate the occurrence of tractor accidents (4). The fact that tractors may be used to carry humans as well as for agricultural purposes can also result in numerous injuries or deaths in the event of accidents (5).

This study investigated patients presenting to the emergency department (ED) due to tractor accidents. Through the data obtained, we intend this study to contribute to the existing literature and to produce some understanding of the important points to be considered during the management of traffic accident victims in the ED.

MATERIALS AND METHODS

Study design

This retrospective study involved patients presenting to the Kırıkkale University faculty of medicine ED in Turkey, due to tractor accidents over a 10-year period from 2012 to 2021. Approval was granted by the local ethical committee (no. 2021.10-11). Patient data were retrieved from the hospital information processing automation system and archive information. All patients' demographic data, the cause of the accident, where the victim was sitting on the tractor when the incident occurred, the injury localizations, and trauma scores (GCS, Glasgow Coma Score; ISS, Injury Severity Score; RTS, Revised Trauma Score and PTS, Pediatric Trauma Score), imaging results, and clinical outcomes were recorded. Individuals with deficient file data or whose data could not be retrieved were excluded. GCS is a scoring indicator of neurological status in which the patient's motor response along with verbal and

eye-opening responses are evaluated. The highest score value is 15, while the lowest value is 3. A decrease in the score is interpreted as worsening neurological status. RTS is a physiologically based triage score. It is obtained by evaluating systolic blood pressure, respiratory rate and GCS. RTS ranges from 0-12. A decrease in score indicates fatal trauma-related injuries. ISS is an anatomical score established to assess the severity of trauma. Post-traumatic mortality is associated with morbidity and length of hospital stay. ISS ranges from 1 to 75. An increase in score indicates an increase in injury severity. PTS is a scoring that evaluates the patient's physiological status (Airway, Systolic blood pressure, Central nervous system, Open wound, Skeletal system) and body weight together. The total score ranges from -6 to +12. Values below eight points indicate potentially significant trauma for pediatric patients (6).

Statistical analysis

The study data were analyzed on SPSS version 21.0 software (IBM Corporation, Armonk, NY, USA). Descriptive statistics were expressed as number (n), frequency (%), median, and mean plus standard deviation (\pm SD) values. Normality of data distribution was evaluated using the Kolmogorov-Smirnov test. Student's t-test was used to compare normally distributed variables and the Mann-Whitney U-test for abnormally distributed variables. Pearson's chi-square test was applied in the comparison of categorical variables. The relationship between mortality and injury sites was analyzed using Spearman's correlation test. *p* values <0.05 were considered statistically significant.

RESULTS

Demographic data: One hundred seventy-three patients presented to the ED due to tractor accidents during the study period. Eight patients with deficient data were excluded, and the research was thus completed with 165 patients. The accident victims' demographic data are shown in Table 1.

Table 1. Accident victims' demographic data

Age (mean±SD)	46.48±23.24
Sex	n (%)
▪ Female	29 (17.6)
▪ Male	136 (82.4)
Accident victim	n (%)
▪ Driver	69 (41.8)
▪ Passenger	96 (58.2)
Position of the victim on the tractor	n (%)
▪ Driver's seat	69 (41.8)
▪ Above the wheel	52 (31.5)
▪ Trailer	44 (23.7)
Month of accident	n (%)
▪ January	-/-
▪ February	6 (3.6)
▪ March	9 (5.5)
▪ April	15 (9.1)
▪ May	13 (7.9)
▪ June	21 (12.7)
▪ July	35 (21.2)
▪ August	13 (7.9)
▪ September	23 (13.9)
▪ October	22 (13.3)
▪ November	7 (4.2)
▪ December	1 (0.6)
Time of accident	n (%)
▪ 00:00-04:00	8 (4.8)
▪ 04:00-08:00	3 (1.81)
▪ 08:00-12:00	30 (18.2)
▪ 12:00-16:00	40 (24.2)
▪ 16:00-20:00	55 (33.3)
▪ 20:00-00:00	29 (17.5)
Accident mechanism	n (%)
▪ Fall from tractor	76 (46.1)
▪ Rollover of tractor	39 (23.6)
▪ Hitting another vehicle and/or object	6 (3.6)
▪ Being crushed under the tractor	30 (18.2)
▪ Injury with other equipment belonging to the tractor	14 (8.5)
Clinical outcome	n (%)
▪ Discharged from the emergency department	78 (47.2)
▪ Hospitalized for treatment	85 (51.5)
▪ Admitted to relevant department	61 (71.7)
▪ Admitted to intensive care unit	24 (28.3)
▪ Exitus	6 (3.6)
▪ Driver	5 (3.0)
▪ Passenger	1 (0.6)

Examination of injury locations: Injuries were most common to the thoracic region. The rates of injuries to the head and thorax were significantly higher in drivers

than in passengers ($p=0.005$ and 0.039 , respectively) (Table 2).

Table 2. A comparison of drivers' and passengers' injury localizations

Localization	Total (n=165)	Passenger (n=96)	Driver (n=69)	p
	n (%)	n (%)	n (%)	
Head	72 (43.6)	33 (34.4)	39 (56.5)	0.005
Cervical	20 (12.1)	9 (9.4)	11 (15.9)	0.319
Thorax	80 (48.5)	40 (41.7)	40 (57.9)	0.039
Abdomen	42 (25.5)	25 (26.1)	17 (24.6)	0.838
Pelvis	25 (15.2)	14 (14.6)	11 (15.9)	0.810
Extremity	75 (45.5)	44 (45.8)	31 (44.9)	0.908

The rates of injuries to the abdominal and pelvic regions were significantly higher in the exitus victims than in the surviving patients ($p=0.018$ and 0.015 , respectively) (Table 3). Positive correlations were determined

between post-accident mortality and abdominal and pelvic injuries ($r=0.184$, $p=0.018$ and $r=0.189$, $p=0.015$, respectively). No correlation was observed between mortality and other region injuries.

Table 3. A comparison of exitus and surviving patients' injury localizations

Localization	Total (n=165)	Surviving (n=159)	Exitus (n=6)	p
	n (%)	n (%)	n (%)	
Head	72 (43.6)	68 (42.8)	4 (66.7)	0.247
Cervical	20 (12.1)	18 (11.3)	2 (33.3)	0.266
Thorax	80 (48.5)	75 (47.2)	5 (83.3)	0.092
Abdomen	42 (25.5)	38 (23.9)	4 (66.7)	0.018
Pelvis	25 (15.2)	22 (13.8)	3 (50.0)	0.015
Extremity	75 (45.5)	72 (45.3)	3 (50.0)	0.082

Examination of imaging findings: Fracture was determined in 37.6% of victims at direct radiography. The five most common pathologies at computed tomography (CT) were, in descending order, rib fracture

(57.5%), thoracolumbar fracture (30.7%), pneumothorax (22.2%), maxillofacial fracture (20.8%), and pelvic fracture (17.2%) (Table 4).

Table 4. Accident victims' imaging test results

Direct radiography findings, (n=133)	n (%)
▪ Fracture detected	50 (37.6)
Brain CT findings, (n=101)	n (%)
▪ Hemorrhage (epidural, subdural hematoma or subarachnoid hemorrhage)	9 (8.9)
▪ Pneumoencephaly	3 (2.9)
▪ Fracture (head and maxillofacial bone)	27 (26.7)
▪ Eye injury	1 (0.9)
▪ More than one pathology	27 (26.7)
Vertebral CT findings	n (%)
▪ Cervical CT, (n=81)	
▪ Fracture detected	11 (13.6)
▪ Corpus	6 (7.4)
▪ Spinous process	3 (3.7)
▪ Transverse process	3 (3.7)
▪ More than one site	1 (1.2)
▪ Thoracolumbar CT, (n=117)	
▪ Fracture detected	36 (30.7)
▪ Corpus	9 (7.7)
▪ Spinous process	5 (4.3)
▪ Transverse process	28 (23.9)
▪ More than one site	6 (5.1)
Thoracic CT findings, (n=99)	n (%)
▪ Rib fracture	57 (57.5)
▪ Hemothorax	15 (15.1)
▪ Pneumothorax	22 (22.2)
▪ Pulmonary contusion	6 (6.2)
▪ Sternum fracture	1 (1.1)
▪ Scapula fracture	1 (1.1)
▪ More than one pathology	64 (64.6)
Abdominal and Pelvic CT findings, (n=99)	n (%)
▪ Liver injury	3 (3.0)
▪ Spleen injury	2 (2.0)
▪ Kidney injury	2 (2.0)
▪ Ureter injury	2 (2.0)
▪ Multiorgan injury	2 (2.0)
Pelvic CT findings, (n=99)	n (%)
▪ Pelvic fracture	17 (17.2)
▪ Ramus pubis	6 (6.1)
▪ Ischium,	1 (1.0)
▪ Ilium	2 (2.0)
▪ More than one site	11 (11.1)

CT, computerized tomography

Examination of trauma scores: No difference was determined between drivers and passengers in terms of trauma scores (Table 5).

Table 5. A comparison of drivers' and passengers' trauma scores

Trauma Score	Total (n=165)	Driver (n=69)	Passenger (n=96)	p
GCS, median (min-max)	15 (3-15)	15 (3-15)	15 (10-15)	0.076
RTS, median (min-max)	9 (3-75)	11 (3-75)	6 (3-57)	0.218
ISS, median (min-max)	12 (0-12)	12 (0-12)	12 (11-12)	0.079
PTS, median (min-max)	10 (6-12)	9 (6-9)	10 (6-12)	0.569

GCS, Glasgow Coma Scale; ISS, Injury Severity Score; RTS, Revised Trauma Score; PTS, Pediatric Trauma Score.

GCS and RTS results were significantly lower in the exitus victims than in the survivors ($p < 0.001$ and

< 0.001 , respectively), while ISS results were significantly higher ($p < 0.001$) (Table 6).

Table 6. A comparison of exitus and surviving patients' trauma scores

Trauma Score	Total (n=165)	Exitus (n=6)	Surviving (n=159)	p
GCS, median (min-max)	15 (3-15)	9 (3-15)	15 (10-15)	<0.001
RTS, median (min-max)	9 (3-75)	10 (0-12)	12 (11-12)	<0.001
ISS, median (min-max)	12 (0-12)	60 (44-75)	7.5 (3-66)	<0.001
PTS*, median (min-max)	10 (6-12)	-	10 (6-12)	N/A

GCS, Glasgow Coma Scale; ISS, Injury severity score; RTS, Revised trauma score; PTS, Pediatric trauma score.*p value could not be investigated due to the absence of any pediatric exitus patient. N/A: non applicable

DISCUSSION

Tractors are frequently employed, particularly in developing countries, both in agriculture and for human transportation. Members of all age groups, including the pediatric age group, and of both genders can therefore be involved in tractor accidents (5). However, studies have shown that the majority of victims consist of middle-aged men, who are more suited to working in the agricultural sector (7-9). In the present study, 82.4% of the victims were male, and the mean age of all the victims was 46.48 ± 23.24 years, findings consistent with previous research.

The times of the greatest activity in the agricultural sector are during sowing and harvesting (10). The presence of daylight is also highly important for agricultural activities. Tractor accidents may therefore be expected to occur more frequently in the summer and fall and during daylight hours when work is most intensive (11). A study from Kentucky in the USA reported that tractor accident-related injuries frequently occurred between June and August, while Erkol et al. reported that such accidents increased more in June and

July (12,13). Goodman et al. reported that tractor accidents can be encountered at any time between 07:00 and 12:00 a.m., but that they peak between 04:00 and 05:00 p.m., with a marked decrease around mid-day (11). In the present study, and consistent with the previous literature, tractor accidents were most common in July and between 04:00 and 08:00 p.m.

Due to their different designs to those of other vehicles, the disproportion between their front and rear wheels, the deficient nature of accident-prevention safety systems, and the uneven nature of the terrain on which they are used, tractors involve a high risk of accidents when not employed with due care (14-16). These accidents can assume the form of hitting another vehicle and/or object and can also involve the driver or passengers falling from the tractor (4). "Tractor rollover" is noteworthy as the most common accident mechanism in studies from different countries examining tractor accidents (9,10,17-19). The most frequent mechanism in the present study; however, was "falling from the tractor", followed by rollover in second place. This may be associated with passengers

representing the great majority of victims in this study. These may have fallen from the tractors due to fatigue after work, carelessness, or a lack of safety equipment, thus resulting in the variation in our results.

Equipment attached to the vehicle (such as the steering wheel, driver's mirror, or other equipments in drivers cabin) can result in simple or fatal injuries to both driver and passengers in all body regions, particularly the head, spine, and thorax during tractor accidents (14,20-22). A study from Ireland reported that tractor accidents most frequently resulted in injuries to the extremities, thorax, spine, and head, while Erkol et al. described the thorax (46.4%) as the most frequently injured region (13,23). Franklin et al. reported head trauma, and multiple organ and thoracic injuries in fatal tractor accidents, while Höstükler et al. described injuries to the thorax, neck, and abdomen as the most important causes of mortality (24,25). The most commonly injured region in the present study was the thorax, followed by extremity and head injuries. These findings are compatible with previous studies. However, the noteworthy point is that the rate of injuries to the head and thorax was significantly higher among drivers compared to passengers. This suggested that drivers were more frequently injured due to striking vehicle equipment during accidents and that the tractors possessed insufficient protective equipment (such as seat belts and airbags). In terms of fatal accidents, the rate of abdominal and pelvic injuries in the exitus victims was significantly higher than that in the survivors. In addition, a positive correlation was also determined between mortality and abdominal and pelvic injury. This suggests that injuries to the thorax and head will be frequently observed in patients presenting to the ED due to tractor accidents, but that in terms of preventing mortality it will also be useful to take particular care over hemorrhagic shock-related injuries, such as those to the abdomen and pelvis.

The use of radiological methods is of vital importance in trauma patients (26). Although direct radiography is the first-choice method in the diagnosis of some isolated trauma patients, CT is superior to direct radiography,

and its use is spreading (27). In addition, tractor accidents can involve high-energy traumas, for which reason CT will be of greater use in the evaluation of such patients (28,29). Rates of detection of fracture using direct radiography in tractor accident victims have been reported at 37% by Akdur et al., and 57.2% by Vryhof et al. (8,30). The rate in the present study was 37.6%. In terms of studies examining CT results among tractor accident victims, Cogbill et al. listed the most frequently detected pathologies as rib fracture (22%), pelvic fracture (15%), pulmonary contusion (%14), renal contusion (12%), maxillofacial fracture (12%), and pneumothorax (12%), while Eraybar et al. listed rib fracture (19.3%), pneumothorax (13.6%), maxillofacial fracture (9.1%), intracranial hemorrhage (8%), and pelvic fracture (7.4%) (31,32). The injuries most frequently detected at CT in the present study was rib fracture (57.5%), followed by thoracolumbar fracture (30.7%), pneumothorax (22.2%), maxillofacial fracture (20.8%), pelvic fracture (17.2%), and hemothorax (15.1%). Although these findings are compatible with the previous literature, rates of pathologies involving the thoracic region (such as rib fracture, thoracolumbar fracture, pneumothorax, and hemothorax) and maxillofacial fracture were much higher than in other studies. We think that this may be attributable to the frequent use of CT in patient evaluation during our study or to falls from tractors representing the most frequent injury mechanism.

Trauma scores are calculated based on the patient's responses (neurological status, eye-opening, verbal, and motor response), vital findings, and the anatomical region injured (33). Although none of these scores involve a definitive result regarding the trauma patient's course, they assist diagnosis and treatment management (34). Among previous studies evaluating victims' GCS scores following tractor accidents, Jawa et al. reported a median value of 15, while Eraybar et al. reported a median GCS value of 15 and a median RTS value of 12 (32,35). In terms of studies examining ISS values following tractor accidents, Cogbill et al. reported a mean ISS value of 13.3 in one study and 8.5 in another,

while Sheehan et al. reported a median value of nine (23,31,36). The median trauma scores of all the victims in the present study were GCS: 15, RTS: 9, and ISS: 12, respectively. These results are similar to those of other studies. However, the particularly noteworthy finding was that the GCS and RTS values of the exitus victims were significantly lower than those of the survivors, while ISS was significantly higher. We interpreted this as indicating that the exitus victims being exposed to higher trauma energy than the survivors and to their vital findings and neurological functions being more impaired.

There are a number of limitations to this study, and these affected the results obtained. The first and most important is the retrospective nature of the research. The second is that characteristics of the tractors involved in accidents were not fully known (such as the roll bars, roll cages or presence of rollover protection structures). A third limitation is that the results are based on data from a single center.

Based on the results of this study, tractor accidents are frequently observed in middle-aged men, and the frequency rises during the summer. Falling from tractors was the most frequent trauma mechanism, and thoracic injuries were most frequently observed in both drivers and passengers. Abdominal and pelvic injuries were correlated with mortality in the non-surviving victims, and it may be concluded that these were exposed to higher trauma energy and suffered greater vital finding and neurological impairment. Patients presenting to the ED following tractor accidents must be examined in detail and placed under close hemodynamic follow-up, and care must be taken over injuries to all organ systems, but particularly the thorax.

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Researchers' Contribution Rate Statement: Concept/Design: OK, EC; Analysis/Interpretation: OK, EC, OE; Data Collection: OK, EC; Writer: OK, EC, OE; Critical Review: BI, TD; Approver: TD.

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COMPARISON OF PERFORMANCES OF OPEN ACCESS NATURAL LANGUAGE PROCESSING BASED CHATBOT APPLICATIONS IN TRIAGE DECISIONS

Açık Erişimli Doğal Dil İşleme Tabanlı Sohbet Botu Uygulamalarının Triyaj Kararlarındaki Performanslarının Karşılaştırılması

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ABSTRACT

Objective: Being publicly available, easy to use, and continuously evolving, next-generation chatbots have the potential to be used in triage, one of the most critical functions of an Emergency Department. The aim of this study was to assess the performance of Generative Pre-trained Transformer 4 (GPT-4), Bard and Claude during decision-making for Emergency Department triage.

Material and Methods: This was a preliminary cross-sectional study conducted with 50 case scenarios. Emergency Medicine specialists determined the reference Emergency Severity Index triage category of each scenario. Subsequently, each case scenario was queried using three chatbots. Inconsistent classifications between the chatbots and references were defined as over-triage (false positive) or under-triage (false negative). The primary and secondary outcomes were the predictive performance of chatbots and the difference between them in predicting high acuity triage.

Results: F1 Scores for GPT-4, Bard, and Claude for predicting Emergency Severity Index 1 and 2 were 0.899, 0.791, and 0.865 respectively. The ROC Curve of GPT-4 for high acuity predictions showed an area under the curve (AUC) of 0.911 (95% CI: 0.814-1; $p<0.001$), while Bard showed an AUC of 0.819 (95% CI: 0.692-0.945; $p<0.001$) and for Claude this was 0.881 (95% CI: 0.768-0.994; $p<0.001$).

Conclusion: GPT-4, in its current form, was able to detect high acuity Emergency Severity Index scores in our case set and had close agreement with Emergency Medicine specialists, followed by Claude, while Bard's agreement was relatively lower. GPT-4 and Claude provided better results than Bard in case management recommendations. We believe that studies evaluating the effectiveness and limitations of chatbots in triage are important because of their future potential.

Keywords: Artificial intelligence, diagnosis, triage

ÖZ

Amaç: Herkese açık olan, kolay kullanılan ve sürekli gelişen yeni nesil sohbet botları, Acil Servisin en kritik işlevlerinden biri olan triyajda kullanılma potansiyeline sahiptir. Bu çalışmanın amacı, acil servis triyajına karar verme sırasında Generative Pre-trained Transformer 4 (GPT-4), Bard ve Claude uygulamalarının performansını değerlendirmektir.

Gereç ve Yöntemler: Bu çalışma, 50 vaka senaryosu ile yürütülen kesitsel bir ön çalışmaydı. Acil Tıp uzmanları her senaryonun referans Emergency Severity Index triyaj kategorisini belirledikten sonra, her vaka senaryosu üç sohbet botu kullanılarak sorgulandı. Sohbet botları ve referanslar arasındaki tutarsız sınıflandırmalar overtriyaj (yanlış pozitif) veya undertriyaj (yanlış negatif) olarak tanımlandı. Birincil sonlanım sohbet botlarının tahmin performansı ve ikincil sonlanım ise yüksek ciddiyetteki vakaların triyajını belirlemede aralarındaki farktı.

Bulgular: GPT-4, Bard ve Claude'nin Emergency Severity Index 1 ve 2'yi belirlemede F1 skorları sırasıyla 0,899, 0,791 ve 0,865'ti. Yüksek ciddiyet tespiti için ROC eğrilerinde; GPT-4'ün eğri altında kalan alanı (AUC) 0,911 (%95 GA: 0,814-1; $p<0.001$), Bard'ın 0,819 (%95 GA: 0,692-0,945; $p<0.001$) ve Claude'nin 0,881 idi (%95 GA: 0,768-0,994; $p<0.001$).

Sonuç: GPT-4, mevcut haliyle, vaka setimizde yüksek ciddiyetteki Emergency Severity Index skorlarını tespit edebildi ve Acil Tıp uzmanları ile yakın uyum gösterdi. Bunu Claude takip ederken, Bard ile uyumu ise nispeten daha düşüktü. GPT-4 ve Claude, vaka yönetimi önerilerinde Bard'a göre daha iyi sonuçlar verdi. Gelecekteki potansiyelleri nedeniyle, sohbet botlarının triyajdaki etkinliğini ve sınırlılıklarını değerlendiren çalışmaların önemli olduğunu düşünüyoruz.

Anahtar Kelimeler: Yapay zekâ, tanı, triyaj



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INTRODUCTION

Chatbots are computer applications designed to simulate human online conversation. Recently, many successive developments related to Chatbots have been made and this has extended even to the field of medicine, leading to an increased interest in evaluating the healthcare opportunities that can arise with the use of chatbots (1). Generative Pre-trained Transformer (GPT) is a large natural language processing model (LLM) of OpenAI, trained by Reinforcement Learning from Human Feedback (RLHF). The fourth version of the model was released on March 14, 2023, and this was claimed to be 40% more accurate than the previous version, even performing above the passing score on several standardized tests (2,3). Google's Bard and Anthropic's Claude are two recently released chatbots, similar to GPT in nature (4,5).

In triage areas of Emergency Departments (ED), medical professionals determine the urgency of patients being attended to in the light of data, including symptoms and vital signs. Multiple triage scales are used for the proper management of patient density and efficient use of resources (6). One of the most frequently used is the Emergency Severity Index (ESI) (6,7). ESI is a five-level triage system to categorize patients from level 1 (most urgent) to level 5 (least urgent), based on the acuity of their medical conditions and the resources required for their care (8). Factors such as ED crowding, training level or experience of the personnel may affect the accuracy of the triage decisions (9). The use of artificial intelligence (AI) systems in emergency triage has been studied frequently in recent years with the intention of identifying a way to help medical professionals to make rapid and accurate triage decisions (10–13). Although these studies show promising results, they are often of a retrospective nature (12,14), based on a single hospital or region (13,15), tested in only one language (12), require changes in hospital information systems and data records (10), or study datasets and code are not available (14), which ultimately make their generalization and widespread use difficult. Although they were not trained

specifically for health care, the fact that new models of open access natural language processing-based chatbot applications, namely GPT-4, Bard, and Claude, can be used by any user without requiring additional training or major changes in hospital information systems, are constantly evolving with feedback data, and not restricted to the English language (except Bard), gives them a potential to find a unique place in emergency triage (1,2,4,5).

The aim of this study was to determine Emergency Severity Index (ESI) triage estimation performances of OpenAI's GPT-4, Google's Bard, and Anthropic's Claude chatbots in case scenarios based on ED triage vignettes that included presenting symptoms and vital signs.

MATERIALS AND METHODS

Study Design and Setting

This was a preliminary cross-sectional study conducted with the case scenarios generated by Emergency Medicine (EM) specialists and based on the cases provided in the ESI handbook v4 (8). The study protocol was approved by the Kocaeli University Non-Interventional Clinical Research Ethics Committee (Date: 4/6/2023, Number: GOKAEK-2023/07.10). Since the study is experimental in nature and was not performed on humans or animals, informed consent was not required.

Study Protocol

The scenarios were limited to presenting symptoms and vital signs (Supplement 1). A total of 50 case scenarios were prepared. The case scenarios were electronically prepared and distributed to two independent EM specialists who were experts in the ESI triage scale to determine their triage category as multiple-choice questions. A third independent EM specialist was consulted in the case of conflicting categorization. ESI stages were defined as follow (8):

ESI Level 1 (Immediate) - Patients with life-threatening conditions requiring immediate medical intervention.

ESI Level 2 (Emergent) - Patients with high-risk situations or severe distress, necessitating rapid attention.

ESI Level 3 (Urgent) - Patients with multiple or complex problems, who require multiple resources but can tolerate a short wait.

ESI Level 4 (Semi-Urgent) - Patients with less complex issues, needing one resource and able to wait longer for care.

ESI Level 5 (Non-Urgent) - Patients with minor complaints, requiring minimal resources and able to wait without significant risk.

The agreed results of each case scenario were assumed as the reference triage category. Subsequently, each case scenario was queried with GPT-4, Bard, and Claude to determine the chatbot-determined triage category (Figure 1). The answers of each program were recorded as index triage categories (Supplement 2). Inconsistent classifications between the chatbots and references were defined as over-triage (false positive) or under-triage (false negative). For the prediction performance of high acuity cases, a two-tier classification was carried out. ESI-1 and ESI-2 were defined as high acuity, while ESI-3, ESI-4, and ESI-5 categories were defined as moderate and low acuity levels (16).

Outcome Measures

The primary outcome was the predictive performance of GPT-4, Bard, and Claude for each ESI triage category. The secondary outcome was the difference between GPT-4, Bard, and Claude in predicting high acuity (ESI-1 and ESI-2) triage.

Data Analysis

Interrater reliability was determined using Cohen’s Kappa. A confusion matrix was constructed with the predictions of GPT-4, Bard, and the reference triage categories. The precision, recall and specificity and F1 scores for each triage category were calculated. Calculation formulas were as follows:

- Precision (positive predictive value) = True positive / (true positive + false positive)
- Recall (sensitivity) = True positive / (true positive + false negative)

- Specificity = True negative / (true negative + false positive)
- F1 score = 2*[(precision*recall) / (precision+recall)]

The Receiver Operator Characteristic (ROC) curves of GPT-4 Bard and Claude for the prediction of high acuity patients (ESI-1 and ESI-2) were constructed. Area under the curves (AUC) were calculated.

RESULTS

A total of 50 case scenarios were analyzed by EM specialists and the three chatbots. Of the scenarios, nine were expert-evaluated as ESI category 1, 12 as category 2, 10 as category 3, six as category 4, and 13 as category 5, by the EM specialists. Distribution of reference and chatbot-determined triage levels are shown in Figure 1 and Table 1.

Table 1: Distribution of results regarding ESI levels

Chatbot-determined triage	Reference Triage					
	1	2	3	4	5	
1	GPT-4	7	1	0	0	0
	Bard	5	2	1	0	0
	Claude	6	0	0	0	0
2	GPT-4	2	8	0	1	0
	Bard	3	7	0	2	2
	Claude	3	7	0	0	0
3	GPT-4	0	2	1	6	1
	Bard	1	3	4	6	10
	Claude	0	4	8	2	3
4	GPT-4	0	1	4	3	8
	Bard	0	0	1	2	1
	Claude	0	1	2	4	10
5	GPT-4	0	0	1	0	4
	Bard	0	0	0	0	0
	Claude	0	0	0	0	0

ESI: Emergency Severity Index, GPT-4: Generative Pre-trained Transformer 4

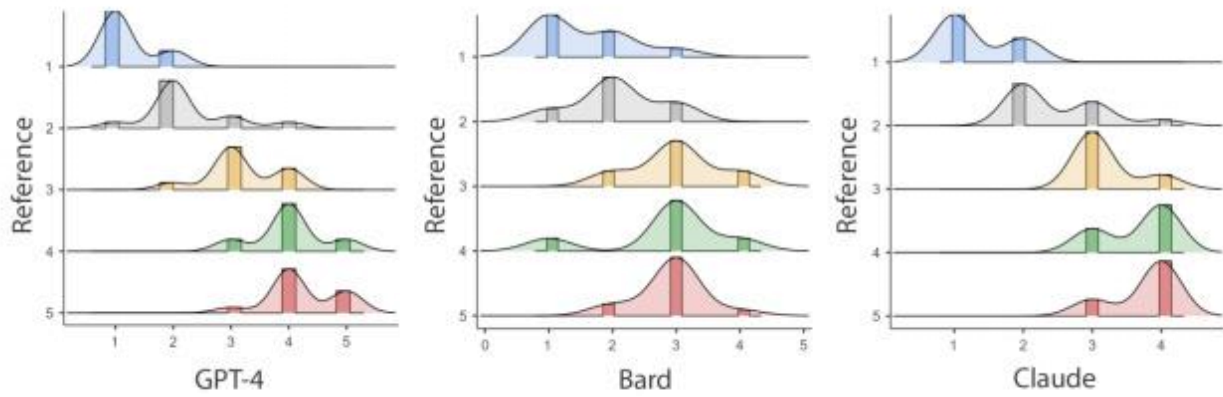


Figure 1: Distribution of chatbot-determined triage levels

Predictive performances of GPT-4, Bard, and Claude for each ESI level are shown in Table 2. For ESI 1, Claude showed the highest precision (100%) and specificity (100%), while GPT-4 had the highest recall (sensitivity) at 77.8%. For ESI 2, GPT-4 showed the highest precision, recall and specificity (72.7%, 66.7%, 92.1%, respectively). However, GPT-4 showed a higher F1 scores in all triage levels (Table 2).

Table 2: Predictive performance of chatbots for each ESI triage category

		ESI 1	ESI 2	ESI 3	ESI 4	ESI 5
Precision (%)	GPT-4	87.5	72.7	60	25	80
	Bard	62.5	50	25	25	NA
	Claude	100	70	47.1	23.5	NA
Recall (%)	GPT-4	77.8	66.7	60	66.7	30.8
	Bard	55.6	58.3	60	16.7	NA
	Claude	66.7	58.3	80	66.7	NA
Specificity (%)	GPT-4	97.6	92.1	90	72.7	97.3
	Bard	92.7	81.6	55	93.2	NA
	Claude	100	92.1	77.5	70.5	NA
Accuracy (%)	GPT-4	94	86	84	72	80
	Bard	86	76	56	84	NA
	Claude	94	84	78	70	NA
F1 Score	GPT-4	0.824	0.696	0.600	0.364	0.445
	Bard	0.588	0.538	0.353	0.200	NA
	Claude	0.800	0.636	0.593	0.348	NA

ESI: Emergency Severity Index, GPT-4: Generative Pre-trained Transformer 4, NA: Non applicable

In the 2-tier triage classification, 21 scenarios were labeled as high acuity, while 29 scenarios were in the moderate and low acuity class. GPT-4 showed a higher performance for predicting high acuity triage followed by Claude and then Bard (F1 score of 0.900, 0.865, and 0.791, respectively). The confusion matrix and predictive performances are shown in Table 3 and Table 4. Reliability analysis showed a Cohen’s kappa of 0.834 for GPT-4, 0.633 for Bard and 0.788 for Claude and EM specialists.

Table 3: Confusion matrix for high and low acuity prediction of chatbots

Chatbot-determined triage	Reference triage		
	High Acuity (ESI 1 and 2)	Moderate and low Acuity (ESI 3 to 5)	
High Acuity (ESI 1 and 2)	GPT-4	18	1
	Bard	17	5
	Claude	16	0
Moderate and low Acuity (ESI 3 to 5)	GPT-4	3	28
	Bard	4	24
	Claude	5	29

ESI: Emergency Severity Index, GPT-4: Generative Pre-trained Transformer 4

Table 4: Predictive performance of chatbots for 2-tier triage

		High Acuity (ESI 1 and 2)	Moderate and low Acuity (ESI 3 to 5)
Precision (%)	GPT-4	94.7	90.3
	Bard	77.3	58
	Claude	100	85.3
Recall (%)	GPT-4	85.7	69.6
	Bard	81	82.8
	Claude	76.2	100
Specificity (%)	GPT-4	96.6	85.7
	Bard	82.8	81
	Claude	100	76.2
Accuracy (%)	GPT-4	92	92
	Bard	82	82
	Claude	90	90
F1 Scores	GPT-4	0.900	0.786
	Bard	0.791	0.682
	Claude	0.865	0.921

ESI: Emergency Severity Index, GPT-4: Generative Pre-trained Transformer 4, NA: Non applicable

The ROC curve of GPT-4 for high acuity predictions showed an area under the curve (AUC) of 0.911 (95% CI: 0.814-1; $p < 0.001$), while the ROC curve of Bard showed an AUC of 0.819 (95% CI: 0.692-0.945; $p < 0.001$) and for Claude these values were 0.881 (95% CI: 0.768-0.994; $p < 0.001$) (Figure 2).

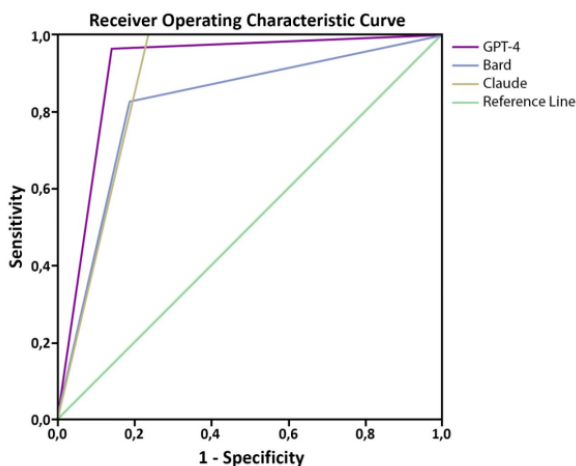


Figure 2: ROC curve for GPT-4, Bard and Claude for determining high-acuity triage level

Interpretation and reasoning

The reference diagnosis list and the preliminary diagnoses provided by the applications are given in Supplement 3.

