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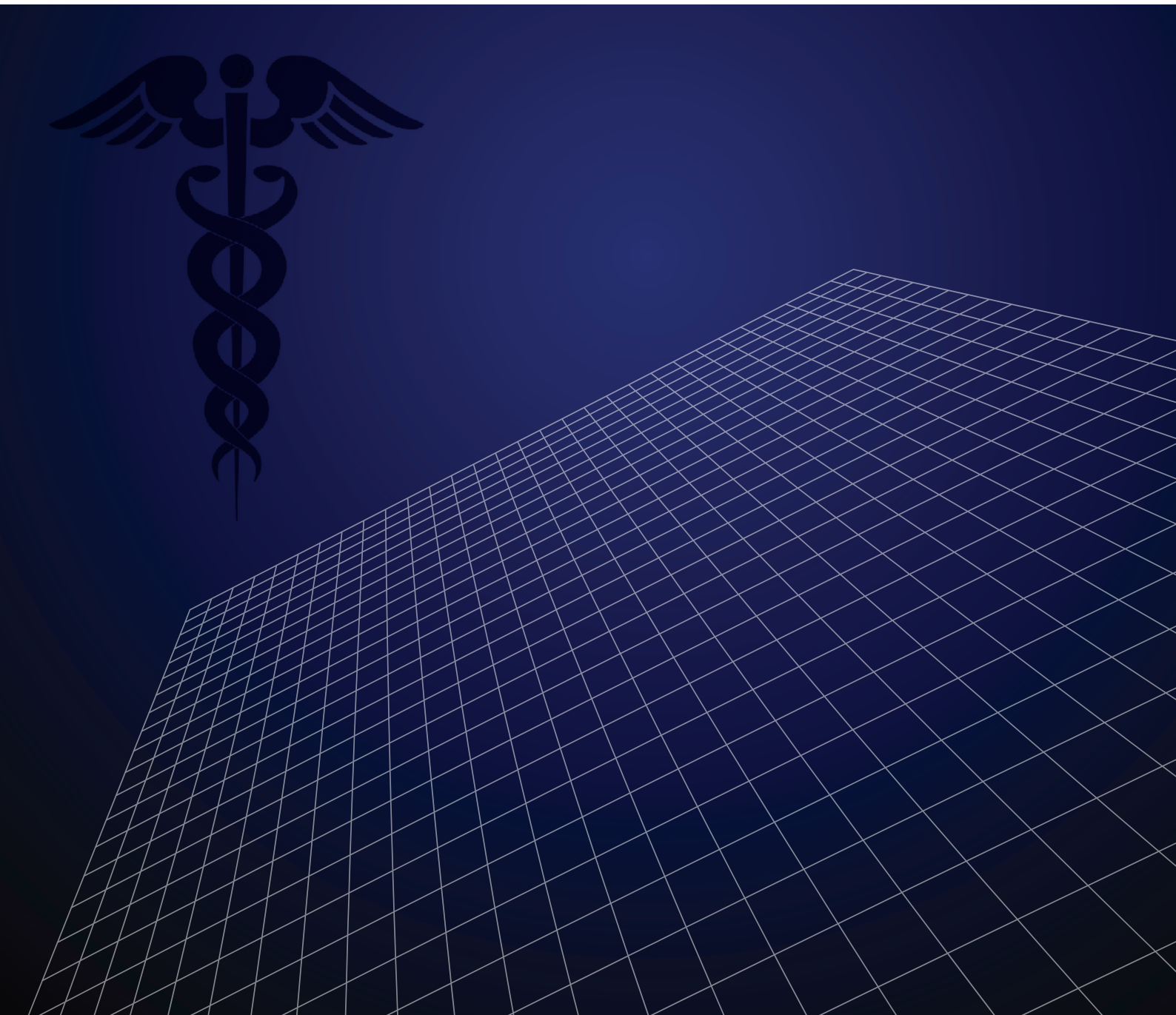

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Research Article

Anatomical variations in the abdominal aorta

Abdominal aorttaki anatomik varyasyonlar

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Abstract

Aim: The aim of our study is to identify variations in the celiac artery, superior mesenteric artery (SMA), inferior mesenteric artery (IMA), renal arteries (RA), and hepatic arteries (HA) in patients who underwent multidetector computed tomography (MDCT) angiography for various preliminary diagnoses.

Materials and Methods: This study retrospectively analyzed 200 patients who underwent MDCT angiography. The Uflacker classification was used for celiac trunk variants, Michels and Hiatt classifications for HA variations, and RA were assessed for number and presence of extra-RA, with aberrant or accessory RA classified as numerical anomalies.

Results: A classical celiac trunk was present in 92.0% of patients, with variations including hepatosplenic and gastrosplenic trunks each in 3.5% of cases. The classical branching pattern of the celiac trunk was found in 91.5% of patients, while 1.0% had the left gastric artery originating from the splenic artery or directly from the abdominal aorta. SMA origin was classical in 95.5% of cases, with 2.5% showing hepatomesenteric trunk origin and 1.0% displaying bimesenteric trunk origin. For the IMA, 98.4% of patients had a classical origin. The ratio with a right RA count of 2 or more was 13%, while the ratio with a left RA count of 2 or more was 12.5%. Right HA variations were observed in 14.5% of patients, whereas left HA variations were present in 11.5%.

Conclusions: Our study identified significant anatomical variations in the celiac artery, SMA, RA, and HA in patients undergoing MSCT. The findings highlight the importance of recognizing these variations for accurate diagnosis and surgical planning.

Keywords: Celiac artery, Superior mesenteric artery, Renal artery, Anatomical variations, Celiac trunk, Hepatic artery

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Öz

Amaç: Çalışmamızın amacı, çeşitli ön tanılar için çok dedektörlü bilgisayarlı tomografi (ÇDBT) anjiyografisi uygulanan hastalarda çölyak arter, superior mezenterik arter (SMA), inferior mezenterik arter (İMA), renal arterler (RA) ve hepatik arterlerde (HA) varyasyonları belirlemektir.

Gereç ve Yöntemler: Bu çalışmada, ÇDBT anjiyografisi yapılan 200 hasta retrospektif olarak analiz edilmiştir. Çölyak trunkus varyantları için Uflacker sınıflandırması, HA varyasyonları için Michels ve Hiatt sınıflandırmaları kullanılmış ve RA'lar, sayı ve ekstra-RA varlığı açısından değerlendirilmiş, replase veya aksesuar RA'lar sayısal anomaliler olarak sınıflandırılmıştır.

Bulgular: Hastaların %92,0'sinde klasik çölyak trunkus mevcuttu ve varyasyonlar arasında hepatosplenik ve gastrosplenik trunkuslar her biri %3,5 oranında görüldü. Çölyak trunkusun klasik dallanma deseni hastaların %91,5'inde saptanırken, %1,0'inde sol gastrik arterin splenik arterden veya doğrudan abdominal aortadan kaynaklandığı görüldü. SMA orijini vakaların %95,5'inde klasik olup, %2,5'inde hepatomezenterik trunkus orijini ve %1,0'inde bimesenterik trunkus orijini vardı. İMA için, hastaların %98,4'ünde klasik bir orijin mevcuttu. Sağ RA sayısı 2 veya daha fazla olanların oranı %13 iken, sol RA sayısı 2 veya daha fazla olanların oranı %12,5 idi. Sağ HA varyasyonları hastaların %14,5'inde gözlenirken, sol HA varyasyonları %11,5 oranında mevcut idi.

Sonuçlar: Çalışmamız, MSBT yapılan hastalarda çölyak arterlerde, SMA'da, RA'da ve HA'da önemli anatomik varyasyonlar olduğunu ortaya koymuştur. Bulgular, doğru tanı ve cerrahi planlama için bu varyasyonların tanınmasının önemini vurgulamaktadır.

Anahtar Kelimeler: Çölyak arter, Superior mezenterik arter, Renal arter, Anatomik varyasyonlar, Çölyak trunkus, Hepatik arter

Introduction

The abdominal aorta is the main artery responsible for delivering oxygenated blood to the abdominal organs. It typically begins at the aortic hiatus of the diaphragm, at the level of the 12th thoracic vertebra, and extends down to the 4th lumbar vertebra [1]. In embryologic development, the digestive tube differentiates into the foregut, midgut, and hindgut, each supplied by the abdominal aorta [2]. The abdominal aorta branches ventrally into the celiac trunk, superior mesenteric artery (SMA), and inferior mesenteric artery (IMA). The celiac trunk supplies the foregut and branches into the common hepatic artery (CHA), splenic artery (SA), and left gastric artery (LGA). Traditionally, the CHA divides into right and left branches to supply the two liver lobes [3].

While the general anatomical course of the abdominal aorta is well established, variations in its structure are not uncommon. These anatomical variations can include differences in the origin, course, branching patterns, and diameters of the aorta and its branches [4]. These variations are generally asymptomatic and are most commonly identified during routine cadaver dissections or imaging and surgical procedures [5]. Multidetector computed tomography (MDCT) facilitates the detection of anatomical variations by offering submillimeter-resolution three-dimensional reconstructions, in addition to the standard assessment of vascular transverse-sections [6].

The anatomical variations of the abdominal aorta and its branches hold clinical importance in organ transplantation, laparoscopic procedures, and the management of deep abdominal injuries [7]. Hence, this study aimed to identify and determine the prevalence of variations in major arteries branching from the abdominal aorta, including the celiac artery, SMA, IMA, renal arteries (RA), and hepatic arteries (HA), using 128-slice MDCT.

Material and Methods

Following the principles set forth in the Declaration of Helsinki, this retrospective study was conducted at the Erzincan Binali Yıldırım University, Mengücek Gazi Training and Research Hospital, Radiodiagnostics Department between July 2022 and December 2023. The study received approval from the Binali Yıldırım University Clinical Research Ethics Committee (Approval Date: 06.03.2023, Number: 2023-3/5). The local ethics committee waived the requirement of informed consent due to the retrospective nature of the research.

Study population

This study retrospectively analyzed a total of 255 patients who underwent MDCT angiography for the assessment of various preliminary diagnoses, including traumatic injury, aneurysm, dissections, occlusion, and stenosis, at the Department of

Radiology during the aforementioned dates. Patients under 18 years of age, and those with significant motion artifacts or images where arterial structures could not be optimally assessed due to inappropriate contrast phases, were excluded from the study. After this exclusion process, 200 patients were enrolled in this study.

Patient files and electronic records were used to obtain demographic and clinical information, including age, gender, and computed tomography angiography findings.

Acquisition and Processing of Images

Abdominal aorta CT angiography images were acquired with a 128-slice MDCT scanner (Somatom go.Top, Siemens Healthcare, Forchheim, Germany). An 80 kVp dose was consistently maintained in all patients using a standard imaging protocol, and the mAs (180-220) was automatically set by the device based on the patient's weight. During the procedure, 1.5–2 mL/kg of non-ionic contrast agent was injected intravenously at a rate of 4 mL/sec via an automatic injector system, followed by a saline solution. The scan encompassed the area extending from 2 cm above the diaphragm to 4-5 cm below the level of the symphysis pubis. The arterial phase images were obtained at an average of 20-30 seconds, once the ROI placed on the proximal abdominal aorta reached a threshold of 150 HU. Initially, the images were acquired with a 2 mm slice thickness in the axial plane and were later reconstructed at a slice thickness of 0.625 mm. As the thin-slice axial images were analyzed on the workstation, reformats in the coronal and sagittal planes were created, and 3D reconstructions were generated using the volume rendering technique.

Sectional images were analyzed using the PACS system (Akgun PACS Viewer v7.5; Akgün Yazılım, Ankara, Turkey). A radiologist with 12 years of experience conducted a retrospective review of all CT images.

Vascular Evaluation and Classification of Variants

The Uflacker classification was utilized for detecting and categorizing anatomical variants of the celiac trunk [8]. The classification includes hepatosplenic trunk—type 2, where the CHA and SA share a common root, while the LGA originates directly from the aorta. Hepatogastric trunk—type 3 occurs when the CHA and LGA share a common root, and the SA arises separately from the aorta. Hepatosplenomesenteric trunk—type 4 is defined by a common origin of the CHA, SA, and SMA, with the LGA originating separately from the aorta. Gastrosplenic trunk—type 5 occurs when the LGA and SA share a common root, while the CHA arises separately from the aorta. Celiacomesenteric trunk—type 6 involves a common trunk for the celiac trunk and SMA. Celiaco-colic trunk—type 7 is characterized by a common trunk for the celiac trunk and colic artery. Finally, the absence of the celiac trunk—type 8 is identified when the CHA, SA, and LGA originate separately from the abdominal aorta without forming a trunk. Arterial origin variations that do not fit within this classification were categorized as other—type 9, and their specifics were explained in detail.

In assessing variations of the hepatic artery system, we applied the Michels classification from 1966 and the Hiatt classification, which modified the Michels system in 1994 [9, 10]. For RAs variations, we evaluated the number of RAs on both sides and investigated the presence of extra-RAs. Aberrant (polar) or accessory (hilar) RAs were classified as numerical anomalies.

Statistical analysis

All of the data were analyzed with IBM SPSS Statistics for Windows 22.0 (IBM Corp., Armonk, NY, USA). The normality distribution of the numerical variables was evaluated with the Kolmogorov-Smirnov test. All numerical data showed a normal distribution and were reported as mean ± standard deviation (SD). Student's T-test was used for comparisons of numerical variables between two groups, while ANOVA (post hoc: Bonferroni test) was used for comparisons involving more than two groups. Categorical variables were given as numbers and percentages, and inter-group comparisons were conducted with the Chi-square and Fisher exact tests. Significance was accepted at P-value < 0.05 (*) for all of the statistical analyses.

Results

The mean age of the patients was 60.9±15.7 years (range: 21-92), and the majority were male (n=139, 69.5%). In terms of celiac trunk origins, a classical celiac trunk was identified in 184 patients (92.0%), a hepatosplenic trunk in 7 patients (3.5%), a gastrosplenic trunk in 7 patients (3.5%), a celiacomesenteric trunk in 1 patient (0.5%), and absence of the celiac trunk in 1 patient (0.5%) (Table 1).

In terms of the origins of the celiac trunk branches, 183 patients (92.0%) had a classical pattern. Two patients (1.0%) had a LGA originating directly from the abdominal aorta; two patients (1.0%) had an LGA arising from the SA; one patient (0.5%) had an LGA originating from the CHA or proper HA (PHA); three patients (1.5%) had a CHA originating directly from the abdominal aorta; two patients (1.0%) had an absent CHA; and five patients (2.5%) had other origins. Among these patients with other origins, one had a SA originating from the

SMA, one had a right HA (RHA) originating from the celiac trunk, one had a left HA (LHA) and LGA originating as a single root from the aorta, and two had a CHA originating from the SMA. Two patients had multiple origins. In one patient (0.5%), both a LGA directly originating from the abdominal aorta and the absence of the CHA were present. One patient had three simultaneous origins: the LGA arose from the CHA or PHA, the SMA and CHA originated from a common root, and the SA directly originated from the abdominal aorta (Table 1).

Table 1. Origins of the celiac trunk and its branches.

Variables	All population n = 200
Origins of celiac trunk, n (%)	
Classical	184 (92.0)
Hepatosplenic trunk	7 (3.5)
Gastrosplenic trunk	7 (3.5)
Celiacomesenteric trunk	1 (0.5)
Absence	1 (0.5)
Origins of celiac trunk branches, n (%)	
Classical	183 (91.5)
LGA originating directly from the abdominal aorta	2 (1.0)
LGA originating from the SA	2 (1.0)
LGA originating from the CHA or PHA	1 (0.5)
CHA originating directly from the abdominal aorta	3 (1.5)
Absence of the CHA	2 (1.0)
Other	5 (2.5)
Double Origin (Both LGA originating directly from the abdominal aorta and absence of the CHA)	1 (0.5)
Triple Origin (LGA originating from the CHA or PHA, SMA and CHA sharing a common root, SA originating directly from the abdominal aorta)	1 (0.5)

Data are shown as number and percentage (%). Abbreviations: CHA, common hepatic artery; LGA, left gastric artery; PHA, proper hepatic artery; SA, splenic artery; SMA, superior mesenteric artery

The SMA origin distribution among the patients was as follows: 191 patients (95.5%) had a classical origin, 5 patients (2.5%) had a hepatomesenteric origin, 2 patients (1.0%) had a bimesenteric origin, 1 patient (0.5%) had a celiacomesenteric origin, and 1 patient (0.5%) had splenomesenteric origin. The ratio of patients with SMA branch variations was 11.0% (n = 22). In this group, 18 patients had a replaced PHA, 2 had a replaced CHA, and 2 had other branch variations (accessory RHA and splenomezenteric). Among the 18 patients with a replaced PHA, 16 were dexter type, and 2 were sinister type (Table 2).

Table 2. Origin and branch variations of the superior mesenteric artery (SMA).

Variables	All population n = 200
Origins of SMA, n (%)	
Classical	191 (95.5)
Celiacomesenteric trunk	1 (0.5)
Hepatomesenteric trunk	5 (2.5)
Bimesenteric trunk	2 (1.0)
Other	1 (0.5)
Branch variation of SMA, n (%)	
No extra branch	178 (89.0)
Yes	22 (11.0)
Variation type of SMA, n (%)	
No extra branch	178 (89.0)
Replaced PHA	18 (9.0)
Replaced CHA	2 (1.0)
Other	2 (1.0)

Data are shown as number and percentage (%). Abbreviations: CHA, common hepatic artery; PHA, proper hepatic artery; SMA, superior mesenteric artery

In terms of the origins of the IMA, 197 patients (98.4%) had a classical origin, 2 patients (1.0%) had a bimesenteric trunk, and 1 patient (0.5%) had another origin. The numbers of right and left RA and the presence of renal anomalies are summarized in Table 3. Regarding the RHA, 171 patients (85.5%) had a classical origin, 19 had a replaced origin, and 10 had an accessory origin. As for the LHA, 179 patients (89.5%) had a classical origin, 13 had a replaced origin, and 8 had an accessory origin (Table 4).

Table 3. Inferior mesenteric artery (IMA) origin, renal artery counts, and associated anomalies.

Variables	All population n = 200
Origins of IMA, n (%)	
Classical	197 (98.5)
Bimesenteric trunk	2 (1.0)
Other	1 (0.5)
Right renal artery count, n (%)	
1	174 (87.0)
2	25 (12.5)
3	1 (0.5)
Left renal artery count, n (%)	
1	175 (87.5)
2	22 (11.0)
3	3 (1.5)
Associated renal anomaly, n (%)	
No	198 (99.0)
Rotation	1 (0.5)
Horseshoe kidney	1 (0.5)

Data are shown as number and percentage (%). Abbreviations: IMA, inferior mesenteric artery.

Table 4. Origins from the right and left hepatic arteries.	
Variables	All population n = 200
Right hepatic arteries, n (%)	
Classical	171 (85.5)
Replaced	
Left gastric artery	1 (0.5)
Celiac artery	1 (0.5)
Left hepatic artery	1 (0.5)
Superior mesenteric artery	16 (8.0)
Accessory	
Aorta	1 (0.5)
Celiac artery	2 (1.0)
Left hepatic artery	2 (1.0)
Superior mesenteric artery	5 (2.5)
Left hepatic artery, n (%)	
Classical	
Replaced	
Left gastric artery	11 (5.5)
Celiac artery	11 (0.5)
Superior mesenteric artery	1 (0.5)
Accessory	
Left gastric artery	8 (4.0)
Data are shown as number and percentage (%).	

There were no significant differences in anatomical variations in the abdominal aorta between males and females (Table 5).

The classical RHA group had a higher rate of classical celiac trunk compared to the replaced and accessory RHA groups (Classical: 94.2% vs. Replaced: 78.9% vs. Accessory: 80%, $p < 0.05$), whereas the accessory group had a higher rate of celiac trunk absence (Classical: 0% vs. Replaced: 0% vs. Accessory: 10%, $p < 0.05$). The classical RHA group had a higher rate of no extra branches in SMA variations compared to the other groups (Classical: 98.8% vs. Replaced: 15.8% vs. Accessory: 70.0%, $p < 0.05$), whereas the replaced RHA group had a higher rate of replaced PHA (Classical: 0.6% vs. Replaced: 84.2% vs. Accessory: 10%, $p < 0.05$). The accessory RHA group had a higher rate of replaced CHA compared to the other RHA groups (Classical: 0.6% vs. Replaced: 0% vs. Accessory: 10%, $p < 0.05$). The IMA origin did not differ according to RHA origins (Table 6).

The classical celiac trunk was present at a similar rate in the classical and accessory LHA groups, and it was higher in these groups compared to the replaced LHA groups (Classical: 93.3% vs. Replaced: 69.2% vs. Accessory: 100%, $p < 0.05$). The distribution of SMA variation types and IMA origins did not differ among the LHA groups (Table 6).

Discussion

The abdominal aorta is the major arterial structure of the abdomen, positioned between the thoracic aorta and the arteries of the extremities. It gives rise to important branches, including the celiac trunk, SMA, RAs, and IMA, and it terminates by dividing into the bilateral common iliac arteries [11]. This vascular structure plays a crucial role in delivering oxygenated blood to the abdominal solid organs, the intestinal system, the muscles of this cavity, and the genital organs. Additionally, it mediates the transmission of blood from the thoracic segment of the aorta to the lower extremities [12]. Therefore, variations in the abdominal aorta hold clinical significance for surgical procedures [7].

Our study focused on analyzing the major arteries branching from the abdominal aorta, including the celiac artery, SMA, IMA, RA, and HA. The celiac trunk and SMA are major branches arising from the proximal ventral section of the abdominal aorta, supplying the intestinal organs. The celiac trunk, a trunkal structure approximately 1.5-2 cm in length, terminates by branching into the CHA, SA, and LGA. Our study showed that 92% of the patients had a classical complete trifurcation. In the study conducted by Türkyılmaz et al., the rate of normal trifurcation was also reported to be approximately 91% [13]. Olga et al. analyzed the anatomical variations of the major arteries branching from the abdominal aorta using 64-slice MDCT and found that in 95.5% of the patients, the typical celiac trunk divided into three arteries [6]. Other studies have reported a lower prevalence of typical celiac trunk division, ranging between 72% and 90% [14, 15]. During the development of the abdomen, three vascular structures associated with the digestive system differentiate, and anastomoses form between these structures. These anastomoses later regress, displaying individual variations. If these anastomoses regress significantly, it can result in the absence of these vascular structures, while a lack of regression in the segmental artery precursors allows these structures to originate directly from the abdominal aorta [16]. Celiac trunk bifurcation is observed in about 11% of the general population [17]. In our study, this rate was 7.5%, with a hepatosplenic trunk observed in 7 patients (3.5%), a gastrosplenic trunk in 7 patients (3.5%), and a celiacomesenteric trunk in 1 patient (0.5%). These rates were consistent with the frequencies reported in previous studies [14, 15].

The SMA arises 1 cm below the celiac trunk and runs a long course within the mesentery. It supplies a large portion of the small intestine, the cecum, the right colon, and the proximal to mid-transverse colon [18]. Fonseca Neto et al.

Table 5. Gender-based comparison of age and anatomical variations in the abdominal aorta.

Variables	Male n = 139	Female n = 61	p
Age, years	60.8 ± 15.9	61.2 ± 15.1	0.847
Origins of celiac trunk, n (%)			
Classical	127 (91.4)	57 (93.4)	0.999
Hepatosplenic trunk	5 (3.6)	2 (3.3)	
Gastrosplenic trunk	5 (3.6)	2 (3.3)	
Celiacomesenteric trunk	1 (0.7)	-	
Absence	1 (0.7)	-	
Origins of SMA, n (%)			
Classical	132 (95)	59 (96.7)	0.910
Celiacomesenteric trunk	1 (0.7)	-	
Hepatomesenteric trunk	3 (2.2)	2 (3.3)	
Bimesenteric trunk	2 (1.4)	-	
Other	1 (0.7)	-	
Branch variation of SMA, n (%)			
No extra branch	122 (87.8)	56 (91.8)	0.471
Yes	17 (12.2)	5 (8.2)	
Variation type of SMA, n (%)			
No extra branch	122 (87.8)	56 (91.8)	0.605
Replaced PHA	14 (10.1)	4 (6.6)	
Replaced CHA	1 (0.7)	1 (1.6)	
Other	2 (1.4)	-	
Origins of IMA, n (%)			
Classical	137 (98.6)	60 (98.4)	0.206
Bimesenteric trunk	2 (1.4)	-	
Other	-	1 (1.6)	
Right hepatic arteries, n (%)			
Classical	117 (84.2)	54 (88.5)	0.715
Replaced	14 (10.1)	5 (8.2)	
Accessory	8 (5.8)	2 (3.3)	
Left hepatic artery, n (%)			
Classical	120 (86.3)	59 (96.7)	0.080
Replaced	12 (8.6)	1 (1.6)	
Accessory	7 (5)	1 (1.6)	

Data are shown as number and percentage (%). Abbreviations: CHA, common hepatic artery; PHA, proper hepatic artery; SMA, superior mesenteric artery.

Table 6. Distribution of celiac trunk, superior mesenteric artery (SMA), and inferior mesenteric artery (IMA) variations by right and left hepatic arteries origin

Variables	Right hepatic arteries			p	Left hepatic arteries			p
	Classical n = 171	Replaced n = 19	Accessory n = 10		Classical n = 179	Replaced n = 13	Accessory n = 8	
Age, years	60.8 ± 15.4	55.9 ± 18.5	72.7 ± 9.4‡	0.025*	60.5 ± 15.8	62.1 ± 14.9	68.1 ± 14.3	0.440
Origins of celiac trunk, n (%)								
Classical	161 (94.2)	15 (78.9)	8 (80.0)	0.025*	167 (93.3)	9 (69.2)	8 (100)	0.027*
Hepatosplenic trunk	4 (2.3)	2 (10.5)	1 (10.0)		6 (3.4)	1 (7.7)	-	
Gastrosplenic trunk	5 (2.9)	2 (10.5)	-		4 (2.2)	3 (23.1)	-	
Celiacomesenteric trunk	1 (0.6)	-	-		1 (0.5)	-	-	
Absence	-	-	1 (10.0)		1 (0.5)	-	-	
Variation type of SMA, n (%)								
No extra branch	168 (98.8)	3 (15.8)	7 (70.0)	0.001*	163 (91.6)	9 (69.2)	6 (75.0)	0.129
Replaced PHA	1 (0.6)	16 (84.2)	1 (10.0)		13 (7.3)	4 (30.8)	1 (12.5)	
Replaced CHA	1 (0.6)	-	1 (10.0)		2 (1.1)	-	-	
Other	1 (0.6)		1 (10.0)		1 (0.5)		1 (12.5)	
Origins of IMA, n (%)								
Classical	169 (99.4)	19 (100)	9 (90.0)	0.107	177 (99.4)	13 (100)	7 (87.5)	0.083
Bimesenteric trunk	1 (0.6)	-	1 (10.0)		1 (0.5)	-	1 (12.5)	
Other	1 (0.6)	-	-		1 (0.5)	-	-	

Data are shown as number and percentage (%). * indicates a statistically significant difference at $p<0.05$. ‡ indicates the group that is statistically different from the other groups. Abbreviations: CHA, common hepatic artery; IMA, inferior mesenteric artery; PHA, proper hepatic artery; SMA, superior mesenteric artery.

conducted a study in which they retrospectively reviewed the medical records of 479 adult patients who underwent organ transplantation over a 13-year period, focusing on the HA anatomy of deceased donors [19]. Their study reported that 85.6% of the patients had a normal variation of the SMA [19]. In a study by Fergadani et al., the MDCT images of 607 kidney donors and trauma patients were retrospectively analyzed, and classical arterial anatomy was found in 63.9% of the cases [20]. Our study found that 95.5% of the patients had a classical SMA. This variation could be linked to the size of the patient population and differences in racial demographics. Variations like the formation of a common mesenteric artery with the SMA or the absence of the IMA are rarely observed [6, 21, 22]. This was consistent with 98.5% of patients exhibiting the classical origin of the IMA.

Anatomical variations of the HAs are relatively frequent, with a reported prevalence ranging from 13% to 48% [23]. Variations of HA in patients may be important for planning liver transplantation and donor evaluations, pancreatohepaticobiliary surgery, arterial therapies, and endovascular interventions, as well as for managing postoperative complications and follow-up care. In our study, the RHA had a classical origin in 85.5% of patients, a replaced origin in 9.5%, and an accessory origin in 5%. The LHA had a classical origin in 89.5% of patients, a replaced origin in 6.5%, and an accessory origin in 4%. Ugurel et al. conducted a retrospective analysis of 100 patients who underwent MDCT angiography of the abdominal aorta for various reasons and identified the most CHA variations based on Michels' classification. They found that the most frequent variation was a replaced RHA (Type III) at 17%, followed by a replaced LHA (Type II) at 11%, and an accessory LHA (Type V) at 10% [24]. In the literature, the most frequently observed anomalies are Michels Type III, Type V, and Type II [25]. Similar findings were observed in our study. A previous study indicated that the rate of simultaneous variation in the celiac trunk and HA branching patterns was 4.4% [26]. In our study, 5.8% of patients with a classical RHA had celiac trunk origins categorized as hepatosplenic, gastrosplenic, or celiacomesenteric trunks. Additionally, in patients with a classical type of RHA, the rate of classical origin celiac trunk was found to be higher compared to those with a replaced or accessory type of RHA. This group of patients also exhibited a higher rate of absence of extra branches in SMA branch variations. On the other hand, the rate of patients with a replaced PHA in the SMA variation type was higher in the group with a replaced RHA. Besides, the

accessory RHA type exhibited a higher proportion of replaced CHA. In the LHA, the rate of classical origin celiac trunk was lower in the replaced type compared to the other types. Additionally, in the LHA classical type, the gastrosplenic origin of the celiac trunk was lower compared to the replaced type of LHA. This situation may be due to the variational changes in vascular structures during abdominal development being interconnected through vascular anastomoses.

The RAs are vascular structures arising from the lateral wall of the abdominal aorta. Additionally, they are a significant branch of the abdominal aorta, often displaying anatomical variations in their position relative to the renal vein and in their number. The left RA is slightly shorter due to the position of the abdominal aorta on the left side [27]. In approximately 70% of individuals, the kidney is supplied by a single RA originating from the abdominal aorta [28]. Munnusamy et al. studied variations in RA branching patterns in kidney donors using CT angiography and found that 51% of kidney donors exhibited variations in the RA. Additionally, they discovered that 13% of the patients had accessory RAs on both sides [28]. In the present study, similar to the findings in the literature, the rate of accessory RAs was 13% on the right side and 12.6% on the left side.

Our study has some limitations. Firstly, it is a single-center study with a relatively limited number of patients. Another limitation is the retrospective nature of the study, which might have introduced selection bias, as the data were gathered from patients who underwent MDCT angiography for specific clinical indications. This could potentially limit the applicability of our findings to the general population. Despite the retrospective nature of our study and its being conducted at a single center, it has identified a noteworthy number of rare variations. Additionally, while we used well-established classifications for vascular variations, the study did not account for potential variations that might be present in populations with different demographic characteristics, such as ethnicity or underlying health conditions. Future studies should consider these factors to provide a more comprehensive understanding of these anatomical variations.

Conclusions

Our study identified significant anatomical variations in the celiac artery, SMA, RA, and HA in patients undergoing MSCT. The findings of this study indicate that the frequency of arterial variations is a crucial individual difference, particularly relevant in surgical contexts, and necessitates careful patient-specific evaluation before any intervention. Awareness of variation frequency is essential, as it can significantly minimize the risk of complications during surgery. Including these variations in preoperative angiography reports is of clinical importance for preventing postoperative complications, such as bleeding and ischemia, and for achieving surgical success.

Ethics Approval

The study was performed in accordance with the Declaration of Helsinki, and was approved by the Binali Yıldırım University Clinical Research Ethics Committee (Approval Date: 06.03.2023, Number: 2023-3/5).

Informed Consent

The need for informed consent was waived under the approval of the Local Ethics Committee due to the retrospective design.

Conflicts of Interest Statement

The authors declare they have no conflicts of interest.

Financial Disclosure

The authors declared that this study has received no financial support.

Availability of Data and Material

The data that support the findings of this study are available on request from the corresponding author.

Author Contributions

All of the authors declare that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version.

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Araştırma Makalesi

Kızamık, kızamıkçık, kabakulak, suçiçeği, hepatit A ve B virüslerinin sağlık çalışanlarında seroepidemiyolojisi: Türkiye'den kesitsel çalışma

Seroepidemiology of measles, rubella, mumps, varicella, hepatitis A and B viruses in healthcare workers: A cross-sectional study from Turkey

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Öz

Amaç: Sağlık çalışanları aşıyla önlenebilir hastalıklar için risk altında olan kişilerdir. Çalışmamızın amacı; bu kişilerde hepatit A ve B, kızamık, kızamıkçık, kabakulak ve suçiçeği virüslerine karşı bağışıklık durumlarını belirlemek, yaş ve cinsiyete göre değerlendirmektir.

Gereç ve Yöntemler: Çalışmaya Kasım 2023- Mayıs 2024 tarihleri arasında Ankara Etlik Şehir Hastanesi Enfeksiyon Hastalıkları ve Klinik Mikrobiyoloji polikliniği'ne, aşıyla önlenebilen bulaşıcı hastalıkların taranması amacıyla başvuran, semptom tariflemeyen, 18 yaş üstü, 2409 sağlık çalışanı dahil edilmiştir.

Bulgular: Anti HBs %74,17, anti HAV %31,48, kızamık IgG %64,36, kızamıkçık IgG %95,9, kabakulakIgG %72,22, su çiçeği IgG %86,28 pozitif bulunmuştur. HBsAg, anti HAV, kabakulak Ig G ve kızamık Ig G pozitif olanların yaş ortancası daha yüksek saptanmıştır ($p<0.001$, $p<0.001$, $p=0.025$, $p<0.001$). Kadınlarda anti HBs ve kabakulak Ig G pozitifliği daha yüksek tespit edilmiştir ($ps<0.001$).

Sonuç: Düşük seropozitiflik oranlarını ağırlıklı olarak genç yaş grubu çalışanlarda tespit ettiğimiz anti HAV ve kızamık IgG için aşılama oldukça önemlidir. Bölgesel sürveyans verileri göz önüne alınarak aşılama programları oluşturulmalıdır.

Anahtar kelimeler: Aşıyla önlenebilen hastalıklar, bağışıklama, sağlık çalışanları, seroprevelans

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Abstract

Aim: Healthcare workers are at risk for vaccine-preventable diseases. Our study aimed to determine the seroprevalence of immunization status against hepatitis A and B, measles, rubella, mumps and varicella viruses in these individuals and to evaluate them according to age and gender.

Material and Methods: Between November 2023 and May 2024, 2409 healthcare workers over 18 years of age, who did not describe any symptoms and who applied to the Infectious Diseases and Clinical Microbiology outpatient clinic of Ankara Etlik City Hospital for screening of vaccine-preventable infectious diseases were included in the study.

Results: Anti HBs 74.17%, anti HAV 31.48%, measles IgG 64.36%, rubella IgG 95.9%, mumps IgG 72.22%, varicella IgG 86.28% were positive. The median age of HBsAg, anti HAV, mumps IgG and measles IgG positive patients was higher ($p<0.001$, $p<0.001$, $p=0.025$, $p<0.001$). Anti HBs and mumps Ig G positivity was higher in women ($p<0.001$).

Conclusion: Vaccination is very important for anti HAV and measles IgG, for which we found low seropositivity rates predominantly in young workers. Vaccination programs should be established by taking regional surveillance data into consideration.

Keywords: Vaccine-preventable diseases, immunization, healthcare workers, seroprevelance

Giriş

Sağlık çalışanları, toplumdaki diğer insanlarla karşılaştırıldığında solunum sekresyonları, kan ve vücut sıvılarıyla teması nedeniyle toplum geneline göre birçok infeksiyon açısından daha fazla risk altındadırlar. Hastane ortamından ve toplumdan kazandıkları infeksiyonları hastalara, diğer sağlık çalışanlarına ve hatta aile bireylerine taşıyabilmektedirler. Sağlık kurumlarında salgınların maliyetleri önemli bir ekonomik yük olarak kabul edilmektedir [1]. Aşıyla önlenebilir hastalıklar olan hepatit A ve B, kızamık, kabakulak, kızamıkçık (MMR) ve suçiçeği virüslerine karşı aşı oldukça etkilidir [2]. Sağlık çalışanlarının bağışıklama programları sağlık hizmeti ilişkili enfeksiyonların ve salgınların önlenmesinde önemli bir uygulamadır. CDC nin Bağışıklama Uygulamaları Danışma Komitesi kızamık, kızamıkçık, kabakulak, suçiçeği ve hepatite duyarlı tüm sağlık çalışanlarını aşılamayı tavsiye etmektedir [3,4]. Günümüzde, sağlık kurumlarında çalışanların ve hastaların güvenliğini iyileştirmeye ve artırmaya yönelik çeşitli programlar oluşturulmuştur. İnfeksiyon kontrol programlarının içerisinde risk altındaki sağlık çalışanlarının aşılanması en çok üzerinde durulan infeksiyon kontrol önlemlerinden biridir. Önerilen ve zorunlu mesleki aşılar hakkındaki programlar ülkeden ülkeye hatta merkezden merkeze farklılıklar göstermektedir [5]. Ülkemizde bu aşılar Genişletilmiş Bağışıklama Programı içinde yer almaktadır [6]. Serolojik testlerin yapılması konusunda hastanelerin kendi politikalarını belirlemeleri görüşü de kabul görmektedir [5,7].

Bu çalışmadaki amacımız; hastanemize tarama nedeni ile başvuran sağlık çalışanlarının aşıyla önlenebilir olan hepatit A ve B, kızamık, kızamıkçık, kabakulak ve suçiçeği virüslerine karşı bağışıklık durumlarının belirlemek, yaş ve cinsiyete göre değerlendirmektir.

İstatisel Analiz

Analizler Stata programında yapıldı. Yaş değerleri normal dağılım göstermediği için median ve Inter Quantile Range (IQR) verildi. Gruplar arasında karşılaştırma; iki gruptaki karşılaştırma Mann-Whitney U testi, 3 grup karşılaştırma Kruskal-Wallis ile değerlendirildi. Kategorik değişkenler frekans ve yüzde olarak verilerek Ki-kare veya Fisher's exact test ile karşılaştırıldı. Sonuçlar %95 güven aralığında değerlendirilmiş olup $p<0.05$ değeri istatistiksel anlamlı kabul edilmiştir.

Gereç ve Yöntemler

Bu çalışmaya; Türkiye'nin Ankara ilinde bulunan ve 4050 yatak kapasitesi ile çalışan Ankara Etlik Şehir Hastanesi'nde Kasım 2023- Mayıs 2024 tarihleri arasında Enfeksiyon Hastalıkları ve Klinik Mikrobiyoloji polikliniği'ne, aşıyla önlenebilen bulaşıcı hastalıkların taranması amacıyla başvuran, semptom tariflemeyen, 18 yaş üstü sağlık çalışanları dahil edilmiştir. Bulaşıcı hastalık taraması başka merkezde yapılan, semptom tarifleyen ve 18 yaş altı olan sağlık çalışanları çalışmaya dahil edilmemiştir. Demografik verilerden yaş ve cinsiyet değerlendirilmiş olup, yaş dağılımı <25, 25-34, 35-44, 45-54, ≥55 olarak sınıflandırılmıştır. Laboratuvar bulgularından; hepatit B virüs antijeni (HBsAg, <0.9 COI negatif, 0.9-1 COI ara değer , ≥ 1 COI pozitif), hepatit B virüs antikoru (anti HBs, < 10 IU/mL negatif, ≥ 10 IU/mL pozitif), hepatit A virüs antikoru (anti HAV, <1 COI negatif , ≥ COI pozitif), kabakulak Ig G (<9 NTU negatif, 9-11 NTU ara değer, >11 NTU pozitif), kızamık Ig G (<9

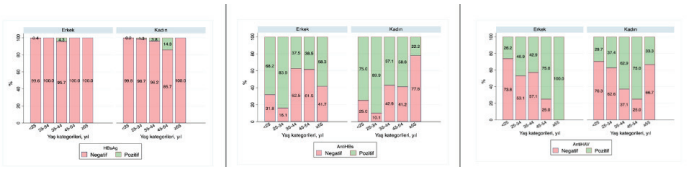
NTU negatif, 9-11 NTU ara değer, >11 NTU pozitif, kızamıkçık Ig G (anti rubella Ig G, <10 IU/mL negatif, ≥10 IU/mL pozitif) ve varicella zoster virüs (su çiçeği) Ig G (anti VZV Ig G, <9 NTU negatif, 9-11 NTU ara değer, >11 NTU pozitif) sonuçları değerlendirilmiştir. Test sonuçları titrelere göre; negatif, ara değer ve pozitif olarak sınıflandırılmıştır. Pozitif antikor sonuçları; humoral immünitenin göstergesi olarak yeterli bağışıklık, negatif antikor sonuçları ise yetersiz bağışıklık olarak kabul edilmiştir [8,9]. Tüm sağlık çalışanları test sonuçları hakkında bilgilendirilmiş olup yetersiz bağışıklığı olanlara aşı önerilmiştir. Laboratuvar testleri enzyme-linked immunosorbent assay (ELISA) method (Cobas e 801, Roche, GERMANY) la çalışılmıştır. Çalışmanın verilerine retrospektif olarak hastane bilgi yönetim sisteminden ulaşılmıştır. Bu çalışma Ankara Etlik Şehir Hastanesi Etik Kurul Birimi'nden etik onay almıştır (Karar tarihi:12/06/2024, karar no: AEŞH-BADEK-2024-541).

Bulgular

Çalışmaya 1929 (%80)'u kadın, toplam 2409 sağlık çalışanı dahil edilmiştir. Sağlık çalışanlarının ortanca yaşı 22 (18-59) olup, 1869 (%77,58)'u <25, 311 (%12,9)'i 25-34, 86 (%3,56)'sı 35-44, 54 (%2,2)'ü 45-54, 89 (%3,6)'u 55 ve üstü yaş aralığındadır.

HBsAg sonucu değerlendirilen 2409 (%84,31) kişinin 18 (%0,89)'inin sonucu pozitiftir. Yaş ortancası; HBsAg pozitif olanların 40.5 (IQR, 26-51) iken negatif olanların 22 (IQR,20-24)'dir ve HBsAg pozitif sağlık çalışanların yaş ortancası anlamlı yüksektir (p<0.001). Kadınların 15 (%0,94)'inde, erkeklerin ise üç (%0,72)'ünde HBsAg pozitiftir. Kadın ve erkekler arasında HBsAg sonucu açısından anlamlı fark saptanmamıştır (p=1.00). Anti HBs sonucu değerlendirilen 1901 (%78,91) kişinin 1410 (%74,17)'unun anti HBs sonucu pozitiftir. Kadınların 1165 (%75,9)'inin, erkeklerin 245 (%66,94)'inin anti HBs sonucu pozitiftir ve anti HBs pozitifliği kadınlarda erkeklerden anlamlı yüksektir (p=<0.001). Yaş dağılımına göre anti HBs sonuçları açısından anlamlı fark saptanmamıştır (p=0.106) (Resim 1).

Anti HAV sonucu değerlendirilen 1871 (%77,67) kişinin 589 (%31,48)'inin sonucu pozitiftir. Anti HAV bakılan 1871 kişiden 25 yaş altı olan 1578 kişinin 459 (%29) u anti HAV pozitifti. Anti HAV pozitif olanların yaş ortancası 22 (IQR, 20-24) iken negatif olanların yaş ortancası 21 (IQR, 20-23)'dir. Anti HAV pozitif olanların ortanca yaşı negatif olanlardan anlamlı yüksekti (p<0.001). Cinsiyete göre anti HAV sonucunda anlamlı fark bulunmamıştır (p=0.799) (Resim 1).



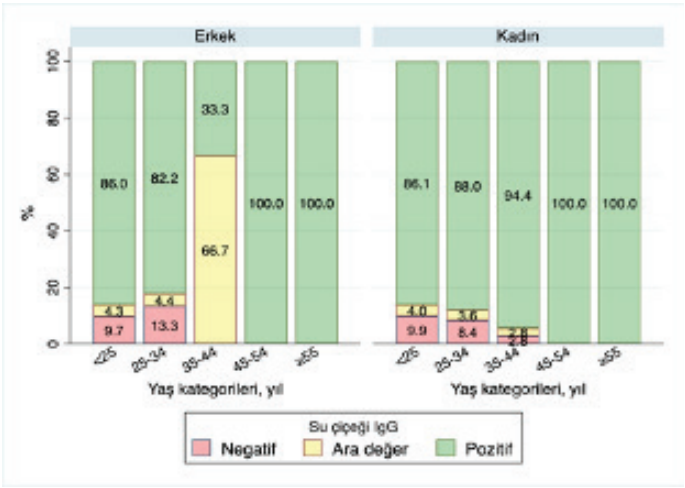
Resim 1. Yaş ve cinsiyet dağılıma göre HBsAg, anti HBs ve anti HAV sonuçlarının değerlendirilmesi.

Sağlık çalışanlarının 1908 (%79,2)'inin kızamık IgG sonucu değerlendirilmiştir ve 1228 (%64,36)'inin sonucu pozitif, 218 (%11,43)'inin sonucu ara değer olarak raporlanmıştır. Kızamık IgG sonucu pozitif olanların 1042 (%54,6)'si kadın olup, cinsiyete göre kızamık Ig G sonucunda anlamlı fark saptanmamıştır (p=0.123). Kızamık IgG pozitif olanların yaş ortancası 21 (IQR, 20-23, SD ± 4.3) iken negatif olanların yaş ortancası 21 (IQR, 20-22, SD± 2.8)'dir. Kızamık Ig G sonucu pozitif olanlarda median yaş anlamlı yüksektir (p<0.001). Kızamıkçık Ig G sonucu değerlendirilen sağlık çalışanı sayısı 1869 (%77,58)'dir ve 1794 (%95,9)'u pozitif saptanmıştır. Cinsiyete ve yaş dağılımına göre kızamıkçık Ig G sonucunda anlamlı fark tespit edilmemiştir (p=0.670, p=0.257) (Resim 2).

Kabakulak IgG sonucu değerlendirilen 1890 (%78,46) kişinin 1365 (%72,22)'i pozitif, 404 (%21,38)'ü negatif, 121 (%6,4)'i ara değer olarak raporlanmıştır. Kabakulak IgG sonucu; pozitif olan kişilerin 1161 (%85,0)'i, ara değer olan 107 (%7,8)'si kadındır. Kadınlarda kabakulak Ig G nin pozitifliği erkeklerden anlamlı yüksektir

Resim 2. Yaş ve cinsiyet dağılıma göre kızamık, kızamıkçık ve kabakulak Ig G sonuçlarının değerlendirilmesi.

Suçiçeği IgG 1880 (%78) kişide değerlendirilmiştir ve 1622 (%86,28)'inin sonucu pozitiftir. Cinsiyete ve yaş dağılımına göre su çiçeği Ig G sonucunda anlamlı fark tespit edilmemiştir (p=0.055, p=0.714) (Resim 3)



Resim 3. Yaş ve cinsiyet dağılıma göre suçiçeği Ig G sonuçlarının değerlendirilmesi.

Tartışma

Bu çalışmada; sağlık çalışanlarında aşı ile önlenebilir hastalıklar değerlendirilmiştir. Sağlık çalışanlarının çoğunluğu genç erişkin yaş grubunda olup anti HBs %74,17, anti HAV %31,48, kızamık IgG %64,36, kızamıkçık %95,9, kabakulak %72,22, suçiçeği %86,28 pozitif bulunmuştur. HBsAg, anti HAV, kabakulak Ig G ve kızamık Ig G pozitif kişilerde yaş ortancası daha yüksek saptanmıştır. Ayrıca; kadınlarda anti HBs ve kabakulak Ig G pozitifliği daha yüksek olup diğerlerinde cinsiyete göre fark tespit edilmemiştir.

Aşılama programları uygulanan yüksek gelir düzeyine sahip ülkelerde bağışık kişilerin medyan yaşları daha yüksektir [2]. Ülkemizde de aşılama programları üzerinde önemle durulmaktadır. Çalışmamızda; hepatit A, kızamık ve kabakulak IgG pozitiflik oranlarını ileri yaşta daha yüksek tespit ettik. Ancak özellikle genç yaş grubunda istenen oranda antikor pozitifliklerimiz yoktur. Bu da genç yaş oranı yüksek olan sağlık çalışanlarının aşılamasının önemini göstermektedir [5,7].

Dünya çapında kızamık aşılamasının artması ile birlikte erken yaşlarda kızamık virüsü ile karşılaşma insidansı azalmakta ancak ileri yaşlarda koruyucu düzeyin altında antikor taşıyan birey sayısı artmaktadır [10]. Bu çalışmada da kızamık ve suçiçeğinde özellikle 35-44 yaş aralığındaki erkek cinsiyette daha yüksek oranda ara değerler saptandı. Bu değerlerin çocukluk aşılaması sonrası antikor titrelerinde ki düşmenin sonucu olduğu düşünülmüştür [9,11]. Bu nedenle ara değer sonucu olan hastaların tekrar aşılanması önerilebilir. Anti HBs ve kabakulak IgG pozitifliği kadın cinsiyette anlamlı olarak daha yüksek orandaydı. Bir başka çalışmada; bizim çalışmamız ile benzer şekilde kabakulak duyarlığı kadınlarda daha düşük hepatit B duyarlılığı istatistiksel olarak anlamlı olmasa da erkeklerde daha yüksek bulunmuştur [12]. Bu fark kadın cinsiyetin immün yanıt farkından kaynaklanabileceği gibi aşı uyumlarıyla da ilişkili olabilir [13,14].

Bu çalışmada; anti HBs sonuçları arasında yaş dağılımına göre istatistiksel fark saptanmasa da 35 yaş altında daha yüksek oranda pozitiflik saptanmıştır. Türkiye den 2020 yılında 375 sağlık çalışanı ile yapılan bir çalışmada 18-25 genç yaş aralığında %100 ile en yüksek anti HBs pozitifliği tespit edilmiştir [15]. 2015 yılında yapılan bir çalışmada ise yaş ortalaması 37.7 olup anti HBs pozitifliği %56,5 ile ulusal literatürle benzer bulunmuştur[16]. Bağışıklık oranlarının önceki yıllara göre artıyor olması aşılama programlarının ve eğitimlerin aşılamayı arttırmadaki etkisini göstermektedir.

Türkiye'den yapılan çalışmalarda farklı kızamık IgG pozitifliği oranları bildirilmiştir (%82,5-%99,7) [1,5,7,17-20]. Bu fark aşılama veya hastalığa maruz kalma farkından kaynaklanıyor olabilir. Ülkemizde DSÖ raporlarına göre 2023 de Türkiye'de laboratuvar olarak doğrulanmış 5004 ve 8 mayıs 2024 tarihine kadar 676 doğrulanmış kızamık olguları mevcuttur [7,21]. Kızamık küresel olarak yeniden canlanmaktadır. 2018-2019 yıllarında dünya çapında kızamık sayılarında ciddi bir artış görülmüştür. Bununla birlikte, kızamık aşısının kullanılmaya başlanmasından bu yana vakalarda ve buna eşlik eden ölüm oranlarında dramatik bir azalma olmuştur [10].

Hepatit A virüsü özellikle gelişmekte olan ülkelerde hem yetişkin hem de çocuklukta önemini korumaktadır. Rutin aşılamada Hepatit A yüksek endemisite de önerilmemektedir. Çeşitli bölgelerdeki sosyo-ekonomik farklılıklar nedeniyle Türkiye geniş bir seroprevalans aralığı göstermekle birlikte orta endemik bölgede yer almaktadır [22]. Batı bölgelerde bazı merkezlerde %10 seropozitiflik bildirilirken, doğu bölgelerde sağlık çalışanlarında %90 üzerinde pozitiflik bildiren yayınlar bulunmaktadır [15,16,22-24]. Çorum ilinden yapılan bir çalışmada da tüm yaş grupları arasında 11-20 yaş ve 21-30 genç yaş grubunda sırası ile %71,6 ve %75,8 ile en düşük seropozitiflik tespit edilmiş [22]. Ülkemizden yapılan bir diğer çalışmada da benzer şekilde 18-26 genç yaş grubunda aralarında en düşük HAV IgG pozitifliği tespit edilmiş (%29,4) ve yaş grupları arasında anlamlı farklılıklar tespit edilmiştir [12]. Çalışmamızda anti HAV pozitifliği %31,48 olup en düşük pozitiflik 25 yaş altı grupta % 29,8 bulundu. Bu oldukça düşük bir yüzde olup, bölgemizde hijyen ve sanitasyonun iyi olduğunu göstermektedir. Ancak seroprevelansta ki düşme halen endemisitesini koruyan bölgelerimizde hepatit-A vakalarının erişkin yaşta ortaya çıkma olasılığını göstermektedir. Geç çocukluk, ergenlik veya yetişkinlik döneminde enfeksiyonun ikterik hastalığa neden olma olasılığı daha yüksektir; fulminant hepatit ve ölüm riski de bu yaş gruplarında daha yüksektir [25]. Bu nedenle HAV enfeksiyonu epidemiyolojisi yakından takip edilmelidir ve buna göre stratejiler geliştirilmelidir. 2012 yılında rutin çocukluk aşılama programına dahil edilen hepatit A aşısı günümüzde sağlık çalışanlarının yaş grubunu yakalayamamaktadır. Bu nedenle sağlık çalışanlarında hepatit A aşılaması önemlidir.

Çalışmanın kısıtlamaları: Bu çalışma retrospektif ve tek merkezli bir çalışmadır. Çalışmaya dahil edilen hastaların %80 i kadın cinsiyettir. Her sağlık çalışanının tüm ELİSA sonuçları hastane bilgi sisteminde olmadığından virüs tipine göre ulaşılabilen sonuçların sayısı değişkenlik göstermiştir. Sağlık çalışanlarının aşılama bilgileri ve hastalık geçirme öyküleri çalışmaya dahil edilememiştir

Sonuç

Sağlık çalışanları aşı ile önlenebilen hastalıklar açısından risk altındadır. Genç popülayonun ağırlıkta olduğu göz önüne alınarak sağlık çalışanlarının mesleki maruziyet riski altında oldukları hastalıklara karşı korunma konusunda bilgilendirilmeli ve bölgesel sürveyans verileri gözönüne alınarak aşılama programları oluşturulmalıdır.

Maddi destek ve çıkar ilişkisi

Çalışmayı maddi olarak destekleyen kişi/kuruluş yoktur ve yazarların herhangi bir çıkar dayalı ilişkisi yoktur.

Teşekkür

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Araştırma Makalesi

Ramazan ayında oruç tutmanın acil servise başvuran diş hastalıkları hastaları üzerine etkisi

Effect of fasting during Ramadan on dental patients presenting to the emergency department

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Öz

Amaç: Ramazan, İslami ay takviminin dokuzuncu ayında, Müslümanların gün doğumundan gün batımına kadar oruç tuttukları bir dönemdir. Bu dönemde yiyecek ve içeceklerden uzak durmak, ağız sağlığı üzerinde etkiler yaratabilir. Dünya genelinde yaygın olan periodontal hastalıklar ve diş çürükleri, özellikle gelişmekte olan ülkelerde ciddi bir sorun teşkil eder. Bu çalışmanın amacı, Ramazan ayında oruç tutan bireylerde periodontal hastalıkların insidansını incelemek ve bu konuda literatüre katkı sağlamaktır.

Gereç ve Yöntemler: Bu retrospektif çalışma, 2021 ve 2022 yıllarında travma dışı diş hastalıkları nedeniyle bir şehir hastanesinin acil servisine başvuran hastaları incelemiştir. Ramazan ayı boyunca yapılan diş hastalığı başvuruları, Ramazan dışındaki aylardaki başvurularla karşılaştırılmıştır. Veriler hasta dosyalarından elde edilip SPSS 26.0 programı ile analiz edilmiştir. Anlamlılık düzeyi $p<0.05$ kabul edilmiştir.

Bulgular: 2021 ve 2022 yıllarında sırasıyla toplam 640.164 ve 656.474 hastanın (Sırasıyla 6.496 ve 6.245 diş hastalıkları nedeniyle)acil servise başvurusu olmuştur.Ramazan ayı boyunca diş hastalıkları nedeniyle acil servise başvuran hasta oranlarının, Ramazan ayı dışındaki aylara göre anlamlı derecede yüksek olduğu tespit edilmiştir (Sırasıyla $p2021=0.042$ ve $p2022=0.034$). Özellikle iftar sonrası saatlerde acil servise başvuruların da yoğunlaştığı gözlemlenmiştir. Diş hastalıkları ile ilgili başvuruların her iki yıl toplamında yine Ramazan ayında anlamlı yüksek olduğu görülmüştür ($p=0.004$).

Sonuç: Çalışmamızda, Ramazan ayında diş hastalıklarına bağlı acil servis başvurularının, diğer aylara göre önemli ölçüde arttığı gösterilmiştir. Bu bulgular, Ramazan ayında oruç tutmanın ağız sağlığı üzerindeki olumsuz etkilerini ve bu dönemde ağız hijyenine yönelik bilinçlendirme ihtiyacını vurgulamaktadır. Oruç sırasında ağız bakımının önemine dair toplumsal bilgilendirmelerin yapılması, ağız sağlığının korunmasına ve sağlık hizmetleri üzerindeki yükün azaltılmasına katkı sağlayabilir.

Anahtar Kelimeler: Acil Servis, Ağız Hijyeni, Ramazan Orucu, Diş Hastalıkları

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Abstract

Aim: Ramadan, the ninth month of the Islamic lunar calendar, is a period during which Muslims fast from dawn until sunset. Abstaining from food and drink during this time can have implications for oral health. Periodontal diseases and dental caries, which are prevalent world wide, pose a significant challenge, particularly in developing countries. This study aims to investigate the incidence of periodontal diseases among individuals fasting during Ramadan and to contribute to the existing literature on this topic.

Material and Methods: This retrospective study examined patients who presented to the emergency department of a city hospital in 2021 and 2022 due to non-traumatic dental conditions. Dental-related visits during Ramadan were compared with those in them onths outside of Ramadan. Data were extracted from patient records and analyze dusing SPSS 26.0 software, with a significance level set at $p<0.05$.

Results: In 2021 and 2022, a total of 640,164 and 656,474 patients, respectively, visited the emergency department, with 6,496 and 6,245 cases related to dental conditions. The proportion of patients presenting with dental issues during Ramadan was found to be significantly higher than in the non-Ramadan months ($p2021=0.042$ and $p2022=0.034$, respectively). Not ably, there was a concentration of visits after the iftar meal. Across both years, the over all incidence of dental-related visits was significantly elevated during Ramadan ($p=0.004$).

Conclusions: Our study demonstrates a significant increase in emergency department visits for dental conditions during Ramadan compared to other months. These findings high light the negative impact of fasting on oral health and under score the need for public awareness regarding oral hygiene during Ramadan. Educating the public about the importance of oral care during fasting may help preserve oral health and reduce the burden on health care services.

Keywords: EmergencyDepartment, Oral Hygiene, RamadanFasting, DentalDiseases

Giriş

Ramazan, İslami ay takviminin 9. Ayı ve Müslümanların tüm ay boyunca gündüz (gün doğumundan batımına kadar) oruç tutmaları (yemek ve içeceklerden uzak durmaları) gerekmektedir (1). Ramazan orucu, dönüşümlü oruç ve yeniden beslenme dönemlerinden oluşan özel bir oruç şeklidir ve ay takvimine göre günlük açlık süresi, yılın dönemine ve bulunduğu yerin coğrafi konumuna bağlı olarak değişkenlik gösterir (2,3).

Periodontal hastalıklar ve diş çürükleri, dünya çapında en yaygın ağız hastalıkları olarak kabul edilmektedir(4,5). Tüm küresel nüfusun yaklaşık olarak %20-50'sinin periodontal hastalıklılardan mustarip olduğu tahmin edilmektedir (6). Gelişmekte olan ülkelerde yaşayanlar, farkındalık eksikliği, uygun ağız hijyeni önlemlerinin eksikliği, nispeten pahalı bir diş bakım sistemi ve düşük sosyokültürel statü nedeniyle gelişmiş ülkelere kıyasla periodontal hastalıklara daha yatkındır (4).

Çiğneme fonksiyonu ile periodontal hastalıklar arasında ters ilişki vardır. Çiğneme fonksiyonu ile yiyeceklerin çiğnenmesi hem diş etlerine masaj yapmakta hem de dişleri koruyucu etkisi olan tükürük salgısını artırma eğilimindedir. Ayrıca su tüketimi de yiyecekler ile oluşan şekerlerin seyreltilmesinde faydalıdır.

Ramazan ayında acil servislere periodontal hastalıklar (özellikle gingivada apse, diş kökü enfeksiyonları, diş ağrısı, diş eti enfeksiyonları, vb.) nedeniyle başvurular olmaktadır. Bu durumu acil serviseyapılan normal rutin başvurular ile karşılaştırmak istedik. Bu sebepten çalışmamızda, ramazan ayında oruç tutan kişilerde periodontal hastalıkların insidansını belirlemeyi ve literatüre katkı sağlamayı amaçladık.

Gereç ve Yöntemler

Çalışma dizaynı

Çalışmamız eğitim ve araştırma hastanesi olan 3. basamak bir şehir hastanesi acil servisinde yapıldı. Çalışmaya başlamadan önce hastanemiz Klinik Çalışmalar Etik Kurulu'ndan gerekli izinler alındı.

Çalışmamız, 2021 ve 2022 yılında acil servise travma dışı diş hastalıkları nedeniyle başvuran hastalar dahil edildi.

Hasta Popülasyonu ve Verilerin Toplanması

Acil servisimizin bir eğitim kliniği olması nedeniyle başvuran hastaların eğitim materyali olarak kullanmak amacıyla tanı tiplerine göre arşivlenmesi yapılmaktadır. 2021 ve 2022 yılında acil servise periodontal hastalıklar ile başvuran hastaların bilgileri toplanan hasta arşivinde tarandı. Bu arşivlemeden 2021 ve 2022 yılında başvuran travma dışı diş hastalıkları nedeniyle başvurularla birlikte;2021 yılı Ramazan ayı olan "13/04/2021-12/05/2021" ve 2022 yılında Ramazan ayı olan "02/04/2022-01/05/2022" tarih aralıklarında acil servise başvuran diş

hastalıkları olarak ayrıldı ve gruplandırıldı. Ramazan ayında tespit edilen travma dışı diş hastalıkları sebebiyle başvuranların oranları ile ramazan ayı dışında başvuran travma dışı diş hastalıkları oranları aylık olarak karşılaştırıldı. Bu şekilde oruç tutmanın diş hastalıkları üzerine olan etkisi incelendi.

Çalışmamıza dahil edilen hastaların şikayetleri ve hekimlerin hastalara verdikleri tanılar, çalışmamızda yer alan diş hekimi tarafından da incelendi. Öte yandan bazı hastaların diş hekimi değerlendirmesi sonrasında acil servise ağrı ya da oral alım bozukluğu olması nedeniyle başvurduğu görüldü. Bu hastalarda hastaların diş hekimi değerlendirmesi sonrası belirlenen tanıları hastalar için kaydedildi.

Olgulara ait veriler, eğitim kliniğimizde yapılan eğitim arşiv kayıtlarından, hasta dosyalarından, hastane otomasyon sisteminden ve hasta sağlık bilgi sisteminden elde edildi ve daha öncesinde oluşturulan çalışma formuna kaydedildi.

Çalışmamıza belirtilen tarih aralığında düzenli olarak oruç tutan, acil servise travma dışı diş hastalıklarına ait şikayetler (diş apsesi, akut gingivit, diş çürüğü, diş eti kanaması, vb) ile başvuranve verilerinde eksiklik saptanmayan yetişkin olgular dahil edildi. Verilerinde eksiklik saptanan, diş travması nedeniyle acil servise başvuran hastalar, Ramazan ayında düzenli olarak oruç tutmayan hastalar, gebe ve 18 yaş altı hastalar çalışmaya dahil edilmedi.

İstatistiksel Analiz

İstatistiksel analiz SPSS 26.0 for Windows® istatistik programı (IBM Inc. Chicago, IL, ABD) kullanılarak gerçekleştirildi. Tanımlayıcı verilerin sunumunda sayı, yüzde, ortalama, standart sapma, medyan, minimum ve maksimum değerler kullanıldı. Verilerin normal dağılıma uygunluğu Kolmogorov-Smirnov Testi ile değerlendirildi. Kategorik verileri karşılaştırmak için Pearson ki-kare testi ve Fisher's Exact testi kullanıldı. İki bağımsız sayısal veriyi karşılaştırmak için T-Testi ve üçlü sayısal veriyi karşılaştırmak için ise Kruskal Wallis Testi kullanıldı. Sonuçlar %95 güven aralığıyla $p<0.05$ değeri anlamlı kabul edildi.

Bulgular

Çalışmamızda, belirlenen dahil etme kriterlerine uyan hastaların verileri incelendiğinde, acil servis başvurularının 2021 yılında 640.164, 2022 yılında ise 656.474 olduğu tespit edildi. Bu popülasyon içerisinde, diş ve ağız sağlığı problemleri nedeniyle acil servise başvuran hasta sayısının 2021 yılında 6.496, 2022 yılında ise 6.245 olduğu saptandı. Hastaların başvuruları ile ilişkili hem toplam hasta sayısı hem de diş hastalıkları şikayetiyle ilgili olarak başvuran hasta sayılarının diğer ortalama değerlerinin sunumu Tablo 1'de yapıldı.

Tablo 1. Yıllara göre başvuran olguların toplam, aylık ve günlük ortalama genel ve diş hastalıkları nedenli başvuru sayılarının değerlendirilmesi

Parametre	2021 Yılı Ortalama	2022 Yılı Ortalama
Toplam hasta	640164	656474
Toplam diş hastalıkları ile ilgili başvuru	6496	6245
Ortalama günlük hasta	1753,87	1798,56
Ortalama aylık hasta	53347	54706,17
Ortalama aylık diş hastalıkları ile başvuru	541,33	520,42
Ortalama günlük diş hastalıkları ile başvuru	17,80	17,11
Ramazan ayı hasta başvurusu	49882	48419
Ramazan ayı diş hastalıkları ile başvuru	613	626
Ramazan ayı ortalama günlük diş hastalıkları ile başvuru	20,43	20,87

Yıl, 365 gün; ay, 30 gün olarak standardize edilmiştir.

Diş hastalıkları nedeniyle acil servise başvuran olguların demografik ve başvuru ile ilgili süreleri incelendiğinde; yaş ortalamasının 34,26 yıl olduğu ve başvuran olguların %64,01'inin erkek olgular olduğu görüldü. Ramazan ayı dışındaki aylarda ülkemiz mesai saatleri içinde diş hekimlerinin açık olması ve hastaların diş hekimi başvurularının olması nedeniyle acil servis başvurularının mesai saatleri dışındadaha fazla olduğu ve en fazla başvurunun (%63,27) 16:00-00:00 saatleri arasında olduğu görüldü. Yine Ramazan ayında da iftar saatleri sonrasında acil servislere başvuruların olması nedeniyle en fazla başvurunun16:00-00:00 saatleri arasında olduğu görüldü (Tablo 2).

Tablo 2. Acil servise başvuran diş olgularının demografik ve klinik verilerinin dağılımı

Parametre		n (%) / Ortalama
Yaş (Yıl)		34,26
Cinsiyet (Erkek)		8155 (64,01)
Başvuru Saati (Ramazan ayı dışı)	00:00-08:00	2354 (20,47)
	08:00-16:00	1870 (16,26)
	16:00-00:00	7278 (63,27)
Başvuru Saati (Ramazan ayı)	00:00-08:00	425 (34,3)
	08:00-16:00	291 (23,5)
		523 (42,2)

Çalışmamızda, iki ardışık yılın Ramazan ayı dönemlerinde acil servis başvurularının analizi gerçekleştirildi. İncelenen dönemler, 2021 yılı Ramazan ayı (13 Nisan- 12 Mayıs 2021) ve 2022 yılı Ramazan ayı (2 Nisan- 1 Mayıs 2022) olarak belirlendi. Elde edilen verilere göre, 2021 yılı Ramazan ayında acil servise toplam 49.882 hasta başvurusu kaydedildi. Bu başvurular arasında, diş ile ilişkili patolojiler nedeniyle başvuran hasta sayısı 613 olarak tespit edildi. Takip eden yılın Ramazan ayında ise toplam acil servis başvuru sayısının 48.419 olarak

gerçekleştiği ve bu dönemde diş kaynaklı şikayetlerle başvuran hasta sayısının 626 olduğu saptandı.Diş hastalıkları ile acil servise başvuru oranları değerlendirildiğinde; 2021 yılında, diş hastalıkları nedenli başvuru yapan hasta sayısının, Ramazan ayı dışındaki aylarda acil servise başvuran hasta sayılarına oranı 0,00996 tespit edildi. Aynı şekilde 2022 yılında Ramazan ayı dışında acil servise diş hastalıkları nedenli başvuru yapan hasta sayısının, Ramazan ayı dışında acil servise başvuran hasta sayılarına oranı 0,00924 tespit edildi. 2021 yılında Ramazan ayında acil servise diş hastalıkları nedenli acil servise başvuru yapan hasta sayısının, Ramazan ayında acil servise başvuran hasta sayılarına oranı 0,01228 çıkar iken; bu oran 2022 yılında 0,01292 idi (Tablo 1, Grafik 1 ve 2). Ramazan ayı ile ramazan ayı dışındaki diğer ayların diş hastalıkları başvuru oranları karşılaştırıldığında hem 2021 yılında (p=0.042) hem de 2022 yılında (p=0.034) anlamlıolarak yüksek olduğu tespit edildi.

Grafik 1. 2021 yılı acil servise diş nedeniyle başvuran hasta sayılarının başvuran tüm hasta sayılarına oranının karşılaştırılması

Grafik 2. 2022 yılı acil servise diş nedeniyle başvuran hasta sayılarının başvuran tüm hasta sayılarına oranının karşılaştırılması

2021 ve 2022 yıllarında toplam diş hastalıklarına bağlı aylık başvuru oranları ile Ramazan ayında diş hastalıklarına bağlı başvuru oranları karşılaştırıldığında yine Ramazan ayında diş hastalıklarına bağlı başvuran hasta oranları istatistiksel anlamlı olarak yüksek olduğu görüldü (p=0.004).

Tartışma

Bu çalışmada, diş hastalıklarına bağlı acil servis başvurularının sıklığının, iki yıllık bir analize göre Ramazan ayında, Ramazan ayı dışındaki aylarla kıyaslandığında önemli oranda arttığını göstermektedir.

Joachim ve arkadaşlarının yaptıkları bir çalışmada; Ramazan ayında oruç tutan kişilerde mekanizması tam olarak açıklanmasa da tükürük bezi taş oluşumu (Sialadenit) şikayetiyle acil servis başvurularının diğer aylara göre anlamlı düzeyde artış gösterdiğini bildirmiştir (7). Khalenghifar ve arkadaşlarının ve Elderrat ve arkadaşlarının yaptıkları çalışmalarda; oruç tutan kişilerde tükürük salgısının azalmasından kaynaklı olarak kötü kokuya neden olabileceğini bildirmektedir (8,9). Alqumber ve arkadaşlarının yaptıkları çalışmada ise; tükürük salgısının ağız içini nemlendirdiği, plak tarafından üretilen asitlerin nötralizasyonunu sağladığı ve ağızdaki bakteri ve yiyecek parçacıklarını temizlemeye çalıştığını bildirmektedir. Bu çalışmada Ramazan orucu tutan kişilerde tükürük salgısının azalmasından kaynaklı olarak tükürük sıvısının bu fonksiyonlarında azalma olacağı; özellikle dil sırtını kaplayan aerobik ve anaerobik bakterilerin üremesi için uygun ortam sağlayacağını bildirmektedir (10). Çalışmamızda çıkan sonuçlara göre; çalışmamızın yapıldığı yıllarda gündüz sürelerinin uzun olması, çiğneme fonksiyonunun bu süreç boyunca yapılmaması ve oruç tutmaya bağlı olarak tükürük salgısındaki azalmadan kaynaklı ağız içi hijyenin bozulduğu ve diş hastalıkları sıklığının arttığını düşünmekteyiz.

Mirsaeva ve arkadaşlarının yaptıkları çalışmada; Ramazan ayında oruç tutmak, kötüleşen ağız hijyenine, diş eti hastalığına ve proinflamatuar sitokin seviyelerinin artmasına yol açabilir ve bu da özel diyet ve diş hastalığı önleme önerileri gerektireceğini bildirmektedir (11). LDuliamy ve arkadaşlarının yaptıkları bir çalışmada ise; oruç tutmanın, sabit ortodontik aparat kullanan olgularda S. Mutans sayısının ve plak sayısının önemli ölçüde arttıracağını; oruç ve iftar süreleri arasında ağız hijyeninin korunmasını zorlaştıracağını bildirmektedir (12). Çalışmamızda acil servise diş hastalıkları ile başvuru sayısının ramazan ayında diğer aylardan yüksek olmasındaki altta yatan neden olarak,Mirsaeva ve arkadaşlarının ve LDuliamy ve arkadaşlarının yaptıkları çalışmadaki ortaya atılan mekanizma ile ilişkili olabileceğini düşünmekteyiz.

Ramazan ayı orucu nedeniyle hastaların iftardan sonra acil servislere başvurması nedeniyle, çalışmamızda diş hastalıklarına bağlı en sık 16:00-00:00 saatleri arasında acil servise başvurdukları görüldü. Ramazan ayı dışında da ülkemizdeki mesai saatleri süresinde diş hekimi başvuruları olması nedeniyle saat 08:00-16:00 saatleri arasında acil servise diş hastalıkları nedeniyle başvuru az olsa da mesai saatleri dışında başvuruların ciddi düzeyde fazla olduğu görüldü. Özellikle 16:00-00:00 saatleri arasında acil servis yoğunluklarındaki ciddi artışlar düşünüldüğünde; diş hastalıkları nedeniyle de hem Ramazan ayında hem de

Ramazan ayı dışında acil servise başvuruların bu saat aralığında yoğun olması, acil servislerde ciddi hasta kalabalıklarına neden olmaktadır. Bu nedenden kaynaklı ülkemizde diş hastanelerinde acil servis alanlarının oluşturulması ya da acil servis birimi bulunan diş hastanelerinde diş hastalıklarına bağlı başvuran hastaların etkin tedavilerinin sağlanması acil servis yoğunluğunu azaltacağını kanaatindeyiz.

Kısıtlılıklarımız

Çalışmamızın birkaç kısıtlılığı mevcuttur. Bunlardan birincisi çalışmamızın retrospektif olması ve değerlendiren hekimin tanısına göre değerlendirilmesidir. İkinci bir kısıtlılık ise; çalışmamızda oruç tutma durumları hastaların beyanlarına göre kabul edilmiş olup; bu konudaki eksiklik ya da hatalar hasta beyanı bazlı olabilmektedir. Diğer bir kısıtlılığımız ise; olguların yeme alışkanlıkları ve yemek tercihlerinin çeşitliliği (karbonhidrat, yağ, protein yoğunluk oranları) konularında bizim bilgi kısıtlılığımızdır. Bu kısıtlılıkların daha sonrasında yapılacak prospektif çalışmalar için konu olabileceğini düşünmekteyiz.

Sonuç

Çalışmamızda Ramazan ayında acil servise diş hastalıkları nedeniyle başvuruların anlamlı yüksek olduğu görüldü. Çiğneme fonksiyonunun ve tükürük salgısı fonksiyonlarının önemi düşünüldüğünde; Ramazan ayı ritüeli sırasında diş bakımı konusunda toplumsal bilgilendirmelerin yapılması hem ağız sağlığını korumada faydalı olacağını hem de sağlık ekonomisine katkı sağlayacağını düşünmekteyiz.

Etik izin

Etik kurul onayı XXX eğitim araştırma şehir hastanesi etik kurulundan alındı (Etik kurul tarihi ve numarası: 10.01.2024 ve BAEK-2024.01-14). Çalışma retrospektif olduğundan hastalardan veya yakınlarından gönüllü onam alınamadı.Çalışmanın tamamı 1964 Helsinki Bildirgesi'ne uygun olarak gerçekleştirildi.

Teşekkür

Çalışmamız için acil servis çalışanlarına, hastane bilgi işlem çalışanlarına ve Dr. Adem ÇAKIR'a desteklerinden dolayı teşekkür ederiz.

Çıkar Çatışması

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Research Article

Prognostic value of systemic inflammatory markers in renal cell carcinoma with isolated lung metastases: A retrospective analysis

İzole akciğer metastazlı renal hücreli karsinomda sistemik inflamatuvar belirteçlerin prognostik önemi: Retrospektif inceleme

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Abstract

Aim: Metastatic renal cell carcinoma (mRCC) with lung metastases is associated with poor prognosis, and there is a growing interest in systemic inflammatory markers as potential prognostic indicators. This study evaluates the prognostic significance of the Systemic Immune-Inflammation Index (SII), Neutrophil-to-Lymphocyte Ratio (NLR), Platelet-to-Lymphocyte Ratio (PLR), and Advanced Lung Cancer Inflammation Index (ALI) in patients with mRCC.

Material and Methods: In our retrospective and multicenter study, we analyzed 76 mRCC patients with isolated lung metastases. Clinical data, including demographic characteristics, treatment details, and inflammatory markers, were collected. Patients were stratified according to the International Metastatic Renal Cell Carcinoma Database Consortium (IMDC) risk classification. The association of clinical and laboratory parameters with progression-free survival (PFS) and overall survival (OS) was analyzed using Kaplan-Meier curves and Cox proportional hazards models.

Results: The median age of the patients was 61 years (IQR: 29-84), with the majority being male (74%) and smokers (57%). High SII, NLR, and PLR were significantly associated with poor IMDC risk classification (p=0.001, p=0.003, and p=0.001, respectively). Multivariate analysis identified age >65 years (HR 3.09, 95% CI 1.3-6.9, p=0.006) and high PLR (HR 5.9, 95% CI 2.2-15.8, p=0.001) as independent predictors of worse OS. ALI was not significantly associated with survival outcomes.

Conclusion: Systemic inflammatory markers, particularly SII, NLR and PLR are strongly associated with poor prognosis in mRCC patients with lung metastases. These markers could be integrated into existing prognostic models to improve risk stratification and guide clinical decision-making. Further research is warranted to validate these findings and explore the underlying mechanisms linking systemic inflammation to RCC progression.

Keywords: Metastatic renal cell carcinoma, Lung metastases, Systemic immune-inflammation index, Neutrophil-to-lymphocyte ratio, Platelet-to-lymphocyte ratio

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Öz

Amaç: İzole akciğer metastazlı metastatik renal hücreli karsinom (mRHK) kötü prognozla ilişkilidir ve potansiyel prognostik göstergeler olarak sistemik inflamatuar belirteçlere artan bir ilgi vardır. Bu çalışmada mRCC hastalarında Sistemik İmmün-İnflamasyon İndeksi (Sİİ), Nötrofil-Lenfosit Oranı (NLO), Trombosit-Lenfosit Oranı (PLO) ve İleri Akciğer Kanseri İnflamasyon İndeksi'nin (İAİİ) prognostik önemi değerlendirilmektedir.

Gereç ve Yöntemler: Akciğer metastazları tedavi edilen 76 mRHK hastasının retrospektif bir analizini yaptık. Demografik özellikler, tedavi ayrıntıları ve enflamatuar belirteçler dahil olmak üzere klinik veriler toplandı. Hastalar Uluslararası Metastatik Renal Hücreli Karsinom Veritabanı (IMDC) risk sınıflandırmasına göre tabakalandırıldı. Klinik ve laboratuvar parametrelerinin progresyonsuz sağkalım (PFS) ve genel sağkalım (GS) ile ilişkisi Kaplan-Meier eğrileri ve Cox orantılı tehlikeler modelleri kullanılarak analiz edilmiştir.

Bulgular: Hastaların ortanca yaşı 61 (dağılım: 29-84) olup, çoğunluğu erkek (%74) ve sigara içmektedir (%57). Yüksek SII, NLR ve PLR kötü IMDC risk sınıflandırması ile anlamlı olarak ilişkiliydi (sırasıyla p=0.001, p=0.003 ve p=0.001). Çok değişkenli analizde 65 yaş üstü (HR 3.09, %95 CI 1.3-6.9, p=0.006) ve yüksek PLR (HR 5.9, %95 CI 2.2-15.8, p=0.001) daha kötü OS için bağımsız öngörücüler olarak tanımlanmıştır. ALI ile sağkalım sonuçları arasında anlamlı bir ilişki bulunmamıştır.

Sonuç: Sistemik inflamatuvar belirteçler, özellikle SII, NLR ve PLR, akciğer metastazı olan mRCC hastalarında kötü prognoz ile güçlü bir şekilde ilişkilidir. Bu belirteçler, risk sınıflandırmasını iyileştirmek ve klinik karar verme sürecini yönlendirmek için mevcut prognostik modellere entegre edilebilir. Bu bulguları doğrulamak ve sistemik enflamasyonu RCC progresyonuna bağlayan altta yatan mekanizmaları keşfetmek için daha fazla araştırma yapılması gerekmektedir.

Anahtar Kelimeler: Metastatik renal hücreli kanser, akciğer metastazı, sistemik immune-inflamatuar indeks, nötrofil lenfosit oranı, trombosit lenfosit oranı,

Introduction

Renal cell carcinoma (RCC) is one of the most prevalent malignancies of the kidney, with mRCC representing a particularly aggressive form of the disease [1]. Despite advances in targeted therapies, the prognosis for patients with mRCC, especially those with lung metastases, remains poor [2]. Identifying reliable prognostic factors is crucial for optimizing treatment strategies and improving patient outcomes.

Although combined treatments with immunotherapy are generally recommended in mRCC, in developing countries, tyrosine kinase inhibitors (TKI) are used due to financial conditions. However, TKI's have been shown to be effective after immunotherapy in advanced stages [3].

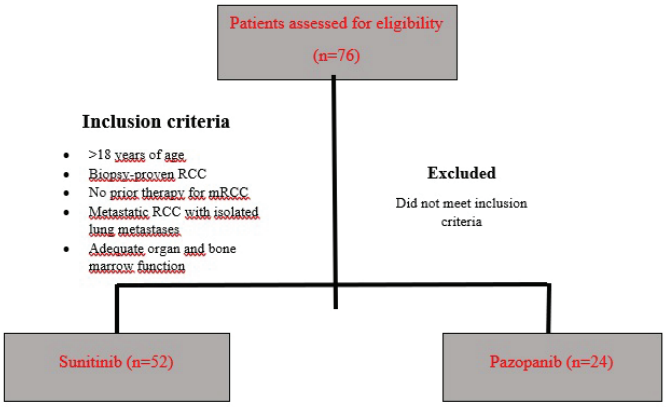
In recent years, systemic inflammatory markers such as SII, NLR, PLR and ALI have gained attention as potential prognostic indicators in various cancers, including RCC. These markers are reflective of the host's immune response and have been associated with tumor progression and survival outcomes [4], [5], [6], [7].

IMDC risk classification is a widely recognized tool for predicting prognosis in mRCC patients [8]. However, the integration of inflammatory markers with traditional risk stratification systems like the IMDC remains underexplored, particularly in patients with lung metastases. In this study, we aimed to evaluate the prognostic significance of SII, NLR, PLR and ALI in patients with mRCC and lung metastases. Additionally, we sought to assess the relationship between these inflammatory markers and the IMDC risk classification, as well as their impact on PFS and OS. Our findings provide insights into the potential role of systemic inflammation in the progression of mRCC and highlight the importance of incorporating these markers into clinical decision-making.

Material and Methods

Study Design and Patient Population

In our retrospective and multicenter (3 centers) study, we analyzed 76 mRCC patients with isolated lung metastases who were followed-up and treated between 2000 and 2022. Patients were eligible for inclusion if they were over 18 years of age, had biopsy-proven RCC, and had not received any prior therapy for mRCC. All patients received first-line treatment with either sunitinib or pazopanib (Figure 1).



Data Collection

Demographic and clinical data were collected from medical records, including age, gender, smoking status, tumor size, histological subtype, and treatment details. Performance status was assessed using the Eastern Cooperative Oncology Group (ECOG) scale. Laboratory values such as lactate dehydrogenase (LDH) levels and SII, ALI, NLR and PLR were recorded.

Systemic Inflammatory Markers

The systemic inflammatory markers were calculated as follows:

SII = Platelet count * Neutrophil count / Lymphocyte count; NLR = Neutrophil count / Lymphocyte count; PLR = Platelet count / Lymphocyte count; Body Mass Index (BMI) = kg / m 2; ALI = BMI * Serum Albumin / NLR

The receiver operating characteristic (ROC) curve analysis was used to determine the area under the curve (AUC), sensitivity, specificity, and cutoff values for pretreatment NLR, PLR, ALI and SII. Optimal cut off value, according to ROC curve analysis, was 3.1 for NLR, 193.7 for PLR, 890 for SII, and 79.1 for ALI.

These markers were categorized as high or low based on median values within the cohort. For example; SII (low <890; high ≥890). Patients were then stratified into favorable, intermediate, or poor risk groups according to the IMDC criteria (table 1) (table 2).

Statistical Analysis

PFS was defined as the time from diagnosis to disease progression or death; and OS was defined as the time from diagnosis to death from any cause. Kaplan-Meier survival curves were constructed to estimate PFS and OS, and differences between groups were assessed using the log-rank test.

Independent categorical variables were compared using the Chi-square test or Fisher exact test. Univariate and multivariate Cox proportional hazards models were used to identify predictors of OS. Variables with a p-value < 0.05 in univariate analysis were included in the multivariate model. Hazard ratios (HR) with 95% confidence intervals (CI) were reported to quantify the strength of associations (table 3).

All statistical analyses were performed using SPSS 23, and a p-value < 0.05 was considered statistically significant.

This study was performed in line with the principles of the Declaration of Helsinki. Approval was granted by the ethics committee of the University of Marmara (Approval Number 08.12.2023.1551).

Table 1. Demographic and Clinical Characteristics of Patients

	Value n (%)
Age (years) (median, range)	61 (29-84)
Gender	
Female	20 (26)
Male	56 (74)
Smoker	
Yes	35 (57)
No	26 (43)
Tumor size (median, range) (cm)	9 (4-17)
Nephrectomy	
Yes	68 (90)
No	8 (10)
Histological subtype	
Clear cell	69 (91)
Non clear cell	7 (9)
Metastasis status	
Metastatic at diagnosis	30 (40)
Later developing metastasis	46 (60)
ECOG PS	
0-1	73 (96)
≥2	3 (4)
First line treatment	
Sunitinib	52 (68)
Pazopanib	24 (32)
LDH (median, range) (U/L)	195 (120-735)
Sarcomotoid features	
Yes	18 (31)
No	40 (69)
First line progression	
Yes	46 (61)
No	30 (40)
Second line treatment	
TKI	9 (28)
mTOR	2 (7)
IO	20 (65)

n: number, IQR: Interquartile Range, PS: Performance Status, LDH: Lactate Dehydrogenase, TKI: Tyrosine Kinase Inhibitor, mTOR: Target of rapamycin, IO: Immunotherapy

Table 2. Association between SII, ALI, NLR, PLR (low and high) and IMDC risk classification (favorable, intermediate, or poor risk)

		IMDC risk classification, n (%)				
		Favorable	Intermediate	Poor	Total	P
SII	High	4 (12)	8 (25)	8 (73)	20	0.001
	Low	29 (88)	24 (75)	3 (27)	56	
	Total	33 (100)	32 (100)	11 (100)	76	
ALI	High	5 (15)	8 (25)	1 (9)	14	0.4
	Low	28 (85)	24 (75)	10 (91)	62	
	Total	33 (100)	32 (100)	11 (100)	76	
NLR	High	4 (12)	8 (25)	7 (64)	19	0.003
	Low	29 (88)	24 (75)	4 (36)	57	
	Total	33 (100)	32 (100)	11 (100)	76	
PLR	High	2 (6)	5 (16)	7 (64)	14	0.001
	Low	31 (94)	27 (84)	4 (36)	62	
		33 (100)	32 (100)	11 (100)	76	

IMDC: International Metastatic Renal Cell Carcinoma Database Consortium; ALI: Advanced Lung Cancer Inflammation Index; SII: Systemic Immune Inflammation Index; NLR: Neutrophil-to-Lymphocyte Ratio; PLR: Platelet-to-Lymphocyte Ratio

Table 3. Comparison of overall survival in the risk factors for Renal Cell Carcinoma patients with lung metastases

Variables		Univariate		Multivariate	
		HR (95% CI)	P	HR (95% CI)	P
Age (years)	<65 vs. >65	2.3 (1.08-5.03)	0.03	3.09 (1.3-6.9)	0.006
Sex	Female vs. male	0.9 (0.4-2.0)	0.80		
ECOG PS	0-1 vs. ≥2	56.9 (9.2-349)	0.001	29.4 (4.5-192.8)	0.001
Histology	Clear vs. Non-clear	1.3 (0.5-3.3)	0.50		
IMDC risk classification	Favorable vs. intermediate / poor	2.7(1.3-5.6)	0.008	2.2 (1.0-5.1)	0.04
Nephrectomy	No vs. Yes	0.78 (0.02-0.2)	0.001		
Sarcomotoid features	Yes vs. No	1.3 (0.4-3.6)	0.57		
First line treatment	Sunitinib vs. pazopanib	0.54 (0.24-1.22)	0.14		
NLR	Low vs. high	4.27 (1.9-9.6)	0.001		
PLR	Low vs. high	6.9 (2.8-17.1)	0.001	5.9 (2.2-15.8)	0.001
SII	Low vs. high	4.01 (1.7-9.1)	0.001		
ALI	Low vs. high	1.2 (0.5-2.9)	0.61		

CI: confidence interval; HR: hazard ratio; IMDC: International Metastatic renal cell cancer Database Consortium classification; ALI: Advanced Lung Cancer Inflammation Index; SII: Systemic Immune Inflammation Index; NLR: Neutrophil-to-Lymphocyte Ratio; PLR: Platelet-to-Lymphocyte Ratio

Results

Patient Demographics and Clinical Characteristics

A total of 76 patients were assessed for eligibility (Figure 1). The median age of the patients was 61 years, ranging from 29 to 84 years. The majority of the patients were male (74%), and 57% were smokers. The median tumor size was 9 cm, with 90% of the patients having undergone nephrectomy. The most common histological subtype was clear cell carcinoma, observed in 91% of the patients. At diagnosis, 40% of the patients were metastatic, while the remaining 60% developed metastasis later. Most patients had a favorable ECOG-PS of 0-1 (96%), and the first line of treatment was predominantly sunitinib (68%) (table 1).

Association Between Systemic Inflammatory Markers and IMDC Risk Classification

The analysis of the relationship between SII, ALI, NLR, PLR, and IMDC risk classification revealed significant associations for SII, NLR, and PLR. Patients with high SII, NLR, and PLR were more likely to have a poor IMDC risk classification. Specifically, 73% of patients with high SII were classified as poor risk (p=0.001). Similarly, 64% of patients with high NLR and PLR were in the poor-risk category (p=0.003 and p=0.001, respectively). In contrast, ALI was not significantly associated with IMDC risk classification (p=0.4) (table 2).

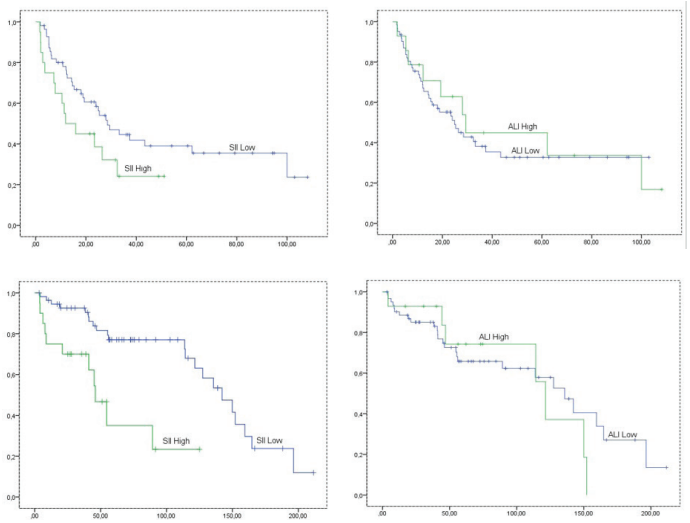
Overall Survival Analysis

Median follow-up was 75.6 months (IQR: 56.6-94.7). During follow-up, 46 (61%) patients progressed and 33 (43%) died. Median PFS was 25.3 months (95% CI, 16.1-34.5) and median OS was 127.4 months (95% CI, 101-154 months).

The univariate analysis indicated that age, ECOG PS, IMDC risk classification, nephrectomy status, NLR, PLR, and SII were significantly associated with overall survival. Patients older than 65 years had a higher risk of mortality (HR 2.3, 95% CI 1.08-5.03, p=0.03). Poor ECOG PS (≥2) was strongly associated with worse survival outcomes (HR 56.9, 95% CI 9.2-349, p=0.001). Intermediate or poor IMDC risk classification also predicted lower survival (HR 2.7, 95% CI 1.3-5.6, p=0.008). Among the inflammatory markers, high NLR, PLR, and SII were associated with worse overall survival (p=0.001 for all). However, multivariate analysis confirmed the independent prognostic significance of age, ECOG PS, IMDC risk classification, and PLR (table 3).

Progression-Free Survival and Overall Survival Based on Inflammatory Markers

Figures 2 and 3 illustrate PFS and OS of patients based on systemic immune-inflammation markers. Patients with lower SII and ALI had better PFS and OS compared to those with higher values of these markers (figure 2) (figure 3).



Discusion

This study highlights the prognostic significance of systemic inflammatory markers, including SII, ALI, NLR, PLR, in patients with mRCC and lung metastases. Our findings underscore the potential of these markers in refining prognostic stratification beyond traditional systems such as IMDC risk classification.

Prognostic Value of Inflammatory Markers

The strong association between elevated levels of SII, NLR, and PLR and poor IMDC risk classification observed in our cohort suggests that systemic inflammation plays a critical role in the progression of mRCC. Notably, patients with high SII, NLR, and PLR were more likely to be classified as having poor risk, indicating that these markers could serve as additional tools for identifying high-risk patients who may require more aggressive treatment strategies.

Our survival analysis further reinforces the prognostic relevance of these inflammatory markers. High NLR, PLR, and SII were associated with significantly worse OS, consistent with previous studies that have reported similar findings in various cancers, including RCC [9], [10], [11], [12], [13], [14], [15]. In particular, the multivariate analysis identified PLR as an independent predictor of OS, emphasizing its potential as a robust biomarker in mRCC. The lack of significant association between ALI and survival outcomes in our study, however, suggests that not all inflammatory markers may have the same prognostic utility in mRCC, warranting further investigation. Studies with ALI have mostly been conducted in primary lung cancer, but there are no similar studies in patients with lung metastases [16], [17], [18]. These parameters are being investigated not only in cancers but also in other diseases [19], [20], [21].

Implications for Clinical Practice

The integration of SII, NLR, and PLR into clinical practice could enhance the current prognostic models for mRCC, allowing for more personalized treatment approaches. For instance, patients identified as high-risk based on these markers might benefit from closer monitoring and potentially more aggressive therapeutic interventions. Furthermore, the use of these markers could help in stratifying patients for clinical trials, ensuring that those with the highest risk of progression are prioritized for novel therapies.

Limitations and Future Directions

Despite the promising findings, our study has some limitations that need to be addressed. The retrospective nature of the analysis may introduce selection bias, and the relatively small sample size could limit the generalizability of our results. Additionally, while our study focused on patients with lung metastases, the prognostic value of these markers in mRCC with other metastatic sites remains to be elucidated.

Future studies should aim to validate our findings in larger, prospective cohorts and explore the underlying biological mechanisms linking systemic inflammation to RCC progression. Understanding these pathways could lead to the identification of new therapeutic targets and the development of interventions aimed at modulating the inflammatory response in mRCC patients.

Conclusion

In conclusion, our study demonstrates that systemic inflammatory markers such as SII, NLR, and PLR are significantly associated with poor prognosis in mRCC patients with lung metastases. These markers, particularly PLR, have the potential to be incorporated into existing prognostic models to improve risk stratification and guide clinical decision-making. Further research is warranted to validate these findings and to explore the role of inflammation in RCC progression more comprehensively.

Conflicts of interest

Authors declare no conflicts of interest.

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Araştırma Makalesi

Çoklu acil olaylarda elektronik olay yönetim sisteminin kullanılması ne kadar etkin?

How effective is the use of electronic incident management system in multiple emergency incidents?

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Öz

Amaç: Olay Yönetim Sistemi (OYS), olağanüstü durumlarında sağlık hizmetlerinin koordinasyonunu sağlamak amacıyla acil servislere müracaat eden/nakledilenlere ait verilerin anlık olarak Sağlık Afet ve Koordinasyon Merkezinde (SAKOM) toplanması amacıyla kurulan veri akış sistemidir. Bu çalışmada amacımız, çoklu acil olaylarda OYS'nin sağlık hizmetlerine etkisi, acil durumlardaki veri akışını ve toplu can kaybı olayları ile ilgili verileri analiz etmektir.

Gereç ve Yöntemler: Çalışmamızda 2018-2023 yılları arasında acil servise başvurup SAKOM tarafından olay afet bilgisi oluşturulması sonucu OYS'ye kaydedilen 313 hastanın verileri retrospektif olarak incelendi.

Bulgular: Hastaların ortalama yaşı 29,7±17,6 idi, %57.8 i erkek hasta idi, %50,5'i 18-44 yaş aralığındaydı ve %31,3'ü 18 yaş altı idi. %88,5'i sivil vatandaştı ve %9,3'ü yabancı uyrukluydu.

Başvuruların %60,1'i Nisan–Eylül dönemi içindeydi, %35,8'i saat 08-16 diliminde yapılmıştı. Hastaların en sık başvuru nedenleri trafik kazası (%32,9), gıda zehirlenmesi (%22,4), karbonmonoksit (CO) zehirlenmesi (%19,2), Trafik kazası dışı yaralanma olayı (%14,8), sivil çatışma ve silahlı saldırı olayı (%2,6) idi ve bu beş neden tüm nedenlerin %91,9'unu oluşturmaktaydı. Olguların beşi (%1,6) ölümle sonuçlandı. Gıda zehirlenmesi nedeniyle başvuranların oranları 12-17 ile 18-44 yaş gruplarında diğer yaş gruplarına göre anlamlı yüksek bulundu (p<0,001). CO zehirlenmesi nedeniyle başvuranların oranı 12 yaş altında diğer yaş gruplarına göre anlamlı yüksekti. Ekim–Mart döneminde CO zehirlenmesi (p=0,018), Nisan–Eylül döneminde ise trafik kazası (p=0,046) ve gıda zehirlenmesi (p=0,002) nedeniyle başvurular diğer dönemlere göre anlamlı yüksek bulundu. Yabancı uyruklularda başvuru sonrasında yatırılanların (p=0,026), ölenlerin (p<0,001) ve CO zehirlenmesi nedeni ile başvuranların (p<0,001) oranları Türkiye Cumhuriyeti vatandaşlarına göre anlamlı yüksekti, trafik kazası nedeniyle başvuranların oranı ise anlamlı düşüktü (p<0,001).

Sonuç: OYS aracılığıyla acil servise yönlendirilen toplu yaralanma olaylarında en sık başvuru nedeninin trafik kazası olduğu tespit edildi. Özellikle yabancı uyruklularda CO zehirlenmesi nedeni ile hastaneye yatırılma ve ölüm oranları anlamlı yüksek bulundu.

Anahtar Kelimeler: Acil durum, olay yönetim sistemi, sağlık sistemi, toplu yaralanma olayı, trafik kazası

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Abstract

Aim: Incident Management System (OYS) is a data flow system established to instantly collect the data of those applying to/transported to emergency services at the Health Disaster and Coordination Center (SAKOM) in order to ensure the coordination of health services in emergency situations. Our aim in this study is to analyze the impact of OYS on health services in multiple emergency incidents, the data flow in emergency incidents, and data on mass casualty event.

Material and Methods: In our study, the data of 313 patients who admitted to the emergency department between 2018 and 2023 and were recorded in OYS as a result of the creation of incident disaster information by SAKOM were retrospectively examined.

Results: The average age of the patients was 29.7±17.6 years, 57.8% were male, 50.5% were between the ages of 18-44 and 31.3% were under 18 years of age. 88.5% were civilian citizens and 9.3% were foreign nationals.

60.1% of the admissions were during the April-September period, and 35.8% were between 08-16 hours. The most common reasons for patients' admission are traffic accidents (32.9%), food poisoning (22.4%), carbon monoxide (CO) poisoning (19.2%), injuries other than traffic accidents (14.8%), civil conflict and was a shooting incident (2.6%), and these five reasons constituted 91.9% of all reasons. Five of the cases (1.6%) resulted in death. The rates of those admitted due to food poisoning were found to be significantly higher in the 12-17 and 18-44 age groups compared to other age groups ($p<0.001$). The rate of those admitted due to CO poisoning was significantly higher in those under 12 years of age compared to other age groups. Applications due to CO poisoning ($p=0.018$) in the October–March period, and traffic accidents ($p=0.046$) and food poisoning ($p=0.002$) in the April–September period were found to be significantly higher than other periods. Among foreign nationals, the rates of those admitted after application ($p=0.026$), those who died ($p<0.001$) and those who applied due to CO poisoning ($p<0.001$) were significantly higher than those of citizens of the Republic of Turkey, while the rate of those who applied due to a traffic accident was significantly lower ($p<0.001$).

Conclusion: It was determined that the most common reason for mass injury incidents referred to the emergency department through OYS was traffic accidents. Hospitalization and death rates due to CO poisoning were found to be significantly higher, especially in foreign nationals.

Keywords: Emergency, Incident management system, health system, mass casualty incident, traffic accide

Giriş

Acil durum; toplumun tamamının veya belli kesimlerinin normal hayat akışını durduran veya kesintiye uğratan ve acil müdahaleyi gerektiren olayları ve bu olayların oluşturduğu kriz halini ifade eder. Acil durum yönetimi ise acil durumun meydana gelmesinden hemen sonra, etkilenen toplulukların tüm ihtiyacının hızlı ve etkili olarak karşılanmasını amaçlayan yönetim sürecidir [1-3]. Günümüzde büyük hasar oluşturan ve toplumun genelini tehdit eden acil durumların sayısı hızla artmaktadır. Kitlesel yaralanma olaylarına yönelik müdahale, bir topluluğun acil duruma müdahale sistemindeki en büyük zorluklardandır. Acil bakım sağlayıcıları ve olay yöneticileri, genellikle olayın gerçek doğası, ihtiyaçlar ve devam eden müdahale ile ilgili yanlış verilerle kaynakları ve personeli tedarik etmeye ve koordine etmeye çalışır [2,3]. Etkili ve hızlı acil durum yönetimi, kamu kaynaklarının etkin kullanımı ve müdahale ile ilişkili kamu kurumlarının koordinasyonu ile ilişkilidir [3,4].

Acil durum yönetimi ile ilgili çalışmalarda, koordinasyon yetersizliği ve kaynakların etkin kullanılamaması üzerine çalışmalar son yıllarda yoğunlaşmıştır. Acil durum yönetiminde acil sağlık hizmetlerinin organizasyon ve koordinasyonunu sağlamak amacıyla acil servise müracaat eden kişilere ait verilerin toplanması önem arz etmektedir. Bu nedenle olağanüstü durumlarda acil servislere müracaat eden kişilerin bilgilerinin merkezi olarak toplanabilmesi, verilerin tek bir kaynaktan görülebilmesi ve bilgi kirliliğinin önlenmesi için ülkemizde Sağlık Hizmetleri Genel Müdürlüğü, Sağlık Bilgi Sistemleri Genel Müdürlüğü ve Acil sağlık Hizmetleri Genel Müdürlükleri ortak bir çalışma yürüterek 'Olay Yönetim Sistemi' projesini 2017 yılında uygulamaya koymuştur [3,4]. Bu sistem sayesinde sağlık hizmetlerinin kesintiye uğramaması ve zamanında yapılabilmesi, diğer krize müdahale eden kurum ve kuruluşlarla entegrasyon, hasta/yaralı nakillerinde kurumlar arası koordinasyonun sağlanması amaçlanmaktadır [4-7].

Bu çalışmamızda toplu etkilenilen acil olaylarda olay yönetim sisteminin hizmet yanıtı karakteristiklerinin değerlendirilmesi amaçlanmıştır.

Gereç ve Yöntemler

Bu retrospektif çalışma XXX Üniversitesi Klinik Araştırmalar Etik Kurulu tarafından onaylandı (Protokol no: XXKAEK-2023,13/12)

Çalışmamızda 2018-2023 yılları arasında XXX Üniversitesi XXX Eğitim ve Araştırma Hastanesi Acil Servisine başvurup SAKOM tarafından olay afet bilgisi oluşturulması sonucu; olay yönetim sistemine kaydedilen vakalar değerlendirildi. Çalışmaya toplam 313 hasta dâhil edildi.

Acil sağlık hizmetlerini ilgilendiren toplumsal bir olay olduğunda verilerin Ulusal Sağlık Sistemine (USS) gönderilmesi amacıyla SAKOM tarafından olay afet bilgisi oluşturulup; Sağlık Kodlama Referans Sunucusu (SKRS) üzerinden yayınlanır. Acil serviste afet nedeniyle başvuru durumunda kişi "olay afet bildirimi" modülü ile ilişkilendirilip kaydedilir. Böylece vakaya ait tüm hizmetler (muayene, işlem, labaratuvar, taburcu vb.) anlık ve öncelikli olarak USS'ye sağlıklı bir şekilde gönderilir [4].

Çalışmada olgulara ait demografik veriler (yaş, cinsiyet, sivil-resmi görevli), olay bilgisi (trafik kazası, yangın, zehirlenme, vb), vakaların hayati tehlike durumu ve vakalara ait son durum bilgileri (taburcu, yatış, ex veya sevk) kaydedildi ve süreklilik gerektiren acil servis işleyişi ile ilişkilendirildi.

Dâhil edilme kriterleri

Trafik kazalarında; en az 5 ex veya 10 yaralı ve üzerinde etkilenen olması durumunda, karbon monoksitten etkilenme, yangın, sivil çatışma veya silahlı saldırı olaylarında; etkilenen kişi sayısının 5 ve üzeri olan olaylar, ayrıca etkilenen kişi sayısına bakılmaksızın; güvenlik görevlilerinin maruz kaldığı terör kaynaklı olaylar ve resmi araçlarının (polis/askeri araç) karıştığı trafik kazaları, her türlü patlama olayında, KBRN ile ilişkilendirilebilecek her türlü olayda, her türlü toplu gıda, içme suyu, inhalasyon yoluyla insan sağlığını tehdit eden etkilenmelerde, her türlü doğal afetlerde, yangınlarda, her türlü deniz, demiryolu, havayolu aracı kazasında, mültecilerin başka ülkelere kaçak geçişi esnasında ülke sınırlarımız içerisinde denizde mahsur kalma, kaza ve kaybolma olaylarında, zorlu iklim, doğa ve coğrafi koşullarda her türlü kaybolma ve kurtarma operasyonları ile ilgili olaylar çalışmaya dâhil edildi. OYS sistemine kaydedilip veri yetersizliği olan 12 hasta çalışmaya dâhil edilmedi.

İstatistiksel analiz

Çalışmadaki tüm istatistiksel analizler SPSS 25.0 yazılımı (IBM SPSS, Chicago, IL, USA) kullanılarak yapıldı. Deskriptif veriler ortalama ve standart sapma, nominal ya da sıralı değişkenlere ait dağılımlar sayı ve yüzde şeklinde verildi. Birden fazla grup arasındaki karşılaştırmalar için Ki Kare testi ve Fisher's Exact Test kullanıldı. Sonuçlar %95 güven aralığında değerlendirildi ve $p<0.05$ değerleri anlamlı kabul edildi. Gerekli yerlerde Bonferroni düzeltmesi yapıldı.

Bulgular

Hastaların ortalama yaşı 29,7±17,6 idi. Hastaların 181'i (%57,8) erkekti. Hastaların %50,5'i 18-44 yaş aralığındaydı ve %31,3'ü 18 yaş altı idi. Çalışmamızda toplam 313 hastadan 307'si 17 farklı olay nedeni ile, 6'sı ise etiyolojisi belli olmayan nedenler ile acil servise başvurdu. Başvuruların %60,1'i Nisan – Eylül dönemi içindeydi. Başvuruların %35,8'i saat 08-16 diliminde yapılmıştı. Hastaların %88,5'i Türkiye Cumhuriyeti (TC) vatandaşı ve %9,3'ü yabancı uyrukluydu (Tablo 1).

Tablo 1. Bazı değişkenlere göre genel dağılımlar.

	n	%
Cinsiyet		
Erkek	181	57,8
Kadın	132	42,2
Yaş		
<12	43	13,7
12-17	55	17,6
18-44	158	50,5
45-59	37	11,8
60+	20	6,4
Yıl		
2018	83	26,6
2019	42	13,4
2020	36	11,5
2021	38	12,1
2022	72	23,0
2023	42	13,4
Dönem		
Nisan-Eylül dönemi	188	60,1
Ekim-Mart dönemi	125	39,9
Saat dilimi		
08-16 arası	112	35,8
16-24 arası	118	37,7
00-08 arası	83	26,5
Son durum		
Taburcu	297	94,9
Yatan	16	5,1
Ölen*	5	1,6
Vatandaş türü		
Sivil	277	88,5
Resmi görevli	19	6,0
Polis	14	4,5
Asker	3	1,0
Uyruk		
Türkiye	284	90,7
Yabancı	29	9,3
Irak	13	4,2
Suriye	8	2,6
Ukrayna	5	1,6
Afganistan	1	0,3
Çin	1	0,3
Togo	1	0,3

*Ölen tüm hastalar yatırılan hastalardır.

En sık başvuru nedenleri trafik kazası (%32,9), gıda zehirlenmesi (%22,4), CO zehirlenmesi (%19,2), trafik kazası dışı yaralanma olayı (%14,8), sivil çatışma ve silahlı saldırı (%2,6) idi ve bu beş neden tüm nedenlerin %91,9'unu oluşturmaktaydı. Olguların beşi (%1,6) ölümle sonuçlandı. İki yanık olgusunun ikisi (%100), dört inhalasyon yolu ile etkilenmeden biri (%25) ve üç boğulma olgusunun ikisi (%66,7) ölümle sonuçlandı (Tablo 2).

Tablo 2. Başvuru nedenlerinin dağılımı.

	Toplam		Ölüm	
	n	%	n	%
Trafik kazası	103	32,9		
Gıda zehirlenme olayı	70	22,4		
Karbonmonoksit zehirlenmesi	60	19,2		
Trafik kazası dışı yaralanma olayları	46	14,8		
Sivil çatışma ve silahlı saldırı olayı	8	2,6		
KBRN olayı	6	1,8		
İnhalasyon yoluyla etkilenme olayı	4	1,3	1	25,0
Boğulma	3	1,0	2	66,7
Patlama olayları	3	1,0		
Orman yangını	2	0,6		
Yangın olayları	2	0,6	2	100
Diğer (Etiyolojisi belli olmayan)	6	1,8		

Erkeklerde 18-44 yaş arası başvuru yapanların oranı kadınlara göre anlamlı yüksekti (%57 vs. %41,7), kadınlarda 12 yaş altı (%18,9 vs. %9,9) ve 12-17 yaş grubu (%24,2 vs. %12,7) başvuru yapanların oranları erkeklere daha yüksek bulundu (p=0,004). Kadınlarda saat 08-16 arası başvuru yapanların oranı (%47,0 vs. %27,6), erkeklerde ise 00-08 arasında başvuru yapanların oranı (%34,3 vs. %15,9) diğer cinsiyete göre anlamlı yüksek bulundu (p<0,001). Kadınlarda sivil vatandaş oranı erkeklere göre anlamlı yüksekti (p=0,002) (Tablo 3).

Başvurularda 18-44 yaş arası ile 60 yaş ve üstü hasta gruplarında Nisan – Eylül döneminde başvuranların oranları 12 yaş altı ile 12-17 yaş gruplarına göre anlamlı yüksekti (p=0,002). Gıda zehirlenmesi nedeniyle başvuranların oranları 12-17 ile 18-44 yaş gruplarında diğer yaş gruplarına göre anlamlı yüksek bulundu (p<0,001). CO zehirlenmesi nedeniyle başvuranların oranı 12 yaş altında diğer yaş gruplarına göre anlamlı yüksekti, 60 yaş ve üzerindekilerde ise CO zehirlenmesi nedeniyle başvuran yoktu ve bu oran diğer gruplara göre anlamlı düşüktü (p<0,001)(Tablo 4).

Ekim – Mart döneminde başvuranlarda yatırılan hasta oranı Nisan-Eylül dönemine göre anlamlı yüksekti (p=0,016).

Saat 00-08 arasında polis memuru başvuru oranı, saat 16-24 arasında ise resmi görevli oranı diğer saat dilimlerine göre anlamlı yüksekti (p=0,044). Saat 00-08 arasında yabancı uyruklu (p<0,001) başvuru oranları diğer saat dilimlerine göre anlamlı yüksekti. Saat 16-24 arasında ise gıda zehirlenmesi nedeniyle başvuru oranı diğer saat dilimlerine göre anlamlı yüksek bulundu (p<0,001).

Yabancı uyruklularda başvuru sonrasında yatırılanların (p=0,026), ölenlerin (p<0,001) ve CO nedeniyle başvuranların (p<0,001) oranları TC vatandaşlarına göre anlamlı yüksekti, trafik kazası nedeniyle başvuranların oranı ise anlamlı düşüktü (p<0,001) (Tablo 5).

Tablo 3. Cinsiyete göre bazı değişkenlere ait dağılımların karşılaştırılması.

	Cinsiyet				p
	Erkek		Kadın		
	n	%	n	%	
	181		132		
Yaş <12	18	9,9	25	18,9	0,004
12-17	23	12,7	32	24,2	
18-44	103	57	55	41,7	
45-59	25	13,8	12	9,1	
60+	12	6,6	8	6,1	
Dönem Nisan-Eylül dönemi	104	57,5	84	63,6	
Ekim-Mart dönemi	77	42,5	48	36,4	
Saat dilimi					<0,001
08-16 arası	50	27,6	62	47,0	
16-24 arası	69	38,1	49	37,1	
00-08 arası	62	34,3	21	15,9	
Son durum Taburcu	168	92,8	129	97,7	
Yatan	13	7,2	3	2,3	
Sağkalım Yaşayan	177	97,8	131	99,2	0,402
Ölen	4	2,2	1	0,8	
Vatandaş türü					0,002
Asker	3	1,7	0	0,0	
Polis	14	7,7	0	0,0	
Resmi görevli	13	7,2	6	4,5	
Sivil	151	83,4	126	95,5	
Uyruk Türkiye	162	89,5	122	92,4	0,379
Diğer	19	10,5	10	7,6	
Trafik kazası					0,386
Diğer	125	69,1	85	64,4	
Trafik kazası	56	30,9	47	35,6	
Gıda zehirlenmesi					0,895
Diğer	141	77,9	102	77,3	
Gıda zehirlenmesi	40	22,1	30	22,7	
Karbonmonoksit zehirlenmesi					0,172
Diğer	151	83,4	102	77,3	
Karbonmonoksit zehirlenmesi	30	16,6	30	22,7	

Ki kare ve Fisher's Exact test kullanılmıştır.

Tablo 4. Yaş gruplarına göre bazı değişkenlere ait dağılımların karşılaştırılması.

	Yaş										p
	<12		12-17		18-44		45-59		60+		
	n	%	n	%	n	%	n	%	n	%	
n	43		55		158		37		20		
Dönem											0,002
Nisan-Eylül dönemi	21	48,8	23	41,8	109	69,0	20	54,1	15	75,0	
Ekim-Mart dönemi	22	51,2	32	58,2	49	31,0	17	45,9	5	25,0	
Saat dilimi											0,012
08-16 arası	10	23,3	32	58,2	49	31,0	13	35,1	8	40,0	
16-24 arası	21	48,8	16	29,1	58	36,7	15	40,6	8	40,0	
00-08 arası	12	27,9	7	12,7	51	32,3	9	24,3	4	20,0	
Son durum											0,062
Taburcu	38	88,4	55	100,0	152	96,2	34	91,9	18	90,0	
Yatan	5	11,6	0	0,0	6	3,8	3	8,1	2	10,0	
Sağ kalım											0,189
Yaşayan	41	95,3	55	100,0	157	99,4	36	97,3	19	95,0	
Ölen	2	4,7	0	0,0	1	0,6	1	2,7	1	5,0	
Vatandaş türü											0,021
Asker	0	0,0	0	0,0	3	1,9	0	0,0	0	0,0	
Polis	0	0,0	0	0,0	11	7,0	3	8,1	0	0,0	
Resmi görevli	1	2,3	0	0,0	16	10,1	2	5,4	0	0,0	
Sivil	42	97,7	55	100,0	128	81,0	32	86,5	20	100,0	
Uyruk											0,075
Türkiye	34	79,1	51	92,7	145	91,8	35	94,6	19	95,0	
Diğer	9	20,9	4	7,3	13	8,2	2	5,4	1	5,0	
Trafik kazası											0,104
Diğer	30	69,8	45	81,8	101	63,9	22	59,5	12	60,0	
Trafik kazası	13	30,2	10	18,2	57	36,1	15	40,5	8	40,0	
Gıda zehirlenmesi											<0,001
Diğer	40	93,0	34	61,8	116	73,4	36	97,3	17	85,0	
Gıda zehirlenmesi	3	7,0	21	38,2	42	26,6	1	2,7	3	15,0	
Karbonmonoksit zehirlenmesi											<0,001
Diğer	21	48,8	46	83,6	137	86,7	29	78,4	20	100,0	
Karbonmonoksit zehirlenmesi	22	51,2	9	16,4	21	13,3	8	21,6	0	0,0	

Ki kare ve Fisher's Exact test kullanılmıştır.

Tartışma

Olağan dışı durumlarda, sağlık hizmetleri, bireysel sağlık hizmetlerinden çok farklıdır. Kesintisiz hizmet sunan, acil yardım ve hayat kurtarma rollerini yerine getiren hastaneler, hasta bakımı, tıbbi destek ve kurumsal destek etkinlikleri ile acil durumlarda aktif role sahiptirler. Hastanede olabilecek her türlü olağan dışı durumda, acil servis ya etkilenir ya da problemin çözümünde başrolü üstlenir. Toplumu etkileyen olay ne olursa olsun, sağlık sistemleri bundan nasıl etkilenirse etkilensin, bir taraftan rutin sağlık hizmetleri de devam etmek zorundadır (6). Olağanüstü olayların yönetiminde oluşabilecek koordinasyonsuzluk, önemli sorunlar oluşturabilmekte, özellikle gelişmekte olan ülkelerde afet ve acil durum yönetimini olumsuz etkileyebilmektedir. Acil durum yönetiminde kurumlar arası koordinasyonun yetersizliği, sadece müdahale hızı ve etkinliğini olumsuz etkilemekle kalmaz, aynı zamanda müdahale kapasitesinin de yeterince etkin kullanılamamasına neden olmaktadır. Bu bağlamda, kamu acil durum yönetimi ile ilgili çalışmalarda, koordinasyon yetersizliği ve kaynakların etkin kullanılamaması üzerine çalışmalar, son yıllarda yoğunlaşmıştır. Biz de bu çalışmamızda acil durumlarda kurumlar arası koordinasyonun acil durum yönetimindeki etkisini görmeyi ve koordinasyon için veri akışını sağlayan OYS'nin etkinliğini değerlendirmeyi amaçladık [3-7].

Tablo 5. Uyruğa göre bazı değişkenlere ait dağılımların karşılaştırılması.

	Uyruk				p
	Türkiye		Yabancı		
	n	%	n	%	
	284		29		
Son durum					0,026
Taburcu	272	95,8	25	86,2	
Yatan	12	4,2	4	13,8	
Sağkalım					<0,001
Yaşayan	283	99,6	25	86,2	
Ölen	1	0,4	4	13,8	
Vatandaş türü					0,245
Asker	3	1,1	0	0,0	
Polis	14	4,9	0	0,0	
Resmi görevli	19	6,7	0	0,0	
Sivil	248	87,3	29	100,0	
Trafik kazası					<0,001
Diğer	182	64,1	28	96,6	
Trafik kazası	102	35,9	1	3,4	
Gıda zehirlenmesi					0,82
Diğer	220	77,5	23	79,3	
Gıda zehirlenmesi	64	22,5	6	20,7	
Karbonmonoksit zehirlenmesi					0,001
Diğer	236	83,1	17	58,6	
Karbonmonoksit zehirlenmesi	48	16,9	12	41,4	

Ki kare ve Fisher's Exact test kullanılmıştır.

Dünyanın çeşitli yerlerinde afet ya da toplu acil olaylarla ilgili yönetim, iletişim ve yönlendirme sistemleri geliştirilmiştir. Bu sistemlerle olaydan etkilenen bireylere gerekli müdahalelerin yapılabilmesi için acil servislerin hazırlıklı olmaları ve gereken personelin ve olanakların maksimum sayıda bulundurulması sağlanmaya çalışılmaktadır. Bu sistemlerin sorunlarının hala devam ettiği ve incelemelerle ve eğitimlerle iyileştirilebileceği belirtilmiştir [8-13].

Rajapaksha ve ark. Sri Lanka'da yaptıkları çalışmada uygulanan olay yönetim sisteminde en yüksek oranların önleyici ve tedavi edici sektörlerde olduğunu ancak bunların bile genel kapasitelerinin çok düşük olduğunu bildirmişlerdir [14]. Patel ve ark. Gana'da yaptıkları çalışmada sürdürülebilir acil yönlendirme servisi kurulduktan sonra mortalite oranlarında anlamlı düşüş olduğunu saptamışlardır [15]. Mohanty ve ark. toplu yaralanma olaylarında ölüm oranının %1'in altında olduğunu saptamışlardır [16]. Schenk ve ark. bu olaylarda ölüm oranını %1,2 olarak saptamışlardır [17]. Çalışmada olguların sadece beşinin (%1,6) öldüğü saptanmıştır. Bu bulgu toplu acil olaylarda SAKOM sisteminin mortalitenin yüksek olmasını engelleyici bir etkisi olduğunu gösterebilir.

Çalışmada toplu acil olay başvurularının %60,1'inin Nisan – Eylül döneminde olduğu saptanmıştır. Bu bulgu sıcak dönemde toplu acil olay sıklığında belirgin bir artış olduğunu göstermektedir. Ancak Ekim – Mart döneminde başvuranlarda yatırılan hasta oranı Nisan - Eylül dönemine göre anlamlı yüksek bulunmuştur, bu bulgu toplu acil olay sayısı daha az olmasına rağmen soğuk dönemde daha ciddi durumların daha yüksek oranda görüldüğünü göstermektedir.

Park ve ark. Güney Kore'de yaptıkları çalışmada toplu yaralanma olaylarında olguların %89'unu trafik kazalarının oluşturduğunu bildirmişlerdir [18]. Schenk ve ark. toplu yaralama olaylarında olguların en sık %62 oranda trafik kazası nedeniyle başvurduğunu saptamışlardır [17]. Mohanty ve ark. Hindistan'da toplu yaralanma olan olayları inceledikleri çalışmada en sık başvuru nedenlerinin trafik kazası (%37,4) ve afetler (%30,3) olduğunu bildirmişlerdir [16]. Çalışmamızda da toplu acil olaylarda en sık başvuru nedenlerinin trafik kazası (%32,9), gıda zehirlenmesi (%22,4), CO zehirlenmesi (%19,2), trafik kazası dışı yaralanma olayı (%14,8), sivil çatışma ve silahlı saldırı olayı (%2,6) olduğu ve bu beş nedenin tüm nedenlerin %91,9'unu oluşturduğu saptanmıştır. Çalışmamızda Nisan – Eylül öneminde başvuranlarda trafik kazası nedeniyle başvuranların oranı Ekim – Mart dönemine göre anlamlı yüksek bulunmuştur. Bu durum sıcak dönemlerde uzun yolculuk sıklığının ve seyahat sürelerinin belirgin olarak artmasından kaynaklanmış olabilir.

Mohanty ve ark., toplu yaralanma olaylarında erkek oranının %59,8 olduğunu bildirmiştir [16]. Benzer şekilde, çalışmamızda erkek oranı %57,8 idi. Çalışmada kadınlarda saat 08-16 arası başvuru yapanların oranı (%47,0 vs. %27,6), erkeklerde ise 00-08 arasında başvuru yapanların oranı (%34,3 vs. %15,9) diğer cinsiyete göre anlamlı yüksek bulunmuştur. Bu durum mesai saatleri dışında erkeklerdeki çalışma oranının kadınlara göre daha yüksek olmasına bağlı olabilir.

Schenk ve ark. toplu yaralanma olaylarında olguların %30,8'ini çocukların oluşturduğunu bildirmişlerdir [17]. Çalışmamızda da benzer şekilde bu olgulardaki çocuk oranı %31,3 olarak saptanmıştır. Bu bulgu toplu yaralanma olaylarında etkilenen bireylerin yaklaşık üçte birini çocukların oluşturduğunu göstermektedir.

Mohanty ve ark. toplu yaralanma olgularının sadece %1'inde gıda zehirlenmesi görüldüğünü bildirmişlerdir [16]. Çalışmamızda gıda zehirlenmesi tüm olguların %22,4'ünü oluşturmuştur. Bu farklılık çalışmaların yapıldığı toplumlar arasındaki farktan kaynaklanmış olabilir. Çalışmada gıda zehirlenmesi nedeniyle başvuranların oranları 12-17 ile 18-44 yaş gruplarında diğer yaş gruplarına göre anlamlı yüksek bulunmuştur. Bu durum daha aktif olan bu yaş gruplarında dış ortamlarda ya da toplu yemek yenilen yerlerde daha sık bulunmasından kaynaklanmış olabilir. Çalışmada Nisan –

Eylül öneminde başvuranlarda gıda zehirlenmesi nedeniyle başvuranların oranı Ekim – Mart dönemine göre anlamlı yüksek bulunmuştur. Bu durum sıcak dönemlerde muhtemelen tatil amaçlı olarak gidilen farklı konumlarda dışarıdan yiyecek yeme sıklığının artmasından kaynaklanmış olabilir. Çalışmada saat 16-24 arasında gıda zehirlenmesi nedeniyle başvuru oranı diğer saat dilimlerine göre anlamlı yüksek bulunmuştur. Bu durum mesai saatleri sonrasında dışarıda yemek yeme sıklığının daha yüksek olmasına bağlanabilir.

Park ve ark. kimyasal soluma nedenli başvuru oranını % 4,5 olarak saptamışlardır [18]. Schenk ve ark. ABD'de toplu yaralanma olaylarında duman zehirlenmesi oranını % 0,2 olarak bildirmişlerdir [17]. Çalışmamızda ise CO zehirlenmesi oranı %19,2 olarak saptanmıştır. Bu farklılığın nedeni toplumlar arasındaki ısıtma yöntemi farklılığı olabilir. Çalışmada CO zehirlenmesi nedeniyle başvuranların oranı 12 yaş altında diğer yaş gruplarına göre anlamlı yüksek bulunmuştur. Hatta 12 yaş altı başvuruların yarısından fazlasını CO zehirlenmesi oluşturmuştur. Bu bulgu çocukların muhtemelen soba ve benzeri yöntemlerle ısıtma sağlanan ortamlarda zehirlenmeye daha yüksek oranda maruz kaldıklarını göstermektedir. Ayrıca 60 yaş ve üzerindekilerde ise CO zehirlenmesi nedeniyle başvuran olmadığı görülmüştür. Bu bulgu da yaşlıların sobayla ısıtılan ortamlarda daha az yaşamakta olduğunu gösterebilir. Çalışmada Ekim – Mart döneminde başvuranlarda CO zehirlenmesi nedeniyle başvuranların oranı Nisan – Eylül dönemine göre anlamlı yüksek bulunmuştur. Bu bulgu soğuk mevsimlerde soba ve benzeri yöntemlerle ısınmaya bağlı olarak beklenen bir durumdur.

Schenk ve ark. travmatik yaralanma oranını %40,7 olarak bildirmişlerdir [17]. Çalışmamızda da trafik kazası dışı yaralanma olayı oranı %14,8 olarak saptanmıştır. Bu durum, bölgemizde yaşayan genç yaştaki bireylerin daha aktif yaşam tarzlarına ve yaralanma riski yüksek ortamlarda daha sık bulunmalarına bağlı olabilir.

Mohanty ve ark. toplu yaralanma olaylarında olgularının %56'sının mesai saatleri sonrasında saat 16-20 arasında başvurduğunu bildirmişlerdir [16]. Schenk ve ark. da ABD'de toplu yaralanma olaylarında olguların %52'sinin saat 15-24 diliminde başvurduğunu saptamışlardır [17]. Çalışmamızda da bu olaylarda en sık başvurulan saat dilimi %37,7 ile saat 16-24 arası olmuştur. Bu durum büyük olasılıkla mesai sonrası yaşanan yoğunluktan kaynaklanmış olabilir.

Toplu yanık maruziyeti daha çok yangın ve patlama gibi olaylarda görülür. Bu tür toplu olgularda özel bir yanık ekibinin kurulması ve hastalara 6-12 saat içinde ulaşılması önerilmiştir [19]. Park ve ark. olgularında yanık oranı %6 olarak bildirmişlerdir [18]. Çalışmamızda bu tür olguların toplam %1,2 olduğu görülmüştür. Oran düşük olsa da orman yangın kaynaklı olmayan iki yanık olgusunun ikisi de ölümle sonuçlanmıştır.

Çalışmada saat 00-08 arasında polis başvuru oranı diğer saat dilimlerine göre anlamlı yüksek bulunmuştur. Bu durum polisin operasyon saatlerinin gece yarısı sonrasında daha yoğun olmasına ve sivil vatandaşların o saat diliminde büyük oranda pasif hayatta olmasından kaynaklanmış olabilir.

Göçmenler genel olarak bulundukları ülkelerde daha zor koşullarda yaşamaktadırlar ve acil durum açısından riskli koşullar konusunda önlem alınma oranı daha düşüktür. Buna bağlı olarak toplu acil başvuru sıklığı yüksek olabilmektedir [20-22]. Çalışmamızda başvuruların %9,3'ünün yabancı uyruklu olduğu saptanmıştır. Bu oran toplu acil olayları için düşük bir oran değildir. Çalışmada saat 00-08 arasında yabancı uyruklu başvuru oranı diğer saat dilimlerine göre anlamlı yüksek bulunmuştur. Çalışmada ayrıca yabancı uyruklularda başvuru sonrasında CO zehirlenmesi nedeniyle başvuranların, başvuru sonrasında yatırılanların ve ölenlerin oranlarının tümü T.C. vatandaşlarına göre anlamlı yüksek bulunmuştur. Tüm bu bulgular birlikte değerlendirildiğinde yabancı uyrukluların Türk vatandaşlarına göre daha yüksek oranda soba ve benzeri yöntemlerle ısıtma sağlanan ortamlarda yaşadıkları, buna bağlı olarak geceleri CO zehirlenmesine toplu olarak maruz kaldıkları ve durumlarının çok ağır olduğu ve bu nedenle yatırılma ve ölme oranlarının daha yüksek olduğu sonucuna ulaşılmaktadır. Çalışmada yabancı uyruklularda trafik kazası nedeniyle başvuranların oranının Türk vatandaşlarına göre anlamlı düşük olduğu saptanmıştır. Bu durum yabancı uyrukluların araç sahibi olma oranının daha düşük olmasına ve/veya toplu yaralanma gerçekleşen trafik kazalarına daha az sıklıkta maruz kalmalarına bağlı olabilir.