While the answers given by GPT-4 and Claude to the questions and the scores seemed more consistent, it was observed that there was often a discrepancy between Bard's answers and scores. For example, in question 36, Bard and Claude were able to correctly assess the presence of a foreign body in the eye, while GPT-4 did not mention this, evaluating the case as "eye burning due to irritation". However, although Bard was correct in the preliminary diagnosis, it assigned the wrong score (ESI 3), while GPT-4 and Claude gave a score consistent with their own interpretation.

Again, for questions 41 and 42, Bard over-triaged, although it was correct on the preliminary diagnosis, that the patient needed only one resource, and that there was no need for urgent intervention. In question 43, it answered that there was a risk of deterioration for a "sore throat" and gave ESI 2 triage to the patient. In question 45, Bard assigned an ESI 3 score for "tooth decay", while GPT-4 gave comprehensive and accurate results as "no need for additional resources in the emergency department, pain management and discharge with a follow-up recommendation to the dentist".

GPT-4 and Claude give more accurate results regarding the methods to be used for diagnosis. For example, all three applications are able to correctly identify the source of the pain as gallstone in their answers to question 24, but GPT-4 mentioned an ultrasound scan will be required. In question 32, both GPT-4 and Bard correctly identify the presence of an abscess in the nail bed, but Bard gave the patient an ESI 3 score, stating that the patient needs an imaging method or lab test and should be seen within 30 minutes. GPT-4 and Claude correctly determined that only incision and drainage were needed.

DISCUSSION

In this study the performance of GPT-4, Claude, and Bard chatbots in predicting triage categories based on the ESI triage system was compared. Results showed that GPT-4 outperformed Claude and Bard in predicting ESI levels, with higher F1 scores across all triage levels. Furthermore, in the two-tier classification system, GPT-4 demonstrated superior performance in predicting high

acuity triage cases, followed by Claude and Bard. These findings suggest that GPT-4 exhibits promising potential for improving triage decision-making in emergency care settings.

The use of LLMs has become widespread in recent years, and models such as Bard and ChatGPT that can be used easily by everyone without the need for additional training have become a topic of research in healthcare (17,18). Studies have investigated the performance of LLMs for analyzing clinical documents, diagnosing, and admission or triage predictions (1,14,19).

Emergency department (ED) crowding and waiting times are major problems worldwide, and effective triage is seen as a crucial step in mitigating these issues (20). The ESI is one of the most widely used emergency triage systems globally (7,21). However, the accuracy of ESI depends on the practitioner, with factors such as patient age, comorbidities, mental status, and incorrect clinical assessment of vital signs potentially causing errors in triage with ESI (21). Despite these potential sources of error, inter-rater reliability has been shown to be high (22).

While numerous studies involving the chatbots mentioned in our article are either preliminary or preprinted studies, there is currently no published study that compares GPT-4, Bard, and Claude in the context of triage. Prior research into the application of LLMs in emergency triage has primarily focused on triage scoring, hospitalization estimation, and critical illness estimation (14). In a systematic review of 19 studies, LLMs were found to have an AUC of 0.89-0.96 in estimating triage data (14). Google BERT, for instance, demonstrated a 0.92 accuracy in tagging complaint data in 2020 (17). The model of Wang et al. that estimated ESI scores exhibited high performance with an AUC of 0.96 (23), while the model of Ivanov et al. accurately predicted the ESI score in 75.9% of cases, surpassing nurses and performing on a par with physicians, particularly in identifying high acuity patients (15). In the study of Tahayori et al., which compared their LLM model to emergency medicine (EM) physicians, the

algorithm achieved 83% accuracy, 0.88 AUC, and sensitivity, specificity, precision, and F1 scores of 72%, 86%, 56%, and 63%, respectively (24). The present study found that all three models—GPT-4, Claude, and Bard—outperformed the aforementioned model in terms of accuracy and F1 scores.

In the context of ESI triage classification, accurately determining each level is important, but even more critical is ascertaining whether a case falls within the high acuity (triage levels 1-2) or moderate-to-low acuity (triage levels 3-5) categories, as this determines the need for immediate treatment (22). Our study revealed a high level of agreement between the reference values and GPT-4 when assessed these two groups, with 94.7% precision and 85.7% recall. There was also a high agreement with Claude (Precision: 100%, Recall: 76.2%), although the performance of Bard was lower (Precision: 77.3%, Recall: 81%). The accuracy of GPT-4, Claude, and Bard for the high acuity group were 92%, 90%, and 82%, respectively. The F1 score, which symmetrically represents precision and recall, demonstrated that GPT-4, Claude, and Bard had scores of 0.899, 0.865, and 0.791, respectively, for predicting high acuity cases. These results indicate that all applications perform well in high acuity cases, with GPT-4 exhibiting a slightly superior performance.

Various limitations and potential safety risks of LLMs are explained by the developers (2). Among these, we believe that special attention should be paid to “hallucinations”, overreliance, and data security. “Hallucination” is the risk that applications will produce results that seem quite convincing but are clearly false according to their training data. As users' trust in applications increases, the risk of overreliance increases, causing them to directly use the outputs they receive from applications without questioning them first. This situation may result in the deterioration of the quality of application responses, as applications are constantly fed by user feedback. For example, the fact that these applications facilitate the work of clinicians in triage or diagnosis and treatment recommendations may lead to a stage where the outputs of the applications are accepted

as correct without questioning, the level of knowledge of the clinicians about the guides decreases, and the applications lose the feedback to give accurate results due to the continuous reinforcement with wrong outputs (2,25). Since applications have the opportunity to save and use input data, it is also important that the questions presented to the applications do not contain personal information about the patients.

Our study has numerous limitations. First, it is dependent on the results of the compared applications at the time of the study. The performances of the applications may change depending on the data they are trained for after the study. In addition, chatbots mentioned in this study are not trained specifically with health data or primarily aim to be used in healthcare. They should be expected to perform better if they were fine-tuned with a focus on healthcare. This study, which was performed with a limited number of patient scenarios, may need validation with real data. The validation of the scenarios specified in the ESI handbook cannot be performed due to their potential to be included among the data on which chatbots are trained ("Contamination" risk). Triage guides have been prepared to guide experts. For this reason, it can be expected that there will be differences between the expert decisions according to expert opinions and the working environment conditions in which the guides are used. The output of the model is dependent on the prompt that is used as input, as well as the supplied context and the presence or absence of examples (so called Few Shot Learning or FSL). As greater understanding of the most effective way to prompt models emerges, one might assume improved performance. This is recommended as a subject of future study.

This study demonstrated that GPT-4 effectively detected high acuity ESI scores with strong agreement with emergency medicine specialists, outperforming Claude and Bard. Furthermore, GPT-4 and Claude offered better case management recommendations than Bard. Evaluating the effectiveness and limitations of natural language processing-based chatbot applications is

becoming more important due to their potential role in future triage systems.

Conflict of Interest: The authors İS, GBB and İÜÖ have no commercial associations or sources of support that might pose a conflict of interest. KG is the founder of Curistica, a Digital Health & Innovation Consultancy. He worked for Babylon company as Director of Digital Health, Innovation, and Clinical Product Management, and worked on the company's symptom checker. He no longer works for this company (Left in Dec 2022). He does not work for Google, Microsoft, Anthropic, or OpenAI, nor has he done any paid work for them.

Researchers' Contribution Rate Statement:
Concept/Design: İS, GBB, and İÜÖ;
Analysis/Interpretation: İS, GBB, İÜÖ, KG;
Data Collection: İS, KG;
Writer: İS, GBB, and İÜÖ;
Critical Review: İS, GBB, and İÜÖ;
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Supplement 1: Triage scenarios

1- A 30-year-old female patient is brought to the ED due to sudden onset of unconsciousness. On her arrival she appears comatose. Pupils were miotic, GCS: 6, BP: 100/60 mmHg, HR: 110, RR: 14, SpO₂: 90%, T: 98° F. First responders told you that they found an empty syringe at the scene.

2- A 60-year-old male patient presents to the emergency department with complaints of fainting and impaired consciousness. Vital signs on arrival: BP: 70/30 mmHg, HR: 25/min, RR: 15, SpO₂: 99%, T: 98° F.

3- A 90-year-old male patient is brought to the ED by ambulance. It is stated that the patient fainted in the toilet and his stool seemed bloody. He seems pale. Intense red blood is seen on the patient's diaper. Vital signs on arrival: BP: 65/30 mmHg, HR: 140/min, RR: 25. Medication history is notable for anticoagulants.

4- A 25-year-old male patient is brought to the ED by ambulance due to a gunshot wound to the abdomen. On arrival, he is conscious and oriented. The bullet entrance wound is located on the left upper quadrant of the abdomen. No other wounds were found in the primary evaluation. BP: 80/50 mmHg, HR: 120/min, RR: 20/min. It is learned that up to 500 ml of fluid was given during the transfer.

5- A 60-year-old female patient with a diagnosis of COPD is brought to the ED with respiratory distress. On arrival, her oxygen saturation is measured as 70%. BP: 90/55 mmHg, HR: 115/min, RR: 25/min.

6- A 65-year-old female patient presents with pressure-like pain located in the middle of the chest that has been going on for 1 hour. She appears to have a cold sweat. BP: 60/palp, heart rate: 140/min, RR: 25.

7- A 50-year-old patient with a history of heart failure and hypertension is brought to the ED with shortness of breath. BP: 190/90 mmHg, HR: 100/min, SpO₂: 78 %, RR: 30/min. A gasping sound when breathing is notable.

8- A 20-year-old male patient was found unconscious at home. Empty boxes of prescribed drugs he used for the treatment of depression were found next to him. On arrival he appears comatose. Pupils are miotic, GCS: 5, BP: 90/60 mmHg, HR: 110, RR: 10, SpO₂: 89%.

9- EMS is activated for a 30-year-old female patient who was found unconscious at home. First responders found the patient was in cardiac arrest and spontaneous circulation was established with successful CPR. On arrival to the ED BP: 90/50 mmHg, HR: 130, spo₂: 99%.

10- A 70-year-old patient who presented to the ED with abdominal pain. Seems pale. Capillary refill time is prolonged. Vital signs on arrival: BP: 60/palp, HR: 130, spo₂: 97%, T: 36° C.

11- A 36-year-old female presents to the ED. She has a history of severe allergic reaction due to a bee sting. She told you that a bee stung her arm. In a couple of minutes, she felt dizzy and nauseous. Vital Signs: BP 145/74, HR 117, RR 19, SpO₂: 98%, T: 97° F.

12- A 50-year-old male patient is admitted to the ED with complaints of palpitation and fainting that has been going on for a few hours. Vital Signs: BP: 100/40 mmHg, HR: 190, RR: 15, SpO₂: 99%, T: 98° F.

13- A 40-year-old female patient presents with pressure-like pain in the middle of the chest that has been going on for 2 hours. BP: 130/80 mmHg, HR: 70/min, RR: 14, T: 36.5° C.

14- A 30-year-old female patient comes with a sudden onset of severe headache and nausea after lifting a heavy object. She is conscious, oriented and cooperative and states that the pain is the most severe pain of her life. BP: 120/75 mmHg, HR: 80, RR: 15, T: 36.5° C.

15- A 25-year-old physician comes to the ED after a needle used while administering medication to her patient accidentally stabbed her hand.

16- A 26-year-old patient, who is 20 weeks pregnant, presents to the ED with the complaint of pain and "water breaking ". BP: 120/85 mmHg, HR: 90, RR: 15, T: 36.5° C.

17- A 50-year-old male patient presents to the ED with complaints of high fever, and chills. It is learned that he is on chemotherapy for lung cancer. BP: 120/69 mmHg, HR: 105, SpO₂: 96, RR: 16, T: 38.8° C.

18- An 18-year-old female patient was rescued by her relatives after an attempt to hang herself at home and brought to the ED by ambulance. There was no loss of consciousness. No markings are present on her neck. BP: 130/75 mmHg, HR: 100, SpO₂: 98, RR: 14, T: 36.8° C.

19- A 90-year-old male patient is brought to the ED because of the confusion that started on the same day. On arrival he is conscious, but gives confused answers. BP: 120/69 mmHg, HR: 80, SpO₂: 98, RR: 14, T: 36.6° C.

20- A 40-year-old female patient presents with severe left flank pain. Her skin looks pale. In her medical history, it is learned that she presented to the ED due to kidney stones before. Pain score is 9/10. BP: 140/90 mmHg, HR: 110, SpO₂: 98, RR: 17, T: 36.6 C.

21- A 20-year-old male patient presents to the ED with complaints of nausea and vomiting that started in the morning and pain localized to the right lower quadrant within hours. Pain score is 6/10. BP: 130/90 mmHg, heart rate: 100, SpO₂: 98, RR: 16, T: 36.4° C.

- 22- A 20-year-old male patient presents to the ED with the suspicion of a fracture of the forearm after falling on his arm while playing basketball. A prominent displaced fracture is observed on the proximal wrist. Radial pulse is palpable and sensation and circulation are evaluated as normal.
- 23- A 34-year-old female patient comes with complaints of high fever and cough for two days. Describes chest pain that increases with coughing. She seems healthy. BP: 120/90 mmHg, HR: 100, SpO2: 98, RR: 16, T: 38.4° C.
- 24- A 40-year-old female patient presents with the complaint of pain in the upper quadrants of the abdomen that started after lunch today. She has a history of gallstones and DM in her history. BP: 130/80 mmHg, heart rate: 87, SpO2: 98, RR: 14, T: 36.2° C.
- 25- A 27-year-old female patient presents to the ED with complaints of nausea, vomiting and diarrhea that started about 1 day ago. She describes abdominal pain that is relieved by diarrhea and is not very severe. A few hours before her symptoms started, she had eaten a meal that "tasted strange". Diarrhea is watery and includes mucus and does not contain blood. Her skin appears dry but turgor is normal. BP: 140/90 mmHg, heart rate: 89, SpO2: 99, RR: 15, T: 36.4° C.
- 26- A 35-year-old female patient is presented to the ED due to the pain in her left leg for 2 days. She previously had traveled on intercontinental flights. The left leg appears to be edematous. Distal pulses are palpable. On examination, the Homans test is positive. BP: 130/88 mmHg, heart rate: 85, SpO2: 97, RR: 15, T: 36.4° C.
- 27- A 55-year-old male patient comes to the ED with the complaint of shortness of breath during exertion. No active complaints at the time of presentation. He states that he has arrhythmia and hypertension in his medical history. He doesn't use prescribed drugs. BP: 120/60 mmHg, HR: 97, SpO2: 95, RR: 16, T: 36.4° C.
- 28- A 45-year-old female patient is brought to the ED by ambulance for falling from the first floor balcony. She has an open fracture in her left leg. She states that she fell on her left foot and describes no other injury. She has not lost consciousness. Pain Score: 9/10. BP: 110/80 mmHg, HR: 100, SpO2: 99, RR: 15, T: 36.4° C.
- 29- A 3-year-old male patient is brought in with the complaint of slipping his foot and hitting his head on the cabinet door. There is a superficial laceration in the frontal head. He is alert. Family does not describe loss of consciousness. The family was worried because he vomited several times.
- 30- A 24-year-old female patient presents to the ED with severe abdominal pain. It is learned that there is a delay in menstruation and that the pregnancy test she did 2 days ago was positive. BP: 110/64 mmHg, HR: 70, RR: 14, T: 36.5° C.
- 31- A 22-year-old male patient comes with pain around the ankle following falling while running. No open wounds or deformity. Pain score is 8/10.
- 32- A 30-year-old male patient presents with swelling in the nail bed of the left index finger. The appearance of the abscess formed within two days. He complains of pain and throbbing. He has no fever.
- 33- A 40-year-old female patient comes with complaints of frequent and painful urination. No known medical condition. She does not describe abdominal pain. BP: 120/90 mmHg, HR: 70, SpO2: 99, RR: 14, T: 36.4° C.
- 34- A 15-year-old male patient comes with a complaint of edema in the nose after being hit with a ball while playing football. No deformity. No active nosebleeds. No history of syncope. No additional complaints. Oriented and cooperative. BP: 110/60 mmHg, HR: 70, SpO2: 99, RR: 14, T: 36.5° C.
- 35- A 23-year-old female patient fell down while jogging. Presents to the ED due to a superficial laceration on the forearm. Range of motion of joints is normal. She does not describe pain in the extremity. There is no active bleeding from the wound. There is a simple superficial laceration of approximately 3-4 cm in length.
- 36- A 30-year-old male patient comes with the complaint of eye itching after walking in windy weather. Thinks a particle of dust got in his eye. No known medical history. Pain score: 3/10.
- 37- A 77-year-old female patient with a history of heart valve replacement and on anticoagulants presents to the ED with a couple of bruises in her legs. No additional complaints. Describes no bleeding. BP: 110/75 mmHg, HR: 80, SpO2: 99, RR: 14, T: 36.5° C.
- 38- A 43-year-old male patient came to the ED because of an accidental knife cut on his index finger. The bleeding stopped with the dressing he applied at home. The cut seems superficial but may need some sutures. Distal sensory and circulatory examination is normal. Tendons and nerves seem intact. BP: 110/80 mmHg, HR: 80, SpO2: 99, RR: 14, T: 36.5° C.
- 39- A 60-year-old female patient comes because a splinter penetrated her foot while walking. It is seen that there is a splinter located on the sole of the foot which is protruding from the skin.
- 40- A 20-year-old male patient, who describes he has lost taste and smell for two days and suspects that he has contacted with COVID-19, is presented to the ED. He has no medical history. Respiratory sounds are normal. Seems healthy. BP: 130/85 mmHg, HR: 73, SpO2: 99, RR: 14, T: 36.7° C
- 41- An 8-year-old male patient presents with a burn with an area of 3 cm² due to scald injury on his left forearm the day before. No bullae. Pain score: 3/10.

- 42- A 10-year-old male patient comes to the Emergency Department with the complaint of itching and redness in both eyes. He has no fever. Vital parameters are normal. Does not describe pain.
- 43- A 40-year-old female patient presents to the ED with a sore throat for 3 days. No swallowing difficulties or hoarseness. Examination of the throat is normal. BP: 120/75 mmHg, HR: 80, SpO2: 98, RR: 14, T: 36.8° C.
- 44- A 20-year-old female patient has a history of nickel allergy. After wearing a metal bracelet, she complains of itching and redness on the area which contacts with the bracelet. No systemic reaction.
- 45- A 50-year-old female patient with caries on her left molar teeth comes with the complaint of pain in the same area that starts while eating. No facial swelling. Pain score: 4/10. No fever.
- 46- A 2-year-old female patient is brought to the ED with a runny nose and vomiting. She looks active and alert. Her mother states that her appetite is normal. Seems hydrated.
- 47- A 27-year-old female patient presents with complaints of pain in both legs with movement and palpation, which started one day after heavy exercise. BP: 120/90 mmHg, HR: 70, SpO2: 99, RR: 14, T: 36.4° C. No difference in diameter between the two legs. Urine color is normal.
- 48- A 10-year-old male patient presents with swelling in the nail bed of the right hand thumb. There is no pus-filled blister. He has no fever.
- 49- An 18-year-old female patient presented to the ED due to stepping on a rusty nail. On inspection, you can not see a wound. She has no additional complaints and no fever.
- 50- A 70-year-old male patient comes with pain on the left big toe while walking. He states that his complaints have been going on for about a few weeks. On palpation, a hard dark lesion is present located under the left big toe.

ED: Emergency Department, GCS: Glasgow Coma Scale, BP: Blood Pressure, HR: Heart Rate, RR: Respiratory Rate, T: Temperature, COPD: Chronic obstructive pulmonary disease, DM: Diabetes Mellitus

Supplement 2: Reference and index triage categories and answers

NO	Ref. ESI outcome	BARD	GPT-4	Claude
1	1	Based on the information provided, the patient's ESI score is 1. The patient is unconscious and has miotic pupils, which are signs of a serious medical condition. The patient also has a low blood pressure, fast heart rate, and low oxygen saturation. These findings suggest that the patient is in need of immediate medical attention. The patient's ESI score is 1 because she is an immediate, life-saving intervention required without delay. The patient's condition is likely due to a drug overdose or a medical condition such as a stroke or a brain aneurysm. The patient needs to be stabilized and then transferred to a higher level of care, such as an intensive care unit.	ESI 1 - Immediate, life-saving intervention required without delay. The patient is comatose, has a low GCS of 6, and low SpO2 of 90%. The presence of an empty syringe at the scene suggests possible drug overdose, which requires immediate intervention to stabilize and manage the patient's condition.	Based on the information provided, I would triage this patient as ESI Level 1, as follows: ESI Level 1: The patient is comatose with GCS of 6 indicating critical illness. Major deviations in vital signs including hypotension, tachycardia, and hypoxia requiring immediate intervention. The history of an empty syringe at the scene raises suspicion of drug overdose which requires emergent care and close monitoring. This patient requires immediate life-saving interventions and should be the top priority. ESI Level 1 is most appropriate.
2	1	Based on the vital signs and history, this patient is an ESI 1. He is experiencing severe hypotension and bradycardia, which are life-threatening conditions. He needs immediate medical attention, including intravenous fluids and medications. The ESI 1 level is used for patients	ESI 1 - Immediate, life-saving intervention required without delay. The patient has a significantly low BP of 70/30 mmHg and an abnormally slow HR of 25/min, indicating potential cardiogenic shock or another life-threatening condition. Immediate intervention is necessary to	Based on the presented case, I would assign an ESI level of 1 to this patient, indicating a resuscitation priority. Justification: The patient is presenting with impaired consciousness (not alert and not responding to verbal stimuli).

		<p>who are experiencing immediate, life-threatening conditions. These patients need immediate medical attention and may require life-saving interventions. Some examples of ESI 1 patients include cardiac arrest, severe bleeding, and airway obstruction.</p> <p>The ESI 1 level is the most urgent level on the ESI scale. Patients who are assigned to this level should be seen by a doctor as soon as possible.</p>	<p>stabilize the patient and address the underlying cause.</p>	<p>This meets the criteria for ESI level 1.</p> <p>The patient also has hypotension (BP 70/30 mmHg) which is an unstable vital sign and indicates a critical condition requiring immediate attention.</p> <p>The patient's bradycardia (HR 25/min) also indicates acute clinical instability which requires resuscitation.</p> <p>The presentation of syncope (fainting) along with the other unstable clinical indicators strongly suggests a life-threatening condition that warrants emergent assessment and treatment.</p> <p>So in summary, the patient's presentation with impaired consciousness, hypotension and bradycardia necessitates immediate resuscitation and qualifies for ESI level 1 triage priority.</p>
3	1	<p>Based on the information provided, I would assign this patient an ESI score of 2. The patient is an elderly male with a history of anticoagulants who has fainted and has bloody stool. He is pale and his vital signs are unstable. These findings suggest that the patient may be experiencing a serious medical condition, such as a bleeding ulcer or a heart attack. The patient needs immediate medical attention and should be triaged to a higher level of care.</p> <p>The ESI rules are a tool that can be used to triage patients in the emergency department. They are based on the severity of the patient's condition and the resources that they require. An ESI score of 1 indicates that the patient is in immediate danger and requires immediate medical attention. An ESI score of 2 indicates that the patient is in high risk of deterioration and requires urgent medical attention. An ESI score of 3 indicates that the patient is stable but requires multiple resources to investigate or treat. An ESI score of 4 indicates that the patient is stable and requires only one resource to investigate or treat. An ESI score of 5 indicates that the patient is stable and requires no resources to investigate or treat.</p> <p>In this case, the patient meets the criteria for an ESI score of 2. He is an elderly male with a history of anticoagulants who has fainted and has bloody stool. He is pale and his vital signs are unstable. These findings suggest that the patient may be experiencing a serious medical condition, such as a bleeding ulcer or a heart attack. The patient needs</p>	<p>ESI 1 - Immediate, life-saving intervention required without delay. The patient presents with bloody stool, pallor, and intense red blood in the diaper, which suggest active bleeding. Additionally, the patient has a low BP of 65/30 mmHg, an elevated HR of 140/min, and a history of anticoagulant use. These factors indicate a life-threatening hemorrhage, necessitating immediate intervention to stabilize the patient and manage the bleeding.</p>	<p>Based on the provided case details, I would assign an ESI triage level of 1 to this patient, indicating that this is an immediate/resuscitation priority patient requiring immediate medical attention.</p> <p>Justification:</p> <ul style="list-style-type: none"> - The patient is showing signs of severe hypovolemic shock with a systolic BP of 65 mmHg and tachycardia, indicating acute blood loss. - There is evidence of lower GI bleeding based on the bloody stool and bloody diaper. The anticoagulant use puts the patient at high risk of severe bleeding. - The patient's age of 90 years old also places him at higher risk of hemodynamic instability from blood loss and complications. - An ESI level 1 triage indicates a need for immediate resuscitation and treatment to prevent imminent risk to life or limb. This patient meets several criteria indicating a need for emergent stabilization and management of the bleeding.

		immediate medical attention and should be triaged to a higher level of care.		
4	1	<p>ESI 1</p> <p>This patient is a 25-year-old male with a gunshot wound to the abdomen. He is conscious and oriented, but his vital signs are unstable. He has lost a significant amount of blood and is in need of immediate life-saving intervention. He should be triaged as ESI 1 and given immediate attention.</p> <p>Justification:</p> <p>This patient is in immediate danger of life and limb. His vital signs are unstable and he has lost a significant amount of blood. He is in need of immediate life-saving intervention. He should be triaged as ESI 1 and given immediate attention.</p>	<p>ESI 2 - High risk of deterioration, or signs of a time-critical problem. The patient has a gunshot wound to the abdomen, which can potentially cause life-threatening internal injuries. His low BP of 80/50 mmHg and elevated HR of 120/min suggest the possibility of ongoing blood loss or hemodynamic instability. While the patient is conscious and oriented at this time, his condition could deteriorate rapidly, and he requires urgent evaluation and treatment.</p>	<p>Based on the description, this patient would have an ESI score of 1, indicating an immediate life-threatening condition requiring immediate physician assessment and treatment.</p> <p>Justification:</p> <ul style="list-style-type: none"> - The patient has a gunshot wound to the abdomen which is a serious traumatic injury that can cause life-threatening internal bleeding. - Although the patient is currently conscious and oriented, the vital signs show hypotension and tachycardia indicating potential hypovolemic shock from blood loss. - Despite receiving fluids during transfer, the patient's blood pressure remains low. - Given the severity and urgency of the condition, this patient warrants immediate physician assessment, resuscitation and likely emergency surgery. Therefore ESI level 1 is most appropriate.
5	2	<p>The patient is a 60-year-old female with a diagnosis of COPD who is presenting with respiratory distress. Her oxygen saturation is 70%, her blood pressure is 90/55 mmHg, her heart rate is 115/min, and her respiratory rate is 25/min. Based on this information, I would assign her an ESI score of 2. She is at high risk of deterioration, and she requires immediate intervention.</p> <p>The patient's oxygen saturation is below 80%, which is a critical value. Her blood pressure is low, her heart rate is high, and her respiratory rate is high. These are all signs of respiratory distress. She is at risk of developing respiratory failure, which is a life-threatening condition.</p> <p>The patient needs to be treated immediately. She will need to be given oxygen, and she may also need to be given medication to help her breathe. She may also need to be hospitalized.</p> <p>I would recommend that the patient be triaged to the emergency department's resuscitation bay. She should be seen by a doctor immediately.</p>	<p>ESI 2 - High risk of deterioration, as the patient has a history of COPD and is experiencing respiratory distress with low oxygen saturation, low blood pressure, and an elevated heart rate.</p>	<p>Based on the information provided, I would assign this patient an ESI score of 2, indicating a high-urgency patient.</p> <p>Justification:</p> <ul style="list-style-type: none"> - The patient has a significant medical condition (COPD) with respiratory distress and hypoxemia (SpO2 70%). - Vital signs indicate potential instability: Tachycardia (HR 115), increased respiratory rate (25/min), mild hypotension (BP 90/55). - Given the respiratory distress and abnormal vitals, this patient needs prompt medical assessment and treatment, consistent with an ESI level 2. Stabilization and respiratory support are likely needed.

6	1	<p>ESI score: 2 Justification: The patient is a 65-year-old female with a history of chest pain that has been going on for 1 hour. She is experiencing pressure-like pain, has a cold sweat, and her vital signs are abnormal. These findings are consistent with a heart attack, which is a time-critical problem. The patient will need to be evaluated by a cardiologist immediately. The ESI scale is a tool used by emergency physicians to triage patients according to the severity of their condition. ESI 1 is the highest level of severity, and ESI 5 is the lowest. ESI 2 indicates that a patient is at high risk of deterioration or has signs of a time-critical problem. This means that the patient needs to be evaluated and treated immediately.</p>	<p>ESI 1 - Immediate, life-saving intervention required without delay. The patient presents with chest pain, cold sweat, hypotensive BP of 60/palp, and an elevated HR of 140/min, which are suggestive of a potential acute coronary event or other life-threatening cardiac issue. Immediate evaluation and intervention are necessary to stabilize the patient and address the underlying cause.</p>	<p>Based on the presented history and vital signs, this patient would be triaged as ESI level 2 (Emergent). Justification: The patient is experiencing chest pain symptoms concerning for acute coronary syndrome (ACS), given her age and risk factors. Her blood pressure is very low (shock index > 1), heart rate is significantly elevated, and respiratory rate is increased, indicating potential hemodynamic compromise. According to the ESI guidelines, this constellation of symptoms and signs would warrant emergent evaluation and treatment within 10 minutes, corresponding to ESI level 2. The patient should be immediately evaluated with ECG, cardiac enzymes, and stabilization of her vitals. She likely needs urgent cardiology consultation and admission to the ICU for management of a possible acute myocardial infarction.</p>
7	2	<p>The 50-year-old patient with a history of heart failure and hypertension is an ESI 3. The patient has a high risk of deterioration, as evidenced by their shortness of breath, rapid respiratory rate, and low oxygen saturation. The patient also requires multiple resources to investigate or treat, as they will need an X-ray to assess their lung function and medications to control their blood pressure and heart rate. The ESI 3 category indicates that the patient is stable but requires timely intervention. The patient should be evaluated by a physician and receive appropriate treatment as soon as possible.</p>	<p>ESI 1 - Immediate, life-saving intervention required without delay. The patient has a history of heart failure and hypertension, and presents with shortness of breath, significantly elevated BP of 190/90 mmHg, tachycardia with HR of 100/min, critically low SpO2 of 78%, and increased RR of 30/min. The gasping sound during breathing is also concerning. These findings indicate a potential acute decompensation of heart failure or another life-threatening respiratory or cardiac issue, requiring immediate intervention to stabilize the patient.</p>	<p>Based on the presented signs and symptoms, I would assign an ESI score of 2 for this patient, indicating a high-risk situation requiring urgent evaluation and treatment. Justification: The patient has a history of heart failure and hypertension, indicating a higher risk condition. Vital signs show respiratory distress with tachypnea (RR 30/min), tachycardia (HR 100/min), hypoxemia (Spo2 78%), and hypertension (BP 190/90 mmHg). The gasping sound indicates a probable exacerbation of CHF or pulmonary edema. Given the severity of presentation, this patient requires immediate medical attention and treatment within 15 mins as per ESI level 2. A more prolonged wait could lead to respiratory failure. So in summary, based on the history of chronic illness, vital signs indicating life-threatening respiratory compromise, and gasping respiration, an ESI score of 2 is most appropriate. The patient needs urgent evaluation and treatment.</p>

8	1	<p>ESI score: 2</p> <p>This patient is in a high risk of deterioration, or signs of a time-critical problem. He is unconscious and has miotic pupils, which indicates that he is in a coma. His GCS is 5, which is the lowest level of consciousness. His BP, HR, and RR are all elevated, which indicates that he is in distress. His SpO2 is also low at 89%, which indicates that he is not getting enough oxygen.</p> <p>This patient needs to be seen by a doctor immediately. He may have a drug overdose or a head injury. He may also have a medical condition that is causing his symptoms. He needs to be stabilized and then transferred to the hospital for further treatment.</p>	<p>ESI 1 - Immediate, life-saving intervention required without delay. The patient is comatose with a low GCS of 5, low SpO2 of 89%, and decreased RR of 10, suggesting significant respiratory depression. The presence of empty boxes of prescribed antidepressant medications suggests a potential overdose, which requires immediate intervention to stabilize and manage the patient's condition.</p>	<p>Based on the presented case, I would assign an ESI score of 1 to this patient, indicating a life-threatening emergency requiring immediate life-saving intervention.</p> <p>Justification:</p> <ul style="list-style-type: none"> - The patient is unresponsive with a GCS of 5, indicating potential overdose and risk of respiratory failure or cardiopulmonary arrest. - Vital signs show hypotension, tachycardia and hypoxemia, indicating shock and possible organ dysfunction. - Prescription drug overdose is suspected based on history and empty pill boxes found. - This constellation of findings warrants emergent airway management, ventilatory support and hemodynamic resuscitation. - ESI level 1 is appropriate for this critically ill patient requiring immediate life-saving treatment.
9	1	<p>Based on the information given, the patient is an ESI 1. She is in cardiac arrest and requires immediate life-saving intervention.</p> <p>The ESI is a tool that helps emergency department staff triage patients quickly and efficiently. It assigns each patient a score from 1 to 5, with 1 being the most urgent and 5 being the least urgent. Patients with an ESI 1 score are the most urgent and need to be seen by a doctor immediately.</p> <p>In this case, the patient is in cardiac arrest and needs immediate life-saving intervention. She is an ESI 1 and should be seen by a doctor immediately.</p>	<p>ESI 1 - Immediate, life-saving intervention required without delay. The patient experienced cardiac arrest and required CPR to reestablish spontaneous circulation. Although her SpO2 is now 99%, her BP is still low at 90/50 mmHg and her HR is elevated at 130/min, indicating hemodynamic instability. Immediate evaluation and intervention are necessary to address the underlying cause of her cardiac arrest and to stabilize her condition.</p>	<p>Based on the information provided, I would assign an ESI level 1 to this patient, indicating a resuscitation priority.</p> <p>Justification:</p> <ul style="list-style-type: none"> - The patient was found in cardiac arrest, requiring CPR. This meets the ESI criteria for "requires immediate lifesaving intervention". - Although circulation has been restored, the patient's vital signs indicate hemodynamic instability with hypotension and tachycardia. This suggests a critical condition requiring close monitoring and immediate treatment. - A patient who has just suffered a cardiac arrest would be considered extremely unstable and at high risk of recurrent arrest, warranting the highest acuity level in the ESI system. <p>So in summary, due to the cardiac arrest, critical condition and instability, I would triage this patient as ESI level 1 for resuscitation. Please let me know if you require any clarification.</p>