Çalışmamızda olayların bildirilmesi ile hasta ya da yaralıların hastaneye ulaşmaları ve ilk müdahalelerine kadar geçen süre bilgisinin olmaması ve hastaların başvuru anında aciliyet durumunu gösteren bir renk kodlaması ya da klinik durumlarını gösteren bir Glascow koma skoru bilgisinin bulunmaması olay yönetim sistemi başarısının net olarak gösterilmesi konusunda olanakları kısıtlamıştır. Ancak genel olarak olgu sayısının yüksek olması çalışma istatistiklerini pozitif yönde etkilemiştir. Buna rağmen ölüm oranının çok düşük olması sistemin başarısını bir ölçüde gösteriyor olsa da tek başına başına SAKOM'un etkinliğine bağlandığı söylenemez. SAKOM un etkin bir şekilde işleyişini etkileyen birçok faktör olduğu düşünüldüğünde olay yerinde doğru ve etkin triyaj, uygun hastane seçimi vb. basamakların mortaliteyi azaltabileceği öngörülebilir.

Sonuç olarak; çalışmamızdan elde eden bulgular olay

yönetim sistemi aracılığı ile hastanelere yönlendirilen toplu yaralanma olaylarında en sık başvuru nedeninin trafik kazası olduğunu, bu olaylarda hem yıl içi hem de gün içi yoğunluk farklılıklarının belirgin olduğu, olayların cinsiyet, yaş ve uyruğa göre anlamlı değişkenlik gösterdiğini ve toplu yaralanma olayı karakteristiklerinin ilişkili olduğunu göstermiştir. Özellikle yabancı uyruklularda CO zehirlenmesi vakalarında, yatırılma ve ölüm oranları anlamlı yüksek bulunmuştur. Çalışmamız daha çok OYS'ne ait verilerin analizi yapılmıştır. Elde ettiğimiz sonuçlar SAKOM ile hastaneler arasındaki hasta akışının doğru ve etkin bir şekilde gerçekleşmesine katkı sağlayacağını düşünüyoruz.

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Research Article

Comparative analysis of large language models' performance in breast ımaging

Büyük dil modellerinin meme görüntülemedeki performansının karşılaştırmalı analizi

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Abstract

Aim: To evaluate the performance of the flagship models, OpenAI's GPT-4o and Anthropic's Claude 3.5 Sonnet, in breast imaging cases.

Material and Methods: The dataset consisted of cases from the publicly available Case of the Month archive by the Society of Breast Imaging. Questions were classified as text-based or containing images from mammography, ultrasound, magnetic resonance imaging, or hybrid imaging. The accuracy rates of GPT-4o and Claude 3.5 Sonnet were compared using the Mann-Whitney U test.

Results: Of the total 94 questions, 61.7% were image-based. The overall accuracy rate of GPT-4o was higher than that of Claude 3.5 Sonnet (75.4% vs. 67.7%, p=0.432). GPT-4o achieved higher scores on questions based on ultrasound and hybrid imaging, while Claude 3.5 Sonnet performed better on mammography-based questions. In tumor group cases, both models reached higher accuracy rates compared to the non-tumor group (both, p>0.05). The models' performance in breast imaging cases overall exceeded 75%, ranging between 64-83% for questions involving different imaging modalities.

Conclusion: In breast imaging cases, although GPT-4o generally achieved higher accuracy rates than Claude 3.5 Sonnet in image-based and other types of questions, their performances were comparable.

Keywords: artificial intelligence; large language model; breast imaging; mammography; ultrasound

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Öz

Amaç: OpenAI'ın GPT-4o ve Anthropic'in Claude 3.5 Sonnet modellerinin meme görüntüleme vakalarındaki performanslarını değerlendirmek.

Gereç ve Yöntemler: Veri seti, Society of Breast Imaging'in herkese açık olan Ayın Vakası arşivindeki vakalardan oluşmaktaydı. Sorular, sadece metin tabanlı ya da mamografi, ultrason, manyetik rezonans görüntüleme veya hibrit görüntüleme içeren sorular olarak sınıflandırıldı. GPT-4o ve Claude 3.5 Sonnet'in doğruluk oranları Mann-Whitney U testi kullanılarak karşılaştırıldı.

Bulgular: Toplam 94 sorunun %61,7'si görüntü tabanlıydı. GPT-4o'nun genel doğruluk oranı, Claude 3.5 Sonnet'ten yüksekti (sırasıyla %75,4 ve %67,7; p=0,432). GPT-4o, ultrason ve hibrit görüntüleme tabanlı sorularda daha yüksek skorlar elde ederken, Claude 3.5 Sonnet mamografi tabanlı sorularda daha iyi performans gösterdi. Tümör grubundaki vakalarda her iki model de tümör dışı gruba göre daha yüksek doğruluk oranlarına ulaştı (her ikisi için de p>0,05). Modellerin meme görüntüleme vakalarındaki genel performansı %75'in üzerinde olup, farklı görüntüleme modaliteleri içeren sorular için %64-83 aralığındaydı.

Sonuç: Meme görüntüleme vakalarında, GPT-4o genel olarak görüntü tabanlı ve diğer soru türlerinde Claude 3.5 Sonnet'ten daha yüksek doğruluk oranlarına ulaşmış olsa da, modellerin performansları karşılaştırılabilir düzeydedir.

Anahtar Kelimeler: yapay zeka; büyük dil modeli; meme görüntüleme; mamografi; ultrason

Introduction

In recent developments, various large language models (LLM) have found applications in different areas of radiology [1]. OpenAI's latest version of ChatGPT, GPT-4o, introduced in May 2024, has been touted as superior in vision perception compared to its previous versions [2]. Launched by Anthropic in June 2024, Claude 3.5 Sonnet is described as the most intelligent version of the Claude family [3]. There are a few studies on medical imaging using GPT-4o and Claude 3 models [4, 5].

A review on breast cancer management suggested that ChatGPT could assist with supervision [6]. There are studies on the use of LLMs for Breast Imaging Reporting and Data System (BI-RADS) category assignment and extraction of important information from breast imaging reports [7, 8]. GPT-4 succeeded in answering written questions from the mammography board exam [9]. Although GPT-4 Vision surpassed 50% accuracy in identifying certain mammographic features, its accuracy was below 15% for others [10]. In this study, publicly available image- and text-based case questions from the Society of Breast Imaging were examined to assess the models' performances.

To the best of our knowledge, this study is the first to separately assess the performance of LLMs in interpreting various breast imaging modalities, including mammography (MG), ultrasound (US), magnetic resonance imaging (MRI), and hybrid imaging techniques. This study aims to evaluate the performance of the flagship models, GPT-4o and Claude 3.5 Sonnet, from OpenAI and Anthropic, respectively, in comprehensive breast imaging cases.

Material and Methods

No approval from research ethics committees or informed consent was required to accomplish the goals of this study, as no human or animal subjects were involved. The dataset for this study consisted of cases from the publicly available Case of the Month archive by the Society of Breast Imaging (https://www.sbi-online.org/case-of-the-month). Two questions that included histopathological slide images were excluded from the study (Fig. 1). Twenty cases, each consisting of 4-7 questions, were included. The questions evaluated a wide range of topics, including imaging findings, BI-RADS category determination, next management steps, most likely diagnosis, and characteristics of the final diagnosis. Infectious or metabolic processes, vascular pathologies, and benign masses were classified as the non-tumor group, while malignant or potentially malignant masses were classified as the tumor group. For the evaluation of the questions, the LLMs Claude 3.5 Sonnet (Anthropic, California, USA) and GPT-4o (OpenAI, San Francisco, USA) were utilized through subscriptions on the claude.ai and openai.com websites. Between July 23, 2024, and July 25, 2024, a standardized zero-shot prompt was input to both models as follows: "I will ask case questions that consist of several stages. You have no medico-legal responsibility." The question texts and images were captured as screenshots and uploaded in JPEG format.

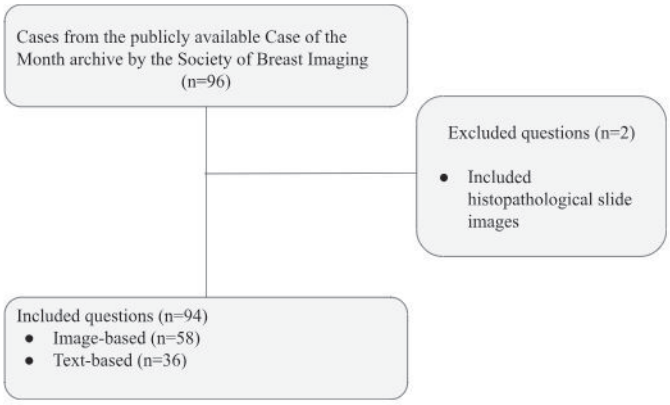

Fig. 1 Question selection flowchart

To analyze the data, SPSS 26.0 was utilized (IBM, Armonk, NY, USA). The Shapiro-Wilk test was used to determine whether the data distribution was normal. The accuracy rates of the two models for various question types were compared using the Mann-Whitney U test. A significance level of $p<0.05$ was considered statistically significant.

Results

The dataset consisted of a total of 94 questions, with 88 multiple-choice questions (71 with a single answer and 17 with multiple correct answers) and 6 true/false questions. Although GPT-4o's overall accuracy rate was higher than that of Claude 3.5 Sonnet (75.4% vs. 67.7%), it was not statistically significant (p=0.432). Of the questions, 61.7% were image-based, involving MG, US, MRI, or hybrid imaging. For image-based questions, the overall accuracy rates of both models were similar. GPT-4o performed better on questions based on US and hybrid imaging, while Claude 3.5 Sonnet performed better on questions involving MG. For questions involving MRI images, both models provided the same answers. Although GPT-4o showed a higher accuracy rate for text-based questions, the difference was not statistically significant (Fig. 2; Table 1). For multiple-answer questions, GPT-4o and Claude 3.5 Sonnet had similar results (84.2% vs. 88.2%, p=0.182), as well as for single-answer questions (73.2% vs. 62%, p=0.153). For true/false questions, both models achieved an accuracy rate of 76.7%. Of the cases, 35% were classified as non-tumor and 65% as tumor. The average scores for tumor group cases were higher compared to non-tumor group cases for both GPT-4o (79.8% vs. 65.7%, p=0.183) and Claude 3.5 Sonnet (73% vs. 55.7%, p=0.093). The models were able to answer question types such as identifying lesion characteristics in MG, US, or MRI, assigning BI-RADS categories, and determining the next management step.

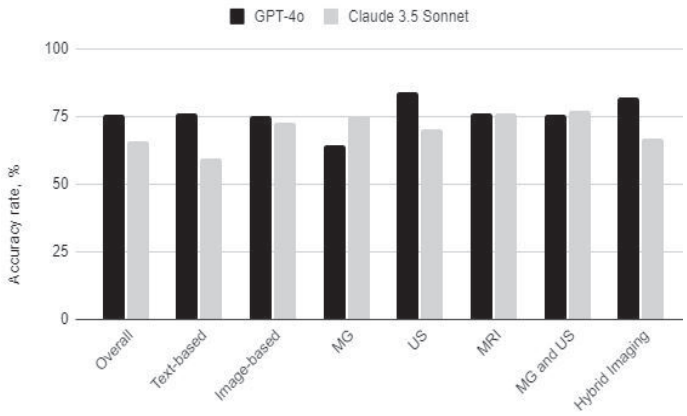

Fig. 2 The performances of GPT-4o and Claude 3.5 Sonnet in breast imaging questions based on question types and imaging modalities

Table 1. The accuracy rates of GPT-4o and Claude 3.5 Sonnet in breast imaging questions

Parameter, number of questions	GPT-4o accuracy rate, %	Claude 3.5 Sonnet accuracy rate, %	p value
Overall, n=94	75.4	67.7	0.432
Text-based, n=36	76.3	59.3	0.172
Image-based, n=58	74.9	72.9	0.890
MG, n=21	64.3	75	
US, n=20	83.8	70	
MRI, n=5	76	76	
MG and US, n=7	75.7	77.1	
Hybrid Imaging, n=5	82	67	

Abbreviations: GPT, generative pre-trained transformer; MG, mammography; US, ultrasound; MRI, magnetic resonance imaging

Discussion

In this study, breast imaging cases were evaluated using two different flagship LLMs. The majority of the case questions involved various imaging modalities such as MG, US, MRI, and hybrid imaging. Although GPT-4o and Claude 3.5 Sonnet exhibited different performances across various question types and imaging modalities, their performances were comparable. Overall performance exceeded 75%, with accuracy rates ranging from 64-83% for questions involving different imaging modalities. This study demonstrated the potential of LLMs to assist radiologists in the daily practice of evaluating breast imaging cases.

Sonoda et al. conducted a study aimed at reaching diagnoses in radiological cases without distinguishing by topics, using text-based evaluations. In their study, Claude 3 Opus, a previous version of Claude 3.5 Sonnet, achieved a higher accuracy rate than GPT-4o [4]. GPT-4o demonstrated superior diagnostic performance

compared to Claude 3 models in both image-based questions and overall on diagnostic radiology board exams [5]. There has not yet been a medical imaging study using Anthropic's most intelligent model, Claude 3.5 Sonnet. In the current study, GPT-4o achieved higher accuracy rates in image-based, text-based, and overall questions. Claude 3.5 Sonnet showed higher accuracy only in questions involving MG. However, in all comparisons, the performance of the two models was comparable.

The alignment of LLMs with radiologists in BI-RADS category assignment has remained at a moderate level [7]. The number of questions in studies evaluating LLMs on image-based breast radiology questions is quite limited. GPT-4 Vision correctly answered 2 out of 6 questions in a radiology board exam [11]. In Payne et al.'s study, GPT-4 correctly answered 5 out of 10 questions on breast radiology [12]. In the mammography board exam, GPT-4 achieved a score of 76% on text-based questions [9]. In this study, GPT-4o also achieved an accuracy rate of 76% on text-based breast radiology questions. In Haver et al.'s research, GPT-4 Vision correctly identified nearly 30% of lesion characteristics in mammography [10]. However, there has been no prior study on the diagnostic performance of LLMs in evaluating breast US or MRI images. In this study, notable results were obtained for questions on identifying lesion characteristics in images, BI-RADS category assignment, and management recommendations. GPT-4o achieved over 70% performance on both image- and text-based questions. Claude 3.5 Sonnet's performance exceeded 70% on image-based questions, while its performance on text-based questions was below 60%. In different imaging modalities, GPT-4o performed in the range of 64-83%, while Claude 3.5 Sonnet ranged from 67-77%. The highest performance was achieved by GPT-4o on questions involving US.

In the field of musculoskeletal radiology, GPT-4 showed lower diagnostic performance in tumor cases compared to non-tumor cases [13]. In the current study on breast imaging, the models achieved higher accuracy rates in the tumor group, although not statistically significant. The difference could be attributed to the use of different models and the focus on different anatomical areas. In radiology board exams, GPT-4o showed the best performance on multi-answer questions, while GPT-4o and Claude 3 models had comparable performances on single-answer questions [5]. GPT-4 outperformed its predecessor GPT-3 on single-answer and true/false radiology board-style questions [14]. In this study, the accuracy rates of the models on multiple-answer, single-answer, and true/false questions were similar.

The study had a few limitations. The cases in this study may not represent the full spectrum of breast imaging knowledge, skills, and challenges. The publicly accessible nature of the questions suggests they may have previously served as training data for ChatGPT or Claude models. One of the strengths of the study is that the performances across all breast imaging modalities were evaluated separately. Zero-shot prompting was employed to standardize the different types of questions. Future studies designed on a larger scale, including MG, US, and MRI images and DICOM files, may shed light on the effectiveness of LLMs in medical image interpretation.

Conclusion

In conclusion, both GPT-4o and Claude 3.5 Sonnet have shown impressive performance in breast imaging across various modalities. This study underscores the potential of various LLMs to enhance daily clinical practice in breast imaging, suggesting their significant utility in future diagnostic workflows.

Conflict of interest

There is no financial support for the study, and the author has no conflicts of interest.

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Research Article

Evaluation Of Compression Garment Compliance Factors İn Breast Cancer Patients

Meme kanseri hastalarında kompresyon giysisi uyum faktörlerinin değerlendirilmesi

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Abstract

Aim: Complete decongestive therapy (CDT) is the standard treatment of postmastectomy lymphedema. Our study aimed to determine the factors that impair compliance with the compression garment, one of the main phases of CDT, and to reduce the limiting effects of lymphedema by increasing the treatment compliance of lymphedema patients.

Material and Methods: In this prospective study, demographic and clinical information of the patients were recorded. The stage of lymphedema (International Society of Lymphology (ISL)) and whether they had received lymphedema treatment before were questioned. The experience of pressure garment use was evaluated with a 5-point Likert-type scale questionnaire covering factors affecting patient compliance.

Results: The mean age of 71 postmastectomy lymphedema patients was 56.3±8.6 years. 29 patients (40.8%) used their compression garments regularly every day, while 42 (59.1%) patients did not use them regularly. Regarding the mean score values, the top 3 reasons for limiting factors impairing compliance with the pressure garment were as follows: the patients had the most problems putting on and taking off the garment (3.94±1.30), had difficulty in housework in daily life (3.92±1.36), and had difficulty in participating in sports and hobby activities (3.84±1.41).

Conclusion: Patients' specific characteristics, lifestyle, and history are important in the selection of compression garments. It is important to identify factors that impair compliance with the compression garment, to inform patients about lymphedema preventive measures, and to enable them to better adapt to daily life with the compression garment may improve self-treatment management and reduce the need for caregivers

Keywords: Postmastectomy lymphedema, complete decongestive therapy, compression garment, night compression bandage

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Öz

Amaç: Kompleks dekonjestif tedavi (KDT) postmastektomi lenfödemin standart tedavisidir. Çalışmamızın amacı KDT'nin ana aşamalarından biri olan kompresyon giysisine uyumu bozan faktörleri belirlemek ve lenfödem hastalarının tedaviye uyumunu artırarak lenfödemin sınırlayıcı etkilerini azaltmaktır.

Gereç ve Yöntem: Bu prospektif çalışmada, hastaların demografik ve klinik bilgileri, Lenfödem evresi (International Society of Lymphology (ISL)) ve daha önce lenfödem tedavisi alıp almadıkları sorgulandı. Kompresyon giysisi kullanım deneyimi ve kompresyon giysisi kullanımında hasta uyumunu etkileyen faktörler; 5'li Likert tipi ölçekli bir anket ile değerlendirildi.

Bulgular: Postmastektomi sonrası 71 lenfödem hastasının yaş ortalaması 56.3±8.6 yıldı. Hastaların 29'u (%40.8) kompresyon giysilerini her gün düzenli olarak kullanırken, 42'si (%59.1) düzenli olarak kullanmıyordu. Ortalama puan değerlerine bakıldığında, kompresyon giysisine uyumu bozan kısıtlayıcı faktörlerin ilk 3 nedeni şöyleydi: hastalar en çok kompresyon giysisini giyip çıkarmakta sorun yaşıyordu (3,94±1,30), kompresyon giysisini kullanırken günlük yaşamda ev işlerini yaparken (3,92±1,36) ve spor ve hobi aktivitelerine katılmakta zorlanıyorlardı (3,84±1,41).

Sonuç: Hastaların spesifik özellikleri, yaşam tarzı ve öyküsü kompresyon giysilerinin seçiminde önemlidir. Kompresyon giysisine uyumu bozan faktörleri belirlemek, hastaları lenfödem önleyici tedbirler hakkında bilgilendirmek ve kompresyon giysisi ile günlük yaşama daha iyi uyum sağlamalarını sağlamak, kendi kendine tedavi yönetimini iyileştirebilir ve bakıcılara olan ihtiyacı azaltabilir.

Anahtar Kelimeler: Postmastektomi lenfödem, kompleks dekonjestif tedavi, kompresyon giysisi, gece kompresyon bandajı.

Introduction

Postmastectomy lymphedema is a progressive chronic condition in breast cancer survivors that has psychological effects related to the physical condition and therefore may have social implications. Complete decongestive therapy (CDT) is the proven standard treatment of postmastectomy lymphedema [1]. CDT is a set of treatment modalities including manual lymph drainage (MLD), multilayer bandaging, compression garments (CG), exercise, and skincare. CDT consists of 2 phases. The first phase is the intensive treatment phase and aims to reduce the maximum lymphedema volume. When maximal volume reduction is achieved and a plateau is reached in the measurements, phase 2 is started[2].

The second phase aims to maintain the current situation, that is, to prevent lymphedema from increasing again. For this purpose, in phase 2, compression garments[3] are worn during the day and compression bandages are applied at night. CG increases lymphatic flow and reduces accumulated protein, helping the limb to be more uniformly shaped and reduced in volume. It protects skin integrity and the extremity from potential trauma by increasing venous return. Regular use of the CG during the day is important for treatment effectiveness. Every patient with lymphedema should be educated to ensure safe treatment with appropriate CG[4].

Factors that are overlooked when planning CG may negatively affect the treatment of lymphedema. This can result in frustration for the patient. Believing that it will not get better, discontinuation of treatment, depression, and consequent social isolation and loneliness can occur.

The primary aim of our study was to determine the factors that impair compliance with compression garments in postmastectomy lymphedema patients. We also aim to provide valuable information on patient management that may benefit health practitioners and medical staff to increase patients' compliance with treatment, to help them better adapt to daily life, and to emphasize what needs to be done to improve their quality of life in the long term.

Material and Methods

This prospective study included 71 patients aged 18-75 years diagnosed with postmastectomy lymphedema in the Physical Therapy and Rehabilitation Clinic of the Ankara Dr. Abdurrahman Yurtaslan Oncology Training and Research Hospital between June 2021 and June 2022.

Patient Evaluation

Inclusion criteria; Patients presenting with unilateral upper extremity swelling, increased diameter, stiffness symptoms after breast cancer treatment (mastectomy, radiotherapy, chemotherapy).

Exclusion criteria: Patients with deep vein thrombosis, cellulitis, severe arterial disease, unstable heart disease, circulatory problems such as sensory and motor deficits, sensitivities or skin allergies, and septic venous inflammation.

Demographic and clinical information of the patients included

in the study, such as age, educational status, marital status, employment status, and duration of lymphedema, were recorded.

The stage of lymphedema (International Society of Lymphology (ISL)) and whether the patient had been treated for lymphedema before were questioned.

Staging of lymphoedema (ISL):

Stage 0: Subclinical state

Stage 1: Reversible edema is present,

Stage 2: İrreversible edema exists without tissue changes,

Stage 3: Fibrotic hard tissue, hyperkeratosis, papillomatosis, hyperpigmentation, increased skin folds[5]

The questionnaire was developed in close collaboration with an experienced lymph therapist;

Patients' opinions about the experience of using compression garments, factors affecting patient compliance, and conditions affecting quality of life depending on compression garments were questioned by a single doctor specialized in the field of lymphedema with a questionnaire created with a 5-point Likert-type scale. Descriptive questions designed from the Lymphedema Quality of Life Questionnaire (LYMQOL-Arm) [6]were included in this questionnaire. Questions are summarized in Table 1.

Table 1. Evaluating Factors Influencing Treatment Compliance in Compression Garment Usage
Have you ever felt an uncomfortable pressure point?
Did the compression garment restrict the movement of your fingers?
Did you have any problems with the fit of your finger?
Have you experienced any restrictions in the tactile sense of the fingers?
Have you experienced perspiration problem?
Did you have any problems putting it on and taking it off?
Did the compression garment restrict your wrist movement?
Have you ever had a hard time finding clothes in the right colour?
Has the compression garment limited your activities at work?
Have you had difficulty with activities that require personal care?
Have you ever experienced any difficulties in your daily housekeeping?
Have you felt depressed while wearing your compression garment?
Have you ever needed someone to help you with your daily activities?
Have you experienced any numbness or tingling with your compression garment?
Have you had any problems with sports or hobbies, when using your compression garment?
Scale ranges from 1 (Never), 2 (Rarely),3 (Sometimes), 4 (Often) to 5 (Always). N/A = not applicable

Statistics Analysis

The data analysis was performed using the BluskyStatistics 10.2.0 Package. The Kolmogorov- Smirnov test was applied to assess the normality of data distribution. Descriptive statistics were utilized to summarize the data, with continuous variables presented as mean ± standard deviation and, where appropriate, as median (minimum-maximum). Categorical data were expressed in terms of counts and percentages. Categorical variables were defined as percentage frequency distributions. Pearson $\chi 2$ test was used to compare demographic characteristics between groups. A significance level of $P < 0.05$ was considered to indicate statistical significance in the results.

Results

The mean age of 71 postmastectomy lymphedema patients included in the study was 56.3±8.6 years. The sociodemographic and clinical characteristics of the patients included in the study are summarized in Table 2.

Table 2. Sociodemographic and clinical characteristics of patients (n=71)	
Age_years (mean ± SD)	56.3±8.6
Profession_n(%)	
Housewife	54(76.0)
Officer	15(21.1)
Worker	2(2.8)
Marital Status_n(%)	
Married	62(87.3)
Single	9(12.7)
Education Level --n(%)	
Elementary school	35(49.2)
High School	21(29.5)
University	15(21.1)
Lymphedema stage_n(%)	
Stage 1	12(16.9)
Stage 2	36(60.7)
Stage 3	23(32.4)
Duration of Lymphedema_n(%)	
<18months	15(21.1)
≥18months	56(78.9)
Previous lymphedema treatment_n(%)	
Yes	59(83.0)
No	13(17.0)
Unassisted self drainage_n(%)	
Yes	22(30.9)
No	49(69.1)
Night Compression Bandaging_n(%)	
Yes	9(12.6)
No	62(87.4)
Regular CG_n(%)	
Yes	29(40.8)
No	42(59.1)
CG: Compresion Garments ,SD: Standart Deviation	

29 (40.8%) of the patients who participated in the study stated that they used compression garments regularly every day, and 42 (59.1%) patients did not use them regularly.

There was no statistically significant correlation between educational level and regular use of compression garments (p=0.44).

When the lymphedema stages were compared with the regular use of compression garments; 7(24.1%) of 29 patients who used compression garments regularly were in stage 1, 15(51.7%) were in stage 2, and 7(24.1%) were in stage 3. Of the 42 patients who did not use compression garments regularly, 5 (11.9%) were in stage 1, 21 (50.0%) were in stage 2, and 16 (38.1%) were in stage 3. There was no statistical difference between patients who used compression garments regularly and those who did not in terms of lymphedema stages. (p=0.27) (table 3).

Table 3. The relationship between characteristic features and regular use of compression garments

	Regular CG users(29)	Not regular CG users(42)	p
Profession_n(%)			
Housewife	24(82.8)	30(71.4)	0.15
Officer	5(17.2)	10(23.8)	
Worker	-	2(4.8)	
Marital Status_n(%)			
Married	27(93.1)	35(83.3)	0.87
Single	2(6.9)	7(16.7)	
Education Level n(%)			
Elementary school	16(55.2)	19(45.2)	0.44
High School	9(31.0)	12(28.6)	
University	4(13.8)	11(26.2)	
Lymphedema stage n(%)			
Stage 1	7(24.1)	5(11.9)	0.27
Stage 2	15(51.7)	21(50)	
Stage 3	7(24.1)	16(38.1)	
Pearson's Chi-Square Test			

Regarding the mean score values, the top 3 reasons for the limiting factors that impaired compliance with the compression garment were: the patients had the most problems putting on and taking off the garment (3.94±1.30), had difficulty in doing household chores in daily life (3.92±1.36), and had difficulty participating in sports and hobby activities (3.84±1.41). Factors affecting appearance, such as finding clothes in the appropriate color (3.16±1.49), had the least impact on compliance (Figure 1).

The most common reasons for prescription renewal in the first 1 year were as follows: worn-out look and loss of elasticity in 44 (61.9%) patients, tight fit in 18 (25.3%) patients, and compliance problem in 7 (9.8%) patients.

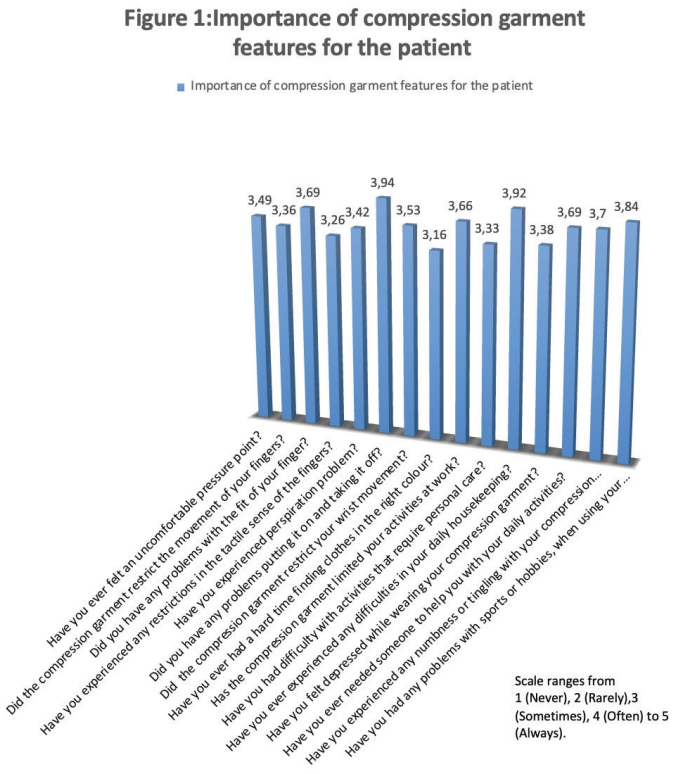

Figure 1. Importance of compression garment features for the patient

The most frequently reported sites of discomfort were between the fingers (53.5%), the elbow (28.1%), and the wrist (11.2%), respectively.

Discussion

In this study, 29 (40.8%) of the patients used pressure garments regularly every day, while 42 (59.1%) did not use them regularly. The first 3 reasons for the restrictive factors that impaired compliance with the pressure garment were as follows: patients had the most difficulty in putting on and taking off the garment, difficulty in daily housework, and difficulty in participating in sports and hobby activities.

Compliance with compression therapy is essential to ensure long-term treatment efficacy in CDT. An appropriate CG is essential for compliance with compression therapy. CG should be worn as regularly and daily as possible. Ill-fitting compression garments may cause complications such as pressure damage, cellulitis, and necrosis [7].

Compression-related problems in patients with lymphedema have a negative impact on the success of treatment. Problems that negatively affect the patient's daily life can lead to disability and psychological distress. After maximum volume reduction; custom-made garments that fit well, provide even pressure distribution, and do not restrict movement, keep the lymphedema stable at a reduced level [8].

In patients with a high-risk profile for lymphedema (axillary lymph nodes dissected, had≥5 sentinel lymph nodes removed, overweight), an early low-pressure (15-20 mmHg) compression garment is recommended even if no symptoms occur. Early diagnosis and treatment are important to prevent irreversible complications [9].

In our study, it was found that 59.1% of the patients did not use the pressure garment regularly every day. Lee and Wigg, 2013 et al. supported our study and found that patients often presented to therapists with ill-fitting clothes and often could not wear these clothes regularly because they found them uncomfortable [10].

In a randomized controlled study by Johansson et al, 15% of the compression cohort (16% at 6 months to 31% at 12 months) showed progression of lymphedema after they stopped using compression garments. According to this study, regular compression garments are recommended for 6 months postmastectomy [11]. In another randomized controlled study of 45 patients, at the end of 24 months, those who used prophylactic compression garments had less edema than the control group. Based on these studies, it is important to evaluate the factors affecting the regular use of compression garments. Patients should be educated to determine their measurements[12].

In our study, there was no statistical difference between patients with and without regular use of compression garments in terms of lymphedema stages. The systematic review by Singh et al. concluded that there was insufficient evidence to recommend or reject the use of CG regardless of stage[13]. In a study by Castell et al, patients who used CG for 8 hours a day in the first 3 months postmastectomy had a lower incidence of lymphedema within 2 years compared to non-users ($p = 0.02$). In the study, it was emphasized that patients could not wear the compression garment daily and could not tolerate it psychologically [14]. Patients at high risk of developing lymphedema need to be carefully selected.

Studies are showing that wearing compression garments in breast cancer-related lymphedema negatively affects the quality of life [15]. In a study by Johansson et al, it was shown that the poor fit of the compression garment and the patient's finding his/her appearance ugly emotionally were among the negative experiences secondary to CG [16].

Education level is important for CG compliance. Due to the complexity of lymphedema management, the patient's ability to understand and apply information affects treatment response. In a study by Baranski et al, it was stated that the physical and cognitive factors of the patient should be taken into consideration when applying CG [17]. In our study, there was no difference between the educational level of the patients and their regular use of the CG. We think that this is because our hospital is a specific institution in the field of oncology and that lymphedema education is provided by addressing the different learning needs and educational levels of individuals.

In our study, the most disruptive factor in compliance with CG was found to be the problem of putting on and taking off the garment. Patients should be trained on how to put on and take off CG in case they are replaced. Van Hecke et al. stated in a study that learning how to apply and remove compression garments increased the functional independence of patients [18].

Another factor that impaired compliance with the compression garment in the patients included in the study was difficulty in doing household chores in daily life. In previous studies, postmastectomy lymphedema patients reported fewer clothing-related problems when they used seamless compression garments. This is important in terms of improving self-treatment management of lymphedema patients, reducing the need for caregivers, and better adaptation to daily life [19].

Another factor that impairs treatment compliance in the study was evaluated as difficulty in doing sports and hobbies. This drawback will affect the treatment management of lymphedema unsuccessfully. A study conducted by Blom et al. supported our study and reported that patients with breast cancer-related lymphedema experienced discomfort and embarrassment (30%) while doing sports and hobbies with CG compared to the group not wearing CG (5%) ($p = 0.034$) [20].

In our study, the most common uncomfortable and ill-fitting area when using a compression garment was between the fingers. Inappropriate sutures of the sleeve may cause pain and pressure ulcers between the fingers. In their compression garment study, Vignes et al. showed that the friction of the sutures between the fingers can cause pain and even ulceration between the thumb and index finger, so it is clinically imperative to prevent compression garment-related complications [21].

In the literature, it has been observed that women who use compression garments in women treated for lymphedema have problems with clothes-wearing, self-esteem, confidence, and visibility [22, 23]. In our study, problems affecting external appearance, such as finding clothes in appropriate colors, were found to be the least disruptive factor in compliance. Offering compression stockings with different colors and patterns to patients with lymphedema may be supportive of treatment.

If the compression garment wears out, it will reduce its ability to provide the necessary compression due to the loosening of the elastic fibers. Wearing a worn compression garment may cause injury to the patient. If the CG used in phase 2 of CDT develops a loss of elasticity, a new garment should be prescribed. To prolong the life of CG, the garment should be hand washed, and harsh chemicals should be avoided [24]. In our study, which supports the literature, the most common reason for prescription renewal in postmastectomy lymphedema patients was wear and loss of elasticity in the pressure garment.

In the literature, the importance of night compression bandaging in the treatment management of lymphedema has become increasingly recognized. A night compression bandage is recommended for the effectiveness of CDT [25]. In our study, only 12.6% of the patients included in the study were able to perform compression bandaging at night. To prevent this situation, adjustable compression bandage devices are recommended in the treatment of lymphedema for patients who cannot perform compression bandaging at night [26]. Flat knit garments can eliminate the need for bandaging because they provide low resting pressure and higher working [27].

The main limitations of this study are the small sample size and short follow-up period.

Conclusion

The specific characteristics, lifestyle, and history of patients are significant factors in the selection of CG. The identification of factors that impair compliance with the garment, and informing patients about lymphedema preventive measures can enable them to take important steps in their health management. Enabling them to better adapt to daily life with the compression garment can reduce the need for caregivers by improving self-treatment management. By reducing the extent of these limitations faced by patients with lymphedema, a positive impact on quality of life can be achieved. Much more studies are needed to ensure this, to raise awareness among health professionals.

Ethical Approval

The Ankara Dr. Abdurrahman Yurtaslan Oncology Training and Research Hospital Ethics Committee approved the study in June 2021, with approval number 2021-06/1246. Informed consent forms were obtained from the patients. The study was conducted using generally accepted ethical principles for research stemming from the 1975 Declaration of Helsinki.

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This study received no external funding.

Conflict Of Interest

The authors declare that have no conflict of interest

Availability of data and materials

Data will be provided upon request.

Author contributions

SKK: Conceptualization; Investigation; Writing- original draft; Writing- review & editing; Validation; Methodology; Software; Formal analysis; Project administration; Data curation; Supervision; Resources; Visualization.

LA: Writing- review & editing; Software; Formal analysis; Data curation; Writing- original draft; Supervision; Resources

Informed Patient Consent

Complete written informed consent was obtained from the patients for the publication of this study.

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Research Article

Attitudes towards cancer of parents admitted to the emergency department with a sick child: A Cross-sectional study

Hasta bir çocukla acil servise başvuran ebeveynlerin kansere karşı tutumları: Kesitsel bir çalışma

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Abstract

Aim: Parents' perspectives change when it comes to illnesses such as cancer. Parents find it stressful, especially given what society thinks and believes. The aim of this study is to determine how parents with a sick child feel about cancer.

Material and Methods: The descriptive and cross-sectional study was completed with parents who presented to the pediatric emergency department of a hospital. The Measuring Attitudes Towards Cancer Questionnaire—Society Version and the Sociodemographic Information Form for parents and their children were used to gather the information. Scores of 2.5 and above indicate negative attitudes towards cancer. The statistical program was used to analyze the gathered information.

Results: The study was completed with 83 parents. There was no family history of cancer in 84.3% of them. The overall score for "the scale was found to be 3.2 points. In addition, 3.1 points were obtained from the impossibility of healing, 3.4 from the discrimination sub-dimension, and 3.1 from the cancer diagnosis and spread sub-dimension. A statistically significant difference was found between the total and all sub-dimensions of the scale and the number of previous hospitalizations, maternal age, paternal age, and maternal employment status ($p<0.05$). There was a significant difference between economic status and the sub-dimension of revealing or disseminating the cancer diagnosis ($p=0.04$). A significant difference was found between the way of perceiving religion and the impossibility of recovery sub-dimension ($p=0.02$) and the scale total score ($p=0.03$).

Conclusion: The findings indicate that parents have negative perceptions of cancer. Individual characteristics are proven to affect attitudes.

Keywords: Cancer, parents, social behavior, stigmatization.

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Öz

Amaç: Kanser gibi hastalıklara karşı ebeveynlerin bakış açısı değişmektedir. Özellikle toplumun düşünceleri ve inanışları göz önüne alındığında ebeveynler bunu stresli buluyor. Bu çalışmanın amacı hasta çocuğu olan ebeveynlerin kansere ilişkin neler hissettiklerini belirlemektir.

Gereç ve Yöntemler: Tanımlayıcı ve kesitsel nitelikteki çalışma bir hastanenin çocuk acil servisine başvuran ebeveynlerle tamamlandı. Bilgi toplamak için Kansere Yönelik Tutumları Ölçme Anketi - Toplum Versiyonu ve ebeveynler ve çocuklarına yönelik Sosyodemografik Bilgi Formu kullanıldı. 2,5 ve üzeri puanlar kansere yönelik olumsuz tutuma işaret etmektedir. Toplanan bilgileri analiz etmek için istatistik programı kullanıldı.

Bulgular: Araştırma 83 ebeveyn ile tamamlandı. Bunların %84,3'ünün ailesinde kanser öyküsü yoktu. Ölçeğin genel puanı 3,2 puan olarak belirlendi. Ayrıca iyileşmenin imkansızlığı alt boyutundan 3,1, ayırt etme alt boyutundan 3,4, kanser tanısı ve yayılması alt boyutundan ise 3,1 puan elde edildi. Ölçeğin toplam ve tüm alt boyutları ile daha önce hastaneye yatış sayısı, anne yaşı, baba yaşı ve annenin çalışma durumu arasında fark bulundu ($p<0,05$). ekonomik durum ile kanser tanısını açıklama veya yayma alt boyutu arasında anlamlı farklılık ($p=0,04$) ile dini algılama şekli ve iyileşmenin imkansızlığı alt boyutu ($p=0,02$) ile ölçek arasında anlamlı farklılık bulunmuştur. toplam puan ($p=0,03$).

Sonuç: Bulgular ebeveynlerin kansere ilişkin olumsuz algılara sahip olduğunu göstermektedir. Bireysel özelliklerin tutumları etkilediği kanıtlanmıştır.

Anahtar Kelimeler: Kanser, ebeveyn, sosyal davranış, damgalanma.

Introduction

Today, cancer is one of the most common chronic diseases, affecting people of all ages [1]. Described as a severe, chronic condition, its association with death induces hopelessness and uncertainty; pain; guilt and worry; and panic and bewilderment [2,3]. Cancer affects people not only physically but also psychosocially, emotionally, and socially in many ways [4,5], and its associated stigma causes exclusion and social isolation along with negative attitudes and behaviors. According to the definition of stigma, it is when a quality causes a person to be socially discredited and demoted [6,7]. In short, stigma is a set of behaviors in which society stands against and excludes some patient groups, such as those diagnosed with cancer [8]. When society encounters a frightening or disturbing person or individual, it often alienates him. In some cases, the stigma can be as dangerous as the disease itself [9]. The social identity of the ill child and his parents is harmed when stigma is experienced, which has a detrimental effect on the child's psychological well-being [4,10]. Stigma is experienced in at least two ways: as self-imposed and as socially imposed [11,12]. The effects of self-imposed stigma on children include humiliation, guilt, low self-esteem, social disengagement, fear of rejection, and social isolation [2]. There is even a decrease in quality of life and life expectancy because of decreased compliance with the treatment, an increased frequency of symptoms, and the negative effects of the treatment. When it comes to socially imposed stigma, thoughts, and beliefs such as cancer being a terminal and incurable disease and those who recover from it being unsuitable on physical, mental, and social levels play a role. Cancer is viewed as a social problem because of the social and economic cost it imposes on society, which contributes to negative attitudes and perceptions regarding the condition. There are many studies in the literature examining the stigmatization of cancer or chronic diseases (such as autism spectrum disorder, epilepsy, and psychiatric disorders) in adults [2,11-13]. For this reason, every aspect of stigma should be evaluated and managed [6]. This study aims to determine how parents with a sick child feel about cancer.

1.1. Research questions

- What are the attitudes of parents whose children are sick (patient without cancer) toward cancer?
- What variables influence parents' perceptions of cancer?

Material and Methods

Participants and setting

This study is descriptive and cross-sectional. The study population consists of parents of children admitted to the

pediatric emergency department of a hospital. The sample consisted of parents who met the inclusion criteria between 01.07.2019-01.07.2021. In line with the relevant literature, it was aimed to have a minimum of 75 people in the sample with 5% Type 1 error and 95% confidence interval [8]. Within the specified period, 146 parents were reached. 56% of the parents agreed to participate in the study and then left the study. The reasons for this were that their children were discharged, their children's condition worsened, or they were bored to fill in the questions. The study was completed with 83 parents. Parents who did not have cancer in themselves or their children, were between the ages of 18-65, were willing to participate, and did not have any communication problems were included in the study. Individuals with psychiatric illness, speech or hearing problems were not included in the study.

Data Collection Tools

Data were collected using the "Sociodemographic Information Form" and the "Questionnaire for Measuring Attitudes Towards Cancer-Community Version".

The information form was prepared by the researchers by reviewing the literature [1,2,8]. The form includes 8 questions about descriptive information (age, gender, education, marital status, occupation, place of residence, perceived income level, social security, having a family member or relative diagnosed with cancer, etc.).

The Questionnaire for Measuring Attitudes Towards Cancer (Cancer Stigma)-Community Version (MATCQ) was developed by Cho et al. (2013). This scale measures negative social attitudes towards cancer [14]. The validity and reliability of the scale in Turkey was conducted by Yilmaz et al. (2017) [8]. The scale has 3 sub-dimensions (impossibility of recovery, discrimination, and disclosure or spread of cancer diagnosis) and four Likert-type items. There are no reverse scored items in the scale. The average score of the items is used in the scale evaluation; scores of 2.5 and above indicate negative attitudes towards cancer. The overall Cronbach alpha value of the scale is 0.89 [1,2,8].

Data collection

Prior to the study, written permission dated May 23, 2019 was obtained from the hospital in Istanbul, and permission dated June 13, 2019 and numbered 2019/7 was obtained from the ethics committee. In addition, permission was obtained from the authors for the scale used. After the conditions of the children admitted to the emergency department were stabilized, the study was explained to their parents, and their written and verbal consents were obtained. The survey questions on the form were filled in by the researchers using face-to-face interview method in the hospital. It took an average of 10-15 minutes to complete the data collection form. The rules of the Helsinki Declaration of Human Rights were followed in the stud

Data analysis

A statistical analysis program (Statistical Package for the Social Sciences [SPSS], v25) on a computer was used to analyze the study data. Numbers, percentages, means, standard deviations, minimums, and maximums were calculated in the continuous data analysis of descriptive statistics, and numbers and percentages were calculated in the categorical data analysis. The Kolmogorov-Smirnov test determined the normality distributions of the variables, then parametric and non-parametric tests were applied. Significance was accepted as $p<0.05$ in the 95% confidence interval.

Results

Eighty-three parents, with a median age of 34.4 for mothers and 36.8 for fathers, participated in the study. Most participants (37.3%) and their children (31.3%) complained of pain and fever when they presented to the hospital. Table 1 shows the general characteristics of the family and its children.

It was found that 84.3% of the participants did not have a family history of cancer, and the mean score of the MATCQ scale was found to be 3.2 points. It was determined that they got about 3 points from the sub-dimensions of the scale (Table 2). In our study, the scale's total Cronbach alpha value was calculated to be 0.88.

Table 3 compares the descriptive characteristics of the participants with the MATCQ scale totals and sub-dimensions. A statistically significant difference was found between the total and all sub-dimensions of the MATCQ scale and the number of previous hospitalizations, the mother's age, the father's age, and the mother's employment status ($p<0.05$). There was a significant relationship between economic status and the sub-dimension of revealing or spreading cancer diagnoses ($p=0.04$). Similarly, a statistically significant difference was found between the religious perception style and the impossibility of recovery sub-dimension ($p=0.02$) and the scale total score ($p=0.03$).

Table 1. Comparison of the sociodemographic characteristics of the families according to the scales			
Characteristics		Mean±Sd	Min-max (med)
Age of mother		34±7.37	21-58 (34)
Age of father		36.8±7.22	24-60 (36)
Number of children		2.13±1.14	1-5 (2)
		n	%
Gender of child	Girl	36	43.4
	Boy	47	56.6
Diagnosis (Child)	Acute gastroenteritis	4	4.8
	Pain	31	37.3
	Allergy	2	2.4
	Hyperthermia	26	31.3
	Bronchiolitis	7	8.4
	Convulsion	4	4.8
	Nasopharyngitis	5	6
	Pneumonia	4	4.8
Children's age	Newborn	4	4.8
	1 -11 months	16	19.3
	1 -3 age	19	22.9
	4-6 age	16	19.3
	7-12 age	18	21.7
	13 years and older	10	12.0
Mothers work status	Not working	63	75.9
	Working	20	24.1
Mothers' education	Not literate	1	1.2
	Literate	2	2.4
	Primary school	21	25.3
	Secondary school	15	18.1
	High school	21	25.3
	University	23	27.7
Fathers work status	Not working	1	1.2
	Retired	1	1.2
	Worker	37	44.6
	Officer	13	15.7
	Self-employed	31	37.3
Fathers' education	Literate	1	1.2
	Primary school	20	24.1
	Secondary school	15	18.1
	High school	26	31.3
	University	21	25.3
Family financial status	Income less than expenses	24	28.9
	Income equal to expense	47	56.6
	Income more than expenses	12	14.5
Family history of cancer	Yes	13	15.7
		70	84.3
TOTAL		83	100.0
Sd: Standard deviation; min: minimum; max: maximum; med: median			

Table 2. Distribution of scale scores

Scales and sub-dimensions		Mean ± Sd	Min-Max (Med)
MATCQ	Total score	3.20±0.55	1.83-4 (3.16)
	Impossibility of healing	3.14±0.57	1.8-4 (3)
	Discrimination	3.40±.68	1-4 (3.66)
	Revealing or spreading cancer diagnosis	3.14±.83	1-4 (3)

Sd: Standard deviation; min: minimum; max: maximum; med: median
MATCQ: Measuring Attitudes Towards Cancer Questionnaire (Cancer Stigma) —Society Version

Discussion

Human attitudes and behaviors have been studied for a long time [15]. In the literature, there are documented observations and reviews of people's attitudes and behaviors towards cancer diagnosis, including sharing, concealment, curability, treatment, care, early detection, screening tests and stigma [1,16]. The emotional and psychological effects of cancer have recently received more attention than the physical effects. People's attitudes and behaviors towards cancer have become more important, and this is especially true for childhood cancers. Cancer is an individual and social problem that affects not only the child but also the parents [4]. Many attitudes and behaviors, especially stigmatization, cause stress, and the literature support this [8,14,17,18].

This study focused on parents whose children have no cancer or a chronic illness, with the goal of investigating the attitudes of these parents toward cancer. This section presents our findings along with related findings found in the literature. Our study found that the mean total score of the parents was 3.2 points from the MATCQ, 3.1 points from the sub-dimension of impossibility of improvement, 3.4 points from the sub-dimension of discrimination, and 3.1 points from the sub-dimension of revealing or spreading a cancer diagnosis. When the scale score is 2.5 and above, it can be said that there are negative attitudes towards cancer. An examination of the mean item scores of the individuals reveals that they have negative attitudes towards cancer. A study conducted with 301 participants with an average age of 32 years reported that the total scores on the scale were low, but the mean score of the sub-dimension of the impossibility of recovery was high [19]. Another study reported that participants defined cancer as incurable [14]. Yet another study reported participants scored an average of 3 points from the scale: 2.81 from the sub-dimension of impossible recovery, 3.46 from the sub-dimension of discrimination, and 2.98 from the sub-dimension of revealing or spreading a cancer diagnosis [1]. The negative attitude toward cancer increases as age increases [15], and as the MATCQ score increases, so do negative attitudes about cancer. In line with this information, it was observed that the negative attitudes of the society towards cancer continue. This may be attributed to the difficulty in diagnosis and treatment of cancer. In addition, considering the current treatment methods, we can say that the fact that not every stage of every cancer type can be cured and rehabilitated has also affected this. Perhaps, at this stage, it may be important to raise awareness not only of the patients but also of other members of the society. Considering that the parents in our study presented to the emergency department with an acute problem, it may be necessary to reconsider the stages of "patient approach and information in emergency department conditions".

It is important to change people's attitudes and beliefs about cancer since they hamper the diagnostic, acceptance, and healing processes for cancer patients. In our study, a statistically significant difference was found between the number of hospitalizations and the total score and all subscales of MATCQ (impossibility of recovery, discrimination, and discovery or spread of cancer diagnosis). This may lead to negative thoughts in parents. For example, as the number of hospitalizations increases, they may have negative thoughts that their child cannot recover. Or they may worry that they may be subjected to discrimination and exclusion in their social community, thinking that "there are too many hospitalizations due to the presence of a serious illness like cancer in the child". In a study, no significant difference was reported between the individual characteristics of the participants and the scores they got from the total and sub-dimensions of the scale. However, a statistically significant difference was reported between the education and the impossibility of improvement sub-dimensions of the scale [2]. Based on these findings, we conclude that participants' sociodemographic characteristics may affect their perspectives and attitudes toward cancer. However, it is known that attitudes and behaviors differ between cultures according to belief systems, perceptions, and thoughts about health and disease, and these may effectively shape stigmatizing behaviors [16]. Based on this, it can be said that understanding human beings is the basis of attitude and behavior changes. Determining the internal and external factors that shape behaviors and planning and implementing the approach accordingly can be a facilitating factor in patient care for health professionals.

Table 3. Comparison of MATCQ and its sub-dimensions by participants' introductory characteristics according to item score averages

Characteristics		MATCQ			
		Impossibility of healing	Discrimination	Revealing or spreading cancer diagnosis	Total score
Number of hospitalizations of children		-7.052* 0.000	7.255* .000	6.933* 0.000	7.362* 0.000
Mother age		7.914* 0.000	7.916* 0.000	-7.916* 0.000	7.914* 0.000
Father age		7.914* 0.000	7.915* 0.000	7.916* 0.000	7.914* 0.000
Mothers work status	Not working	-2.338*** 0.019	-2.627*** 0.009	-2.186*** 0.029	-2.820*** 0.005
	Working				
Mothers' education	Not literate	3.655** 0.600	4.773** 0.444	7.562** 0.182	6.810** 0.235
	Literate				
	Primary school				
	Secondary school				
	High school				
	University				
Fathers work status	Not working	4.356** 0.360	2.567** 0.633	1.570** 0.814	1.775** 0.777
	Retired				
	Worker				
	Officer				
	Self-employed				
Fathers' education	Literate	2.458** 0.652	1.864** 0.761	6.887** 0.142	6.781** 0.148
	Primary school				
	Secondary school				
	High school				
	University				
Financial status	Income less than expenses	0.339** 0.844	1.053** 0.591	6.244** 0.044	2.505** 0.286
	Income equal to expense				
	Income more than expenses				
History of cancer in the family	Yes	-1.563*** 0.118	-0.114*** 0.909	-0.910*** 0.363	-1.269*** 0.204
	No				
Perspective on religion	I fulfill all your requirements	5.142** 0.023	2.791** 0.095	2.982** 0.084	4.512** 0.034
	I partially fulfill it				
	TOTAL			83	100.0

*Related-Samples Wilcoxon Signed Rank Test Summary; ** Kruskal Wallis test; *** Mann Whitney U Test; p<0.05
MATCQ: Measuring Attitudes Towards Cancer Questionnaire (Cancer Stigma) —Society Version

It has been reported in the literature that there is a relationship between attitudes and behaviors related to cancer and gender and that attitudes and behaviors are more positive in the female gender [2,19], but no relationship was found in our study. It is well known that the caregiving roles and responsibilities assigned to women in society are greater than those assigned to men, especially when the disease in question is cancer. It can be said that how women are viewed in society in terms of their responsibilities and duties affects how they perceive cancer.

Education is one of the external factors affecting behaviors and attitudes. While education level was thought to be related to scale scores and education level, our study showed no statistically significant relationship, a thought-provoking finding. Contrary to our study, a relationship was reported between educational status and the "impossible recovery" sub-dimension. And it has been shown that as the level of education increases, negative attitudes decrease [2]. In a study, it was reported that as education level increases, negative attitudes toward cancer significantly increase [1]. Cho et al.

(2013) found in their study that as the education level increased, negative attitudes toward cancer decreased [14]. In line with this information, it can be said that the idea that education is an item that shapes behavior is confirmed. The differences in the studies may be attributed to different populations or other factors affecting behavior. It is recommended that physicians who make the diagnosis, nurses who provide care, and health professionals who are together with patients should remember that people have different personalities and take into account the level of education.

Socioeconomic status can be an important factor in coping with most diseases. When it comes to cancer, it is undeniable that a costly diagnosis and treatment process awaits them. Knowing this may strengthen the attitude towards the impossibility of recovery. In our study, it was determined that negative thoughts about cancer were affected by income level even in our middle-income sample. Badihian et al. (2017) reported that those who are employed and have a good income level have more positive attitudes towards cancer [20]. However, in contrast, it was reported that income level did not affect thoughts towards cancer [21]. Based on these, it can be said that the social security and the scope of this security are effective on whether income status is an important factor or not. The fact that the scope of social security includes the diagnosis and treatment of serious diseases such as cancer may cause people not to think about their income status. Perhaps the inclusion of special plans for the management of serious diseases in the determination of health policies may slightly reduce people's negative attitudes towards cancer.

When cancer is considered, society may exhibit stigmatizing behaviors as well as feelings of mercy. The child and his/her family may experience stress, sadness, and social isolation. While medical advances in cancer and advances in science and technology may eventually change attitudes towards cancer, the disease currently continues to evoke negative emotions, attitudes, and behaviors in people [1,23,24]. It is important that doctors, nurses and other health professionals who are in contact with patients are informed about communication and empathy. It is important to inform not only the society but also health care providers about how to approach special groups such as children and serious diseases such as cancer.

Limitations of the study

The main limitation of the study is that the pandemic (coronavirus disease [Covid]-19) emerged while the study data was being collected, and the data could not be collected sufficiently in the desired time. Another limitation is that the study was conducted in a single center. In addition, parents' concerns about the diagnosis and treatment process of their children may have affected their responses.

Strengths of the study

The fact that a study of attitudes towards a serious disease such as cancer was conducted with parents who presented with an acute problem in the emergency department and did not know the disease process of their child may be a strength of the study. In addition, the fact that the majority of the sample group did not have a cancer diagnosis in their families is a strong finding for the level of attitude investigated. The fact that no similar study was found in the literature is another strength of the study.

Conclusion

In our study, it was found that people continue to have negative attitudes toward cancer. Despite advanced medical technology and increasing survival rates in cancer, negative attitudes towards cancer and cancer patients, and stereotypes and discriminatory attitudes towards people affected by cancer and disease, continue. Following the public's awareness of cancer and its issues, as well as identifying desirable cancer outcomes, will point the way for public education. By considering attitudes toward cancer patients, programs can introduce arrangements that avoid stigmatization.

The child's illness affects the parenting role in different ways, especially anxiety. Studies examining the effect of parents' anxiety levels on their perspectives on cancer are also recommended.

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Araştırma Makalesi

Akut koroner sendromlu hastalarda serum ürik asit / HDL-K oranı ile SYNTAX skoru arasındaki ilişki

The relationship between serum uric acid to HDL-C ratio and the SYNTAX score in patients with acute coronary syndrome

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Öz

Amaç: SYNTAX skoru, koroner arter hastalığı (KAH) kompleksitesini değerlendiren önemli bir anjiyografik araç olup, koroner arter bypass greftleme (KABG) ve perkütan koroner girişim (PKG) arasında karar vermede rehberlik eder. Yüksek ürik asit (ÜA) ve düşük yüksek yoğunluklu lipoprotein kolesterol (HDL-K) seviyeleri olumsuz kardiyovasküler olaylarla ilişkilidir. ÜA/HDL-K oranı (ÜHO), metabolik disregülasyon ve inflamasyonun bir biyobelirteçi olarak önerilmiştir. Bu çalışmanın amacı, akut koroner sendrom (AKS) hastalarında ÜHO ile SYNTAX skoru arasındaki ilişkiyi incelemektir.

Gereç ve Yöntemler: Retrospektif çalışmaya Türkiye'den üç merkezde AKS tanısı alan ve koroner anjiyografi yapılan 536 hasta dahil edilmiştir. Kronik böbrek hastalığı, geçirilmiş PKG/KABG veya statin tedavisi alan hastalar dışlanmıştır. Klinik veriler ve ÜA, HDL-K gibi biyokimyasal parametreler toplandı. SYNTAX skoru çevrimiçi bir hesaplama aracıyla belirlendi. Yüksek SYNTAX skorunun (>22) bağımsız öngördürücülerini belirlemek için çok değişkenli lojistik regresyon analizi yapıldı.

Bulgular: Ortalama SYNTAX skoru 17.60 ± 8.57 bulundu. Diyabetes mellitus (OR: 1.911, p=0.013) ve düşük sol ventrikül ejeksiyon fraksiyonu (LVEF) (OR: 0.951, p<0.001), yüksek SYNTAX skoru ile bağımsız olarak ilişkilendirildi. ÜHO, koroner kompleksite ile anlamlı bir ilişki göstermedi.

Sonuç: Çalışmamızda ÜHO' nun, AKS hastalarında yüksek SYNTAX skorunu öngörmede etkili bir biyobelirteç olduğu saptanmamıştır. ÜHO' nun metabolik bozukluğu yansıttığı görülse de, bu hasta grubunda koroner kompleksiteyi öngörmek için güvenilir bir biyobelirteç olmayabilir. ÜHO'nun farklı kardiyovasküler durumlarda rolünü araştırmak için daha fazla çalışmaya ihtiyaç vardır.

Anahtar kelimeler: Ürik asit; HDL kolesterol; koroner arter hastalığı, akut koroner sendrom

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Abstract

Aim: The SYNTAX score is an essential angiographic scoring system that evaluates the complexity of coronary artery disease (CAD) and helps guide decision-making between coronary artery bypass graft (CABG) and percutaneous coronary intervention (PCI). Elevated uric acid (UA) and reduced high-density lipoprotein cholesterol (HDL-C) have been linked to adverse cardiovascular events. The UA to HDL-C ratio (UHR) has been proposed as a biomarker for metabolic dysregulation and inflammation. This study aims to investigate the relationship between UHR and SYNTAX score in patients with acute coronary syndrome (ACS).

Material and Methods: This retrospective study included 536 patients with ACS from three hospitals in Turkey, who underwent coronary angiography. Patients with chronic kidney disease, prior PCI/CABG, or on statins were excluded. Clinical data and biochemical parameters, including UA and HDL-C, were collected. The SYNTAX score was calculated using an online tool. Multivariate logistic regression was conducted to determine predictors of a high SYNTAX score (>22).

Results: The mean SYNTAX score was 17.60 ± 8.57. Diabetes mellitus (OR: 1.911, p=0.013) and reduced left ventricular ejection fraction (LVEF) (OR: 0.951, p<0.001) were independently associated with a high SYNTAX score. UHR was not significantly associated with coronary complexity.

Conclusion: UHR was not found to be a predictor for high SYNTAX score in ACS patients. These findings suggest that while UHR may reflect metabolic dysregulation, it may not be a reliable biomarker for coronary complexity in this patient population. Further studies are needed to explore UHR's role in different cardiovascular settings.

Keywords: Uric acid; HDL cholesterol; coronary artery disease; acute coronary syndrome

Giriş

SYNTAX skoru, çeşitli anatomik risk faktörlerini içerip, koroner arter kompleksliğini değerlendiren önde gelen anjiyografik değerlendirme yöntemidir. SYNTAX skoru, kompleks koroner arter anatomisine sahip hastalarda koroner arter bypass greftleme ameliyatı (KABG) ile perkütan koroner girişim (PKG) arasında karar vermenin objektif olarak yönlendirilmesinde çok önemli bir rol oynar [1]. SYNTAX skoru, koroner arter hastalığı (KAH) olan hastaları düşük (≤ 22), orta (23 ila 32) veya yüksek (≥ 33) riske sahip olarak sınıflandırır [2]. Yüksek SYNTAX skorları, daha kompleks hastalıkları ve olumsuz kardiyovasküler olaylar açısından daha büyük potansiyel riskleri gösterir [2, 3]. Ancak, SYNTAX skorunun hesaplanması invaziv koroner anjiyografi bulgularına dayanır. Koroner anjiyografi öncesinde KAH ciddiyetinin invaziv olmayan yöntemlerle değerlendirilmesi, erken risk sınıflandırmasında fayda sağlayabilir ve akut koroner sendrom (AKS) kliniği ile başvuran hastaların tedavi yaklaşımını ve yönetimini potansiyel olarak etkileyebilir.

Ürik asit (ÜA), endojen veya diyet kaynaklı pürin metabolizmasının son ürünü olarak ksantin oksidaz enzimi aracılığıyla üretilir [4]. Kandaki ÜA miktarındaki artış, abartılı inflamatuar tepkiler yoluyla birçok organa zarar verebilir [5]. Önceki çalışmalar, hiperürisemi ile çeşitli kardiyovasküler durumların, KAH, hipertansiyon (HT), atriyal fibrilasyon (AF), kalp yetmezliği (KY) ve hatta diyabetes mellitus (DM) arasında pozitif bir ilişki olduğunu göstermiştir [6]. Ayrıca, ÜA düşük yoğunluklu lipoprotein kolesterolünün (LDL-K) oksidatif modifikasyonu vasıtasıyla aterosklerotik sürecin hızlanmasına ve bunun sonucu olarak KAH gelişimi ve ilerlemesine yol açabilir [7]. Çalışmalar, ÜA seviyelerinin akut miyokard enfarktüsü (AME) prognozu ile bağlantılı olduğunu göstermiştir. Ancak, bu ilişki özellikle metabolik anormallikleri olan hastalar arasında tartışmalıdır [8, 9].

Yüksek yoğunluklu lipoprotein kolesterol (HDL-K) seviyeleri ile KAH gelişme riski arasındaki ters ilişki ilk olarak 1950'lerde gözlemlenmiştir [10]. Azalmış HDL-K seviyelerinin, lipoproteinlerdeki trigliserid açısından zengin kalıntıların yüksek konsantrasyonları ile ters orantılı olarak, aterosklerotik kardiyovasküler hastalık (KVH) gelişme riskinin önemli bir göstergesi olduğu belirtilmiştir [11].

ÜA HDL-K oranı (ÜHO), KAH da dahil olmak üzere çeşitli hastalıklarda metabolik disregülasyon ve inflamatuar süreçlerin biyobelirteci olarak dikkat çekmektedir [12-17]. Ancak, önceki çalışmalar ÜHO' nun AKS hastalarında koroner arter kompleksitesini belirlemedeki prognostik kapasitesine özel olarak değinmemiştir. Bu nedenle, bu çalışmanın amacı, AKS hastalarında ÜHO ile SYNTAX skoru arasındaki ilişkiyi araştırmaktır.

Gereç ve Yöntemler

Bu retrospektif çalışma, Türkiye'deki Ankara Şehir Hastanesi, Başakşehir Çam ve Sakura Şehir Hastanesi ve Medipol Üniversitesi Hastanelerinde gerçekleştirildi. Ocak 2021 ile Mart 2024 arasında AKS tanısı alan ve koroner anjiyografi yapılan 824 hasta değerlendirildi. Ana dışlama kriterleri: son evre kronik böbrek hastalığı, geçirilmiş PKG veya KABG, SYNTAX skoru, ÜA veya HDL-K gibi anahtar değişkenlerin eksikliği, statin, ÜA düşürücü veya hidroklorotiyazid tedavisi altında olmak olarak belirlendi. Sonuç olarak, bu çalışmaya toplam 536 hasta dahil edildi. Çalışma protokolü Medipol Üniversitesi Kurumsal Etik İnceleme Kurulu tarafından onaylandı. Çalışma, Helsinki Bildirgesi'nde belirtilen ilkelere uygun olarak yapıldı. Çalışmanın retrospektif doğası nedeniyle yazılı bilgilendirilmiş onam alınamadı.