10	1	<p>The 70-year-old patient with abdominal pain seems pale and has a prolonged capillary refill time. His vital signs on arrival are BP: 60/palp, HR: 130, spo2:97%, Temperature: 36 C. Based on these findings, I would assign him an ESI score of 3. He is stable and does not require immediate intervention, but he does require multiple resources to investigate and treat his condition. The most likely diagnosis is abdominal aortic aneurysm, which is a life-threatening condition that requires surgery. He should be seen by a surgeon as soon as possible.</p> <p>The ESI score is a tool used by emergency department physicians to triage patients. It is based on the acuity of patients' health care problems and the number of resources their care is anticipated to require. ESI triage is based on the idea that patients who are more acutely ill should be seen by a physician more quickly than patients who are less acutely ill. The ESI score is a five-level scale, with level one indicating the greatest urgency. The levels are as follows:</p> <p>Level 1: Immediate, life-saving intervention required without delay Level 2: High risk of deterioration, or signs of a time-critical problem Level 3: Stable, with multiple types of resources needed to investigate or treat (such as lab tests plus X-ray imaging) Level 4: Stable, with only one type of resource anticipated (such as only an X-ray, or only sutures) Level 5: Stable, with no resources anticipated except oral or topical medications, or prescriptions</p>	<p>ESI 1 - Immediate, life-saving intervention required without delay. The patient presents with abdominal pain, pallor, and prolonged capillary refill time, suggesting potential shock or significant blood loss. The hypotensive BP of 60/palp and elevated HR of 130/min indicate hemodynamic instability. Immediate evaluation and intervention are necessary to determine the cause of the patient's condition and to provide appropriate treatment.</p>	<p>Based on the presentation, I would assign an ESI level of 2 for this patient, indicating a high-risk situation needing immediate life-saving interventions.</p> <p>Justification:</p> <ul style="list-style-type: none">- Elderly patient with hypotension (BP 60/palp) and tachycardia (HR 130), indicating potential shock.- Prolonged capillary refill time suggests poor perfusion.- Though oxygen saturation is normal, the other vital signs are concerning for a life-threatening condition like internal bleeding.- An ESI 2 level warrants immediate bedside assessment and treatment to stabilize the patient. Blood tests, IV access, fluids and monitoring of vital signs would be priorities. <p>So in summary, the patient's age, vital signs and clinical condition indicate a potential medical emergency requiring prompt intervention and close monitoring, warranting an ESI level 2.</p>
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11	1	<p>Based on the information provided, the 36-year-old female patient has a history of severe allergic reaction due to a bee sting. She is currently experiencing dizziness, nausea, and elevated vital signs. This suggests that she is experiencing an allergic reaction and is in need of immediate medical attention. Therefore, I would assign her an ESI score of 1.</p> <p>The ESI scale is a tool used by emergency physicians to triage patients according to the severity of their condition. ESI 1 is the highest level of urgency and indicates that a patient requires immediate, life-saving intervention without delay. ESI 2 indicates that a patient is at high risk of deterioration or has signs of a time-critical problem. ESI 3 indicates that a patient is stable but requires multiple types of resources to investigate or treat. ESI 4 indicates that a patient is stable and only requires one type of resource to be treated. ESI 5 indicates that a patient is stable and only requires oral or topical medications or prescriptions.</p> <p>In this case, the patient has a history of severe allergic reaction and is currently experiencing symptoms consistent with an allergic reaction. This suggests that she is at high risk of deterioration and requires immediate medical attention. Therefore, I would assign her an ESI score of 1.</p>	<p>ESI 2 - High risk of deterioration, or signs of a time-critical problem. The patient has a history of severe allergic reactions due to bee stings and is experiencing dizziness and nausea following a recent sting. While her vital signs are relatively stable at the moment, she is at high risk for rapid deterioration due to a potential anaphylactic reaction. Immediate evaluation and treatment are necessary to prevent the development of life-threatening complications.</p>	<p>Based on the case description, I would assign an ESI score of 2 to this patient, indicating high urgency. Justification:</p> <ul style="list-style-type: none">- The patient has a known history of severe allergic reaction to bee stings, indicating a high risk of anaphylaxis.- Although the vital signs are stable at the moment, she is already experiencing symptoms of an allergic reaction like dizziness and nausea within minutes of the bee sting.- There is a high likelihood that her condition may deteriorate quickly without immediate treatment like epinephrine.- Therefore, this patient should be prioritized as ESI level 2, needing to be seen within 10 minutes. Prompt medical attention and monitoring is required in case she progresses to anaphylactic shock.
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12	2	<p>The ESI score for this patient is ESI 2. The patient has a history of palpitations and fainting, which are symptoms of a potential cardiac arrhythmia. The patient's vital signs are within normal limits, but the rapid heart rate and shortness of breath suggest that the patient is in some distress. The patient needs further evaluation to determine the cause of the palpitations and fainting, and to assess the patient's risk of deterioration.</p> <p>The ESI 2 score is assigned to patients who are at high risk of deterioration, or who have signs of a time-critical problem. This score indicates that the patient needs to be seen by a physician as soon as possible, but that their condition is not immediately life-threatening.</p> <p>The patient should be given oxygen and monitored for any changes in their condition. They should also be given fluids to prevent dehydration. The patient should be evaluated by a physician as soon as possible to determine the cause of the palpitations and fainting, and to assess the patient's risk of deterioration.</p>	<p>ESI 2 - High risk of deterioration, or signs of a time-critical problem. The patient has a very high heart rate (HR: 190) and low blood pressure (BP: 100/40 mmHg), which can indicate a potentially serious cardiac issue that needs urgent evaluation and treatment.</p>	<p>Based on the case details, I would assign an ESI score of 2 for this patient, indicating that this is an unstable emergency condition requiring immediate life-saving intervention.</p> <p>Justification:</p> <ul style="list-style-type: none"> - The patient is presenting with symptoms of palpitations and syncope (fainting) indicating potential heart rhythm issues. - The vital signs show tachycardia (HR 190) and hypotension (BP 100/40), which are signs of hemodynamic instability and shock. - This meets the criteria for an ESI level 2 - unstable emergency condition requiring immediate life-saving intervention. The patient needs immediate medical attention and treatment to stabilize the heart rhythm and blood pressure.
13	2	<p>Based on the information provided, I would triage this patient as ESI 2. The patient is a 40-year-old female with pressure-like pain in the middle of the chest that has been going on for 2 hours. Her vital signs are stable, but her pain is a sign of a time-critical problem. She may be having a heart attack, which is a life-threatening condition. She would need to be seen by a doctor immediately for further evaluation and treatment.</p> <p>The Emergency Severity Index (ESI) is a five-level triage algorithm used in emergency departments to assess the severity of patients' conditions. ESI 1 is the most urgent level, and ESI 5 is the least urgent level. ESI 2 is the second most urgent level, and it is used for patients who have a time-critical problem or who are at risk of deterioration.</p>	<p>ESI 2 - High risk of deterioration, or signs of a time-critical problem. The patient presents with chest pain lasting for 2 hours, which could potentially indicate an acute coronary syndrome or another serious cardiac condition that requires urgent evaluation and treatment. Although her vital signs are stable, the nature of her symptoms warrants a higher priority.</p>	<p>Based on the presented information, I would assign this patient an ESI score of 3, indicating urgent.</p> <p>Justification:</p> <ul style="list-style-type: none"> - The patient is hemodynamically stable with normal vital signs. However, the chest pain of unspecified origin that has been ongoing for 2 hours is concerning and requires prompt assessment and monitoring. - ESI level 3 is for patients who require urgent care but are not in immediate danger. They have a moderate risk of deterioration and should be seen within 1-2 hours. - The history of chest pain requires urgent evaluation, diagnosis and risk stratification for acute coronary syndrome or other cardiac conditions. Further assessment with ECG, cardiac enzymes and possibly chest imaging is needed. - The patient does not appear critically ill (ESI 1-2) but the chest pain is not minor (ESI 4-5). Therefore, an ESI score of 3 is most appropriate for this clinical scenario.

14	2	<p>The patient meets the criteria for ESI 1. She has a sudden onset of severe headache and nausea, which is a sign of a time-critical problem. Her vital signs are within normal limits, but her pain is severe and she is cooperative. This indicates that she is likely to deteriorate if she does not receive immediate treatment.</p> <p>Therefore, I would triage this patient as ESI 1 and recommend that she receive immediate attention.</p>	<p>Based on the information provided, this patient would be given an ESI score of 2 - High risk of deterioration, or signs of a time-critical problem. The sudden onset of severe headache and nausea, which is the most severe pain of her life, suggests the possibility of a life-threatening condition such as a ruptured aneurysm or bleeding in the brain. The stable vital signs do not necessarily rule out a serious condition. Further evaluation and intervention are required without delay to prevent deterioration and potential morbidity or mortality.</p>	<p>Based on the information provided, I would assign this patient an ESI score of 3, indicating an urgent condition.</p> <p>Justification:</p> <ul style="list-style-type: none"> - The patient is hemodynamically stable with normal vital signs. This rules out an ESI level 1 (Resuscitation) or 2 (Emergent) designation. - The sudden onset of severe headache and nausea suggests a concerning condition like subarachnoid hemorrhage, but the patient is still conscious and oriented. This is an urgent but not emergent presentation, warranting an ESI 3 score. - Additional testing like a CT scan of the head is needed to rule out a life-threatening cause of symptoms. However, the patient's vital signs are reassuring and not immediately concerning for an emergent condition. - An ESI 4 (Less Urgent) or 5 (Non-Urgent) score would be inappropriate given the acute onset of neurological symptoms. - In summary, the patient likely needs emergent workup and monitoring but is not in immediate distress, consistent with an ESI 3 designation. <p>Does this sound like an appropriate assessment and justification for the ESI score of 3? Let me know if you need any clarification.</p>
15	4	<p>ESI 1.</p> <p>The patient is a 25-year-old physician who has been stabbed in the hand with a needle while administering medication to a patient. This is a life-threatening injury that requires immediate intervention. The patient should be treated for the wound and given antibiotics to prevent infection. She may also need surgery to repair the damage to her hand.</p> <p>The ESI rules state that ESI 1 is for patients who need immediate, life-saving intervention without delay. This patient meets this criteria because she has a life-threatening injury that requires immediate intervention. She should be treated as a priority patient.</p>	<p>ESI 3 - The patient is stable, but multiple types of resources may be needed to investigate the injury, such as lab tests to screen for potential bloodborne pathogens and X-ray imaging to assess for any needle fragments or damage to the hand.</p>	<p>Based on the information provided, I would assign an ESI score of 3 for this patient, indicating that this is an urgent case that needs to be seen within 1 to 2 hours.</p> <p>Justification:</p> <ul style="list-style-type: none"> - The patient is not in immediate danger as there are no signs of anaphylaxis or severe bleeding. However, there is a risk of infection or transmission of blood borne viruses from the needle stick injury. - The patient is otherwise young and healthy. - Additional assessment and treatment such as blood tests, prophylactic medications may be needed within a couple of hours. - An ESI 2 or 1 is not warranted as the patient is not in distress and vital signs are likely stable. An ESI 4 or 5 can delay the necessary treatment and follow up. <p>So an ESI 3 score is most suitable for this presenting condition. Please let me know if you need any clarification.</p>

16	2	<p>The patient is 26 weeks pregnant and presents to the ED with the complaint of pain and "water breaking." Her vital signs are within normal limits. Based on the ESI rules, I would assess this patient as ESI 2. She is at high risk of deterioration, as she is experiencing premature labor. She will need to be monitored closely and may need to be hospitalized.</p> <p>The ESI rules are a tool that emergency physicians use to triage patients. The rules are based on the severity of the patient's condition and the resources that are needed to treat them. ESI 1 patients are the most critical and need immediate treatment. ESI 5 patients are the least critical and can be treated with oral or topical medications.</p> <p>In this case, the patient is not in immediate danger, but she is at risk of deterioration. She will need to be monitored closely and may need to be hospitalized. I would assess her as ESI 2.</p>	<p>ESI 2 - High risk of deterioration, or signs of a time-critical problem. This patient is experiencing pain and signs of premature rupture of membranes (water breaking) at 20 weeks pregnant, which can lead to serious complications for both the mother and the baby.</p>	<p>Based on the information provided, I would assign this patient an ESI level of 2, Urgent.</p> <p>Justification:</p> <ul style="list-style-type: none"> - The patient is pregnant, so this presents additional complexity and risk. - Although vital signs are stable, the complaint of water breaking at 20 weeks gestation indicates a potential obstetric emergency that needs prompt assessment and management. - An ESI level 2 suggests emergent risks or symptoms that require timely attention but are not immediately life-threatening. This seems to apply appropriately to this case based on a potentially complicated obstetric issue in a pregnant patient. - Higher acuity levels (ESI 1) would imply immediate life threat which does not seem to be the case here based on stable vital signs. Lower acuity (ESI 3 or higher) would imply lack of emergent risks which also does not fit with the presented complaint. <p>So in summary, ESI level 2, Urgent seems most appropriate based on the potential obstetric emergency in a pregnant patient requiring timely assessment and care but without immediate life-threatening features. Please let me know if you need any clarification.</p>
17	3	<p>The patient is a 50-year-old male with fever and chills. He is on chemotherapy for lung cancer. His BP is 120/69 mmHg, HR is 105, SpO2 is 96, RR is 16, and T is 38.8 C.</p> <p>Based on the ESI rules, this patient would be classified as ESI 2. He has a high risk of deterioration, or signs of a time-critical problem. He is on chemotherapy, which can weaken his immune system and make him more susceptible to infection. His fever and chills could be a sign of an infection, which could be life-threatening.</p> <p>He needs to be seen by a doctor immediately. He may need to be admitted to the hospital for further treatment.</p>	<p>ESI 3 - This patient is stable but requires multiple types of resources for further investigation and treatment, such as lab tests (including blood cultures) to identify the cause of fever and potential infections, and possibly imaging to assess the lung cancer status. The patient's history of chemotherapy for lung cancer increases the risk for infections and complications.</p>	<p>Based on the information provided, I would assign an ESI score of 3 for this patient, indicating an urgent/emergent case that needs to be seen within 30 minutes.</p> <p>Justification:</p> <ul style="list-style-type: none"> - The patient has a high fever (38.8 C) while undergoing chemotherapy for lung cancer, putting him at high risk for complications from infection due to immunocompromised status. - Tachycardia (HR 105) and increased respiratory rate (RR 16), indicating infection is present. - Although vital signs are still stable, the patient's underlying condition and immunocompromised state elevate the acuity and he requires timely assessment and treatment. - ESI level 3 is appropriate for this urgent but not immediately life-threatening situation. The patient needs expedited care but not an immediate life-saving intervention.

18	2	<p>The 18-year-old female patient is in ESI 2. She has a history of a suicide attempt, which is a high risk of deterioration. She is also stable, with no loss of consciousness or markings on her neck. However, she requires further investigation and treatment, as she may have sustained injuries from the suicide attempt.</p> <p>The ESI rules are a tool that can help emergency physicians triage patients quickly and accurately. However, they should not be used in isolation. The physician should also consider the patient's individual circumstances and the resources available at the hospital.</p>	<p>ESI 2 - High risk of deterioration, or signs of a time-critical problem. The patient has attempted suicide and although her vital signs are stable, she requires immediate psychiatric evaluation and close monitoring for potential physical complications or further self-harm attempts</p>	<p>Based on the case details, I would assign an ESI level of 2 for this patient.</p> <p>Justification:</p> <ul style="list-style-type: none"> - The patient has attempted suicide which is a potentially serious condition but there is no immediate life threat currently. - Vital signs are stable with no hypoxia or hypotension. - There are no signs of neck injury. - Patient is young and otherwise healthy. - Requires medical/psychiatric evaluation and monitoring promptly but not immediately life-threatening. - ESI level 2 is for patients with high-risk situations or potential threats to life or limb functions that require rapid medical intervention or delegated nursing triage. This case fits that category. <p>Lower ESI levels like 1 would imply immediate life threat requiring immediate physician assessment. Higher levels like 3 can wait longer for medical care. So ESI 2 is most appropriate here.</p>
19	2	<p>The patient is a 90-year-old male with confusion that started on the same day. His vital signs are stable, with a blood pressure of 120/69 mmHg. Based on the ESI rules, I would triage this patient as an ESI 2. Confusion is a common sign of a time-critical problem, such as a stroke or infection. The patient needs further evaluation to determine the cause of his confusion.</p> <p>The patient will need to be evaluated by a physician, who will order tests such as a blood test, urine test, and imaging studies to look for signs of infection, stroke, or other medical problems. The patient may also need to be admitted to the hospital for further treatment.</p>	<p>ESI 3 - The patient is stable, but may require multiple types of resources to investigate the cause of his confusion, such as lab tests and possibly imaging.</p>	<p>Based on the presented information, I would assign this patient an ESI score of 3, indicating an urgent condition that requires timely assessment and treatment.</p> <p>Rationale:</p> <ul style="list-style-type: none"> - The patient is 90 years old, indicating high vulnerability. - He is experiencing acute onset of confusion, which can be a sign of a serious medical issue at his age, such as infection, electrolyte imbalance or other condition. - While his vital signs are stable at present, his condition requires prompt assessment, diagnosis and treatment given his age and symptoms. - ESI level 3 is appropriate for this due to potential urgency and need for timely care, but lack of high-risk criteria that would warrant an ESI 2. Close monitoring of vitals and symptoms will be needed in case his condition deteriorates. <p>So in summary, ESI 3 is assigned due to:</p> <ul style="list-style-type: none"> - Age (high vulnerability) - Acute change in mental status - Potential for serious underlying condition - Need for timely assessment and diagnosis - Lack of immediate life-threat or unstable vitals (so not ESI 2) <p>Does this seem like an appropriate ESI assignment and rationale? Let</p>

				me know if you need any clarification.
20	2	<p>Based on the information provided, I would assign an ESI score of 3 to this patient. She is stable, but she requires multiple resources to investigate and treat her pain. She has a history of kidney stones, which is a time-critical problem that could deteriorate if not treated promptly. The fact that her skin looks pale suggests that she may be dehydrated, which would require intravenous or intramuscular fluids. She may also need pain medication, which would require a prescription.</p> <p>ESI 3: Stable, with multiple types of resources needed to investigate or treat (such as lab tests plus X-ray imaging)</p>	<p>ESI 3 - This patient is stable but likely requires multiple resources for investigation and treatment, such as lab tests (e.g., urinalysis, blood work) and imaging (e.g., CT scan or ultrasound) to assess for kidney stones or other causes of her severe flank pain.</p>	<p>Based on the presented case, I would assign an ESI score of 2 for this patient, indicating a patient who requires prompt medical attention but is hemodynamically stable.</p> <p>Justification:</p> <ul style="list-style-type: none"> - The patient is presenting with severe pain which requires analgesia and diagnosis. However, the pain alone does not seem to be life-threatening based on the information provided. - She seems hemodynamically stable based on the lack of mention of hypotension or other signs of shock. - Her medical history of kidney stones increases the likelihood of urolithiasis as a possible diagnosis which requires prompt diagnosis and management but is usually not immediately life-threatening. - An ESI 2 score would prioritize this patient to be seen by a physician promptly after initial triage for further assessment, pain management and diagnosis. But would not require immediate life-saving interventions. <p>In summary, this patient seems to require urgent care but lacks signs of immediate life-threat or hemodynamic instability based on the information provided to warrant an ESI 1 score. An ESI 2 score would be most appropriate to direct prompt medical attention for management of her condition.</p>
21	3	<p>ESI score: 3</p> <p>The patient is a 20-year-old male with nausea, vomiting, and right lower quadrant pain. The pain is localized and 6/10 in severity. His vital signs are stable, with a BP of 130/90 mmHg, HR of 100, SpO2 of 98%, RR of 16 breaths/minute, and a temperature of 36.4° C. He does not have any signs of a time-critical problem or a high risk of deterioration. The only resource anticipated is a diagnostic imaging study, such as an X-ray or CT scan.</p> <p>Based on the ESI rules, this patient should be triaged as a 3. He is stable and does not need immediate, life-saving intervention. He does, however, need a diagnostic imaging study to determine the cause of his pain.</p>	<p>ESI 3 - The patient is stable with vital signs within normal limits but presents with right lower quadrant pain and nausea/vomiting. This may require multiple types of resources for investigation, such as lab tests (e.g., complete blood count, basic metabolic panel) and imaging (e.g., ultrasound or CT scan) to evaluate for possible appendicitis or other causes of abdominal pain.</p>	<p>Based on the presented information, I would assign an ESI score of 3 for this patient, indicating that the patient should be seen within 30 minutes.</p> <p>Justification:</p> <ul style="list-style-type: none"> - The patient is hemodynamically stable with normal vital signs apart from tachycardia, indicating the pain is relatively well tolerated. - The pain is localized in the right lower quadrant, which could indicate conditions like appendicitis that require timely assessment and management but are not immediately life-threatening. - The symptoms of nausea/vomiting and abdominal pain started relatively recently, so the condition is unlikely to be immediately critical but merits prompt evaluation. - The patient is young and otherwise healthy, without significant comorbid conditions. - An ESI 3 score indicates the need for timely evaluation and pain management but the condition is unlikely to deteriorate quickly or require immediate life-saving

				intervention. The patient would be reassessed regularly in case the condition changes.
				So in summary, based on abdominal pain, vital signs, and clinical presentation, an ESI 3 score is most appropriate to indicate the need for timely evaluation of a condition that is concerning but not critical at the current time. The patient can wait up to 30 minutes to be seen but requires regular reassessment. Please let me know if you need any clarification.
22	3	<p>Sure. Here is my assessment and ESI score for the patient:</p> <p>Based on the patient's history, physical examination, and imaging studies, I would classify this patient as an ESI 3. The patient has a displaced fracture of the forearm, which is a time-critical problem that requires immediate treatment. The patient also has a radial pulse and normal sensation and circulation, which are good signs. However, the patient is still in need of multiple resources to investigate and treat the fracture, such as x-rays and surgery.</p> <p>ESI 3: Stable, with multiple types of resources needed to investigate or treat (such as lab tests plus X-ray imaging)</p>	<p>ESI 4 - Stable, with only one type of resource anticipated (such as only an X-ray, or only sutures). The patient has a displaced fracture but has a palpable radial pulse and normal sensation and circulation, indicating that he is stable and likely requires only an X-ray for further evaluation and treatment.</p>	<p>Based on the description, I would assign an ESI score of 3 for this patient, indicating high urgency.</p> <p>Justification:</p> <ul style="list-style-type: none"> - The patient has a significant acute injury (displaced forearm fracture) requiring medical attention. - However, the injury is not immediately life-threatening or limb-threatening. Radial pulse is palpable, circulation and sensation are normal. - The patient is hemodynamically stable and can wait for diagnostic workup and treatment. - An ESI 3 is appropriate for this level of urgency - needs to be evaluated within 2 hours but not immediately. Lower scores of 1 or 2 would indicate a greater level of urgency which does not seem to apply here based on the information given.
23	3	<p>ESI Score: 4</p> <p>This patient is a 34-year-old female with a 2-day history of fever and cough. She describes chest pain that increases with coughing. She is otherwise healthy and has a normal blood pressure.</p> <p>The patient's vital signs are stable and she is not in any acute distress. She is not complaining of shortness of breath or chest pain that radiates to the arms or neck. She does not have any other symptoms such as nausea, vomiting, or diarrhea.</p> <p>The patient's history and physical examination suggest that she may have pneumonia. Pneumonia is an infection of the lungs that can cause fever, cough, and chest pain. It is a common infection that can be treated with antibiotics.</p> <p>The patient's ESI score is 4. This means that she is stable and does not require immediate intervention. However, she should be seen by a doctor as soon as possible to confirm the diagnosis and start treatment.</p>	<p>ESI 3 - Stable, with multiple types of resources needed to investigate or treat (such as lab tests plus X-ray imaging). The patient has a high fever and cough, which may indicate an infection like pneumonia, and requires further testing like blood work and chest X-ray to confirm diagnosis and determine appropriate treatment.</p>	<p>Based on the presented case, I would assign an ESI score of 3 for this patient, with the following justification:</p> <p>ESI 3:</p> <ul style="list-style-type: none"> - Ill-appearing but stable patients who need "prompt medical attention but are not high-risk, require a 2-hour treatment response time". - The patient is alert and describing chest pain, but seems otherwise stable (BP normal). - The symptoms of high fever, cough and chest pain suggest a possible respiratory infection, but the patient does not seem to be in severe distress at this point, and vital signs are stable. - However, a 2-hour treatment window is warranted given the possible progression of symptoms and to further assess, diagnose and initiate prompt treatment of the likely infection. - An ESI 2 would indicate the patient is in high-risk or unstable condition requiring immediate life-saving intervention, which does not seem to be the case based on the information provided.

		The patient's treatment plan should include antibiotics, rest, and fluids. She should also be monitored for signs of respiratory distress.		So in summary, ESI 3 due to moderately concerning symptoms of possible respiratory infection, but patient currently stable and not high-risk, requiring prompt medical attention within 2 hours according to the ESI guidelines. Please let me know if you need any clarification.
24	3	The 40-year-old female patient with a history of gallstones and DM presents with upper abdominal pain that started after lunch today. Her vital signs are stable, with a BP of 130/80 mmHg, heart rate of 87, SpO2 of 98, RR of 14, and T of 36.2 C. Based on the history and physical examination, I would classify this patient as an ESI 4. The patient is stable and does not require immediate intervention, but she does need further investigation and treatment. I would order an X-ray of the abdomen to rule out gallstones as the cause of her pain. I would also start her on oral medications for pain and nausea. Once the results of the X-ray are known, I can make a more definitive diagnosis and treatment plan.	ESI 3 - This patient is stable with vital signs within normal limits. However, her history of gallstones and diabetes, along with her current symptoms, may require multiple types of resources such as lab tests and imaging (e.g., ultrasound) to investigate and treat her condition.	Based on the description, I would assign an ESI score of 3 for this patient, with the following justification: <ul style="list-style-type: none">- The patient has abdominal pain in the upper quadrants, which is concerning for potential gallstone complications like cholecystitis. This constitutes an emergency condition that needs medical evaluation and treatment.- The vital signs are stable, though the heart rate is mildly elevated. This rules out an ESI score of 2, which would indicate high-risk/unstable conditions.- There are some comorbid conditions like diabetes and known gallstones that increase the complexity slightly, though not to an ESI 2 level.- Overall, this seems to be an emergency condition (gallstone complications) that needs prompt medical care but is not an immediate life-threat or highly unstable, warranting an ESI 3 score. The patient needs to be seen within 1 hour as per ESI 3 criteria. Does this sound like an appropriate ESI assessment and justification for the described patient? Let me know if you have any other questions.

25	5	<p>ESI Score: 3</p> <p>The patient presents with nausea, vomiting, and diarrhea that started 1 day ago. The abdominal pain is relieved by diarrhea and is not very severe. A few hours before the symptoms started, she had eaten a meal that “tasted strange”. The diarrhea is watery and includes mucus and does not contain blood.</p> <p>These symptoms are consistent with food poisoning. Food poisoning is a common cause of nausea, vomiting, and diarrhea. It is usually caused by eating food that has been contaminated with bacteria or viruses. The severity of food poisoning can vary depending on the type of bacteria or virus that is causing the infection.</p> <p>In this case, the patient does not have any severe symptoms, such as fever, chills, or dehydration. She is also not experiencing any bleeding or blood in her stool. These symptoms suggest that the patient does not have a serious infection.</p> <p>The patient is stable and does not require immediate medical attention. She can be treated at home with oral or topical medications, or prescriptions. She should also drink plenty of fluids to prevent dehydration.</p> <p>If the patient's symptoms worsen or if she develops any of the following symptoms, she should seek medical attention:</p> <ul style="list-style-type: none">FeverChillsDehydrationBleedingBlood in stoolSevere abdominal painVomiting that does not stop	<p>ESI 4 - Stable, with only one type of resource anticipated. The patient is stable and has symptoms suggestive of food poisoning or a gastrointestinal infection. A stool test or lab work might be needed for diagnosis, but the patient is not at high risk of deterioration or showing signs of a time-critical problem.</p>	<p>ESI 4 Justification: This patient appears stable with a likely diagnosis of food poisoning or viral gastroenteritis given the acute onset of symptoms after eating a strange tasting meal. She will likely need IV fluids and possibly some anti-emetics or anti-diarrheals, so one anticipated resource (IV fluids) qualifies her as ESI 4. Vital signs are not mentioned so assuming they are stable, otherwise this could potentially be ESI 3 if there were signs of mild dehydration.</p>
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26	3	<p>The patient has a positive Homans test, which is a sign of DVT. She also has edema in her left leg, which is another DVT risk factor. She is otherwise stable with no acute life threats. I would triage her as ESI 3. She needs further evaluation and treatment, but it is not an immediate emergency.</p> <p>The ESI score is a tool used to triage patients in the emergency department. It helps to determine the order in which patients should be seen by a doctor. ESI 3 patients are stable but need further evaluation and treatment. ESI 4 patients are stable and only need one type of resource, such as an X-ray or sutures. ESI 5 patients are stable and do not need any resources, such as oral or topical medications or prescriptions.</p>	<p>ESI 2 - This patient is at high risk of deterioration due to the possibility of deep vein thrombosis (DVT), which is indicated by her recent travel, edema in the left leg, and a positive Homans test. Immediate evaluation and intervention are needed to prevent complications such as pulmonary embolism. Her vital signs are stable, but the potential for a time-critical problem warrants the ESI 2 classification.</p>	<p>Based on the presented information, I would assign this patient an ESI score of 3, with the following justification:</p> <ul style="list-style-type: none"> - The patient has signs and symptoms of possible deep vein thrombosis (DVT) based on edema, positive Homans sign, recent prolonged flight travel which increases thrombosis risk. This would fall under the 'potentially serious condition' category in ESI triage. - Vital signs are stable. Patient can walk and talk. No signs of severe or life-threatening illness. So does not warrant an ESI 1 or 2. - Further testing like Doppler ultrasound is needed to confirm DVT diagnosis. ESI 3 is for patients who need further medical evaluation and treatment but hemodynamically stable. - In summary, this appears to be a potentially serious condition (suspected DVT) in a hemodynamically stable patient requiring treatment and diagnosis. So ESI 3 would be most appropriate. <p>Does this sound like an appropriate triage assessment and ESI score assignment for the presented patient scenario? Let me know if you need any clarification.</p>
27	3	<p>Based on the information provided, I would triage this patient as ESI 2. He has a history of arrhythmia and hypertension, and he is currently experiencing shortness of breath. These are all signs of a time-critical problem that could deteriorate if not treated promptly. He is also stable at the moment, so he does not need immediate, life-saving intervention. However, he does need to be seen by a doctor soon to determine the cause of his shortness of breath and to receive treatment.</p> <p>The ESI rules are a helpful tool for triaging patients in the emergency department. They provide a consistent way to assess patients and to prioritize care. However, it is important to remember that the ESI rules are just a guideline. The best way to triage a patient is to use your clinical judgment and to consider the specific situation.</p>	<p>ESI 3 - The patient is stable with no active complaints, but has a history of arrhythmia and hypertension. Multiple types of resources may be needed to investigate or treat, such as lab tests and imaging.</p>	<p>Based on the information provided, I would assign an ESI level of 3 for this patient, with the following justification:</p> <ul style="list-style-type: none"> - The patient has a stable presentation with no acute distress. Vital signs are within normal limits except for a slightly elevated heart rate, which can be expected given his complaint of shortness of breath with exertion. - Although the patient has a history of arrhythmia and hypertension, his condition does not appear to be an emergent medical issue based on the information given. - An ESI level 3 indicates a patient whose condition is potentially urgent but not high risk, and who needs medical care within 1-2 hours. This level of acuity seems appropriate for this patient based on the details provided. - Higher ESI levels (1-2) would indicate a more emergent or life-threatening situation requiring immediate attention, which does not seem to apply here based on the clinical presentation. - Lower ESI levels (4-5) indicate non-urgent issues, which would also

				not match this patient's reported symptoms and medical history.
				In summary, ESI level 3 seems the most suitable triage score for this patient based on a stable condition but some clinical concerns due to medical history and current symptoms. Please let me know if you need any clarification.
28	2	The 45-year-old female patient with an open fracture in her left leg is an ESI 2. She is in high risk of deterioration, as she has an open fracture which is a time-critical problem. She also has a pain score of 9/10, which is a high level of pain. Her vital signs are stable, but she is likely to require surgery to repair the fracture.	ESI 2 - The patient has a high risk of deterioration due to the open fracture in her left leg, which is a time-critical problem requiring prompt intervention to prevent complications.	Based on the presented case, I would assign an ESI score of 2, with the following justification: <ul style="list-style-type: none">- The patient has an unstable condition with an open fracture, indicating emergent need for pain control and treatment. This fulfills the criteria for ESI level 2.- Vital signs are within normal limits and the patient is alert and oriented, ruling out a level 1 emergency.- There are no indications that this can be triaged as level 3 or lower, where a longer wait would be acceptable. The open fracture needs prompt evaluation and management.- In summary, this patient needs emergent care and medical attention but is not in immediate life-threatening condition, consistent with ESI level 2.
29	3	Based on the information provided, the ESI score for the 3-year-old male patient is ESI 3. He is stable and does not require immediate intervention, but he does need further investigation and treatment, including sutures to close the laceration. He is also at risk of vomiting again, which could lead to dehydration or aspiration.	ESI 3 - The patient is stable and alert, but may require multiple types of resources to investigate or treat, such as suturing the laceration and imaging to rule out any head injury, especially considering the vomiting episodes.	For this patient, I would assign an ESI score of 4, with the following justification: <ul style="list-style-type: none">The patient is stable with no signs of deteriorating condition or life-threatening symptoms.Only one resource (sutures) is anticipated to treat the superficial head laceration.Although the patient vomited a few times, there are no other concerning signs like altered mental status or neurological deficits. The vomiting is likely due to the head trauma and anxiety.An X-ray is unlikely to be needed based on the described injury (superficial laceration).The patient's alertness and lack of loss of consciousness indicate the head trauma is minor.In summary, this is a stable patient with a minor injury requiring only sutures. ESI 4 is most appropriate.