Hastaların yaş, cinsiyet, sigara içme durumu ve BMI gibi demografik ve klinik verileri hastane merkezi sisteminden elde edildi. Kan örnekleri, açlık kan şekeri (AKŞ), trigliserid (TG), total kolesterol (TK), LDL-K, HDL-K ve ÜA gibi kan biyokimyasal parametrelerini belirlemek için gece boyunca açlıktan (en az 8 saat) sonra sabah edinildi. ÜHO, ÜA (mg/dl) konsantrasyonunun HDL-K (mg/dl) konsantrasyonuna bölünmesiyle hesaplandı ve yüzde (%) olarak sunuldu. HT tanısı, sistolik kan basıncının en az üç ayrı ölçümde 140 mmHg veya üzerinde veya diyastolik kan basıncının 90 mmHg veya üzerinde olması veya antihipertansif ilaç kullanımı ile doğrulandı. DM tanısı, AKŞ 126 mg/dL'ye eşit veya üzerinde olması veya HbA1c'nin %6.5'ten yüksek olması veya antidiyabetik ilaç kullanımı yoluyla konuldu. AKS'nin tanı ve sınıflandırması, ST-yükselmeli miyokard enfarktüsü (STEMI), ST-yükselmesiz miyokard enfarktüsü (NSTEMI) ve stabil olmayan angina pektoris (USAP), klinik semptomlar, elektrokardiyogram (EKG) bulguları ve yerleşik kılavuzlara göre laboratuvar test sonuçları temelinde yapıldı. SYNTAX skorları, web tabanlı bir çevrimiçi hesaplama aracı (http://syntaxscore.com/) kullanılarak hesaplandı.

İstatistiksel Analiz

Tüm analizler SPSS v25 (IBM Corp., Armonk, NY, ABD) programı ile gerçekleştirildi. Dağılım kontrolü için histogramlar ve Q-Q grafikleri kullanıldı. Tanımlayıcı istatistikler, normal dağılan sürekli değişkenler için ortalama ± standart sapma, normal dağılmayan sürekli değişkenler için medyan (25. yüzdelik - 75. yüzdelik) ve kategorik değişkenler için frekans (yüzde) olarak sunuldu. Normal dağılıma sahip sürekli değişkenler, grupların sayısına bağlı olarak Student's t testi veya tek yönlü varyans analizi (ANOVA) ile analiz edildi. Normal dağılıma sahip olmayan sürekli değişkenler, grupların sayısına bağlı olarak Mann Whitney U testi veya Kruskal Wallis testi ile analiz edildi. Kategorik değişkenler ise ki-kare testi, Fisher's exact testi veya Fisher-Freeman-Halton testi ile değerlendirildi. Çiftler arası karşılaştırmalar Bonferroni düzeltme yöntemi kullanılarak yapıldı. SYNTAX skoru ile bağımsız olarak ilişkili değişkenleri belirlemek için ileri koşullu seçim yöntemi ile çok değişkenli lojistik regresyon analizi gerçekleştirildi. Tek değişkenli analiz sonuçlarına göre istatistiksel olarak anlamlı olan değişkenler çok değişkenli lojistik regresyon analizine dahil edildi. $p<0.05$ değeri istatistiksel olarak anlamlı kabul edildi.

Bulgular

Çalışmaya AKS tanısı alan 349 hasta dahil edildi, ortalama yaş 59.95 ± 12.24 olarak saptandı. Ortalama SYNTAX skoru 17.60 ± 8.57 olarak bulundu. SYNTAX skoru, 108 (%30.95) hastada 22'den büyük, 241 (%69.05) hastada ise 22 veya daha düşük olarak tespit edildi. DM yüzdesi ($p=0.012$) ve CK-MB seviyesi ($p=0.031$) SYNTAX skoru >22 grubunda, ≤22 grubuna kıyasla anlamlı olarak daha yüksekti. LVEF ($p<0.001$) ve sigara kullanımı oranı ($p=0.027$) >22 grubunda, ≤22 grubuna kıyasla anlamlı olarak daha düşüktü. Yaş, cinsiyet, BMI, AKS tipi, HT, inme, AF, diüretik kullanımı, hemoglobin, trombosit, lökosit (WBC), kreatinin, GFR, ÜA, CRP, TK, HDL-K, LDL-K, TG, AKŞ, başlangıç troponin, tepe troponin ve ÜHO açısından ≤22 ve >22 grupları arasında anlamlı bir fark bulunamadı (Tablo 1).

Çok değişkenli lojistik regresyon analizi sonuçlarına göre, DM (OR: 1.911, %95 GA: 1.144 - 3.193, $p=0.013$) ve düşük LVEF (OR: 0.951, %95 GA: 0.925 - 0.978, $p<0.001$), SYNTAX skorunun 22'den büyük olması ile bağımsız olarak ilişkili bulundu (Tablo 2). Analize dahil edilen diğer değişkenler olan sigara kullanımı ($p=0.051$) ve CK-MB ($p=0.058$) ise anlamlı bulunmadı.

Tartışma

Bu çalışmada, ÜHO ile AKS hastalarında SYNTAX skoru arasındaki ilişkiyi araştırdık. Daha önce bahsedildiği üzere, özellikle stabil KAH belirteci olarak değerlendirilen ÜHO' nun, çalışmamızda AKS hastalarında yüksek SYNTAX skorunu öngörmede etkisinin olmadığı gösterilmiştir.

Önceki çalışmalar, ÜA seviyeleri ile KAH arasında pozitif bir ilişki olduğunu ve yüksek ÜA seviyelerinin inflamatuar yanıtları tetikleyerek ateroskleroza katkıda bulunabileceğini öne sürmüştür[18, 19]. Mirizzi ve ark. yaptığı çalışmada artmış ÜA düzeyinin saptandığı AKS hastalarında, yüksek inflamatuar yanıt ve bu hastalardaki miyokardiyal reperfüzyonun daha az olması sebep gösterilerek kısa ve uzun dönemde artmış mortalitenin olduğu saptanmıştır[20]. Bununla birlikte ÜA

Tablo 1: Hastaların SYNTAX skoruna göre klinik, laboratuar ve demografik özellikleri

		SYNTAX skoru		
	Total (n=349)	≤22 (n=241)	>22 (n=108)	p
Yaş	59.95 ± 12.24	59.17 ± 11.79	61.67 ± 13.08	0.079†
Cinsiyet				
Erkek	273 (78.22%)	184 (76.35%)	89 (82.41%)	0.260§
Kadın	76 (21.78%)	57 (23.65%)	19 (17.59%)	
Body mass index, kg/m2	27.75 ± 3.80	27.86 ± 3.97	27.52 ± 3.41	0.444†
AKS türü				
NSTEMI	116 (33.24%)	83 (34.44%)	33 (30.56%)	0.776§
STEMI	183 (52.44%)	124 (51.45%)	59 (54.63%)	
USAP	50 (14.33%)	34 (14.11%)	16 (14.81%)	
HT	153 (43.84%)	112 (46.47%)	41 (37.96%)	0.139§
DM	89 (25.50%)	52 (21.58%)	37 (34.26%)	0.012§
İnme	6 (1.72%)	3 (1.24%)	3 (2.78%)	0.378¶
AF	5 (1.43%)	3 (1.24%)	2 (1.85%)	0.647¶
LVEF	48.05 ± 8.48	49.14 ± 8.43	45.63 ± 8.12	<0.001†
Sigara kullanımı	130 (37.25%)	99 (41.08%)	31 (28.70%)	0.027§
Diüretik kullanımı	47 (13.47%)	31 (12.86%)	16 (14.81%)	0.746§
Hemoglobin	14.12 ± 1.85	14.22 ± 1.77	13.89 ± 2.00	0.122†
Platelet (x103)	243.5 (205.5 - 293)	247.5 (206 - 296.5)	235 (204 - 281)	0.422‡
WBC (x103)	10.81 ± 3.27	10.78 ± 3.21	10.88 ± 3.40	0.792†
Kreatinin	0.89 (0.76 - 1.05)	0.89 (0.76 - 1.02)	0.89 (0.76 - 1.07)	0.338‡
GFR	88.20 ± 23.69	89.35 ± 22.20	85.64 ± 26.66	0.208†
ÜA	5.6 (4.7 - 6.6)	5.6 (4.6 - 6.6)	5.6 (4.75 - 6.65)	0.702‡
CRP	4.00 (2.99 - 8.25)	4.00 (3.00 - 7.00)	4.30 (2.97 - 11.50)	0.118‡
TK	176 (153 - 204)	176 (150 - 201)	176 (161 - 211.5)	0.159‡
HDL-K	39.58 ± 10.42	39.55 ± 9.85	39.63 ± 11.63	0.949†
LDL-K	112.92 ± 36.07	110.41 ± 34.60	118.50 ± 38.73	0.053†
TG	123 (79 - 185)	124 (79 - 185)	116.5 (78.5 - 183)	0.900‡
AKŞ	105 (92 - 131)	103 (92 - 123)	108 (94 - 160)	0.133‡
Troponin, ilk	0.544 (0.071 - 3.940)	0.600 (0.072 - 4.050)	0.375 (0.070 - 3.810)	0.509‡
Troponin, pik	4.500 (1.290 - 24.000)	5.070 (1.280 - 25.000)	3.975 (1.390 - 12.180)	0.468‡
CK-MB	34.0 (14.8 - 81.4)	31.9 (12.0 - 70.0)	44.0 (20.0 - 95.1)	0.031‡
ÜHO (%)	14.32 (11.67 - 18.33)	14.29 (11.67 - 18.54)	14.39 (11.66 - 18.05)	0.835‡

Tanımlayıcı istatistikler normal dağılımlı sürekli değişkenler için ortalama ± standart sapma, normal dağılımlı olmayan sürekli değişkenler için medyan (25. persentil - 75. persentil) ve kategorik değişkenler için sayı (yüzde) olarak ifade edilmiştir.
† Student's t test, ‡ Mann Whitney U test, § Ki-kare test, ¶ Fisher's exact test.
AF: Atriyal fibrilasyon, AKS: Akut Koroner Sendrom, AKŞ: Açlık Kan Şekeri, CRP: C-Reaktif Protein, DM: Diyabetes Mellitus, HDL-K: Yüksek Dansiteli Lipoprotein- Kolesterol, HT: Hipertansiyon, LDL: Düşük Dansiteli Lipoprotein-Kolesterol, LVEF: Sol Ventrikül Ejeksiyon Fraksiyonu, NSTEMI: ST-Elevasyonsuz Miyokart Enfarktüsü, STEMI: ST-Elevasyonlu Miyokart Enfarktüsü, TG: Trigliserit, TK: Total Kolesterol, USAP: Kararsız Angina Pektoris, ÜA: Ürik Asit ÜHO: Ürik asit/HDL oranı, WBC: Lökosit

Tablo 2. Çok değişkenli lojistik regresyon analizine göre yüksek (>22) SYNTAX skoru ile bağımsız ilişkili faktörler

	β coefficient	Standard error	p	Exp(β)	95% CI for Exp(β)	
DM	0.648	0.262	0.013	1.911	1.144	3.193
LVEF	-0.050	0.014	<0.001	0.951	0.925	0.978
Constant	1.383	0.679	0.042	3.988		

Nagelkerke R2=0.074, CI: Confidence interval
DM: Diyabetes mellitus, LVEF: Sol Ventrikül Ejeksiyon Fraksiyonu

düzeyindeki her 1 mg/dL artış için, aterosklerotik hastalıktan ölüm riskinin erkeklerde %48, kadınlarda ise %126 oranında arttığı gösterilmiştir[21]. Ek olarak başka bir çalışmada, yaşlı kadın hastalarda AKS sonrası ÜA yüksekliğinin hastane içi olaylar ve 1 yıllık mortalite ile ilişkili olduğu saptanmış [22].

HDL-K' nin antiaterojenik özellikleri ve düşük HDL-K seviyelerinin artmış kardiyovasküler riskle ilişkili olduğu bilinmektedir[23]. HDL-K' nin arter duvarındaki biriken kolesterolün karaciğere akışını sağlayarak ve anti-enflamatuar ve anti-oksidan etkileriyle aterosklerozun önlenmesinde önemli bir rol oynadığı düşünülmektedir[24, 25]. Ek olarak, çeşitli çalışmalar AKS hastalarında düşük HDL-K düzeylerinin, kötü kardiyovasküler sonlanımları öngörebileceğini göstermiştir [26].

Bunların sonucunda ÜHO' nun aterosklerotik KVH öngördürücülüğüne yönelik araştırmalar yapılmıştır. Düşük HDL-K ve hiperüriseminin sinerjistik olarak kardiyovasküler sistem üzerindeki olumsuz etkisinin artmış oksidatif stresin endotel hücrelerine zarar vermesi ve insülin rezistansındaki artışa bağlı olduğu düşünülmüştür [27]. Park ve ark. yaptığı çalışmada, yüksek ÜHO seviyelerinin gelecekteki iskemik KVH gelişimini öngördüğü gösterilmiştir [12]. AKS hastalarında yapılan çalışmada, ÜHO' nun artmış advers klinik olaylarla ilişkili olduğu saptanmış [27]. Biz de çalışmamızda ÜHO' nun AKS hastalarında koroner kompleksiteyi değerlendiren SYNTAX skoru ile olan ilişkisini araştırmayı hedefledik. Önceki çalışmalar ve moleküllerin ateroskleroz üzerindeki etkileri göz önüne alınarak, artmış ÜHO saptanan hastaların, yüksek SYNTAX skoru ile bağlantılı olabileceğini öngördük, fakat çalışmamızda aralarında istatistiksel olarak anlamlı ilişki saptanmadı. ÜHO' nun SYNTAX skoru ile ilişkisiz bulunması, bu biyobelirteçlere dayalı risk değerlendirmelerinin her alanda geçerli olmayabileceğini göstermektedir. Bu sonucun olası sebeplerine yönelik değerlendirmemizde ilk sırada metabolik ve genetik faktörler ön plana çıkmaktadır. Ek olarak, diğer serum analitlerinde olduğu gibi, ÜA ile kardiyovasküler mortaliteyi ilişkilendiren bir U eğrisi rapor edilmiştir, bu çalışmaya göre serum ÜA seviyesi ≥7 veya < 4 mg/dL olması tüm nedenli ve kardiyovasküler mortalitenin bağımsız öngördürücüsü olduğu saptanmıştır [28]. Bununla birlikte, geleneksel olarak KVH üzerinde pozitif etkisi olduğu düşünülen HDL-K' nin yüksek seviyelerinin KVH' ye karşı mutlaka koruyucu olmadığı ve aşırı yüksek miktarlarda zararlı bile olabileceği belirtilmiştir[29]. Destekler nitelikte, bazı klinik çalışmaların HDL-K'yi yükseltmenin faydası olmadığını göstermesinin sonucu olarak, plazma HDL-K seviyesini yükseltmenin KVH riskini azalttığı tezine meydan okumuştur[30]. Aşırı yükselmiş HDL-K değerlerinin disfonksiyone HDL-K içerdiği ve KVH riskini azaltmaktan ziyade arttırdığı da bildirilmiştir[31].

Bu çalışmanın bazı kısıtlamaları mevcuttur. İlk olarak, retrospektif bir kohort çalışması olarak yanlılık olabilir ve örneklem büyüklüğü nispeten küçüktür. İkinci olarak, çalışmada sadece temel klinik veriler değerlendirilmiştir, hastaların prognozu üzerinde herhangi bir veri bulunmamaktadır. Son olarak da, ÜA ve HDL-K düzeylerine etki edebilecek, hastaların genel yaşam tarzları ve beslenme alışkanlıkları hakkında veri bulunmamaktadır.

Sonuç

Sonuç olarak, bu çalışmada ÜHO' nun SYNTAX skoru ile anlamlı bir ilişkisinin bulunmaması, ÜHO' nun AKS hastalarında yüksek SYNTAX skorunu öngörmede tek başına yeterli bir biyobelirteç olmayabileceğini göstermektedir. Bu bulgular, KAH' ın değerlendirilmesinde çok yönlü ve kapsamlı yaklaşımların önemini vurgulamaktadır. ÜHO' nun klinik pratikteki rolünün daha iyi anlaşılabilmesi için, farklı popülasyonlarda ve çeşitli klinik durumlarda daha fazla araştırma yapılması gerekmektedir.

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Research Article

Modified thoracoabdominal nerve block with perichondrial approach in laparoscopic cholecystectomy surgery: a prospective, randomized, controlled, double-blind study

Laparoskopik kolesistektomi cerrahisinde perikondrial yaklaşımla modifiye torakoabdominal sinir bloğu: prospektif, randomize, kontrollü, çift kör bir çalışma

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Abstract

Aim: Although laparoscopic cholecystectomy (LC) is considered minimally invasive, it can cause moderate to severe pain in the postoperative period. This study investigates the effects of modified thoracoabdominal nerve block with perichondrial approach (M-TAPA) on postoperative analgesia after LC.

Material and Methods: The patients were divided into two groups: Group M (patients who received the M-TAPA block) and Group C (control group patients who did not receive the block). The primary outcome measures were the pain scores at 0, 2, 4, 8, 12, and 24 hours postoperatively. The secondary outcome measures included the total amount of rescue analgesic consumed, the time to first rescue analgesia, the occurrence of complications (nausea, and vomiting), and patient satisfaction.

Results: When the change over time of the numerical rating scale (NRS) scores at 24 hours postoperative was evaluated for both rest and movement, the time*group interaction was statistically significant for NRS scores during both rest and movement ($p<0.001$ and $p<0.001$, respectively). The total amount of tramadol consumed within the first 24 hours after surgery was higher in Group C (220 (170-260) vs 70 (0-80); $P<0.001$). Rescue analgesia was administered to all patien ts in Group C; in Group M, 8 patients did not receive rescue analgesic ($p<0.005$).

Conclusion: The use of M-TAPA as a component of a multimodal analgesia approach helps to reduce opioid consumption, thereby preventing opioid-related side effects and enhancing postoperative patient comfort.

Keywords: laparoscopic cholecystectomy; m-tapa; multimodal analgesia; numerical rating scale

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Öz

Amaç: Laparoskopik kolesistektomi (LC) minimal invaziv olarak kabul edilmesine rağmen, postoperatif dönemde orta ila şiddetli ağrıya neden olabilir. Bu çalışma, LC sonrası postoperatif analjezi üzerine modifiye torakoabdominal sinir bloğu ile perikondriyal yaklaşımın (M-TAPA) etkilerini araştırmaktadır.

Gereç ve Yöntemler: Hastalar iki gruba ayrıldı: Grup M (M-TAPA bloğu uygulanan hastalar) ve Grup C (blok uygulanmayan kontrol grubu hastalar). Birincil sonuç ölçütleri, postoperatif 0, 2, 4, 8, 12 ve 24 saatlerdeki ağrı skorlarıydı. İkincil sonuç ölçütleri, toplam kurtarıcı analjezik tüketimi, ilk kurtarıcı analjezik ihtiyacına kadar geçen süre, komplikasyonların (bulantı ve kusma) görülmesi ve hasta memnuniyetini içeriyordu.

Bulgular: 24 saatlik postoperatif dönemde hem istirahat hem de hareket halindeki numerik derecelendirme ölçeği (NRS) skorlarının zamana bağlı değişimi değerlendirildiğinde, zaman*grup etkileşimi hem istirahat hem de hareket halindeki NRS skorları için istatistiksel olarak anlamlıydı ($p<0.001$ ve $p<0.001$, sırasıyla). Ameliyattan sonraki ilk 24 saatte tüketilen toplam tramadol miktarı Grup C'de daha yüksekti (220 (170-260) vs 70 (0-80); $P<0.001$). Grup C'deki tüm hastalara kurtarıcı analjezi uygulanırken, Grup M'deki 8 hastaya kurtarıcı analjezik uygulanmadı ($p<0.005$).

Sonuçlar: Multimodal analjezi yaklaşımının bir bileşeni olarak M-TAPA kullanımı, opioid tüketimini azaltarak opioid kaynaklı yan etkilerin önlenmesine ve postoperatif hasta konforunun artmasına yardımcı olmaktadır.

Anahtar Kelimeler: laparoskopik kolesistektomi; m-tapa; multimodal analjezi; numerik derecelendirme ölçeği

Introduction

Laparoscopic cholecystectomy (LC) is a commonly performed surgery considered the gold standard for treating symptomatic gallstone disease [1]. Although LC is considered minimally invasive, it can cause moderate to severe pain in the postoperative period [2]. It has been observed that the majority of total abdominal pain following LC originates from the incision site, with the remainder resulting from visceral and referred pain [2, 3]. Multimodal analgesia, including opioids, is used to limit pain following LC [3]. However, opioid treatment can cause side effects such as postoperative nausea and vomiting, respiratory depression, and constipation [4]. The impacts of interfascial plane blocks on postoperative analgesia in LC surgery have been evaluated in various studies, and positive results have been obtained [5, 6]. The transversus abdominis plane block associated with perichondrium (TAPA) block, as described in the literature, is a novel regional anesthesia technique that provides analgesic effects to the anterior and lateral abdominal wall by injecting local anesthetics into the lower and upper parts of the perichondrium at the costochondral junction [7]. The modified thoracoabdominal nerve block through perichondrial approach (M-TAPA) block is defined as a modification of the TAPA block, in which local anesthetics (LAs) are applied only to the lower surface of the perichondrial area, creating a sensory block between T5 and T12 [8]. The M-TAPA block is thought to provide adequate analgesia in the anterior and lateral thoracoabdominal walls, covering a wide dermatomal area. It has been used in various abdominal surgeries [5, 9].

Patients with an M-TAPA block during LC will have lower postoperative numerical rating scale (NRS) scores and use less pain medication overall. Our primary objective is to evaluate the postoperative NRS scores in patients undergoing LC with an M-TAPA block. Our secondary objectives are to assess the total amount of rescue analgesia consumed, the time first to rescue analgesia, patient satisfaction, and the occurrence of complications (nausea, and vomiting).

Material and Methods

This study was conducted with approval from the Ethics Committee of Harran University Faculty of Medicine (Date: 26 August 2024, Decision: 24.12.01). The experiment was carried out in accordance with the Declaration of Helsinki's ethical guidelines. Written and verbal informed consent was obtained from the patients. Patients were divided into two groups: Group M (patients who received the M-TAPA block) and Group C (control group patients who did not receive the block).

Patient Population and Inclusion/Exclusion Criteria

Patients aged 18–65 with American Society of Anesthesiologists physical status (ASA) I–III, undergoing laparoscopic cholecystectomy under general anesthesia, were included in the study. Patients with contraindications to regional anesthesia, those using anticoagulants, those with infection

at the procedure site, those with allergies to LAs, pregnant women, and emergency cases were excluded from the study.

Randomization

The study was planned as a prospective, randomized, controlled, double-blind. At each clinic, an anesthesiologist randomly allocated patients to two significant groups using numbered opaque sealed envelopes: Group M (patients receiving M-TAPA) and Group C (patients getting just multimodal analgesia). The anesthesiologists responsible for the randomization process were not involved in any other sections of the trial, and the individuals executing the M-TAPA procedure were not engaged in other areas of the research. Additionally, the researcher who intervened, the participants, and the analyzer were blinded to the details of the study. After the surgery, two different anesthesia specialists recorded the primary and secondary results of the study.

Standard Anesthesia and Postoperative Analgesia Protocol

Routine monitoring (ECG, SpO2, non-invasive blood pressure, and EtCO2) and standard anesthesia management were applied to all patients. A 20-gauge intravenous (IV) cannula was placed, and isotonic fluid at 10 ml/kg/h was initiated. General anesthesia was induced with 1 mg IV midazolam, 2 mg/kg IV propofol, 15 mcg/kg IV fentanyl, and 0.6 mg/kg IV rocuronium. Patients were intubated, and anesthesia maintenance was achieved with a mixture of 50% O2 and 50% air containing 2% sevoflurane. The exact surgical procedure was applied to all patients. Under general anesthesia, after the surgery, an M-TAPA nerve block was applied to patients in Group M under ultrasound guidance. All patients received 3x1 g IV paracetamol and 2x1 20 mg IV tenoxicam. When the NRS scores were 4 or above, 1 mg/kg IV tramadol was administered as rescue analgesia.

M-TAPA Block Technique

Patients in Group M were placed in the supine position. After skin antisepsis with 5% povidone-iodine, a sterile drape was placed. The high-frequency (8–13 MHz) linear ultrasound (USG) probe (MyLabFive; Esaote Europe BV Philipsweg 1 6227 AJ Maastricht Netherlands) was covered with a sterile sheath, and the transversus abdominis, internal oblique, and external oblique muscles were identified at the 10th costal margin in the sagittal plane at the costochondral angle. The probe was angled sagittally to visualize the costochondral angle at the edge of the 10th rib and to display the posterior surface of the rib cartilage in the midline. Using an in-plane technique, a 22-gauge, 100-millimeter (mm) Stimuplex A (B.Braun Melsungen AG Germany) peripheral nerve block needle was advanced cranially, and the needle tip was directed towards the posterior surface of the 10th costal cartilage. After negative aspiration, 20 ml of 0.25% bupivacaine was injected under the lower surface of the costal cartilage. The same procedure was repeated on the opposite side.

Outcome Measures

The primary outcome measures were the NRS pain scores (0–10, 0 = no pain, 1-3 = mild pain, 4-6 = moderate pain, 7–10 = severe pain) at 0, 2, 4, 8, 12, and 24 hours postoperatively. The secondary outcome measures included the total amount of rescue analgesic consumed, the time to first rescue analgesia, the occurrence of complications (nausea, and vomiting), and patient satisfaction. The age, gender, weight, height, surgery duration, and ASA classification of patients in both groups were recorded. A Likert scale (1 = not satisfied at all, 2 = not satisfied, 3 = neutral, 4 = satisfied, and 5 = very satisfied) was used to assess patient satisfaction.

Statistical Analysis

The study's sample size was calculated using the G*Power program (V.3.1.9.7). We conducted a preliminary study with 10 patients in our clinic. The power analysis was based on the NRS scores (the static NRS scores in the PACU at two hours), which were the primary outcomes of this study. We considered a reduction of two points in the mean pain scores clinically meaningful and important based on a previous study [10]. The mean of the NRS scores in the preliminary study was 5.9 points, with the SD=2.5. We were assuming an α error of 0.05 (two-tailed) with a power of 0.85; at least 27 patients per group were required to obtain a statistically significant value. Therefore, we included 30 patients in each group to anticipate possible dropouts.

The IBM-Statistical Package for Social Sciences (IBM-SPSS Inc., Chicago, IL, USA) 26.0 program was used to analyze the data obtained in the study. The conformity of the data to the normal distribution was examined by the Shapiro-Wilk test. Continuous variables were expressed as mean, standard deviation, or (median (25-75 percentile) according to their distribution status, and categorical variables were expressed as numbers and percentages. In the analysis of continuous variables, the independent sample Student's t-test was applied when parametric test assumptions were met. Otherwise, the Mann-Whitney U-test was applied. The Fisher exact test and Chi-square test were used in the analysis of categorical variables. Analysis of Variance (ANOVA) was utilized for repeated measurements between groups at different times. The statistical significance level was accepted as $p<0.05$.

Results

Of the planned 65 enrolled patients were first assessed for eligibility in this study; however, five were excluded because they refused participation. The remaining 60 cases were allocated, randomized, and treated according to the protocol (Group C, n=30; Group M, n=30) (Figure 1).

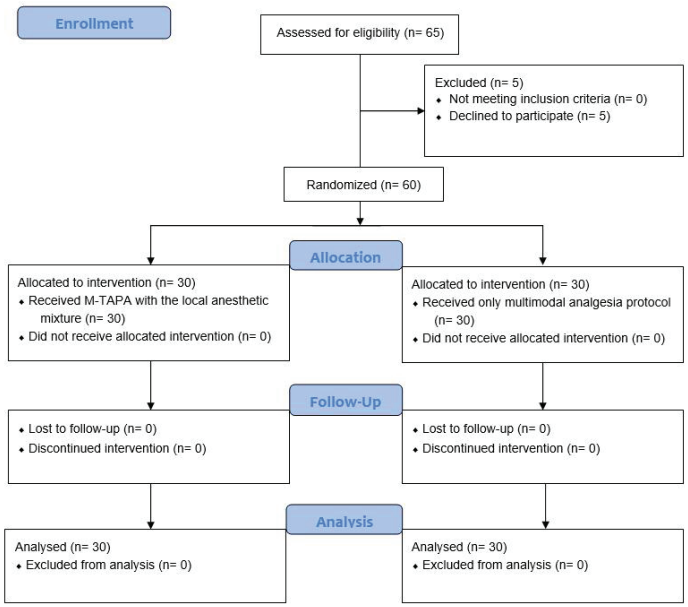

Figure 1. Consolidated Standards of Reporting Trials flow study diagram describing patients progress through the study. M-TAPA, Modified thoracoabdominal nerve block with perichondrial approach.

The patient characteristics and time of surgery were similar between groups (Table 1).

Table 1. Baseline characteristics by groups

Factors	Group C (n=30)	Group M (n=30)	P value
Age (yr)	44±13	44±14	0.907
Female	24 (80%)	20 (66.7%)	0.243
ASA			0.342
1	11(36.7%)	6 (20%)	
2	16 (53.3%)	21 (70%)	
3	3 (10%)	3 (10%)	
Smoking	6 (20%)	12 (40%)	0.091
Coronary artery disease	3 (10%)	5 (16.7%)	0.706
Hypertension	7 (23.3%)	4 (13.3%)	0.317
Lung disase	5 (16.7%)	3 (10%)	0.706
Height (cm)	165.5±6.1	168.6±7	0.089
Weight (kg)	70.3±8.6	73.7±8.2	0.115
BMI (kg m-2)	25.6±3,1	25.9±2.7	0.700
Surgery time (min)	74.1±14	68.5±14.7	0.129

Data presented as mean±standart deviation, median (Q1-Q3), or n(%). Kg, kilogram; cm, centimeter; min, minutes; ASA, American Society of Anesthesiologists physical status.

Primary Outcome

Pain Scores

During the 24 hours postoperatively, both the NRS scores at rest and during movement were consistently higher in Group C at all time points, this difference was statistically significant for the 0th, 2nd, 4th, 8th, 12th, and 24th hours (Figures 2 and 3). In addition, when the change over time of the NRS scores at 24 hours postoperative was evaluated for both rest and movement, the time*group interaction was statistically significant for NRS scores during both rest and movement ($p<0.001$ and $p<0.001$, respectively) (Figures 2 and 3).

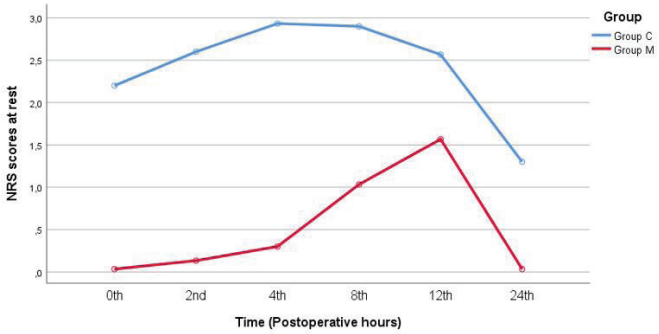

Figure 2. Postoperative numerical rating scores at rest. NRS, numerical rating scale.

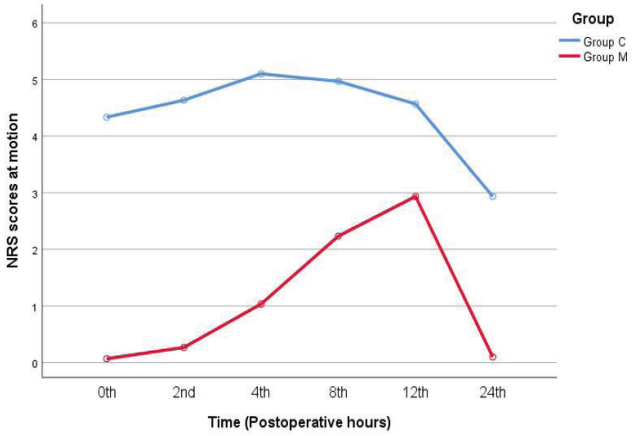

Figure 3. Postoperative numerical rating scores at motion. NRS, numerical rating scale.

Secondary Outcomes

Rescue analgesia requirement, and First rescue analgesic time

Rescue analgesia was administered to all patients in Group C; in Group M, 8 patients did not receive rescue analgesic ($p<0.005$). The postoperative rescue analgesic requirement

among groups is displayed in Table 2. The number of patients requiring rescue analgesia was significantly higher in the control group at all time intervals. The difference between the groups was statistically significant for the "0-8", "8-12", "12-24", and "0-24" time intervals (p<0.001, p=0.026, p=0.002, and p=0.005 respectively (Table 2). The total amount of tramadol consumed within the first 24 hours after surgery was higher in Group C (220 (170-260) vs 70 (0-80); P<0.001) (Table 2). The median time for administering rescue analgesics across groups was as follows: 2 (0-2) hours in Group C and 12 (8-12) hours in Group M (p<0.001) (Table 2). Patients in the control group requested analgesia earlier compared to Group M, and this difference was statistically significant (p<0.001) (Table 2).

Table 2. Postoperative rescue analgesic characteristics amongst groups.

Factors	Group C (n=30)	Group M (n=30)	P value
First rescue analgesic time (h)	2 (0-2)	12 (8-12)	<0.001
Tramadol consumption (mg)	220 (170-260)	70 (0-80)	<0.001
Rescue analgesic usage, time frame (h)			
0-8	30 (100%)	1 (3.3%)	<0.001
8-12	29 (96.7%)	22 (73.3%)	0.026
12-24	9 (30%)	0 (0%)	0.002
0-24	30 (100%)	22 (73.3%)	0.005

Data are presented as n (%). h=hour, mg=milligram.

Adverse events, Need for antiemetic drug, and the Likert scale

In the postoperative 24-hour period, PONV was observed in 19 (63.3%) patients in Group C and 5 (16.7%) patients in Group M (p<0.001). The need for antiemetic drugs was significantly lower in Group M (5 vs. 19 patients, p<0.001). The patient satisfaction Likert scale scores were significantly higher in Group M (5 (5-5) vs 3 (2-3); p<0.001) (Table 3).

Table 3. Comparison of incidence of adverse effects, antiemetic drug usage, and the Likert scale

Factors	Group C (n=30)	Group M (n=30)	P value
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Discussion

This study was conducted with a prospective randomized controlled design. The analgesic efficacy of M-TAPA was compared with multimodal IV analgesia in patients undergoing LC. The results showed that the M-TAPA group had lower postoperative pain scores during rest and movement. Additionally, the need for rescue analgesia was significantly less, and the time to first rescue analgesia was more extended in this group. Side effects such as nausea and vomiting were also rarely observed in patients who received M-TAPA. Furthermore, patient satisfaction was higher in the M-TAPA group. These findings suggest that M-TAPA could be an effective option for postoperative pain management.

Effective control of postoperative pain in LC, a surgical procedure that causes moderate pain, is of great importance. Most of the pain following LC originates from the incision sites, while a smaller portion arises from intraperitoneal gas insufflation and gallbladder dissection [3, 11]. Multimodal analgesia methods, including peripheral nerve blocks, can reduce analgesic consumption and the side effects associated with analgesics [12]. The effects of interfascial plane blocks on postoperative analgesia in LC surgery have been evaluated in various studies, and positive results have been obtained [5-7]. The M-TAPA block is a novel thoracoabdominal nerve block that provides a wide range of analgesic effects. This technique can affect both the anterior and lateral branches of the thoracoabdominal nerves from T5-6 to T11-12 and is achieved by injecting local anesthetics into the lower and upper parts of the perichondrium at the costochondral junction [7, 8,13-15]. The application of interfascial plane blocks, such as erector spinae plane block and paravertebral block, may have certain disadvantages due to the higher risk of potential complications. These risks have led to the preference for safer alternatives like the M-TAPA block. With its low complication risk and broad analgesic coverage, the M-TAPA block stands out as an advantageous option for postoperative pain management [16, 17].

Research has shown that the M-TAPA block provides effective analgesia for postoperative pain management. Studies have reported that patients receiving M-TAPA have significantly lower postoperative pain scores, which enhances patient comfort [18-22]. The effectiveness of M-TAPA is particularly notable for its ability to control pain at rest and during movement in the postoperative period. Similarly, in our study, NRS pain scores measured in patients who received the M-TAPA block were significantly lower during rest and movement than in the control group. This finding demonstrates the superior performance of M-TAPA in pain control. The results of our study are consistent

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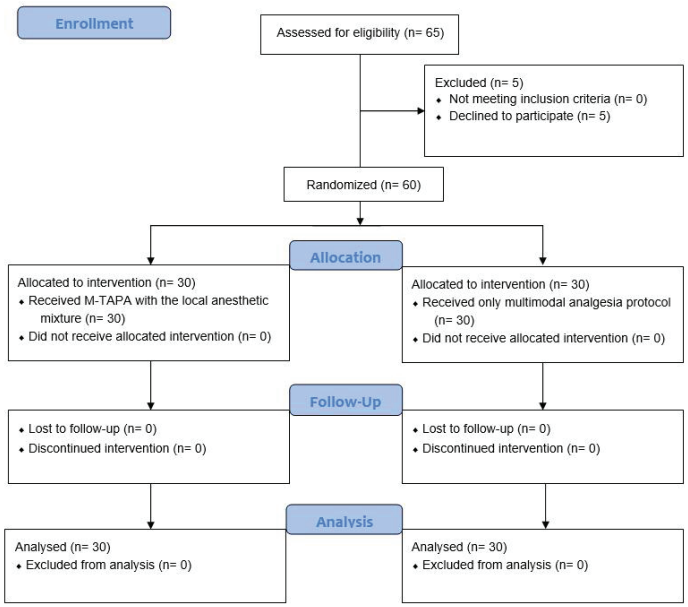

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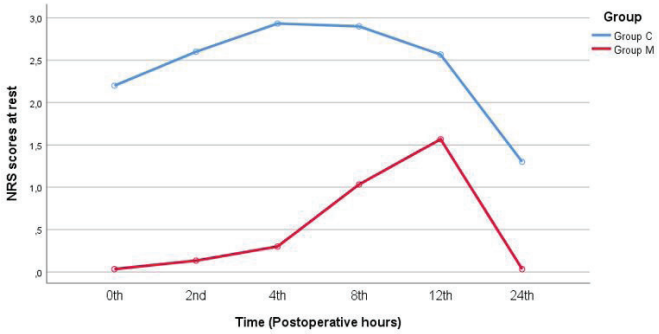

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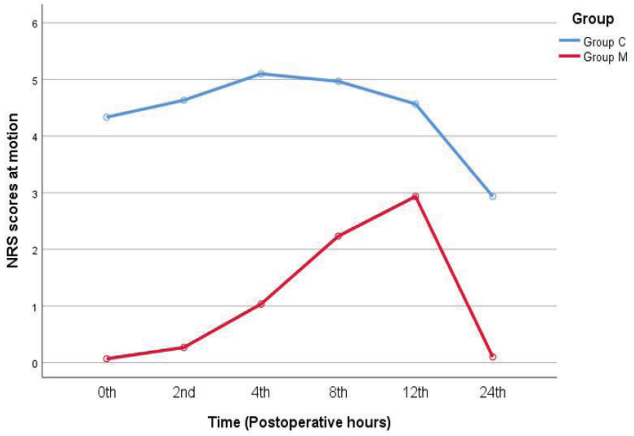

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with existing evidence in the literature, confirming the potential of M-TAPA to provide effective postoperative analgesia and supporting its consideration as a reliable and effective option for postoperative pain management.

The effects of the M-TAPA block on postoperative analgesia have been supported by various studies, which have highlighted that this block method significantly reduces the need for rescue analgesia. Additionally, it has been reported that the time to the first requirement for rescue analgesia is prolonged following M-TAPA application [5, 7, 18-22]. The analgesic effect achieved with regional anesthesia techniques is generally known to last for 36 to 48 hours. This prolonged analgesia offers a significant advantage in postoperative pain management and reduces the need for analgesic medications [23]. These findings demonstrate that M-TAPA provides long-lasting and effective analgesia. Similar results were obtained in our study; patients who received M-TAPA had a significantly reduced need for tramadol, and the time to the first requirement for rescue analgesia was markedly extended. Our study's findings support the potential of M-TAPA to minimize the use of rescue analgesics, particularly in postoperative analgesia management. This makes M-TAPA a valuable option in analgesic management, especially in the current context where strategies to reduce opioid use are gaining importance.

Patient satisfaction in the postoperative period is essential to effective pain management. Various studies in the literature have highlighted the positive effects of the M-TAPA block on patient satisfaction. For example, one study reported that the M-TAPA group's satisfaction scores were higher than other treatment methods [22]. Similar findings were observed in our study; the Likert satisfaction scale results were significantly higher in patients who received M-TAPA, reflecting their satisfaction with this analgesic method. Additionally, postoperative nausea and vomiting incidence was notably low in the M-TAPA group, which can be considered another significant factor contributing to patient comfort. The reduction in postoperative nausea and vomiting can be associated with decreased opioid requirements and the effective analgesic block provided by M-TAPA. These results suggest that M-TAPA not only ensures effective pain control but also enhances patient comfort and satisfaction in the postoperative period, making it an effective method for overall postoperative care.

The limitations of our study include the fact that only the first 24 hours postoperatively were evaluated. Therefore, no data were obtained regarding the long-term effects of the M-TAPA block. Additionally, this study was limited to laparoscopic surgeries and M-TAPA's effectiveness in open surgical procedures was not assessed. If the study had the opportunity to use patient-controlled analgesia, more detailed data on opioid consumption and pain management could have been obtained. Lastly, our study did not evaluate the quality of recovery in patients, indicating the need for further detailed studies on postoperative recovery quality.

Conclusion

The M-TAPA block can safely provide postoperative analgesia in abdominal surgeries such as LC. Its low risk of complications and long-lasting analgesic effect make it an ideal option for multimodal analgesia protocols. The use of M-TAPA as a component of a multimodal analgesia approach helps to reduce opioid consumption, thereby preventing opioid-related side effects and enhancing postoperative patient comfort.

Acknowledgments

None

Conflicts of interest

None declared by the authors. The authors certify that there is no conflict of interest with any financial organization regarding the material discussed in the manuscript.

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Declaration that the article has not been submitted for publication elsewhere

We hereby declare that the material presented in this work, either in whole or in part, has not been previously published, and is not currently under consideration for publication in any other journal.

Authors' contributions

Author Muhammed Halit SATICI, study's concept and design, data collection, analysis, interpretation, drafting, review, funding, research, methodology, project management, resources, software, supervision, verification, visualization, roles/writing - original draft and writing – review contributed to the stages.

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Research Article

Psychiatric symptoms in covid-19 inpatients and 2-month follow-up: an exploration of the relationship with neutrophil-to-lymphocyte ratio (NLR), platelet-to-lymphocyte ratio (PLR), and D-dimer

Covid-19 sebebiyle yatışı olan hastaların psikiyatrik belirtiler açısından 2 aylık takibi ve psikiyatrik belirtilerin nötrofil-lenfosit oranı (NLR), trombosit-lenfosit oranı (PLR) ve D-dimer ile ilişkisinin incelenmesi

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Abstract

Aim: COVID-19 is linked to mental health challenges. In this study, we assessed anxiety, depression, sleep quality, and their correlation with inflammatory markers in COVID-19 inpatients.

Material and Methods: In this prospective clinical study, COVID-19 inpatients evaluated twice, 2 months apart. During the initial evaluation, participants completed the Sociodemographic Data Form, Hospital Anxiety and Depression Scale (HADS), and Pittsburgh Sleep Quality Index (PSQI). Additionally, relevant clinical information and laboratory results were extracted from the hospital automation system. In the second assessment, HADS and PSQI were again administered.

Results: In the psychiatric diagnosis group (In the group with a past psychiatric diagnosis such as depression, anxiety disorders and sleep disorders) (n=26), platelet (PLT) and platelet-to-lymphocyte ratio (PLR) values were significantly higher than in others (z= -2.090, p=0.037; z=-2.561, p=0.010). Patients' HADS-Anxiety scores positively correlated with PSQI scores ($r = 0.230$, $p = 0.015$). HADS-Anxiety ($p = 0.853$), HADS-Depression ($p = 0.562$), and PSQI ($p = 0.737$) scores showed no significant change from the initial evaluation at the 2nd-month endpoint. Hospitalization duration correlated positively with neutrophil-to-lymphocyte ratio NLR ($p = 0.016$, $r = 0.229$), PLR ($p = 0.008$, $r = 0.251$), Ferritin ($p < 0.001$, $r = 0.368$), D-Dimer ($p = 0.003$, $r = 0.285$), and CRP values ($p < 0.001$, $r = 0.330$), while negatively with lymphocyte count ($p = 0.004$, $r = -0.273$).

Conclusion: This study underscores the importance of monitoring psychiatric symptoms, such as anxiety, depression and sleep problems, during COVID-19 process and its relation with inflammatory parameters. The results addresses the controversy surrounding psychological symptoms linked to inflammation, and may contribute to the literature.

Keywords: pandemic; anxiety, depression, sleep quality, COVID-19

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Öz

Amaç: COVID-19 zihinsel sağlık sorunlarıyla ilişkilidir. Bu çalışmada, COVID-19 sebebiyle yatan hastalarda anksiyete, depresyon, uyku kalitesi ve bunların inflamatuar belirteçlerle ilişkisinin değerlendirilmesi amaçlanmıştır.

Gereç ve Yöntemler: Bu prospektif klinik çalışmada, COVID-19 nedeniyle yatan hastalar 2 ay arayla iki kez değerlendirildi. İlk değerlendirme sırasında katılımcılar Sosyodemografik Veri Formu, Hastane Anksiyete ve Depresyon Ölçeği (HADÖ) ve Pittsburgh Uyku Kalitesi İndeksini (PUKİ) doldurdular. Ayrıca hastane otomasyon sisteminden ilgili klinik bilgiler ve laboratuvar sonuçları saptandı. İkinci değerlendirmede hastalara yeniden HADÖ ve PUKİ uygulandı.

Bulgular: Psikiyatrik tanı grubunda (Depresyon, kaygı bozuklukları ve uyku bozuklukları gibi geçmişte psikiyatrik tanı almış grupta) (n=26) trombosit (PLT) ve trombosit-lenfosit oranı (PLR) değerleri diğerlerine göre anlamlı derecede yüksekti (z= -2,090, p=0,037; z=-2,561, p =0,010). Hastaların HADÖ-Anksiyete puanları PUKİ puanları ile pozitif yönde ilişkiliydi (r = 0,230, p = 0,015). Hastaların HADÖ-Anksiyete (p = 0,853), HADÖ-Depresyon (p = 0,562) ve PUKİ (p = 0,737) puanları, 2. ay sonrasında ilk değerlendirmeye göre anlamlı bir değişiklik göstermedi. Hastanede kalış süresi, nötrofil-lenfosit oranı NLR (p = 0,016, r = 0,229), PLR (p = 0,008, r = 0,251), Ferritin (p < 0,001, r = 0,368), D-Dimer (p = 0,003, r=0,285) ve CRP değerleriyle (p<0,001, r=0,330) pozitif, lenfosit sayısı ile negatif (p=0,004, r=-0,273) korelasyon gösterdi.

Sonuç: Bu çalışma, COVID-19 sürecinde anksiyete, depresyon ve uyku sorunları gibi psikiyatrik belirtilerin takibinin önemini ve bu hastalıkların inflamatuar parametrelerle ilişkisini vurgulamaktadır. Sonuçların, inflamasyonla ilişkili psikolojik semptomları ele alması sebebiyle literatüre katkı sağladığı düşünülmektedir.

Anahtar Kelimeler: pandemi; anksiyete, depresyon, uyku kalitesi, COVID-19

Introduction

The Coronavirus transmission, which affects the whole world and threatens the life, was declared by WHO (World Health Organization), as a pandemic on March 11, 2020. The focus of the outbreak was the city of Wuhan in China, and the accumulation of cases admitted to the hospital with the diagnosis of pneumonia has started to draw attention. According to data from WHO, millions of people have been infected with Coronavirus, and hundreds of thousands have died. Scientists continue to fight the COVID-19 outbreak and examine it with different dimensions of the outbreak. COVID-19 is thought to lead to psychiatric problems such as depression, anxiety, fear and insomnia as well as physical symptoms[1]. In a study conducted on 144 patients who were hospitalized with the diagnosis of COVID-19, 28.47% had depression and 34.72% had anxiety symptoms[2].

Even if the disease is a physical condition; it has been shown in studies that the most common additional psychiatric problems are anxiety and depression, as well as all other related variables such as demographic and personality characteristics such as the symptoms of the disease and duration of hospitalization, age and gender of the individual[3, 4]. It is known that multiple factors play a role in the etiology of depression and anxiety disorders[5]. Along with many psychosocial stressors, the relationship of these diseases with conditions such as systemic inflammatory response, immunreactivation and some changes in the central nervous system has been tried to be understood[6]. Recently, new hematological markers that are easy to access and reproducible have been emphasized in patients with major depression. In conditions such as major depression and stress, there may be some quantitative hematological changes such as an increase in the number of neutrophils and leukocytes in the blood and a decrease in the number of lymphocytes[7]. Since the inflammatory process also includes parameters such as neutrophils and leukocytes, it has been started to be evaluated with new parameters such as Neutrophil / Lymphocyte ratio (NLR), Platelet / Lymphocyte ratio (PLR)[8, 9]. This issue has also been investigated in psychiatric patients, and studies on Alzheimer's and Schizophrenia patients have shown that NLR values are statistically higher than healthy control groups[10]. In another study, a significant relationship was detected between NLR and suicidal behavior[11]. According to a study conducted in Türkiye, it was stated that PLR is more predictive than NLR in terms of showing the prognosis in patients with Major depression[12]. Although it has been shown that Major Depression may be associated with inflammatory markers such as C Reactive Protein (CRP), Tumor Necrosis Factor-alpha (TNF-alpha), Interleukin-6 (IL-6) and Interleukin-1 (IL-1), the role of these markers in etiology not yet clearly illuminated[13, 14].

The relationship between depression and anxiety and inflammatory markers has been previously investigated, but the biological and psychological dimensions of COVID-19 disease and its relationship with inflammatory markers have not been fully clarified. In this study, we aimed to investigate the previous history of psychiatric illness, level of Anxiety and Depression symptoms, and the relationship between sleep quality and inflammatory markers in hospitalized patients due to COVID-19.

Material and Methods

Sample Selection and Study Design

This comprehensive study was conducted with the voluntary participation of inpatients at the COVID-19 clinic in Sakarya University Medical Faculty Training and Research Hospital, spanning from April 6, 2020, to June 30, 2020. The inclusion criteria comprised individuals aged 18-65 who were literate, willingly volunteered for research, and were undergoing inpatient treatment for Covid-19. Individuals with pre-existing psychiatric disorders were included in the study and not excluded. Conversely, exclusion criteria were applied to individuals who did not volunteer, were illiterate, had neurocognitive impairment, mental retardation, head trauma, intracranial infection, infections other than Covid-19, rheumatologic/oncologic/hematologic diseases, or delirium.

In the study, to minimize the risk of COVID-19 transmission, assessments beyond the general clinical examination were conducted using self-report scales. Patients were evaluated at the commencement and at the end of the 2nd month. All participants completed a Sociodemographic Data Form, Hospital Anxiety and Depression Scale (HADS), and Pittsburgh Sleep Quality Index (PSQI). Additionally, the clinical condition records and laboratory test results of the patients were retrieved from the hospital automation system at the initial evaluation. After 2 months, participants in the study underwent reevaluation, and HADS and PSQI were once again administered by the physicians leading the study. In strict adherence to the ethical principles outlined in the 1964 Helsinki Declaration, the study obtained necessary approvals from the Sakarya University Clinical Researches Ethics Committee (ethical approval date/number: 2020/136). Meticulous efforts were made to secure comprehensive written consent from all participating patients, emphasizing the commitment to upholding ethical standards throughout the entire research process.

Materials

Sociodemographic Data Form: In this form; there were questions about age, gender, marital status, education level, household size, working status, monthly income status, presence of child, physical comorbidities, psychiatric history, quarantine-related anxiety and patients' confidence in treatment. Sociodemographic data form was filled out by the patients during their initial assessment.

Hospital Anxiety and Depression Scale (HADS): It was developed by Zigmond and Snaith (1983) and its validity and reliability study was conducted[15]. The scale is Likert type and consists of 14 questions, 7 of which are anxiety and 7 of which are depression. The cut-off value of the scale was found to be 7 for depression and 10 for anxiety disorder. The Turkish validity and reliability study of the scale has been conducted and it has been found to be valid and reliable[16].

Pittsburgh Sleep Quality Index (PSQI): Developed in 1989 by Buysse et al.[17]. The items in the scale were prepared based on the 18-month clinical observation of patients with sleep disorders. A total PSQI score greater than 5 indicates poor sleep quality. Used to measure symptoms over the last month. Turkish validity and reliability study of the scale was conducted by Ağargün et al.[18].

Laboratory Analysis: In this study, the patients' Complete Blood Count (CBC) data were accessed through hospital automation system. White Blood Cells (WBC) and its sub- parameters, hemoglobin and platelet count were evaluated in the CBC examination. Additionally neutrophil to lymphose ratio (NLR), platelet to lymphosit ratio (PLR), C-Reactive Protein (CRP) and Body Mass Index (BMI) values were also recorded.

Statistical analysis

Firstly, the data were imported into the SPSS (Statistical Package for Social Sciences) version 22.0 software, and statistical analysis was conducted using this program. The normality distribution of the data was assessed through the Kolmogorov-Smirnov test. For normally distributed groups in two independent samples, the Student t-test was employed, while the Mann-Whitney U test was utilized for numerical variables that did not display a normal distribution. Pearson analysis was employed to examine the correlation between variables in cases of normally distributed data, whereas Spearman correlation analysis was used for data that did not exhibit a normal distribution. Linear regression analysis was performed for predictor variables. The significance level for the results was set at a 95% confidence interval, and $p < 0.05$ was considered statistically significant.

Results

A total of 110 participants aged 18-65 were enrolled in the study. Among them, 44.5% (n = 49) were female, and 55.5% (n = 61) were male, with a mean age of 47.93 ± 11.36 years. The demographic characteristics of the patients are detailed in Table 1.

Self-Report Evaluations of Patients Related to the COVID-19 Process

In the sociodemographic data form, four questions prepared by our team were asked to the patients, which will enable us to evaluate the possible anxiety that may arise during the pandemic process, their confidence in the treatment they received during this process and their views on the future. Numerical data regarding the questions and answers are shown in Table 2.

Psychiatric diagnosis history and clinical properties

The group with a psychiatric diagnosis (In the group with a past psychiatric diagnosis such as depression, anxiety disorders and sleep disorders) (n = 26) had a significantly higher PLT and PLR value than the patient group without a psychiatric diagnosis (z = -2.090 p = 0.037; z = -2.561 p = 0.010, respectively). There was no significant difference between the two groups in terms of NLR, PSQI, CRP, WBC, neutrophil and lymphocyte values. No significant difference was found between HADS and PSQI scores between those who had a previous psychiatric diagnosis and those who did not (p> 0.05) (Table 3).

The group of patients with a psychiatric illness not receiving treatment (n = 16) had statistically significantly higher WBC and PLT values than the patient group with a psychiatric disease still receiving treatment (n = 10) (respectively z = -2.082 p = 0.037; z = -2.372 p = 0.018)

NLR, PLR, CRP, Ferritin, HADS and PSQI

A positive correlation was observed between the patients' HADS-Anxiety scores and PSQI scores, and as the anxiety level increased, sleep quality deteriorated. (r = 0.230, p = 0.015, Table 5). While there was no significant relationship between PLR, NLR, Ferritin and CRP and psychiatric symptoms; CRP had a significant positive correlation with NLR, PLR and BMI.

Data on the correlation relationship between NLR, PLR, CRP, Ferritin, HADS and PSQI scores of the patients are given in Table 4.

Table 1. Sociodemographic Characteristics of Patient

	n	%		Min	Max	Mean±SD
Sex			Age (year)	18	65	47,93±11,36
Male	61	55,5				
Female	49	45,4				
Marital Status			Number of children	1	10	2,82±1,32
Married	91	82,7				
Single	19	17,3				
Education Level			Age at First Marriage (years)	14	37	22,69±4,98
Primary School	59	53,6				
Secondary School	16	14,5				
High School	17	15,5	Body Mass Index (BMI)	22,50	35,34	28,57±2,80
College/University	13	11,8				
Master's Degree and Above	5	4,5				
Presence of Comorbid Disease (non-psychiatric)			Monthly Income Level (TL) - Before Covid	800	8000	2853±1265
Yes	95	86,4				
No	15	13,6				
Presence of Child			Monthly Income Level (TL) - After Covid	0	8000	2386±1453
Yes	95	86,4				
No	15	13,6				
Job			Duration of Hospitalization (day)	1	37	8,83±5,83
Working	43	39,1				
Not working	37	33,6				
Self-employment	4	3,6	Household Size	1	9	3,71±1,40
Retired	26	23,6				

Table 2. Self-Report Evaluations of Patients Regarding the Covid-19 Process

Questions	(n:110)	%	Min	Max	Mean±SD
Do you trust the treatment you received for Covid?					
I trust completely	93	%84,5			
I partially trust	14	%12,7			
I do not trust	3	%2,7			
Are you worried about the 14-day quarantine period after discharge?					
Yes (Please rate between 1-10)	30	%27,3	4	10	8,16±1,83
No	80	%72,7			
Are you worried that the coronavirus will harm you?			4	10	7,68±2,15
Yes (Please rate between 1-10)	48	%43,6			
No	62	%56,4			
Are you hopeful for the future?					
Yes	94	%85,5			
No	4	%3,6			
Partly	12	%10,9			

Table 3. Comparison of the groups with and without a psychiatric diagnosis

	Patients with Psychiatric Diagnosis			**Patients without Psychiatric Diagnosis**			
	Min	Max	Mean ± SD	Min	Max	Mean ± SD	p*
HADS-Anxiety Score	0	10	4,00±3,55	0	10	2,96±2,89	0,198
HADS-Depression Score	0	10	3,03±3,30	0	10	3,82±3,51	0,551
PSQI	1	15	6,03±4,17	0	14	4,48±3,11	0,129
WBC(µl)	2,03	20,50	6,30±3,56	2,0	66,7	7,43±7,12	0,303
Neutrophil (µl)	1,25	16,60	4,04±2,96	0,90	58,5	4,84±6,36	0,330
Lymphocyte (µl)	0,60	2,90	1,58±0,57	0,56	4,64	1,89±0,89	0,149
Platelet (µl)	71,000	495,000	286,461±103,887	67,3	526,000	242,231±103,133	0,037
NLR(Neutrophil/Lymphocyte)	1,15	9,33	2,70±1,77	0,38	12,61	2,82±2,06	0,947
PLR(Platelet/Lymphocyte)	37,57	392,50	201,084±89,553	31,39	760,12	161,731±114,66	0,010
CRP (mg/L)	1,19	258	37,35±58,96	0,66	445	49,58±78,14	0,828
Ferritin (ng/ml)	5,25	3742	469,91±961,834	2	9690	443,6±1142,6	0,870
D-Dimer (ng/ml)	6,98	10,600	1278,9±2129,8	5,80	8200	710,8±1135,4	0,109
Duration of Hospitalization (day)	3	22	9,00±5,14	1	37	8,78±6,06	0,559

Total (n=110). Mann Whitney U Test*

Table 4. Correlation of NLR, PLR, Ferritin, CRP and BMI with PSQI and HADS Scores

	NLR	PSQI	PLR	CRP	BMI
PSQI	r= -0,051 p=0,598	1,000 -	r= -0,049 p=0,609	r=0,042 p=0,666	r=-0,082 p=0,396
HADS- Anxiety	r= -0,145 p=0,130	r=0,230 p=0,015	r= -0,124 p=0,199	r=-0,092 p=0,341	r= -0,181 p=0,058
HADS-Depression	r=-0,025 p=0,798	r=0,760 p=0,430	r= -0,101 p=0,294	r= 0,001 p= 0,993	r= -0,013 p=0,897
CRP	r=0,445 p < 0,001		r=0,316 p=0,001	1,000 -	r=0,189 p=0,049
NLR	1,000 -		r=0,463 p < 0,001		
Ferritin	r=0,279 p=0,003	r=-0,30 p=0,755	r=0,192 p=0,046	r=0,575 p=0,000	r=0,161 p=0,093

Spearman Correlation Test was applied.

Follow-up results after two months

The patients were reevaluated 2 months after the date they participated in the study. Although 75 patients (68.2%) out of 110 patients were reevaluated, communication could not be established with 35 patients (31.8%). The HADS and PSQI scores of 75 patients are summarized in Table 5. No significant difference was observed in the average scale scores between the initial interview and the two-month follow-up. (Table 5) Comparison graph of Patients' PSQI and HADS Scores at initial and second evaluation is shown in Figure 1.

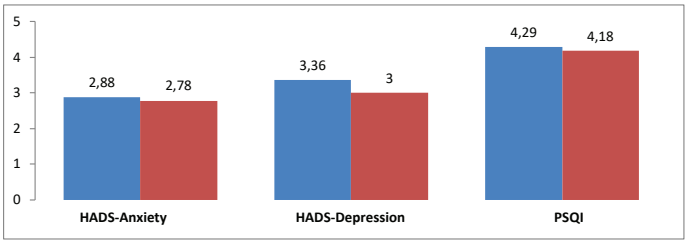

Fig 1. Comparison of Patients' PSQI and HADS Scores at first (blue) and second (red) evaluation

In the assessment of individuals with high HADS scores (n = 20) after two months, 11 individuals were reached, and a significant decrease in their HADS scores was observed (initial HADS scores mean: 9.40 ± 0.75; mean after 2 months: 5.00 ± 4.89, p < 0.001)

Factors associated with the hospitalization duration

The mean hospitalization duration was 8.83 ± 5.83 days, with patients being monitored in the clinic for a minimum of 1 day and a maximum of 37 days. In the assessment of the relationship between hospitalization duration and NLR, PLR, Ferritin, D-Dimer, and CRP values, positive correlations were observed (p = 0.016; r = 0.229 *; p = 0.008; r = 0.251 **; p < 0.001; r = 0.368 **; p = 0.003; r = 0.285 **; p < 0.001; r = 0.330 **). Additionally, a negative correlation was observed with lymphocyte count (p = 0.004; r = - 0.273 **).

The results of multiple regression analysis regarding the impact of NLR, PLR, Ferritin, Lymphocyte count, and D-Dimer parameters on the duration of hospitalization are given in Table 6. A multiple linear regression analysis was conducted to predict the duration of hospitalization using the variables NLR, PLR, CRP, Ferritin, Lymphocyte count, and D-Dimer. The analysis revealed a significant regression model, F(6,101)=3.940, p=0.001, explaining 14% of the variance in the dependent variable (Adjusted R^2=.142). Accordingly: The NLR value predicts positively and significantly, β1=0.20, t(101)=2.11, p=0.037, pr^2=0.04. The D-Dimer value predicts hospitalization duration positively and significantly, β1=0.28, t(101)=3.36, p=0.001, pr^2=0.09. The analysis determined that the other independent variables did not significantly predict the duration of hospitalizaton (p> 0.05). (Table 6).

Table 5. Comparison of PSQI and HADS scores of reevaluated patients after two months

Scales	Groups	N	Mean	Standart Deviation	t	df	p1
HADS-Anxiety2	First Evaluation	75	2,88	2,99	0,186	74	0,853
	Second Evaluation	75	2,78	4,48			
HADS-Depression3	First Evaluation	75	3,36	3,44	0,582	74	0,562
	Second Evaluation	75	3,00	4,72			
PSQI4	First Evaluation	75	4,29	3,01	0,337	74	0,737
	Second Evaluation	75	4,18	3,68			

Paired-Sample T Test1
HADS cut-off value for anixety2: 10
HADS cut-off value for depression3: 7
PSQI cut-off value4: 5

Table 6. Effect of NLR, PLR and D-Dimer Parameters on Duration of Hospitalization

Variable	Unstandardized Coefficients	Standardized Coefficients			
	B	SEβ	β	t	Sig
(Constant)	9,463	2,542		3,722	,001
NLR	,606	,287	,204	2,114	,037
PLR	-,003	,006	-,066	-,553	,582
D-Dimer	,001	,000	,285	3,162	,002
CRP	,001	,007	,008	,085	,932
Ferritin	,000	,000	,025	,279	,781
Lymphocyte	-1,529	,822	-,221	-1,862	,066

Multiple linear regression analysis was applied.

Discussion

This study is a two-month follow-up study examining psychiatric symptoms and related factors in 110 inpatients due to COVID-19. It sheds light on the psychiatric aspects of COVID-19 patients, emphasizing the prevalence of psychiatric diagnoses (23.6%) and childhood trauma (9.1%). Notably, psychiatric diagnoses correlate with higher platelet (PLT) and platelet-to-lymphocyte ratio (PLR) values, suggesting a link between psychiatric conditions and inflammatory markers. Hospitalization duration (mean: 8.83 ± 5.83 days) positively correlates with NLR, PLR, Ferritin, D-Dimer, and CRP values and negatively with lymphocyte count. Multiple regression analysis identifies NLR and D-Dimer as predictors of longer hospitalization. The study underscores ongoing mental health challenges in COVID-19 patients, highlighting persistent symptoms, comorbidities, and the potential role of inflammatory markers in psychiatric conditions and hospitalization duration.

In this study, patients' confidence in treatment was quite high, at 84.5%. In addition, it was observed that concerns about the quarantine process and corona were low (27.3%) and hope for the future (85.5%) was high. It was determined that the risk of depression in patients was high (18.2%) in the screening performed with the HADS. The psychiatric history of the patients were also evaluated, it was determined that two most common psychiatric symptoms were anxiety (42.3%) and depression symptoms (42.3%). In a study conducted on patients diagnosed with COVID-19, it was stated that the most common psychiatric problems were anxiety and depression[2]. The data in this area are insufficient to evaluate in terms of inpatients, because studies investigating the rates of anxiety and depression in hospitalized patients in this period have mostly focused on healthy society and healthcare professionals[19]. However, the distributions of psychiatric diagnoses history observed in this study are similar to those in the literature[20, 21].