30	2	<p>ESI score: 3</p> <p>The patient is a 24-year-old female with severe abdominal pain and a positive pregnancy test. She has a history of delayed menstruation. Her vital signs are stable. The patient needs further investigation to determine the cause of her pain and to confirm her pregnancy. This may require lab tests, imaging, and/or a consultation with a specialist. The patient is not an immediate life-saving emergency, but she does need to be seen soon.</p>	<p>ESI 2 - The patient has severe abdominal pain and a delayed menstruation with a positive pregnancy test, which may indicate an ectopic pregnancy or other time-critical pregnancy-related complications. Prompt evaluation and intervention are necessary.</p>	<p>Based on the information provided, I would assign an ESI score of 3 for this patient, indicating an urgent condition.</p> <p>Justification:</p> <ul style="list-style-type: none"> - She presents with severe abdominal pain, indicating a condition that needs medical attention. - The pregnancy test indicates she may be pregnant, which can complicate the diagnosis and management. - Her vital signs are stable, indicating she is not in immediate life-threatening danger (excluding ESI 1 or 2). - Given the pain and possible pregnancy complication, she needs urgent assessment and treatment, but is not critical (excluding ESI 4 or 5). - Therefore, an ESI triage score of 3 seems most appropriate for this patient presentation.
31	2	<p>The patient is a 22-year-old male with a pain score of 8/10 in his ankle after falling while running. There is no open wound or deformity. Based on the ESI rules, this patient would be triaged as ESI 3. He needs multiple types of resources to investigate and treat his injury, such as an X-ray to rule out a fracture and pain medication. His condition is stable, but he needs to be seen by a doctor soon.</p>	<p>ESI 4 - The patient is stable, with no open wounds or deformity. Only one type of resource, such as an X-ray, is anticipated to assess for potential fractures or injuries to the ankle.</p>	<p>For this patient, I would assign an ESI score of 4.</p> <p>Justification: The patient is stable with no life-threatening condition. He will likely require imaging such as an X-ray to assess for any fractures but does not anticipate needing multiple resources. An ESI score of 4 is appropriate for patients who are stable but require one resource to investigate or treat their condition.</p>
32	4	<p>Based on the information provided, the patient meets the criteria for ESI 3. He has a stable condition with multiple types of resources needed to investigate or treat his condition, such as lab tests and X-ray imaging. He is experiencing pain and throbbing, which is likely due to the abscess. He does not have a fever, which is a good sign.</p> <p>The ESI 3 triage level indicates that the patient should be seen promptly, but does not require immediate intervention. The patient should be placed in a low-acuity waiting area and should be seen by a physician within 30 minutes.</p>	<p>ESI 4 - The patient is stable, with no fever or systemic symptoms. Only one type of resource, such as incision and drainage, is anticipated to treat the abscess in the nail bed.</p>	<p>ESI 4</p> <p>Justification: The patient is stable with only one anticipated resource - incision and drainage of the abscess. No signs of systemic infection or sepsis are mentioned.</p>

33	5	<p>The patient is a 40-year-old female with complaints of frequent and painful urination. She has no known medical conditions and does not describe abdominal pain. Her vital signs are within normal limits. Based on the ESI rules, I would assess this patient as a ESI 3.</p> <p>ESI 3 means that the patient is stable, but requires multiple types of resources to investigate or treat. In this case, the patient needs to be evaluated by a physician to determine the cause of her urinary symptoms. She may also need to undergo laboratory tests and imaging studies.</p> <p>The patient is not in immediate danger, but she should be seen by a physician as soon as possible.</p>	<p>ESI 4 - The patient is stable and presents with symptoms consistent with a urinary tract infection (UTI). Only one type of resource, such as a urinalysis, is anticipated to diagnose and guide treatment.</p>	<p>Based on the case description, I would assign an ESI score of 3 for this patient, with the following justification:</p> <ul style="list-style-type: none">- The patient's vital signs are normal and stable, indicating no immediate life threat.- The symptoms of frequent and painful urination in a healthy young female suggest a likely lower urinary tract infection, which is an urgent but not emergent condition.- There is no mention of abnormal abdominal or flank pain that would suggest possible kidney infection or stone requiring immediate attention.- An ESI level 3 is appropriate for this likely urgent but non-emergent clinical situation that requires diagnosis and treatment but is not immediately life-threatening. The patient can wait but should be seen within 1-2 hours.
34	5	<p>The patient is a 15-year-old male with edema in the nose after being hit with a ball while playing football. He is oriented and cooperative, with vital signs within normal limits. There is no deformity, active nosebleed, or history of syncope. Based on this information, I would assign the patient an ESI score of 3. He needs to be evaluated by a physician, but he is not in immediate danger. The resources needed to investigate or treat him include an X-ray to assess for a fracture and a prescription for pain medication.</p> <p>ESI 3 is defined as stable, with multiple types of resources needed to investigate or treat. The patient meets this criteria because he needs to be evaluated by a physician and he needs an X-ray to assess for a fracture. He does not need sutures or any other type of immediate intervention, so he is not ESI 2 or 1. He is also not ESI 4 or 5 because he does not need any oral or topical medications or prescriptions.</p>	<p>ESI 4 - The patient is stable, oriented, and cooperative with no deformity or active nosebleeds. Only one type of resource, such as an X-ray, is anticipated to assess for potential nasal fractures or injuries.</p>	<p>Based on the information provided, I would triage this patient as ESI 4.</p> <p>Justification:</p> <p>The patient is stable with no signs of immediate life threat or deterioration.</p> <p>Only one resource (X-ray) is anticipated to investigate for possible nasal fracture.</p> <p>Vital signs are stable and within normal limits.</p> <p>No active complaints other than nasal edema. Patient is oriented and cooperative.</p>

35	4	<p>The patient is a 23-year-old female with a superficial laceration on her forearm. She is stable and does not require any immediate intervention. She will be placed at ESI level 4.</p> <p>The ESI severity index is a tool used to triage patients in the emergency department. It is a five-level scale, with level 1 being the most urgent and level 5 being the least urgent. ESI level 4 is defined as "stable, with only one type of resource anticipated (such as only an X-ray, or only sutures)." This patient meets this criteria, as she does not require any immediate intervention and only needs a simple suture to close the laceration.</p>	<p>ESI 4 - The patient is stable, with no active bleeding or pain in the extremity. Only one type of resource, such as sutures or wound care, is anticipated to treat the superficial laceration on her forearm.</p>	<p>ESI 4 - Stable, with only one type of resource anticipated (such as only an X-ray, or only sutures) Justification: The patient has a superficial laceration that requires suturing, but is otherwise stable with normal range of motion and no active bleeding. Only suturing is anticipated as a resource for this patient, consistent with ESI level 4.</p>
36	4	<p>The 36-year-old male patient with eye itching after walking in windy weather is an ESI 3. He is stable and has multiple types of resources needed to investigate or treat, such as an eye exam and possibly an eye wash. The patient's pain score is 3/10, which is mild. The patient's history is unremarkable, and he does not have any known medical conditions. The patient's eye itching is likely caused by a foreign object in his eye, which can be treated with an eye exam and possibly an eye wash. The patient's condition is not life-threatening, but it is important to treat it promptly to prevent further irritation and damage to the eye.</p>	<p>ESI 5 - The patient is stable, with a minor complaint of eye itching and mild pain. No resources are anticipated except for potential oral or topical medications to alleviate the itching and discomfort.</p>	<p>ESI 4 Justification: The patient appears stable with only one anticipated resource needed - removal of the foreign particle from the eye. The pain score of 3/10 suggests mild discomfort but no signs of deterioration or time critical problem. The lack of known medical history also suggests low acuity. An ESI of 4 seems appropriate based on the information provided.</p>

37	3	<p>The patient is a 77-year-old female with a history of heart valve replacement and on anticoagulants who presents to the ED with a couple of bruises in her legs. She describes no bleeding. Her vital signs are stable. Based on the ESI rules, I would triage her as an ESI 3.</p> <p>ESI 3 patients are stable, with multiple types of resources needed to investigate or treat. In this case, the patient needs to be evaluated for her bruises, which could be a sign of a more serious condition. She also needs to be assessed for her risk of bleeding, as she is on anticoagulants. This evaluation will likely require lab tests and X-rays.</p> <p>The patient is not an ESI 2 patient, who are high risk of deterioration, or signs of a time-critical problem. She is also not an ESI 1 patient, who are immediate, life-saving intervention required without delay.</p> <p>I would recommend that the patient be seen by a doctor as soon as possible.</p>	<p>ESI 4 - The patient is stable and has no additional complaints or active bleeding. Only one type of resource, such as a blood test to assess coagulation status, is anticipated to evaluate the patient's anticoagulant therapy and bruising.</p>	<p>ESI 3</p> <p>Justification: Stable patient with a complex medical history and on anticoagulants. Multiple resources such as lab tests and imaging anticipated to investigate for possible complications from anticoagulation or other issues. Although no active complaints concerning for emergent issues, the medical complexity and anticoagulation status warrants a higher level of initial evaluation and monitoring.</p>
38	4	<p>ESI score: 3</p> <p>The patient is a 43-year-old male with a superficial knife cut on his index finger. The bleeding stopped with the dressing he applied at home. The cut seems to need some sutures, but there is no distal sensory or circulatory impairment. The tendons and nerves seem intact. His vital signs are normal.</p> <p>Based on the ESI rules, this patient would be classified as ESI 3. He is stable, with multiple types of resources needed to investigate or treat (such as lab tests plus X-ray imaging). He does not need immediate, life-saving intervention, but he does need to be seen by a doctor to assess the extent of the injury and determine if sutures are necessary.</p>	<p>ESI 4 - The patient is stable, with bleeding stopped by home dressing, and no apparent damage to tendons or nerves. Only one type of resource, such as sutures, is anticipated to treat the superficial cut on his index finger.</p>	<p>ESI 4 - Stable, with only one type of resource anticipated (such as only an X-ray, or only sutures) Justification: The patient's vital signs are stable. The injury seems superficial and may only require sutures to close, with no major complications noted on initial examination. Only one resource (sutures) seems to be anticipated at this point, consistent with ESI level 4.</p>

39	3	<p>ESI score: 3</p> <p>Justification: This patient has a splinter in her foot that is protruding from the skin. This is a minor injury that can be treated with oral or topical medications. The patient is stable and does not require any immediate intervention.</p> <p>The patient is not in any immediate danger and can wait to be seen by a doctor. The splinter can be removed by a nurse or a doctor. The patient will likely need to take a tetanus shot.</p>	<p>ESI 4 - The patient is stable, with a splinter located on the sole of her foot. Only one type of resource, such as a minor procedure to remove the splinter, is anticipated to treat the issue.</p>	<p>ESI 4 - Stable, with only one type of resource anticipated (such as only an X-ray, or only sutures) Justification: The patient seems stable with a localized injury that will likely only require suturing to remove the splinter. No major intervention seems immediately needed.</p>
40	4	<p>The patient is a 20 year old male who has lost taste and smell for 2 days. He suspects that he has COVID-19. He has no medical history and his respiratory sounds are normal. He seems healthy. His vital signs are BP: 130/85 mmHg, HR: 73, SpO2: 98%.</p> <p>Based on the ESI rules, I would classify this patient as ESI 3. He is stable, but he needs multiple types of resources to investigate and treat. He needs to be tested for COVID-19 and he needs to be monitored for any signs of ухудшения condition.</p> <p>I would recommend that he be placed in the waiting room and that he be seen by a doctor as soon as possible.</p>	<p>ESI 4 - The patient is stable and presents with minor symptoms related to potential COVID-19 exposure. Only one type of resource, such as a COVID-19 test, is anticipated to investigate the issue.</p>	<p>Based on the presented information, I would triage this patient as ESI level 3, for the following reasons:</p> <ul style="list-style-type: none"> - The patient is a young male with no significant medical history, appearing clinically stable with normal vital signs. This suggests no immediate life-threatening condition. - The patient suspects COVID-19 infection based on his symptoms of loss of taste and smell, however he does not report any severe or worsening respiratory symptoms like shortness of breath, cough or chest tightness. Oxygen saturation is normal. This indicates the infection, if present, is likely mild to moderate. - While COVID-19 is a serious issue, based on the available information this patient does not appear to have a condition that requires immediate lifesaving intervention or treatment. ESI level 3 is appropriate for patients with "potentially urgent" conditions that require medically necessary treatment but are not immediate life-threatening emergencies. - Additional assessment including temperature check, COVID-19 swab test and chest x-ray may be needed to further evaluate for infection and clinical stability. The triage category can be reassessed if there are any significant findings. <p>In summary, based on the presenting symptoms and clinical status, ESI level 3 appears to be most suitable for this patient with suspected mild COVID-19 infection and no immediate life-threats. Let me know if you need any clarification.</p>

41	5	<p>ESI Score: 2</p> <p>The patient is a 8-year-old male with a 3 cm² burn on his left forearm. The burn is a scald injury and there are no bullae. The patient has a pain score of 3/10. This is a stable patient with a single type of resource anticipated (such as only an X-ray). The patient does not require immediate, life-saving intervention without delay. The patient is not at high risk of deterioration, or signs of a time-critical problem.</p>	<p>ESI 4 - The patient is stable and presents with a minor burn injury. Only one type of resource, such as wound care, is anticipated to treat the issue.</p>	<p>ESI 3 - Stable, with multiple types of resources needed to investigate or treat (such as lab tests plus X-ray imaging)</p> <p>Justification:</p> <ul style="list-style-type: none"> - Although the burn is small, it is in a sensitive area of a child. - There is potential for risk of scarring and functional impairment without proper management. - The patient will likely require wound cleaning, dressing, analgesia, tetanus prophylaxis and follow up. - There may be a need for bacterial culture and sensitivity if signs of infection develop. - X-ray may be needed to assess deeper tissue damage. - Several resources and investigations are anticipated for this patient, warranting an ESI 3.
42	5	<p>ESI score: 3</p> <p>The patient is a 10-year-old male with itching and redness in both eyes. He has no fever, vital parameters are normal, and he does not describe pain. This suggests a non-urgent condition, such as conjunctivitis. Conjunctivitis is an inflammation of the conjunctiva, the thin layer of tissue that covers the white of the eye and the inside of the eyelid. It is a common condition that can be caused by a number of things, including allergies, viruses, and bacteria.</p> <p>The patient does not require immediate intervention, but he will need to be seen by a doctor to determine the cause of his conjunctivitis and receive treatment. He can likely be treated with over-the-counter eye drops or ointment. If the conjunctivitis is severe or does not respond to treatment, he may need to be prescribed antibiotics.</p> <p>The patient is stable and does not require any resources beyond over-the-counter eye drops or ointment. He can likely be discharged home with instructions to follow up with his doctor.</p>	<p>ESI 5 - The patient is stable and has no signs of a time-critical problem. No resources are anticipated except for oral or topical medications to alleviate the itching and redness in the eyes.</p>	<p>ESI 4 - Stable, with only one type of resource anticipated (such as only an X-ray, or only sutures)</p> <p>Justification: The patient is stable with a non-life threatening complaint. Only one resource, an eye exam, is anticipated to investigate the redness and itching. No immediate or urgent intervention is required. Vital signs are stable. This meets the criteria for ESI level 4.</p>
43	5	<p>The patient is a 40-year-old female with a 3-day history of a sore throat. She has no swallowing difficulties or hoarseness. Examination of the throat is normal. Her vital signs are within normal limits.</p> <p>Based on the ESI rules, I would assign this patient an ESI score of 2. She is not in immediate danger, but she is at risk of deterioration. She needs to be seen by a doctor to determine the</p>	<p>ESI 5 - The patient is stable and has no signs of a time-critical problem. No resources are anticipated except for oral medications or prescriptions to address the sore throat.</p>	<p>ESI 4.</p> <p>Stable patient with only one type of anticipated resource (throat culture). No signs of airway compromise or hemodynamic instability. Unlikely to deteriorate significantly without intervention but requires basic investigation.</p>

		<p>cause of her sore throat and to rule out any serious conditions.</p> <p>The resources that she needs include a doctor's evaluation and possibly some lab tests. She does not need any immediate interventions, such as X-rays or sutures.</p> <p>I would recommend that she be seen by a doctor as soon as possible. If her condition worsens, she may need to be triaged to a higher ESI score.</p>		
44	5	<p>The patient is a 20-year-old female with a history of nickel allergy. She is complaining of itching and redness on the area which contacts with a metal bracelet. There is no systemic reaction. Based on the ESI rules, this patient should be triaged as ESI 3. She is stable, with multiple types of resources needed to investigate or treat. She will need to be seen by a doctor to rule out any other causes of her symptoms, such as an infection. She may also need to be treated with antihistamines or steroids to relieve the itching and redness.</p> <p>Here is my justification:</p> <p>The patient is stable, as she is not experiencing any life-threatening symptoms. She has multiple types of resources needed to investigate or treat her symptoms, as she will need to be seen by a doctor and may also need to be treated with antihistamines or steroids. She does not have any signs of a time-critical problem, as her symptoms are not worsening and she is not experiencing any new symptoms. I hope this is helpful!</p>	<p>ESI 5 - The patient is stable, with no signs of a time-critical problem or systemic reaction. No resources are anticipated except for oral or topical medications or prescriptions to address the localized allergic reaction.</p>	<p>ESI 3 - Stable, with multiple types of resources needed to investigate or treat (such as lab tests plus X-ray imaging)</p> <p>Justification: While the patient is stable with no life-threatening symptoms, she requires investigations such as allergy testing and possibly removal / treatment of a dermatitis reaction which would need nursing time, medications and possibly a dermatology consult. This warrants an ESI 3 designation, as opposed to ESI 4 where only one intervention like an X-ray would be needed, or ESI 5 where only prescriptions would suffice.</p>
45	5	<p>ESI score: 3</p> <p>The patient is a 50-year-old female with caries on her left molar teeth. She is experiencing pain in the area that starts while eating. There is no facial swelling or fever. The pain score is 4/10.</p> <p>The patient is stable and does not require immediate intervention. However, she does need to see a dentist to have her teeth treated. This may require X-rays and other diagnostic tests.</p> <p>The patient should be triaged to ESI level 3. This means that she should be seen by a dentist as soon as possible, but she is not in immediate danger.</p>	<p>ESI 5 - The patient is stable, with no signs of a time-critical problem. The issue appears to be dental in nature, and no resources are anticipated in the emergency department except for oral medications or prescriptions for pain management. The patient should be advised to follow up with a dentist for further evaluation and treatment.</p>	<p>For this patient, I would assign an ESI score of 4.</p> <p>Rationale: This patient is stable with only one anticipated resource needed, which is possibly an x-ray of the tooth or dental block to manage the pain. There are no signs of life-threatening conditions or risks of deterioration that would warrant a higher ESI score. The pain is moderate and managed with over-the-counter medications. No fever is present. Overall this patient qualifies for ESI 4 - Stable, with only one type of resource anticipated.</p>

46	5	<p>Based on the information provided, I would triage this patient as ESI 3. The patient is a 2-year-old female with a runny nose and vomiting. She is active and alert, and her mother states that her appetite is normal and she seems hydrated. These symptoms are common in children with viral infections, which are typically not life-threatening. However, it is important to rule out more serious causes of these symptoms, such as dehydration or an ear infection. The patient will need to be evaluated by a physician to determine the cause of her symptoms and receive treatment.</p> <p>The Emergency Severity Index (ESI) is a tool used to triage patients in the emergency department. The ESI score is based on the acuity of the patient's condition and the resources that will be needed to treat them. ESI scores range from 1 (most urgent) to 5 (least urgent).</p> <p>ESI 1: Immediate, life-saving intervention required without delay</p> <p>ESI 2: High risk of deterioration, or signs of a time-critical problem</p> <p>ESI 3: Stable, with multiple types of resources needed to investigate or treat (such as lab tests plus X-ray imaging)</p> <p>ESI 4: Stable, with only one type of resource anticipated (such as only an X-ray, or only sutures)</p> <p>ESI 5: Stable, with no resources anticipated except oral or topical medications, or prescriptions</p>	<p>ESI 4 - The patient is stable and alert with no signs of a time-critical problem. Only one type of resource is anticipated (such as lab tests) to assess the cause of the symptoms and determine the appropriate treatment plan. The patient's normal appetite and hydration status suggest a lower level of urgency.</p>	<p>ESI 4</p> <p>Justification: The patient seems stable with only one anticipated resource needed, likely an IV for mild dehydration. No immediate life-threatening concerns are noted based on the information provided. An ESI 3 would indicate multiple resources anticipated, which does not seem to match this presentation. ESI 5 does not seem appropriate as the patient will likely need IV hydration, not just oral medications.</p>
47	5	<p>The patient is a 27-year-old female with a history of pain in both legs after heavy exercise. The pain is worse with movement and palpation. Her vital signs are stable, with a blood pressure of 120/90 mmHg and a heart rate of 80 beats per minute. She is not in any distress.</p> <p>Based on the ESI rules, I would triage this patient as an ESI 3. She is stable, but she requires multiple types of resources to investigate or treat, such as lab tests and X-ray imaging. She may also need physical therapy or other treatments.</p> <p>I would assess her further to determine the cause of her pain and to develop a treatment plan. I would also monitor her vital signs and her response to treatment.</p>	<p>ESI 4 - The patient is stable with no signs of a time-critical problem. Only one type of resource is anticipated (such as a physical examination or a consultation with a specialist) to assess the cause of the symptoms and provide appropriate treatment recommendations. The onset of pain after heavy exercise suggests a lower level of urgency.</p>	<p>ESI score: 4 Justification: Stable vital signs. Single resource (likely X-ray) needed to investigate leg pain. No immediate life-threatening features.</p>

48	5	<p>Based on the given information, the 10-year-old male patient with swelling in the nail bed of the right hand thumb would be triaged as an ESI 3. The patient is stable and does not require immediate intervention, but he does require multiple types of resources (such as lab tests and X-ray imaging) to investigate or treat. The swelling in the nail bed could be a sign of a more serious underlying condition, such as a bacterial infection or a fungal infection. It is important to rule out these possibilities with further testing.</p> <p>ESI 3 is defined as "Stable, with multiple types of resources needed to investigate or treat (such as lab tests plus X-ray imaging)." This means that the patient is not in immediate danger, but they do require medical attention. The patient is likely to be seen by a doctor within a few hours, but they may not be seen immediately.</p> <p>The 10-year-old male patient with swelling in the nail bed of the right hand thumb does not meet the criteria for an ESI 1, which is "Immediate, life-saving intervention required without delay." This means that the patient does not need immediate medical attention. The patient is also not in immediate danger of death or serious injury, so they do not meet the criteria for an ESI 2, which is "High risk of deterioration, or signs of a time-critical problem."</p>	<p>ESI 4 - The patient is stable and has no signs of a time-critical problem. Only one type of resource is anticipated (such as a physical examination or a consultation with a specialist) to assess the cause of the swelling and provide appropriate treatment recommendations. There is no fever or pus-filled blister, indicating a lower level of urgency.</p>	<p>ESI 4 Justification: The patient is stable with only one anticipated resource needed - an X-ray to assess for possible fracture or foreign body. There are no signs of infection or sepsis. This would be triaged as ESI level 4.</p>
49	5	<p>The patient is an 18-year-old female who presented to the ED due to stepping on a rusty nail. She has no additional complaints and no fever. The wound is not visible, but she is experiencing pain. Based on the ESI rules, I would assign her an ESI score of 4. She is stable and does not require immediate intervention. However, she will need to be seen by a physician to assess the wound and determine if any further treatment is necessary.</p> <p>Here is my justification:</p> <p>The patient is stable, with no signs of deterioration. She does not require immediate intervention. She will need to be seen by a physician to assess the wound and determine if any further treatment is necessary.</p>	<p>ESI 3 - The patient is stable and has no signs of a time-critical problem. However, multiple types of resources may be needed to investigate and treat the potential injury. This could include a tetanus shot, a physical examination to locate any possible wound, and imaging (such as an X-ray) if needed to check for any foreign body or deeper damage.</p>	<p>ESI 4 - Stable, with only one type of resource anticipated (such as only an X-ray, or only sutures) Justification: The patient has stepped on a rusty nail which may require an X-ray to exclude fracture or embedded foreign body. There are no other symptoms suggesting urgent intervention at this point, but will require some investigation.</p>

50	5	<p>ESI Score: 3</p> <p>The patient is a 70-year-old male with pain on the left big toe while walking. He states that his complaints have been going on for about a few weeks. On palpation, a hard dark lesion is present located under the left big toe.</p> <p>This is a stable patient with multiple types of resources needed to investigate or treat. The patient needs to have an X-ray to rule out a fracture or other structural damage to the toe. He may also need to have a culture to rule out infection. Once the diagnosis is made, the patient can be treated with oral or topical medications.</p> <p>The patient is not at immediate risk of deterioration or death, but he does need to be seen by a physician as soon as possible.</p>	<p>ESI 4 - Stable, with only one type of resource anticipated. The patient is stable and likely requires an X-ray to investigate the cause of the hard dark lesion under the left big toe.</p>	<p>ESI 4 Rationale: Based on the information provided, this patient appears stable but will likely require an X-ray to investigate the lesion under the left big toe. An ESI 4 score is appropriate as the patient is stable but will need a single resource (X-ray imaging) to evaluate the condition.</p>
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ESI: Emergency Severity Index, GPT-4: Generative Pre-trained Transformer 4, GCS: Glasgow Coma Scale, BP: Blood Pressure, HR: Heart Rate, RR: Respiratory Rate, GI: Gastrointestinal, COPD: Chronic obstructive pulmonary disease, DM: Diabetes Mellitus, ECG: Electrocardiogram, ICU: Intensive Care Unit, CPR: Cardiopulmonary Resuscitation, CT: Computed Tomography, IV: Intravenous, DVT: Deep Vein Thrombosis

Supplement 3: Reference diagnosis list and the preliminary diagnoses provided by the applications

NO	DIAGNOSIS	BARD REASONING	GPT-4 REASONING	CLAUDE REASONING
1	drug-induced coma	drug overdose or a medical condition such as a stroke or a brain aneurysm	drug overdose	drug overdose
2	severe bradycardia	severe hypotension and bradycardia	cardiogenic shock? (severe hypotension and bradycardia)	impaired consciousness, hypotension and bradycardia
3	hemorrhagic shock due to GI bleeding	bleeding ulcer or a heart attack	life-threatening hemorrhage	hypovolemic shock due to GI bleeding
4	gunshot wound to the abdomen	gunshot wound to the abdomen	gunshot wound to the abdomen	gunshot wound to the abdomen
5	respiratory failure	respiratory failure	respiratory distress and potential hypoxia	respiratory distress and hypoxemia
6	cardiogenic shock due to Myocardial Infarction	heart attack	acute coronary event or other life-threatening cardiac issue	shock due to acute coronary syndrome
7	respiratory failure	high risk of deterioration, as evidenced by their shortness of breath, rapid respiratory rate, and low oxygen saturation	potential acute decompensation of heart failure or another life-threatening respiratory or cardiac issue	CHF or pulmonary edema, respiratory distress
8	coma, apnea and respiratory failure	coma (drug overdose or a head injury)	coma, respiratory depression (overdose)	prescription drug overdose
9	intubated, post-cardiac arrest care	cardiac arrest	cardiac arrest	post-cardiac arrest
10	hypotension requiring emergency resuscitation	abdominal aortic aneurysm	potential shock or significant blood loss	shock (internal bleeding?)
11	allergic reaction	allergic reaction	risk of potential anaphylactic reaction	allergic reaction, high risk of anaphylaxis

















12	severe tachycardia	potential cardiac arrhythmia	potentially serious cardiac issue	heart rhythm issues, shock
13	myocardial infarction	heart attack	acute coronary event or other life-threatening cardiac issue	acute coronary syndrome
14	subarachnoid hemorrhage	-	ruptured aneurysm or bleeding in the brain	subarachnoid hemorrhage
15	occupational hazard for healthcare workers	stabbing with a needle	stabbing with a needle	needle stick injury
16	spontaneous abortion	premature labor	premature rupture of membranes (water breaking)	potential obstetric emergency
17	immunocompromised patient with fever	immunocompromised patient with fever ("He is on chemotherapy, which can weaken his immune system and make him more susceptible to infection.")	immunocompromised patient with fever ("chemotherapy for lung cancer increases the risk for infections and complications.")	immunocompromised patient with fever
18	suicidal patient	suicide attempt	suicide attempt	suicidal patient
19	confusion in an elderly patient.	confusion	confusion	confusion
20	severe pain possibly due to renal colic	kidney stones	kidney stones or other causes of her severe flank pain	severe pain due to urolithiasis
21	acute appendicitis	right lower quadrant pain	possible appendicitis or other causes of abdominal pain	appendicitis
22	fracture (needs reduction)	displaced fracture of the forearm	displaced fracture	displaced forearm fracture
23	community-acquired pneumonia	pneumonia	pneumonia	respiratory infection
24	acute cholecystitis	gallstones	gallstones	cholecystitis
25	food poisoning / acute gastroenteritis	Food poisoning	food poisoning or a gastrointestinal infection	food poisoning / viral gastroenteritis
26	DVT	DVT	DVT	DVT
27	pulmonary embolism	shortness of breath	-	shortness of breath
28	open fracture	open fracture in her left leg	open fracture in her left leg	open fracture
29	head trauma	laceration, further investigation	head trauma, laceration	head trauma
30	ectopic pregnancy	further investigation to determine the cause of her pain and to confirm her pregnancy	ectopic pregnancy or other time-critical pregnancy-related complications	possible pregnancy complication
31	sprained ankle	ankle injury	ankle injury	-
32	paronychia (drainage)	abscess	abscess in the nail bed (incision and drainage)	abscess (incision and drainage)
33	urinary tract infection	urinary symptoms	urinary tract infection	lower urinary tract infection
34	nasal fracture	fracture?	nasal fracture	nasal fracture
35	laceration (suturing needed)	superficial laceration on her forearm	superficial laceration on the forearm	laceration (suturing needed)
36	foreign body (eye)	foreign object (eye)	eye itching	foreign particle (eye)
37	coagulation status (lab test)	risk of bleeding (lab tests and X-rays)	coagulation status (lab test)	coagulation status (lab test)
38	laceration (suturing needed)	laceration (suturing needed)	laceration (suturing needed)	injury (suturing needed)
39	foreign body (foot)	splinter (foot)	splinter (foot)	splinter
40	COVID-19 (PCR test)	COVID-19	COVID-19 (PCR test)	COVID-19
41	2nd degree burn	scald injury - no bullae	minor burn injury	small burn
42	conjunctivitis	conjunctivitis	conjunctivitis	redness and itching (eye exam)
43	sore throat	sore throat	sore throat	-

44	contact dermatitis	allergy or infection	localized allergic reaction	dermatitis
45	tooth decay	caries	dental issue	tooth pain
46	viral infection	viral infection	-	mild dehydration
47	Sore muscles	-	-	leg pain
48	paronychia	swelling in the nail bed (bacterial or fungal infection)	swelling in the nail bed	possible fracture or foreign body
49	tetanus prophylaxis	wound	wound (tetanus prophylaxis)	stepping on a rusty nail (fracture or embedded foreign body)
50	callus	lesion	lesion	lesion

CHF: Congestive heart failure, DVT: Deep Vein Thrombosis, GI: Gastrointestinal., PCR: Polymerase chain reaction. See Supplement 2 for full prompts.

THE EVALUATION OF THE KNOWLEDGE AND OPINIONS OF FACULTY OF MEDICINE TERM VI STUDENTS ON NOTIFIABLE DISEASES AND RELEVANT PRACTICES BASED ON THEIR PUBLIC HEALTH INTERNSHIP STATUS

Tıp Fakültesi Dönem 6 Öğrencilerinin Halk Sağlığı Stajı Alma Durumuna Göre Bildirimi Zorunlu Hastalıklar ve İlgili Uygulamalar ile İlgili Bazı Bilgi ve Görüşlerinin Değerlendirilmesi

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ABSTRACT

ÖZ

Objective: The primary purpose of this study is to evaluate the knowledge and opinions of pre-physicians, term VI students in the 2021-2022 academic year, who participated and did not participate in a public health internship program appertaining to the notifiable diseases process.

Material and Methods: The participants of this study consisted of term VI students from 126 faculty of medicine. We used a data collection form, consisting of 25 questions in total, to assess the knowledge of term VI students on their socio-demographic characteristics, their educational background, and internship process, in addition to their opinions on the notifiable diseases. Considering knowledge questions, correct answers were worth one point each, while the other answers were worth zero points and evaluated over the total score. The data were collected through observation method of data collection.

Results: 48.7% of the 115 participants had completed their public health internship program A statistically significant difference was found between public health internship and having knowledge and being skilled in the notifiable diseases ($p<0.001$, $p=0.003$, respectively). The mean knowledge score of the students who had received their public health internship program obtained from propositions measuring the knowledge level of the participants on reporting notifiable diseases was 5.9 ± 2.1 , score was 4.3 ± 2.1 for those who had not received the internship program in question. Based on the public health internship status, there was a statistically significant difference among the success points of the students ($p<0.001$).

Conclusion: The level of knowledge and awareness of pre-physicians having completed their public health internship program concerning the notification process was found to be higher than those who have not yet done their internships. Some required information and applications about the notifiable diseases should be taken into account while building undergraduate curriculums of the faculty of medicine and setting out the public health internship program.

Keywords: Infectious disease reporting, disease notification, medical student, public health, undergraduate medical education

Amaç: Bu araştırmayla tıp eğitimlerinin son senesinde olan 2021-22 eğitim öğretim yılı dönem 6 öğrencilerinin bildirim zorunlu hastalık bildirim süreciyle ilgili Halk Sağlığı Stajı almış ön hekimlerin ve henüz stajı almamış ön hekimlerin bu konudaki bilgi ve görüşlerinin değerlendirilmesi amaçlanmıştır.

Gereç ve Yöntemler: Kesitsel tipteki bu çalışmanın evrenini 126 tıp fakültesi dönem 6 öğrencileri oluşturmuştur. Veri kaynağı olarak, araştırmacılar tarafından hazırlanan; dönem 6 öğrencilerinin bazı sosyo demografik özelliklerinin, aldıkları eğitimi ve intörnlik süreci ile ilgili bazı bilgilerinin, bildirim zorunlu hastalıklarla ilgili bazı görüşlerinin ve bilgilerinin değerlendirileceği 25 sorudan oluşan veri toplam formu kullanılmıştır. Bilgi sorularında her bir doğru cevap bir puan diğer cevaplar puansız olarak hesaplanmış ve toplam üzerinden değerlendirilmiştir. Veriler gözlem altında veri toplama yöntemiyle toplanmıştır.

Bulgular: Katılımcıların %48.7'si Halk Sağlığı stajı almıştır. Sırasıyla Halk Sağlığı stajı almış olma durumu ile bildirim zorunlu hastalık kavramını bilme ve becerisine sahip olma durumları arasında istatistiksel olarak anlamlı bir fark bulunmuştur ($p<0.001$ ve $p=0.003$). Halk Sağlığı stajı alan öğrencilerin bildirim zorunlu hastalıklar ve bu hastalıkları, durumları bildirme ve raporlama konusunda bilgi düzeyini ölçen önermelerden aldıkları bilgi puanı ortalamaları 5.9 ± 2.1 iken, halk sağlığı stajı almayanlarda bu ortalama 4.3 ± 2.1 olarak hesaplanmıştır. Halk sağlığı stajı alma durumuna göre başarı puanları arasında istatistiksel olarak anlamlı bir fark tespit edilmiştir ($p<0.001$).

Sonuç: Bu çalışmanın sonuçlarına göre bildirim zorunlu hastalık bildirim süreciyle ilgili halk sağlığı stajı almış ön hekimlerin, henüz stajı almamış ön hekimlere göre bilgi ve farkındalık düzeyi yüksek bulunmuştur. Tıp fakültesi mezuniyet öncesi eğitim müfredatlarının ve özellikle halk sağlığı stajı içeriği planlanırken bildirim zorunlu bulaşıcı hastalıklar hakkındaki bilgilendirmelerin ve uygulamaların yer alması gerekliliği göz ardı edilmemelidir.

Anahtar Kelimeler: Enfeksiyöz hastalık bildirim, hastalık bildirim, tıp öğrencisi, halk sağlığı, önlisans tıp eğitimi



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INTRODUCTION

Communicable diseases are health problems that affect many people and can cause serious problems if precautions are not taken. For this reason, it is required to collect data regularly on communicable diseases on time and in the most appropriate way to evaluate them and to take prompt precautions in necessary cases (1,2). As is seen around the world, close monitoring of surveillance systems and reporting processes is of critical importance to ensure regular data flow regarding several applications toward the detection and follow-up of communicable diseases and disease burden and deaths caused, and the control of presumptive sources (3-5).

The Public Health Law No.1593 dated 24.04.1930 created a legal obligation in Türkiye to notify the identified communicable diseases (6). Another regulation on this matter is Communicable Diseases Surveillance and Control Principles Regulation No. 26537 dated 30.05.2007. With this regulation, for the prevention and control of the diseases, the notifiable communicable diseases list has been made, and communication and report lines have been established. The number of notifiable diseases has been determined as 81 in A, B, C, and D groups, with the latest update of the regulation (No. 31107 dated 22.04.2020) (7).

Although the notification of the diseases in the list has been imposed an obligation and the notification systems have been developed and optimized by the Ministry of Health, there are still problems in reporting today. Some deficiencies and errors in hospital records, lack of knowledge and skills of physicians in reporting, the feeling of inadequacy seen in physicians, and differences in the level of physicians' knowledge in terms of their fields of specialization may be included in these problems (8-10). Moreover, several physicians declared that they had not received any education regarding the notifiable diseases and their notification processes as well (9).

Due to the problems mentioned above, it is likely to confront some misapplications and a lack of data in communicable diseases notification systems and critical

malfunctions in the filiation processes in health institutions and organizations. In this regard, it is important to eliminate the deficiencies of physicians in this matter and to provide them regular training opportunities. Considering the National Core Education Program, there is a statement related to the skills to be acquired by physicians in the pre-graduate process regarding the notification and reporting of the notifiable diseases: 'They implement the application including even intricate situations/cases' Besides, it is indicated that general practitioners should acquire this competence at the highest level (11). For this reason, faculty of medicine students acquire knowledge and qualifications on the notifiable communicable diseases throughout their undergraduate education. One of the internship programs requiring this kind of notification is the public health internship program. Term VI students prepare seminars related to notifiable diseases and their notification process, discuss them with their advisors based on field applications and some sample cases as well, and make on-site observations on the notification systems throughout primary care field visits, thanks to this program.

When taking into account the lack of knowledge and practical experience of physicians after they had completed their undergraduate education, the requirement of having the highest level of competence about the Core Curriculum of Specialty Branches, and the impact of internship programs on the students, we aimed in this study to evaluate the knowledge and opinions of pre-physicians about the notification process of the notifiable communicable diseases, according to the students' public health internship status.

MATERIALS AND METHODS

Design

The participants of this cross-sectional study consisted of term VI students from one hundred and twenty-six different faculty of medicine, except for 13 interns who had participated in a public health internship program and were involved as a researcher in this study in February 2022. We did not select a sample for this

research. The reason behind this decision was that we aimed to reach the entire population. One hundred and fifteen participants admitted to taking part in this study, and thus the rate of the population reached was 91.2%.

Data collection tool

We used a data collection form consisting of 25 questions prepared by the researchers. Here are the number and content of the questions involved in this form, respectively: Three questions about the knowledge of term VI students on their socio-demographic characteristics such as age and gender, five questions about their opinions on their educational background and internship processes, seven questions about their practical experiences on the notifiable diseases, and ten propositions about their knowledge on the notification and reporting processes of the disease and cases in question. Each correct response to the ten propositions evaluating the participants' knowledge was one point. However, no points were given to the wrong answers and the option of responding with "I don't know". The data were collected in the first two weeks of February 2022 through the observation method of data collection. Kırıkkale University Non-Invasive Research Ethics Committee approval (Decision No: 2022.01.08) and dean's permissions were obtained to conduct the study.

Statistical analysis

Data entry and evaluation in the research were made using the "Statistics Package for Social Sciences" (SPSS 20.0) (Statistical Computer Package Program). Descriptive statistics in the analyses were stated as percentage, mean, median, quartiles, minimum-maximum values, and standard deviation. The conformity of the variables to the normal distribution was checked with Kolmogorov-Smirnov and Shapiro-Wilk tests. Chi-square tests were used to evaluate the difference between groups formed by categorical variables. The Mann-Whitney U test was used for the comparison of independent two-group continuous variables that did not fit the normal distribution, and the Kruskal-Wallis test for the comparison of three or more

variables. Type 1 error value less than 5% was accepted as statistically significant.

RESULTS

The mean age of the 115 students participating in the research was 25.3 ± 2.0 , and the median age was 25. The maximum and minimum ages were 39 and 23, respectively. 60.9% of the participants were female, and 95.7% were citizens of the Republic of Türkiye. The success rates of the participants when they were undergraduate at the Faculty of Medicine were as follows: 2.6% very good, 37.4% good, 47.0% fair, 12.2% poor, and 0.9% very poor. On the other hand, the course attendance rates of the participants were as follows: 20.9% very good, 40.9% good, 27.8% fair, 8.0% poor, and 1.7% very poor, according to their statements (Table 1).

Table 1: Distribution of opinions of faculty of medicine term VI students on socio-demographic characteristics and educational background.

Characteristic	n	%
Gender	Female	70 60.9
	Male	45 39.1
Nationality	Republic of Türkiye	110 95.7
	Other	5 4.3
Faculty of medicine success status	Very good	3 2.6
	Good	43 37.4
	Fair	54 47.0
	Poor	14 12.2
	Very poor	1 0.9
Faculty of medicine attendance status	Very good	24 20.9
	Good	47 40.9
	Fair	32 27.8
	Poor	10 8.7
	Very poor	2 1.7

48.7% of the students stated that they had completed a public health internship program. 51.8%, 33.9%, and 14.3% of these participants evaluated their attendance statuses as very good, good, and fair, respectively. However, no participants were responding with poor or very poor (Table 2).

Table 2: Public health internship program participation and attendance statuses of faculty of medicine term VI students

Characteristic	n	%	
Public health internship program Participation status	Those participating a public health internship program	70	48.7
	Those not participating a public health internship program	45	51.3
Public health internship program Attendance status	Very good	29	51.8
	Good	19	33.9
	Fair	8	14.3

95.6% of the participants stated that they had heard of the term notifiable disease, while only four (3.5%) participants expressed that they had previously reported a notifiable disease.

88.7% of the participants responded to the question "Have you ever heard the term notifiable disease?" by saying yes; however, 11.3% answered no. The response

to the same question of all participants completing their public health internship program and 78.0% of those not receiving this training was yes. We found a statistically significant difference between the status of receiving a public health internship program and of having heard of the term notifiable disease ($p < 0.001$) (Table 3).

Table 3: Distribution of the status of having heard of the term notifiable disease of faculty of medicine term VI students, according to their public health internship program participation status

Public Health Internship Program Participation Status	Status of having heard of the term notifiable disease						p* value
	Yes		No		Total		
	n	%	n	%	n	%	
Yes	56	100.0	-	-	56	100.0	
No	46	78.0	13	22.0	59	100.0	<0.001
Total	102	88.7	13	11.3	115	100.0	

*Chi-square test

The rate of the participants responding to the question "Do you think you can report legally notifiable diseases and cases?" was as follows: 12.2% yes, 61.7% no, and 26.1% neutral, respectively. On the other hand, the rate of the participants having and not having received a public health internship program was as follows: 19.6%

and %5.1% yes, 46.4% and 76.3% no, and 33.9% and 18.6% neutral, respectively. A statistically significant difference was detected between the status of receiving a public health internship program and of having competence in the notification and reporting of legally notifiable diseases and cases ($p = 0.003$) (Table 4).

Table 4: Distribution of faculty of medicine term vi students' opinions on whether they have competence in the notification and reporting of the notifiable diseases, according to their public health internship program participation status

		Competency in the notification and reporting of the legally notifiable diseases and cases								
		Yes		No		Neutral (Neither agree nor disagree)		Total		
Public Health Internship Program participation status		n	%	n	%	n	%	n	%	*p value
	Yes		11	19.6	26	46.4	19	33.9	56	100.0
No		3	5.1	45	76.3	11	18.6	59	100.0	0.003
Total		14	12.2	71	61.7	30	26.1	115	100.0	

*Chi-square test

89.8% of those who had not received a public health internship program stated that this kind of program contributes to the notification and reporting knowledge of the notifiable diseases and cases; however, the rate was 75.0% for those having received the training in question.

Considering the period before the internship, nine (7.8%) participants in this study stated that they had received courses on the notification and reporting of notifiable diseases and cases. The number of participants expressing relevant terms had been mentioned in their courses was as follows: 5 participants in Term III Public Health Course, 1 participant in

Microbiology Course, and 2 participants in Pediatric Course.

What the responsibilities of physicians are for the notification and reporting of notifiable diseases and cases was another question posed to the participants. 75.7% of the participants responded to this question by stating that they are obliged to report notifiable diseases as soon they make a diagnosis. 8.7% of the participants stated that physicians are not responsible; however, 7.8% consider physicians may decide whether they report notifiable diseases and cases based on their will. Apart from these, the rate of the neutral participants was the same as the last one (Table 5).

Table 5: Distribution of faculty of medicine term VI students' opinions on the responsibility of physicians for the notification and reporting of notifiable diseases and cases

What do you think about the responsibilities of physicians for the notification and reporting of notifiable diseases and cases?	n	%
I don't think physicians are responsible for notifiable diseases and cases.	10	8.7
I consider that physicians may decide whether they report notifiable diseases and cases.	9	7.8
I believe that physicians are obliged to report notifiable diseases and cases as soon as they make a diagnosis.	87	75.7
Neutral (Neither agree nor disagree)	9	7.8
Total	115	100.0

82.1% and 69.5% of the participants who had received and not received a public health internship program stated that physicians are obliged to the notification, respectively. There was no statistically significant difference between the opinions of physicians on reporting obligation and the status of having received a public health internship program ($p=0.114$).

As shown in Table 6 when the responses of the participants to the propositions were evaluated, knowledge questions about notification requirements and which institutions are responsible for were answered with a higher percentage. On the other hand, the percentages of the other questions related to notifiable disease groups, their features, and which institutions and

organizations are responsible for them were found to be lower (Table 6).

The mean knowledge score of the students who had received their public health internship program obtained from propositions measuring the knowledge level of the participants on reporting notifiable diseases was 5.9 ± 2.1 , while this score was 4.3 ± 2.1 for those who had not received the internship program in question. A statistically significant difference was found between the knowledge scores of the participants according to their public health internship statuses ($p<0.001$)

(Table 7).

Table 6: Percentage distribution of the faculty of medicine term VI students' responses to the propositions regarding notification and reporting of notifiable diseases and cases

Propositions	Correct answer	Incorrect answer	Do not know the answer
Notifiable diseases are divided into 4 groups.	40.0	0.9	59.1
Group D notifiable diseases can be reported from any health institution.	6.1	14.8	79.1
Notifiable diseases are reported through the system with Form 014.	25.2	0.9	73.9
Cancers are in group C notifiable diseases.	21.7	9.6	68.7
Group B notifiable diseases (such as polomyelitis) must be reported to the Ministry of Health directly and immediately due to having great importance even a single case was seen.	32.2	7.0	60.9
Skin rashes in childhood are some of the notifiable diseases.	73.0	6.1	20.9
University hospitals are not obliged to report notifiable diseases.	80.0	0.9	19.1
The reason behind the reporting of notifiable diseases is only to detect the number of the diseases.	83.5	2.6	13.9
Filiation is carried out in necessary cases by the provincial/district directorate of health and public health center employees of the relevant unit.	79.1	0.9	20.0
Reporting of notifiable diseases and cases are enacted by laws and circulars.	73.0	0.9	26.1

Table 7: Mean±standard deviation, median, and maximum and minimum points of faculty of medicine term VI students about reporting notifiable diseases and cases given below, according to public health internship program participation status

	Mean±standard deviation	Median	Min-Max	*p value
Those having received a public health program	5.9±2.1	6.0	0-10	<0.001*
Those not having received a public health program	4.3±2.1	5.0	0-8	

*Mann-Whitney U Test

DISCUSSION

Considering the reasons behind deaths, communicable diseases remain the most common ones today (12). It is vital to provide all kinds of public health-oriented practices and training at the international level to not only prevent communicable diseases but also control them. For this reason, implementing effective policies on the reporting and control of these diseases is required. In this process, the attitudes of physicians are of great importance (1).

Certain protocols and regulations are the primary tools in our country and almost all around the world to struggle with communicable diseases. However, it is an undeniable fact that physicians constitute one of the most substantial components of this process (1,7). Particularly the attitudes of physicians on how to manage this process as well as the level of knowledge on reporting of notifiable diseases have a direct impact on this matter.

Four hundred general practitioners who attended medical conferences in Iran in 2009 were asked for their opinions on reporting of notifiable communicable diseases, the reasons for non-compliance with notification requirements, and suggestions for improving compliance with reporting. 88% of the participants expressed that they had never heard of any notifiable diseases during their careers. It has been determined that one of the major obstacles in front of reporting is the lack of knowledge on notifiable communicable disease list, and notification requirements as well (13).

In another study conducted in South Africa on the compliance of healthcare personnel and physicians with

the notifiable diseases surveillance system, 58% of the 919 participants stated they had been diagnosed a notifiable disease before, while 92% of them expressed they had reported these diseases. However, it has been determined that only 51% of these notifications have reached the Ministry of Health correctly. The compliance of physicians and healthcare personnels with the surveillance system in South Africa was found to be insufficient in general (14).

In another cross-sectional study conducted in six hospitals, which evaluated the knowledge and attitudes of Jordanian physicians towards the surveillance of communicable diseases, only 27.4% of 223 physicians stated that they had received training on this matter. Many physicians had inadequate knowledge on the surveillance and reporting of communicable diseases and therefore participating in a training program is of vital importance (15).

As in the world, research in Türkiye also emphasizes the need for education. Korkmaz et al. conducted a study at Dicle University Faculty of Medicine in 2015. In this study 85.7% of 105 physicians considered that their knowledge of notifiable communicable diseases was inadequate (10).

In a cross-sectional study conducted in our country, in which the attitudes toward reporting communicable diseases of a group of infectious diseases and clinical microbiology residents and specialists were evaluated, more than 70% of 251 participants stated that they had received training related to notifiable communicable diseases. Besides, only 62.5% of the participants expressed that they had reported all notifiable diseases encountered. However, more than one-fourth of the

participants stated they had entered another diagnosis in order not to fill out the notification form. More than 40% of the physicians participating in the study declared that they did not know what to do after the notification process, and more than half of the participants indicated that they did not consider they had applied the procedure in a suitable way (9). The lack of knowledge and training even observed in physicians who are particularly familiar with the diagnosis and treatment of communicable diseases points out how necessary the training received in the pre-graduate period is.

The process of struggling with infectious diseases is critical in terms of reporting, filtration in the field and filtration to a patient who contacted an infected person, and patient follow-up and contact tracing. Not to mention the role of physicians in this process (2).

It was observed in another cross-sectional study evaluating personnels in charge of the provincial communicable disease control department affiliated with the Ministry of Health that the majority of those working in a managerial position were physicians. Furthermore, physicians in this field had frequently been relocating, and they were semi-skilled and experienced. Based on this, during medical education, providing training for notifiable diseases and certain procedures to be followed and for the responsibilities of physicians is considered necessary (16).

The knowledge level of the participants about the reporting mechanisms and algorithm of notifiable communicable diseases was evaluated in a study conducted with a group of 144 medical faculty students in 2020, consisting of term III and VI students. Compared to term III students, the knowledge level of term VI students about notifiable diseases was found to be higher. However, the mean knowledge score was inadequate (17).

In conclusion, It is obvious that the contribution of the internship period to raising awareness about notifiable diseases and their notification processes is very substantial since intern doctors are likely to see patients and make active notifications based on their job descriptions. In this sense, the importance of public

health internship in terms of observing field applications is also supported by our study. According to the results, all those who participated in a public health internship program have heard of the term notifiable communicable disease. Having heard of this concept and having the competence to notify and report on this issue has made a statistically significant difference in a positive way with participating in a public health internship program. However, considering the percentage of neutral students on the point of feeling competent, some required information and applications about the notifiable diseases should be taken into account while building undergraduate curriculums of the faculty of medicine and setting out the public health internship program. Besides, public health internship programs should be supported by notification processes particularly in clinical branches.

It is seen that receiving a public health internship program made a statistically significant difference in the answers given to the propositions, which had been prepared in compliance with the topics discussed and demonstrated in this program and field visits. Nevertheless, it has been concluded that trainings on notifiable communicable diseases should be updated as supported in the literature in order to reflect this improvement on the skills and practices of physicians in their professional lives.

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TAURİN TEDAVİSİNİN DENEYSSEL MİYOZİT OLUŞTURULMUŞ RATLAR ÜZERİNDEKİ YARARLI ETKİLERİ

Beneficial Effects of Taurine Treatment on Experimental Myositis-induced Rats

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ÖZ

ABSTRACT

Amaç: Taurin iskelet kasında bol miktarda bulunan bir amino asittir. Hücre zarının korunması, anti-inflamatuar ve anti-apoptotik etkiler dahil olmak üzere sitoprotektif özelliklere sahiptir. Bildiğimiz kadarıyla, bu çalışma, taurinin asetik asit ile deneysel olarak oluşturulan miyozitteki kas hasarı ve inflamasyonu azaltmadaki faydalı etkilerini araştırmak amacıyla ilk kez yapılmıştır.

Gereç ve Yöntemler: Çalışmaya 20 haftalık 24 adet Wistar albino türü sıçan dahil edildi. Sıçanlar kontrol grubu (n=8), %1 asetik asit (miyozit) grubu (n=8) ve miyozit + taurin 500 mg/kg/gün grubu (n=8) olmak üzere üç gruba ayrıldı. Miyozit indüksiyonu için %1 asetik asit kullanıldı. Taurin tedavisi 15 gün süreyle yapıldı ve ratlar sakrifiye edildi. Gastrocnemius kası histopatolojik ve immünohistokimyasal olarak değerlendirildi. Elde edilen sonuçlar istatistiksel olarak karşılaştırıldı.

Bulgular: Gruplar arasında konjesyon, dejenerasyon, nekroz, inflamasyon ve dezorganizasyon açısından istatistiksel olarak anlamlı fark vardı (p<0.01). Kaspaz3'te de istatistiksel olarak anlamlı fark vardı. Bu fark histopatolojik karşılaştırmadaki sonuçlara benzer şekilde asetik asit ve taurin grupları arasında p<0.01 idi.

Sonuç: Taurinin anti-inflamatuar ve antioksidan özellikleri, kas hasarının ve inflamasyonun hafifletilmesine önemli katkılarda bulunabilir. Bu çalışmada, asetik asit ile miyozit oluşturulan sıçanlarda yapılan taurin tedavisinin, kas hasarının ve inflamasyonun belirgin bir şekilde azaldığını ve apoptozun baskılandığını gözlemledik. Bu sonuçlar, Taurinin inflamatuvar kas hasarını azaltma konusundaki potansiyel faydalı etkilerini desteklemektedir.

Objective: Taurine is an amino acid abundantly present in skeletal muscle, and it possesses cytoprotective properties, including the preservation of cell membrane integrity, anti-inflammatory, and anti-apoptotic effects. To the best of our knowledge, this study was conducted for the first time to investigate the potential beneficial effects of taurine in reducing muscle damage and inflammation in experimentally induced myositis using acetic acid.

Material and Methods: The study included 24 Wistar albino rats aged 20 weeks. The rats were divided into three groups: a control group (n=8), an acetic acid (myositis) group (n=8), and a myositis + taurine 500 mg/kg/day group (n=8). Acetic acid at a concentration of 1% was used for myositis induction. Taurine treatment was administered for 15 days, after which the rats were sacrificed. The gastrocnemius muscle was evaluated histopathologically and immunohistochemically, and the results were compared statistically.

Results: Significant differences were observed between the groups in terms of congestion, degeneration, necrosis, inflammation, and disorganization (p<0.01). There was also a statistically significant difference in caspase-3 levels. This difference was consistent with the histopathological findings, with p<0.01 between the acetic acid and taurine groups.

Conclusion: Taurines anti-inflammatory and antioxidant properties may significantly contribute to mitigating muscle damage and inflammation. In this study, we observed a marked reduction in muscle damage and inflammation, along with the suppression of apoptosis, in rats with myositis induced by acetic acid following taurine treatment. These findings support the potential beneficial effects of taurine in reducing inflammatory muscle damage.

Anahtar Kelimeler: Taurin, asetik asit, deneysel miyozit, apoptozis, kas hasarı

Keywords: Taurin, acetic acid, experimental myositis, apoptosis, muscle damage



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GİRİŞ

Miyozit, kas dokusunda inflamasyon ve hasara neden olan iltihaplanma veya enfeksiyon gibi çeşitli faktörler sonucu kaslarda gelişebilen bir durumdur. Kas ağrısı, sertliği ve güçsüzlüğe neden olabilen bu durum, birçok etiyolojik faktörün etkisi altında gelişebilir. Miyozit genellikle otoimmün nedenlerden kaynaklanır ve kas güçsüzlüğü en belirgin belirtisidir (1-3). Bu hastalığın çeşitli tipleri ve nedenleri vardır. Juvenil miyozit, dermatomiyozit ve polimiyozit gibi otoimmün bozukluklar bu hastalık grubuna dahildir. Kas hasarı ve inflamasyon, insanların günlük yaşamlarını olumsuz yönde etkileyebilir ve aynı zamanda klinik koşulların bir sonucu olarak ortaya çıkabilir (1-4). Bu kompleks patolojinin anlaşılması ve potansiyel tedavi yaklaşımlarının geliştirilmesi için birçok araştırmacı deneysel modeller kullanmaktadır (4-6).

Deneysel miyozit, laboratuvar ortamında, kas hasarı ve inflamasyonun kontrollü bir şekilde oluşturulmasını sağlar. Bu miyozit modelleri, kas hastalıkları, inflamasyon mekanizmaları ve tedavi stratejileri hakkında daha fazla bilgi edinmek için kullanılabilir. İnsan hastalıklarının tamamına sahip olmayan bu modeller, inflamatuvar kas hastalığının patofizyolojik mekanizmaları hakkında fikir verebilirler (5,6).

İnsan miyoziti için kullanılan hayvan modelleri arasında spontan, indüklenmiş ve transgenik modeller bulunmaktadır (4-7). Ayrıca, kas dokusunda hasar ve inflamasyon oluşturmak için bir kimyasal madde kullanarak deneysel miyozit modeli oluşturulabilir. Örneğin kimyasal madde olarak asetik asit kullanılabilir. Asetik asit, kas hücrelerinin zarını tahrip eder ve hücre içi bileşenlerin dışarı sızmasına ve hücrelerin ölmesine neden olarak kas dokusunda inflamasyona yol açar. Bu durum, bağışıklık sisteminin zarar görmüş kas dokusunu algılamasına ve inflamatuvar yanıtı tetiklemesine neden olur. İmmün hücreler, kas dokusuna göç eder ve inflamasyonu artırır. Asetik asidin sebep olduğu hücresel hasar ve inflamasyon sonucunda kas dokusu da zarar görür (8,9).

Miyozit tedavisi, miyozitin etyopatogeneze ve şiddetine göre değişir. Bağışıklık sistemini baskılayan

ilaçlar, antiinflamatuvar ilaçlar, antibiyotikler ve miyozitin nedenine bağlı olarak, diğer ilaçlar da kullanılabilir (10,11). Örneğin, dermatomiyozit gibi otoimmün bir hastalıktan kaynaklanan miyozitte, immün sistemi baskılayan ilaçlar kullanılabilir. Miyozit tedavisinde kullanılan tedaviler; fizik tedavi, iş terapisi ve bazı durumlarda miyozitli kasların cerrahi olarak çıkarılması olabilir. Miyozit tedavisinde kullanılan ilaçlar ve tedaviler ile gösterebilen potansiyel ve yararlı etkiler; kas ağrısını ve iltihaplanmayı azaltmak, kas gücünü, hareketliliği ve yaşam kalitesini iyileştirmektir (10-12).

Taurin (2-aminoetansülfonik asit), vücuttaki en bol bulunan kükürt içeren serbest amino asitlerden biridir ve bir dizi biyolojik işlevi vardır. Hem vücut tarafından sentezlenebilir hem de diyet yoluyla alınabilir ve kas, beyin, karaciğer, retina, kardiyovasküler sistemi ve üreme sistemi gibi önemli organ ve sistemlerde çeşitli kilit roller üstlenir. Taurin, safra asidi konjugasyonundan, kalsiyum dengesinin korunmasına, osmoregülasyona ve hücresel membran stabilizasyonuna kadar pek çok temel biyolojik süreçte önemli bir işleve sahiptir (13-15). Taurin aynı zamanda hücresel gelişim ve düzenleme, hücresel hacmin kontrolü, stres tepkilerine karşı antioksidan savunma ve kalsiyum dengesinin sağlanması gibi bir dizi önemli hücresel süreçte de etkili bir rol oynar. Ayrıca, apoptozun zayıflaması ve antioksidan aktivitesi, taurinin sitoprotektif etkileri için çok önemli görünmektedir. Taurinin anti-inflamatuvar ve antioksidan özellikleri, kas hasarının ve inflamasyonun hafifletilmesine yardımcı olabileceğini düşündürmektedir (14-16).

Taurinin antioksidan özelliklere sahip olduğu ve oksidatif stresi azaltabileceği öne sürülmüştür. Bu nedenle, inflamatuvar hücreler gibi oksidanlara maruz kalan dokularda taurinin potansiyel olarak anti-inflamatuvar etkilere sahip olabileceği düşünülmektedir (16). Bu çalışmanın amacı, asetik asit ile miyozit oluşturulan sıçanlarda, kas hasarının iyileştirilmesine potansiyel katkıda bulunabilecek taurinin etkilerini histopatolojik ve immünohistokimyasal yöntemlerle incelemektir. Bu çalışma, taurinin miyozit tedavisindeki

yararlı etkilerini ilk kez deneysel bir modelde immunhistokimya ile arařtırmaktadır ve bu çalıřma aynı zamanda immunhistokimyanın bu bağlamdaki ilk uygulamasını sunmaktadır. Bu da yeni tedavi stratejileri geliřtirme konusunda önemli bir adım olabilir.

GEREÇ VE YÖNTEM

Bu deneysel çalıřma, Sađlık Bilimleri Üniversitesi Ankara Eđitim ve Arařtırma Hastanesi Hüsnü Sakal Deneysel ve Klinik Uygulama Merkezi'nde gerçekleřtirilmiřtir. Deneysel protokoller için Yerel Hayvan Deneyleri Etik Kurulu'ndan 724/2023 protokol numarası ile onaylı etik izin belgesi alınmıřtır. Deneyde kullanılan Wistar Albino ratlar, Saki Yenillli Tıbbi Deney Hayvanları Merkezi'nden (Ankara, Türkiye) temin edilmiřtir. Ratların bakımı ve uygulamaları ulusal (Laboratuvar Hayvanlarının Bakımı ve Kullanımı Kılavuzu) ve uluslararası (Hayvanlar ile yapılan Biyotıp Arařtırmalarında Uluslararası Rehber İlkeler) yasal düzenlemelere tam uygunluk göstermektedir.

Deney Tasarımı

Çalıřmada kullanılan ratlar, daha önce herhangi bir deneyde yer almamıřlardır. Arařtırma öncesinde hayvanlar, laboratuvarın iklim kontrolü sađlanmış standart hayvan barındırma kořullarında, en az on dört gün süresince bu kořullara uyum sađlamaları için tutulmuřlardır. Ratların hepsi günlük periyodik aralıklarla bir veteriner hekim tarafından fiziksel olarak muayene edilmiřtir. Her bir kafeste 2-3 hayvanın bulunduđu odalarda, 12 saatlik aydınlık (06:00 - 18:00) ve 12 saatlik karanlık döngüsüne tabi tutulmuřlardır. Bu odalarda, 20-23°C sıcaklık ve %65-70 nem seviyesini sađlayan standart laboratuvar kořulları oluřturulmuřtur. Ratların beslenmesinde herhangi bir yem veya su kısıtlaması uygulanmamıř ve standart pellet yem ile taze su, ad libitum (istedikleri kadar) prensibiyle sađlanmıřtır.

Deneysel model olarak, 250-350 gram ađırlığında ve 20 haftalık olan 24 yetiřkin Wistar albino türü rat çalıřmaya dahil edilmiřtir. Ratlar, kontrol ve tedavi gruplarındaki rat ađırlıklarının dađılımına mümkün olduđunca yakın olacak řekilde gruplandırılmıřtır. Çalıřmada, kontrol

(n=8), asetik asit ile indüklenmiř tedavisiz miyozit (miyozit) (n=8) ve miyozit+taurin (n=8) olmak üzere üç grup bulunmaktadır. Kontrol grubunda (Grup 1), hiçbir iřlem yapılmamıř ve 14 gün sonra kas dokusu çıkarılmıřtır. Miyozit grubunda (Grup 2), miyozit modelini oluřturmak için %1'lik konsantrasyonda asetik asit (Norateks®, Derkim Lab, İstanbul, Türkiye) kullanılarak 0.2 ml hacimde intramusküler olarak verilmiřtir. Son olarak, miyozit+taurin grubunda (Grup 3), %1'lik asetik asit intramusküler olarak verilmiř ve 500mg/kg/gün dozunda 0.5 ml taurin salin ile seyreltilerek 14 gün boyunca uygulanmıřtır. Taurin tozu (Farmatek Kimya, İstanbul/Türkiye-TR-34-K062203), orogastrik uygulama öncesinde salin ile ölçek başına 3 g oranında seyreltilmiřtir.

Bu çalıřmada kullanılan %1 asetik asit ve taurin dozları, Deney Hayvanları Yerel Etik Kurulu gereklilikleri dođrultusunda yürütölen yayımlanmamıř bir ön çalıřma ile belirlenmiřtir. Ratlarda gastroknemius kasında miyozit oluřturuldu. Miyoziti tetiklemek için, hayvanın sađ arka ekstremitesinin dorsal bölgesi trařlandı ve bu bölgeye asepsi yapıldı. Daha sonra insülin řırıngası ile 0.2 ml hacminde %1'lik asetik asit, sađ arka ekstremitedeki gastroknemius kasına intramusküler olarak enjekte edildi. Miyozit yalnızca bir kez tetiklendi (17).

Çalıřma bitiminde analiz için numune elde etmek amacıyla hayvanlara 15. günde ötenazi yapıldı. Tüm gruplardaki hayvanlar yüksek doz anestezik Xylazine (Rompun®, Bayer, İstanbul, Türkiye) uygulanarak servikal dislokasyon yöntemiyle sakrifiye edildi. Hemen ardından histopatolojik ve immünhistokimyasal inceleme için gastroknemius kas dokusu örnekleri alınarak deney sonlandırıldı.

Histopatolojik Deđerlendirme

Gastroknemius kas dokuları, %10 nötral tamponlu formalin (pH 7.2-7.4) içinde fikse edildi ve rutin patoloji protokolüne uygun olarak iřlendi. Dokular alkolde dehidrate edilerek řeffaflık elde etmek için ksilol ile iřlendi ve parafin bloklara gömüldü. Bloklar, oda sıcaklığında donduruldu ve buzdolabında sođutuldu.