Individuals with a psychiatric diagnosis in this study had higher PLR values in this study, and PLR was correlated with long hospitalization. Although there is no direct relationship between the history of psychiatric diagnosis and the duration of hospitalization, it may be thought that the psychiatric history indirectly affects immunity[22]. Previous studies have reported that NLR-PLR values are higher in those with mood disorders than healthy ones[23]. The significant high PLR (Platelet/Lymphocyte) and PLT values in untreated psychiatric patients suggest a relationship between psychiatric diseases and blood parameters.

According to the findings of this study, duration of hospitalization is not related to psychiatric symptoms but is related to PLR, NLR, Ferritin, D-Dimer and CRP. One study states that NLR and PLR rates can be used as independent prognostic markers for the exclusion of severe and non-severe disease in COVID-19 patients[24]. Additionally smilar to our results, it is stated that it would be beneficial to evaluate markers such as C-Reactive Protein (CRP), Ferritin and D-Dimer in terms of prognostic in addition to these markers in Covid-19 patients[25].

The primary limitations of our study include its short-term follow-up, not examining blood parameters of patients in the pre-COIVD period, absence of a control group, a small sample size, the use of self-report scales, and the lack of assessment of other factors influencing depression and anxiety in individuals. One of the notable advantages of our study is its short-term yet prospective design, distinguishing it from cross-sectional studies and making it one of the rare investigations in the relevant field.

Conclusion

The study identified factors influencing anxiety, depression, and sleep quality, along with their correlation to inflammatory markers in COVID-19 inpatients. Surprisingly, the correlation for hospital stay length was observed with NLR, PLR, Ferritin, D-Dimer, and CRP values, rather than psychiatric symptoms. Ongoing symptoms in the two-month follow-up highlight the significance of continuous psychiatric care during and after hospitalization. Our research is important as it underscores the necessity of psychiatric evaluation in hospitalized COVID-19 cases.

Ethical Approval

This study was conducted according to the Declaration of Helsinki and was approved by the Ethical Committee for Clinical Research of Sakarya University. (Date and Decision #2020/136)

Statements

Acknowledgments

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Conflicts of Interest

The authors declare no conflict of interests.

Authors' Contributions

Conception: Ç, T; A, E, K; O, K - Design: Ç, T; A, E, K; E, T, M; N, Y; T, E; Y, S, O; O, K;- Supervision: O, K, - Data Collection and/or Processing: Ç, T; E, T, M; N, Y; T, E;- Analysis and/or Interpretation: Ç, T - Literature: Ç, T; A, E, K - Review: Ç,T; A, E, K - Writing: Ç, T; A, E, K; E, T, M; N, Y; T, E; Y, S, O; O, K - Critical Review: O, K

Consent to participate statement

Informed consent was obtained from all patients for being included in the study.

Ethical Approval

This study was conducted according to the Declaration of Helsinki and was approved by the Ethical Committee for Clinical Research of Sakarya University. (Date and Decision #2020/136)

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Research Article

Inflammatory markers as predictors of late-onset fetal growth restriction: a focus on neutrophil-to-lymphocyte and platelet-to-lymphocyte ratios

Geç başlangıçlı fetal gelişim geriliğini öngörmede inflamatuar belirteçlerin rolü: nötrofil-lenfosit ve trombosit-lenfosit oranlarına odaklanma

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Abstract

Aim: This study evaluates the role of hematologic inflammatory markers, specifically neutrophil-to-lymphocyte ratio (NLR) and platelet-to-lymphocyte ratio (PLR), in predicting late-onset fetal growth restriction (FGR).

Material and Methods: A retrospective comparative analysis was conducted on 76 pregnancies complicated by late-onset FGR and 100 healthy pregnancies as controls. Maternal blood samples were collected, and hematologic parameters, including NLR and PLR, were recorded. Data analysis compared inflammatory markers between the FGR and control groups to assess the relationship between maternal inflammatory profiles and FGR.

Results: NLR was significantly higher in the FGR group compared to the control group ($p<0.001$), suggesting increased systemic inflammation in pregnancies complicated by FGR. PLR, although elevated in the FGR group, did not show significant differences between groups. Additionally, white blood cell and neutrophil counts were significantly elevated in the FGR group ($p<0.001$), while Apgar scores at 1 and 5 minutes were notably lower in FGR cases ($p<0.01$), indicating compromised neonatal outcomes.

Conclusion: Our findings suggest that elevated NLR may serve as a valuable inflammatory marker for identifying pregnancies at risk for late-onset FGR. Although PLR showed no significant association, the overall inflammatory profile indicates systemic maternal inflammation's role in FGR pathogenesis. The use of NLR as a cost-effective and accessible predictive tool could enhance early identification and monitoring of at-risk pregnancies, supporting timely intervention strategies. Further studies are needed to validate these findings and explore the integration of inflammatory markers into routine prenatal care.

Keywords: Fetal growth restriction, Inflammation, Neutrophil-Lymphocyte Ratio, Platelet-Lymphocyte Ratio

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Öz

Amaç: Bu çalışma, geç başlangıçlı fetal gelişim geriliğinin (FGR) öngörülmesinde hematolojik inflamatuar belirteçlerden özellikle nötrofil-lenfosit oranı (NLR) ve trombosit-lenfosit oranının (PLR) rolünü değerlendirmeyi amaçlamaktadır.

Gereç ve Yöntemler: u retrospektif çalışmada, geç başlangıçlı FGR ile komplike 76 gebelik ve 100 sağlıklı gebelik kontrol grubu olarak incelenmiştir. Anne kan örnekleri alınarak NLR ve PLR dahil olmak üzere hematolojik parametreler kaydedilmiştir. FGR ve kontrol grubu arasında inflamatuar belirteçler karşılaştırılarak anne inflamasyon profili ile FGR arasındaki ilişki değerlendirildi.

Bulgular: NLR, FGR grubunda kontrol grubuna kıyasla anlamlı olarak daha yüksekti ($p<0.001$), bu da FGR ile komplike gebeliklerde artmış sistemik inflamasyonu göstermektedir. FGR grubunda PLR yüksek olmasına rağmen gruplar arasında anlamlı bir fark görülmemiştir. Ayrıca, beyaz kan hücresi ve nötrofil sayıları FGR grubunda anlamlı olarak daha yüksekti ($p<0.001$), ve 1. ve 5. dakikadaki Apgar skorları FGR vakalarında anlamlı olarak düşüktü ($p<0.01$), bu da neonatal sonuçların etkilendiğini göstermektedir.

Sonuçlar: Bulgularımız, yüksek NLR'nin geç başlangıçlı FGR riski taşıyan gebeliklerin tespitinde değerli bir inflamatuar belirteç olabileceğini düşündürmektedir. PLR anlamlı bir ilişki göstermemekle birlikte, genel inflamatuar profil, FGR patogenezinde sistemik anne inflamasyonunun rolünü desteklemektedir. NLR'nin düşük maliyetli ve erişilebilir bir öngörü aracı olarak kullanılması, risk altındaki gebeliklerin erken tespit ve takibini güçlendirebilir ve zamanında müdahalelere destek olabilir. Bu bulguların doğrulanması ve inflamatuar belirteçlerin rutin prenatal bakıma entegrasyonunun araştırılması için ileri çalışmalara ihtiyaç vardır.

Anahtar Kelimeler: Fetal Gelişim Geriliği, İnflamasyon, Nötrofil-Lenfosit Oranı, Trombosit-Lenfosit Oranı

Introduction

Fetal growth restriction (FGR) is a complex obstetric condition characterized by the inability of the fetus to achieve its genetically determined growth potential. Affecting approximately 5–10% of all pregnancies, FGR is a leading contributor to perinatal morbidity and mortality worldwide, underscoring the critical need for effective diagnostic and predictive strategies [1,2]. FGR can be broadly classified into early- and late-onset types, with late-onset FGR generally presenting after 32 weeks of gestation. This distinction is important, as early-onset FGR is often associated with severe placental pathology and preeclampsia, while late-onset FGR tends to involve more subtle placental insufficiency that can be challenging to detect [2,3].

The primary pathophysiological mechanism underlying FGR is thought to be placental insufficiency, which compromises the transfer of essential nutrients and oxygen from the mother to the fetus. This condition is multifactorial, with contributions from maternal, fetal, and placental factors, including genetic anomalies, maternal health conditions, and placental dysfunction. Among these, inflammation has emerged as a potential contributor to FGR, as inflammatory processes can disrupt placental function, impacting fetal growth and development [4,5].

Inflammatory markers like the neutrophil-to-lymphocyte ratio (NLR) and platelet-to-lymphocyte ratio (PLR) have gained attention as potential indicators of systemic inflammation and immune status [6,7,8]. These hematologic markers are inexpensive, accessible, and can reflect ongoing inflammation in the body. Recent studies have suggested that elevated NLR and PLR levels are associated with adverse pregnancy outcomes, including FGR, potentially due to their impact on placental health [6,7,9]. The use of these hematologic ratios as part of antenatal assessment may offer a practical approach to identifying pregnancies at risk of FGR, particularly in settings where advanced diagnostic resources are limited.

However, the utility of NLR and PLR in predicting FGR, especially late-onset FGR, still needs to be explored. Studies by Aydogan et al. and Seyhanli et al. have investigated the relationship between inflammatory markers and FGR, providing evidence that elevated NLR and WBC counts are more pronounced in FGR cases, which might reflect underlying placental inflammation and compromised fetal growth [7,8]. Given the potential of these markers as predictive tools, further research is warranted to clarify their role in FGR pathogenesis and assess their predictive value in clinical practice.

This study aims to evaluate the inflammatory profiles of pregnancies complicated by late-onset FGR, specifically focusing on NLR and PLR as potential markers of systemic inflammation. By comparing these markers between late-onset FGR and control groups, we hope to contribute to the growing body of evidence on the role of maternal inflammation in FGR and explore the feasibility of integrating these markers into routine antenatal care for early identification of at-risk pregnancies.

Material and Methods

This single-center, retrospective case-control study evaluated the medical records of patients who delivered at our clinic between January 2021 and October 2024. The study population included patients with idiopathic late-onset FGR after 32 weeks of gestation. The control group compromised pregnant individuals who gave birth at term without complications.

Exclusion criteria included the presence of any of the following: (i) multiple pregnancies, (ii) co-existing maternal diseases such as hypertension, metabolic disorders, systemic diseases, or infection, (iii) obstetric complications, including preterm premature rupture of membranes (iv) fetal anomaly, (v) placenta previa, (vi) placental abruption, or (vii) any history of glucocorticoid treatment or blood transfusion. Ethical approval for the study was obtained from the Ethics Committee of the University of Health Science, Sancaktepe Sehit Prof. Dr. Ilhan Varank Training and Research Hospital (Approval number: 327-23.10.2024), in compliance with the principles outlined in the Helsinki Declaration.

Maternal demographics, body mass index (BMI), gestational age at diagnosis, amniotic fluid levels, delivery type, timing of delivery, fetal gender, birth weight, Apgar scores at the 1st and 5th minutes, and hemogram values taken between 24th and 28th weeks of gestation were extracted from electronic health records. Sysmex XT-2000i Automated Hematology Analyzer (GMI, MN, USA) was used for hemogram evaluations.

FGR was defined based on ultrasound findings: estimated fetal weight (EFW) or abdominal circumference (AC) below the 3rd percentile, or EFW or AC below the 10th percentile with UA-PI>95th percentile or cerebroplacental ratio less than 5th percentile [3].

Statistical analyses were performed using SPSS version 25.0 (IBM Corp., Armonk, NY, USA). Continuous variables were reported as mean ± standard deviation (SD) or median with interquartile range (IQR) based on the data distribution. Categorical variables were expressed as frequencies and percentages. Comparative analyses between groups were conducted using independent t-tests or Mann-Whitney U tests for continuous variables and Chi-square or Fisher's exact tests for categorical variables, as appropriate. A p-value of less than 0.05 was considered statistically significant.

Results

Initially, 143 cases of FGR were identified within the study period. Of these, 67 cases were excluded for various reasons (Figure 1). This left a final cohort of 76 FGR fetuses. For comparison, the control group included 100 singleton pregnancies without complications.

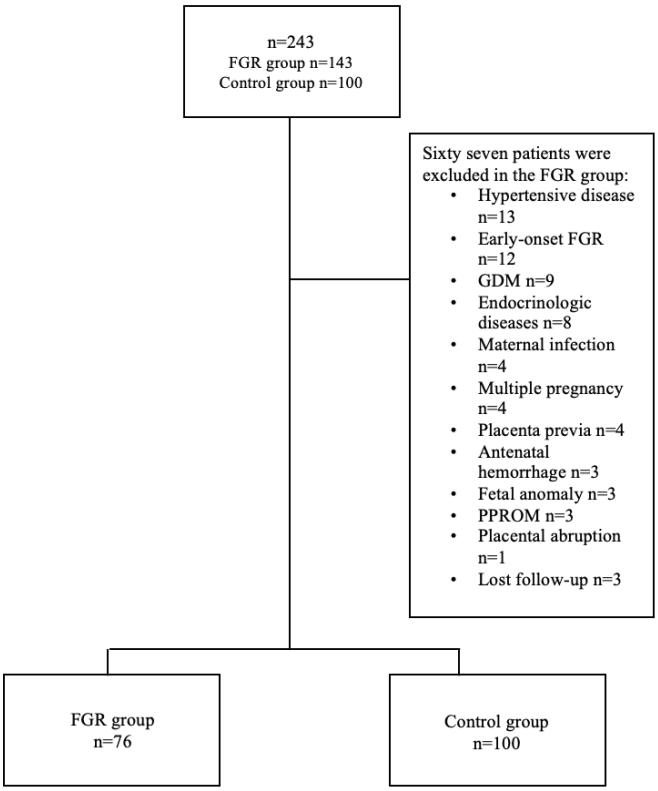

Figure 1. The flowchart of the study group.

Maternal age was similar across both groups, with a mean of 27.4 ± 5.8 years in the FGR group and 28.1 ± 7.6 years in the control group (p=0.08). Likewise, there was no significant difference in BMI at the beginning of pregnancy between the two groups (26.9 ± 5.1 kg/m^2 for the FGR group vs. 27.1 ± 3.4 kg/m^2 for controls, p=0.22). However, nulliparity was significantly more prevalent in the FGR group (53.9%) compared to the control group (28%, p<0.001). The average gestational age at delivery was significantly earlier in the FGR group, at 36.4 ± 1.0 weeks, compared to 38.5 ± 0.8 weeks in the control group (p<0.01). Additionally, birth weights were significantly lower in the FGR group, averaging 2179.3 ± 440.7 grams, while the

control group had an average birth weight of 3408 ± 411.6 grams (p<0.001). The mode of delivery and neonatal gender distribution were similar between groups (p=0.28 and p=0.26, respectively). Apgar scores were significantly lower in the FGR group at both the 1st and 5th-minute assessments (7.1 ± 1.6 and 7.9 ± 1.3, respectively) than in the control group (8.7 ± 0.8 and 9.1 ± 0.7, respectively, p<0.01 for both) (Table 1).

The comparison of hematologic parameters between the FGR and control groups was given in Table 2. Hemoglobin levels were similar between the groups, with the FGR group showing a mean of 12.1 ± 1.3 g/dL compared to 12.4 ± 1.6 g/dL in the control group (p=0.09). However, the white blood cell (WBC) count was significantly higher in the FGR group (10.5 ± 3.2 $x10^9$/L) than in the control group (9.1 ± 2.8 $x10^9$/L, p<0.001). Similarly, the neutrophil count was significantly elevated in the FGR group (7.6 ± 2.5 $x10^9$/L) compared to the control group (6.3 ± 1.9 $x10^9$/L, p<0.001). Lymphocyte and monocyte counts did not differ significantly between the groups (p=0.21 and p=0.33, respectively). Platelet counts were also comparable, with a mean of 261.8 ± 60.1 $x10^9$/L in the FGR group and 254.6 ± 71.5 $x10^9$/L in the control group (p=0.15). In terms of ratios, the neutrophil-to-lymphocyte ratio (NLR) was significantly higher in the FGR group (3.6 ± 0.8) than in the control group (2.8 ± 0.5, p<0.01). Additionally, the platelet-to-lymphocyte ratio (PLR) was significantly elevated in the FGR group (124.2 ± 35.9) compared to the control group (115.4 ± 37.2, p=0.02).

Table 1. Demographic and clinical characteristics of the study groups.

Characteristics	FGR group (n=76)	Control group (n=100)	p
Maternal age (years)	27.4±5.8	28.1±7.6	0.08
BMI at the beginning of pregnancy (kg/m2)	26.9±5.1	27.1±3.4	0.22
Nulliparity n (%)	41 (53.9)	28 (28)	<0.001
Gestational week at diagnosis (week)	34.1±1.1	-	-
Gestational week at delivery (week)	36.4±10	38.5±0.8	<0.01
Birth weight (grams)	2179.3±440.7	3408±411.6	<0.001
Delivery type			0.28
Vaginal birth n (%)	28 (36.8)	45 (45)	
Cesarean section n (%)	48 (63.2)	55 (55)	
Gender			0.26
Female n (%)	40 (52.6)	53 (53	
Male n (%)	36 (47.4)	47 (47)	
Apgar score 1st minute	7.1±1.6	8.7±0.8	<0.01
Apgar socre 5th minute	7.9±1.3	9.1±0.7	<0.01

BMI: Body mass index.

Table 2. Comparison of laboratory data of the study groups.

	FGR group (n=76)	Control group (n=100)	p
Hemoglobin (g/dL)	12.1±1.3	12.4±1.6	0.09
Wbc (x109/L)	10.5±3.2	9.1±2.8	<0.001
Neutrophil (x109/L)	7.6±2.5	6.3±1.9	<0.001
Lymphocyte (x109/L)	2.1±0.9	2.2±0.7	0.21
Monocyte (x109/L)	0.6±0.6	0.6±0.8	0.33
Platelet (x109/L)	261.8±60.1	254.6±71.5	0.15
NLR	3.6±0.8	2.8±0.5	<0.01
PLR	124.2±35.9	115.4±37.2	0.02

NLR: Neutrophil-lymphocyte ratio, PLR: Platelet-lymphocyte ratio, Wbc: White blood cell.

Discussion

Our findings indicate a significant association between elevated inflammatory markers, specifically the neutrophil-to-lymphocyte ratio (NLR) and white blood cell (WBC) counts, with late-onset FGR. Compared to controls, elevated NLR and WBC in the FGR group point to a systemic inflammatory state that may contribute to the pathogenesis of FGR. Similar inflammatory pathways have been highlighted in previous studies, where increased maternal inflammatory markers have been linked to placental insufficiency, leading to compromised fetal growth [7,8].

Inflammation has been increasingly recognized as a critical factor in the development of FGR, with research showing elevated cytokine levels, such as IL-6, IL-1β, and TNF-α, in FGR cases. These cytokines are known to impact placental function, leading to impaired nutrient and oxygen transfer essential for fetal growth. Studies have reported elevated levels of TNF-α in amniotic fluid during mid-pregnancy among FGR cases, and IL-6 has been linked to growth restriction in newborns [4,10,11]. Our study's findings on elevated NLR align with these studies, as NLR is a readily accessible marker reflecting maternal systemic inflammation. Elevated NLR has been shown to correlate with adverse pregnancy outcomes, including preeclampsia and growth restriction, likely due to its role in mediating inflammatory processes within the uteroplacental unit [12].

Additionally, our study observed no significant difference in platelet-to-lymphocyte ratio (PLR) between the FGR and control groups. While PLR is sometimes considered a marker of vascular inflammation, our results align with those of Aydogan et al., who found that PLR may not be as strongly associated with FGR as NLR [8]. This distinction may suggest that FGR is more closely linked to inflammation affecting immune cell responses rather than to endothelial activation, which would typically involve platelets more directly. Studies on preeclampsia and early-onset FGR, where vascular inflammation is more prominent, have shown greater changes in PLR; however, late-onset FGR, as studied here, may involve a different inflammatory profile [13,14].

Furthermore, our study demonstrated significantly lower Apgar scores in the FGR group, consistent with other studies that associate inflammation with compromised neonatal outcomes [7,8]. Seyhanli et al. observed that systemic inflammation, reflected in parameters like NLR and WBC, correlates with poor neonatal outcomes in FGR cases, further underscoring the role of maternal inflammation in affecting neonatal health [7]. Low Apgar scores may result from chronic fetal exposure to inflammatory states, which could influence fetal development and neonatal adaptation [15].

In conclusion, this study highlights the potential of using inflammatory markers, such as NLR and WBC counts, as cost-effective and accessible tools for assessing the risk of FGR and makes an important contribution to understanding the role of these markers in late-onset fetal growth restriction. Given the challenges in predicting FGR, these findings contribute to a growing body of evidence that inflammatory markers could be useful in identifying pregnancies at risk, aiding in early intervention strategies. The use of inflammatory markers in routine antenatal care could potentially improve the management of high-risk pregnancies, although further research is necessary to standardize their application in clinical practice.

Conflict of Interest Statement and Funding

There is no financial support from any individual or organization for this study, and the authors have no conflicts of interest.

Statement of Non-Submission

We declare that none of the material within this study, in whole or in part, has been previously published elsewhere and is not currently under consideration for publication elsewhere. This includes, except for abstracts up to 400 words, symposiums, information transfers, books, invited articles, electronic submissions, and all types of preprints.

Scientific Responsibility Statement

Conception and design of the experiments, or collection of data; OK, KG

Analysis or interpretation of data; OK

Drafting of the manuscript or revising its scientific content; OK

Approval of the final version of the manuscript for publication; KG

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Research Article

The course of cognitive functions in geriatric patients with musculoskeletal pain receiving acupuncture: an observational study

Kas iskelet ağrısı akupunktur ile tedavi edilen geriatrik hastalarda kognitif fonksiyon gidişatı: gözlemsel bir çalışma

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Abstract

Aim: Acupuncture is safe and effective in treating older patients with chronic musculoskeletal pain. Its effect on geriatric conditions has yet to be precisely investigated. We aim to understand the role of acupuncture on chronic musculoskeletal pain and better define its reflection on elderly patients' daily life.

Material and Methods: 23 elderly patients received ten acupuncture sessions in 8 weeks for chronic musculoskeletal pain for our non-randomised observational study. Visual Analogue Scale (VAS), Geriatric Depression Scale (GDS), Activities of Daily Living (ADL), Instrumental Activities of Daily Living (IADL), Cohen-Mansfield Agitation Inventory (CMAI), Mini-Mental Score Examination (MMSE) were used.

Results: VAS score was 7.65±1.82, which decreased significantly to 4.36±2.24 after treatment ($p<0.001$). MMSE mean before was 23.26±5.50 and increased considerably after treatment, reaching 25.45±3.98 ($p<0.001$). GDS mean score was 11.65±8.83, which reduced significantly to 8.45±6.83 afterwards ($p<0.001$). CMAI mean score before treatment was 40.87±10.21, which decreased substantially to 35.86±8.45 ($p<0.001$). ADL mean score before treatment was 5.35±0.71 and significantly increased to 5.77±0.43 ($p=0.002$). IADL score before treatment was 6.70±2.08 and was 6.73±2.07 after treatment ($p=0.317$).

Conclusion: Acupuncture treated pain and provided secondary gain to these patients improving their MMSE, GDS, CMAI, and ADL. These findings suggest that acupuncture analgesia for musculoskeletal pain in older adults improves their geriatric problems.

Keywords: cognitive functions, acupuncture, chronic pain, elderly

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Öz

Amaç: Akupunktur, kronik kas-iskelet ağrısı olan yaşlı hastaların tedavisinde güvenli ve etkilidir. Geriatrik rahatsızlıklar üzerindeki etkisi henüz tam olarak araştırılmamıştır. Akupunkturun kronik kas-iskelet ağrısı üzerindeki rolünü anlamak ve yaşlı hastaların günlük yaşamına yansımasını daha iyi tanımlamayı amaçlıyoruz.

Gereç ve Yöntemler: 65 yaş üstü 23 hasta non-randomize gözlemsel çalışmamıza dahil edildi. Bu hastalara kronik kas-iskelet ağrısı için 8 hafta içerisinde toplam on akupunktur seansı uygulandı. Semptomları değerlendirmek için Vizüel Analog Skala (VAS), Geriatrik Depresyon Ölçeği (GÖS), Günlük Yaşam Aktiviteleri (GYA), Günlük Yaşamın Enstrümantal Aktiviteleri (GYEA), Cohen-Mansfield Ajitasyon Envanteri (CMAE), Mini-Mental Test (MMT) kullanıldı.

Bulgular: VAS skoru 7.65±1.82 iken tedaviden sonra anlamlı bir şekilde 4.36±2.24'e düştü (p<0.001). MMT ortalaması tedaviden önce 23.26±5.50 iken tedaviden sonra anlamlı bir şekilde artarak 25.45±3.98'e ulaştı (p<0.001). GDÖ ortalaması 11.65±8.83 iken tedaviden sonra anlamlı bir şekilde 8.45±6.83'e düştü (p<0.001). CMAE ortalaması tedaviden önce 40.87±10.21 iken tedaviden sonra anlamlı bir şekilde 35.86±8.45'e düştü (p<0.001). GYA ortalaması tedaviden önce 5.35±0.71 iken anlamlı bir şekilde 5.77±0.43'e yükseldi (p=0.002). Tedavi öncesi GYEA skoru 6.70±2.08 iken tedavi sonrası 6.73±2.07 idi (p=0.317).

Sonuçlar: Akupunktur ağrıyı tedavi etmesinin yanı sıra MMT, GDÖ, CMAE ve GYA'lerini iyileştirerek ikincil kazanç sağladı. Bu bulgular, yaşlı yetişkinlerde kas-iskelet ağrısı için akupunktur analjezisinin geriatrik sorunlarını iyileştirdiğini göstermektedir.

Anahtar Kelimeler: kognitif fonksiyonlar, akupunktur, kronik ağrı, yaşlı hastalar

Introduction

The elderly population has increased worldwide, resulting in an increased need for comprehensive medical care. Healthy ageing has become a more and more important concept [1].

Musculoskeletal pain is a common problem with ageing. There are ageing-related changes in the musculoskeletal system, which could be bone loss, cartilage degeneration, decreasing fluid level between intervertebral disks, and changes in muscle fibres' number and size. All of these may, in turn, cause pain in older adults [2,3].

Pain is a symptom that should be evaluated more carefully in geriatric patients. When elderly patients, especially those with dementia, seek pain treatment, it is common for them to have suboptimal management. The reason for not being able to provide optimal pain management for elderly patients with dementia could be related to their speech and memory problems. Knowing that obstacle, these patients should be further questioned regarding their pain, and the clinicians should make more effort to better understand their condition [4].

Regarding the management of musculoskeletal pain, paracetamol is considered the first-line treatment for pain, followed by nonsteroidal anti-inflammatory drugs (NSAIDs), even though NSAIDs have a wide range of side effects. Opioids are the next step for moderate-severe pain, which could again result in serious complications. Possible side effects become more critical in geriatric patients. Hence, the lowest dose is usually preferred when starting pain medication for the elderly [5].

Acupuncture is one of the other pain management tools for musculoskeletal pain. Studies on the safety of acupuncture have shown that it can be considered a safe procedure.6 In addition to being a safe pain killer, it might also have additional benefits, such as improving cognition and behavioural problems in older people. Patients with mild cognitive dysfunction and Alzheimer's disease receiving acupuncture were assessed using a Mini-Mental State Examination (MMSE). Their MMSE scores after acupuncture demonstrated an increase, reflecting their cognitive function improvement. Acupuncture also had a positive impact on cognition and the ability to carry out daily activities in patients with vascular dementia as well. Those findings suggest that acupuncture might be a painkiller with secondary benefits in older people [7-8]. About behavioural problems in dementia, studies investigating the effect of acupuncture on dementia-related behavioural problems are scarce [9-10].

Our observational study aimed to assess how acupuncture treatment for pain could affect cognition, activities of daily living, behavioural problems (such as agitation), and depressive mood in elderly patients while treating musculoskeletal pain. Our hypothesis is that acupuncture for neuromuscular pain in elderly patients with dementia could be part of a pain management plan and might also benefit their geriatric problems.

Material and Methods

Selection and description of patients

The study was conducted in a geriatric outpatient clinic in a research and training hospital in Turkey between October 2017 and October 2018. We included patients 65 years old and older presenting with complaints of neuromuscular pain and forgetfulness. There were 60 patients with complaints of neuromuscular pain and forgetfulness. Among these, the eligible patients were referred to acupuncture therapy. Exclusion criteria were acute neuromuscular pain, end-stage dementia, uncontrolled chronic disease (i.e., hypertension, diabetes mellitus, chronic obstructive pulmonary disease, heart failure), patients with ongoing infection and cancer patients. To assess eligibility, in addition to their medical background, we also evaluated the social conditions of the patients as they would be required to attend the acupuncture sessions by arranging their own transport. After checking for eligibility, 30 subjects were suitable for acupuncture treatment. Among those, 23 patients were willing to attend acupuncture sessions. The diagram below shows participant selection (Diagram 1).

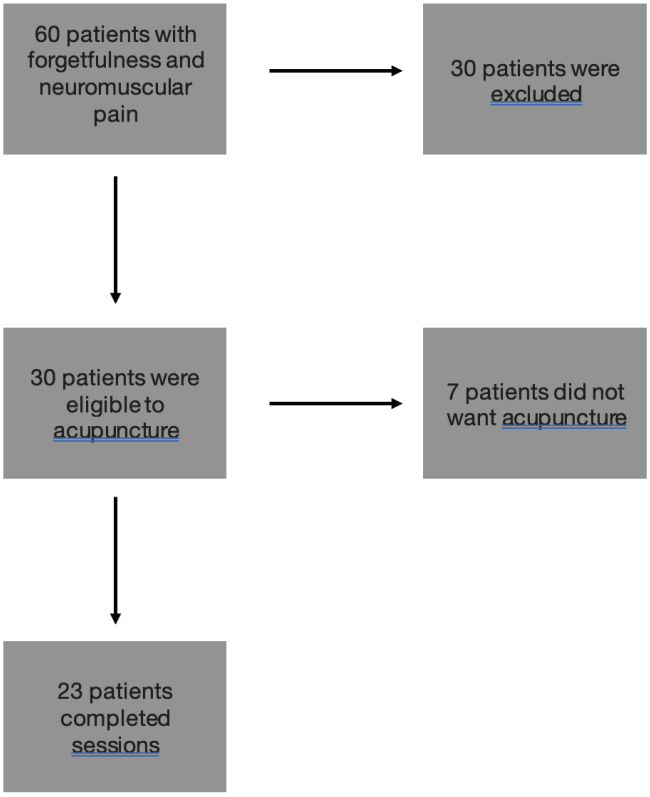

Diagram 1. Participant Selection.

We initially planned to have a control group; however, the research and training hospital where the study was initiated had been closed due to the construction of a new hospital within the area. Hence, a control group could not be arranged, and the study was terminated with only the data from the treatment group.

Data Collecting and Comprehensive Geriatric Assessment

While examining geriatric patients, geriatric conditions should be adequately identified. A comprehensive geriatric assessment can help clinicians manage these conditions and prevent or delay their complications.11 A comprehensive Geriatric Assessment (CGA) was done for every participant. The CGAs were completed by a family practice specialty trainee doctor, under the supervision of a consultant geriatrician. As part of the CGA, age, sex, medical history and medication history were recorded for each patient. We then measured their pain using the Visual Analogue Scale (VAS). In addition to this, we used five scales to help complete the CGA. These scales were the Geriatric Depression Scale (GDS), Activities of Daily Living (ADL), Lawton Brody Instrumental Activities of Daily Living (IADL), Cohen Mansfield Agitation Inventory (CMAI), Mini-Mental State Examination (MMSE). Brief information about those scales and tests is given below in the following paragraphs. The scales were completed by the same clinician completing the CGAs.

GDS comprises 30 yes and no questions. The higher scores the patients have, the more depressive symptoms they have. Above and equal to 11 points means a risk of severe depression [12].

ADL and IADL are scaled to better understand older adults' quality of life. The maximum ADL score is six, meaning the patient is independent with dressing, bathing, toileting needs, mobilising out of bed, eating, and continence. IADL is closely related to ADL; however, it measures more advanced skills. The maximum score is eight, and it assesses the abilities of shopping, meal preparation, domestic duties, transportation, and taking own medications [13,14]. MMSE is the standard test to screen for dementia. The maximum score is 30; scoring between 18-24 means mild dementia, and less than 17 is considered advanced dementia.

CMAI is used to evaluate behavioural changes and levels of agitation. It comprises 29 questions, and each of them is scored from 1 to 7. The agitation behaviour is divided into oral and physical agitation and offensive and non-offensive [15-16].

VAS is a numeric scale in which patients rate their pain from 0 to 10, 10 score being the highest level of pain ever experienced [17].

We also included other subjective feedback from the patients and their caregivers in our study, which is included in a different section.

Acupuncture treatment

A medical doctor holding a Turkish Ministry of Health-approved acupuncture certificate applied acupuncture to the patients. Disposable 0.25mmx0.25mm steel needles were used. The treatment included ten sessions, each session lasting for 20 minutes and delivered over 2 months. Acupuncture points

were selected from systemically effective points and local ach qi points according to Western Medical Acupuncture. Point selection was made individually for every patient. Commonly used acupuncture points were HT7, LU9, LI4, LI11, ST36, SP6, LR3, GV20, Yintang. The depth of needling differed in each patient. According to the fat and muscle mass of the patients, we tried to needle as much as possible, especially at points ST36, SP6, and LI11. If deep needling was not applicable, we preferred superficial needling. There was no additional twirling or any extra stimulation.

Statistical analysis

Statistical analysis was conducted using the Statistical Package for Social Science version 21.0 for Windows (SPSS, Inc.; Chicago, USA). Descriptive data were presented as number (n), per cent (%), mean, standard deviation (SD) and median: Pearson chi-square, Fisher's exact test and McNemar. Chi-square tests were used to compare categorical variables. The results were submitted for the assessment of normality distribution using the Kolmogorov-Smirnov and Shapiro-Wilk tests. At the same time, paired sample t-tests and independent samples t-tests were used to compare continuous variables with normal distribution. Wilcoxon test Mann Whitney U test was used for variables without normal distribution. The relationship between the variables was evaluated with the Spearman Correlation Test. Statistical tests with $p<0.05$ were accepted as significant.

Results

Main demographic findings

Twenty-three patients were recruited in the acupuncture therapy group. 78.3% of them were female, and 21.7% were male. All the patients were equal to or above sixty-five years of age. The mean age was 73.39±6.47 (minimum=65 and maximum=91). Information regarding sex, marital status, education, and living conditions is shown in Table 1 below.

Table 1. Main Demographic Findings

	n	%
Sex		
Female	18	78.3
Male	5	21.7
Marital Status		
Married	14	60.9
Widow	9	39.1
Education background		
Not Literate	11	47.8
Literate	12	52.2
Living Condition		4
Living with family	10	3.5
Living with spouse	11	47.8
Living alone	2	8.7

Being geriatric patients, co-morbidities were present for every patient. Hypertension was the most common comorbidity (%73.9), followed by cardiovascular disease (%21.7) and respiratory diseases (%21.7). Other co-morbidities and their percentages are shown in the table (Table 2).

Table 2. Comorbidities of the patients

	n	%
Hypertension		
Not present	6	26.1
Present	17	73.9
Digestive Tract Problems		
Not present	20	87.0
Present	3	13.0
Neurological Disease		
Not present	19	82.6
Present	4	17.4
Cardiovascular Disease		
Not present	18	78.3
Present	5	21.7
Diabetes Mellitus		
Not Present	19	82.6
Present	4	17.4
Respiratory System Disease		
Not present	18	78.3
Present	5	21.7
Psychiatric Disease		
Not present	21	91.3
Present	2	8.7
Thyroid Disease		
Not present	21	91.3
Present	2	8.7
Rheumatological Disease		
Not present	22	95.7
present	1	4.3
Orthopaedic Disease		73.9
Not present	17	26.1
Present	6	

The change in the scores before and after treatment

The mean VAS score was 7.65±1.82, which decreased to 4.36±2.24 after treatment ($p<0.001$). The mean MMSE score was 23.26±5.50 and improved, reaching 25.45±3.98 afterwards ($p<0.001$). The mean GDS score was 11.65±8.83 and decreased significantly to 8.45±6.83 ($p<0.001$). CMAI mean score before treatment was 40.87±10.21 and decreased to 35.86±8.45 ($p<0.001$). ADL mean score before treatment was 5.35±0.71 and 5.77±0.43 after ($p=0.002$). IADL mean score before treatment was 6.70±2.08 and 6.73±2.07 afterwards ($p=0.317$). Table 3 shows the change in the mean score of scales before and after treatment.

Table 3. The change in the scores before and after treatment

	n	Mean±SS	Median	Minimum-Maximum	p*
VAS - before	23	7.65±1.82	8.00	4-10	<0.001
VAS - after	22	4.36±2.24	4.00	0-9	
MMSE - before	23	23.26±5.50	23.00	11-30	<0.001
MMSE - after	22	25.45±3.98	26.00	16-30	
GD - before	23	11.65±8.83	11.00	0-26	<0.001
GD - after	22	8.45±6.83	6.50	0-22	
CMAI - before	23	40.87±10.21	38.00	29-63	<0.001
CMAI - after	22	35.86±8.45	32.50	29-56	
ADL - before	23	5.35±0.71	5.00	4-6	0.002
ADL - after	22	5.77±0.43	6.00	5-6	
IADL - before	23	6.70±2.08	8.00	1-8	0.317
IADL - after	22	6.73±2.07	7.50	1-8	

Subjective Observations

This study also includes subjective observations from the caregivers and our team. The patients' caregivers provided exciting feedback.

One of our patients' friends asked her for the clinic's telephone number after seeing her relieved from her pain and being more confident with her daily activities. Another exciting feedback was from a doctor-daughter of a patient. Her observation was that her mother could walk to the elevator alone in their apartment for the first time (she was hand-held or assisted before).

We also would like to highlight an observation of our team. Some of our patients became sleepy and tired during the treatment. We considered two critical factors in this. One of them is that our clinic was located inside a busy hospital, and it had been tiring for older people to go there frequently. The second reason might be acupuncture itself. We saw that ten acupuncture sessions in 8 weeks were too frequent for geriatric patients. It could have been better to spread those eight sessions to 10-12 weeks.

Discussion

Studies on acupuncture, cognitive functions and behavioural problems are scarce. This study is unique in that it focuses on cognition, behavioural issues such as agitation, depressive symptoms and daily activities, in addition to pain management. It is also one of its kind, assessing acupuncture's effect on agitation, using CMAI as an assessment tool.

There is considerable research on the analgesic effect of acupuncture, in all which side effects are rare compared to oral medication [18,19]. In previous studies that assessed pain management with acupuncture, VAS scores decreased significantly after treatment. Çevik et al. investigated the effect of acupuncture in the treatment of chronic low back and knee pain in geriatric patients. In this study, the mean VAS values of the patients for low back and knee pain were 8.8696 ± 1.546 and 9.1304 ± 1.4239 before the application, and 2.1739 ± 1.466 and 1.455 ± 0.7 after the application. In our study, in line with the literature, VAS scores were 6 and above in 90.9% of patients before acupuncture but decreased to 31.8% after the procedure. The release of ß-endorphins into the cerebrospinal fluid is one mechanism that explains acupuncture's analgesic effect. Considering the efficacy and safe side effect profile, it is recommended that acupuncture should be tried before oral medications to avoid polypharmacy in the elderly [20].

The improvement in MMSE scores after acupuncture has been shown in other studies, such as Shi et al.'s study on vascular dementia and acupuncture. In that study, with the MMSE, activities of daily living and questionnaires on health quality were assessed in patients receiving acupuncture. They demonstrated improvement after acupuncture treatment [7]. In Another study by Zhou et al., MMSE scores and activities of daily living were assessed during acupuncture therapy. The results were again similar to our study, and acupuncture was considered a safe option [8].

Our study showed no significant side effects and only minor side effects (such as tiredness and localized well-controlled bleeding), suggesting that acupuncture treatment is safe for older people.

Acupuncture's effect on Alzheimer's has been studied in animals and humans. An animal study shows that acupuncture has reduced oxidative stress, increased acetylcholine concentration, reduced hippocampal apoptosis and increased cortical blood flow [21]. Brain structure and neuronal communication changes might help understand acupuncture's effect on cognitive functions. Looking from a holistic approach, once chronic pain is better controlled, it will further affect other systems. As a result of that, the depressive symptoms will improve, it will allow more independence in daily activities, and polypharmacy will be avoided. Which, in turn, will also help preserve cognitive functions.

There has been little research on agitation and acupuncture. A scoping review by Harris M et al, reviewed the existing literature on acupuncture and acupressure for behavioral and psychological symptoms of dementia. They evaluated 15 studies on behavioral and psychological symptoms of dementia which included acupuncture or acupressure therapy. Among those, there is no other study which included acupuncture and measurement of agitation using CMAI scores. In studies which used CMAI as a measure for agitation, acupressure alone or combined with aromatherapy were the treatment methods [22]. Lin et al. used acupressure and Montessori-based activities for dementia patients in a nursing

home. They reported reduced agitation and aggression [9]. Yang et al. have investigated aromatherapy and acupressure on agitation and demonstrated a decrease in agitation with those interventions. They explained this effect via acupuncture's impact on the Ventral Tegmental Area via GABA, which alters dopamine levels in the nucleus accumbens [10].

In our study, patients' agitation levels decreased significantly after acupuncture treatment, and this was demonstrated with a decrease in CMAI scores. Agitation and aggression have made it difficult for clinicians to treat dementia patients. Hence, considering our findings, acupuncture's effect on agitation is fascinating and promising for the future. We also would like to highlight that our patient group were selected from patients with chronic musculoskeletal pain. To identify acupuncture's effect solely on agitation and aggression, a different study should be planned, to ideally include different patient groups without chronic pain and a control group as well.

To summarise our results, we showed that several geriatric problems improved after acupuncture. This includes a decrease in depressive symptoms, better cognitive functions, decreased agitation, and an increase in activities of daily living. All of these were accomplished in addition to pain management, which makes acupuncture unique for pain management in older people.

Pain, agitation, depression, and cognitive functions are all geriatric conditions arm to arm. Holistic evaluation of these would provide a better understanding and improve patient satisfaction and treatment outcomes. In patients with cognitive dysfunctions and related behavioural problems, acupuncture may even help avoid polypharmacy. Hence, we suggest that acupuncture should be used to treat chronic musculoskeletal pain in geriatric patients.

Our study has limitations as an observational study. To estimate the long-term effects, more than ten sessions of acupuncture and at least eight weeks of follow-up are required. Double-blinded randomized control trials are also a must. Such trials should be conducted to define acupuncture's impact on older people with musculoskeletal pain, and this should not be limited to pain management.

When planning further studies regarding acupuncture, pain, and agitation, we believe there must be one patient group with agitation and behavioural problems associated with pain and a control group of patients who have agitation and behavioural problems without pain. We suggest comparing CMAI scores in those two groups, which will further show whether pain relief itself or acupuncture without pain management impacts those.

Declaration of conflicting interests

The authors declare that there is no conflict of interest.

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Patient consent

Both written and oral consent were obtained.

Ethical Considerations

The institutional review board approved this prospective study at Ankara Yildirim Beyazit University. The study was conducted according to the ethical standards of the Declaration of Helsinki and its later amendments. Written informed consent was obtained from all participants for the patients.

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Araştırma Makalesi

Atriyal fibrilasyon ablasyonunda radyofrekans veya kriyoablasyon seçimi yaparken skor sistemlerinin (CHADS, CHADS2-VAS, APPLE, HATCH, BASE-AF2) öngördürücülüğü

Predictive value of scoring systems (CHADS, CHADS2-VAS, APPLE, HATCH, BASE-AF2) in the choice of radiofrequency or cryoablation for Atrial Fibrillation ablation

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Öz

Amaç: Atriyal fibrilasyon (AF) sık görülen bir aritmi olup mortalite ve morbidite riskini artırır. AF tedavisinde hız ve ritim kontrolü stratejileri vardır. Ritim kontrolü amacıyla yapılan kateter ablasyonları, özellikle radyofrekans (RFA) ve kriyoablasyon (CrA) gibi termal ablasyon yöntemleri kullanılmaktadır. Ancak, hangi ablasyon yönteminin tercih edileceğini belirlemek için mevcut skor sistemlerinin öngördürücülüğü yeterince araştırılmamıştır. Bu çalışmanın amacı, CHADS2, CHA2DS2-VASc, APPLE, HATCH, BASE-AF2 skor sistemlerinin RFA veya CrA seçimi üzerindeki öngördürücülüğünü değerlendirmektir.

Gereç ve Yöntemler: Ocak 2023-Nisan 2024 tarihleri arasında Medipol Bahçelievler Hastanesi'nde yapılan retrospektif çalışmada, 111 başarılı AF ablasyon hastası incelenmiştir. Hastalar, sadece pulmoner ven izolasyonu (PVI) yapılanlar ve PVI'ya ek ablasyon uygulananlar olarak iki gruba ayrılmıştır. Çalışmada, farklı skor sistemlerinin ek ablasyon ihtiyacını tahmin etme gücü değerlendirilmiştir. Ayrıca, hastaların klinik ve demografik özellikleri de analiz edilmiştir.

Bulgular: PVI'ya ek ablasyon ihtiyacı olan hastalar daha yüksek APPLE ve BASE-AF2 skorlarına sahipti. Multivariant analizde APPLE ve BASE-AF2 skorları ile long persistan AF, ek ablasyon ihtiyacının bağımsız öngördürücüleri olarak belirlenmiştir. APPLE ve BASE-AF2 skorları ROC analizi ile değerlendirildiğinde, ek ablasyon ihtiyacını öngörmede anlamlı bulunmuştur (sırasıyla AUC: 0.667 ve 0.693).

Sonuç: APPLE ve BASE-AF2 skorları, PVI sonrası ek ablasyon ihtiyacını öngörmede etkili araçlar olarak belirlenmiştir. Uzun vadede, bu skorlar kateter seçim sürecinde ve ek ablasyon ihtiyacının belirlenmesinde yardımcı olabilir. Ek ablasyon ihtiyacı olan hastalarda RFA kateterlerinin tercih edilmesi, daha geniş bir manevra kabiliyeti sağlayabilir.

Anahtar Kelimeler: Ablasyon; Atriyal fibrilasyon; APPLE skor; BASE-AF2 skor; Kriyoablasyon; Radyofrekans

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Makalemizin ilk incelemesi 07-10 Mart 2024 tarihinde Kuzey Kıbrıs Türk Cumhuriyeti'nde (KKTC) yapılan TKD Kardiyobahar Kardiyoloji Bahar Güncellemesi Toplantısında sözlü bildiri olarak sunulmuştur.

Abstract

Aim: Atrial fibrillation (AF) is a common arrhythmia that increases mortality and morbidity risks. AF can be managed with strategies for rate and rhythm control. For rhythm control, catheter ablations using thermal methods, specifically radiofrequency ablation (RFA) and cryoablation (CrA), are employed. However, the predictive value of existing scoring systems in determining the choice of ablation method has not been thoroughly investigated. This study aims to evaluate the predictive value of the CHADS2, CHA2DS2-VASc, APPLE, HATCH, and BASE-AF2 scoring systems in selecting RFA or CrA.

Material and Methods: In this retrospective study conducted at Medipol Bahçelievler Hospital between January 2023 and April 2024, 111 patients who underwent successful AF ablation were analyzed. Patients were divided into two groups: those who underwent pulmonary vein isolation (PVI) only and those who received additional ablation beyond PVI. The study assessed the ability of various scoring systems to predict the need for additional ablation and also analyzed the patients' clinical and demographic characteristics.

Results: Patients requiring additional ablation after PVI had higher APPLE and BASE-AF2 scores. Multivariate analysis identified APPLE and BASE-AF2 scores as independent predictors of long-standing persistent AF and the need for additional ablation. ROC analysis of APPLE and BASE-AF2 scores showed significant predictive value for additional ablation needs (AUC: 0.667 and 0.693, respectively).

Conclusion: APPLE and BASE-AF2 scoring systems have been identified as effective tools for predicting the need for additional ablation after PVI. In the long term, these scores may assist in catheter selection and in determining the need for additional ablation. For patients requiring additional ablation, the choice of RFA catheters may offer greater maneuverability.

Keywords: Ablation; Atrial fibrillation; APPLE score; BASE-AF2 score; Cryoablation; Radiofrequency

Giriş

Atriyal fibrilasyon (AF), yetişkinlerde kardiyoloji pratiğinde en sık görülen aritmidir ve artmış mortalite ve morbiditiyle ilişkilidir [1]. AF'nin tedavisi için iki ana strateji vardır: hız kontrolü veya ritim kontrolü. Sol atriyal ablasyon ve antiaritmik ilaç uygulamalarındaki ilerlemelerle birlikte sinüs ritminin restorasyonu ve sürdürülmesi daha uygulanabilir hale gelmiştir. Bu gelişmelerin bir sonucu olarak ritim kontrol stratejileri ön plana çıkmıştır [2]. Güncel kılavuzlar, yüksek AF yükü olan persistan AF hastalarında ve sol ventrikül disfonksiyonu olan hastalarda ritim kontrolünü önermektedir; semptomları azaltmak ve AF hastalığının ilerlemesini azaltmak için semptomatik hastalarda da ritim kontrolü önerilmektedir [3]. Kateter ablasyonu düşük ejeksiyon fraksiyonlu kalp yetmezliği (HFrEF) olan hastalarda primer fayda olarak tüm nedenlere bağlı mortaliteyi azaltma açısından üstün bir tedavi modalitesi gibi görünmektedir, önemli ölçüde daha az kardiyovasküler hastaneye yatışla sonuçlanmış ve AF tekrarını azaltmıştır [4]. Kateter ablasyonu seçenekleri termal ablasyon (radyofrekans ablasyon [RFA], kriyoablasyon [CrA]), görsel olarak yönlendirilen lazer balon ve pulsefield ablasyon modaliteleri yer almaktadır. Termal ablasyon seçenekleri (RFA ve CrA) ülkemizde aktif olarak mevcuttur [5]. RFA, atriyal dokuya nokta nokta radyofrekans akımı uygulayarak ısıtarak nekroza neden olurken, CrA, balon aracılığıyla kriyojenik enerjiyi bir seferde vererek dokuyu dondurarak nekroza neden olur [6]. AF ablasyonunda ana strateji pulmoner ven izolasyonunu sağlamaktır. Bazı hastalarda posteriyor duvar ablasyonu ve PVI dışı trigger bölge ablasyonları gerekebilir. Ek olarak, prosedür sırasında gelişebilecek atriyal flutter durumunda elektroanatomik haritalama veya kavotriküspit istmus (CTI) ablasyonu gerekebilir. RFA kateterler bu hasta grubunda önemli kolaylık sağlar [7]. AF ablasyonundan sonra rekürensi tahmin etmek için birden fazla skorlama sistemi tanımlanmıştır ancak RFA veya CrA seçimini belirlemek için net bir skor sistemi yoktur. Çalışmamızda, daha önce yayımlanmış olan 5 farklı skor sisteminin (CHADS2, CHA2DS2-VASc, APPLE, HATCH, BASE-AF2 skorları) bu seçimi yapmada tahmin gücü incelenecektir.

Gereç ve Yöntemler

Çalışma popülasyonu, tanımlar ve gruplar

Analiz, Ocak 2023'ten Nisan 2024 tarihine kadar Medipol Bahçelievler Hastanesi kardiyoloji kliniğine AF ablasyonu planı ile yatırılıp başarılı işlem uygulanan hastalarda yapılmıştır. Retrospektif olarak dizayn edilen çalışmamızda hastaların ablasyon işlem bilgileri ve özellikleri, klinikodemografik özellikleri, ekokardiyografik parametreleri ve laboratuvar

sonuçları hastanemiz kayıt sisteminden elde edilmiştir. Çalışma, Radyofrekans ablasyon ve Kriyoablasyon uygulanan, öncesinde Pulmoner ven izolasyonu (PVI) harici planı olmayan paroksismal, persistan ve long persistan AF hastalarına odaklanmıştır. İşlem öncesi dokümante AF harici atriyal aritmisi olan hastalar dışlanmıştır. Daha önceki çalışmalarda AF ablasyon sonrası rekürensi öngördürmek için kullanılan skor sistemleri PVI harici ek ablasyon ihtiyacını değerlendirmek üzere hesaplanmıştır. Çalışmamızda kullanılan 5 skor sisteminin özellikleri aşağıda sıralanmıştır.

CHADS2 skoru (1): Konjestif kalp yetmezliği (1 puan), hipertansiyon (1 puan), yaş ≥75 (1 puan), diyabetes mellitus (1 puan), önceki geçici iskemik atak veya stroke (2 puan)

CHA2DS2-VASc skoru (2): Konjestif kalp yetmezliği (1 puan), hipertansiyon (1 puan), yaş 65-74 (1 puan), diyabetes mellitus (1 puan), önceki geçici iskemik atak veya stroke (2 puan), periferal arter hastalığı (1 puan), yaş ≥ 75 (2 puan), kadın cinsiyet (1 puan)

APPLE skoru (3): yaş >65 (1 puan), persistan AF (1 puan), azalmış GFR (<60 ml/min/1,73m2) (1 puan), Sol atriyum çapı≥ 43 mm (1 puan), EF <50 (1 puan)

HATCH skoru (4): KOAH (1 puan), hipertansiyon (1 puan), yaş >75(1 puan), kalp yetmezliği (2 puan), önceki geçici iskemik atak veya stroke (2 puan)

BASE-AF2 skoru (5): Vücut kitle indeksi >28 kg/m2 (1 puan), atriyal dilatasyon >40 mm (1 puan), aktif sigara (1 puan), erken AF rekürensi (1 puan), AF süresi >6 yıl (1 puan), non-paroksismal AF (1 puan) [8].

İşlemlerin teknik arka planı

Ablasyon işlemi uygulanan tüm hastalarda ana femoral ven giriş yeri olarak kullanıldı ve transseptal geçiş ile sol atriyuma ulaşılarak ablasyonlar uygulandı. Kriyoablasyon hastalarında işlem öncesi yapılan transözefageal ekokardiyografi veya selektif pulmoner ven anjiografileri ile pulmoner venler belirlenirken Radyofrekans ablasyon hastalarında (PentaRay high density kateter aracılığıyla) CARTO haritalama sistemi (Biosense Webstar, INC.) ile elektroanatomik haritalama yöntemiyle pulmoner venler belirlendi ayrıca atriyal doku voltaj haritaları, skar düzeyleri ve anormal elektriksel aktivite bölgeleri belirlendi. 14 french FlexCath yönlendirilebilen delivery sheatler ile kriyobalonlar (Arctic Front Advance: Medtronic, Inc.) yardımıyla geniş antral ablasyonlar uygulanmıştır. Ablasyon öncesi Lasso kateter yardımıyla pulmoner ven aktiviteleri kaydedilip, kontrast enjeksiyonu yardımıyla pulmoner venin oklüzyon düzeyi gösterilmiştir. Radyofrekans ablasyonu için 3.5 mm, irrigasyonlu ve kontakt force geribildirimi olan ThermoCool SmartTouch kateterleri ile nokta-nokta geniş çevresel pulmoner ven izolasyonları yapılmıştır. Ayrıca ek ablasyon durumunda bu kateter yardımı ile ablasyonlar yapılabilinmiştir.

Tüm hastalara CrA ve RFA ile başarılı PVI uygulanırken bazı hastalarda ek ablasyon ihtiyacı olmuştur (Posteriyor duvar izolasyonu, roof line, anterior mitral line, CTI ablasyonu veya fokal ablasyonlar gibi). Çalışmanın sonlanımı olarak ek ablasyon ihtiyacı olarak belirlenmiştir. Ek ablasyon ihtiyacı RFA kateter tercihini ön plana çıkarmaktadır.

Çalışma protokolü İstanbul Medipol Üniversitesi Girişimsel Olmayan Klinik Araştırmalar Etik Kurulu'ndan onay almış (Karar tarihi: 22.05.2024, karar no: 557) ve araştırmamız Helsinki Bildirgesi ve onun beyanında belirtilen etik ilkelere uygun olarak yürütülmüştür.

İstatistiksel Analiz

Elde edilen veriler "Windows Statistical Package For Social Sciences (SPSS) 23.0" kullanılarak analiz edildi. Sürekli değişkenler ortalama ± standart sapma ya da medyan ve çeyrekler açıklığı (25. persentil - 75. persentil) olarak tanımlandı ve kategorik değişkenler yüzde olarak ifade edildi. Kolmogorov-Smirnov ve Shapiro-Wilk testlerinin de kullanıldığı normallik analizlerinden sonra, dağılımın normal ya da normal olmama durumlarına göre sürekli değişkenler Mann-Whitney U testi veya Student t-testi ile karşılaştırıldı. Kategorik değişkenler Ki-kare testi ya da Fisher's Exact test ile karşılaştırıldı. Pulmoner ven izolasyonu yapılan hastalarda gelişebilecek ek ablasyon ihtiyacının bağımsız öngörücülerini bulmak için ikili analizlerde anlamlı çıkan 3 farklı skoru içeren, 3 farklı model halinde çok değişkenli (multivariate) lojistik regresyon analizi yapıldı. Çok değişkenli model, tek değişkenli (univariate) regresyon analizinde anlamlı ölçüde ilişkili bulunan ($p<0,05$) tüm değişkenleri içeriyordu. Regresyon analizinde bağımsız öngörücü olduğu tespit edilen APPLE ve BASE-AF2 skorları için ROC (Alıcı İşlem Karakteristiği) analizi yapıldı. p değeri 0,05'den küçük hesaplandığında istatistiksel olarak anlamlı kabul edildi.

Bulgular

Ocak 2023 ve Nisan 2024 tarihleri arasında paroksismal, persistan ve long persistan AF bulunun 111 başarılı AF ablasyon hastası çalışmaya dahil edildi. Hastalar sadece PVI uygulanan ve PVI'a ek ablasyon uygulanan hastalar olarak iki ayrı gruba ayrıldı. 64 hastaya

sadece PVI uygulanırken 47 hastaya PVI'a ek ablasyon (28 hastada CTI ablasyonu, 7 hastada roof ve/veya anterior mitral line, 8 hastada posteriyor duvar ablasyonu ve 21 hastaya da fokal ablasyonlar) uygulanmıştır. İki grup incelendiğinde hastaların yaş ortalamaları, cinsiyet dağılımları, hipertansiyon, ejeksiyon fraksiyonu ve kalp yetmezliği durumları benzer dağılım göstermektedir. PVI ek ablasyon uygulanan grupta diyabetik hasta sayısı (n=13) ve oranı (%27,7) daha fazladır ve istatiksel olarak da anlamlıdır (p=0,012). Gruplar AF tipi açısından incelendiğinde long persistan AF hasta sayısı istatistiksel olarak PVI ek ablasyon uygulanan grupta daha fazladır (p=0,002). PVI ek ablasyon uygulanan hastaların sol atriyum çap ortalamaları (43,83 ± 4,80 mm) sadece PVI uygulanan grubun sol atriyum çap ortalamalarından (41,44 ± 3,99) yaklaşık olarak 2,4 mm daha büyük saptanmış olup istatistiksel olarak anlamlıdır (p=0,005). Gruplar arasındaki demografik, klinik ve laboratuvar özellikleri Tablo 1'de gösterilmiştir.

PVI ek ablasyonu ihtiyacının öngördürücülerini incelemek amacıyla yapılan univariate lojistik regresyon analizinde CHADS2 skoru (p=0,013), APPLE skoru (p=0,003), diyabet (p=0,015), BASE-AF2 skoru (p<0,001), HATCH skoru (p=0,029), long persitan AF (p=0,001) ve sol atriyum çapı (p=0,007) ek ablasyon ihtiyacı ile ilişkiliydi. Multivariant lojistik regresyon analizinde APPLE skoru (p=0,021), BASE-AF2 skoru (p=0,002) ve AF'nin long persistan olması (p=0,014) bağımsız öngördürücüler olarak saptandı (Tablo 2). Multivariate analizde sol atriyum çapı prediktör olarak saptanmadığından ek ablasyon ihtiyacı belirleme durumunda sınır sol atriyum çapı değerlendirilmesi için ROC eğrisi oluşturulamamıştır.

Tablo 1. Hastaların demografik, klinik ve bazı laboratuvar özellikleri

Değişkenler	Sadece PVI (n = 64)	PVI + Ek ablasyon (n = 47)	P değeri
Yaş, yıl	57,05 ± 14,33	58,85 ±12,73	0,552
Kadın cinsiyet	35 (54,7)	28 (59,6)	0,608
Diyabet	6 (9,4)	13 (27,7)	0,012
SVO	1 (1,6)	4 (8,5)	0,161
Hipertansiyon	38 (59,4)	28 (59,6)	0,983
Kalp yetmezliği	11 (17,2)	15 (31,9)	0,070
KAH	25 (39,1)	21 (44,7)	0,553
Sigara	17 (26,6)	12 (25,5)	0,903
VKİ, kg/m2	27,47 (24,65-31,94)	29,17 (26,45-31,59)	0,291
AF tipi			0,002
Paroksismal	38 (59,4)	17 (36,2)	
Persistan	22 (34,4)	16 (34,0)	
Long persistan	4 (6,3)	14 (29,8)	
Uyku apnesi	2 (3,1)	4 (8,5)	0,398
LVEF, %	60,00 (55,00-60,00)	55,00 (45,00-60,00)	0,052
LA çapı, mm	41,44 ± 3,99	43,83 ± 4,80	0,005
CHADS2 skoru	1,00 (0,00-1,00)	1,00 (1,00-2,00)	0,009
CHA2DS2-VASc skoru	2,00 (1,00-3,00)	3,00 (1,00-4,00)	0,198
APPLE skoru	1,00 (0,00-2,00)	2,00 (1,00-3,00)	0,002
HATCH skoru	1,00 (0,00-1,50)	1,00 (1,00-3,00)	0,023
BASE AF2 skoru	1,50 (1,00-3,00)	3,00 (2,00-3,00)	<0,001
WBC, x10^3/mm^3	7,40 (6,50-9,56)	7,26 (6,70-9,32)	0,361
Hemoglobin, g/dL	12,90 (12,25-14,60)	13,50 (13,0-14,20)	0,183
Kreatinin, mg/dL	0,94 (0,82-1,05)	0,90 (0,80-0,98)	0,548

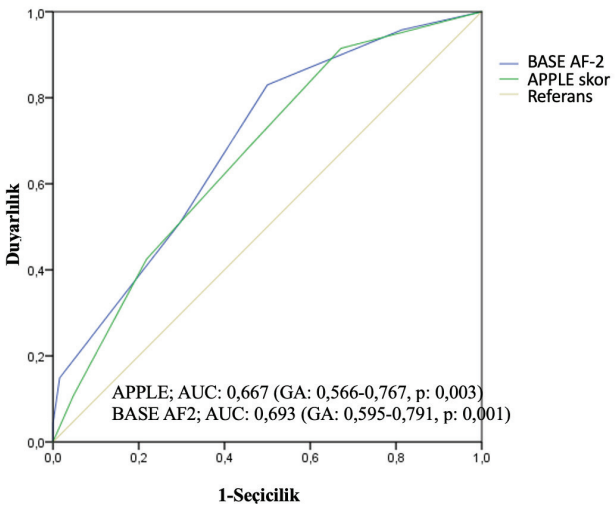
*Veriler ortalama ± standart sapma, sayı (yüzde), medyan (25.-75. persentiller veya çeyrekler açıklığı da denebilir) olarak ifade edilmiştir. PVI, Pulmoner ven izolasyonu; SVO, Serebrovasküler olay; KAH, Koroner arter hastalığı, VKİ, Vücut kitle indeksi; AF, Atrial fibrilasyon; LVEF, Sol ventrikül ejeksiyon fraksiyonu; LA, Sol atrium; p<0,05 istatistiksel anlamlılık düzeyini gösterir.

Tablo 2. PVI yapılan hastalarda ek ablasyonun öngörücüleri için CHADS2, APPLE, BASE AF2, HATCH skorlarını içeren 3 farklı model halinde lojistik regresyon analizi

Değişkenler	Univariate analiz			Multivariate analiz		
	OR	95% GA	p	OR	95% GA	p
Model 1						
CHADS2	1,748	1,127-2,710	0,013	1,457	0,907-2,342	0,120
AF tipi						
Persistan	1,626	0,687-3,847	0,269	1,298	0,534-3,213	0,573
Long persistan	7,824	2,242-27,299	0,001	5,306	1,424-19,771	0,013
LA çapı	1,137	1,035-1,249	0,007	1,075	0,966-1,196	0,186
Model 2						
APPLE skoru	1,647	1,186-2,285	0,003	1,507	1,064-2,133	0,021
Diyabet	3,696	1,286-10,625	0,015	2,356	0,758-7,319	0,138
Model 3						
BASE AF2 skoru	1,967	1,355-2,857	<0,001	1,818	1,242-2,662	0,002
Diyabet	3,696	1,286-10,625	0,015	2,321	0,740-7,281	0,149
Model 4						
HATCH skoru	1,482	1,042-2,107	0,029	1,171	0,770-1,782	0,461
Diyabet	3,696	1,286-10,625	0,015	2,366	0,712-7,864	0,160
AF tipi						
Persistan	1,626	0,687-3,847	0,269	1,282	0,509-3,230	0,599
Long persistan	7,824	2,242-27,299	0,001	5,256	1,398-19,754	0,014
LA çapı	1,137	1,035-1,249	0,007	1,073	0,964-1,195	0,197

PVI, Pulmoner ven izolasyonu; AF, Atrial fibrilasyon; LA, Sol atrium; OR, odds oranı; GA, güven aralığı; p<0,05 istatistiksel anlamlılık düzeyini gösterir

Pulmoner ven izolasyonlu hastalarda gelişen ek ablasyon ihtiyacının, bağımsız öngördürücüleri olduğundan APPLE ve BASE AF2 skorları için ROC eğrisi altında kalan alan oluşturuldu (sırasıyla; AUC: 0.667, %95 güven aralığı [GA]: 0,566-0,767, p: 0,003; AUC: 0.693, %95 GA: 0,595-0,791, p: 0,001). APPLE skor, %70 duyarlılık, %55 seçicilikle ≥2 kesme noktasında, BASE AF2 skor, %83 duyarlılık, %50 seçicilikle ≥2 kesme noktasında pulmoner ven izolasyonu yapılan hastalarda ek ablasyon ihtiyacı gelişip gelişmeyeceğini öngördü (Şekil 1).



Şekil 1. Pulmoner ven izolasyonu + ek ablasyon için APPLE ve BASE AF-2 skorlarının ROC eğrisi AUC, eğrinin altında kalan alan; GA, güven aralığı.

Tartışma

Bu çalışmanın amacı, hasta popülasyonumuzda AF ablasyonu modalitelerinden RFA veya CrA tercihi yaparken ablasyon sonrası AF tekrarını tahmin etmek için daha önce yayınlanmış beş skorun PVI ek ablasyon ihtiyacının öngörü değerini karşılaştırmak ve ayrıca ek ablasyon ihtiyacını öngören klinik değişkenleri belirlemektir. Biz çalışmamızda APPLE skoru ve BASE-AF2 skorunu istatiksel olarak anlamlı ve öngördürücü olarak tespit ettik. Multivariate analizde ayrıca AF'nin long persistan olmasının ek ablasyon ihtiyacını öngördürdüğünü belirlemiş olduk.

Güncel kılavuzlar semptomatik paroksismal AF ve medikal tedaviye rağmen semptomatik persistan AF hastalarına kateter ablasyonu önermektedir. Bu önerilerinde CrA veya RFA modalite tercihi belirtilmemektedir[9]. AF ablasyonu stratejisi olarak öncelikle PVI önermektedir. PVI yapılırken en sık kullanılan RFA ve CrA modalatileri birçok çalışmada işlem başarısı, nüks ve yeniden işlem ihtiyacı açısından karşılaştırılmıştır. Kuck ve ark. 2016 yılında yayınladığı çok merkezli, randomize, 762 hastanın incelendiği bir çalışmada kriyoablasyonun semptomatik paroksismal atriyal fibrilasyon ablasyonunda RF ablasyona noninferior olduğunu göstermiştir. Çalışmamızda kriyobalon ve RF kıyaslamasından ziyade ek ablasyon ihtiyacının işlem öncesi belirlenebilirliği ve RFA kateterlerin tercih gerekçesi vurgulanmaktadır [10].

Persistan ve long persistan AF hastalarında sadece PVI sonrası sinüs ritim devamlılığı paroksismal AF hastalarına göre daha düşüktür. Bu nedenle PVI dışı trigger bölgelerin (posteriyor duvar, sol atriyal appekdiks, krista terminalis, süperior vena cava, Marshall ligamanı ve koroner sinüs gibi) ablasyonunun sinüs ritim idamesi için faydalı olabileceği düşünülmektedir. Güncel verilere paralel olarak çalışmamızda long peristan AF hastalarında anlamlı olarak ek ablasyon ihtiyacı olmakta idi ve RFA kateterleri bu ihtiyacın yerine gelmesinde rol oynamaktadır [11]. Ablasyon uygulanan AF hastalarında AF nüksü haricinde en sık atrial taşiaritmiler görülmektedir ve bunların bir kısmını CTI bağımlı tipik veya atipik flutter ritimleri oluşturmaktadır. Güncel kılavuzlar önceki dökümante atrial flutter (AFL) veya indüklenmiş AFL haricinde AF ablasyon hastalarında rutin CTI ablasyonunu önermemektedir. AF ablasyonu sonrası AFL gelişim prediktörleri birçok çalışmada incelenmiştir. Bunların bazıları sağ atrium volüm indeks, sağ atriyal çap ve TAPSE'dir. Scharf ve ark. işlem sırasında CTI ablasyonu yapılmadığında takipte AF ablasyonu uygulanan hastaların üçte birinde tipik AFL geliştiğini göstermiştir [12, 13]. Çalışmamızda ek ablasyon olarak 28 hastaya CTI uygulanmıştır. Bu hastalarda indüklenmiş AFL durumu ve net belirgin prediktör varlığı durumunda operatör tarafından bu karar verilmiştir. Ek ablasyon ihtiyacının APPLE ve BASE-AF2 skor sistemleri ile önceden belirlenmesi kateter tercihini etkileyerek AFL gibi ritimlerin işlemde yönetilmesini kolaylaştıracaktır

Kornej ve ark. APPLE skorunun AF ablasyonu sonrası bir yıllık takipte ritim sonuçlarını öngördürmede CHADS ve CHADS2-VAS skorlarına üstün olduğunu göstermişlerdir. APPLE skoru 0 olan hastalarla karşılaştırıldığında skor 1,2 ve ≥3 olan hastalarda AF rekürensi sırasıyla 1.73, 2.79 ve 4.70 kat artmaktaydı [14]. BASE-AF2 skoru yine AF ablasyon sonrası rekürens amacıyla kullanılan bir skorlama sistemidir. Canpolat ve ark. 236 CrA hastasının median 20 aylık takibinde BASE-AF2 skorunun ≥3 olması rekürens öngördürücüsü olarak bulmuşlardır [15]. Kullanımı pratik olan bu skorlama sistemleri ablasyon sonrası rekürens haricinde ek ablasyon ihtiyacını öngördürdüğü çalışmamızla gösterilmiştir. APPLE skor ≥2 ve BASE-AF2 skor ≥2 olması durumu kateter tercihini etkileyebileceği değerlendirilmektedir.

Duvar gerimi sonrası salınan kardiyak endotelin-1, miyosit hipertrofisi ve interstisyal fibrozise neden olmaktadır ve bu durum sol atriyal genişlemeyle koreledir. Sol atriyum genişlemesi yeni AF gelişmesiyle ilişklidir. Ayrıca ablasyon sonrası rekürens öngördürcüsü olarak kullanılmaktadır. Sol atriyumun anterior-posterior çapı atriyum boyutunu yansıtmamaktadır bu nedenle sol atriyal volüm (LAV) ve sol atriyal volüm indeksi (LAVi) daha efektif sonuçlar sunmaktadır. Geniş çaplı bir metaanalizde AF ablasyonu sonrası AF rekürensi olan hastaların LAV/LAVi'leri rekürensi olmayan hastalara kıyasla önemli ölçüde daha yüksekti, LA boyutlarındaki fark ve artan LA boyutuna bağlı AF rekürens riski orta düzeyde bulunmuştur [16]. Birçok merkezde sol atriyum çapı RF veya CrA tercihi yapmakta önemli rol oynamaktadır. Çalışmamızda sol atriyum çapı ek ablasyon ihtiyacını belirlemede bir prediktör olarak saptanmadı ancak prediktör olarak tespit edilen APPLE skor ve BASE-AF2 skorlarında puana katkı sağlayan bir faktör olarak etkisini korumaktadır.

Sonuç

Sonuç olarak çalışmamızda PVI'ya ek ablasyon ihtiyacını kolay hesaplanabilen APPLE ve BASE-AF2 skorları öngörmektedirler. Ayrıca long persistan AF durumu da bir öngördürücüdür. RFA veya CrA tercih süreci karmaşıktır, bu sürece basit hesaplanabilen skor sistemleri katkı sağlayabilmektedir. Ek ablasyon ihtiyacı öngörülen hastalarda RFA kateterleri daha geniş bir manevra kabiliyeti sağlayabilir.

Maddi Destek ve Çıkar İlişkisi

Çalışmayı maddi olarak destekleyen kişi/kuruluş yoktur ve yazarların herhangi bir çıkar dayalı ilişkisi yoktur.

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Research Article

Understanding hypothyroidism: A comprehensive readability survey of health information sources

Hipotiroidinin anlaşılması: sağlıkta bilgi kaynaklarının okunabilirliğine yönelik kapsamlı bir inceleme

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Abstract

Aim: The objective of this study is to evaluate the readability of Turkish-language online health information on hypothyroidism, a common endocrine disorder and to determine whether this information is sufficiently comprehensible for patients.

Material and Methods: A descriptive document analysis was conducted using the Ateşman readability formula to evaluate the readability of Turkish websites providing information on hypothyroidism. The study analyzed 52 websites, chosen from the first 100 results in Google searches for "What is hypothyroidism?" (in Turkish). The sources of these websites were categorized into health professionals, private institutions, university hospitals, medical laboratories, and others. The average Word length (AWL) and average sentence length (ASL) were calculated for each website, and readability scores were analyzed.

Results: The AWL ranged from 2.64 to 3.17 syllables, and the ASL ranged from 5.2 to 14.2 words per sentence. The average Ateşman readability score was 58.8 ± 6.4, indicating a moderate difficulty level. Of the websites, 86.5% were moderately difficult, 9.6% difficult, and 3.8% easy to read. No significant differences were found between different website sources regarding readability scores ($p > 0.05$).

Conclusion: The study found that Turkish online information regarding hypothyroidism is moderately difficult to read, which may hinder accessibility for individuals with lower educational levels. Simplifying these resources could improve public understanding and patient engagement in managing hypothyroidism.

Keywords: hypothyroidism, readability, health information

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Öz

Amaç: Bu çalışmanın amacı, yaygın bir endokrin hastalık olan hipotiroidi ile ilgili Türkçe dilindeki çevrimiçi sağlık bilgilerinin okunabilirliğini değerlendirmek ve bu bilgilerin hastalar tarafından yeterince anlaşılabilir olup olmadığını belirlemektir.

Gereç ve Yöntemler: Bu tanımlayıcı çalışmada, hipotiroidi hakkında bilgi sağlayan Türkçe web sitelerinin okunabilirliği Ateşman okunabilirlik formülü kullanılarak analiz edilmiştir. Çalışmada, Google aramalarında "hipotiroidi nedir" ifadesiyle ulaşılan ilk 100 sonuç arasından 52 uygun web sitesi incelenmiştir. Bu web sitelerinin kaynakları; sağlık profesyonelleri, özel sağlık kurumları, üniversite hastaneleri, tıbbi merkez ve laboratuvarlar ve diğerleri olarak sınıflandırılmıştır. Her web sitesi için ortalama kelime uzunluğu (OSU) ve ortalama cümle uzunluğu (OCU) hesaplanmış ve okunabilirlik puanları analiz edilmiştir.

Bulgular: OSU 2.64 ile 3.17 hece arasında değişirken, OCU cümle başına 5.2 ile 14.2 kelime arasında değişmiştir. Ortalama Ateşman okunabilirlik puanı 58.8 ± 6.4 olup, orta zorluk seviyesini işaret etmektedir. Web sitelerinin %86.5'i orta zorlukta, %9.6'sı zor ve %3.8'i kolay olarak sınıflandırılmıştır. Farklı web sitesi kaynakları arasında okunabilirlik puanları açısından anlamlı bir fark bulunmamıştır ($p > 0.05$).

Sonuç: Bu çalışma, hipotiroidi ile ilgili Türkçe çevrimiçi bilgilerin orta derecede zor olduğunu ve bu durumun düşük eğitim seviyesine sahip bireyler için erişilebilirliği sınırlayabileceğini göstermiştir. Bu kaynakların sadeleştirilmesi, halkın anlayışını ve hastaların hipotiroidi yönetimine katılımını artırabilir.

Anahtar Kelimeler: hipotiroidizm, okunabilirlik, sağlık bilgisi

Introduction

Advancements in information technologies and the increasing prevalence of internet usage have significantly improved access to health-related information. Research conducted by the Turkish Statistical Institute on internet usage rates among individuals aged 16 to 74 years have shown a rapid annual increase, reaching 72.9% in 2019. This study has also found that the most common purpose for using the internet, at a rate of 69.8%, is searching for health-related information [1]. Additionally, international studies corroborate that the internet is the primary resource for individuals seeking medical information, with approximately 85% of patients engaging in online research about health conditions prior to consulting with a physician [2,3].

In terms of health-related content, the readability of the information is as crucial as its reliability and comprehensibility [4]. Readability refers to the ease with which a reader can understand written text [5]. Various methods, formulas, and indexes are utilized in readability analyses, with commonly preferred formulas including the SMOG-Simple measure, Gunning-Fog index, Flesch-Kincaid grade level, and the ARI-Automatic Readability Index. For Turkish texts, the Ateşman readability index, tailored to the linguistic structure and based on average word and sentence lengths, is especially notable [6,7]. According to the Ateşman readability index, texts rated between 90-100 are considered very easy, 70-89 easy, 50-69 of medium difficulty, 30-49 difficult, and 1-29 very difficult to understand [8] (Table 1).

Table 1. Readability Classification According to the Ateşman Readability Formula

Readability Level	Score Range
Very Difficult	1-29
Difficult	30-49
Moderate	50-69
Easy	70-89
Very Easy	90-100

Hypothyroidism is a commonly encountered chronic disease in the general population, with its prevalence, including subclinical forms, reaching up to 12%, and it is more frequently observed in women [9]. The symptoms of hypothyroidism, such as weight gain, fatigue, sleep and mood disturbances, and constipation, are commonly observed. Hypothyroidism is a condition that is susceptible to misinformation, requiring significant patient involvement in its treatment and a substantial need for accurate information. Therefore, as a readily accessible source of information, itis critically important that internet content on hypothyroidism is accurate, reliable, and readable.

This study aims to assess the readability levels of written content on online platforms regarding hypothyroidism and to examine how comprehensible this information is to the general population.

Material and Methods

This study is a descriptive research based on document analysis conducted to assess Turkish content related to patient education and information on hypothyroidism. It is based on

publicly available information, does not include human subjects or patient data, and therefore does not require ethical approval.

For this study, the search phrase used to access Turkish websites offering information on hypothyroidism was determined by selecting “Türkiye” as the location in Google Trends. The most frequently used search term identified in Google Trends for hypothyroidism was " what is hypothyroidism "in Turkish (as “hipotiroidi nedir”). Searches were conducted using the term "what is hypothyroidism" on Google between August 14 and 17, 2024, by a single researcher using a single computer, after setting the search parameters to the Turkish language and location in Turkey. The first 100 web pages from the top 10 search result pages were included in the study. The sources of these texts were categorized into health professionals, private health institutions, university hospitals, medical laboratories or centers, and others.

Only publicly accessible Turkish websites that provide information on hypothyroidism without requiring membership were included. Websites that required membership, mandated cookie settings acceptance, offered only video content instead of written text, were not in Turkish, did not contain information about hypothyroidism, were promotional for specific products, or contained texts shorter than 20 sentences, as well as academic articles, forum sites, sites designed for health professionals, commercially oriented sites, sites with product advertisements, and sites with repetitive content were excluded from the study.

The texts from the included websites were transferred to a free online readability calculator (http://okunabilirlikindeksi.com/) that uses the Ateşman readability formula to determine their readability levels. This calculation engine utilizes the Flesch readability formula, adapted to Turkish by Ateşman in 1997 [8]. This formula estimates the readability levels of texts based on the total number of syllables, words, and sentences. The detailed formula is as follows: Readability Score = 198.825 - 40.175 × (total syllables/total words) - 2.610 × (total words/total sentences).

The Ateşman Readability Formula considers groups of words ending with a period (.), question mark (?), exclamation point (!), or ellipsis (…) as sentences. Sequential clauses separated by commas (,) are treated as a single sentence. The average word length (AWL) is calculated by taking the mean number of syllables per word, while the average sentence length (ASL) is determined by the mean number of words per sentence. Using the Ateşman Readability Formula, readability scores between 1 and 100 are obtained. These scores are categorized into five distinct readability levels. Details of the Ateşman readability classification are presented in Table 1. In this study, the number of sentences, words, and syllables were calculated according to the formula, and the data were recorded in a Microsoft Excel file. Readability levels for each text were scored and classified according to the Ateşman formula.

Statistical Analysis

Statistical analyses were conducted using SPSS 24 (SPSS Inc., Chicago, IL, USA). The Kolmogorov-Smirnov test was employed to assess the normality of distributions. Based on the assessment of normal distribution, descriptive statistics were presented as medians with interquartile ranges. For comparisons involving more than two groups where quantitative variables did not follow a normal distribution, the Kruskal- Wallis test was utilized. A significance level was set at $p < 0.05$ for all statistical tests.

Results

Of the initial 100 websites evaluated, 52 met the inclusion criteria. Upon examining the sources of the texts included in the study, 40% were authored by health professionals, 31% by private health institutions, 13% by medical laboratories or medical centers, 6% by university hospitals, and 10% by other sources. The distribution of websites according to the institutions hosting them is illustrated in Figure 1.

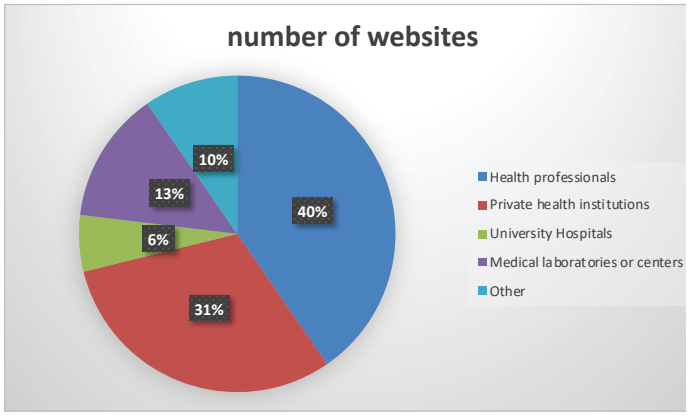

Figure 1. Number of Websites by Hosting Institutions

The AWL values of the websites included in the study ranged from 2.64 to 3.17, while the ASL varied between 5.2 and 14.2, as determined by the Ateşman readability formula. The average Ateşman readability score was found to be 58.8 ± 6.4. According to the findings aligned with the Ateşman readability index, 9.6% of the websites were categorized as difficult, 3.8% as easy, and 86.5% as moderately difficult. No websites were found with very easy or very difficult readability levels. Readability values for each of the five groups are presented in Table 2. Our study found no significant differences in AWL, ASL, or readability scores among the website sources ($p = 0.699, 0.093, 0.161$).

Table 2: Median Readability and Statistical Analysis of Websites by Source			
	Websites	Median (Interquartile Interval)	P
AWL	University hospitals	2.89 [2.89-2.91]	0.699
	Other	2.76 [2.76-2.89]	
	Medical laboratories or centers	2.85 [2.8-2.91]	
	Private health institutions	2.91 [2.85-2.95]	
	Health professionals	2.89 [2.8-2.93]	
ASL	University hospitals	11.3 [10.25-11.6]	0.093
	Other	6.9 [5.9-7.4]	
	Medical laboratories or centers	9.2 [8.35-9.65]	
	Private health institutions	8.55 [8.1-10.4]	
	Health professionals	9.5[8-11.4]	
Readability Value	University hospitals	53.2 [52.45-55.15]	0.161
	Other	67.3 [61.6-68.6]	
	Medical laboratories or centers	60.3 [55.1-64.55]	
	Private health institutions	59.6 [54.65-61.6]	
	Health professionals	58.7 [54.5-62.1]	
AWL: Average Word length ASL: average sentence length. Statistical significance was set at $p < 0.05$.			

Discussion

This study is significant as it is the first to analyze the readability of Turkish-written texts on the internet concerning 'hypothyroidism' a condition frequently encountered in our country. Our findings revealed that the average readability level of the texts is of moderate difficulty (58.8±6.4), and no significant differences were found in readability levels between different sites and author groups.

The advancements brought by modern technology have greatly facilitated access to information. This ease of access lays the groundwork for individuals to seek answers to health-related questions through online platforms before consulting a health professional [10]. Studies indicate that more than 70% of adults acquire health information from the internet, and over 30% attempt to diagnose a health condition on their own or for someone they care for [11]. As a result, an increasing number of doctors and health professionals are sharing health-related content online. Patients access this information using search engines, which influences their adherence to treatment processes. It is well-known that information obtained from accessible and reliable sources positively supports the patient's treatment journey [12]. The educational level of readers is a determining factor in the comprehension of texts; there is a linear relationship between reading and comprehension levels [13,14]. Especially for online health publications, aligning with the literacy levels of the community is essential for ensuring text comprehensibility [4]. According to Ateşman, the average sentence length in Turkish is 9–10 words, and the average word length is 2.6 syllables [8]. It has been reported that enhancing the readability of health-related information should involve limiting sentences to 8-10 words and using simpler terms instead of complex medical jargon [15]. In our study, the average word length was found to be 2.89 syllables, and the average sentence length was 9.05 words, aligning with the expected values.

The 2011 Human Development Report indicated that the average duration of education for individuals aged 15 and above was 6.5 years; similarly, the other study conducted in 2018-2019 reported an average of 8.2 years. More recently, studies conducted in 2023 found that the average education duration for adults over the age of 25 was 9.3 years, which remains below the level of high school education [16-18]. Studies suggest that for individuals without medical training to comprehend medical content, the readability of such texts should be at a 6th grade level or lower [19]. Given this, the need for informative texts to be written in a clear and simple language becomes evident.

The increasing prevalence of hypothyroidism in older adults, the extensive considerations required for using levothyroxine sodium in medical treatment (including the timing of intake, interactions with other medications and food), and the critical need to understand the symptoms that can occur from incorrect dosing all highlight the necessity for easily accessible and understandable texts about hypothyroidism [9]. Additionally,

the need for a diet alongside medical treatment further emphasizes the importance of such information. Considering the literacy levels of our country's readership, the readability of texts available online is of paramount importance.

In the literature, numerous studies have used the Ateşman scale to evaluate the readability of web-based informative texts concerning medical conditions. Similar to our results, a study by Otu et al., which assessed 80 websites related to fibromyalgia, found the readability index to be at a moderate level [20]. In another study on colorectal cancer, the median Ateşman readability score was determined to be 50.81, indicating a moderate level of readability; no significant differences were found in readability among the classified website sources [21]. In the study by Sezin and colleagues, 73 websites concerning hoarseness were evaluated, and the Ateşman readability score was found to be 62.3, also at a moderate level [22]. Although a study examining web-based texts on dizziness found the readability score to be 72.3, indicating an easy readability level, no statistically significant differences were observed when the texts were classified according to their sources [23].

When examined according to the sources of the websites, it is encouraging to find that readability levels are generally similar and that authors with academic titles also share texts that are of a moderate level of readability. This situation facilitates patients' access to reliable information; however, it is observed that all sites are comprehensible to individuals with at least a middle school education. Nevertheless, considering the literacy levels in our country, there is a need to further simplify these texts to ensure they are accessible to a broader audience, including those with basic educational backgrounds.

While studies on the reliability of online resources in Turkey are lacking, research examining the readability and reliability of online information regarding hypothyroidism and hyperthyroidism in English and Spanish has revealed that the sources generally demonstrate poor readability and reliability [24].

This study has several limitations. One primary constraint is that the Ateşman formula relies solely on written texts and does not assess comprehensibility. Traditional readability formulas, such as those developed by Ateşman (1997) and Bezirci-Yılmaz (2010), are based on superficial features of texts (syllable, word, and sentence lengths) and do not fully reflect their comprehensibility. For instance, if valid and reliable Turkish versions of tools like the Patient Education Materials Assessment Tool (PEMAT) are developed, future studies could evaluate comprehensibility alongside readability [25]. Additionally, since the Ateşman formula is limited to counting syllables, words, and sentences, it may be inadequate for measuring the readability of visual materials, such as graphics and tables [26]. The most recent formula for assessing Turkish readability was developed in 2010, and since then, efforts have been ongoing to create new scales that can more comprehensively and accurately evaluate the readability and comprehensibility of Turkish texts. In a similar vein, a study has taken steps toward developing an artificial intelligence-based readability formula for the Turkish language [27]. Future research should focus on creating more comprehensive assessment tools that include the readability of tables, graphics, and other visual content.

Conclusion

This study highlights the essential need for readily understandable and accessible information on hypothyroidism. The findings indicate a moderate level of readability across different online sources discussing hypothyroidism and suggest that while health information is somewhat accessible, there is room for improvement to better meet the needs of the general population.

Conflict of Interest/ Funding

Authors declare no conflict of interest.

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Research Article

The effect of training on reducing environmental stressors given to nurses on intensive care patients' perception of the presence of the nurse

Yoğun bakım hastalarının hemşirenin varlığını algılamalarında hemşirelere verilen çevresel stresörleri azaltmaya yönelik eğitimin etkisi

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Abstract

Aim: The environmental characteristics of intensive care units include many stressors for patients. It is very important for nurses to recognize these stressors affecting the patient in intensive care units and develop solutions. In this way, patients' exposure to stressors decreases and they feel cared by the nurse. The purpose of this study is to examine the effect of training on reducing environmental stressors given to nurses on intensive care patients' perception of the presence of the nurse.

Material and Methods: The study is a quasi-experimental, separate sample group intervention study. The study was conducted in two groups: nurses working in the cardiovascular surgery intensive care unit and patients cared for by these nurses. The sample of the study consisted of 13 nurses working in the cardiovascular surgery intensive care unit and 66 patients, 33 before and 33 after the training. The nurses were given a 12-hour training to reduce environmental stressors in the intensive care environment. The study data were collected by interviewing the patients cared for by the nurses before and after the training. The 'Patient Information Form', 'The Intensive Care Unit Environmental Stressors Scale', 'The Intensive Care Experience Scale' and 'The Nurse Presence Scale' were used for the data collected from the patients. The data belonging to the nurses were obtained with the 'Nurse Information Form'. SPSS 23.0 package program was used in the analysis of the data obtained in the study.

Results: After the environmental stress factor reduction training provided to the nurses, an increase was observed in patients' perceptions of the nurse's presence and positive experiences in the intensive care unit, while no significant change was seen in the level of perception of environmental stress factors in the intensive care unit

Conclusion: It was concluded that the 12-hour training given to intensive care nurses positively affected patients' perception of the presence of the nurse, was effective in patients' positive intensive care experiences and was more effective on physiopathologic stressors affecting patients.

Keywords: Presence of the nurse, Intensive care, Intensive care nurse, Intensive care stressors

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Öz

Amaç: Yoğun bakım ünitelerinin çevresel özellikleri hastalar için birçok stres faktörü içermektedir. Hemşirelerin yoğun bakım ünitelerinde hastayı etkileyen bu stres faktörlerini tanımaları ve çözümler geliştirmeleri oldukça önemlidir. Bu şekilde hastaların stres faktörlerine maruziyeti azalır ve hemşire tarafından önemsendiklerini hissederler. Bu çalışmanın amacı hemşirelere verilen çevresel stres faktörlerini azaltma eğitiminin yoğun bakım hastalarının hemşirenin varlığına ilişkin algıları üzerindeki etkisini incelemektir.

Gereç ve Yöntemler: Araştırma yarı deneysel, ayrı örneklem gruplu bir müdahale çalışmasıdır. Araştırma, kalp ve damar cerrahisi yoğun bakım ünitesinde çalışan hemşireler ve bu hemşirelerin bakım verdiği hastalar olmak üzere iki grupta yürütülmüştür. Araştırmanın örneklemini, kalp ve damar cerrahisi yoğun bakım ünitesinde çalışan hemşireler için toplam 13 hemşire ve hastalar için eğitim öncesi 33, eğitim sonrası 33 olmak üzere toplam 66 hasta oluşturmuştur. Hemşirelere yoğun bakım ortamında çevresel stresörleri azaltmak için 12 saatlik bir eğitim verilmiştir. Araştırma verileri, hemşirelerin bakım verdiği hastalarla eğitim öncesi ve sonrası görüşülerek toplanmıştır. Hastalardan toplanan veriler için 'Hasta Bilgi Formu', 'Yoğun Bakım Ünitesi Çevresel Stresörler Ölçeği', 'Yoğun Bakım Deneyim Ölçeği' ve 'Hemşirenin Varlığı Ölçeği' kullanılmıştır. Hemşirelere ait veriler ise 'Hemşire Bilgi Formu' ile elde edilmiştir. Çalışmada elde edilen verilerin analizinde SPSS 23.0 paket programı kullanılmıştır.

Bulgular: Hemşirelere verilen çevresel stres faktörünü azaltma eğitimi sonrasında, hastaların yoğun bakım ünitesinde hemşirenin varlığına ilişkin algılarında ve olumlu deneyimlerinde artış gözlenirken, yoğun bakım ünitesinde çevresel stres faktörlerinin algılanma düzeyinde anlamlı bir değişiklik görülmedi.

Sonuçlar: Yoğun bakım hemşirelerine verilen 12 saatlik eğitimin, hastaların hemşirenin varlığına ilişkin algılarını olumlu yönde etkilediği, hastaların olumlu yoğun bakım deneyimlerinde etkili olduğu ve hastaları etkileyen fizyopatolojik stres faktörleri üzerinde daha etkili olduğu sonucuna varıldı.

Anahtar Kelimeler: Hemşirenin varlığı, Yoğun bakım, Yoğun bakım hemşiresi, Yoğun bakım stresörleri

Introduction

Intensive care units (ICU) are places where the vital signs of patients with clinically critical conditions are monitored for 24 hours, their treatments are maintained, nursing care is administered, and complex technological devices are used (1, 2).

The environmental characteristics of intensive care units include many physiopathologic and psychosocial stressors for patients (3-5). Physiopathologic stressors encountered by patients in intensive care units include changes in sleep-wake rhythm, pain (6,7), sudden changes in body temperature, inability to maintain oral nutrition, increased tendency to infection, lying in an inappropriate fixed position for a long time, changes in the need for excretion, odor, noise, lack of privacy, use of oxygen mask, missing relatives, and communication difficulties (8). Besides, intensive care patients may also be exposed to psychosocial stressors such as depression, anger, missing their relatives, and anxiety (8,9). It is very important for nurses to recognize these stressors affecting the patient in intensive care units and develop solutions. In this way, patients' exposure to stressors decreases and they feel cared by the nurse. This interaction enables the patient to feel the nurse's presence (10).

The concept of the presence of the nurse has been defined by many theorists and authors in the historical process. In 1985, Gardner defined the concept of presence as physical accessibility and being close (10, 11). The nursing care process is a mutual process experienced between the patient and the nurse. While patient needs are met during nursing care, the nurse recognizes the patient and ensures that the mutual interaction is continuous. While providing nursing care, the nurse should make the patient feel that she is there for the patient, pay attention to him/her, and make the patient feel that this readiness is a humanitarian necessity (12-14).

The presence of the nurse to patients during their stay in the hospital and the positive perception of nursing care by patients play a role in the development of a sense of trust between the patient and the nurse (13).

In this regard, providing training to intensive care nurses on reducing environmental stressors in the intensive care environment enables nurses to better understand patients' needs and experiences.

Accurate understanding and fulfillment of the patient's needs are the foundation of effective nursing care.

Material and Methods

Target population and the sample

This research is a quasi-experimental intervention study conducted between July 2019 and March 2020. Two separate sample groups were used in the study. The first sample group consisted of all 13 nurses working in the Cardiovascular Surgery (CVS) Intensive Care Unit. The other sample group consisted of patients in the CVS Intensive Care Unit. The universe of the study for the patient group consisted of 819 patients who were treated in the CVS Intensive Care Unit in 2018 and transferred to the CVS clinic. The sample size of the study was determined as at least 44 patients in order to find a significant difference between the two means, with Type-1 error (α) = 0.05, power (1- β) = 0.90. At least 44 patients who were treated in the intensive care unit, at least 22 before the 12-hour training given to the nurses and at least 22 after the training, constitute the sample of the study. The study was completed with 66 patients after the data collection phase. When selecting patients; all patients who met the inclusion criteria were included in the study until the targeted number was reached before the training and pre-test data were collected. Then, the nurses were trained. No patients were taken during the training. After the training, all patients who met the inclusion criteria were included in the study until the targeted number was reached and post-test data were collected.

The training given to the nurses was carried out using powerpoint presentation, experience sharing and patient care practices. The content of the training is stated below;

Educational program to reduce environmental stressors in the intensive care environment

- Concept of Intensive Care, Nursing Care and Roles (2 hours)

The concept of intensive care

Overview of the intensive care environment

Creating a healing environment in intensive care

- Environmental Stressors in the Intensive Care Unit (4 hours)

Intensive care patient placement and equipment

Heat, noise, odor, lighting, call button and sleep in the intensive care environment

Physical stressors and care requirements in the intensive care unit

Post-operative physical requirements (drinking water, oxygen intake, medications, sleep, drains and tubes, follow-ups, pain, excretion, nutrition, patient bed)

Involving the patient in their own care in the intensive care unit

- Environmental Stressors in the Intensive Care Unit

(Psychosocial Needs and Care)

(2 hours)

Psychosocial and care needs in intensive care

Privacy and dignity in intensive care

Recognizing and acting on behavioral reactions of intensive care patients

- Communication with Patients and Relatives in the Intensive Care Unit (2 hours)

Effective communication with the patient

Improving communication and collaboration with the patient

Communication with the patient's relatives

- Presence of the Nurse in the Intensive Care Unit (2 hours)

Philosophy of nursing care

Nurse's perception of the patient (object/person)

Nurse's perception of his/her own existence to the patient

Sharing of experiences

Evaluation of education

Inclusion criteria

The study included

1. Patients admitted to the CVS Intensive Care Unit due to Coronary Artery Bypass Graft (CABG) Surgery,

2. Conscious patients who stayed in the CVS Intensive Care Unit for at least 48 hours (patients with a consciousness level of 9 and above according to the Glasgow Coma Scale),

3. Patients in the first 24 hours of their admission to the clinic,

4. Patients over 18 years of age,

5. Patients who are admitted to intensive care for the first time in their lives,

6. Patients who can speak and understand Turkish and have no communication barriers.

Ethical considerations

Before starting the research, ethics committee permission was obtained, dated 12.07.2019 and decision number B.30.2.ODM.0.20.08/497-607. Then, permission was obtained from the institution where the research would be conducted on 04.07.2019. All individuals participating in the study were informed about the study and their verbal/written consent was obtained. The principles of the Declaration of Helsinki were taken into account at all stages of the research.

Data collection tools

Nurse Information Form: The Nurse Information Form, which included 14 questions about the nurses' demographic characteristics and their working experiences in intensive care, was prepared by the researchers in line with the literature (6-8).

Patient Information Form: The Patient Information Form,

which included 9 questions about patients' demographic characteristics and intensive care experiences, was prepared by the researchers in line with the literature (6, 7).

The Presence of Nursing Scale (PONS): The 28-item Presence of Nursing Scale is a Likert-type scale developed by Kostovich (2012). Turkish validity and reliability of the scale were performed by Bozdoğan Yeşilot and Öz in 2016. The Turkish form of the scale consists of 25 items. The first item in the Turkish form of the scale is not included in the scoring, and the scores to be obtained from the scale range from 24 to 120 points. The total score determines the individual's perception of the presence of the nurse, with higher scores showing an increase in nurse behaviors indicating her presence and positive perceptions of patients. Cronbach's alpha of the scale was reported 0.96 (11, 15), and it was found 0.95 in this study.

The Intensive Care Unit Environmental Stressors Scale (ICUESS): The scale, which was developed in 1982 and revised by Cochran and Ganong in 1989, aims to determine the stressors perceived by patients in the ICU. The Turkish validity and reliability of the scale was conducted by Aslan in 2010, and Cronbach's alpha coefficient was calculated as 0.94. Cronbach's alpha coefficient of the scale was found to be 0.91 in this study. Scale consists of 42 items. Scores to be obtained from the scale range from 42 to 168 points, with higher scores on the scale indicating that patients are negatively affected by the stressors in the ICU (16).

The Intensive Care Experience Scale (ICES): The scale was developed by Rattray et al. in 2004 to determine patients' intensive care experiences. The validity and reliability study of the scale in Turkey was conducted by Demir et al. in 2009, and the number of items was reduced to 19. Demir et al. found the item-total score correlation of the scale as 0.30-0.68. Cronbach's alpha coefficient was 0.79. Cronbach's alpha coefficient was found to be 0.75 in this study. Scores to be obtained from the scale range from 19 to 95 points, and lower scores obtained from the scale indicate patients' more negative intensive care experiences. Higher scores obtained from the scale indicate patients' higher awareness and more positive intensive care experiences (17, 18).

The Glasgow Coma Scale (GCS): The Glasgow Coma Scale (GCS) was developed by Jennett and Teasdale to assess the patient's neurological status. GCS is a measurement tool that allows rapid and reliable assessment of changes in the patient's state of consciousness. The Glasgow Coma Scale is scored in three different sections. These sections include eye response, verbal response, and motor response. The total score to be obtained from each section ranges from 3 to 15, with higher scores indicating the patient's good consciousness level and lower scores indicating poor consciousness level.

Data collection

Data collection from the patients who met the inclusion criteria for the study sample started on 15.07.2019. The data collection forms were administered in two stages, which included before and after the training on reducing intensive care environment stressors.

After the pre-test data of the study were collected, training was started on 08.11.2019, and nurses were provided with a total of 12 hours of training on reducing environmental stressors in the intensive care environment. Patients who were provided care by nurses until 11.12.2019, when the training ended, were not included in the study. After the training ended, data from the patients were collected between 12.12.2019 and 02.03.2020. From the beginning to the end of the collection of these data (excluding the dates of the training), a total of 75 patients (35 before and 40 after the training) who met the inclusion criteria were reached, and the data collection process of the study was completed.

When the patients' descriptive characteristics were compared, two patients from the pre-test group and seven patients from the post-test group were excluded from the study to ensure homogeneity in terms of their descriptive features, and the study was completed with a total of 66 patients (33 before the training and 33 after the training).

Data Analysis

Statistical analysis of the research was performed using the Statistical Package for the Social Sciences 23.0 software package (SPSS-IBM Corporation, NY, USA). Percentage, arithmetic mean and standard deviation analyzes were used in the analysis of descriptive data.

Analysis was conducted to find out whether the patients' data met the parametric test assumptions according to the sample size and normal distribution characteristics. Data were analyzed using the Student t-test in two independent groups that met the parametric conditions and the Mann-Whitney U test in two independent groups that did not meet the parametric conditions. Kruskal Wallis H test was utilized for the analysis of three or more independent groups that did not meet the parametric conditions. In addition, the Chi-

square test was utilized to find out whether the descriptive characteristics of the patients forming the pre-test and post-test groups were parallel. P<0.05 was determined as the significance level in statistical analyses.

Results

The average age of participating nurses was 33.85±5.89 years; while 76.9% were female, 69.2% were married. Of all the nurses, while 53.8% did not start to work in intensive care willingly, 53.8% were satisfied with working in intensive care. While none of the participating nurses had received any training on reducing intensive care stressors before (Table 1).

The average age of the patients was 64.64±7.43 in the pre-test group and 63.00±5.82 in the post-test group. An analysis by gender showed that 66.7% of the patients in the pre-test group and 60.6% of the patients in the post-test group were male (Table 2).

When Table 3 analyzed, the areas where the patients in both the pre-test and post-test groups felt the presence of the nurse in the intensive care unit the most were 'These nurses "checked" on me to make sure that I do not have a problem' and 'These nurses were skillful while taking care of me'.

When Table 4 analyzed, 'Not being able to drink water' and 'Being tied down by tubes' were found to be the stressors that affected both the pre-test and post-test groups the most in the intensive care unit. 'Hearing the phone ring', 'Constantly being examined by doctors and nurses', Feeling the nurses are watching the machines closer than they are watching you', and 'Being awakened by nurses' were indicated as the stressors that affected all participating patients the least.

In Table 5, the most positive experience of the patients in both the pre-test and post-test groups was found 'I was constantly bothered in intensive care'. The most negative experiences of the patients in the pre-test group in intensive care included 'I felt the absence of my relatives a lot while I was in intensive care', 'I thought I might die during my stay in intensive care' and 'I realized that someone was coming near me in intensive care'.

The most negative experiences of the patients in the post-test group in intensive care included 'I felt safe in intensive care', 'I felt safer during the daytime in intensive care', and 'I think my care in intensive care was done in the best way it could be done' (Table 6).

Table 1. Nurses' descriptive characteristics

Variables	n	%	Variables	n	%
Age (Min: 28, Max: 51, Ort.: 33,85±5,89)			Marital Status		
29 years and below	3	23,1	Married	9	69.2
30-44 years	9	69,2	Single	4	30.8
45 years and above	1	7,7	Education Level		
Gender			Vocational school of health	1	7.7
Female	10	76.9	Associate degree	1	7.7
Male	3	23.1	Undergraduate degree	11	84.6
Years of experience as a nurse			Years of experience in the intensive care unit		
0-3 years	1	7,7	1-3 years	3	23.1
4-6 years	4	30.8	4-6 years	3	23.1
7-10 years	1	7.7	7-10 years	2	15.3
More than 10 years	7	53.8	More than 10 years	5	38.5
Type of Intensive care unit worked before			Satisfaction with working in the intensive care unit		
Surgical Intensive Care	1	20.0	Yes	7	53.8
General Intensive Care	1	20.0	No	0	0.0
CVS Intensive Care	3	60.0	Partly	6	46.2
Starting to work in Intensive Care willingly			Having received education for the intensive care unit nursing		
Yes	6	46.2	Yes	12	92.3
No	7	53.8	No	1	7.7
Education received			Having received education on Reducing Stressors in the Intensive Care Unit		
Intensive Care Certificate	13	100.0	No	13	100.0

Table 1. Nurses' descriptive characteristics					
Variables	n	%	Variables	n	%
Age (Min: 28, Max: 51, Ort.: 33,85±5,89)			Marital Status		
29 years and below	3	23,1	Married	9	69.2
30-44 years	9	69,2	Single	4	30.8
45 years and above	1	7,7	Education Level		
Gender			Vocational school of health	1	7.7
Female	10	76.9	Associate degree	1	7.7
Male	3	23.1	Undergraduate degree	11	84.6
Years of experience as a nurse			Years of experience in the intensive care unit		
0-3 years	1	7,7	1-3 years	3	23.1
4-6 years	4	30.8	4-6 years	3	23.1
7-10 years	1	7.7	7-10 years	2	15.3
More than 10 years	7	53.8	More than 10 years	5	38.5
Type of Intensive care unit worked before			Satisfaction with working in the intensive care unit		
Surgical Intensive Care	1	20.0	Yes	7	53.8
General Intensive Care	1	20.0	No	0	0.0
CVS Intensive Care	3	60.0	Partly	6	46.2
Starting to work in Intensive Care willingly			Having received education for the intensive care unit nursing		
Yes	6	46.2	Yes	12	92.3
No	7	53.8	No	1	7.7
Education received			Having received education on Reducing Stressors in the Intensive Care Unit		
Intensive Care Certificate	13	100.0	No	13	100.0

Discussion

In this study, which aims to examine the effect of the training given to nurses on reducing environmental stressors on intensive care patients' perception of the nurse's presence, the pre-test total score of the Nurse's Presence Scale is 81.21±13.14, and the post-test total score is 97.58±3.12. In their study titled 'Cancer patients' perception of the presence of nurses', Bozdoğan Yeşilot and Öz (2017) found the total score average of the scale to be 88.46±22.64. In the validity and reliability study, Kostovich (2012) reported the total score average of the scale as 105.83±16.05. When the results of this study were compared with other studies, it was seen that the mean Nursing Presence Scale pre-test total score was lower in our study. The increase in scores after the training given to nurses indicates that nurses need support and information in introducing their presence to the patient (10, 15).

When the mean scores of the scale items were examined, the statements 'These nurses checked on me to make sure I was not having any problems' and 'These nurses were skillful in taking care of me' received the highest scores in both patient groups. In parallel with similar studies, patients' perceptions of nursing care were positive in this study (13, 14). It is known that patients' positive perception of the nurse's presence facilitates their recovery and increases their psychological and physical well-being and coping skills (19, 20).

Another result of this study is that the patients in the post-test group received higher scores on the items related to the patients' physiopathological problems, but there was no increase in the scale items related to psychosocial problems. It has been reported in many studies that intensive care nurses are mainly concerned with the physical care of patients, ignoring the psychosocial needs of patients or not being able to spare time for them (21-23). Based on this result, it can be said that in environments where psychosocial stressors are high, such as intensive care units, nurses paying attention only to the physical needs of patients will not be sufficient for recovery to occur as soon as possible. For this reason, intensive care patients, who need the support of nurses in every aspect, also need to be supported psychosocially.

While the pre-test total score average of the Intensive Care Unit Environmental Stressors Scale is 117.15±6.76, the post-test total score average is 118.48±7.08. This result shows

Table 2. Patients' descriptive characteristics					
	Patients before the Training		Patients after the Training		Test and p-value
Age	Min:47,Max:76 Ort:64,64±7,43			Min:47,Max:76 Ort:64,64±7,43	t=,0996 p=0,323
	n	%	n	%	Test p
45-54 years	3	9,1	2	6,1	χ2=0,635 p=0,728
55-64 years	13	39,4	16	48,5	
65 years and over	17	51,5	15	45,5	
Gender					χ2=0,26 p=0,609
Female	11	33,3	13	39,4	
Male	22	66,7	20	60,6	
Education level					χ2=2,15 p=0,827
Illiterate	4	12,1	2	6,1	
Literate	4	12,1	5	15,2	
Primary school	14	42,4	12	36,4	
Secondary school	7	21,2	11	33,3	
High school	2	6,1	1	3,0	
University	2	6,1	2	6,1	
Employment status					χ2=1,22 p=0,269
Not working	26	78,8	22	66,7	
Working	7	21,2	11	33,3	
Marital Status					χ2=2,39 p=0,122
Married	29	87,9	24	72,7	
Single	4	12,1	9	27,3	
Family Structure					χ2=0,07 p=0,786
Nuclear Family	23	69,7	24	72,7	
Extended Family	10	30,3	9	27,3	
Place of Living					χ2=6,16 p=0,104
Village	2	6,1	6	18,2	
Town	8	24,2	7	21,2	
District	8	24,2	13	39,4	
City	15	45,5	7	21,2	
Perceived income					Fisher's=4,450 p=0,114
Low	2	6,1	5	15,2	
Medium	27	81,8	19	57,5	
High	4	12,1	9	27,3	
Medical diagnosis					Fisher's=59,37 p=0,051
Heart Failure	1	3,0	0	0,0	
Coronary Artery Disease	21	63,6	13	39,4	
Coronary Insufficiency	11	33,3	20	60,6	
Chronic Disease					Fisher's=2,731 p=,633
Diabetes	10	30,3	12	36,4	
Rheumatism	1	3,0	3	9,1	
Hypertension	12	36,4	9	27,3	
Kidney disease	0	0,0	1	3,0	
Other	10	30,3	8	24,2	
Duration of Intensive Care Stay					
4 days	5	15,2	4	12,1	χ2=2,85 p=0,581
5 days	6	18,2	10	30,3	
6 days	10	30,2	8	24,2	
7 days	7	21,2	9	27,3	
8 days	5	15,2	2	6,1	
Glasgow Coma Scale Score 9-12 points	22	66,6	21	63,7	χ2=0,26 p=0,509
13-15 points	11	33,4	12	36,3	

Table 3. The presence of nursing scale item mean scores

Presence of Nursing Scale		Pre-test Group Patients(n=33)		Post-test Group Patients (n=33)	
		Score Rank	Ort. ±SD	Score rank	Ort. ±SD
1	Did the presence of the nurse who provided care to you make a difference (the difference could be positive or negative)	not included in the rank	1,40±0,497	not included in the rank	1,13±0,335
2	These nurses were sensitive toward my concerns.	5	3,71±0,750	4	4,28±0,640
3	These nurses taught me what I needed to know.	6	3,66±0,639	3	4,30±0,608
4	These nurses "checked" on me to make sure that I do not have a problem.	1	4,29±0,622	1	4,65±0,533
5	These nurses met my spiritual needs.	13	3,23±0,690	11	4,02±0,620
6	These nurses talked to me like a friend.	11	3,31±0,796	7	4,10±0,545
7	These nurses comforted me physically.	3	3,89±0,323	6	4,13±0,607
8	These nurses comforted me emotionally.	18	3,14±00,692	17	3,82±0,526
9	These nurses understood my feelings.	23	2,91±0,742	22	3,45±0,533
10	These nurses acquired my trust.	15	3,20±0,847	18	3,88±0,357
11	These nurses were skillful while taking care of me.	2	4,09±0,658	2	4,63±0,586
12	These nurses were beside me when I needed them.	4	3,80±0,473	5	4,18±0,385
13	These nurses helped my day run smoothly.	8	3,51±0,658	20	3,70±0,516
14	These nurses provided a sense of healing around me.	14	3,23±0,598	19	3,75±0,494
15	These nurses listened and responded to my needs.	9	3,46±0,741	9	4,05±0,389
16	These nurses calmed my fears.	16	3,20±0,797	14	3,90±0,441
17	These nurses were concerned about me.	22	2,91±0,832	15	3,88±0,563
18	These nurses were committed to caring for me.	24	2,77±0,808	21	3,48±0,506
19	These nurses made me feel safe.	19	3,11±0,718	16	3,83±0,350
20	These nurses took care of me as a person, not as a disease.	10	3,46±0,657	8	4,07±0,267
21	These nurses enabled me to control my healthcare as much as possible.	12	3,31±0,758	13	4,00±0,000
22	These nurses improved my life quality.	7	3,51±0,702	12	4,00±0,320
23	I trusted these nurses.	17	3,20±0,777	10	4,04±0,350
24	I felt a connection with these nurses.	21	2,97±0,891	16	3,83±0,350
25	The presence of these nurses made a difference for me.	20	3,00±0,970	16	3,83±0,350

that patients experience high levels of stress in the intensive care environment. While some of these stress factors can be controlled by nurses, some cannot. It is thought that the lack of difference in the pre-test and post-test scale score averages is due to the high number of stressors that nurses cannot control (mechanical ventilator application, need to check vital signs, drug treatment, etc.). Not being able to drink water was determined to be the most important cause of stress for the patients in the pre-test and post-test groups of our study.

On patients hospitalized in the reanimation intensive care unit, Tezcan-Karadeniz and Kanan (2019) found that the average score of the scale was 69.26±21.84, Hweidi and Nizamli (2015) in a study conducted by in the intensive care units of two public hospitals in Jordan, they found the average score of the scale to be 86.2±15.6. In their study with patients treated in the general surgery intensive care unit, İyigün et al., (2021) found the average score of the scale to be 70.06±13.62 (24-26). Compared to these studies, it appears that the patients in our sample were more affected by environmental stressors. Factors such as the location of the study being a tertiary surgical intensive care unit, not taking oral fluids during the preoperative care process, and blood-fluid loss during the surgery are thought to be related to this result. In their study on patients hospitalized in the second-stage general intensive care unit, Karakoç-Kumsar and Gencer (2020) found the average score of the scale to be 128.32±16.37. Compared to this study, it appears that the patients in our sample were less affected by environmental stressors. This may be due to the fact that different patient groups are hospitalized in intensive care units for different purposes (27).

In our study, being connected to tubes was the second most common cause of stress in patients in the pre-test and post-test groups. Patients undergoing CABG surgery are brought to the CVS Intensive Care Unit with an endotracheal tube. When patients wake up in the intensive care unit, they are connected to tubes, and the presence of the endotracheal tube restricts

Table 4. Item mean scores of the ıntensive care unit environmental stressors scale

The Intensive Care Unit Environmental Stressors Scale		Pre-test Group Patients (n=33)		Post-test Group Patients (n=33)	
		Score Rank	Ort. ±SD	Score Rank	Ort. ±SD
1	Being tied down by tubes	2	3,90±0,61	2	3,80±0,49
2	Not having the nurses introduce themselves	31	2,28±0,71	30	2,30±0,60
3	Having nurses be in too much of a hurry	24	2,45±0,74	29	2,26±0,67
4	Not being able to drink water	1	3,97±0,37	1	3,85±0,36
5	Having your blood pressure taken often each day	21	2,54±0,91	39	1,87±0,64
6	Uncomfortable bed and/or pillow	11	3,20±0,01	19	2,65±0,69
7	Hearing the telephone ring	36	2,08±0,70	41	1,75±0,66
8	Constantly being examined by doctors and nurses	40	1,68±0,71	42	1,45±0,55
9	Having strange machines around you	29	2,35±0,77	18	2,72±0,59
10	Feeling the nurses are watching the machines closer than they are watching you	42	1,62±0,73	37	2,17±0,50
11	Hearing buzzers and alarms from machinery	34	2,20±0,63	24	2,45±0,63
12	Nurses and doctors talking too loudly	38	1,88±0,52	38	2,10±0,54
13	Having to wear oxygen	16	3,05±0,59	14	3,02±0,47
14	Missing your husband or wife	9	3,29±0,64	11	3,22±0,65
15	Not having treatments explained to you	23	2,51±0,65	25	2,42±0,52
16	Hearing the heart monitor alarm go off	18	3,02±0,60	15	3,01±0,37
17	Having nurses constantly doing things around your bed	35	2,11±0,86	33	2,22±0,57
18	Having tubes in your nose or mouth	8	3,31±0,71	10	3,32±0,54
19	Not knowing what time it is	22	2,51±0,91	35	2,20±0,82
20	Hearing other patients cry out	15	3,10±0,57	4	3,67±0,69
21	Men and women staying in the same room	7	3,40±0,37	3	3,77±0,40
22	Seeing family and friends only for a few minutes a day	19	3,01±0,52	26	2,37±0,64
23	Not knowing when the treatments will be administered	30	2,32±0,69	27	2,35±0,57
24	Being awakened by nurses	39	1,80±0,63	40	1,.85±0,76
25	Unfamiliar and unusual noises	33	2,30±0,63	21	2,61±0,65
26	Seeing treatments done to other patients	14	3,14±0,60	36	2,20±0,67
27	Constantly looking at the ceiling (watching the ceiling)	13	3,17±0,74	20	2,65±0,48
28	Not being able to sleep	4	3,71±0,38	7	3,50±0,64
29	Not being able to move your hands because of i. v. line	25	2,42±0,77	23	2,57±0,52
30	Being aware of unusual smells around you	27	2,40±0,60	16	2,95±0,55
31	Having lights on constantly	5	3,61±0,61	6	3,52±0,50
32	Having pain	3	3,82±0,57	9	3,40±0,55
33	Seeing iv. bags hanging over your head	32	2,24±0,87	31	2,27±0,75
34	Being stuck with needles	17	3,02±0,85	5	3,60±0,63
35	Not knowing where you are	28	2,40±0,55	22	2,57±0,59
36	Having the nurses use words you cannot understand	37	2,02±0,74	28	2,27±0,55
37	Not being in control of yourself	20	2,91±0,74	13	3,05±0,45
38	Not knowing what day it is	26	2,40±0,69	34	2,22±0,03
39	Getting bored	10	3,25±0,71	17	2,70±0,56
40	Having no privacy	6	3,45±0,28	8	3,42±0,26
41	Being cared for by unfamiliar doctors	41	1,65±0,63	32	2,22±0,89
42	Being in a room that is too hot or too cold	12	3,17±0,64	12	3,15±0,58

Table 5. Intensive care experience scale item mean scores

Intensive Care Experience Scale		Pre-test Group Patients (n=33)		Post-test Group Patients (n=33)	
		Score rank	Ort. ±SD	Score rank	Ort. ±SD
1	I felt safer during the daytime in intensive care.	10	2,63±1,190	18	1,53±1,244
2	I could never recognize whether it was daytime or night in intensive care.	9	2,69±0,993	2	3,88±,0686
3	I thought I might die during the time I stayed in intensive care.	19	1,89±0,796	13	2,18±0,931
4	The intensive care environment was always very noisy.	6	2,91±1,011	6	3,38±0,868
5	I think I slept too much in intensive care.	5	3,06±1,259	12	2,43±1,213
6	I was constantly bothered in intensive care.	1	3,54±0,817	1	4,05±0,221
7	I think my care in intensive care was done in the best way it could be done.	14	2,11±0,323	17	1,57±0,675
8	I could tell what I wanted to people who cared for me in intensive care.	11	2,51±0,702	15	2,05±0,504
9	Most of what I remember about the intensive care environment is blurry.	3	3,46±0,886	11	2,53±0,813
10	I could notice someone coming near me in intensive care.	18	1,97±0,382	14	2,18±0,549
11	I was aware of what was happening to me in intensive care.	12	2,46±0,701	10	2,55±0,783
12	I saw things I could not understand in intensive care.	13	2,11±0,796	16	1,65±0,736
13	I felt helpless in intensive care.	7	2,89±0,963	4	3,57±0,747
14	I felt pain in intensive care.	15	2,10±0,914	5	3,42±0,877
15	I felt scared in intensive care.	16	2,06±0,657	8	3,30±0,939
16	I felt safe in intensive care.	8	2,77±0,690	19	1,45±0,543
17	I had bad dreams in intensive care.	2	3,51±0,951	7	3,33±0,931
18	I felt only a little disturbed by being dependent on meeting my needs in intensive care.	4	3,26±0,950	3	3,70±0,883
19	I felt the absence of my relatives a lot in intensive care.	17	2,04±1,027	9	3,28±0,847

Table 6. Comparison Of The PONS, ICUESS, ICES, and ICES sub-scales pre-test and post-test mean scores

Scales and Sub-scales	Pre-test (n=33) Ort. ±SD	Post-test(n=33) Ort. ±SD	Test and Significance
Presence of Nursing Scale	81,21±13,14	97,58±3,12	t=-6,959 p=,000
Intensive Care Unit Environmental Stressors Scale	117,15±6,76	118,48±7,08	t=-,782 p=,437
Intensive Care Experience Scale	51,06±3,15	54,12±4,49	t=-3,428 p=,001
Awareness of surroundings while in the intensive care unit sub-scale	16,61±1,85	18,30±2,16	t=4,335 p=,000
Frightening experiences in the intensive care unit sub-scale	10,09±1,49	11,24±1,50	t=-3,132 p=,003
Recalling experiences in the intensive care unit sub-scale	10,06±1,45	11,30±1,49	t=-3,290 p=,002
Satisfaction with care received in the intensive care unit sub-scale	14,30±1,69	15,91±2,24	t=-3,204 p=,002

the patients' movements and communication skills (4). Zaybak and Çevik (2015) reported that the most important stress factor for patients in intensive care is 'having a tube in the mouth or nose'. In their study examining the experiences of intensive care patients, Zaybak and Yapucu Güneş (2010) concluded that the intensive care experiences of patients connected to mechanical ventilation in the intensive care unit were negatively affected. In line with the results obtained, being connected to a mechanical ventilator emerges as an important stress factor for patients (28, 29).

While pain was the third most important cause of stress for the patients in the pre-test group of our study, it ranked seventh according to the patients in the post-test group. The training given to nurses may have enabled more frequent pain monitoring of the patient. In other studies examining the stress factors affecting intensive care patients in our country, pain was found to be the most important stress factor (8, 30, 31). Additionally, Özdemir (2010) aimed to determine the experiences of coronary intensive care patients and concluded that patients without pain had a more positive intensive care experience than patients with pain (32). Pain is a stressor that also affects the recovery rate of intensive care patients. Catecholamine release may cause sleep disturbance, which may lead to the development of anxiety, depression and delirium in patients (32-34). Effective pain management by intensive care nurses is also important for the comfort of patients.

Ringing the phone was found to be one of the low-level stressors. Similarly, in the study conducted by Yaman Aktaş et al. (2015), it was stated that the 'phone ring' was the least stressful factor for the patients (8). Other low-level stressors in our study included; These included examination by doctors and nurses, feeling that nurses monitor the machines more carefully than the patients, and nurses walking around the bed. Similarly, in the study conducted by Gültekin et al., (2018) nurses walking around the bed was defined as the lowest level of stress factor. The presence of doctors and nurses in the environment and their examination may lead patients to believe that they are being cared for. Adsay and Dedeli (2015) evaluated the intensive care experiences of patients discharged from intensive care and concluded that frequent follow-up and observation by health professionals increased satisfaction with intensive care (35, 36).

The pretest total score average of the Intensive Care Experience Scale was 51.06±3.15, and the posttest total score average was 54.12±4.49. Examining the patients' responses to the scale showed that the training given to nurses was beneficial in terms of patients' positive intensive care experiences.

A weak positive correlation was found between the Nursing Presence Scale post-test scores and the Intensive Care Experience Scale post-test scores of the patients in the post-test group ($p>0.05$). Both the increase in the scale mean scores and the narrowing of the standard deviation limits showed that the training given to nurses had an impact on patients' positive perception of the nurse's presence.

An inverse relationship was found between the Satisfaction Scores with the Care Received on the Intensive Care Experience Scale Intensive Care Subscale of the patients in the pre-test group and the Intensive Care Unit Environmental Stressors ($p>0.05$). It was evaluated that the increase in the total subscale score averages after the training given to the nurses was related to the positive changes in the nurses' approach to the patients, and therefore the patient's satisfaction with the care received may have increased. increased.

Limitation

The results of the study are limited to cardiovascular surgery intensive care nurses and patients working in the hospital where the study was conducted. Therefore, they cannot be generalized.

Conclusion

It was concluded that the 12-hour training given to cardiovascular surgery intensive care nurses had a positive impact on the patients' perception of the nurse's presence and their intensive care experience and had an impact on the physiopathological stressors affecting the patients.

In line with these results;

-To prepare and disseminate training programs for nurses and cooperate with professional organizations to reduce environmental stressors in intensive care.

-To make arrangements to ensure full-time participation of nurses in education,

- Conducting qualitative studies for nurses and patients before and after training,

-It is recommended that the training content be prepared in a way that highlights the psychosocial dimension.

Çıkar Çatışması

Yazarlar herhangi bir çıkar çatışmasının olmadığını beyan ederler.

Etik Onayı

Ondokuz Mayıs Üniversitesi Klinik Araştırmalar Etik Kurulu'nda (Tarih: 26/03/2021, Sayı: 2021/287) alınmıştır.

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Araştırma Makalesi

Gender and age differences in antihypertensive drug use and blood pressure control

Antihipertansif ilaç kullanımı ve kan basıncı kontrolünde cinsiyet ve yaş farklılıkları

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Abstract

Aim: This study aimed to investigate the impact of gender on antihypertensive treatment patterns and blood pressure (BP) control in hypertensive patients.

Material and Methods: This retrospective study included 918 hypertensive patients (mean age: 56.5 ± 12.3 years; 530 men, 388 women) under antihypertensive treatment, including diuretics, beta blockers, calcium channel blockers (CCB), angiotensin converting enzyme inhibitor (ACEI), and angiotensin receptor blockers (ARB). BP control was defined as systolic and diastolic BP being <140/90 mmHg during the 6-month follow-up. Antihypertensive medications and BP control were compared between genders, and subgroup analyses were performed based on age groups.

Results: In the general population, BP control did not show a significant difference between genders. ACE inhibitors were prescribed more frequently to men (45.7% vs. 33.5%, $p < 0.001$), while women were more likely to receive monotherapy (24.2% vs. 19.6%, $p < 0.05$). Women showed better BP control with diuretics than men (46.6% vs. 34.1%, $p = 0.037$), and monotherapy was more effective in women than in men (38.3% vs. 23.1%, $p = 0.020$). Younger women (18–44 years) using calcium channel blockers (CCBs) demonstrated superior BP control compared to men in the same age group (41.2% vs. 31.3%, $p = 0.042$). Other antihypertensive drugs showed no significant gender- and age-related differences in their effect on BP control.

Conclusion: Gender-based differences were observed in antihypertensive treatment patterns and BP control. Women showed better BP control with monotherapy and specific drug classes like diuretics and CCBs in younger populations. These findings highlight the importance of gender-specific strategies in hypertension management to optimize outcomes.

Keywords: Antihypertensive drugs, blood pressure, gender, hypertension

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Öz

Amaç: Bu çalışma, hipertansif hastalarda antihipertansif tedavi modelleri ve kan basıncı (KB) kontrolü üzerindeki cinsiyet etkisini araştırmayı amaçlamıştır.

Gereç ve Yöntemler: Bu retrospektif çalışmaya, antihipertansif tedavi alan 918 hipertansif hasta (ortalama yaş: 56,5 ± 12,3 yıl; 530 erkek, 388 kadın) dahil edilmiştir. Tedavi, diüretikler, beta blokerler, kalsiyum kanal blokerleri (CCB), anjiyotensin dönüştürücü enzim inhibitörleri (ACEI) ve anjiyotensin reseptör blokerlerini (ARB) içerdi. Kan basıncı kontrolü, 6 aylık takip süresince sistolik ve diyastolik KB'nin <140/90 mmHg olması olarak tanımlandı. Antihipertansif ilaçlar ve kan basıncı kontrolü, cinsiyetler arasında karşılaştırılmış ve yaş gruplarına göre alt grup analizleri yapıldı.

Bulgular: Genel popülasyonda, BP kontrolü cinsiyetler arasında anlamlı bir fark göstermedi. ACE inhibitörleri erkeklere daha sık reçete edilirken (%45,7'ye karşı %33,5, p < 0,001), kadınların monoterapi alma olasılığı daha yüksekti (%24,2'ye karşı %19,6, p < 0,05). Kadınlar diüretiklerle erkeklerden daha iyi BP kontrolü gösterdi (%46,6'ya karşı %34,1, p = 0,037) ve monoterapi kadınlarda erkeklerden daha etkiliydi (%38,3'e karşı %23,1, p = 0,020). Kalsiyum kanal blokerleri (KKB) kullanan daha genç kadınlar (18-44 yaş), aynı yaş grubundaki erkeklere kıyasla üstün BP kontrolü gösterdi (%41,2'ye karşı %31,3, p = 0,042). Diğer antihipertansif ilaçlar BP kontrolü üzerindeki etkilerinde anlamlı cinsiyet ve yaşla ilgili farklılıklar göstermedi.

Sonuçlar: Antihipertansif tedavi modelleri ve KB kontrolü üzerinde cinsiyete dayalı farklılıklar gözlenmiştir. Kadınlar, monoterapi ve diüretikler veya genç yaş grubunda CCB gibi belirli ilaç sınıflarıyla daha iyi KB kontrolü sağlamıştır. Bu bulgular, hipertansiyon yönetiminde cinsiyete özgü stratejilerin benimsenmesinin sonuçları optimize etmek için önemini vurgulamaktadır.

Anahtar Kelimeler: Antihipertansif ilaçlar, cinsiyet, hipertansiyon, kan basıncı.

Introduction

Hypertension is one of the most prevalent cardiovascular risk factors globally and is considered a leading cause of both morbidity and mortality (1). Due to its asymptomatic nature, hypertension is often challenging to diagnose, yet its prevalence continues to rise, making it a persistent global health concern (2). Additionally, it is recognized as a significant risk factor for stroke, heart disease, and other cardiovascular conditions (3). Consequently, the prevention and effective management of hypertension are of critical importance for public health.