Soğutma işlemi sonrasında mikrotom ile beş µm kalınlığında kesitler alındı ve deparafinize edildi. İlk üç ve her onuncu kesit Leica RM 2125 RT ile lam'lara monte edildi. Kesitler, alkol ve ksilol serilerinden geçirildi ve Hematoksilen ve Eozin boyası (H&E) ile boyandı. Tüm boyalı kesitler, bir veteriner patolog tarafından Işık mikroskobu (Olympus BX-50, Tokyo, Japonya) altında x 40-400 büyütmede incelendi ve skorlandı. Çizgili kas dokusu histopatolojik olarak kas liflerinin dejenerasyonu, vasküler konjesyon, kas liflerinde nekroz belirtileri (liflerde düzensiz eozinofili, lifler arasındaki bağlantıların kaybı), kas liflerinin düzensizliği (çizgilerin kaybı, kas lifleri arasındaki bağ dokusunda artış) ve enflamasyon belirtileri (mononükleer hücre infiltrasyonu) açısından değerlendirildi. Bulgular, yarı kantitatif bir skorlama sistemi kullanılarak değerlendirildi ve 0 (Normal, yapısal değişiklik yok) ile 3 (Şiddetli yapısal değişiklikler) arasında puanlandı (Şekil 1) (18).

İmmünohistokimyasal Değerlendirme

Kas kesitlerinde Kaspaz3 (Caspase3) reseptör aktivitesi immünohistokimyasal yöntemlerle incelendi. Parafin bloklardan 5 µm kalınlığında kesitler hazırlandı ve Avidin Biotin Kompleks (ABC) tekniđi uygulandı. Antijen retrieval işlemi mikrodalga fırında 700 W gücünde ve pH 6.0 sitrat tampon solüsyonunda 10 dakika süresinde gerçekleştirildi. Dokulardaki endojen peroksidadz aktivasyonu metanol içinde 0.01 mol/l Fosfat Tamponlu Salin (PBS) içinde %0.3 hidrojen peroksit (H₂O₂) ile 15 dakika boyunca bloke edildi. Kesitlerin primer antikor uygulanmadan önce protein blokajı %5 normal keçi serumu ile 20 dakika süresince yapıldı. Kesitler, Kaspaz3 (1:50) primer antikorları ile bir saat süresince inkübe edildi. Bağlanmamış primer antikor uzaklaştırıldıktan sonra kesitler biotinlenmiş sekonder antikor ile 30 dakika boyunca reaksiyona sokuldu. Daha sonra, kesitler 5 dakika süresince DAB kromajen ile inkübe edildi. Son olarak, kesitlerin arka planı hematoksilen ile boyandı. Tüm adımlar nemlendirilmiş bir odada 37°C'de gerçekleştirildi ve tüm yıkamalar PBS kullanılarak yapıldı.

Histolojik preparatların immünoreaktivitesi, modifiye edilmiş yarı kantitatif bir ölçek kullanılarak boyanma derecesine göre değerlendirildi [(-): İmmün boyama yok, (+): Zayıf boyama, (++) Orta derecede boyama, (++++): Yoğun boyama]. Kesitler, Olympus BX-50 model ışık mikroskobu ile görüntüldü (Şekil 2).

İstatistiksel Değerlendirme

Elde edilen veriler, analiz için Statistical Package for Social Sciences for Windows SPSS 24.0 (SPSS sürüm 24.0, SPSS Inc., Chicago, IL) yazılımı kullanılarak bilgisayar ortamında işlendi. Çalışma verilerinin sayısal dağılımları, Shapiro-Wilks testi ile normal dağılıma uygunluk açısından değerlendirildi. Normal dağılım göstermeyen değişkenlerin tanımlayıcı istatistiklerini sunmak için medyan (minimum; maksimum) kullanıldı. Ortalama±standart sapma değerleri ek bilgi olarak sunuldu.

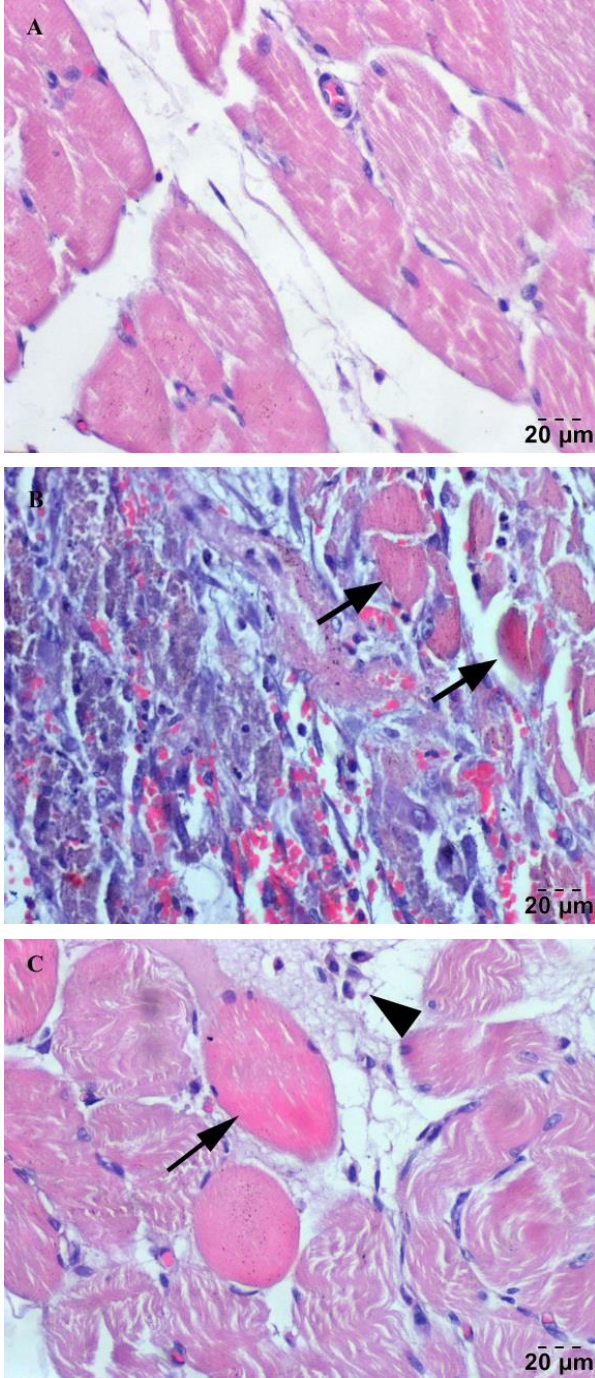
Dağılım analizi sonucunda, grupların konjesyon, dejenerasyon, nekroz, inflamasyon, disorganizasyon ve Kaspaz3 açısından normal dağılım göstermediđi tespit edildi (Shapiro-Wilk test; p<0.05). Bu nedenle gruplar arası karşılaştırmalarda Kruskal-Wallis testi kullanıldı. Ayrıca, eşleştirilmiş gruplar arasındaki karşılaştırmalar için Mann-Whitney U testi uygulandı. İstatistiksel olarak anlamlılık düzeyi (p) 0.05 olarak belirlendi

BULGULAR

Taurin tedavisi, miyozit oluşturulmuş ratlarda kas hasarını, inflamasyonunu ve apoptozu önemli ölçüde azalttı. Taurin tedavisi alan ratlarda, kontrol grubundaki ratlara göre kas hasarı skorları %50, inflamasyon skorları %70 ve apoptoz oranı %30 oranında azaldı.

Kontrol (Resim 1A) grubunda Hematoksilen-Eozin boyama ile kas dokusu normal görünüme sahipti. Mononükleer hücre infiltrasyonu, miyofibrillerde dejenerasyon, bağ dokusunda artış gösteren disorganizasyon, nekroz ve vasküler konjesyon bulguları saptanmadı. Miyozit grubunun kas dokularında; mononükleer hücre infiltrasyonu, hemorajı, miyofibrillerde dejenerasyon, disorganizasyon, nekroz ve vasküler konjesyon gözlemlendi

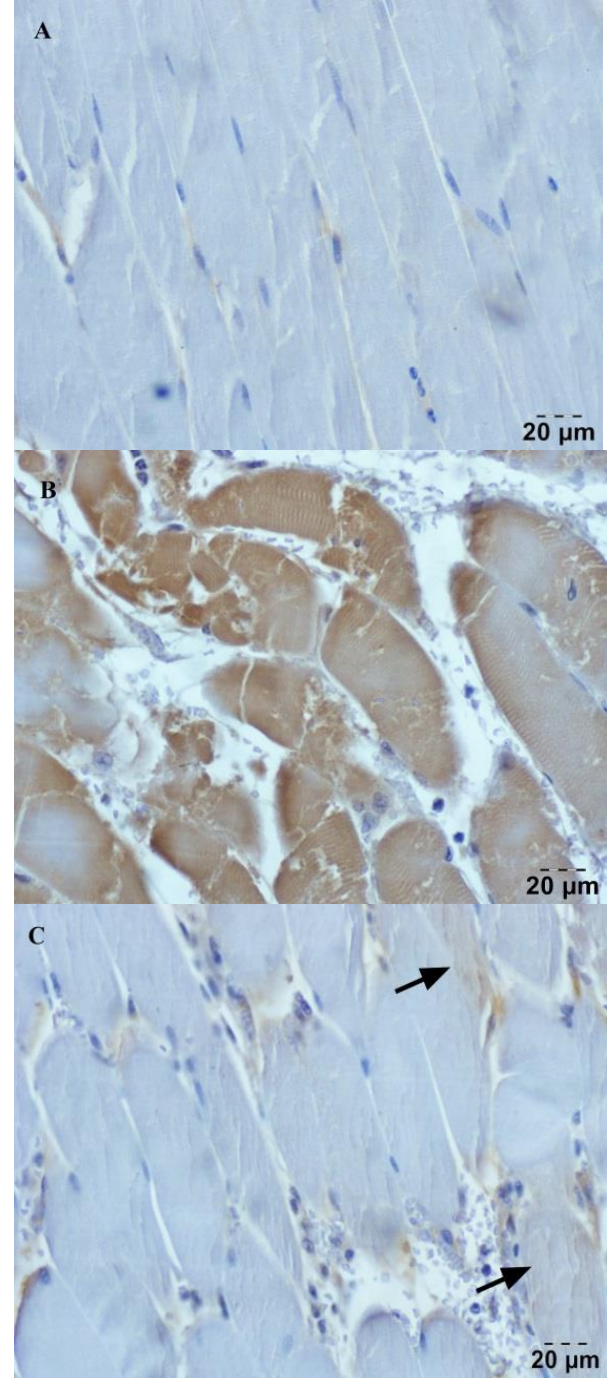
(Resim 1B). Miyozit+taurin grubunda kas örnekleri incelendiğinde, miyozit grubuna kıyasla konjesyon, miyofibriller disorganizasyon, nekroz, enflamasyon ve dejenerasyon bulgularının hafiflediđi ve iyileşmelerin olduđu tespit edildi (Resim 1C).



Resim 1: Tüm grupların kas dokularının histopatolojik görünümü. **1A:** Kontrol grubu (H&E). **1B:** AA ile indüklenen miyozit grubu; oklar şiddetli dejeneratif kas inflamasyonunu gösterir (H&E). **1C:** Miyozit+ Taurin grubu; ok tek dejeneratif hücreleri ve ok başı hafif enflamasyonu göstermektedir (H&E).

Kaspaz3 ile apoptoz değerlendirilmesinde, Kaspaz3 immünoaktivitesi açısından kontrol grubunda hiçbir

pozitiflik gözlenmezken (Resim 2A), Kaspaz3 immünoaktivitesi açısından miyozit grubunda güçlü pozitiflik tespit edilmiştir (Resim 2B). Miyozit+taurin grubunda ise Kaspaz3 immünoaktivitesinde hafif pozitiflik gözlenmiştir (Resim 2C).



Resim 2: Tüm grupların immünohistokimyasal değerlendirme bulguları. **2A:** Kontrol grubunda Kaspaz3 immünoaktivitesi için pozitiflik gözlenmedi (immünonegatif). **2B:** Miyozit grubunda Kaspaz3 immünoaktivitesi için güçlü pozitiflik tespit edildi (güçlü immünopozitif); Kaspaz3 immünoaktivitesi yok. **2C:** Miyozit+ Taurin grubu; hafif pozitif (ok) Kaspaz3 immünoaktivitesi.

Histopatolojide mikroskopik olarak elde edilen veriler arasındaki karşılaştırmalar sonucunda, konjesyon, inflamasyon, dezorganizasyon, nekroz ve dejenerasyon açısından gruplar arasında istatistiksel olarak anlamlı fark bulunmuştur ($p<0.01$). Bu farklar, Mann-Whitney U testi kullanılarak kontrol ve miyozit grupları ($p<0.01$),

kontrol ve taurin grupları ($p<0.01$) arasında ortaya çıkmıştır. Ayrıca, miyozit ve taurin grupları arasında inflamasyon parametresinde ($p<0.05$) ve diğer parametrelerde ($p<0.01$) istatistiksel olarak anlamlı farklar belirlenmiştir. İlgili histopatolojik sonuçlar Tablo 1'de sunulmuştur.

Tablo 1: Kontrol ve deney gruplarına ait gastrocnemius kas dokularının histopatolojik değerlendirme sonuçları.

Histopatoloji	Kontrol (n=8)		Asetik Asit (n=8)		Taurin (n=8)		P	Grupların istatistiksel karşılaştırması *
	Ortanca	Min.-Maks.	Ortanca	Min.-Maks.	Ortanca	Min.-Maks.		
Konjesyon	0	0-1	2	1-3	0	0-1	0.0001**	Grup 1-2 p=0.0001 Grup 2-3 p=0.001
Dejenerasyon	0	0-0	2	2-3	1	0-1	0.0001**	Grup 1-2 p=0.0001 Grup 1-3 p=0.009 Grup 2-3 p=0.0001
Nekroz	0	0-0	2	1-3	1	0-1	0.0001**	Grup 1-2 p=0.0001 Grup 1-3 p=0.009 Grup 2-3 p=0.001
İnflamasyon	0	0-0	2	2-3	0.5	0-1	0.0001**	Grup 1-2 p=0.0001 Grup 1-3 p=0.025 Grup 2-3 p=0.001
Disorganizasyon	0	0-0	2	2-3	0	0-1	0.0001**	Grup 1-2 p=0.0001; Grup 2-3 p=0.0001

*Mann Whitney U testi $p<0.01$, ** Kruskal Wallis test, $p<0.01$

Ayrıca, Kaspaz3 ile yapılan apoptotik hücre ölçümleri sonuçları, gruplar arasında istatistiksel olarak anlamlı farklar göstermiştir ($p<0.001$). Bu farklar, kontrol ve asetik asit grupları ($p<0.01$), Kontrol ve taurin grupları ($p<0.01$) ile asetik asit ve taurin grupları ($p<0.01$) arasındaki farklardan kaynaklanmaktadır (Tablo 2).

Tablo 2: Deney gruplarının gastroknemius kas dokularından elde edilen immünohistokimyasal değerlendirme sonuçları

İmmünohistokimya	Kontrol (n=8)		Asetik Asit (n=8)		Taurin (n=8)		P	Grupların istatistiksel karşılaştırması *
	Ortanca	Min.-Maks.	Ortanca	Min.-Maks.	Ortanca	Min.-Maks.		
Kaspaz3	0	0-0	3	3-3	1	0-1	0,0001**	Grup 1-2 p=0.0001 Grup 1-3 p=0.009 Grup 2-3 p= 0.0001

*Mann Whitney U testi $p<0.01$, **Kruskal Wallis test, $p<0.01$

TARTIŞMA

Miyozit, kas dokusundaki inflamasyon ve hasara neden olan bir durumdur ve birçok etiyolojik faktörün etkisi altında gelişebilir. Kas hasarı ve inflamasyon, insanların günlük yaşamlarını olumsuz etkileyebilir ve klinik koşulların bir sonucu olarak ortaya çıkabilir (1-3). Özellikle inflamasyonun azaltılması, kas ağrısını ve iltihaplanmayı azaltarak kas fonksiyonunu ve yaşam kalitesini iyileştirebilir (19). Biz bu çalışmada, taurinin kas hasarı ve inflamasyon üzerindeki potansiyel tedavi etkinliği, Asetik asit ile miyozit oluşturulan bir rat modeli kullanılarak değerlendirdik. Çalışmamızda miyozitli ratlarda taurin tedavisinin kas dokusunu iyileştirdiği ve inflamasyonu azalttığını gözlemledik ($p<0.01$). Ayrıca, apoptoz sürecini azalttığı düşünülen Kaspaz3 immünoaktivitesinde de benzer sonuçlar elde edildi. Çalışmamız, taurinin miyozite karşı potansiyel yararlı bir tedavi seçeneği olarak değerlendirilebileceğini göstermektedir.

Miyozitin altında yatan mekanizmaları daha iyi anlamak için deneysel miyozit modelleri oluşturulabilir. Hurme T. ve arkadaşları ratlarda yaptıkları çalışmalarında, yaylı çekiçle oluşturulan gastroknemius kas hasarının iyileşmesini ultrastrüktürel ve immünohistokimyasal olarak değerlendirdiler (20). Deneysel olarak kas hasarı oluşturulmuş modellerde, bu hasara karşı yararlı etkilerin araştırıldığı başka çalışmalar da vardır. Sikorska ve arkadaşlarının çalışmasında, kardiyotoksin injeksiyonu ile iskelet kasında hasar oluşturulan rat modelinde β -escin'in iskelet kası rejenerasyonu üzerindeki etkileri araştırmıştır. Bu çalışmada elde edilen bulgular β -escin'in kas gelişimini desteklediğini göstermektedir. β -escin'in kas rejenerasyonunda,

özellikle de zayıf rejenerasyon olan yavaş kasılan kaslarda yararlı rolünü ortaya koymaktadır (21). Biz de çalışmamızda asetik asit ile oluşturulan deneysel miyozitte taurinin yararlı etkilerini benzer şekilde değerlendirdik. Çalışmamızda, iskelet kası kesitlerinin histopatolojik incelemesinde, Miyozit oluşturulan grupta gastroknemius kasında kas liflerinin yapısında düzensizlik, dejenerasyon, inflamatuvar hücre infiltrasyonu, vasküler konjesyon ve yoğun ödem gözlemledik. Miyozit oluşturulan ve taurin uygulanan grupta ise histopatolojik kesitlerde kas dokusundaki dejenerasyon, inflamatuvar hücre infiltrasyonu ve vasküler konjesyonda anlamlı bir azalma tespit ettik. Grupların istatistiksel karşılaştırmasında, miyozit+kontrol ve miyozit grupları arasında istatistiksel olarak anlamlı farklılık ($p<0.01$) bulundu. Bu sonuçlar, çalışmamızın diğer literatürdeki benzer çalışmalardan farklı olarak taurinin miyozit tedavisindeki özgün etkilerini vurgulamaktadır.

Taurin, iskelet kas fonksiyonlarını modüle eder. Bu, kalsiyum sinyal yolu üzerinden AMP ile aktive olan protein kinazın aktivasyonu yoluyla mitokondriyal ve solunum metabolizmasıyla ilişkili genlerin ve proteinlerin ekspresyonunun uyarılması ile olur (22). Taurin eksikliği kas iletkenliğini azaltabilir ve miyozit ile kas hasarı gibi durumlarda potansiyel faydalar sunar. Taurin, anti-inflamatuvar, antioksidan ve kas onarıcı özelliklere sahip bir bileşiktir ve kas ağrısını hafifletebilirken kasların daha hızlı iyileşmesine yardımcı olabilir (23). Bu bağlamda, De Carvalho FG. ve arkadaşlarının yaptığı bir çalışma, taurinin egzersiz performansı ve kas hasarı üzerindeki olası etkilerini incelemiştir. Çalışma, taurin ve çikolata süt

takviyelerinin atletlerde oksidatif stresi azaltma ve protein metabolizması belirteçleri ile aerobik parametreler üzerinde olumlu etkiler yaratabileceđini göstermektedir (24). Ghosh ve arkadaşlarının yürüttüğü bir diđer çalışmada ise, Streptozotosin ile diyabet oluşturulan Wistar sıçanlarda taurinin testis fonksiyon bozukluklarına karşı potansiyel yararlarını araştırmışlardır. Streptozotosin tarafından tetiklenen diyabet, sıçanların testislerinde oksidatif ve endoplazmik retikulum stresi yoluyla fonksiyon bozukluklarına yol açmıştır. Çalışmada, diyabetin indüksiyonunu takiben 6 hafta boyunca 100 mg/kg dozunda taurin uygulanmış ve elde edilen sonuçlar, taurinin bu komplikasyonları başarılı bir şekilde düzeltebileceđini göstermektedir (25). Taurin tedavisinin miyozit oluşturulan kaslardaki etkilerini deđerlendirdiđimiz çalışmamızda, özellikle konjesyon, inflamasyon, dezorganizasyon, nekroz ve dejenerasyon gibi histopatolojik parametrelerde sonuçlarımız gruplar arasında anlamlı farklar olduđunu göstermektedir ($p<0.01$). Taurin, kas hasarı ile ilgili potansiyel yararlar sunmaktadır ve özellikle anti-enflamatuar etkisi sayesinde inflamasyonun azaltılmasına yardımcı olmaktadır. Sonuçlarımız, kas dokusundaki inflamasyonun hafifletilmesinin miyozit semptomlarının ve kas ağrısının azaltılmasına katkı sağlayabileceđini göstermektedir. Ayrıca, taurinin antioksidan etkisi kas hücrelerini oksidatif stresten koruyarak serbest radikal hasarını engelleyebilir ve kasların daha hızlı iyileşmesine yardımcı olabilir.

Kas yaralanması veya hasarı, apoptozisin artmasına neden olabilir. İyileşme sürecinin nasıl gerçekleştiđini anlamak ve kasların tamir edilmesine yardımcı olacak stratejiler geliştirmek için apoptozis çalışmaları önemlidir. Örneđin, Jin H. ve ekibi, brakial pleksus hasarı nedeniyle oluşan atrofik iskelet kasında apoptozu incelemişler ve atrofiye uğramış kas dokusunda sağlıklı kas dokusuna göre belirgin bir apoptotik hücre artışı tespit etmişlerdir (26). Benzer şekilde, Schneider C. ve arkadaşları, Lewis ratlarında deneysel otoimmün miyozit modeli kullanarak T hücrelerinin dođal apoptoz oranını incelemişler ve inflamasyonlu kas dokusunda T

hücrelerinin dođal apoptoz oranının düşük olduđunu gözlemlemişlerdir. Ancak, glukokortikosteroid tedavisi sonrası apoptoz gösteren T hücrelerinde belirgin bir artış görmüşlerdir, bu da glukokortikosteroidlerin inflamatuvar aktiviteyi azaltmada etkili bir mekanizma olabileceđini öne sürmektedir (27). Torlak Koca ve arkadaşlarının çalışmaları, valproik asit ile miyozit oluşturulan ratlarda Kalsitriol'ün kas dokularındaki iyileştirici etkilerini araştırmışlardır. Bu çalışmada, kontrol, miyozit ve tedavi grupları arasında konjesyon, dejenerasyon, nekroz, inflamasyon ve dezorganizasyon açısından anlamlı farklar tespit edilmiş ve ayrıca Kaspaz3 düzeylerinde de anlamlı farklılık gözlenmiştir. Özellikle Valproik Asit ve Kalsitriol grupları ile diđer gruplar arasında bu farklar belirgin olarak ortaya çıkmıştır ($p<0.01$) (28). Bizim çalışmamızda da apoptoz sonuçları literatürdeki çalışmalara benzer şekildedir. Çalışmamızda taurin tedavisinin miyozitli sıçanlarda kas apoptozunu azalttığı gösterildi ($p<0.01$). Apoptotik hücre ölçümleri Kaspaz3 ile gerçekleştirildi ve sonuçlar, kontrol ve asetik asit grupları ($p<0.01$), kontrol ve taurin grupları ($p<0.01$) ve asetik asit ve taurin grupları arasındaki farkları yansıtmaktadır ($p<0.01$).

Bu çalışmanın bazı limitasyonları mevcuttur. Örneđin, farklı taurin dozları ve uygulama sürelerinin etkileri deđerlendirilmemiştir. Ayrıca, insanlarda kullanılabilir dozların belirlenmesi için daha fazla prelinik ve klinik çalışmaya ihtiyaç vardır. Çalışmamız kısa vadeli bir perspektife sahiptir ve uzun vadeli etkileri deđerlendirmek için daha uzun süreli çalışmalara ihtiyaç duyulmaktadır. Son olarak, taurin tedavisinin insanlardaki miyozit üzerindeki etkilerini deđerlendirmek için daha fazla araştırmaya ihtiyaç vardır.

Sonuç olarak, bu çalışma, taurinin miyozite bađlı inflamatuvar kas hasarını azaltma potansiyeline işaret etmektedir. Elde edilen bulgular, taurinin kas hasarı, inflamasyon ve apoptotik hücre ölümünü azaltmada etkili olabileceđini göstermektedir. Bu, miyozit tedavisine yönelik yeni bir potansiyel yaklaşım sunabilir. Ancak, bu çalışmanın sınırlamaları ve daha

fazla araştırma ihtiyacı göz önüne alındığında, taurinin klinik uygulamalardaki kullanımını ve insanlar üzerindeki etkilerini belirlemek için daha fazla çalışmaya ihtiyaç vardır. Taurinin miyozit tedavisindeki potansiyel kullanımı üzerine daha fazla araştırma, bu alandaki bilgi birikimini artırabilir ve hastaların yaşam kalitesini iyileştirmeye katkıda bulunabilir.

Çatışma Beyanı: Yazarlar arasında herhangi bir çıkar çatışması bulunmamaktadır.

Katkı Oranı Beyanı: Ana Fikir/Planlama: NTK, TOC; Analiz/Yorum: NTK, TOC; Veri sağlama: NTK; Makale yazımı: NTK, TOC; Gözden geçirme ve düzeltme: NTK; Onaylama: NTK, TOC.

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GÖÇÜN HASSAS GRUPLARA ETKİSİ

Impact of Migration on Vulnerable Groups

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ÖZ

Tarih boyunca, her dönem ve coğrafyada göç olgusu karşımıza çıkmaktadır. Göç, ekonomik, siyasi, sosyo-kültürel ve doğal nedenlerle gerçekleşebilmektedir. Göçler zorunlu, isteğe bağlı, düzenli veya düzensiz olarak sınıflandırılabilir. Göçün gerek göç eden kişi ve kişiler üzerinde gerek ise göç edilen toplum üzerinde pek çok etkisi vardır. Ekonomik, toplumsal ve psikososyal etkiler en çok hassas grupları etkilemektedir. Özellikle kadın, çocuk, yaşlı ve engelli bireyler temel sağlık hizmetlerine erişmekte güçlük çekmekte, pek çok fiziksel sağlık sorunları yaşamakta, bulaşıcı ve kronik hastalıklar ile mücadele etmekte ve yetersiz beslenmektedirler. Ayrıca, göç edilen kültürlere uyum sağlamada zorlanmakta ve psikolojik anlamda ciddi olarak etkilenmektedirler. Bu derlemede; göçün çeşitleri, nedenleri ve hassas gruplar üzerine etkileri ayrıntılı olarak ele alınmaktadır.

Anahtar Kelimeler: Halk sağlığı, göç ve göçmenlik, hassas popülasyonlar

ABSTRACT

Throughout history, we encounter the phenomenon of migration in every period and geography. Migration can occur for economic, political, socio-cultural and natural reasons. Migration can be classified as forced, voluntary, regular or irregular. Migration has many effects on both the migrant and the society to which they migrate to. Economic, social and psychosocial impacts affect vulnerable groups the most. In particular, women, children, the elderly and persons with disabilities have difficulties in accessing basic health services, experience many physical health problems, struggle with infectious and chronic diseases and are malnourished. In addition, they have difficulties in adapting to the cultures they migrate to and are severely affected psychologically. In this review, the types, causes and impacts of migration on vulnerable groups are discussed in detail.

Keywords: Public health, emigration and immigration, vulnerable populations



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GİRİŞ

Göç olgusu, insanlığın en eski tarihlerinden bu yana süregelen ve gelecekte de devam edecek olan, dünyanın her yerinde görülebilecek bir durumdur (1).

Göç Nedir?

Uluslararası hukukta net olarak tanımlanmayan göç; kişinin çeşitli nedenlerle bir ülke içinde başka bir yere veya uluslararası bir sınırı geçerek başka bir ülkeye gitmek suretiyle, geçici veya kalıcı olarak mutlak ikametgahından ayrılması olarak tanımlanabilir (2).

Göç Türleri

Göçler; isteğe bağlı ya da zoraki göç, devamlı ya da geçici göç, iç ya da dış (uluslararası)göç, bireysel ve toplu, iklim kaynaklı, ekonomik kaynaklı, siyasi kaynaklı, eğitim kaynaklı göç, beyin göçü, emekli göçü gibi birçok türden oluşmaktadır (3).

Göç Nedenleri

İnsanın iradesi dışında gelişen doğa olayları tarihsel süreç içerisinde göçün en önemli nedenlerini oluşturmuşken, sanayi devrimi sonrasında ekonomik, siyasi ve sosyal nedenler göçün en önemli nedeni haline gelmiştir (4).

1.Ekonomik Nedenler

Yoksulluk, kötü ekonomik koşullar, nüfus artışı, kötü iklim koşulları ve doğal afetler sonucu daha iyi yaşama koşullarına sahip olma isteği, kişileri kırsal alanlardan kentlere çekmektedir (1).

2.Siyasi Nedenler

Savaş, terör, bazı siyasi anlaşmalar, ihtilaller, sürgünler vb. durumlar göçlere sebep olmaktadır (5). Savaşlar ve bunun sonucunda insanlık dışı muameleler, işkenceler ve hatta katliamlar göçün en önemli nedenlerindedir. Terör ise insanların mal, can, çevresel, bireysel, ailesel güvenliğinin yitirildiği bir sorundur (1).

3.Sosyal ve Kültürel Nedenler

Göçün sosyokültürel nedenleri arasında ilk sırada eğitim yer almaktadır. Kentlerin eğitim şartlarının kırsal alanlara göre daha iyi olması, kişilerin kentlere veya başka ülkelere göç etme kararlarını etkilemektedir (5). Bir diğer sosyal faktör de dini sebeplerdir. Kişilerin din değiştirmeye zorlanması veya bağlı oldukları mezheplerden dolayı kötü muameleyle maruz kalmaları

buna örnektir (5).Ayrıca kentsel bölgelerdeki gelişmiş kamu ve sağlık hizmetleri, daha iyi altyapı ve ulaşım, kentler için göç açısından çekici faktörleri oluşturmaktadır (1).

4.Doğal Nedenler

Afetler veya insan eliyle oluşmuş tahribata bağlı bölgenin yaşanamayacak hale gelmesi, savaş sonrasında ortaya çıkan kimyasal atıklar sebebiyle çevrenin bozulması göçün doğal nedenleri arasında sayılmaktadır (5).

Göç Etkileri

1.İç Göç Etkileri

İç göç bağlamında incelediğimizde, göçün; hızlı ve çarpık kentleşme, konut sorunu ve gecekondulaşma, çevre sorunları, iş gücü ve istihdam yapısındaki değişim, kentleşme sorunları ve sosyal yapıdaki değişim gibi etkileri toplumda izlenmektedir (6).

2.Uluslararası Göç Etkileri

2.1.Ekonomik Etkileri

Uluslararası göç ekonomik anlamda olumlu ve olumsuz etkilere sebep olabilir. Uluslararası göçün iç talep, dış ticaret, sermaye birikimine olumlu etkileri gözlenmiştir. Ancak göç alan ülkede yüksek işsizlik varsa göçmenlerin emek piyasasına girmesi işsizliğin artmasına, ücretlerde dalgalanmalara ve kayıtsız işçi çalıştırmaya neden olmaktadır (7).

2.2.Toplumsal Etkileri

Göç, insanlar, toplumlar ve ülkeler arasındaki ilişki ve etkileşimin ortaya çıkmasında önemli bir role sahiptir (4). Uluslararası göç ile dil, din, gelenek, kültür vb. pek çok açıdan birbirinden tümüyle farklı geçmişlere sahip bireyler aynı ortamda yaşamını sürdürmek durumunda kalmaktadır (8).

Ekonomik faktörler, kültürel yapıyı da etkilemektedir. Aileler yeni yerleştikleri yerde ekonomik açıdan tutunmak zorunda oldukları için geleneksel aile yapısı değişerek kadın ve çocuklar da iş hayatına girmek zorunda kalmışlardır (9).

Göç alan ülkede, göçmenler ile birlikte nüfusun artması ve iş alanlarında göçmenlerin olması, göç edilen ülke vatandaşlarında var olan kaynakları kaybetme korkusu oluşturmaktadır (9).

2.3. Psikososyal Etkileri

Göçün psikososyal etkisi, göç edenlerin, can ve mal güvenliği, beslenme ve barınma konusu kadar önemlidir ve birbiriyle ilişkilidir. Güvensizlik, aidiyetsizlik, dışlanma, suçluluk ve yetersizlik gibi duygular yaşayan bireylerde psikiyatrik sorunların ortaya çıktığı, özellikle; depresyon, anksiyete, somatoform bozuklukların sık görüldüğü belirtilmektedir (10). Genellikle bu olumsuz etkiler zorunlu göçlerde ve savaş, siyasal ve dini sebepli göçlerde daha çok karşımıza çıkmaktadır (9).

Ayrıca travma potansiyeli taşıyan durumlara birikimsel olarak maruz kalma en çok depresyon ile ilişki gösteriyorken; işkence, Travma Sonrası Stres Bozukluğu (TSSB) ile ilişkili en güçlü faktör olarak belirlenmiştir (11).