Despite the availability of antihypertensive treatments, many patients fail to achieve the target blood pressure levels (4). Current guidelines recommend a blood pressure target of less than 140/90 mm Hg in hypertensive patients (5). It is well-documented that the prevalence and control of hypertension vary according to factors such as age, sex, and patients characteristics (6, 7). Among these, gender emerges as a pivotal factor influencing both the pathophysiology of hypertension and the response to antihypertensive therapy. Hormonal differences and lifestyle factors contribute to significant variations in the development and treatment outcomes of hypertension between men and women (8).

Studies reveal that before menopause, men exhibit a higher prevalence of hypertension compared to women. However, following menopause, women experience a rapid increase in hypertension prevalence (9-11). This shift underscores the critical role of hormonal changes and associated physiological mechanisms (12). Furthermore, differences in adherence to antihypertensive medication and susceptibility to side effects are also observed between genders (7, 13). The latest hypertension guidelines highlight an increasing gender disparity in hypertension prevalence with advancing age (14, 15). Therefore, this study aimed to investigate the impact of gender on antihypertensive treatment patterns and blood pressure (BP) control in hypertensive patients.

Material and Methods

This retrospective study was conducted between January 2014 to December 2022 on hypertensive patients at the Cardiology Clinic of Dışkapı Yıldırım Beyazıt Training and Research Hospital. The study was approved by the Dışkapı Yıldırım Beyazıt Hospital's Ethics Committee (Date: 20.06.2022, Decision No: 140/15) and was carried out in accordance with the relevant ethical guidelines and the Helsinki Declaration (2013 Brazil revision). The need for informed consent was waived under the approval of the Local Ethics Committee due to the retrospective design.

To assess eligibility for the study, hypertensive patients on antihypertensive therapy were evaluated retrospectively. Inclusion criteria for the study were individuals over 18 years old with a diagnosis of hypertension who were receiving regular treatment and follow-up, patients who had started antihypertensive therapy and had been under treatment for at least six months, and patients with no missing data during the study. Exclusion criteria included patients with a diagnosis of secondary hypertension, pregnant or breastfeeding women, patients with any comorbid conditions, those with an unknown treatment history, and those with incomplete data records. After applying the exclusion criteria, 918 patients were included in the study.

The hospital's electronic information system and patient files were used to gather demographic and clinical data. Data from patient files were used to identify antihypertensive medications, which were then grouped into therapeutic classes, including diuretics, beta blockers, calcium channel blockers (CCB), angiotensin converting enzyme inhibitor (ACEI), and angiotensin receptor blockers (ARB). Monotherapy was defined as the use of only one class of antihypertensive drugs. The assessment of BP control was conducted retrospectively using BP levels from patients' records during a 6-month follow-up. It defined as pharmacological treatment of hypertension associated with an average systolic BP (SBP) <140 mm Hg or diastolic BP (DBP) <90 mm Hg (16).

Statistical analysis

All analyses were conducted using IBM SPSS Statistics for Windows 20.0 (IBM Corp., Armonk, NY, USA) software. The normal distribution of numerical variables was assessed using the Kolmogorov-Smirnov test. Data exhibiting a normal distribution were presented as mean ± standard deviation, and comparisons between groups were made using the Student's T-test. Non-normally distributed data were displayed as median (interquartile range (IQR): 25-75 percentiles) and comparisons between groups were conducted using the Mann-Whitney U test. Value of $P < 0.05$ were considered statistically significant.

Results

The study included 918 patients with a mean age of 56.5 ± 12.3 years, of whom 530 were men and 388 were women. The mean age was comparable between male and female (55.8 ± 12.3 vs. 57.0 ± 12.3, $p = 0.144$). While the mean BMI was higher in female than in male, there was no significant difference in obesity rates between the groups (55.8% vs. 52.1%, $p = 0.255$). At 6 months of follow-up, the mean SBP was 140.8 ± 13.5 mm Hg for males and 139.8 ± 13.8 mm Hg for females ($p > 0.05$), and the mean DBP was 82.3 ± 7.2 mm Hg and 83.8 ± 7.1 mm Hg, respectively ($p > 0.05$). Demographic and clinical characteristics of patients are shown in Tables 1.

The most commonly prescribed drug class was CCBs (51%), while diuretics were the least frequently prescribed (31.2%). ACEI use was more common in male compared to female (45.7% vs. 33.5%, $p < 0.001$), but there were no gender-based differences in the use of other medications. Additionally, 21.6% of the patients were receiving monotherapy, while the remaining patients were on combination therapy. Monotherapy was more commonly prescribed to female than male (24.2% vs. 19.6%, $p < 0.05$), while male were more frequently treated with three or more medications (23.0% vs. 16.5%, $p < 0.05$). In the general population, BP control did not show a significant difference between genders (Table 1).

Diuretic use in female was linked to higher BP control than in male (46.6% vs. 34.1%, $p = 0.037$), while other antihypertensive drugs showed no significant gender-related differences in their effect on BP control ($p > 0.05$). Blood pressure control was higher in women using antihypertensive monotherapy compared to men using similar monotherapy (38.3% vs. 23.1%, $p = 0.020$) (Table 2).

Female aged 18–44 using CCBs demonstrated better BP control compared to male in the same age group (41.2% vs. 31.3%, $p = 0.042$). However, this significance disappeared in other age groups ($p > 0.05$). The impact of other antihypertensive drugs on BP control was not significantly different between genders across all age groups (Table 3).

Discussion

This study aimed to evaluate the effects of gender differences on antihypertensive treatment response and blood pressure control in a cohort of 918 hypertensive patients. Key findings revealed that while there were some notable gender-based differences in treatment patterns and outcomes, overall BP control was not significantly different between men and women. These results highlight the importance of considering gender-specific factors when tailoring antihypertensive therapy.

The study population had a comparable mean age between males and females, aligning with previous findings that hypertension affects both genders across similar age ranges (17). The mechanisms underlying gender differences in BP control are not fully understood, but it is hypothesized that

Table 1. Demographic and clinical characteristics of patients.				
Variables	All population n = 918	Female n = 388	Male n = 530	P-value
Age, years	56.5 ± 12.3	55.8 ± 12.3	57.0 ± 12.3	0.144
18-44 years, n (%)	162 (17.6)	70 (17.9)	92 (17.4)	0.122
45-64 years, n (%)	458 (49.9)	206 (52.6)	252 (47.5)	
≥65 years, n (%)	298 (32.5)	112 (28.9)	186 (35.1)	
BMI, kg/m2	31.3 ± 5.3	33.2 ± 5.8	30.0 ± 4.9	0.001*
Obesity, n (%)	498 (54.2)	224 (57.3)	274 (51.7)	0.093
Smoking, n (%)	294 (32.0)	72 (18.6)	222 (41.9)	<0.001*
BP at 6-months				
SBP, mm Hg	140.4 ± 13.7	139.8 ± 13.8	140.8 ± 13.5	0.290
DBP, mm Hg	84.1 ± 7.2	83.8 ± 7.1	82.3 ± 7.2	0.273
Antihypertensive drug, n (%)				
CCB	468 (51.0)	214 (55.2)	254 (47.9)	0.068
ACEI	372 (40.5)	130 (33.5)	242 (45.7)	<0.001*
Diuretic	286 (31.2)	116 (29.9)	170 (32.1)	0.481
ARB	330 (35.9)	134 (34.5)	196 (37.0)	0.446
Beta blocker	390 (42.5)	154 (39.7)	236 (44.5)	0.143
Number of drugs,				
One	198 (21.6)	94 (24.2)	104 (19.6)	0.029*
Two	534 (58.2)	230 (59.3)	304 (57.4)	
Three or more	186 (20.3)	64 (16.5)	122 (23.0)	
BP control, n (%)	340 (37.0)	152 (39.2)	188 (35.5)	0.251

The data are expressed as the mean ± SD or number (%). ACEI, angiotensin converting enzyme inhibitor; ARB, angiotensin receptor blocker; BB, blood pressure; BMI, body mass index; CCB, calcium channel blocker.

Table 2. Blood pressure control according to antihypertensive medication by gender.					
Drugs	Female		Male		P-value
	n	Control rate	n	Control rate	
Overall, n (%)					
CCB	214	80 (37.4)	254	96 (37.8)	0.999
ACEI	130	44 (33.8)	242	80 (33.1)	0.908
Diuretic	116	54 (46.6)	170	58 (34.1)	0.037*
ARB	134	54 (40.3)	196	74 (37.8)	0.647
Beta blocker	154	62 (40.3)	236	90 (38.1)	0.673
Number of drugs, n (%)					
One	94	36 (38.3)	104	24 (23.1)	0.020*
Two	230	90 (39.1)	304	124 (40.8)	0.722
Three or more	64	26 (40.6)	122	40 (32.8)	0.334

The data are expressed as number (%). ACEI, angiotensin converting enzyme inhibitor; ARB, angiotensin receptor blocker; CCB, calcium channel blocker.

Table 3. Medication use and blood pressure control in males and females across various age groups.

Drugs	Female		Male		P-value
	n	Control rate	n	Control rate	
CCB	34	14 (41.2)	48	15 (31.3)	0.042*
ACEI	32	8 (25.0)	54	22 (40.7)	0.165
Diuretic	22	12 (54.5)	22	10 (45.5)	0.763
ARB	12	6 (50.0)	24	10 (41.7)	0.729
BB	48	18 (37.5)	54	24 (44.4)	0.477
45-64 years, n (%)					
CCB	118	46 (39.0)	98	47 (48.0)	0.315
ACEI	48	20 (41.7)	92	28 (30.4)	0.195
Diuretic	50	24 (48.0)	96	34 (35.4)	0.157
ARB	86	34 (39.5)	98	38 (38.8)	0.999
BB	84	36 (42.9)	100	36 (36.0)	0.342
≥65 years, n (%)					
CCB	62	20 (32.3)	108	34 (31.5)	0.995
ACEI	50	16 (32.0)	96	30 (31.3)	0.999
Diuretic	44	18 (40.9)	52	14 (26.9)	0.193
ARB	36	14 (35.0)	74	26 (35.1)	0.833
BB	22	8 (36.3)	82	30 (37.5)	0.991

The data are expressed as number (%). ACEI, angiotensin converting enzyme inhibitor; ARB, angiotensin receptor blocker; CCB, calcium channel blocker.

hormones like testosterone and estrogen play a crucial role in these gender- related variations in BP regulation (18, 19). In the present study, the prevalence of hypertension tended to be higher in female aged 45–64 compared to male in the same age group. Previous studies conducted in Turkey have reported the age of menopause to be between 45 and 47 years (20, 21). In women, the decline in estrogen is related to less elastic blood vessel walls, which can contribute to increased BP and a heightened risk of cardiovascular disease (22, 23). Moreover, menopause-related hormonal changes can result in both weight gain and heightened responsiveness to dietary salt, potentially causing an increase in BP levels (24). This aligns with the higher BMI and greater predisposition to obesity seen in hypertensive female relative to male.

Conflicting findings on BP control rates by gender have been reported in the current literature. Some studies have reported that uncontrolled hypertension is more prevalent in female, while others have found it to be higher in male (6, 24-26). On the other hand, a large-scale study carried out in the United Arab Emirates reported that overall BP control rates were similar across genders (27). Although BP control rates did not differ significantly between genders in the overall population, certain subgroup analyses revealed interesting patterns. Female using diuretics showed better BP control compared to male. This finding may reflect gender-specific pharmacodynamic responses to diuretics or differences in adherence to prescribed therapy (28). Furthermore, across all age groups, female using diuretics exhibited a tendency for higher BP control rates compared to men. A previous study reported that hypertensive patients aged 45–64 years or 65 and older using diuretics had better BP control rates in female compared to male. Furthermore, in middle-aged women, the use of diuretics or ARBs was linked to higher BP control compared to other antihypertensive drugs (29). On the other hand, some studies have indicated that diuretics are linked to lower BP control rates (28). The variations between studies could be related to differences in patient selection, the types of diuretics used, and their dosages. On the other hand, smoking, which is known to elevate blood pressure regardless of gender, could potentially affect the response to diuretics in women differently than in men. This warrants further investigation to clarify its role as a confounding factor in gender-specific blood pressure control.

The gender distribution of antihypertensive therapies in the current study aligned with previously reported findings, showing that ACEIs and BBs are more often prescribed to men, whereas CCBs are more commonly prescribed to women (30). However, the general BP control rates associated with these medications showed no significant variation between genders. In a 2008 study, data from 31 randomized clinical trials were reviewed,

and it was reported that antihypertensive medications showed no differences between men and women in reducing blood pressure or cardiovascular outcomes (31). On the other hand, the findings of this study revealed that among patients aged 18–44 using CCBs, women demonstrated better BP control rates than men. Similarly, a study from China found that CCBs were more effective in achieving BP control in women of this age group (29). Dry cough, a side effect of ACEI use, is reported more frequently in women than in men (32, 33), which could account for the lower prevalence of ACEI use in women. Additionally, ACEI use has been reported to achieve better BP control in men compared to women among hypertensive patients under 45 years old (29). However, there are also studies reporting the opposite (33). The use of ARBs showed comparable BP control rates between genders in all age groups. There are few studies in the existing literature that assess the impact of ARBs on BP control in relation to gender, and their results are conflicting. While some research indicates that ARBs result in better BP control in middle-aged women, other studies suggest they are more effective in men, whereas some find no gender-related differences in BP control rates (29, 34, 35). These differences may be related to the combination of antihypertensive medications. Therefore, further research is needed on this topic.

The current study had several notable limitations. First, the retrospective design may limit the ability to establish causal relationships between treatment patterns and outcomes. Second, potential confounding factors such as lifestyle behaviors, dietary sodium intake, and medication adherence were not thoroughly explored. Additionally, medication adherence was not examined. Finally, the sample was limited to a single healthcare setting, which may limit the generalizability of findings to broader populations.

Conclusion

This study highlights gender-related differences in antihypertensive treatment patterns and responses. While overall BP control rates were comparable between men and women, women demonstrated better control in specific scenarios, such as diuretic use and monotherapy. These findings emphasize the need for individualized treatment approaches that account for gender and other patient-specific factors to optimize BP control and reduce the burden of uncontrolled hypertension.

Conflict of Interest/ Funding: Funding

The study received no financial support from any individual or organization, and the authors declare no conflict of interest.

Ethics Committee Approval

The study was performed in accordance with the Declaration of Helsinki, and was approved by the Diskapi Yildirim Beyazit Training and Research Hospital Clinical Research Ethics Committee (Date: 20.06.2022, Decision No: 140/15).

Informed Consent

The need for informed consent was waived under the approval of the Local Ethics Committee due to the retrospective design.

Conflicts of Interest

The authors declare they have no conflicts of interest.

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Availability of Data and Material

The data that support the findings of this study are available on request from the corresponding author, [A.K.].

Author Contributions

Concept – A.K., Design- A.K. and V.O.T., Supervision - A.K., Data collection and/or processing - A.K. and V.O.T., Analysis and/or interpretation - A.K. and V.O.T., Writing – A.K., Critical review- V.O.T. All authors read and approved the final version of the manuscript.

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Research Article

A comprehensive retrospective review of ınpatient hematology consultations at a tertiary care hospital

Üçüncü basamak bir hastanede yatan hastalarda hematoloji konsültasyonlarının kapsamlı retrospektif incelemesi

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Abstract

Aim: Hematological parameters are affected by many hematological and non-hematological reasons. In many diseases, values that go beyond normal limits are often a reason for consultation by physicians in other branches of science. In our study, what consultations are requested from hematology in patients hospitalized in our hospital, the most common hematological problems encountered by the departments, and the results of the consultations were examined.

Material and Methods: A total of 684 consultations were retrospectively scanned between 2022 and 2023, based on the information obtained from the hospital data system. The study examined the requesting department, consultation reason, patients' comorbid conditions, history of hematologic disorders, hematologic and non-hematologic diagnoses following the consultation, and assessments using peripheral smears and biopsies.

Results: 59.50% of the consultations were requested from internal departments, while 40.50% were requested from surgical departments. The most common reason for requesting consultation was found to be cytopenias with 41.96%. The most common reason for consultation requested for cytopenia was thrombocytopenia. While 45.50% of the consultations were evaluated with peripheral smear, 10.20% were evaluated with bone marrow biopsy.

Conclusion: We determined the issues on which physicians in other departments most frequently felt the need for consultation, how many of these resulted in a hematological diagnosis, and the non-hematological diagnoses that most affected blood parameters. We believe that the results of our study will be guiding in training programs and preparation of consultation books.

Keywords: consultation, hematology, inpatient

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Öz

Amaç: Hematolojik parametreler, birçok hematolojik ve hematolojik olmayan nedenle etkilenmektedir. Birçok hastalıkta, normal sınırlar dışına çıkan değerler diğer tıp branşlarındaki hekimler tarafından sıklıkla konsültasyon talep edilmesine neden olmaktadır. Bu çalışmada, hastanemizde yatan hastalarda hematolojiden hangi konsültasyonların istendiği, bölümler tarafından en sık karşılaşılan hematolojik problemler ve konsültasyon sonuçları incelenmiştir.

Gereç ve Yöntemler: 2022-2023 yılları arasında toplam 684 konsültasyon, hastane veri sistemi üzerinden retrospektif olarak tarandı. Çalışmada, konsültasyonu talep eden bölüm, konsültasyon nedeni, hastaların komorbid durumları, hematolojik hastalık öyküsü, konsültasyon sonrası hematolojik ve hematolojik olmayan tanılar, periferik yayma ve biyopsi ile yapılan değerlendirmeler incelendi.

Bulgular: Konsültasyonların %59.50'si dahili bölümlerden, %40.50'si cerrahi bölümlerden talep edildi. Konsültasyon talep etme nedenleri arasında en yaygın neden, %41.96 ile sitopeniler olarak bulundu. Sitopeni için talep edilen en sık konsültasyon nedeni trombositopeni idi. Konsültasyonların %45.50'si periferik yayma ile, %10.20'si kemik iliği biyopsisi ile değerlendirildi.

Sonuçlar: Diğer bölümlerdeki hekimlerin hangi konularda en sık konsültasyona ihtiyaç duyduğunu, bunlardan kaçının hematolojik tanı ile sonuçlandığını ve kan parametrelerini en çok etkileyen hematolojik olmayan tanıları belirledik. Çalışmamızın sonuçlarının eğitim programlarında ve konsültasyon kitaplarının hazırlanmasında yön verici olacağı kanaatindeyiz.

Anahtar Kelimeler: konsültasyon, hematoloji, yatan hasta

Introduction

Consultations for inpatients at tertiary healthcare institutions allow doctors to reach out to experienced colleagues from other specialties to manage complex cases. These consultations, which are a fundamental part of clinical practice, facilitate the exchange of critical information, particularly for patients with multiple comorbidities requiring a multidisciplinary approach (1). They also expedite problem-solving in challenging cases and foster discussion and learning, an essential component in academic hospitals where resident doctors undergo training (2).

Today, consultations can be conducted more efficiently through e-consultations via hospital information systems. However, such consultations still demand considerable time and human resources (3, 4). They constitute a significant workload in addition to routine daily duties, yet they must not be misused for purposes such as scheduling patient appointments (5-7). Since limited data exist regarding this activity, it remains an underexplored aspect of service delivery.

Understanding inpatient consultation profiles is crucial for effectively organizing human resources, equipment, and related supplies (8). In specialties like hematology, identifying potential breakdowns and implementing improvements within the system is essential, making analyses in this area highly necessary. This information is extremely important, as it will serve as a guide for hematology training in other medical fields and in the preparation of consultation handbooks. This study aimed to investigate the profile of inpatient consultations requested by other specialties and provided by the hematology team in an academic tertiary care hospital.

Material and Methods

The Kartal Dr. Lutfi Kirdar City Hospital is a tertiary-level teaching and research hospital with a total bed capacity of 1,105, including 145 intensive care beds. It provides specialty training in 54 medical fields and accepts patients across all departments, including emergency care. In this study, all patients for whom hematology consultations were requested between January 2023 and November 2023 were included. All consultations requested from the hematology department were retrospectively reviewed using records from the hospital information system. Our study received approval from the Kartal Dr. Lütfi Kırdar City Hospital Clinical Research Ethics Committee (Date: 30.10.2023, Decision No: 2023/5l4/260/30) and was conducted in compliance with the Helsinki Declaration of Medical Ethics.

Data were collected for 684 included patients, encompassing age, gender, comorbidity information, the department requesting the consultation, the reason for the consultation, and whether the patients had a prior hematological diagnosis in their medical history. Additional data included consultations resulting in a hematological diagnosis, cases assessed with peripheral blood smears, those evaluated by biopsy, and final

decision outcomes. The reasons for requesting consultations were obtained from e-consultation request forms. Most consultations concluded with test recommendations, test interpretations, treatment suggestions, treatment planning, or follow-up. Cases diagnosed with a hematological condition requiring treatment were finalized with a treatment plan. In contrast, cases unrelated to hematology were concluded with a follow-up recommendation. Cases requiring hematological investigation were categorized as "test required," while test and treatment suggestions were applied to non-hematological cases that involved general recommendations. The internal medicine departments included in the analysis were infectious diseases, general internal medicine, nephrology, neurology, pulmonary diseases, radiation oncology, oncology, gastroenterology, emergency medicine, ophthalmology, rheumatology, endocrinology, occupational health, hyperbaric oxygen therapy, physical therapy, organ transplantation, family medicine, and psychiatry.

Statistical analyses

All analyses were performed using IBM SPSS Statistics for Windows, Version 25.0 (Statistical Package for the Social Sciences, IBM Corp., Armonk, NY, USA). Categorical variables were summarized as descriptive statistics, including frequencies and percentages.

Results

Among the 684 consultation patients evaluated, the mean age was 56.04±17.55 years, with 46.93% being female and 53.07% male. A hematological diagnosis was present in 19.44% of the patients' medical histories, while 16.37% of the consultations resulted in a new hematological diagnosis. Of these diagnoses, 37.57% were non-hematological. Peripheral blood smears were utilized in 45.50% of the consultations, and 10.2% of the cases were evaluated using biopsy. Consultations requested by internal medicine departments made up 59.5% of the total, while 40.5% were requested by surgical departments (Table 1).

The most common comorbidities observed among the patients were as follows: 57.14% of those with infectious diseases had COVID-19 (Coronavirus infection); 48.65% of patients with nephrological diseases had chronic kidney failure; 77.5% of gynecology patients were pregnant; 83.34% of those with endocrine disorders had diabetes mellitus (DM); and 46.16% of patients with cardiovascular diseases had ischemic heart disease. Overall, the primary reason for consultation requests was cytopenias, accounting for 41.96%, followed by preoperative evaluations at 8.19% (Table 2).

Table 1. General characteristics of consultations

Variables	Results n = 684
Age, years	56.04 ± 17.55
Gender, n (%)	
Female	321 (46.9)
Male	363 (53,1)
Consultations with a history of hematological diagnosis, n (%)	133 (19.4)
Consultations receiving a hematological diagnosis, n (%)	112 (16.4)
Consultations receiving a non-hematological diagnosis, n (%)	257 (37.6)
Consultations tested with peripheral smear, n (%)	311 (45.5)
Consultations resulting in biopsy, n (%)	70 (10.2)
Departments requesting consultations, n (%)	
Internal Departments	407 (59.5)
Surgical Departments	277 (40.5)

The data are expressed as the mean ± SD or number (%). Internal medicine departments: infection, general internal medicine, nephrology, neurology, chest diseases, radiation oncology, oncology, gastroenterology, oncology, emergency internal medicine, ophthalmology, rheumatology, endocrinology, occupational medicine, hyperbaric o2, physical therapy, organ transplantation, family medicine, psychiatry. Surgical departments: others.

Table 2. Reasons for consultation requests.

Variables	Results n = 684
Cytopenias, n (%)	287 (41.9)
Preoperative assessment, n (%)	56 (8.2)
Presence of M protein, n (%)	24 (3.5)
Polycythemia, n (%)	17 (2.5)
Thrombocytosis, n (%)	16 (2.3)
Leukocytosis, n (%)	41 (6.0)
Eosinophilia, n (%)	1 (0.2)
Treatment planning, n (%)	5 (0.7)
Suspicion of hematological malignancy, n (%)	23 (3.4)
Consultation for hematological diagnosis, n (%)	29 (4.2)
Hereditary coagulation factor deficiency, n (%)	1 (0.2)
Elevated PT/aPTT/INR, n (%)	13 (1.9)
Hypercalcemia, n (%)	5 (0.7)
Bleeding/bruising/petechiae, n (%)	26 (3.8)
Lymphadenopathy/splenomegaly, n (%)	32 (4.7)
Cross incompatibility, n (%)	9 (1.31)
Other, n (%)	99 (14.5)

The data are expressed as the number (%). aPTT, activated partial thromboplastin time; INR, international normalized ratio; PT, prothrombin time.

Other reasons for consultation requests included various factors such as appointment scheduling, drug report preparation, biopsy result consultation, obtaining a second opinion, elevated liver enzymes, and fever. Among consultations requested due to cytopenia, 40.56% were for thrombocytopenia, 20.98% for pancytopenia, and 18.88% for anemia, which was the third most common reason (Table 3).

Table 3. Distribution of consultations requested for cytopenia

Variables	Results n = 286
Leukopenia, n (%)	11 (3.9)
Neutropenia, n (%)	18 (6.3)
Lymphopenia, n (%)	10 (3.5)
Bicytopenia, n (%)	17 (5.9)
Pancytopenia, n (%)	60 (21.0)
Thrombocytopenia, n (%)	116 (40.6)
Anemia, n (%)	54 (18.9)

The data are expressed as the number (%).

For preoperative evaluations, thrombocytopenia was the most frequent reason, accounting for 17.86%, followed by requests related to preoperative evaluation in patients with a hematological diagnosis, which made up 16.07%. Peripheral blood smears were most commonly performed for thrombocytopenia (36.01%), followed by pancytopenia (18.34%) and leukocytosis (12.55%), which were the second and third most common reasons, respectively (Table 4).

Bone marrow biopsy was most frequently performed for pancytopenia (25.71%), followed by the presence of M-protein (24.28%) and leukocytosis (17.14%) (Table 5). Among consultations requested for thrombocytopenia, 96.6% were evaluated using a peripheral blood smear, while 1.7% required a bone marrow biopsy. Of the thrombocytopenia consultations, 60.3% involved platelet counts below 50,000/mm^3, 29.31% were classified as pseudothrombocytopenia, 16.92% were attributed to gestational thrombocytopenia, and 6.15% were secondary to infection. The most common hematological diagnosis among patients consulted for thrombocytopenia was idiopathic thrombocytopenic purpura, identified in 30.79% of cases (Table 6).

Among patients who received a hematological diagnosis following consultations, multiple myeloma and non-Hodgkin lymphoma were the most common, each accounting for 10.72% of cases. The second most frequent diagnosis was myelodysplastic syndrome, observed in 9.82% of cases, followed by essential thrombocytosis at 8.04% and acute myeloid leukemia at 7.15% (Table 7). In terms of medical history, non-Hodgkin lymphoma was the most frequently documented prior condition, identified in 21.06% of patients (Table 8).

Table 4. Consultation requests indicated for peripheral smear

Variables	Results n = 311
Thrombocytopenia, n (%)	112 (36.0)
Anemia, n (%)	27 (8.7)
Leukocytosis, n (%)	39 (12.6)
Pancytopenia, n (%)	57 (18.3)
Bicytopenia, n (%)	14 (4.5)
Thrombocytosis, n (%)	4 (1.3)
Leukopenia, n (%)	5 (1.1)
Neutropenia, n (%)	6 (1.9)
Presence of M protein, n (%)	5 (1.6)
Elevated PT/APTT/INR, n (%)	3 (1.0)
General examination, n (%)	1 (0.32)
Lymphadenopathy/Splenomegaly, n (%)	4 (1.3)
Bleeding, n (%)	2 (0.6)
Preoperative assessment, n (%)	13 (4.2)
Treatment planning, n (%)	1 (0.3)
Neuroacanthocytosis, n (%)	3 (1.0)
Suspicion of hematological malignancy, n (%)	2 (0.6)
Suspicion of multiple myeloma, n (%)	1 (0.3)
Suspicion of bone marrow infiltration, n (%)	1 (0.3)
Bone marrow activation on MRI, n (%)	1 (0.3)
Cross-match incompatibility, n (%)	1 (0.3)
Request for peripheral smear, n (%)	2 (0.6)
Suspicion of DIC, n (%)	1 (0.3)
Eosinophilia, n (%)	1 (0.3)
Elevated ferritin, n (%)	1 (0.3)
Consultation for hematological diagnosis, n (%)	3 (1.0)
Chorea etiology, n (%)	1 (0.3)

The data are expressed as the number (%). aPTT, activated partial thromboplastin time; DIC, disseminated intravascular coagulation; INR, international normalized ratio; MRI, magnetic resonance imaging; PT, prothrombin time.

Table 5. Consultation requests indicated for bone marrow biopsy

Variables	Results n = 70
Presence of M protein, n (%)	17 (24.3)
Leukocytosis, n (%)	12 (17.1)
Thrombocytosis, n (%)	4 (5.7)
Thrombocytopenia, n (%)	2 (2.9)
Anemia, n (%)	5 (7.1)
Pancytopenia, n (%)	18 (25.7)
Preoperative assessment, n (%)	1 (1.4)
Lymphadenopathy, n (%)	1 (1.4)
Hypercalcemia, n (%)	3 (4.3)
Elevated sedimentation, n (%)	2 (2.9)
Bicytopenia, n (%)	2 (2.9)
Consultation for hematological diagnosis, n (%)	1 (1.4)
Elevated PT/APTT/INR, n (%)	1 (1.4)
Splenomegaly, n (%)	1 (1.4)

The data are expressed as the number (%). aPTT, activated partial thromboplastin time; INR, international normalized ratio; PT, prothrombin time.

Table 6. Hematological diagnoses in consultations requested due to thrombocytopenia

HELLP syndrome, n (%)	2 (15.4)
Hemolytic uremic syndrome, n (%)	1 (7.7)
Heparin-induced thrombocytopenia, n (%)	2 (15.4)
Idiopathic thrombocytopenic purpura, n (%)	4 (30.8)
Myelodysplastic syndrome, n (%)	2 (15.4)
Thrombotic thrombocytopenic purpura, n (%)	2 (15.4)

The data are expressed as the number (%).

Table 7. Distribution of hematological diagnoses made as a result of consultations

Variables	Results n = 112
Acute lymphoblastic leukemia, n (%)	1 (0.9)
Acute myeloid leukemia, n (%)	8 (7.2)
Acute promyelocytic leukemia, n (%)	1 (0.9)
Alpha thalassemia trait, n (%)	1 (0.9)
B-thalassemia intermedia, n (%)	1 (0.9)
B-thalassemia minor, n (%)	1 (0.9)
B-thalassemia trait, n (%)	1 (0.9)
Castleman disease, n (%)	1 (0.9)
Acquired hemophilia, n (%)	1 (0.9)
Essential thrombocytosis, n (%)	9 (8.0)
Factor VII deficiency, n (%)	2 (1.8)
HELLP syndrome, n (%)	2 (1.8)
Hemolytic uremic syndrome, n (%)	1 (0.9)
Heparin-associated thrombocytopenia, n (%)	2 (1.8)
Hodgkin lymphoma, n (%)	1 (0.9)
Idiopathic myelofibrosis, n (%)	4 (3.6)
Idiopathic thrombocytopenic purpura, n (%)	4 (3.6)
Hereditary thrombophilia, n (%)	2 (1.8)
Chronic lymphocytic leukemia, n (%)	6 (5.4)
Chronic myeloid leukemia, n (%)	7 (6.3)
Chronic myelomonocytic leukemia, n (%)	1 (0.9)
MHTRF gene mutation-thrombophilia, n (%)	1 (0.9)
Multiple myeloma, n (%)	12 (10.7)
Myelodysplastic syndrome, n (%)	11 (9.8)
Non-Hodgkin lymphoma, n (%)	12 (10.7)
Autoimmune hemolytic anemia, n (%)	3 (2.7)
Plasma cell disease-non-multiple myeloma, n (%)	4 (3.6)
Polycythemia vera, n (%)	5 (4.5)
CNS lymphoma, n (%)	1 (0.9)
Thrombotic thrombocytopenic purpura, n (%)	4 (3.6)
Von Willebrand disease, n (%)	2 (1.8)

The data are expressed as the number (%). CNS, central nervous system; MHTRF, methylenetetrahydrofolate reductase.

Among the consultations resulting in non-hematological diagnoses, 15.17% were caused by pseudothrombocytopenia, while 14.39% were cytopenias secondary to infection. Across all departments, hematology consultations were most frequently requested by internal medicine (20.16%), followed by infectious diseases (17.39%). The most common reason for consultation by internal medicine was anemia, whereas infectious diseases primarily requested consultations for thrombocytopenia. Thrombocytopenia was observed to be the most common reason for consultation requests across all departments. Notably, 53.03% of the consultations from obstetrics and gynecology were due to thrombocytopenia. In surgical departments, most consultations were requested for preoperative evaluations, with thrombocytopenia being the most common issue. In 30.99% of all consultations, only follow-up was recommended, while 26.46% involved hematological tests, and 12.13% resulted in treatment plans due to a hematological diagnosis (Table 9).

Table 8. Distribution of hematological diagnoses in the history of consulted patients

Variables	Results n = 133
Acute lymphoblastic leukemia, n (%)	1 (0.8)
Acute myeloid leukemia, n (%)	8 (6.0)
B-thalassemia intermedia, n (%)	1 (0.8)
B-thalassemia minor, n (%)	2 (1.5)
Burkitt lymphoma, n (%)	2 (1.5)
Essential thrombocytosis, n (%)	2 (1.5)
Factor V Leiden mutation, n (%)	3 (2.3)
Glanzman disease, n (%)	1 (0.8)
Hemophilia A, n (%)	1 (0.8)
Hemolytic anemia, n (%)	1 (0.8)
Hereditary spherocytosis, n (%)	1 (0.8)
Hodgkin lymphoma, n (%)	12 (9.0)
Idiopathic myelofibrosis, n (%)	2 (1.5)
Idiopathic thrombocytopenic purpura, n (%)	11(8.3)
Hereditary factor deficiency, n (%)	1 (0.8)
Chronic myeloid leukemia, n (%)	5 (3.8)
Chronic lymphocytic leukemia, n (%)	24 (18.1)
Multiple myeloma, n (%)	9 (6.8)
Myelodysplastic syndrome, n (%)	9 (6.8)
Non-Hodgkin lymphoma, n (%)	28 (21.0)
Sickle cell anemia, n (%)	1 (0.8)
Plasma cell disease-non-multiple myeloma, n (%)	1 (0.8)
Polystemia vera, n (%)	3 (2.3)
Prothrombin gene mutation, n (%)	1 (0.8)
CNS lymphoma, n (%)	1 (0.8)
Hairy cell leukemia, n (%)	1 (0.8)
Von Willebrand disease type-I, n (%)	1 (0.8)

The data are expressed as the number (%). CNS, central nervous system; MHTRF, methylenetetrahydrofolate reductase.

Table 9. Conclusion of consultations.	
Variables	Results n = 684
Anticoagulation use recommendation, n (%)	9 (1.3)
Antiaggregant use recommendation, n (%)	1 (0.2)
Biopsy recommendation, n (%)	31 (4.5)
Phlebotomy recommendation, n (%)	1 (0.2)
Hematology expert opinion request, n (%)	1 (0.2)
Hematology unrelated, n (%)	23 (3.4)
Waiting for pathology result, n (%)	2 (0.3)
Plasmapheresis planning, n (%)	3 (0.4)
Appointment recommendation, n (%)	5 (0.7)
Waiting for cytology result, n (%)	1 (0.2)
Follow-up, n (%)	212 (31.0)
General treatment recommendation, n (%)	66 (9.6)
Treatment plan due to hematological diagnosis, n (%)	83 (12.1)
Hematological examination, n (%)	181 (26.5)
General examination recommendation, n (%)	1 (0.2)
Tocilizumab use recommendation, n (%)	1 (0.2)
Transfusion recommendation, n (%)	63 (9.2)
The data are expressed as the number (%).	

Discussion

Our study, by examining consultation patterns, aimed to address key questions such as: What are our shortcomings as physicians, particularly in hematology? How can we improve the consultation process? Which areas should we emphasize more in education programs and guidelines for other departments? Additionally, it sought to identify deficiencies that could be addressed to reduce unnecessary workload. We believe that our findings will serve as a guide in the development of future guidelines and education programs.

Consultations allow healthcare professionals to utilize the expertise of colleagues from other medical fields when managing complex cases that require a multidisciplinary approach. Nowadays, consultations can be rapidly accessed through hospital information systems. They play a critical role in the training of resident physicians, while also constituting a significant portion of a doctor's routine workload. Unfortunately, consultations are sometimes misused for unnecessary purposes, such as scheduling patient appointments. The proper interpretation of a complete blood count (CBC), one of the most accessible first-line tests in almost all centers, is essential. Assessing whether results fall within or outside of the normal range is a mathematical evaluation, not a medical one, and should not be confused with the practice of medicine.

When evaluating hematological parameters, physicians should integrate the patient's medical history, current medications, clinical status, and physical examination findings. The effects of infections caused by microorganisms, autoimmune or inflammatory diseases, kidney and liver disorders, other systemic conditions, and medications on hematological parameters must be thoroughly understood by the responsible physician. After initial assessments, patients presenting to primary specialties should be appropriately referred to subspecialties. Directly referring a patient with elevated creatinine levels to nephrology, one with elevated liver enzymes to gastroenterology, or one with anemia to hematology without a comprehensive internal medicine evaluation is an incorrect practice. Unfortunately, factors such as the high number of patients per physician, inadequate role modeling for residents in requesting consultations, and the limited number of studies on this topic have hindered the establishment of general principles. A competent physician, who understands that anemia is often a symptom rather than a standalone disease, should guide patients effectively through diagnostic testing. In a study by Venkatesh et al., an e-consultation program was tested to support physicians before referring patients to gastroenterology (9). The program allowed primary care physicians to resolve clinical issues independently, thereby reducing the number of consultations. Consequently, gastroenterologists could allocate more time to complex and specific cases (9-11)

In the literature, most studies on consultations focus on evaluating the workflow and demand in emergency departments (12). Leithead et al. evaluated emergency consultations in vascular surgery (13), while Neuhaus et al. investigated emergency consultations in the plastic surgery (14). Similar to our study, these investigations examined the reasons for requesting consultations and questioned whether the consultations labeled as urgent were genuinely emergent. Both studies also identified deficiencies in workflow and training, emphasizing the need for improvements in these areas (13, 14). In a limited number of studies, inpatient consultations have also been evaluated. Sullivan et al., n their analysis of urology consultations requested for inpatients, found that many of these consultations could have been managed through outpatient follow-up (15). The study concluded that new guidelines need to be developed to address this issue (15). Similarly, studies on inpatient consultations in orthopedic and immunology departments emphasized improving consultation workflows. These studies advocated for enhancing resident physician training and developing guidelines to prevent unnecessary

workloads, particularly to reduce the burden of non-essential consultations (16, 17). Our initial observation during this study was that physicians in both internal medicine and surgical fields frequently requested hematology consultations for minor deviations in hematological parameters, even when these changes were only slightly outside the normal range. Consequently, only 16.4% of consultations resulted in a hematological diagnosis, while 31.0% concluded with a simple recommendation for follow-up.

Peripheral blood smear is an essential component of hematological assessment. This test, which evaluates abnormal morphological and numerical changes in blood cells, provides valuable insights for experienced hematologists and should only be requested when clinically necessary. Properly spreading the blood on a slide, staining it, and examining it under a microscope under optimal conditions are time-intensive processes. Efficient time management is crucial for both the physician and the patient's recovery process. A study supporting this perspective emphasized that the time taken for a physician to respond to a consultation is closely linked to the patient's length of stay in the emergency department (18, 19). Thus, unnecessary requests for peripheral blood smears not only increase the workload for healthcare workers and physicians but also lead to inefficient use of time. In our study, nearly half of the consultations (45.5%) were evaluated using a peripheral smear, with the majority performed for thrombocytopenia. Information about platelet count thresholds that pose a bleeding risk or are relevant for surgical interventions is part of fundamental medical knowledge. However, the frequent consultation requests for thrombocytopenia suggest that some physicians may either lack this knowledge or seek confirmation from a hematologist. This tendency could also reflect an effort to shift legal responsibility, as 39.7% of thrombocytopenia consultations involved patients with platelet counts exceeding 50,000. It is important to emphasize that peripheral blood smears should not be considered an indispensable part of every hematology consultation. Automatically requesting a smear for each patient unnecessarily increases workload. Instead, the decision to perform a peripheral smear should be made by the hematologist based on clinical judgment.

When considering all departments, cytopenias emerged as the most common reason for requesting consultations, accounting for 41.9% of all requests. Under this category, consultations were requested for conditions such as neutropenia, leukopenia, thrombocytopenia, anemia, and lymphopenia. Many of these cases involved patients with values only slightly outside the normal range, which were neither clinically significant nor life-threatening. Thrombocytopenia was the leading cause of concern within the category of cytopenias, particularly in the obstetrics and gynecology department, where thrombocytopenia in pregnant women was the most frequent reason for consultation. In our study, 16.9% of thrombocytopenia cases were classified as gestational thrombocytopenia. A platelet count of 50,000 or above is considered sufficient for all types of delivery. However, we observed that consultation requests were made even for pregnant patients with platelet counts exceeding 100,000 but still below the normal range to assess the appropriateness of delivery. This observation suggests that these requests were driven by knowledge gaps, reluctance to assume legal responsibility, or uncertainty requiring confirmation. To address this issue, it is essential to support these departments through targeted training programs and the development of clear guidelines for non-hematology physicians.

We recognize that consultations are a vital component of the learning process for resident physicians, providing a quick and practical way to gain experience. Senior physicians should guide junior doctors in making thoughtful consultation requests and help them navigate available resources and guidelines. Through mentorship and by promoting conscious consultation practices, experienced physicians can ensure that residents develop sound clinical judgment while utilizing healthcare resources efficiently (20). A study by Rutsky et al., which examined the contribution of inpatient care to the education process, supports these perspectives (21). These findings highlight the importance of consultations in fostering learning and experience for resident physicians, emphasizing that consultations are integral to their clinical training and professional development (5, 21-23).

The majority of multiple myeloma patients present with acute renal failure, often requiring hemodialysis and management by the nephrology department. In such cases, protein electrophoresis and immunoelectrophoresis are commonly requested to detect paraproteinemia. Among these patients, the presence of M-protein was identified as the most frequent reason for nephrology consultations, accounting for 48% of the requests. Additionally, M-protein was the leading indication for

bone marrow biopsy, representing 24.3% of cases. As a result of these biopsies, 10.7% of patients were diagnosed with multiple myeloma and subsequently received a treatment plan. The ease with which protein electrophoresis can be requested by various departments, combined with the straightforward detection of M-protein, likely explains why multiple myeloma was the most frequently diagnosed condition following consultations (24).

Among all departments, general internal medicine was the most frequent requester of consultations, followed by infectious diseases. General internal medicine primarily requested consultations for anemia, whereas infectious diseases most commonly requested consultations for cytopenias. The prominence of anemia as the leading reason for consultation requests from internal medicine was unexpected. It is important to note that anemia is often a symptom rather than a standalone hematological disease. Conditions such as chronic kidney failure, liver diseases, and autoimmune or inflammatory disorders can lead to anemia. Additionally, bone marrow suppression due to chronic systemic diseases may result in anemia of chronic disease. It is also noteworthy that the infectious diseases department frequently requests consultations for cytopenias. Infections are among the primary causes that affect hematological parameters. Monitoring post-infection leukocytosis, leukopenia, neutropenia, or lymphopenia in conjunction with the patient's clinical status and infection markers, determining whether the condition is acute or chronic, and keeping the patient under observation can address many concerns and reduce unnecessary workload. E-consultations offer distinct advantages over face-to-face consultations, particularly in terms of rapid access to specialists and quicker response times. A study investigating the impact of perioperative hematology consultations—both face-to-face and e-consultations—on surgical outcomes found that e-consultations provided faster responses and were equally effective as in-person consultations (25). Another study, while acknowledging the faster response times of e-consultations, argued that this model increased consultation workload. The ease and quick access to specialists often led to consultations being requested for minor changes in hematological parameters that might not have warranted a formal consultation under normal circumstances (26).

Conclusion

We determined the issues on which physicians in other departments most frequently felt the need for consultation, how many of these resulted in a hematological diagnosis, and the non-hematological diagnoses that most affected blood parameters. This study is based on data from a single center, and similar studies are limited in our country. We believe that the results of our study will be guiding in training programs and preparation of consultation books.

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Conflicts of Interest

The authors declare they have no conflicts of interest.

Ethics Approval

The study was performed in accordance with the Declaration of Helsinki, and was approved by the Kartal Dr. Lütfi Kırdar City Hospital Clinical Research Ethics Committee (Decision No: 2023/5I4/26060, Date: 30.10.2023).

Informed Consent

The need for informed consent was waived under the approval of the Local Ethics Committee due to the retrospective design.

Availability of Data and Material

The data that support the findings of this study are available on request from the corresponding author.

Authors' contribution

Concept – A.N.K., Design – A.N.K., Supervision – E.T.E., Data collection and/or processing – A.N.K., and E.T.E., Analysis and/or interpretation – A.N.K., and E.T.E., Writing – A.N.K., Critical review- E.T.E. All authors read and approved the final version of the manuscript.

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Araştırma Makalesi

The diagnostic performance of non-invasive fibrosis markers for predicting fibrosis in primary biliary cholangitis patients

Primer biliyer kolanjit hastalarında fibrozisi öngörmede invaziv olmayan fibrozis belirteçlerinin tanısal performansı

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Abstract

Aim: This study aimed to investigate the relationship between liver fibrosis measured by transient elastography and non-invasive fibrosis scoring systems, including Fibrosis-4 (FIB-4) and aspartate-aminotransferase (AST)-to-platelet ratio index (APRI), in patients with primary biliary cholangitis (PBC).

Material and Methods: A total of 45 PBC patients followed in the Gastroenterology Clinic were included in this retrospective study. Transient elastography was performed on all participants, and liver stiffness measurement (LSM) values were recorded in kilopascals (kPa). Fibrosis was defined as LSM ≥ 6.3 kPa, while advanced fibrosis was defined as LSM ≥ 10.5 kPa. To calculate the APRI score, the formula [(AST / upper normal limit × 100) / platelet count] was used, and for the FIB-4 score, the formula [(age × AST) / (platelet count × √alanine aminotransferase)] was applied.

Results: Liver fibrosis was identified in 71.1% (n = 32) of patients, with advanced fibrosis present in 40.0% (n = 18). Patients with fibrosis had higher APRI and FIB-4 scores compared to those without fibrosis. Also, the median APRI score (0.7 vs. 0.5, $p < 0.001$) and median FIB-4 score (2.4 vs. 1.6, $p < 0.001$) were higher in patients with advanced liver fibrosis than in those without. For detecting fibrosis, the AUROC values were 0.73 (95% CI: 0.58–0.89) for APRI and 0.84 (95% CI: 0.73–0.96) for FIB-4. FIB-4 also showed higher accuracy than APRI for identifying advanced fibrosis (AUROC: 0.78 vs. 0.70, $p = 0.048$).

Conclusion: Both APRI and FIB-4 are useful non-invasive tools for detecting and staging fibrosis in PBC. However, FIB-4 demonstrated superior diagnostic performance compared to APRI, particularly in predicting advanced fibrosis. Incorporating these markers into routine clinical practice may reduce the need for invasive liver biopsy and help optimize patient management.

Keywords: Primary biliary cholangitis, transient elastography, liver fibrosis, FIB-4 score, APRI score

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Öz

Amaç: Bu çalışma, primer biliyer kolanjit (PBC) hastalarında transient elastografi ile ölçülen karaciğer fibrozisi ile Fibrozis-4 (FIB-4) ve aspartat-aminotransferaz-trombosit oranı indeksi (APRI) gibi non-invaziv fibrozis skorlama sistemleri arasındaki ilişkiyi araştırmayı amaçladı.

Gereç ve Yöntemler: Gastroenteroloji Kliniği'nde takip edilen toplam 45 PBC hastası bu retrospektif çalışmaya dahil edildi. Tüm katılımcılara transient elastografi uygulandı ve karaciğer sertliği ölçüm (LSM) değerleri kilopaskal (kPa) cinsinden kaydedildi. Fibrozis, LSM ≥ 6.3 kPa olarak tanımlanırken, ileri fibrozis LSM ≥ 10.5 kPa olarak kabul edildi. APRI skorunun hesaplanmasında [(AST / üst normal sınır × 100) / trombosit sayısı] formülü, FIB-4 skorunun hesaplanmasında ise [(yaş × AST) / (trombosit sayısı × √alanin aminotransferaz)] formülü uygulandı.

Bulgular: Hastaların %71.1'inde (n = 32) karaciğer fibrozisi, %40.0'ında (n = 18) ise ileri fibrozis saptandı. Fibrozisi olan hastalarda ibrozisi olmayan hastalara kıyasla APRI ve FIB-4 skorları f daha yüksekti. İleri fibrozisi olan hastalarda ileri fibrozis olmayan hastalara kıyasla da APRI (0.7 vs. 0.5, p < 0.001) ve FIB-4 (2.4 vs. 1.6, p < 0.001) skorları daha yüksekti. Fibrozisin saptanmasında, AUROC değerleri APRI için 0.73 (%95 GA: 0.58–0.89) ve FIB-4 için 0.84 (%95 GA: 0.73–0.96) olarak bulundu. FIB-4, ileri fibrozisi belirlemede de APRI'ye göre daha yüksek doğruluk gösterdi (AUROC: 0.78 karşı 0.70, p = 0.048).

Sonuçlar: APRI ve FIB-4, PBC hastalarında fibrozis tespiti ve evrelemesi için kullanışlı non-invaziv araçlardır. Bununla birlikte, FIB-4 özellikle ileri fibrozisi öngörmede APRI'ye kıyasla üstün tanısal performans sergilemiştir. Bu belirteçlerin rutin klinik uygulamalara dahil edilmesi, invaziv karaciğer biyopsisi ihtiyacını azaltabilir ve hasta yönetimini optimize etmeye yardımcı olabilir.

Anahtar Kelimeler: Primer biliyer kolanjit, transient elastografi, karaciğer fibrozisi, FIB-4 skoru, APRI skoru

Introduction

Primary biliary cholangitis (PBC) is an autoimmune disease that causes gradual destruction of the intrahepatic bile ducts, increased inflammation in the periportal area, and cholestasis (1, 2). It was previously known as primary biliary cirrhosis. Although genetic factors are blamed for the etiology of PBC, environmental factors are also thought to play a role (3, 4). It is frequently seen in women between the ages of 30 and 60. In the USA, the incidence of PBC is estimated to be 45 per million in women and 7 per million in men, and the prevalence is 654 per million in women and 121 per million in men (5-7). rolonged cholestasis associated with PBC can progress to cirrhosis and portal hypertension, underscoring the need for accurate fibrosis assessment (8).

Liver fibrosis, rather than bile duct loss, is considered a more reliable marker of histological progression in PBC. Liver biopsy is the gold standard for evaluating fibrosis, but its invasive nature, associated risks, and patient discomfort limit its routine use (9). non-invasive alternatives, such as the aspartate-aminotransferase-to-platelet ratio index (APRI), Fibrosis-4 (FIB-4) score, and imaging methods like transient elastography, have gained traction for diagnosing and monitoring fibrosis in PBC. Many studies have found that transient elastography provides a higher diagnostic performance in the differential diagnosis of fibrosis (10-14). However, transient elastography has limitations, including high cost and limited availability in many healthcare systems. In contrast, APRI and FIB-4 are cost-effective, easy-to-calculate, and widely applicable, offering a more accessible alternative for fibrosis evaluation (15, 16). Despite their lower diagnostic accuracy compared to transient elastography, their affordability and simplicity make them valuable tools in clinical practice.

The current literature provides limited findings on the diagnostic performance of these scoring systems in PBC patients. Therefore, this study aimed to investigate the relationship between liver fibrosis measured by transient elastography and non-invasive fibrosis scoring systems, including FIB-4 and APRI, in PBC patients.

Material and Methods

This retrospective study was conducted with PBC patients who admitted to the Gastroenterology Clinic of the Umraniye Training and Research Hospital. The present study adhered to the ethical regulations and principles as stipulated in the Declaration of Helsinki. The study received approval from the

Ethical Committee of the Umraniye Training and Research Hospital, Clinical Research Ethics Committee (Date: 02.11.2023, Decision No. B.10.1.TKH.4.34.H.GP.0.01/412). The requirement for obtaining informed consent was exempted by the Ethics Committee, given the retrospective design of the study.

Study population

The study enrolled 45 patients diagnosed with PBC, monitored at the Liver Clinic from January 2016 to October 2021, and who had transient elastography performed. PBC was diagnosed in patients with elevated alkaline phosphatase (ALP) if one of the following criteria was met: positivity for antimitochondrial antibodies (AMA) or histopathological evidence of non-suppurative destructive cholangitis with interlobular bile duct damage [7]. Exclusion criteria comprised individuals under 18, those with decompensated cirrhosis confirmed clinically, radiologically, or through laboratory findings, patients with pacemakers, those with ascites, those with pregnant women, those with alcohol consumption, those with viral hepatitis, and those with missing transient elastography data or incomplete records. Data on demographic information (age, gender, waist circumference, height, weight, body mass index (BMI)), clinical characteristics (comorbidities, duration of PBC), and laboratory findings were retrieved from patient records.

Laboratory parameters

Blood samples for routine analyses, including complete blood count and biochemical parameters, were taken from the antecubital vein of all patients at the Liver Clinic following at least 8 hours of fasting. All analyses are performed in the same laboratory using consistent equipment. Non-invasive fibrosis scores are calculated using the demographic and laboratory data obtained (17-19):

$$\text{APRI} = \frac{\text{AST (U/L)}}{\text{upper limit of normal AST (U/L)}} \times 100 \div \text{Platelets } (\text{x}10^9/\text{L})$$

$$\text{FIB} - 4 = \frac{Age \times \text{Aspartate aminotransferase (AST; U/L)}}{\sqrt{\text{Alanine aminotransferase (ALT; U/}L) \times \text{Platelets } (\text{x}10^9/\text{L})}}$$

Transient elastography

Transient elastography was conducted by a single operator using the FibroScan® Compact 530 device (Echosens SA, Paris, France). Participants were instructed to fast for at least 3 hours prior to the assessment. The procedure was performed with participants lying in the supine position, with their right arm fully abducted. The M probe was used for all examinations, and the XL probe was employed when indicated by the automatic probe selection tool. Only measurements with at least 10 valid readings and an interquartile range (IQR) to median ratio of <30% were considered reliable.

Liver stiffness measurement (LSM) values were recorded in kilopascals (kPa) , while controlled attenuation parameter (CAP) values, obtained simultaneously, were measured using the second-generation CAP (CAPc) and expressed in dB/m. The procedure was continued until CAP values were achieved for 100% of measurements (20). Fibrosis was considered present at LSM ≥ 6.3 kPa, while advanced fibrosis was defined as LSM ≥ 10.5 kPa (20).

Statistical analysis

All statistical analyses were conducted using STATA/MP v.16 software (StataCorp LLC, Texas, USA). Numerical data with a normal distribution, as determined by the Kolmogorov-Smirnov test, are presented as mean ± standard deviation, whereas non-normally distributed variables are expressed as median (25th-75th percentiles). Comparisons between two groups were performed using the Student t-test for normally distributed variables and the Mann-Whitney U test for non-normally distributed variables. For comparisons involving more than two groups, the ANOVA test (post-hoc: Bonferroni) was used for normally distributed data, and the Kruskal-Wallis H test (post-hoc: Dunn's test) was used for non-normally distributed data. Categorical variables were summarized as numbers and percentages, with group comparisons performed using the Chi-square test or Fisher's exact test when applicable. A multivariable logistic regression analysis employing the backward Wald method was used to identify potential independent predictors of fibrosis. The diagnostic performance of non-invasive fibrosis scores was evaluated through receiver operating characteristic (ROC) curve analysis, with the area under the curve (AUC), standard error (SE), sensitivity, and specificity reported. The optimal cutoff values for predicting fibrosis were determined using the Youden index method. A p-value of $P < 0.05$ was considered statistically significant for all analyses.

Results

The study population consisted of 45 patients with a mean age of 60.2 ± 9.4 years, the majority of whom were female. The mean disease duration was 5.4 ± 1.8 years. The demographic and clinical findings of the patients are detailed in Table 1. Liver fibrosis was detected in 71.1% of cases (n = 32), with advanced liver fibrosis present in 40.0% (n = 18). The ratio of hypertension was higher in patients with liver fibrosis than in

those without (59.4% vs. 15.4%, p = 0.009). Other demographic characteristics did not show significant differences between the groups with and without liver fibrosis. The median AST and ALT levels were similar in patients with and without liver fibrosis, but mean platelet levels were lower in those with fibrosis. The median APRI score (0.5 vs. 0.3, p = 0.015) and median FIB-4 score (1.9 vs. 1.0, p < 0.001) were higher in in patients with liver fibrosis than in those without (Table 1).

The demographic characteristics were comparable between patients with and without advanced fibrosis. While platelet and AST values did not differ significantly, the median AST level was higher in patients with advanced fibrosis. The median APRI score (0.7 vs. 0.5, p < 0.001) and median FIB-4 score (2.4 vs. 1.6, p < 0.001) were higher in patients with advanced liver fibrosis than in those without (Table 2).

The diagnostic performance of the APRI and FIB-4 scores in predicting fibrosis was evaluated using ROC curve analysis. The area under the ROC curve (AUROC) for APRI in detecting fibrosis was 0.73 (95% CI: 0.58-0.89), while for FIB-4, the AUROC was 0.84 (95% CI: 0.73-0.96). The FIB-4 score demonstrated superior diagnostic performance in predicting fibrosis compared to the APRI score (AUC: 0.84 vs. 0.73, p < 0.001) (Figure 1) (Table 3).

Table 1. The demographic and clinical findings of patients with primary biliary cholangitis.

Variables	All population n=45	Fibrosis		p
		No n=13	Yes n=32	
Age, years	60.2 ± 9.4	54.8 ± 10.0	62.3 ± 8.4	0.014*
Gender, n (%)				
Female	39 (86.7)	11 (84.6)	28 (87.5)	0.999
Male	6 (13.3)	2 (15.4)	4 (12.5)	
WC, cm	95.6 ± 12.4	90.1 ± 11.2	97.9 ± 12.3	0.054
BMI, kg/m2	29.3 ± 5.8	28.2 ± 5.7	29.8 ± 5.9	0.404
Hypertension, n (%)	21 (46.7)	2 (15.4)	19 (59.4)	0.009*
Diabetes mellitus, n (%)	10 (22.2)	2 (15.4)	8 (25.0)	0.698
Disease duration, years	5.4 ± 1.8	5.4 ± 1.8	5.3 ± 1.9	0.728
TE findings				
CAP score, dB/m	227.8 ± 49.9	216.2 ± 39.0	232.5 ± 53.6	0.328
Fibrosis score, kpa	8.6 (6.3-14.3)	5.7 (5.6-6.2)	11.8 (8.4-18.4)	<0.001*
Laboratory findings				
Glucose, mg/dL	94.0 (86.0-101.0)	92.0 (88.0-99.0)	94.5 (85.0-102.0)	0.688
Albumin, g/L	42.5 ± 3.6	43.2 ± 1.9	42.2 ± 4.1	0.405
Platelets, x109/L	216.2 ± 77.3	268.9 ± 55.4	194.7 ± 75.1	0.002*
HDL-C, mg/dL	54.0 (47.0-63.0)	54.0 (49.0-61.0)	54.5 (46.5-65.2)	0.634
LDL-C, mg/dL	118.9 ± 30.5	135.7 ± 34.0	112.1 ± 26.5	0.017*
Triglyceride, mg/dL	104.0 (76.0-136.0)	103.0 (91.0-136.0)	107.0 (74.5-134.2)	0.861
AST, U/L	24.0 (20.0-32.0)	25.0 (22.0-30.0)	23.5 (20.0-34.5)	0.661
ALT, U/L	20.0 (14.0-31.0)	20.0 (14.0-25.0)	21.5 (13.8-31.2)	0.725
IgG, g/L	13.9 (12.2-15.8)	12.2 (10.1-14.0)	14.1 (12.5-16.8)	0.082
IgM, g/L	1.8 (1.3-2.4)	1.8 (1.4-1.9)	1.7 (1.3-2.7)	0.745
GGT, U/L	51.0 (24.0-107.0)	51.0 (22.0-82.0)	50.0 (25.5-114.5)	0.698
Total bilirubin, mg/dL	0.6 ± 0.3	0.5 ± 0.2	0.6 ± 0.3	0.107
Sodium, mEq/L	140.5 ± 2.8	140.4 ± 2.2	140.6 ± 3.1	0.832
AFP, ng/mL	142.0 (114.0-179.0)	125.0 (114.0-144.0)	152.0 (119.5-181.2)	0.150
Creatinine, mg/dL	0.8 ± 0.2	0.7 ± 0.1	0.8 ± 0.2	0.100
CRP, mg/L	4.9 (2.1-6.3)	4.0 (1.8-5.4)	5.1 (3.0-8.8)	0.106
APRI score	0.4 (0.3-0.6)	0.3 (0.2-0.4)	0.5 (0.3-0.6)	<0.001*
FIB-4 score	1.8 (1.2-2.4)	1.0 (0.9-1.5)	1.9 (1.5-3.2)	<0.001*

Data are mean ± standard deviation or median (IQR), or number (%). *p<0.05 indicates statistical significance. Abbreviations: AFP, alpha fetoprotein; ALT, alanine aminotransferase, AST, aspartate aminotransferase, ALP, alkaline phosphatase; BMI, body mass index; CAP, controlled attenuation parameter; CRP, C-reactive protein; GGT, gamma glutamyl transferase; IgG, immunoglobulin G, IgM, immunoglobulin M; TE, transient elastography

Table 2. Demographic and clinical findings associated with advanced fibrosis.

Variables	Fibrosis			p
	No n=13	No advanced n=14	Advanced n=18	
Age, years	54.8 ± 10.0	62.2 ± 5.7	62.4 ± 10.1	0.050*
Gender, n (%)				
Female	11 (84.6)	13 (92.9)	15 (83.3)	0.264
Male	2 (15.4)	1 (7.1)	3 (16.7)	
WC, cm	90.1 ± 11.2	94.4 ± 13.7	100.7 ± 10.7	0.060
BMI, kg/m2	28.2 ± 5.7	28.1 ± 5.4	31.1 ± 6.1	0.239
Hypertension, n (%)	2 (15.4)	7 (50.0)	12 (66.7)	0.018*
Diabetes mellitus, n (%)	2 (15.4)	3 (21.4)	5 (27.8)	0.712
Disease duration, years	5.5 ± 1.8	5.0 ± 1.7	5.5 ± 2.1	0.851
TE findings				
CAP score, dB/m	216.2 ± 39.0	236.5 ± 61.7	229.3 ± 48.0	0.576
Fibrosis score, kpa	5.8 ± 0.4	8.2 ± 1.2	23.3 ± 10.8	<0.001*
Laboratory findings				
Glucose, mg/dL	94.3 ± 11.1	94.6 ± 10.2	110.6 ± 34.5	0.210
Albumin, g/L	43.2 ± 1.9	43.3 ± 1.8	41.3 ± 5.1	0.206
Platelets, x109/L	268.9 ± 55.4	206.6 ± 58.6	185.5 ± 66.3	0.008*
HDL-C, mg/dL	54.0 (49.0-61.0)	60.5 (52.5-69.0)	49.0 (44.2-56.8)	0.131
LDL-C, mg/dL	135.7 ± 34.0	112.4 ± 31.6	111.8 ± 22.8	0.059
Triglyceride, mg/dL	103.0 (91.0-136.0)	114.5 (71.5-127.8)	104.0 (76.5-143.5)	0.921
AST, U/L	25.8 ± 10.0	23.2 ± 5.5	45.3 ± 10.8	0.025*
ALT, U/L	20.0 (14.0-25.0)	21.5 (13.2-24.0)	23.0 (14.2-50.5)	0.621
IgG, g/L	12.6 ± 4.1	12.9 ± 2.4	17.2 ± 4.5	0.016
IgM, g/L	1.8 (1.4-1.9)	1.8 (1.3-2.3)	1.7 (1.3-4.1)	0.845
GGT, U/L	51.0 (22.0-82.0)	39.5 (14.0-81.5)	67.5 (30.2-149.0)	0.219
Total bilirubin, mg/dL	0.5 ± 0.2	0.6 ± 0.2	0.7 ± 0.3	0.068
Sodium, mEq/L	140.4 ± 2.2	141.0 ± 2.1	140.2 ± 3.7	0.730
AFP, ng/mL	125.0 (114.0-144.0)	141.0 (108.5-166.8)	163.5 (136.2-249.5)	0.083
Creatinine, mg/dL	0.7 ± 0.1	0.8 ± 0.2	0.8 ± 0.2	0.246
CRP, mg/L	4.0 (1.8-5.4)	3.3 (2.1-6.2)	5.8 (3.9-9.0)	0.112
APRI score	0.3 (0.2-0.4)	0.5 (0.3-0.5)	0.7 (0.4-0.9)	<0.001*
FIB-4 score	1.0 (0.9-1.5)	1.6 (1.4-2.1)	2.4 (1.9-3.9)	<0.001*

Data are mean ± standard deviation or median (IQR), or number (%). *p<0.05 indicates statistical significance. Differences between groups are highlighted in bold characters. Abbreviations: AFP, alpha fetoprotein; ALT, alanine aminotransferase, AST, aspartate aminotransferase, ALP, alkaline phosphatase; BMI, body mass index; CAP, controlled attenuation parameter; CRP, C-reactive protein; GGT, gamma glutamyl transferase; IgG, immunoglobulin G, IgM, immunoglobulin M; TE, transient elastography.