Dünya Sağlık Örgütü (DSÖ) Avrupa bölgesinde yapılan çalışmalara göre; mültecilerdeki kaygı bozukluğu prevalansı (%13), genel nüfus (%9) ile benzerlik gösterirken, depresif bozuklukların prevalansı mültecilerde (%32), genel topluma (%4) göre belirgin olarak yüksektir. Ayrıca DSÖ Doğu Akdeniz bölgesinde yapılan çalışmalar, mülteciler ve göçmenler arasında genel nüfusa göre, yüksek TSSB oranları olduğunu göstermiştir. Berlin'deki mülteciler arasında TSSB sıklığı %24.3 ve Almanya, Erlangen'deki üç toplu barınma merkezinde yaşayan Arapça konuşan sığınmacılar arasında ise %35.7'dir. Ayrıca birçok göçmen ve mülteci ruh sağlığı hizmetlerine erişememektedir (12).

Hassas Gruplar (*Vulnerable Groups*)

Hassas gruplar, diğer gruplara kıyasla, çatışma ve kriz zamanlarında ayrımcı uygulamalar, şiddet, doğal ve çevresel felaketler veya ekonomik zorluklarla karşılaşma riski daha yüksek olan, kadınlar, çocuklar, yaşlılar ve engellilerdir (13).

1.Göçün Kadınlara ve Kadın Sağlığına Olan Etkileri

Birleşmiş Milletler (BM)'nin 2022 Dünya Göç Raporu'na göre; 2020'de 135 milyon (%48) kadın göçmen saptanmıştır (14). Göç süresince kadınlar; sosyal güvencelerinin olmaması, dil problemleri ve bilgisizlik nedeniyle aile planlaması, bağışıklama ve

gebe takibi gibi koruyucu hizmetlerden mahrum kalmaktadırlar (15).

1.1. Sağlık Hizmetlerini Kullanamama Sorunu

Göçmenlerin gittikleri ülkelerde sağlık hizmetinin nerelerde verildiğini, sağlık sistemini ve ücretli olup olmadığını bilmemeleri, sağlık hizmetlerini kullanamamaktaki en önemli nedenlerdir. Bir diğer neden de sağlık güvencelerinin olmaması ve birçok ülkenin acil hizmetler dışındaki hizmetleri karşılamamasıdır. Bu sebeple birçok ülkede göçmenlerin acil hizmetlerine başvuruları o ülkenin vatandaşlarından daha fazla olabilmektedir (15).

Afet ve Acil Durum Yönetimi Başkanlığı'nın (AFAD) 2014 yılındaki Türkiye'deki Suriyeli Kadınlar raporuna göre kendisi veya yakını sağlık hizmetinden yararlanamayan kamp dışındaki kadınların oranı %40, ilaca erişimde güçlük çekenlerin oranı ise %54 dır (16). AFAD'ın 2017 Saha Araştırmasında, kamp dışı sağlık hizmetinden faydalanamayan kadınların oranı %46'ya yükselirken, ilaca erişmekte güçlük çeken kadınların sayısı %51'e düşmüştür (17). Her ne sebeple olursa olsun hem koruyucu hem de tedavi edici sağlık hizmetlerinden yararlanmayan kadınların fiziksel, ruhsal sorunlar ve bunlara bağlı komplikasyonlar ve ölümle yüz yüze kalabileceği açıktır (15).

1.2. Fiziksel Sağlık Sorunları

1.2.1. Bulaşıcı Hastalıklar

Yetersiz hijyen, kalabalık ortamlar, bağışıklama konusundaki eksiklikler, beslenme yetersizlikleri, güvensiz cinsel ilişki ya da cinsel istismar gibi sebeplerden dolayı göçmen kadınlarda bulaşıcı hastalık riski yüksektir. Özellikle su ve gıda ile bulaşan hastalıklar, Hepatit B-C, HIV/AIDS, tüberküloz, kızamık, sıtma ve şistozomiyazis gibi enfeksiyonlar ve paraziter hastalıklar göçmen kadınlarda sık rastlanabilecek enfeksiyonlardır (15).

Sadece göç esnasında değil, sonrasında da kaldıkları koşullar nedeni ile mülteci kadınlarda enfeksiyonlar sıktır. Mülteci ve göçmenlerin, kalabalık, iyi havalandırılmayan yaşam alanlarında, hava geçirmeyen plastik malzemelerden yapılmış barınaklarda ve gayri resmi yerleşkelerde yaşamaları, onları tüberküloz

enfeksiyonuna karşı daha savunmasız hale getirmektedir (12).

1.2.2. Kronik Hastalıklar

Yeni göç etmiş kadınlarda, yerel halka göre kronik hastalıklar daha az görülmekte ancak zamanla sağlık hizmetlerine erişememe, tedavinin aksamaması gibi nedenlerle daha dezavantajlı duruma düşmektedirler (15).

Yeni göç etmiş kişilerdeki bu durum sağlıklı göçmen hipotezi olarak adlandırılmaktadır (18). Yapılan bir çalışmada ABD’de doğmuş ve Latin kökenli olmayan 18-64 yaş kadınlarda diyabet sıklığı %5.7 iken, yeni göç etmiş Meksikalı göçmen kadınlarda bu oran %2.2, yeni göç eden diğer göçmen kadınlarda ise %2.9 bulunmuştur. Ancak, göç ettikten 10 yıl sonra aynı tetkikler tekrarlandığında, diyabet prevalansının diğer ülkelerden göç etmiş kadınlarda %7.6’ya, Meksikalı kadınlarda ise %9.8’e yükseldiği, yani yerleşik nüfustan daha yüksek hale geldiği saptanmış, kalınan süre uzadıkça diyabet gelişme riskinin arttığı ifade edilmiştir(19).

1.2.3. Üreme Sağlığı Sorunları

Bilgi eksikliği, hijyenik olmayan çevre koşulları, yoksulluk, aile planlaması hizmetlerinden yararlanama, sağlık sigortasının olmaması, sağlık hizmetlerine erişememe gibi nedenler mülteci ve göçmen kadınlarda üreme sağlığı sorunlarını ortaya çıkarmaktadır (20).

Aile planlaması hizmetlerinin eksikliğinden dolayı istenmeyen gebelikler sıktır. Yapılan bazı araştırmalar, göçmen kadınlarda Doğum Öncesi Bakım (DÖB) alma düzeyinin genel olarak düşük olduğu, ölü doğum ve bebek ölüm hızlarının daha yüksek olduğunu göstermiştir (21).

Türkiye’de yapılan bir çalışmada, Türk kadınlarda adölesan gebeliklerin oranı %5.3 iken Suriyeli mültecilerde bu oran %14.3 olarak bulunmuştur. Yine aynı çalışmada hiç antenatal bakım almayan mülteci kadınların oranı %41.3 iken, Türk kadınlarda bu oran %7.7’dir (22).

Hollanda’da yapılan bir çalışmada Türkiye, Fas ve bazı batılı ülkelerden de birçok göçmenin dahil edildiği çalışmada göçmen kadınların çoğunun yetersiz

antenatal bakım aldığı saptanmıştır (23). Göçmen kadınlar düşük doğum ağırlıklı bebeğe sahip olma, erken doğum yapma, antenatal mortalite ve konjenital malformasyonlar açısından da daha fazla risk taşımaktadır (24).

Avustralya’da yapılan çalışma, mülteci ve göçmen kadınların gebelik yaşlarına göre küçük çocuk(SGA) doğurma olasılıklarının, yerel ev sahibi ülke kadınlara göre daha fazla olduğunu göstermiştir. Yine Avustralya’da yapılan bir başka araştırmada, doğum öncesi bakımın geç başlamasının, tercümanlık hizmetlerinin yeterince kullanılmamasının ve yalnızca ebeğin verdiği intrapartum bakımın, Afrika ve Hindistan’dan gelen göçmen kadınlar arasında ölü doğum riskini artırdığı saptanmıştır (12).

1.2.4. Cinsel Sağlık Sorunları

Cinsel sağlık ve üreme sağlığı hizmetlerinin kullanımı ve farkındalığı, bazı mülteci ve sığınmacılarda göç edilen ülkeye göre daha düşük olarak gözlenmiştir (12). Ayrıca göçmen ve mülteci kadınların cinsel istismara maruz kalması, ihtiyaçları karşısında cinsel birlikteliğe zorlanması ve seks işçiliği yapmak zorunda kalmaları, cinsel yolla bulaşan hastalıklara (CYBH) maruz kalmalarına neden olabilmektedir (20).

1.2.5. Beslenme

Göçün oluş şekline göre göçmenlerde çok çeşitli beslenme sorunları oluşabilmektedir. Zorunlu göçlerde genellikle vitamin, mineral eksilikleri ve bunlara bağlı rahatsızlıklar görülebilirken gönüllü göçlerde özellikle ilerleyen yıllarda obezite ve obezite ile ilişkili hastalıklar görülebilmektedir (15). İsveç’te yapılan bir çalışmada pek çok ülkeden gelen göçmen kadınların D vitamini düzeyinin İsveçli kadınların kandaki D vitamini düzeyinden daha düşük olduğu saptanmıştır (25). Mülteci kadınlarda gebelikte yetersiz beslenmenin ve yetersiz antenatal bakımın, erken doğum ve fetüste düşük doğum ağırlığı ile ilişkili olduğu düşünülmektedir (26). Türkiye’de 458 Suriyeli göçmen kadının katıldığı çalışmaya göre, kadınların %50’sinde demir eksikliği, %45.6’sında B12 eksikliği ve %10.5’inde folik asit eksikliği saptanmıştır (27).

1.2.6. Diğer Sorunlar

Göçmen kadınlara yönelik şiddet ve tecavüz girişimleri sonucunda yaralanmalar, CYBH, TSSB, anksiyete gibi pek çok durum ortaya çıkmaktadır (15). Almanya’da yapılan çalışmada Türkiye’den göç etmiş evli kadınların %49’unun fiziksel ya da cinsel şiddete maruz kaldığı tespit edilmiştir (21). Ayrıca diğer koruyucu sağlık hizmetlerinde olduğu gibi bağışıklamanın da göçmen kadınlarda daha düşük olduğu saptanmıştır (15). Göçmen kadınlar gittikleri ülkelerde, o ülkede yaşayan vatandaşlara göre düşük statülü ve bazen daha tehlikeli işlerde çalışabilmektedirler. Bunun sonucunda iş kazalarıyla daha sık karşılaşmaktadırlar. ABD, Kanada ve Avrupa’da yapılan birçok çalışmada, göçmenlerde ölümlü iş kazası görülme oranlarının, ilgili ülke vatandaşı çalışanlarına göre daha yüksek olduğu tespit edilmiştir (15).

1.3. Ruhsal sağlık sorunları

Özellikle zorunlu göçlerde ruh sağlığı olumsuz yönde etkilenir ve kadın göçmenler, erkek göçmenlere göre daha fazla zorlanırlar. Yapılan çalışmalara göre göçmen kadınların, stresle baş etme konusunda diğer insanlara göre oldukça yetersiz oldukları saptanmıştır (28). Gebelik ve postpartum depresyon göçmen kadınlarda gittikleri ülkelerdeki kadınlara oranla daha sık görülmektedir. Örneğin Kanada’da yapılan bir çalışmada antenatal depresyon oranı Kanadalı kadınlarda %22.8 iken; göçmen kadınlarda %32 olarak saptanmıştır (15).

1.4. Göçlerin kadın sağlığına olumlu etkileri

Gidilen yerin terkedilen yere göre daha gelişmiş olduğu durumlarda ve gönüllü göçlerde tüm bu olumsuzlukların yanı sıra sağlık durumunda iyileşmeler de görülebilmektedir. Örneğin ABD’de sağlık hizmetlerinden yararlanma oranı eski kuşak göçmenlerde, yeni kuşak göçmenlere göre daha yüksek bulunmuştur (15). Bazı raporlara göre kendi ülkesinde eğitim olanaklarından yoksun olup, göç ettiği ülkede sağlık eğitiminden yararlanan göçmen kadınların çocuklarında görülen hastalık ve ölüm hızları, kendi ülkelerine göre daha düşük olarak saptanmıştır (21).

2. Göçün Çocuklara ve Çocuk Sağlığına Etkileri

Göçmen çocuk, ebeveynlerinden en az birinin göçtüğü ülkede doğmayan çocuk olarak tanımlanmaktadır. Her iki ebeveyn de göçün yapıldığı ülkede doğmuşsa, göçmen çocuk olarak kabul edilmemektedir (29). Uluslararası Göç Örgütü (IOM)’un 2022 raporuna göre, 2000 yılında dünyadaki göçmen çocuk sayısı 27.6 milyon iken, 2022’de 41 milyondur (14). Yetişkinler isteyerek veya zoraki göç edebilirler ama bu çocukların seçimi olmadığı için, çocuklar her zaman sürgün edilirler (11). Bulgular genel olarak, hareket halindeki çocukların, kötü yaşam koşulları, hijyene sınırlı erişim, sağlık hizmetlerinin kesintiye uğraması veya durdurulması nedeniyle, ev sahibi topluluklardaki çocuklara göre risk faktörlerine daha fazla maruz kalma eğiliminde olduğunu göstermektedir. Engelli olma, cinsiyet ve azınlık gruplara üye olma durumlarında risk daha fazla olabilmektedir. Bununla birlikte refakatsiz çocuklar da daha fazla fiziksel ve cinsel istismar riskiyle karşı karşıyadır (12). Unicef ve IOM’un, 11 bin göçmen genç ve ergeni dahil ettiği bir çalışmada, Akdeniz rotaları boyunca yaptıkları yolculukta, 10 çocuktan 8’inin sömürüldüğü ortaya konmuştur (12). Tüm dünyada 2020 yılı itibariyle, 18 yaş altı en çok uluslararası göçmeni barındıran ülkeler sırasıyla; Amerika (3.3 milyon), Suudi Arabistan (2.3 milyon), Ürdün (1.6 milyon), Birleşik Arap Emirlikleri (1.4 milyon) ve Türkiye (1.3 milyon)’dir (30).

2.1. Fiziksel Sağlık Sorunları

2.1.1. Doğum Öncesi Bakım

Doğum öncesi bakım, sağlıklı bir anne ve çocuk sağlığı için ilk ve en önemli basamaklardan biridir. Dünya genelinde göçlerin DÖB oranlarını etkilemektedir ve çoğu kez göçmen gebelerin bir kez bile sağlık personelini görmediği düşünülmektedir (29). DSÖ Göçmen Sağlığı Raporuna göre incelenen ülkelerin çoğunda, uluslararası hamile göçmenler, en fazla üç DÖB ziyareti gerçekleştirirken, ev sahibi topluluklardaki kadınlar için bu sayı dört veya daha fazladır. Daha az DÖB alan göçmen kadınların çocuklarında, düşük doğum ağırlığı, düşük vitamin A ve

D seviyeleri, düşük APGAR skoru ve bazı konjenital kalp hastalıkları görülebilmektedir (12).

2.1.2. Malnütrisyon ve Anemi

2020 Küresel Gıda Krizi Raporu'na göre 55 ülke ve bölgede yapılan araştırma sonucunda 135 milyon kişi gıda güvensizliği ile karşı karşıyayken; 5 yaş altı çocukların 17 milyonu akut malnütrisyon, 55 milyonu da kronik malnütrisyonla mücadele etmektedir (31). Göçmen ve mülteci çocuklar özellikle yetersiz, dengesiz beslenme ve zayıflık açısından daha çok risk altındadır. Etiyopya'da kamplarda yaşayan okul öncesi mülteci çocuklardaki yüksek anemi seviyeleri ile yiyeceğe ulaşamama, yetersiz mikro besin alımı, battaniye ve giysi gibi gıda dışı maddelerin eksikliği arasında bir bağlantı olduğu saptanmıştır. DSÖ Güneydoğu Asya bölgesinde yapılan çalışmalarda, Bangladeş'teki yerel çocuklara kıyasla Rohingya mülteci çocuklarında hem orta derecede akut yetersiz beslenme hem de ciddi-akut yetersiz beslenme prevalansının daha yüksek olduğu gözlemlenmiştir. DSÖ Avrupa bölgesinde de nütrisyonel anemi mülteci ve göçmen çocuklarda yerel halka göre daha yaygın olarak gözlenmektedir (12).

Türkiye'de Geçici Koruma Altındaki Çocuklarda Yapılan Araştırmalar

Sığınmacılar ve Göçmenlerle Dayanışma Derneği (SGDD)'nin yaptığı bir çalışmada, çalışmaya dahil edilen 5-59 ay aralığındaki 817 Suriyeli çocuğun akut malnütrisyon göstergesi olan kavrukluk (çok zayıflık) sıklığı kabul edilebilir düzeylerde iken (%3.8), fazla kiloluluk %4.8 ise sınırda kabul edilebilir durumdadır. Öte yandan bodurluk sıklığı %17.5 ile orta düzeydedir ve toplum sağlığı açısından risk oluşturmaktadır (32). Zayıflık gibi, obezite de çocuklar için önemli bir beslenme problemidir. DSÖ Avrupa bölgesinde yapılan çalışmalara göre her 3 çocuktan biri fazla kilolu veya obezdir. Yapılan çalışmalara göre Avrupalı olmayan mülteci ve göçmen çocukların, kendi ülkelerindeki çocuklara kıyasla obezite açısından daha fazla risk altında olduğu saptanmıştır. Ayrıca bu çocukların ucuz, yüksek şeker ve yağ içeren, ulusal diyet programlarının önerilerine uygun olmayan beslenme tarzlarına sahip oldukları gözlemlenmiştir (12).

2.1.3. Bulaşıcı Hastalıklar ve Bağışıklama

Göç süresince diğer koruyucu hizmetlerde olduğu gibi bağışıklama konusunda da aksaklıklar yaşanmaktadır. Özellikle aşı ile engellenebilir bulaşıcı hastalıkların sıklığında artışlar meydana gelmektedir. DSÖ'ye göre mülteci ve göçmenlerin sağlık sistemi ile ilk karşılaşması aşılama hizmetleriyle olmalıdır. Çünkü aşılama hem göç edenler hem de yerel halk için koruyucudur (12). AFAD'ın Türkiye'deki Suriyeli Sığınmacılar Raporu'na göre kamplarda yaşayan kız ve erkek çocukların her birinin %74'ü çocuk felcine karşı aşılanırken; kamp dışında yaşayanlar için bu oran kız çocuklarına %52, erkek çocuklarında %57'dir. Kızamık aşısı oranları kamplarda kız çocukları için %70, erkek çocukları için %74, kamp dışında yaşayanlarda ise kız çocukları için %58, erkek çocukları için %60'tır. Ayrıca raporda kamp dışında yaşayan ve aşılanmamış çocukların yerel halkı da riske attığı vurgulanmıştır (33). Zambia'daki Meheba mülteci kampında yapılan retrospektif bir çalışmaya göre 5 yaş altı çocuk ölümlerinin %81'inin malarya ve solunum yolu enfeksiyonları, %10'unun ise diyare kaynaklı olduğu görülmüştür (12). Çocuklar, gelmiş oldukları çatışma bölgelerindeki sağlık hizmetleri kesintisinden dolayı latent tüberküloz ve Hepatit B enfeksiyonu gibi aşı ile önlenemez hastalıklara karşı daha savunmasız olmaktadır (12).

DSÖ Avrupa bölgesinde mülteciler ve göçmenler arasında yüksek aşılama kapsamı sağlamak için bölge dışında geçerli olan üç kritik unsur belirlemiştir: (i) yeni gelenlere uygun aşılama hizmetlerinin sağlanması, (ii) mültecilere ve göçmenlere genel sağlık hizmetlerinin bir parçası olarak aşılama hizmetlerinin sağlanması (iii) belirli mülteci ve göçmen topluluklarına ulaşmak için hedefe yönelik ve kültürel olarak uygun aşılama hizmetlerinin sağlanması (12). DSÖ Avrupa Bölge Raporu'nda yüksek riskli gruplara ulaşmak için; kapı kapı yüksek riskli kişileri tarama, aşı kartları kontrolü, anadilde bilgilendirmeler, halka yönelik eğitimler, okullarda aşılama odaklı dersler, çocuklar için bilgilendirici aktiviteler, medya kampanyaları, telefon yardım hatları gibi hedefler belirlenmiştir (34).

2.2. Ruhsal Sağlık Sorunları

Birçok çalışmada göçün, çocukların mental sağlığı açısından olumsuz etkileri gösterilmiştir. Bunların nedenleri arasında göçün kendisinin stres oluşturması, toplumdaki sınırlayıcı süreçlerin oluşturduğu stres ve sadece kültürel alt yapılarından kaynaklanan farklılıklara bağlı gelişen uyumsuzluk problemleri yer almaktadır (29).

Çocukların karşı karşıya kaldığı en önemli riskler ayrımcılık, ihmal, şiddet, istismar ve sömürüdür. Bunlar çocuklar üzerinde kısa ve uzun vadeli psikososyal sorunlara neden olarak akıl hastalığı gelişmesine zemin yaratırlar (11). Bunalmış, kafası karışmış veya sıkıntılı, korkmuş ve endişeli hissedebilirler, ayrıca uyku sorunları, öfke ve üzüntü patlamaları yaşayabilirler. Bu, özellikle, travma sonrası stres bozukluğu veya depresyon gibi akıl sağlığı sorunları yaşayan zorla yerinden edilmiş ve mülteci çocuklar için geçerlidir (12).

Türkiye ve Suriye sınırında yer alan göçmen kampında, 4-10 yaş aralığındaki 144 çocuk ve ebeveynlerinin mental sağlıklarını değerlendirmek amacıyla planlanan çalışmada, Pediyatrik Duygusal Stres Ölçeği (PEDS) ve Güçler ve Güçlülükler Anketi (SDQ) kullanılmıştır. Her iki ölçekte de katılımcıların üçte birinden fazlasında klinik düzeyde davranışsal problemler saptanmış ve çocuklarda gözlenen yüksek duygusal stres ve davranış bozukluklarına yönelik psikososyal desteğe acil ihtiyaç duyulduğu gözlenmiştir (35).

Hollanda'da refakatli ve refakatsiz çocukların katıldığı araştırmada davranış sorunları ve travmatik stres araştırılmıştır. Refakatsiz göçmenlerde yaş arttıkça semptomların şiddetinin arttığı gözlemlenmiş, refakatsiz çocukların psikopatoloji geliştirme riski daha yüksek olarak bulunmuştur (11).

Kız ve erkek çocukların yaşadıkları ve oynadıkları alanlarda güvenliklerinin sağlanması ve ruh sağlığı açısından özel gereksinimi olanlara ek destek sağlanması önemlidir. Travmatize olan çocuğun psikolojik açıdan tedavi edilme sürecinde, bireysel, grup ve aile terapisi uygulanabilir, ayrıca dirençli vakalarda terapiye ek olarak ilaç tedavisi önerilebilir (11).

Aile içi sıkı dayanışmanın göçmen çocuklarda mental durumu iyileştirdiği de bilinmektedir. Bunun yanı sıra kaliteli barınma ortamları bu çocukların fiziksel sağlıkları için gerekli olduğu kadar, mental sağlıkları ve göçtükleri ülkelerdeki sosyolojik yapıya daha kolay uyumlanmalarını sağlamak açısından önemlidir (29).

2.3. Eğitim Sorunu

Eğitim; doğal afetler, savaşlar, ayrımcılıklar gibi nedenlerle sekteye uğrayabilir. Bugün dünyada ilkokul çağındaki 61 milyon, ortaokul çağındaki 60 milyon çocuğun okula gitmediği saptanmıştır (36). Milli Eğitim Bakanlığı Göç ve Acil Durumlarda Eğitim Daire Başkanlığı Ocak 2022 verilerine göre; ülkemizde bulunan 1.365.884 yabancı uyruklu eğitim çağındaki (5-17 yaş) çocuğun 935.731'i (% 68.51) okullarda eğitim almaktadır (37).

Birleşmiş Milletler Mülteciler Yüksek Komiserliği (BMMYK)'nin, 2012-2016 Eğitim Stratejisi'nde; eğitimin özellikle kamplarda yaşamın sürdürülebilmesini sağlayan fiziksel, psikososyal ve bilişsel koruma sağladığı vurgulanmaktadır. Eğitim ortamları, gündelik hayatta bir rutin oluşturup, normalleşme duygusuna yardımcı olmaktadır. Ayrıca erişkinleri rol modeli alma ve akranlarıyla sosyalleşme gibi yararları da vardır. Okullar şiddet ve istismara uğrayan çocukların erken aşamada tanınması için de önemli alanlardır. Böylece ileri destek almaları için yönlendirilebilir (11).

2.4. Diğer Sorunlar

Zorla yerinden edilmiş ve vatansız kız ve erkek çocuklar, güvenlikleri ile fiziksel ve duygusal sağlıklarına yönelik çok sayıda riske maruz kalmaktadırlar. Bunlar arasında çocuk evlilikleri, fiziksel istismar, ihmal, cinsel istismar ve taciz, çocuk işçiliği ve silahlı gruplar tarafından işe alım yer almaktadır (38).

Ayrımcılık ve zorbalık okullarda önemli bir sorun olarak tanımlanmaktadır. BMMYK'nin 2015 Türkiye Raporu'na göre mülteci ve göçmen çocuklara, okullarda yerel halkın çocukları, öğretmenler ve okul idarecileri tarafından milliyet, ırk ve fiziksel özellikler nedeniyle ayrımcı tavırlar takınıldığı ve bu durumun çocukları

okula devam etmekten caydırdığı bildirilmiştir. Ayrıca aynı raporda mülteci ve göçmen çocukların dil problemleri nedeniyle ek destek alamadıkları, geldikleri ülkeden daha düşük sınıflara yerleştirildikleri, psikolojik travma geçiren çocukların eğitime devam edebilmek için yeterli psikolojik destek alamadıkları, ekonomik sebeplerden dolayı çalışmak zorunda oldukları saptanmış ve bu sebeplerin, çocukları okulu terk etmeye ittiği bildirilmiştir (39). Çocuk göçmeler için en önemli sorunlardan biri, çocuk emeğinin kullanılmasdır. Çocuk emeğinin en çok kullanıldığı alanlar; tekstil sektörü, inşaat işçiliği, hizmet sektörü, mevsimlik tarım işçiliği ve çobanlıktır (40).

BMMYK 2015 Türkiye Raporu'na göre; işgücü piyasasına giren çocukların yaşlarının 7-8 yaşlara düştüğü, iş kazalarına maruz kaldıkları, yaşam koşullarının kötü olduğu, yeterli gelirlerinin olmaması nedeniyle çocukların eğitimlerine devam etmedikleri belirtilmektedir (39).

DSÖ Avrupa ve Doğu Akdeniz bölgelerinde yapılan çalışmalar mülteci ve göçmen çocuklarda ağız sağlığının da zayıf olduğunu göstermiştir (12).

3. Göçün Yaşlı Sağlığına Etkileri

Yaşlı birey tanımı DSÖ'ye göre 65 yaş üzerindeki kişiler için kullanılmaktadır (41). 2020 yılında 65 yaş üzeri göçmenlerin sayısı tahmini olarak tüm uluslararası göçmenlerin %12.2'sini oluşturmaktadır (12).

Yaşlanma ile gelen kronik hastalıklar ve yeti kayıpları yaşlıların çevreye uyumunu zorlaştırmaktadır. Yaşlıların karşılaşılabileceği bazı sorunlar; yeni dil öğrenmede ve yeni çevre edinmede güçlük, tıbbi rahatsızlıklar ve ölüm olarak belirlenmiştir (11).

Kendi aile bireyleri tarafından dışlanan yaşlı göçmenler yalnızlık nedeniyle ruhsal çöküntü yaşamakta ve kendilerini daha da güçsüz hissetmektedirler (41).

Sınırlı fiziksel hareketlilik, hastanelere ve kliniklere uzun mesafeler kat etme ihtiyacı, tıbbi randevularda tercüman eksikliği ve evde bakım gibi hizmetler için uzun bekleme listeleri nedeniyle yaşlı göçmen ve mülteciler sağlık hizmetleri ve gıda yardımlarına ulaşmakta daha fazla güçlük çekmektedirler. Ayrıca, gıda yardımının genellikle yaşlı kişilerin

gereksinimlerine uygun olmadığı bildirilmiştir. Bu durum, özellikle engelli veya diyabet gibi kronik sağlık sorunları olan yaşlı kişiler ile gıda takviyesine ihtiyaç duyan diğer kişiler için sorun oluşturmaktadır (38).

Unicef'in aktif insani yardım operasyonları yürüttüğü ülkelerin yaklaşık %50'si, pandeminin doğrudan bir sonucu olarak yerinden edilmiş ve mülteci nüfus arasında sağlık hizmetlerine erişimde azalma olduğunu bildirmiştir (12). Bu durum pandemiden daha fazla etkilenen yaşlı nüfus için ayrıca bir dezavantajdır.

Yaşlı göçmenlerin sağlığı açısından gidilen ülkelerin yaşlılara bakış açısı ve mevcut sigortacılık sistemi ön plana çıkmaktadır. Göç ettikleri ülkede yaşlılık dönemlerini geçiren bireylerin sistem içine alınmalarının yanı sıra sağlık ve bakım hizmetlerine ihtiyaç duydukları noktada ulaşabilmeleri yine toplumsal düzeyde sağlık statüsüne olumlu katkıda bulunacaktır. Örneğin, Almanya'da yaşlı göçmen bireylerin sağlık ve bakım hizmetlerinin temelinde, evde bakım ve çok kültürlü yapı yer almaktadır (41).

4. Göçün Engelli Bireylerin Sağlığına Etkileri

Genel olarak, engelli mülteciler göz ardı edilmekte, uygun bakım ve sosyal hizmet sağlanmamakta ve ülkelerini terk etmeye zorlanmadan önce, geniş ailelerin bir parçası oldukları için yalnız kaldıkları zaman oldukça zorlanmaktadırlar. Ayrıca her türlü sömürü ve suistimale daha açık hale gelmektedirler. Engelli bir kişinin cinsel istismar yaşama riski daha yüksektir. Yaş ve/veya engellilik, ilgili kişilerin fiziksel olarak başkalarına bağımlı olmaları nedeniyle şiddet içeren bir durumdan kaçmalarını zorlaştırmaktadır (42).

BMMYK Yaş, Cinsiyet ve Çeşitlilik Raporu'na göre; engelli kişilerin yeterince tanınmadığı ve bu nedenle çoğu zaman uygun desteği alamadıkları bildirilmiştir. Bu durumun nedenleri, engelli kişilerin evde tecrit edilmesinin yanı sıra personelin farkındalığının yetersiz olması ile açıklanmıştır. Bunun için ilgili personellerin, bu konuda bilgilendirilmesi sağlanmıştır. BMMYK, Meksika'daki çalışmalarında, engelli bireylerin reddedilme, taciz ve ayrımcılığa maruz kaldığı, Zimbabve'de de engelli kadınların aşağılandığı ve

engelli çocukların okullarda zorbalık ve alay konusu olduğu belirtilmiştir (38).

Engelli bireylerin birinci basamak sağlık hizmetlerine erişimde engellerle karşılaştığı saptanmış ve bunun en önemli nedeninin ulaşım zorluğu olduğu gösterilmiştir. Ayrıca engelli kişiler, rehabilitasyon ve yardımcı teknolojiler gibi özellikle engelleri nedeniyle ihtiyaç duydukları sağlık hizmetlerine erişimde de sıkıntılarla karşılaşmaktadırlar (38).

Göçün Diğer Yüzü: İnsan Kaçakçılığı

Göçmen kaçakçılığı; son yıllarda göçmenlerin köle pazarlarında satılması, fidye için işkence görmesi ve çeşitli sektörlerde sömürülmesiyle korkunç manşetlere konu olmuştur. Organize suç grupları bugün neredeyse her ülkede göçmen kaçakçılığı yapmaktadırlar. Mağdurlar, genellikle dezavantajlı sosyoekonomik geçmişlerden ve/veya düşük gelirli ülkelere gelmekte ve insan tacirlerinin sömürülerinden en yüksek mali getiriye elde ettikleri daha zengin ülkelere kaçırılmaktadır (14). Göçün güvensiz ve/veya düzensiz olduğu durumlarda koruma ve destek ağlarına daha az erişim olduğundan, göçmenler için insan ticareti riski daha fazladır. İnsan ticaretine maruz kalan göçmenlerin, 2020'deki 281 milyon uluslararası göçmenin küçük bir bölümünü oluşturduğu, ancak mağdurlar ve aileleri için geldikleri ve göç ettikleri ülkede ciddi sonuçları olduğu saptanmıştır. İnsan ticareti son derece cinsiyetçidir; kadınlar ve kız çocukları cinsel sömürü, zorla evlendirme ve ev köleliği amaçlı insan ticaretine daha yatkınken, erkekler ve erkek çocuklar daha çok balıkçılık ve madencilik sektörlerinde insan ticareti mağduru olabilmektedirler. Ayrıca Covid-19 pandemisi sonrası artan güvensizlik ve yoksulluk insan kaçakçılığının itici güçleri olmuştur. Korkunç ekonomik durum, krizden en çok etkilenen sektörlerde çalışan birçok göçmenin geçim seçeneklerini kısıtlayabilir, daha güvencesiz ve tehlikeli kazanç çözümlerine yönelmek için teşvikler yaratabilir ve sömürücü insan ticareti ağlarının tuzağına düşme riskini artırabilmektedir. Sağlık, sosyal, yasal ve diğer hizmetlere erişimi olmayan göçmen işçiler de resmi ve güvenilir güvenlik ağlarının yokluğunda son çare olarak

başvurdukları insan tacirlerinin ve diğer suçluların kurbanı olmaya karşı savunmasız hale gelmektedir (14).

Covid-19 ve Göç İlişkisi

Covid-19 salgını, dünyaya sağlık ve göç arasındaki güçlü bağlantıyı hatırlatmış, mültecilerin ve göçmenlerin küresel hazırlık ve müdahale planlarına dahil edilmesinin, halk sağlığı acil durumlarına etkili bir şekilde yanıt vermek için ne kadar önemli olduğunun altını çizmiştir (12). DSÖ, Covid-19'u bir pandemi olarak nitelendirdikten kısa bir süre sonra, birçok ülke seyahat kısıtlamaları getirmiş ve sınırlarını kapatmıştır. Sonuç olarak, birçok göçmen kendi ülkesine dönememiş ve yerel hükümetler çok sayıda geri dönüşü reddetmiştir (12).

Temmuz 2019 ile Haziran 2020 arasında beklenen uluslararası göçmen sayısında %27'lik bir düşüş ile 2020 ortasına kadar göçmen sayısında 2 milyon civarında azalma gerçekleşti. DSÖ bölgelerinde yapılan son araştırmalar, çocuklar da dahil olmak üzere mülteci ve göçmen gruplarının, genellikle sosyoekonomik durumlarının ve sağlık sistemi faktörlerinin etkisiyle orantısız bir Covid-19 yükü yaşadıklarını göstermektedir. DSÖ, Göçmen Sağlığı Raporu'nda; özellikle transit veya düzensiz durumda olan, daha yaşlı mülteci ve göçmenlerin, hastalığın doğası ve göçmenlik durumları nedeniyle daha çok risk altında kaldığını bildirmiştir (12).

Çatışma Beyanı: Yoktur.

Araştırmacıların Katkı Oranı Beyanı: Ana fikir/Planlama: MS, ENP; Analiz/Yorum: ENP; Veri Sağlama: ENP; Yazım: ENP, MS; Gözden Geçirme ve Düzeltme: MS, ENP; Onaylama: MS, ENP.

Destek ve Teşekkür Beyanı: Yoktur.

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COMPLAINT OF SPEECH DISORDER IN FAMILY PRACTICE: A RARE CASE HEMANGIOMA OF THE TONGUE

Aile Hekimliğinde Konuşma Bozukluğu Şikayeti: Nadir Bir Olgu Dilde Hemanjiom

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ABSTRACT

Hemangiomas are the most common benign tumors of the head and neck region, but are rarely seen in the oral cavity. Tongue localized hemangiomas are encountered in 7.8% of cases. Depending on their size, hemangiomas located on the tongue can cause recurrent spontaneous bleeding, pain, speech and chewing disorders and shortness of breath. In this article, a case of hemangioma of the tongue characterized by speech disorder in a 7-year-old boy who presented to our family medicine outpatient clinic is presented and discussed in the light of the literature.

Keywords: Hemangioma, tongue, oral cavity, speech

ÖZ

Hemanjiyomlar baş boyun bölgesinin en sık görülen iyi huylu tümörleridir, ancak ağız boşluğunda nadiren görülürler. Dil lokalize hemanjiomlara vakaların %7.8'inde rastlanmaktadır. Büyüklüklerine bağlı olarak, dilde bulunan hemanjiyomlar tekrarlayan spontan kanamalara, ağrıya, konuşma, çiğneme bozukluklarına ve nefes darlığına neden olabilir. Makalemizde aile hekimliği polikliniğimize başvuran 7 yaşındaki erkek çocukta konuşma bozukluğu ile karakterize bir dil hemanjiyomu olgusu sunulmuş ve literatür eşliğinde tartışılmıştır.

Anahtar Kelimeler: Hemanjiyom, dil, oral kavite, konuşma



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INTRODUCTION

Hemangiomas are lesions that are generally seen in the first 2-4 weeks of life and grow rapidly until 6-8 months, then slow down and regress spontaneously by 70% around 5-8 years of age (1). Hemangiomas located in the head and neck region are the most common benign tumors of childhood. They are rarely seen in the lips, oral cavity, tongue and buccal mucosa. Hemangiomas on the tongue, especially in children, are extremely rare (2,3). Trauma, hormonal factors, infections are blamed in its etiology (3). Imbalance in angiogenesis and uncontrolled proliferation of vascular structures are believed to cause hemangiomas (4). These benign tumors show a life cycle of endothelial cell proliferation, rapid growth, and spontaneous shrinkage (5). They are almost never time encapsulated (3). Hemangiomas located in the tongue are very important due to the functions of the tongue such as speaking, swallowing, cleaning the oral mucosa and its vulnerability to trauma (2). It is also important in terms of causing respiratory problems (3). Different symptoms can be observed depending on its location (6).

CASE REPORT

A 7-year-old male patient was brought to the family medicine outpatient clinic by his family with the complaints of speech disorder and dyspnea. In his history, it was informed that the complaint of speech disorder developed gradually in the last two months, and that he had a pronounced speech disorder for the last two weeks. The patient had a history of inguinal hernia operation, his vaccinations were complete, and he had no history of atopy. In his family history, the mother had hypothyroidism, the father had chronic hepatitis B and pemphigus vulgaris. One of the siblings of the patient had an allergic asthma, and the other sibling had a history of allergy to beta-lactam antibiotics and acetaminophen drug group.

The vital signs of the patient were as follows: body temperature: 36.6°C, heart rate: 78/min, arterial blood pressure: 100/70 mmHg, oxygen saturation: 97%. In the examination of the patient, height:126 cm (50-75

percentile), weight: 24 kg (25-50 percentile), there was pus in the nose and postnasal discharge was present. There was a pulsatile, painless mass on the left side of the tongue, approximately 1 cm in diameter, with regular borders, which did not fluctuate on palpation (Figure 1). No pain in the lesion with tongue movements. A few non-pathological lymph nodes were palpated on the right and left sides of the cervical chain of the neck. Lung sounds were normal on auscultation, and other system examinations were normal.

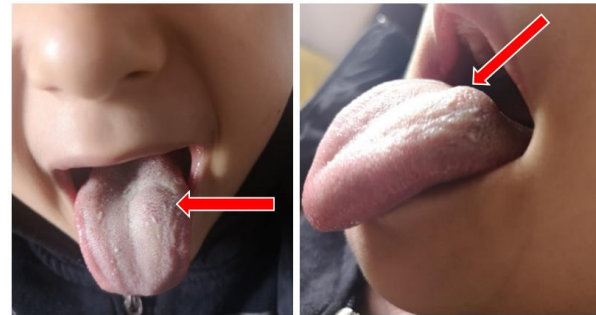


Figure 1: Left sided lesion in the tongue

In the superficial neck ultrasonography performed on the patient for whom otolaryngology consultation was requested, it was determined that there was a 13x8 mm solid image in the localization with swelling in the left posterolateral part of the tongue, and linear vascularization in the central part. With these results, the patient underwent magnetic resonance imaging (MRI). Contrast-enhanced neck MRI report of the patient revealed a peripheral nodular-enhancing lesion in the left part of the tongue, 13x12 mm in size, hyperintense in peripheral T1 and T2 AG, hypointense in central T1 AG and hypointense in T2 AG, and hypointense centrally in millimetric T1 AG (Figure 2).

As a result of the examinations and clinical evaluation, the mass was evaluated as a hemangioma. Clinical follow up was recommended. The patient was seen again two times within an interval of one week. No significant regression in the size of the mass was observed in the first and second evaluations. However, according to the history taken from the patient's mother, there was a period of shrinkage and growth in the mass. No change in the character of the mass was observed in

the follow-up. The patient was consulted to the otorhinolaryngology clinic for surgery. The otolaryngology clinic did not consider surgical intervention at this stage.

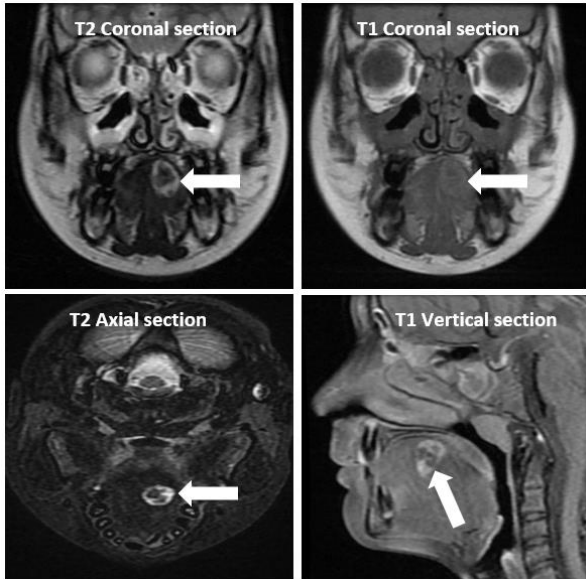


Figure 2: Left sided lesion visualized on MRI sections

DISCUSSION

Hemangiomas are rapidly growing lesions that usually appear in the first few weeks of life, but then regress spontaneously (1). However, in this case, there was a recently rapidly growing hemangioma that was not present at birth. Periodic enlargement and shrinkage of the lesion were observed in the patient's follow up.

It is known that CT and MRI are very successful in the diagnosis of hemangiomas as in other lesions of soft tissues (7,8). In this case, the lesion was evaluated as a hemangioma according to the MRI findings. In addition, the presence of growth and shrinkage periods observed in the clinical course indicates that the lesion is a hemangioma (9).

Although hemangiomas are seen quite frequently in the head and neck region in children, their localization on the tongue in the oral cavity has been reported very rarely. According to the size of the hemangioma located in the tongue, it is known that swallowing and speech disorders are observed. In this case, the patient reported with the complaint of speech disorder. Oral cavity problems have an important place in speech disorders in

children. Ankyloglossia, cleft palate, tooth loss, dental problems are known to cause speech disorders (10-12). The causes of speech delay in children are quite diverse. Many reasons such as mental retardation, hearing loss, maturational language delay, verbal expression disorder, mixed language perception and verbal expression disorder, bilingualism, psychosocial deprivation, autism, selective mutism, cerebral palsy can cause delay in speech. Detailed evaluation of the oral cavity is the first step in determining speech problems (13).

In this case, there was no problem with speech delay, but there was a speech disorder that developed later. Since the hemangioma was found to be located on the left side of the tongue of the patient caused problems in removing certain letters, so it caused speech disorder. No neurodevelopmental problems were observed in the patient.

Due to the basic principles of the family medicine branch, its close relationship with the family in accordance with its core competencies, and its holistic approach to the disease, the family practice is often the first point of application for the families. At this point, there may be important problems underlying the problems that are sometimes considered to be ignored by the family. At this point, even the smallest information given by the family in the anamnesis should be listened carefully and a detailed physical examination should be performed. In this case, a tongue hemangioma emerged under the family's complaint, which was vaguely described as a mispronunciation of some letters. Therefore, it is important to examine the oral cavity in details in patients presenting with speech disorder or speech delay, and to determine whether there are problems with the patient palate, teeth, ankyloglossia, as it is necessary not to neglect the physical examination in all other complaints.

A complete history taking and careful physical examination are key points in the diagnosis and detection of the underlying disease in primary care. This is especially important for patients presenting with speech problems.

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AN OBESE CHILD PATIENT DIAGNOSED WITH CELIAC DISEASE

Çölyak Hastalığı Tanısı Alan Obez Çocuk Hasta

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ABSTRACT

Celiac disease is a systemic autoimmune disease that frequently presents with clinical manifestations such as malnutrition, abdominal distension and diarrhea in childhood. With the increase in the incidence of celiac disease in recent years, differences in findings in patients at the time of diagnosis have been observed. While classical symptoms are common in younger age groups, differences in symptoms are more commonly observed in the adolescent age group. These findings often include abdominal pain, treatment-resistant iron deficiency anemia, elevated transaminase levels and diarrhea. Celiac disease should be considered in the differential diagnosis, even when malnutrition is not evident in such patients. In this case report, we present a case of an obese patient diagnosed with celiac disease, who experienced intermittent abdominal pain.

Keywords: Celiac disease, obesity, malnutrition, constipation, diarrhea

ÖZ

Çölyak hastalığı, çocukluk çağında sıklıkla malnütrisyon bulguları, karında şişlik, ishal gibi klinik tablolar ile başvuruya sebep olan sistemik bir otoimmün hastalıktır. Son yıllarda çölyak hastalığının insidansının artmasıyla birlikte tanı anında hastalarda saptanan bulgulardaki farklılıklar dikkat çekmektedir. Küçük yaşlarda bu klasik semptomlarla başvuru daha sık olurken, özellikle adölesan yaş grubunda bu bulgulardaki farklılıkların daha çok olduğu izlenmektedir. Bu bulguların sıklıkla karın ağrısı, tedaviye dirençli demir eksikliği anemisi, transaminaz yüksekliği veya ishal olduğu belirtilmiştir. Böyle hastalarda malnütrisyon bulunmasa da çölyak hastalığının ayırıcı tanılar arasında bulunması gerekmektedir. Bu olgu sunumunda aralıklı olarak karın ağrısı şikayeti olan, çölyak hastalığı tanısı alan obez hasta sunulmuş ve literatür bilgileriyle tartışılmıştır.

Anahtar Kelimeler: Çölyak hastalığı, obezite, malnütrisyon, kabızlık, ishal



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INTRODUCTION

Celiac disease (CD) is a systemic disease that develops in genetically susceptible individuals due to the autoimmune response to gluten in childhood (1). The classical presentation of CD is usually described as diarrhea, abdominal distension, malnutrition, and growth retardation. However, the increasing incidence of CD, the increasing awareness of the disease, the widespread use of serological tests for diagnosis, along with the increased availability of endoscopy, has resulted in a higher number of CD diagnoses that do not conform to the classical presentation (2-4). The frequency of CD diagnosis is also increasing in patients who are normal or overweight, in addition to those with diarrhea and growth retardation in the classical presentation. This article presents an obese patient who has been investigated for intermittent abdominal pain complaints for a long time and has been diagnosed with CD.

CASE REPORT

A nine-year-old female patient presented to the outpatient clinic with complaints of intermittent, recurrent abdominal pain for two years. Her symptoms were aggravated after eating and she had intermittent constipation. The patient had intermittent constipation, manifesting twice a week as painful and hard bowel movements. There was no history of diarrhea and her medical history was unremarkable. The patient had a history of using lactulose and macrogol treatments for constipation, as well as proton pump inhibitors for dyspeptic symptoms in the past. However, the patient did not benefit from these treatments. Upon presentation, the patient's weight was 68 kg ($p > 99.98$), height was 150 cm ($p: 97.6$), weight percentage according to height was 158%, body mass index (BMI) was 30.22 kg/m², and the BMI Z score was 2.54, which classified the patient as obese. The patient's phenotype was compatible with obesity, and her systemic examinations were normal. Laboratory tests revealed hemoglobin: 12.1 g/dL, mean corpuscular volume (MCV): 80 fL, leukocyte count: 9800/mm³, platelet

count: 459000/mm³, fasting blood glucose: 95 mg/dL, aspartate aminotransferase: 41 U/L, alanine aminotransferase: 44 U/L, and ferritin: 19.5 mcg/L. Urine analysis for investigating the etiology of abdominal pain was found to be normal. There was no growth in the urine culture, and no parasites were detected in the stool microscopy. Grade 1 hepatic steatosis was detected on abdominal ultrasonography. After excluding infection-related causes, among the differential diagnoses for the patient, functional dyspepsia, irritable bowel syndrome, abdominal migraine, functional abdominal pain, aerophagia, functional constipation, and fecal incontinence were considered. Since the patient's main complaint began after meals, an endoscopy was performed to exclude *Helicobacter pylori* infection and gastric causes of chronic abdominal pain with a preliminary diagnosis of functional dyspepsia. The macroscopy of the esophagus and stomach was normal, but widespread cracks were seen in the duodenal mucosa. CD serological tests were performed, and the results showed anti-tissue transglutaminase IgA: >300 U/mL (positive: >18 U) and positive results for anti-endomysium antibody IgA (indirect fluorescent antibody method). A biopsy of the duodenal mucosa revealed total-subtotal villous atrophy and increased intraepithelial lymphocytes, leading to a diagnosis of CD. The patient was started on a gluten-free diet and her complaints improved significantly.

DISCUSSION

Celiac disease has been mostly associated with malnutrition, but in recent years, cases of celiac patients with obesity at the time of diagnosis have also been reported (4,5). When the first case of an obese celiac patient was diagnosed in 1986, it was hypothesized that absorption could increase in the distal intestinal segments due to adaptation based on duodenum-jejenum atrophy in celiac patients, resulting in weight gain and obesity (6). It has also been suggested that excessive adaptation can lead to weight gain and obesity due to excessive energy intake. Children under two years of age with CD present with malabsorption

symptoms, as adaptation has not yet developed in their small intestine. Celiac patients with atypical symptoms are more likely to be diagnosed during adolescence and adulthood due to the increased adaptation mechanism with age (6-8). Despite these hypotheses, the pathogenesis of overweight celiac patients with malabsorption symptoms is not clear.

In a study conducted in Sweden, 242 cases of CD were detected in 12,632 screened patients, and it was stated that body mass index measurements at the time of referral were not a reliable screening tool for CD (9). It has been shown that celiac patients diagnosed by screening are mostly underweight and shorter than their peers who show normal development, but being normal or overweight does not rule out the possibility of having CD.

The most common symptoms in obese children diagnosed with CD are abdominal pain, treatment-resistant iron deficiency anemia, elevated transaminases, and diarrhea after consuming gluten-containing foods (2,7). In our patient, abdominal pain, which had been present for a long time, was the reason for admission to the hospital, but there was no history of anemia or diarrhea. In a study by Valletta et al., that examined the weight, height, and body mass index of 149 celiac patients at the time of diagnosis and after at least 12 months of a gluten-free diet, it was shown that 11% of patients were overweight and 3% were obese at the time of admission (10). It was shown that the number of overweight patients doubled in measurements taken 12 months after starting a gluten-free diet. This is noteworthy in terms of the careful monitoring of nutrition after a diagnosis of CD.

In a case series reported from Italy, 7.8% of 445 children with CD were classified as overweight/obese at the time of diagnosis, and it was shown that the ages of these patients were higher than those of other patients (11). However, there was no significant increase in the prevalence of obesity and overweight after at least 6 months of a gluten-free diet in this series. In a previous study conducted at our clinic, it was found that 4.2% of 148 celiac patients were overweight, and 1.7% were

obese (3). In the same study, the presence of isolated abdominal pain, short stature, anemia, constipation, and elevated liver enzymes was determined as atypical presentations when only one of these symptoms was present, or in cases of asymptomatic disease. The prevalence of atypical symptoms in the entire cohort was reported as 43.2%. In our case, among the atypical symptoms present, abdominal pain and constipation had rates of 12.8% and 0.7%, respectively, as atypical symptoms in this study.

In overweight patients, an elevation in liver function tests can be observed due to fatty liver disease. Our patient had a fatty liver on abdominal ultrasonography but normal liver function tests. In overweight patients who do not show improvement in liver function tests and fatty liver despite appropriate diet programs, the etiology of possible liver diseases should be investigated, and CD should be considered as a differential diagnosis, even if the patient is overweight (12).

In recent years, the number of celiac patients diagnosed as overweight beyond the classical presentation has increased, along with the epidemic of obesity. When taking the history and performing laboratory tests of patients with long-term abdominal pain, constipation, intermittent diarrhea, anemia, and unexplained transaminase elevation, the possibility of CD should be taken into consideration, independent of obesity, and necessary investigations should be planned. The clinician should determine which systemic conditions require CD screening, as CD can also present with extraintestinal symptoms and also manifest with unusual symptoms such as obesity and constipation.

Conflict of Interest: All authors declare that there is no conflict of interest.

Researchers' Contribution Rate Statement:
Concept/Design: FBC, Fİİ, BG, MÇ;
Analysis/Interpretation: FBC, Fİİ; Data Collection: FBC, BG, MÇ; Writer: FBC, BG, MÇ; Critical Review: FBC, Fİİ, BG, MÇ; Approver: FBC, Fİİ, BG, MÇ

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AŞI İLİŞKİLİ NÖBETLERDE DRAVET SENDROMU AKLA GELMELİDİR

Dravet Syndrome Should be Remembered in Vaccine Related Seizures

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ÖZ

Dravet sendromu çocukluk çağı epilepsilerinin yaklaşık %1.4'ünü oluşturan bir epileptik ensefalopatidir. Dravet sendromunda tipik olarak ilk nöbet, hastaların büyük çoğunluğunda bir yaş altında, ateşli bir atakta-bazen aşılama sonrası görülür ve genellikle komplike febril konvülsiyon olarak tanı alır. Hastalığın başlangıcında elektroensefalografi ve kraniyal manyetik rezonans görüntüleme normal olarak beklenir. Takipte febril status epileptikus, afebril nöbetler, bilişsel ve motor gelişimde gerileme meydana gelir. Klinik olarak Dravet sendromu tanısı alan hastaların %75-80'inde *SCN1A* gen varyantları saptanabilir. *SCN1A* geni hücre zarında yer alan ve sinir sisteminin düzenli işleyişinde rol oynayan sodyum kanallarını kodlayan Nav1.1 proteininin oluşumunda görevli bir genidir. Tekrarlayan febril nöbetleri, febril status epileptikus, 3.doz karma aşı sonrası febril nöbeti olan ve 8 aylık iken Dravet sendromu tanısı alan bir hasta sunularak özellikle aşı sonrası nöbetlerde Dravet sendromunun akla gelerek erken tanı konmasının önemi vurgulanmıştır.

Anahtar Kelimeler: Dravet sendromu, epilepsi, *SCN1A* geni

ABSTRACT

Dravet syndrome is an epileptic encephalopathy that accounts for approximately 1.4% of childhood epilepsies. The first seizure in Dravet syndrome typically occurs in most patients under one year of age, usually in a febrile episode (sometimes post-vaccination) and is also diagnosed as a complicated febrile convulsion. At the onset of the disease electroencephalography and cranial magnetic resonance imaging are expected to be normal. In the follow-up, febrile status epilepticus, afebrile seizures, regression in cognitive and motor development occurs. *SCN1A* gene variants can be detected in 75-80% of patients clinically diagnosed with Dravet syndrome. *SCN1A* gene is a gene involved in the formation of Nav1.1 protein, which encodes sodium channels located in the cell membrane and plays a role in the regular functioning of the nervous system. A patient with recurrent febrile seizures, febrile status epilepticus, febrile seizure after the 3rd dose of mixed vaccine and diagnosed as Dravet syndrome at the age of 8 months was presented and the importance of early diagnosis of Dravet syndrome especially in post-vaccine seizures was emphasized.

Keywords: Dravet Syndrome, epilepsy, *SCN1A* gene



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GİRİŞ

İlk defa 1978 yılında Charlotte Dravet erken başlangıçlı, tedaviye dirençli, myoklonik nöbetleri olan hastaları “Bebeklik Döneminin Şiddetli Miyoklonik Epilepsisi” olarak tanımladı (1). Daha sonra bu epilepsi sendromuna “Dravet sendromu” (DS) adı verildi (2). 2001 yılında Claes ve arkadaşları tipik DS fenotipine sahip yedi çocukta *SCN1A* geninde de novo bir mutasyon saptayarak hastalığın genotipi hakkında önemli bir gelişmeye yol açtılar (3). *SCN1A* geni hücre zarında yer alan ve sinir sisteminin düzenli işleyişinde rol oynayan sodyum kanallarını kodlayan Nav1.1 proteininin oluşumunda görevli bir genidir. Klinik olarak DS tanısı alan hastaların %75-80’inde *SCN1A* geni varyantları saptanabilir (4). Bu gende mutasyon saptanamayan kliniği uyumlu hastalarda epilepsi gen panellerinde yer alan diğer mutasyonların taranması önerilir (5).

DS’da tipik olarak, nöbetler bebeklik döneminde 2-16 ay arasında başlar ve hastaların büyük çoğunluğunda bir yaşın altında görülür. İlk nöbet genellikle ateşli bir atakta-bazen aşılardan sonra meydana gelir. Tek taraflı, klonik veya jeneralize, uzun süren ateşli nöbetler nedeniyle genellikle komplike febril konvülsiyon olarak tanı alır. Başlangıç veya febril faz olarak adlandırılan bu dönemde çocuğun gelişimi normaldir, elektroensefalogram (EEG) ve kraniyal manyetik rezonans görüntüleme (MRG) normal olarak beklenir. Kötüleşme fazında ateşli ve/veya ateşsiz, uzun süren jeneralize, myoklonik, atipik absans, fokal, uzun sürebilen nöbetler olmaya başlar. Sadece ateş değil, aynı zamanda yüksek dış ortam sıcaklıkları veya sıcak su, nöbeti tetikleyebilir. Işığa duyarlılık yaygın bir bulgudur ve miyoklonik nöbetlere neden olabilir. Takipte dil gelişimi başta olmak üzere bilişsel ve motor gelişim yavaşlaması görülür. EEG’de epileptik deşarjlar saptanır. Durağan faza genellikle 10 yaşından önce ulaşılır. Bu dönemde nöbetlerin süresi kısa ve seyrek olsa bile bilişsel ve motor sorunlar belirgindir (5-7).

Bu yazıda, tekrarlayan febril nöbetler, febril status epileptikus, 3.doz karma aşı sonrası febril nöbet nedeni ile takip edilen ve 8 aylık iken DS tanısı alan bir hasta sunularak aşı sonrası olan nöbetlerde

DS’nun erken tanısının konabileceğini vurgulamak amaçlanmıştır.

OLGU SUNUMU

Beş aylık kız hasta iki gün arayla ateş yüksekliği, ilkinde sağ kolda titreme, ikincisinde tüm vücutta kasılma, titreme şeklinde 20-30 dakika kadar süren nöbetler nedeniyle başvurdu. On sekiz yaşındaki annenin 1. gebeliğinden 1. yaşayan olarak 40 haftalık servikal açılma olmaması nedeniyle sezaryen doğum yöntemiyle, 3800 gram doğan hastanın postnatal bir sorunu olmadığı, 3 aylıkken başını tuttuğu ve sosyal gülümsemesinin başladığı öğrenildi. Anne-babanın hala torunu olduğu ve annenin dayısının kızında epilepsi tanısı olduğu öğrenildi. Hastada komplike febril nöbet düşünüldüğü için nöbet anında yapılacaklar, enfeksiyon odağına yönelik tedavi, ateş takibi, rektal diazepam kullanımı anlatılarak takibe çağrıldı. Bir hafta sonra ateşin eşlik ettiği 5 dakika kadar süren jeneralize nöbetinin olması, ailenin profilaktik rektal diazepamı kullanamaması üzerine oral valproik asit tedavisi (20 mg/kg, on günde tam doza çıkacak şekilde) başlandı. Bu dönemde fizik ve nörolojik muayenesi EEG’si normal olarak değerlendirildi. Beş gün sonra hasta ateş, 30 dakikadan uzun süren jeneralize nöbet nedeniyle febril status epileptikus tablosunda serviste yatırılarak izlendi. Ateş odağı enteroviral enfeksiyona bağlandı. Fizik ve nörolojik muayenesi, EEG ve kraniyal MRG’si normal olan hasta valproik asit tedavisine devam etmek üzere taburcu edildi. Yedi aylık olduğunda yapılabilen 3. doz beşli karma (DBT-Hib-inaktif polio) aşısından yaklaşık 4 saat sonra ateş, sağ kolda fokal başlayıp jeneralize olan tonik klonik nöbet ile hasta tekrar başvurdu. Bu nöbetin yaklaşık 40 dakika kadar sürmesi nedeni ile hasta febril status epileptikus kabul edilerek antikonvülsan tedaviler (levetirasetam 30 mg/kg, intravenöz iki kez, nöbeti devam etmesi nedeniyle difenilhidantoin 20 mg/kg ve 10 mg/kg intravenöz) ile nöbeti kontrol altına alındı. Hastanın bu ayda gelişim basamakları yaşına uygundu. Nörolojik muayenesi ve tekrarlanan EEG’si normal olarak değerlendirildi.

Tekrarlayan febril nöbetler, status epileptikus ve aşı sonrası nöbeti olması nedeniyle Dravet sendromundan şüphelenilerek genetik analiz gönderildi. *SCN1A* geninde ekzon14'de heterozigot olarak c.2551C>T, p.Arg851Ter (rs397514459) patojenik (klas 1) anlamsız (nonsens) mutasyon saptandı ve DS tanısı konuldu. Henüz ateşsiz nöbetleri görülmeyen, bilişsel ve motor geriliği olmayan hastaya valproik asit tedavisine ek olarak stiripentol ve klobazam tedavisi başlanacağı ve hastalığı anlatılarak, ülkemizde bulunmayan ancak TC Sağlık Bakanlığı kanalıyla alınabilen bu ilaçları temin etmesi istendi. Üç ay sonra kontrole gelen hastanın bu süre boyunca ilaçları temin etmediği, bir kez status epileptikus nedeniyle dış merkezde yatırılarak izlendiği, sonrasında ateşsiz miyoklonik nöbetlerinin başladığı öğrenildi. On bir aylık iken adımlamaya başlayan, tanıyarak anne-baba diyen hastanın son bir aydır bilişsel ve motor gerilemesi başlamıştı. Aile ile tekrar konuşularak stripentol ve klobazam tedavisi başlandı. Son takibinde 18 aylık iken görülen hastanın yaklaşık altı aydır nöbetinin olmadığı, tekrar adımlamaya ve kelime söylemeye başladığı saptandı. Hastanın izlemi devam etmektedir.

TARTIŞMA

Dravet sendromu, 1/15.700-1/40.000 sıklıkta görülen ve çocukluk çağı epilepsilerinin yaklaşık %1.4'ünü oluşturan bir epileptik ensefalopatidir (8). Dravet sendromlu hastaları bekleyen sorunlar arasında SUDEP (*Sudden Unexpected Death in Epilepsy*-Epilepside ani beklenmedik ölüm), zihinsel gerilik, öğrenme güçlüğü, konuşma bozukluğu, otistik özellikler, uyku düzeni bozulması, ileri yaşta motor fonksiyon kaybı bulunmaktadır (6). Dravet sendromlu hastalarda nöbetlerin erken kontrolü, daha az ciddi gelişimsel gecikme ile sonuçlanır. Dravet sendromu tanısı, hala tartışmalı olsa da klinik ve genetik özelliklere dayanarak 12 aydan önce konulabilir. Tek, uzun süreli, ateşli nöbet ve *SCN1A* geninde DS ile ilişkili bir mutasyon saptandıktan hemen sonra, DS için klinik kriterleri karşılamasa bile bu sendrom için önerilen bir ilaçla tedavi başlanmasını öneren yayınlar vardır (9,10).

Dravet sendromu, tedavisi zor bir epilepsi sendromudur ve ilaca en dirençli epilepsilerden biridir. Güncel kılavuzlara göre valproat birinci basamak ilaç olarak önerilmektedir. Sodyum kanal blokörlerinin tercih edilmesi kontrendikedir. İkinci basamak tedavi seçenekleri arasında stiripentol (klobazam ile veya klobazam olmadan), topiramet ve ketojenik diyet yer almaktadır (9,11). Daha yeni Avrupa kılavuzları olası ikinci basamak tedavi olarak kannabidiol ve fenfluramini de içermektedir (11). Biz de hastamıza sekiz aylıkken kötüleşme fazına girmeden, erken dönemde DS'a spesifik ilaçlar (sitiripentol ve klobazam) önermemize rağmen, ailesi ilaçları temin edemediği için, tedavi başlanmamıştı. Takibinde motor ve bilişsel geriliği başlayan hastanın kısa sürede tedavi ve nöbet kontrolü ile bu yetileri geri kazandığı görüldü. Son kontrolünde belirgin motor ve bilişsel geriliği olmayan hastamızın izlemi devam etmektedir.

İlk iki doz karma aşısından sonra nöbeti olmadığı öğrenilen hastamız sık enfeksiyonu nedeni ile yedinci ayda yapılabilen son doz karma aşısından sonra febril status epileptikus ile başvurmuştur. Aşılamalardan sonra rutin olarak antipiretik tedavi önerilmemesine rağmen febril nöbeti olan hastalarda ateş takibinin daha dikkatli yapılması ve özellikle DS'da profilaktik antipiretik tedavi verilmesi önerilmektedir (12,13). Biz de hastamıza bu yönden uyarıda bulunmamıza rağmen aile ateş takibi yapamamış ve febril status epileptikus tablosu gelişmişti. Aşı sonrası uzun süreli ateşli nöbetleri olan bebeklerde, DS'un erken tanısı için *SCN1A* gen analizinin rutin hale gelmesini öneren yayınlar vardır (14,15) Bir kohort çalışmasında *SCN1A* ile ilişkili DS'un nadir görülen bir hastalık olmasına rağmen, yaşamın ilk yılında aşıları takiben bildirilen nöbetlerin %2.5'inin bu bozukluğu olan çocuklarda meydana geldiğini göstermektedir (15). Bir diğer retrospektif çalışmada DS ve *SCN1A* mutasyonları olan hastalarda aşıları takiben nöbet oranı %27 olarak bildirilmiştir. Bu hastaların %58'inde aşuya bağlı nöbetler ilk klinik bulguyu oluşturmaktadır. Nöbetlerin çoğunluğu DPT (Difteri-Boğmaca-Tetanoz)

aşılamlarından sonra ve aşılama sonrası 72 saat içinde ateş ile birlikte ateşsiz meydana gelmiştir (16).

SCN1A mutasyonu epilepsi ile ilişkili olarak DS dışında febril nöbetler ile birlikte olan genetik epilepsi (GEFS+), myoklonik-atonik epilepsi, süt çocukluğu döneminin gezici fokal nöbetlerle seyreden epilepsisi ve erken başlangıçlı SCN1A gelişimsel epileptik ensefalopatide de saptanabilir (17). Bizim hastamızda sık tekrarlayan komplike febril konvülsiyon, febril status epileptikus ve aşı sonrası febril nöbet olması nedeni klinik olarak DS'undan şüphe edilerek SCN1A geni mutasyon analizi gönderildi.

Aşılama sonrası nöbetlerde ek klinik bulgular olmasa da SCN1A geni mutasyonu gönderilerek DS'unun erken tanısının konulması prognoz açısından önemlidir.

Çatışma Beyanı: Yazarların beyan edeceği herhangi bir çıkar çatışması yoktur.

Katkı Oranı Beyanı: Anafikir/Planlama: NŞ, ÜK; Analiz/Yorum: NŞ, AA, ST; Veri Sağlama: NŞ, ÜK; Yazım: NŞ, AA, ÜK; Gözden Geçirme ve Düzeltme: NŞ, ST, AA, ÜK; Onaylama: NŞ, ST.

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Hasta Onamı: Hastadan bilgilendirilmiş onay formu alınmıştır.

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