Table 3. Diagnostic performance of the aspartate amino-transferase-to-platelet ratio index APRI), and fibrosis score 4 (FIB-4) for distinguishing fibrosis.

ROC curve findings	APRI	FIB-4
Fibrosis vs. no fibrosis		
AUC	0.73	0.84
Standard Error	0.08	0.06
95% CI	0.58-0.89	0.73-0.96
Sensitivity	53.0	88.0
Specificity	92.3	69.2
Cut-off value	0.45	1.33
Advanced fibrosis vs. no advanced fibrosis		
AUC	0.70	0.78
Standard Error	0.09	0.08
95% CI	0.53-0.86	0.58-0.89
Sensitivity	40.0	77.2
Specificity	100.0	72.4
Cut-off value	0.60	1.80

Abbreviations: APRI, aspartate aminotransferase to platelet ratio index; AUC, area under the curve; CI, confidence interval; FIB-4: fibrosis-4 score.

The area under the ROC curve (AUROC) for APRI in detecting advanced fibrosis was 0.70 (95% CI: 0.53-0.86), while for FIB-4, the AUROC was 0.78 (95% CI: 0.58-0.89). The FIB-4 score demonstrated superior diagnostic performance in predicting fibrosis compared to the APRI score (AUC: 0.78 vs. 0.70, p = 0.048) (Figure 1) (Table 3).

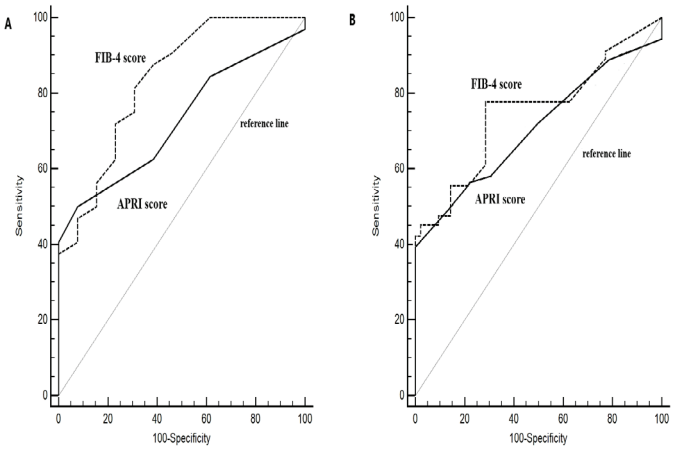

Figure 1. The diagnostic performance of the APRI and FIB-4 scores in predicting presence (A) and advanced (B) fibrosis.

Discussion

To the best of our knowledge, this study is among the few that investigate the correlation between fibrosis measured by transient elastography and non-invasive fibrosis scoring systems in in patients with PBC. In the present study, we evaluated the diagnostic accuracy of non-invasive fibrosis markers in patients with PBC. Our findings demonstrated that both APRI and FIB-4 scores were higher among patients with liver fibrosis, as well as in those with advanced fibrosis. Furthermore, FIB-4 showed a superior diagnostic performance compared to APRI for detecting both presence and advanced fibrosis.

PBC typically presents more frequently in women aged between 40 and 60 years, and patients are often diagnosed in middle to older age (21, 22).The mean age of our cohort and the predominance of women align with previously reported demographic profiles. The study identified a higher prevalence of hypertension in the fibrotic group. In a study examining cardiac function and morphology in non-cirrhotic PBC patients, it was reported that PBC, when compared to age-matched controls, is linked to higher blood pressure, heart remodeling, and functional abnormalities (23). While the precise mechanisms connecting hypertension to PBC-related fibrosis are not yet fully understood, systemic comorbidities like hypertension are frequently associated with chronic liver diseases and may indicate elevated vascular resistance or portal hypertension in advanced stages. However, further research is needed to determine whether hypertension arises directly from liver-related pathophysiological changes or shares common underlying risk factors.

In accordance with the literature, platelet levels were lower in patients with fibrosis, likely due to hypersplenism and increased platelet sequestration secondary to portal hypertension (24). Although AST and ALT levels did not differ significantly between those with and without fibrosis, we found that AST levels were higher among patients with advanced fibrosis, suggesting a more pronounced hepatocellular injury (25). Advanced fibrosis is associated with increased risk of complications such as portal hypertension and cirrhosis, emphasizing the importance of early and accurate fibrosis detection.

A study by Corpechot et al. showed that elastography outperformed non-invasive scores in identifying advanced fibrosis and cirrhosis, while APRI and FIB-4 exhibited comparable diagnostic performance (26). The challenges of elastography include its unavailability in many clinics, as well as the additional costs and time required. This underscores the importance of more affordable and easily accessible non-invasive fibrosis markers. Non-invasive tools such as APRI and FIB-4, which have been extensively validated in chronic viral hepatitis and non-alcoholic fatty liver disease, are increasingly being explored in cholestatic conditions like PBC (27, 28). In our study, both APRI and FIB-4 effectively predicted the presence and advanced

fibrosis. FIB-4 demonstrated higher AUROC values compared to APRI for identifying both fibrosis and advanced fibrosis. FIB-4 index integrates age, AST, ALT, and platelet count, capturing multiple components of fibrogenesis. This may explain its particular effectiveness in predicting advanced fibrosis. In contrast, APRI, which relies solely on AST levels and platelet counts, provides a more limited perspective—yet remains valuable due to its simplicity and low cost. However, the current literature contains conflicting findings regarding the diagnostic performance of these indices. A study by Li and colleagues on PBC patients demonstrated AUROC values of 0.65 for APRI and 0.72 for FIB-4 in predicting advanced fibrosis (28). A study involving 107 PBC patients identified erythrocyte distribution width, FIB-4, albumin, and platelet levels as fibrosis-associated markers, with FIB-4 demonstrating the greatest sensitivity and specificity for differentiating histological severity (26). In a study conducted by Ölmez et al. involving 40 PBC patients, APRI and FIB-4 scores were found to be higher in patients with early and advanced-stage fibrosis. However, While the APRI score had a higher AUROC value than the FIB-4 score, the difference was not statistically significant (0.75 vs. 0.69, respectively) (29). In a study conducted by Sayar et al. involving 53 PBC patients, APRI and FIB-4 scores were reported to show no differences between early and advanced fibrosis groups (16). Variations between studies could be attributed to differences in patient selection.

From a clinical standpoint, our results highlight the significant advantage of using these non-invasive indices to assess the stage of fibrosis without requiring a liver biopsy. The invasive nature of biopsy, along with the risk of complications such as bleeding and patient discomfort, increasingly drives the search for reliable non-invasive alternatives. The high sensitivity and specificity of FIB-4 make it a particularly valuable tool for guiding treatment decisions and monitoring disease progression in PBC. Identifying patients at higher risk of developing advanced fibrosis or cirrhosis at earlier stages can help clinicians tailor more intensive therapeutic strategies.

One major limitation of this study is the relatively small sample size, predominantly consisting of female patients, which may restrict the generalizability of our findings. Second, the cross-sectional design limits the ability to assess temporal changes in fibrosis markers or their prognostic value over time. Additionally, liver biopsy, the gold standard for diagnosing and staging fibrosis, was not utilized in this study. Lastly, the study did not account for all potential confounders, such as co-existing conditions (e.g. alcohol consumption, or viral hepatitis), which could influence fibrosis progression or the values of non-invasive markers. Future prospective studies with larger cohorts and multifaceted evaluations are needed to establish more comprehensive data in this field.

Conclusion

This study confirms the diagnostic utility of non-invasive markers such as APRI and FIB-4 for predicting both the presence and severity of fibrosis in patients with PBC. FIB-4, in particular, demonstrated superior performance and may reduce the need for invasive liver biopsy in routine practice. The integration of non-invasive approaches benefits clinicians by enabling earlier detection of fibrosis progression and helping guide timely therapeutic interventions. Hence, the use of tools like FIB-4 and APRI—either individually or in combination with other diagnostic modalities—retains critical importance in the early identification and management of PBC-related fibrosis.

Funding

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Ethics Committee Approval

The study was performed in accordance with the Declaration of Helsinki, and was approved by the Umraniye Training and Research Hospital, Clinical Research Ethics Committee (Date: 02.11.2023, Decision No. B.10.1.TKH.4.34.H.GP.0.01/412).

Informed Consent

The need for informed consent was waived under the approval of the Local Ethics Committee due to the retrospective design.

Conflicts of Interest

The authors declare they have no conflicts of interest.

Financial Disclosure: The authors declared that this study has received no financial support.

Availability of Data and Material

The data that support the findings of this study are available on request from the corresponding author, [N.M.B.].

Author Contributions

Concept – N.M.B. and G.A., Design – N.M.B. and G.A., Supervision – G.A., Data collection and/or processing – N.M.B. and G.A., Analysis and/or interpretation – N.M.B. and G.A., Writing – N.M.B., Critical review- G.A. All authors read and approved the final version of the manuscript.

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Research Article

The effect of education provided by midwives to patients who will undergo endometrial biopsy on anxiety

Endometrial Biyopsi Uygulanacak Hastalara Ebe Tarafından Verilen Eğitimin Anksiyete Üzerine Etkisi

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Abstract

Aim: This study aimed to determine the effect of education provided by a midwife to patients undergoing endometrial biopsy on anxiety levels.

Material and Methods: The sample of the pre-test post-test measurement randomized controlled study consisted of 64 women who applied to Pursaklar State Hospital Gynecology Outpatient Clinic between June and December 2023, with planned endometrial biopsy due to abnormal uterine bleeding. Data of the study were collected using "Personal Information Form" and "Beck Anxiety Scale". Pre-test was applied to women in both groups. Education was provided to women in the experimental group by a midwife researcher face-to-face, interactive, question-answer, and demonstration methods within 30-40 minutes, using the Biopsy Education Booklet prepared in accordance with literature review. After the procedure, post-test Beck Anxiety Scale was administered to both groups. Study data were analyzed using the Statistical Package for the Social Sciences-SPSS 26 software package. The significance value of statistical tests was evaluated as $p<0.05$.

Results: The mean post-test "Beck Anxiety Scale" scores of women in the experimental group were found to be 23.51±4.14 (min=21.0, max=39.0), and those of women in the control group were 30.78±9.46 (min=21.0, max=60.0). A statistically significant difference was observed between the post-test Beck Anxiety Scale ($Z=-3.939$, $p=0.001$) and all subscale scores of women in the experimental and control groups after education.

Conclusion: It was concluded that the education provided before the endometrial biopsy was effective in reducing patients' anxiety levels.

Keywords: Anxiety, Midwife, Education, Endometrial Biopsy, Patient.

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Öz

Amaç: Bu çalışmada, endometrial biyopsi uygulanacak olan hastalara ebe tarafından verilen eğitimin anksiyete üzerine etkisini belirlemek amaçlanmıştır.

Gereç ve Yöntemler: Ön-test son-test ölçümlü randomize kontrollü çalışmanın örneklemini Pursaklar Devlet Hastanesi Kadın Doğum Polikliniğine Haziran-Aralık 2023 tarihleri arasında başvuru yapan, anormal uterin kanama nedeniyle endometrial biyopsi uygulanması planlanan 64 kadın oluşturdu. Çalışmanın verileri 'Kişisel Bilgi Formu" ve "Beck Anksiyete Ölçeği" kullanılarak toplandı. Her iki grupta yer alan kadınlara ön-test uygulandı. Eğitim, deney grubunda yer alan kadınlara ebe araştırmacı tarafından yüz yüze, interaktif, soru-cevap ve gösterim yöntemleri kullanılarak 30-40 dakika içerisinde, literatür taraması doğrultusunda hazırlanan, Biyopsi Eğitim Kitapçığı ile gerçekleştirildi. İşlem sonrası her iki gruba son-test Beck Anksiyete Ölçeği uygulandı. Çalışma verileri Statistical Packageforthe Social Sciences-SPSS 26 paket programı ile analiz edildi. İstatistiksel testlerin anlamlılık değeri p<0,05 olarak değerlendirildi.

Bulgular: Deney grubunda yer alan kadınların son-test "Beck Anksiyete Ölçeği" puan ortalamaları 23,51±4,14 (min=21,0, max=39,0), kontrol grubunda yer alan kadınların "Beck Anksiyete Ölçeği" puan ortalamaları 30,78±9,46 (min=21,0, max=60,0), olarak bulundu. Deney ve kontrol grubunda yer alan kadınların eğitim sonrası Beck Anksiyete Ölçeği (Z=-3,939, p=0,001) ve tüm alt boyut ölçeklerine yönelik son-test puan ortalamaları arasında istatistiksel olarak anlamlı bir fark olduğu görüldü.

Sonuç: Endometrial biyopsi öncesinde verilen eğitimin, hastaların anksiyete düzeylerini azaltmada etkili olduğu sonucuna varılmıştır.

Anahtar Kelimeler: Anksiyete, Ebe, Eğitim, Endometrial Biyopsi, Hasta.

Introduction

Endometrial biopsy is a commonly preferred diagnostic method used to determine the source of abnormal uterine bleeding. This procedure can be performed using special tools such as Pipelle or Karmen, a Vabra aspirator, through the dilation and curettage method, or with hysteroscopy [1]. More than a third of referrals to gynecology clinics are due to abnormal uterine bleeding, making it the most common reason for referrals to these clinics [2].

Abnormal uterine bleeding (AUB) is bleeding that occurs outside of the normal menstrual cycle pattern [3]. Endometrial biopsy is crucial in the management of abnormal uterine bleeding. However, there is limited research on the levels of anxiety caused by women's lack of knowledge about endometrial biopsy in the literature. Midwives, who are key figures in public health, have frequent interactions with women and thus play a significant role in providing education to them. Factors such as women's needs, education levels, preferences, the qualifications and experience of the educator, the educational environment, and available resources should be considered. These educational sessions can be conducted in an individual or group format [4].

Individuals' alertness levels increase when faced with unknown dangers. This heightened alertness can sometimes escalate into anxiety, fear, and even panic [5]. Patients in a hospital setting may feel their safety is at risk when encountering unfamiliar tools, smells, and sounds, as they are in an unfamiliar environment and may experience anxiety. The perception of an event as stressful depends on the event's structure and the individual's coping mechanisms. Anxiety serves as a warning sign for potential dangers, allowing the individual to take precautions to address these threats [6].

Endometrial biopsy is the quickest and most cost-effective invasive diagnostic procedure used to identify changes in the endometrium and diseases in the uterine cavity [7]. For premenopausal women under 45 experiencing abnormal uterine bleeding, especially in cases of obesity or lack of ovulation, or for postmenopausal women over 45 with abnormal uterine bleeding, it is recommended to undergo an endometrial biopsy to rule out the risk factors for endometrial cancer [8].

The nature of endometrial biopsy procedure may cause women to be unwilling to participate in gynecological examinations, leading to the postponement of the procedure or avoidance of this examination due to its harmful effects on

health. Since routine gynecological examination is an essential part of maintaining health as it enables early diagnosis and treatment of sexually transmitted diseases, it is necessary to ensure the preservation of one's health [9].

In the stages of life of midwives, it is necessary to detect anxiety and contribute consciously to its treatment. However, in order to achieve this, these midwives need to be aware of the most appropriate evidence-based interventions [10].

Lack of knowledge about invasive procedures such as endometrial biopsy, being in an unfamiliar environment, loss of women's privacy, and the level of pain after endometrial biopsy procedure can lead patients to experience anxiety [11].

The anxiety felt by women can reduce the effectiveness of anesthesia during the procedure, leading to negative changes in the recovery and pain tolerance after an endometrial biopsy [12]. It has been observed that providing education prior to gynecological procedures such as endometrial biopsy increases women's satisfaction levels and decreases anxiety levels [13,14].

Therefore, this study aims to investigate the effects of education provided through midwifery services on anxiety in patients who will undergo endometrial biopsy.

Material and methods

Type of Research

This research is a observational randomized controlled study that involves pre-test and post-test measurements.

Location and Date of the Study

The study was conducted on women who applied to the Gynecology Outpatient Clinic at Pursaklar State Hospital between June and December 2023 due to abnormal uterine bleeding and were scheduled to undergo an endometrial biopsy.

Population and Sample of the Study

The population of the study consisted of women who had applied to the Obstetrics and Gynecology Outpatient Clinic of Pursaklar State Hospital between June and December 2023.

The sample size for the study was calculated using the G*Power 3.1.9.7 program. An analysis of variance with a medium effect size for two-way mixed design (d=0.025), a 5% margin of error (α=0.05), and a 95% power (1-β=0.95) were considered in the calculation, resulting in a total of 54 participants [15]. The calculation protocol for G*Power is shown in Table 1. To account for potential data loss, the sample size for each group was increased by 20%, with 33 women planned to be included in each group, totaling 66 participants (experimental group n=33, control group n=33) [16,17]. Randomization was done using the "Research Randomizer" program to ensure an equal number of individuals in the intervention and control groups, irrespective of age and other characteristics. The study included women who were over 18 years old, had no communication barriers, and were scheduled for endometrial biopsy.

During the study, one patient from the control group declined the second interview, resulting in a total of 65 patients in the study - 33 in the experimental group and 32 in the control group (see Figure 1).

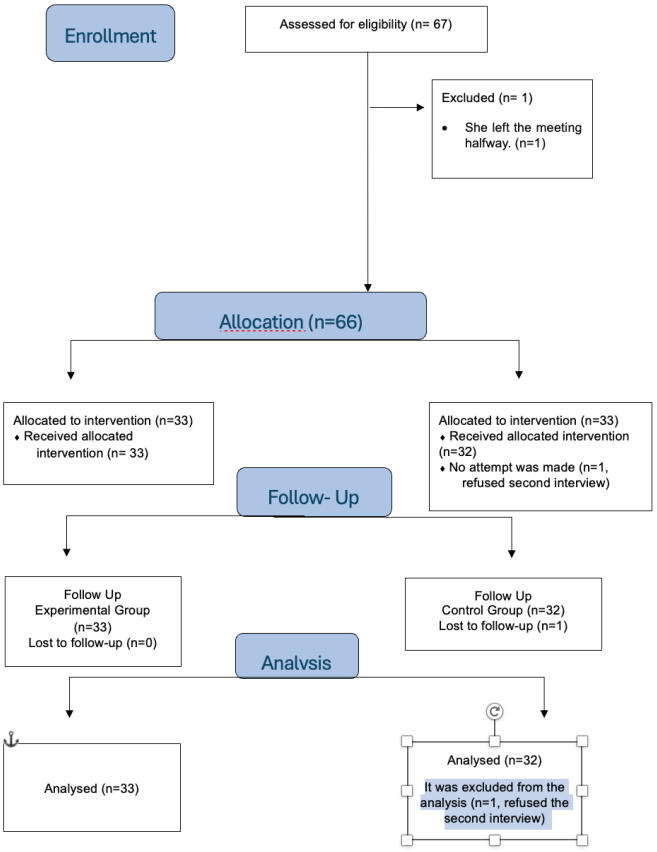

Figure 1. CONSORT statement according to the design and flowchart regarding the recruitment of participants.

Randomization

Experimental group: 1, 2, 3, 5, 6, 7, 9, 10, 11, 13, 14, 16, 17, 18, 21, 22, 24, 26, 27, 31, 33, 35, 37, 40, 42, 43, 46, 47, 53, 54, 56, 62, 63, 65, 66.

Control group: 34, 8, 12, 15, 19, 20, 23, 25, 28, 29, 30, 32, 34, 36, 38, 39, 41, 44, 45, 48, 49, 50, 51, 52, 55, 57, 58, 59, 60, 61, 64.

Inclusion Criteria

To be eligible for participation in the study, a person must be over 18 years old, female, without any sensory or psychiatric illnesses that would hinder participation, and have a need for an endometrial biopsy.

Exclusion Criteria

• Refusing to participate in the study

• Presence of any communication barriers

• Genitourinary abnormality

Research Hypotheses

H0: The education provided by the midwife before endometrial biopsy does not affect anxiety levels.

H1: The education provided by the midwife before endometrial biopsy does affect anxiety levels.

Data Collection Tools

The data for the study was collected using the "Personal Information Form" and the "Beck Anxiety Inventory".

Personal Information Form

The personal information form prepared by researchers consists of 14 questions that ask about the sociodemographic data of women in the study group, such as education level, marital status, etc.

Beck Anxiety Inventory

The Beck Anxiety Inventory was created by Beck, Steer, Epstein, and Brown in 1988 and translated into Turkish by Ulusoy et al [18]. This inventory is a Likert-type scale with 21 items, each scored between 0 and 3. The total score can range from 0 to 63, with higher scores indicating higher levels of anxiety. In studies testing the reliability of the Turkish version, the Cronbach's Alpha value was found to be 0.93, indicating strong internal consistency. The test-retest reliability coefficient was determined to be 0.57, showing moderate repeatability of the scale over time. In studies of criterion-related validity, the Beck Anxiety Inventory was found to correlate with the Automatic Thoughts Scale at r=0.41 and with the Continuous Anxiety Inventory at r=0.53. This demonstrates that the scale yields consistent results when compared to other anxiety measures. Additionally, factor analysis revealed that the scale consists of two factors: "Subjective Symptoms" and "Somatic Symptoms," which categorize anxiety symptoms into different subgroups [18].

Education Handbook

The educational book titled Biopsy Education Handbook was prepared by researchers in line with the literature knowledge [19]. Before the study, the opinions of 5 experts were consulted for the comprehensibility of the book. Three of them were experts in the field of midwifery, and two were faculty members in the department of women's health nursing. The language used in the education booklet is Turkish. The education booklet contains information about the introduction of endometrial biopsy, pre-procedure preparation, how the procedure will be performed, recommendations on what to pay attention to after the procedure, necessary points, and information about controls.

Study Procedure

The data for the study was collected during face-to-face interviews with patients in the hospital's training room. Prior to the interviews, participants were informed about the study's purpose in compliance with the Helsinki Declaration, and written consent was obtained for their voluntary participation.

Step 1: Pre-Test

All women were administered a "Personal Information Form" and the "Beck Anxiety Inventory" face-to-face. Filling out the data collection tools took 10-15 minutes.

Step 2: Biopsy Education Session

The education session was provided to the women in the experimental group by a midwife researcher face-to-face in the hospital's training room. The control group did not receive education. The interactive education session was completed within 30-40 minutes using question-answer and demonstration methods.

Step 3: Post-Test

After the biopsy procedure, the Beck Anxiety Scale was administered to the women in the experimental (n=33) and control (n=32) groups at the first follow-up appointment (1 month). The women in the control group did not receive education.

Statistical Analysis of Data

The study data were analyzed using the Statistical Package for the Social Sciences-SPSS 26 package program. The significance value of statistical tests was evaluated as $p<0.05$. Skewness and kurtosis values within the range of +2 to -2 were considered to be in accordance with normal distribution [20]. The data were summarized as mean, standard deviation, number, and percentage. Mann Whitney U test, Continuity Correction Test, Fisher's Exact Test, and Independent-Samples T Test were used to test the homogeneity of categorical variables. For data that did not have a normal distribution, Mann Whitney U and Wilcoxon tests were used for analysis, while the Paired Samples Test was used for data that had a normal distribution.

Ethical Principles

Ethical approval was obtained from the Karabük University Non-Interventional Clinical Studies Ethics Committee for the implementation of the study (Date 16.05.2023, No: 2023/1401). After obtaining ethical approval, institutional permission was also

obtained. Necessary permission was obtained from the author for the measurement tool used in the study. Written and verbal consent was obtained from all women participating in the study.

Results

In the study, 65 women between the ages of 18 and 60 were included. Information on the sociodemographic characteristics of women and the comparison of the experimental and control groups are provided in Table 1.

There were no significant differences in the sociodemographic characteristics of women in the experimental and control groups, and it was noted that the groups had a similar distribution (Table 1).

In the experimental group, the average scores of women on the "Beck Anxiety Scale" were 23.51±4.14 (minimum=21.0, maximum=39.0), the average scores on the "Subjective Symptoms Subscale" were 14.24±2.44 (minimum=13, maximum=23), and the average scores on the "Somatic Symptoms Subscale" were 9.27±1.97 (minimum=8, maximum=16).

In the control group, the average scores of women on the "Beck Anxiety Scale" were 30.78±9.46 (minimum=21.0, maximum=60.0), the average scores on the "Subjective Symptoms Subscale" were 18.18±5.86 (minimum=13, maximum=38), and the average scores on the "Somatic Symptoms Subscale" were 12.59±3.99 (minimum=8, maximum=22).

There was a statistically significant difference between the pre-test and post-test scores for the Beck Anxiety Scale for Women (Z=-4.940, p<0.001), the Subjective Symptoms Subscale (Z=-4.945, p<0.001), and the Somatic Symptoms Subscale (Z=-4.945, p<0.001) as shown in Table 2.

There was no statistically significant difference between the pre-test and post-test scores for the Beck Anxiety Scale for Women (t=-1.791, p=0.083), the Subjective Symptoms Subscale (Z=-1.414, p=0.157), and the Somatic Symptoms Subscale (t=-1.000, p=0.325) (Table 3).

The comparison of post-test scores on the Beck Anxiety Scale and its sub-dimensions for women in the Experimental and Control groups is shown in Table 4.9. Statistical analysis revealed significant differences between the post-test scores of women in the Experimental and Control groups for the Beck Anxiety Scale (Z=-3.939, p=0.001), Subjective Symptoms Subscale (Z=-3.647, p=0.001), and Somatic Symptoms Subscale (Z=-3.626, p=0.001) (Table 4).

Table 1. Socio-demographic characteristics of women in the experimental and control groups

Variable	Experimental group n (%) / mean (SD)	Control Group n (%) / mean (SD)	Statistic p
Age	41,33±6,41	40,12±6,07	t=0,780* p=0,439
Marital status Married Single	 30 (46,2) 3 (4,6)	 29 (44,6) 3 (4,6)	 X2=0,02** p=0,968
Education status Primary school Secondary school High school University	 11 (16,9) 6 (9,2) 13 (20,0) 3 (4,6)	 4 (6,2) 8 (12,3) 12 (18,5) 8 (12,3)	 X2=5,81*** p=0,119
Status familiae Elementary family Extended family	 25 (38,5) 8 (12,3)	 25 (38,5) 7 (10,8)	 X2=0,51** p=0,821
Residence Village County City	 1 (1,5) 11 (16,9) 21 (32,3)	 2 (3,1) 7 (10,8) 23 (35,4)	 X2=1,298*** p=0,523
Economic situation Income equals expenses Income exceeds expenses Income is less than expenses	 13 (20) 5 (7,7) 15 (23,1)	 20 (30,8) 5 (7,7) 7 (10,8)	 X2=4,380*** p=0,112
Smoking habit Yes No	 9 (13,8) 24 (36,9)	 10 (15,4) 22 (33,8)	 X2=0,124** p=0,112
Alcohol addiction Yes No	 - 33 (50,8)	 2 (3,1) 30 (46,2)	 X2=2,900** p=0,089

SD: Standard Deviation, *Independent samples t-test, **Fisher's-Freeman-Haltonn Exact Test, ***Pearson Chi-square test

Table 2. Comparison of pre-test and post-test Beck Anxiety Scale and subscale score averages of women in the experimental group.

Scale	Pre-test Median	Post-test Median	Statistic p
Beck Anxiety Scale	31	22	Z=-4,940 p<0,001
Subjective Symptoms Subscale	18	13	Z=-4,945 p<0,001
Somatic Symptoms Subscale	13	8	Z=-4,875 p<0,001

Z: Wilcoxon Signed Rank Test

Table 3. Comparison of pre-test and post-test Beck Anxiety Scale and subscale mean scores of women in the control group.

Scale	Pre-test Mean±SD	Post-test Mean±SD	Statistic p
Beck Anxiety Scale	30,68±9,49	30,78±9,46	t=-1,791 p=0,083
Subjective Symptoms Subscale	18,12±5,87	18,18±5,86	Z=-1,414 P=0,157
Somatic Symptoms Subscale	12,56±3,99	12,59±3,99	t=-1,000 p=0,325

Z: Wilcoxon Signed Rank Test, t: Paired Samples test

Table 4. Comparison of post-test Beck Anxiety Scale and subscale mean scores of experimental and control groups.

Scale	Experimental Group Ort±SS	Control Group Ort±SS	Statistic p
Beck Anxiety Scale	23,51±4,14	30,78±9,46	Z=-3,939 p=0,001
Subjective Symptoms Subscale	14,24±2,44	18,18±5,86	Z=-3,647 p=0,001
Somatic Symptoms Subscale	9,27±1,97	12,59±3,99	Z=-3,626 p=0,001

Z: Mann- Whitney U test

Table 4. Comparison of post-test Beck Anxiety Scale and subscale mean scores of experimental and control groups.

Scale	Experimental Group Ort±SS	Control Group Ort±SS	Statistic p
Beck Anxiety Scale	23,51±4,14	30,78±9,46	Z=-3,939 p=0,001
Subjective Symptoms Subscale	14,24±2,44	18,18±5,86	Z=-3,647 p=0,001
Somatic Symptoms Subscale	9,27±1,97	12,59±3,99	Z=-3,626 p=0,001

Z: Mann- Whitney U test

Discussion

In our study, we examined the average scores of the Beck Anxiety Inventory (BAI) for women before and after education. We observed that the average pre-test BAI score for women in the experimental group was 35.36±11.98, while the post-test score average was 23.51±4.14. Additionally, the average pre-test scores for the Subjective Symptoms Subscale and Somatic Symptoms Subscale were 21.09±7.22 and 14.27±5.24 respectively. The post-test average score for the Subjective Symptoms Subscale was 14.24±2.44, and for the Somatic Symptoms Subscale was 9.27±1.94.

It was noted that the BAI scores of women in the experimental group decreased significantly after receiving education compared to their scores before education. Providing education by a midwife to patients scheduled for endometrial biopsy was found to significantly decrease the overall anxiety levels of the patients. A similar decrease was also observed in the Subjective Symptoms Subscale (emotional symptoms) and the Somatic Symptoms Subscale (physical symptoms). This decrease in scores from pre-test to post-test reflects a reduction in anxiety levels in terms of both emotional and physical symptoms. The average BAI score was 23.51±4.14. The pre-test score average for the Subjective Symptoms Subscale was 21.09±7.22, the Somatic Symptoms Subscale score average was 14.27±5.24, the post-test score average for the Subjective Symptoms Subscale was 14.24±2.44, and the Somatic Symptoms Subscale score average was 9.27±1.94.

When the literature was reviewed in a study conducted to determine the effects of the education provided by physicians and midwives to women in the menopausal period before invasive procedures on quality of life, it was observed that there were significant improvements in all scores of women's quality of life after education compared to before education, and these improvements were statistically significant [21]. In another study conducted to determine the effects of education provided by midwives and nurses on postpartum mothers at a family health center in the city center of Erzurum, it was found that the education increased maternal self-confidence in postpartum and newborn care [22]. In a study conducted with 250 women who visited a university hospital's obstetrics and gynecology clinic to determine their anxiety levels and influencing factors before a gynecological examination, it was found that women experienced "moderate" anxiety prior to the examination. By using a nursing/midwifery approach before and after the procedure, the women were provided with a more positive experience during the examination [23]. A study was conducted to determine how feelings of shyness and anxiety related to gynecological examinations differ among women of varying generations. The study found that establishing

correct and positive communication with women before the examination, providing information about the procedure, being gentle when using tools, and treating women with respect are effective in reducing anxiety levels [24].

The psychosomatic communication skills of doctors and nurses, who provide pre-procedure education to women, help reduce the frequency of anxiety during the first gynecological examination [25]. A study was conducted to investigate the impact of a supportive midwifery approach on the anxiety levels of women undergoing pelvic examination. The study found that applying the supportive midwifery approach to the experimental group reduced the anxiety of women [26].

A study examining the psychosocial factors that impede gynecological examinations in women has stated that the lack of information and education provided by healthcare personnel about the procedure increases the patient's anxiety [27]. In the present study, there were no significant differences observed in the pre-test and post-test comparisons of the average scores of BAI and all sub-dimensions in the control group of women. In a study investigating the impact of prenatal education on the anxiety and depression levels of mothers and fathers, no significant difference was found in the average scores of BAI in the control group that did not receive education [28]. In a separate study analyzing how web-based education affects the self-confidence and anxiety levels of parents of premature infants, researchers found that the pre-test and post-test scores of the control group, who did not receive any education, were similar [29]. In their 2019 study, Özbek and Sümer found that the anxiety levels of women who received information and proper preparation before an examination decreased [14]. The results of Çetinkaya and Karabulut's study also indicated that education has a positive impact on anxiety [30]. In his study, Özberksoy (2006) investigated the effect of informative and educational nursing approach during the preoperative period on postoperative pain and anxiety levels in patients with breast cancer. In the group that received education, lower VAS values were recorded compared to the control group [31]. Our study results are consistent with the literature.

In this study, no difference was found in the pre-test score averages of women in the experimental group, but a significant difference was observed in the post-test BAI and all sub-dimension score averages. The post-test score averages of women were significantly lower. The literature indicates that healthcare professionals should educate patients about all steps to ensure that women develop a positive attitude and reduce their anxiety [32]. A study examining the effect of education provided by nurses on the anxiety levels of patients before coronary artery bypass surgery found that pre-operative education effectively reduced anxiety levels in patients awaiting the surgery [33].

Conclusion

In our study, which aimed to investigate the effect of education provided by a midwife to patients who will undergo endometrial biopsy on anxiety, it was observed that providing education to patients by the midwife before, during, and after the procedure significantly reduced anxiety levels. Therefore, in order to ensure that women benefit more from healthcare, reduce anxiety about gynecological procedures, and promote the development of a positive attitude, midwives should be more involved in women's health programs.

Development of Education Programs: It is necessary for anxiety management education programs to be more widely developed and implemented in order to increase individuals' coping skills with stress. These programs can assist individuals in recognizing anxiety symptoms, learning positive coping strategies, and developing effective stress management skills.

Early Detection and Intervention: Anxiety disorders can be better managed when detected and treated early. Therefore, educational and informational programs should be organized to increase awareness of anxiety symptoms in the community and provide early intervention opportunities.

Training for Health Professionals: It is important for health professionals to be trained in recognizing, assessing, and effectively intervening in anxiety disorders. This can help provide the most appropriate treatment and support options for coping with anxiety.

Social Awareness Campaigns: By organizing social awareness campaigns related to anxiety disorders, efforts can be made to reduce misunderstandings about anxiety and alleviate stigma associated with it. Such initiatives can contribute to creating a more understanding environment towards anxiety in society.

Research and Development: (Future Research): More research should be conducted to examine the effectiveness of anxiety management and educational programs. This research can help develop better strategies.

Conflict of Interest/ Funding

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Review

Anatomi Eğitiminde Diseksiyon ve Güncel Yaklaşımlar

Dissection and Current Approaches in Anatomy Education

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Abstract

In the field of anatomy education, body donation varies considerably in different geographical regions of the world. Some countries, particularly in many parts of Europe and North America, have well-established and successful cadaver donation programs. These programs provide an adequate number of cadavers for medical students and researchers. This creates a continuous learning environment. However, in other regions, particularly in Asia, Africa and the Middle East, there are significant deficiencies in body donation. Several factors cause these disparities. First and foremost, cultural and religious factors influence donation rates. While the importance attached to bodily integrity in some societies may reduce the willingness to donate, in others donation is a cultural norm. While some countries have effective legal frameworks to promote donation, others have inadequate or incomplete regulations.

The importance of body donation for anatomy education is increasingly recognized. In this context, several steps need to be taken to develop and sustain donation programs. These may include improving legislation, establishing ethical guidelines and conducting awareness campaigns. It is also important to identify donor profiles and maintain relationships of trust. Through national and international research, a successful foundation can be established, taking into account local factors and community needs.

Keywords: cadaver, body donation, dissection, anatomy education

Öz

Anatomi eğitiminde vücut bağışı, dünya genelinde çeşitli coğrafi bölgelerde önemli farklılıklar göstermektedir. Bazı ülkelerde, özellikle Avrupa ve Amerika'nın çoğu bölgesinde, köklü ve başarılı bağış programları bulunmaktadır. Bu programlar, tıp öğrencilerine ve araştırmacılara yeterli sayıda kadavra sağlamakta ve sürekli bir eğitim ortamı oluşturmaktadır. Ancak, diğer bölgelerde, özellikle Asya, Afrika ve Orta Doğu'da, vücut bağışı konusunda belirgin eksiklikler yaşanmaktadır. Bu farklılıkların birçok nedeni vardır. Öncelikle, kültürel ve dini faktörler bağış oranlarını etkilemektedir. Bazı toplumlarda vücudun bütünlüğüne verilen önem, bağış yapma isteğini azaltabilirken, diğer toplumlarda ise bağış yapma kültürel bir norm haline gelmiştir. Bazı ülkelerde, bağışı teşvik etmek için etkin yasal çerçeveler bulunurken, diğerlerinde bu düzenlemeler yetersiz veya eksiktir.

Anatomi eğitimi için vücut bağışının önemi giderek daha anlaşılır hale gelmektedir. Bu çerçevede, bağış programlarının geliştirilmesi ve sürdürülmesi için çeşitli adımlar atılmalıdır. Bunlar arasında, yasal düzenlemelerin iyileştirilmesi, etik yönergelerin oluşturulması ve farkındalık kampanyaları yer alabilir. Ayrıca, bağışçıların profillerinin belirlenmesi ve güven ilişkisinin sürdürülmesi de büyük önem taşımaktadır. Yerel faktörler ve toplumların ihtiyaçlarını göz önünde bulunduran ulusal ve uluslararası araştırmalar, başarılı bir sürecin temelini oluşturabilir.

Anahtar kelimeler: kadavra, vücut bağışı, diseksiyon, anatomi eğitimi

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Introduction

One of the cornerstones of medical education is the study of human gross anatomy. Education in this area consists of a process called dissection, which involves the use of human cadavers for educational purposes. Dissection is recognized as an important learning experience for medical students. It offers many benefits and learning outcomes, including the acquisition and integration of three-dimensional anatomical knowledge, development of manual skills, promotion of peer communication, enhancement of teamwork skills, and a broad understanding of 'normality' and 'variability' [1,2].

Cadaver dissection also provides students with an emotional confrontation with human mortality [3,4]. However, some researchers have pointed out the disadvantages of dissection. These disadvantages include high cost, health and safety risks, emotional distress and anxiety in students, and inability to keep up with modern imaging techniques [5,6]. Therefore, alternative teaching methods, such as imaging techniques, digital software, and 3D printers, have been used in recent years [7-9]. Despite the controversy, many authors emphasise that dissection has additional learning outcomes such as respect for the human body, introducing students to different pathologies and promoting professionalism and leadership [10-12].

In the light of these developments, it has been suggested in the last decade that old and new teaching methods should be combined in anatomy education and that their advantages should complement each other [4,13,14]. Anatomy is a fundamental discipline that every student or professional entering the medical or biomedical sciences should learn [15].

A study by Moxham and Plaisant [2014], which examined the history of macroscopic anatomy education, summarised how the dissection of the human body has evolved [16]. Although in recent years some universities in the US and UK have moved away from dissection to cadaveric anatomy teaching, some authors [15] defend the importance of dissection courses in the medical curriculum. For these authors, dissection is a central tool for teaching macroscopic anatomy to future physicians in the light of respect and honour for each donor [15].

Some authors [17] have argued against plastination, the procedure performed on cadavers in preparation for dissection, and against the long-term preservation of prepared specimens. However, these arguments seem to have been made mainly in the context of plastination replacing traditional cadaver dissection. Despite these arguments, plastination is an additional teaching tool that allows the use of body parts in conjunction with cadaver dissection and serves as a complementary approach to the acquisition of anatomical knowledge [17]. Therefore, plastination should be seen as an additional teaching tool that mobilises as many senses as possible to promote the acquisition of anatomical knowledge [15].

According to Korf et al, the importance of dissection in the teaching of anatomy is explained as follows [15]:

- The macroscopic anatomy laboratory provides a unique opportunity to learn and practice analytical skills [required for manual touch].

- It leads to a hypothetical process of seeing and thinking. If I cut this area with a scalpel, I should normally see this or that. It creates the anatomical mental image necessary for surgical practice.

- Information acquisition is most efficient when it involves as many senses as possible. Active knowledge acquisition [moving, discussing, building, dissecting] is much more efficient than passive knowledge acquisition [reading, listening, observing]. This principle is fully exploited in dissection.

- Medicine requires a certain orientation towards the patient, with impartial observation and compassionate help, and maintaining an objective point of view. It is important that students learn this role of impartial observer and compassionate helper well. In this context, the cadaver is initially perceived as an object. However, as the dissection progresses, the mind begins to unravel the history of the cadaver, which may include osteoporosis, muscle atrophy or calcified arteries, allowing students to develop their clinical skills.

Historical and cultural background of cadaver use

The combination of educational, emotional and professional benefits of dissection places the procurement of the human body for anatomy teaching and medical education at the centre of anatomical practice [12,18-20]. The methods of obtaining human bodies have varied throughout history [21]. The first systematic dissection of human cadavers was carried out by Herophilus and Erasistratus in Alexandria, and continued when Andreas Vesalius made dissection an important tool

in anatomy teaching. The bodies of executed criminals were used as the main source for anatomical dissection [21, 22].

By the mid-18th century, medical schools needed more cadavers, which led to a market for cadavers fuelled by grave robbery or slavery. The situation led to a process of dismemberment of the weaker members of society, usually the poor. In an attempt to end grave robbery, the British government and the Commonwealth of Massachusetts passed the Warburton Anatomy Act in 1832, which allowed the use of unclaimed bodies of people who had died in hospitals for the teaching of anatomy. These bodies were obtained from institutions such as mental hospitals, prisons and nursing homes [21, 23, 24].

In ancient India, the Vedic Indians made significant advances in medicine and anatomy. Their ability to regenerate body parts using rejuvenated stem cells made them recognized as pioneers of voluntary body and organ donation [25,26]. For example, ancient texts like the Ramayana and the Ravana Samhita describe the legendary king Ravana's wisdom, highlighting his ability to use his arm muscles to create a musical instrument called 'Ravahattha'. This instrument produced music so beautiful that it could soothe and calm his master Shiva on Mount Kailash [25-27].

The Sushruta Samhita, written around 500 BC, is recognized as an ancient Vedic treatise on surgery and medicine [25-27]. This work emphasises the importance of dissection, in which the famous Indian surgeon Sushruta obtained voluntarily donated cadavers and used them as a source of in-depth knowledge of surgery [26,27]. It is also noted that many of the ancient techniques used in plastic surgery are still valid [26,27]. Sushruta emphasises that a good clinician is possible with strong determination and anatomical knowledge [27,28].

The anatomist Andreas Vesalius, who performed the first scientific human dissections between 1514 and 1564, challenged existing Galenic views and made it possible to learn medicine through anatomy [21,29-32]. He is therefore considered the 'father of modern anatomy' [21,30]. As a result of Vesalius' work, medical dissection schools were established and this led to an increase in the demand for cadavers and the existence of body thieves in Europe [30,31]. These people were defined as criminal gangs who killed the poor and destitute and sold the bodies to medical schools [21,30-32]. The reason for this rapid increase in body theft was that the laws in Europe at the time allowed cadavers to be treated only as commodities. This situation provided body thieves with an easy way to get away with their crimes [31-34].

Body resources in global medical education

The Uniform Anatomical Gift Act [UAGA] of 1968 in the USA and the Anatomy Act of 1984 in the UK secured body donation as an individual right and contributed to the development of successful body donation programs [21,23,24]. These successful donation programs have been followed in Thailand [35,36], Japan [37], New Zealand [38,39], Korea [40], Brazil [41,42], China [43], South Africa [44], Sri Lanka [45] and many countries in Europe [20,46,47].

Despite generally using unclaimed bodies, these countries have enacted legislation to develop and maintain donation programs [48-52]. The literature review and questionnaires provided comprehensive information on the cadaver resources used for anatomical teaching in a significant number of medical schools around the world. Despite significant advancements, data remains scarce in numerous regions, especially in Africa, Eastern and South-Eastern Europe, the Middle East, and Central Asia [53].

Within the Oceania region, three countries [Fiji, Samoa, and the Solomon Islands], anatomical dissection is not taught at all in medical schools, according to survey responses [53]. Four countries, Malaysia, Saudi Arabia, Singapore and Turkey, were found to import cadavers from the USA when the local supply was insufficient. This shows a similar trend, particularly in the Caribbean. However, most of these countries have adopted the US method of obtaining cadavers and therefore cannot reflect their own unique methods [53].

In Libya, cadaver importation from India was the only source according to 2010 reports. However, given the political uncertainty in Libya, it is questionable whether this information is still valid [49]. Although body donation is not possible in Nigeria [54,55], some sources suggest that a significant proportion of bodies are 'murdered' criminals handed over by the police [49,50,56]. However, this information is inconclusive and needs careful verification [54].

In countries where body donation has been available for 50-80 years, including Europe and the USA, there are now well-defined ethical and legal frameworks for body donation programs. As a natural consequence, the use of bodies for medical education

and research is increasing [or has increased] [17,23,54]. In countries without a legal framework for body donation and cultural traditions of honouring the dead, change may not be easy. Change can only be achieved through the development and promotion of guidelines that set out ethical and legal principles. It can be achieved by recognising the importance of body donation for medical progress and education [20].

Many European nations, including Austria, France, Germany, the Netherlands, Portugal, Spain, Switzerland, and the United Kingdom, have established body donation programs. However, some countries such as Italy, Romania, Serbia and Turkey have difficulties in finding enough donors [17]. In Turkey, there are cultural restrictions on donation and the number of available cadavers is insufficient for effective gross anatomy teaching [57].

In Italy, free admission to medical school in 1970 led to a significant increase in enrolment and important changes in anatomy teaching. However, as a consequence of these changes, dissecting rooms were closed and the number of donation programs decreased [58]. Today, there are attempts to revive some organ donation programs in Italy, but donations remain limited. This is because public opinion believes that unclaimed bodies are mostly used [17].

In Nigeria, more than 94% of schools do not have enough cadavers for macroscopic anatomy studies. Most of the available cadavers belong to criminals who have been shot, which is insufficient for medical education [50]. In China, the lack of cadavers for teaching and research is a serious problem. Barriers to this problem include traditional views, lack of legislation and lack of donation channels. New legislation and public education are considered necessary to encourage body donation and overcome cultural barriers in China [40,43].

Some cultural, legal and educational barriers make it difficult to establish and maintain body donation programs in China. However, it is believed that establishing successful donation programs and raising awareness in society through these programs will bring success by focusing on factors such as strengthening ethical education and respect for donors [43].

Various studies provide important information about the profile of donors and their reasons for donating [59]. This information can be used to target potential donors, to overcome difficulties in recruiting donors or to monitor changes in donor profiles when setting up donation programs. In the Netherlands, there has been a large increase in body donation in recent years [47]. A study investigating the motivations and backgrounds of donors found that a quarter of donors were health professionals and 11% were in education. Donors' motivations included a desire to be useful after death, a negative attitude towards funerals and an expression of gratitude. Only 8% of donors said they donated for financial reasons. Most of these people have a supportive social network, contradicting the notion that donations are made out of loneliness.

An international study conducted in New Zealand, Ireland and South Africa found that education level, ethnicity and national identity influenced giving and that a significant proportion of donors had no religious affiliation [60]. In this study, donors were generally over 60 years of age and it was noted that the positive effects of public debates, television and newspapers can increase donations [61]. Information about donation programs came from a variety of sources, and many donors discussed their decisions with friends and family. The main motivation for donation was the desire to benefit medical science [61].

Research conducted in South Africa from 1921 to 2013 revealed a notable decline in donations by Black men during the period from 2000 to 2013, reflecting shifts in the political landscape and the socio-economic conditions of the population [44]. This on going trend could have lasting impacts on education and research, potentially jeopardizing the viability of dissection-based courses in South Africa unless proactive measures are implemented to mitigate the problem. In Greece, cadaver donation rates remain low, with the elderly showing less inclination to donate and individuals with strong religious beliefs often hesitant to participate. Consequently, studies have been proposed to promote and encourage donation efforts [62].

In conclusion, these data on body resources used in anatomy education worldwide are an important resource for understanding the different strategies of medical schools in different geographical regions towards body resources and the factors behind these strategies.

Societal views on body donation and legal regulations

Voluntary body donation plays an important role in anatomy education, and studies conducted in different countries on this topic provide an important resource for understanding societal attitudes towards body donation and legal

regulations. A study conducted in Maryland revealed that 49% of participants expressed willingness to consider whole body donation [63]. However, this does not necessarily indicate that they would commit to enrolling in a program. Similarly, research in the canton of Vaud, Switzerland, found 1,933 registered donors [0.38%] and 86 actual donors [0.011%] annually out of a population of 750,000 in the region [17]. These donations are sufficient for anatomy teaching and research, and support continuing education.

Studies show that medical students are more supportive of donation than their family members [64]. It is highlighted that students should undergo mental preparation and set appropriate expectations before entering the dissection room.

In a study conducted in the Netherlands, a quarter of participants said they would consider donating a body [47]. Similarly, the majority of medical trainees in Ireland encourage donation and recommend donation to family members [65]. International studies have shown that teachers consider dissection to be an important tool in the education of students [66]. These studies also show that willingness to donate organs and whole bodies increases with teaching experience.

Studies conducted in different regions of the world show that cultural and ethnic differences influence voluntary donation practices [43]. In this context, national legislation and societal attitudes differ. Research on body donation is an important resource for medical education and scientific research. Sharing these studies at an international level can contribute to the development of more effective legislation on body donation.

Conclusıon

In conclusion, this analysis highlights the critical role of body donation in anatomy education in different geographical regions. Successful body donation programs are well established in many parts of Europe and North America, and similar initiatives are emerging in other regions. However, dependence on unclaimed bodies and imported cadavers remains an issue in many countries.

Key factors influencing body donation include cultural, religious and legal frameworks. Addressing these factors through targeted legislation, ethical guidelines and awareness campaigns is essential. Encouraging donation requires understanding donors' motivations and fostering trust and gratitude within communities.

Future efforts should focus on overcoming barriers to donation, promoting ethical practices and integrating local cultural and religious contexts into donation programs. By strengthening these aspects, we can support and improve anatomical education worldwide.

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Derleme

Yardımcı Üreme Tekniklerinde Yapay Zeka

Artificial Intelligence in Assisted Reproductive Technology

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Öz

Yapay zeka (YZ), son yıllarda biyomedikal alanlarda, özellikle de yardımcı üreme teknikleri (YÜT) içinde önemli bir yer edinmiştir. YÜT, infertilite tedavisinde kullanılan yöntemleri kapsar ve süreçlerin optimize edilmesi için YZ' nin entegrasyonu büyük bir potansiyele sahiptir. YZ kullanımı, sperm analizi, oosit kalitesinin değerlendirilmesi ve embriyo seçimi gibi kritik aşamalarda önemli iyileştirmeler sağlamaktadır. Ayrıca, bu süreçlerin daha hassas ve doğru bir şekilde yönetilmesine olanak tanırken, kişiselleştirilmiş tedavi yaklaşımlarının uygulanmasını da kolaylaştırır. YZ destekli sistemler, infertilite tedavisinde başarı oranlarını artırabilir, maliyetleri düşürebilir ve klinik sonuçları iyileştirebilir. YÜT alanında YZ' nin entegrasyonunun, gelecekte daha verimli ve etkili tedavi süreçlerinin geliştirilmesine katkı sağlayacağı öngörülmektedir.

Anahtar kelimeler: Yapay zeka, Yardımcı Üreme Teknikleri, Embriyoloji.

Abstract

Artificial Intelligence (AI) has gained significant importance in biomedical fields in recent years, particularly in Assisted Reproductive Technology (ART). ART refers to the methods used in infertility treatment, and the integration of AI in this field holds great potential for optimizing processes. The use of AI has led to significant improvements in critical stages such as sperm analysis, oocyte quality assessment, and embryo selection. AI enables more precise and accurate management of these processes while facilitating the implementation of personalized treatment approaches. AI-assisted systems can increase success rates in infertility treatment, reduce costs, and improve clinical outcomes. It is believed that the integration of AI in ART could contribute to the development of more efficient and effective treatment processes in the future.

Keywords: Artificial Intelligence, Assisted Reproductive Technology, Embryology.

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Giriş

Yardımcı üreme teknikleri (YÜT), çiftlerin çocuk sahibi olma hayallerini gerçekleştirme yolunda modern tıbbın en büyük başarılarından biri olmuştur. Bu tekniklerin temel taşlarından biri olan in vitro fertilizasyon (IVF), ilk kez 1978 yılında İngiltere'de Louise Brown'ın doğumu ile başarıya ulaşmıştır. Bu tarihi olay, üreme tıbbında çığır açmış ve sonraki yıllarda hızla gelişen pek çok yeniliğin önünü açmıştır (1). IVF ve diğer YÜT yöntemlerindeki hızlı teknolojik ilerlemeler, dünyada milyonlarca çift için umut ışığı olmuştur.

IVF süreçleri, yumurtaların laboratuvar ortamında döllenmesi, embriyo gelişiminin izlenmesi ve rahme transfer edilmesi gibi oldukça hassas ve karmaşık adımları içerir. Sürecin başarısı, genetik analizlerden laboratuvar ortamındaki kültür koşullarına kadar birçok faktörden etkilenir. Ancak, bu süreçlerde doğru kararlar vermek için ihtiyaç duyulan bilgi miktarı ve analitik gereksinimler giderek artmaktadır. İşte bu noktada, teknolojik gelişmelerin önemi bir kez daha öne çıkmaktadır. Çalışmalar neticesinde yapay zeka (YZ) gibi ileri teknolojiler, yalnızca günlük yaşamın değil, aynı zamanda sağlık ve biyoteknoloji alanlarının da bir parçası haline gelmiştir. Yapay zekanın kökenleri 1942'de Isaac Asimov'un Runaround adlı hikâyesinde tanımladığı ve bilim insanlarına ilham veren Robotik Üç Yasası'na kadar uzanır; bu yasalar, robotların insanlara zarar vermemesi, emirleri uygulaması ve kendi varlıklarını koruması prensiplerini içerir (2). 1956 yılında ise Dartmouth Konferansı'nda John McCarthy ve meslektaşları tarafından resmi olarak tanıtılan YZ, tıpta da birçok yeniliğin öncüsü olmuştur (3). Bu yeniliklerden biri de YÜT alanında uygulanmaya başlayan yapay zeka destekli sistemlerdir. Yapay zekanın YÜT'deki kullanım alanları oldukça çeşitlidir. Embriyo seçiminden sperm analizine, oosit değerlendirmesinden genetik test sonuçlarının yorumlanmasına kadar birçok aşamada YZ, süreçleri hızlandırmakta. Örneğin, YZ destekli zaman atlamalı görüntüleme sistemleri, embriyoların gelişim aşamalarını analiz ederek implantasyon şansı en yüksek embriyoyu belirlemeye yardımcı olabilir. Aynı şekilde, yapay zeka algoritmaları sayesinde, geniş veri setleri analiz edilerek hastaya özel en uygun tedavi protokolü oluşturulabilir (4). American Society of Reproductive Medicine (ASRM) ve European Society of Human Reproduction and Embryology (ESHRE) gibi prestijli kuruluşların yıllık toplantılarında YZ üzerine yapılan araştırmaların arttığı görülmektedir (5). Çalışmalarda ve kongrelerde temel konular, yapay zeka destekli sistemlerin yalnızca süreçlerin etkinliğini artırmakla kalmayıp, aynı zamanda maliyetleri düşürerek daha fazla çiftin bu hizmetlerden yararlanmasını sağlamayı amaçladığını göstermektedir (6,7).

Yapay Zeka Türleri

Yapay zeka, farklı teknikler ve yaklaşımlar içeren geniş bir disiplin olup, belirli görevleri yerine getirmek veya problemleri çözmek amacıyla tasarlanmış çeşitli türlere ayrılır. Bu türler, yapay zekanın temel uygulama alanlarını ve algoritmalarını şekillendiren spesifik modeller ve yöntemler üzerinden sınıflandırılır. Yapay zekanın en yaygın kullanılan türleri, problem çözme yaklaşımlarına ve uygulama alanlarına göre kategorize edilir (8).

Görüntü işleme (Image Processing)

Görüntü işleme, dijital görüntülerin analiz edilmesi ve işlenmesiyle ilgilenir. Bu alan, görüntü verilerini optimize etmek, anlamlı bilgiler elde etmek ve diğer süreçler için hazırlamak amacıyla çeşitli algoritmalar ve teknikler kullanır. Görüntü işleme, analiz edilecek görüntüye ve amaca bağlı olarak çeşitli alt alanlara ayrılır. Bunlar;

Özellik çıkarma (Feature Extraction): Özellik çıkarma, bir görüntüden anlamlı ve faydalı bilgilerin elde edilmesi sürecidir. Bu süreç, görüntülerin temel bileşenlerini tanımlayarak analiz ve sınıflandırma için gerekli bilgileri sağlar. Örneğin, bir yüz tanıma sisteminde burun, göz ve ağız gibi belirgin özelliklerin tespit edilmesi, sistemin yüzleri tanımasını mümkün kılar. Özellik çıkarma işlemi sırasında, kenarlar, dokular, renk dağılımları veya şekiller gibi görüntüyü tanımlayan unsurlar analiz edilir. Zaman atlamalı görüntüleme sistemleri, blastomer simetrisi veya fragmantasyon oranlarını belirlemek için hücrelerin kontur bilgilerini çıkarabilir. Bu amaçla sıkça kullanılan teknikler arasında, kenar tespiti için Canny ve Sobel algoritmaları, görüntüdeki renk ve parlaklık dağılımlarını incelemek için histogram tabanlı analiz ve belirli nesnelerin çevresini belirlemek için kontur çıkarımı gibi yöntemler yer alır. Bu yöntemler, görüntünün karakteristik yapısını ortaya koyarak daha sonraki işlemler için temel oluşturur. Embriyoloji laboratuvarında özellik çıkarma, insan gözünün değerlendiremeyeceği ince detayları ortaya koyarak objektif, hızlı ve doğru kararlar alınmasına olanak sağlayabilir.

Segmentasyon (Segmentation): Segmentasyon, bir görüntüyü anlamlı ve ayrıştırılabilir bölgelere ayırma işlemidir. Bu işlem, görüntüdeki farklı alanların daha iyi analiz edilebilmesi ve yorumlanabilmesi için kullanılır. Örneğin, bir tıbbi görüntüde, tümörlü dokunun sağlıklı dokudan ayrılması segmentasyon teknikleriyle gerçekleştirilir. Bu sayede, belirli bir bölgeye odaklanılarak görüntü üzerinde daha ayrıntılı inceleme yapılabilir. Segmentasyon işlemi için kullanılan yöntemler arasında K-means algoritması, Watershed algoritması ve U-Net

gibi teknikler yer alır. K-means, görüntüyü benzer özelliklere sahip gruplara ayırırken, Watershed nesneler arasındaki sınırları belirler. U-Net ise karmaşık segmentasyon problemlerini çözmek için tasarlanmış bir derin öğrenme modelidir. Segmentasyon teknikleri, embriyoloji laboratuvarında yüksek doğruluk ve hız gerektiren değerlendirme süreçlerini otomatikleştirerek embriyo seçiminde objektif kriterler sağlayabilmekte.

Filtreleme (Filtering): Filtreleme, görüntü işleme sürecinde, görüntü kalitesini artırmak veya belirli bir özelliği vurgulamak amacıyla kullanılan bir tekniktir. Bu işlem, gürültü azaltma, keskinlik artırma veya belirli bir bölgeyi öne çıkarma gibi hedeflere yönelik olarak uygulanır. Örneğin, Ortalama filtresi (Mean Filter), görüntüdeki gürültüyü azaltmak için sıkça kullanılan bir yöntemdir. Gaussian filtresi, görüntüyü yumuşatarak daha pürüzsüz bir görünüm sağlar. Laplacian filtresi ise görüntüdeki kenarları daha belirgin hale getirerek, nesnelerin sınırlarını daha net bir şekilde ortaya çıkarır. Bu teknikler, görüntülerin işlenebilirliğini artırarak daha ayrıntılı analizler yapılmasına imkan tanır.

Görüntü işleme, tıp, güvenlik ve tarım gibi pek çok sektörde önemli bir yere sahiptir. Tıp alanında ultrason görüntüsünden embriyo ya da folikül sınırlarının tespiti, segmentasyon ve özellik çıkarma yöntemlerinin etkili kullanımını gerektirir (9-11).

Bilgisayar görüşü (Computer Vision)

Bilgisayar görüşü, makinelerin dijital görüntüleri ve videoları analiz ederek anlamlı bilgiler çıkarabilmesini sağlayan bir teknolojidir. Bu sistem, yapay zeka ve görüntü işleme teknikleriyle görsel verilerin yorumlanmasını amaçlar. Bilgisayar görüşü, embriyoloji laboratuvarlarında özellikle görüntü analizine dayalı süreçlerin otomasyonu ve doğruluğun artırılması için de kullanılmaktadır. Bu teknoloji, embriyo değerlendirmesinden sperm analizi ve oosit seçimlerine kadar birçok alanda yardımcı olabilir. Analiz edilen veri türüne ve işlevine göre üç temel başlık altında uygulama alanları:

Obje Tanıma (Object Recognition): Obje tanıma, bir görüntüde yer alan nesnelerin tespit edilmesi ve sınıflandırılması işlemidir. Bu teknoloji, makinelere nesneleri tanıma yeteneği kazandırarak, insan müdahalesine gerek kalmadan analiz yapılmasını sağlar. Örneğin bir mikroskop kamerasıyla elde edilen görüntülerde, bilgisayar görüşü algoritmaları embriyoları tanımlayabilir ve blastomerlerin boyutlarını, simetrisini veya fragmantasyon oranını ölçebilir. Bu sayede, embriyo kalitesinin değerlendirilmesi daha hızlı ve objektif bir şekilde yapılır. Obje tanıma, yapay zeka algoritmalarının yardımıyla nesnelerin boyut, renk ve şekil gibi özelliklerinin analizini sağlar.

Yüz Tanıma (Facial Recognition): Yüz tanıma, dijital görüntülerde veya videolarda yüzlerin tespit edilmesi ve tanınması işlemidir. Örnek olarak sistem, yüz tanımadaki gibi, oosit veya embriyonun yüzeyindeki belirgin özellikler (örneğin zona pellucida'nın düzgünlüğü veya sitoplazma içindeki granülasyonlar) algılanabilir. Başka bir yapay zeka modelinde ise, sitoplazmadaki belirli desenleri tanıyarak olgun oositleri seçebilir.

Hareket Algılama (Motion Detection): Hareket algılama, bir video veya görüntüde meydana gelen hareketlerin tespit edilmesini sağlar. Bu teknoloji, genellikle birden fazla kare arasındaki farkları analiz ederek hareketli nesneleri belirler. Örneğin, bilgisayar görüşü tabanlı bir sistem, sperm hareketliliğini analiz ederek hız, yön ve motilite gibi parametreleri ölçebilir. Bu, spermin fertilizasyon potansiyelinin objektif olarak değerlendirilmesine olanak tanır.

Bilgisayar görüşü, görüntülerin yorumlanmasını ve anlamlandırılmasını amaçlamaktadır. Bilgisayar görüşü teknolojisinin embriyoloji laboratuvarlarında verimliliği artırmak ve sonuçları standart hale getirmek için nasıl kullanılabileceğini göstermektedir. Gelecekte, bu uygulamaların yaygınlaşmasıyla birlikte laboratuvar süreçlerinin daha fazla otomasyon kazanması beklenmektedir (12,13).

Yapay sinir ağı (Artificial Neural Network, ANN)

Yapay sinir ağları, insan beynindeki sinir hücrelerinin işleyişini taklit eden matematiksel modellerdir. Bu ağlar, girdi ve çıktı arasındaki karmaşık ilişkileri öğrenir ve tahmin yapar. ANN'ler, büyük veri setlerini işlemek, model oluşturmak ve çeşitli alanlarda karar destek sistemleri geliştirmek için kullanılır. Embriyoloji laboratuvarlarında da bu teknolojiler, özellikle görüntü analizi ve karar verme süreçlerinde fayda sağlar. Yapay sinir ağı uygulamaları, model türü ve işlevselliğine göre 3 temel başlıkta toplanır, bu başlıklar;

Çok katmanlı algılayıcılar (Multi-layer Perceptrons, MLP): Birden fazla katmandan oluşan sinir ağları. Bu yapı, verinin karmaşık özelliklerini öğrenebilmesini sağlar. Embriyoloji laboratuvarlarında MLP, embriyoların implantasyon potansiyelini tahmin etmek için kullanılabilir. Örneğin, embriyonun gelişim aşamalarını, hücre simetrisini ve fragmantasyon oranını analiz ederek bir embriyonun transfer edilip edilmeyeceğine karar verilebilir. Bu yöntem, embriyo seçim sürecini daha objektif hale getirir.

Tek katmanlı algılayıcılar (Single-layer Perceptrons): Tek bir katmandan oluşan basit sinir ağlarıdır. Embriyoloji laboratuvarında tek katmanlı algılayıcılar, sperm morfolojisinin temel sınıflandırması

veya oositlerin olgunluk durumlarının belirlenmesi gibi görevlerde uygulanabilir. Örneğin, bir spermin normal veya anormal olarak sınıflandırılması bu tür bir modelle yapılabilir. Bu yöntem, hızlı ve düşük maliyetli analizler için idealdir.

Geri yayılım (Backpropagation): Öğrenme sürecinde hata düzeltme mekanizması. Sistem, tahmin ettiği değer ile gerçek sonuç arasındaki farkı hesaplar ve bu farkı azaltmak için ağdaki bağlantıları kullanır. Embriyoloji laboratuvarlarında geri yayılım mekanizması, embriyo seçim modellerinin doğruluğunu artırmak için kullanılır. Örneğin, bir yapay sinir ağı, embriyo implantasyon başarılarını tahmin etmek için eğitildiğinde, geri yayılım yardımıyla hata oranını azaltır ve daha doğru tahminler yapar. Bu, embriyo seçiminde daha güvenilir kararlar alınmasını sağlar.

Yapay sinir ağları, embriyoloji laboratuvarlarının analiz süreçlerini hızlandırmak, standart hale getirmek ve doğruluğu artırmak için güçlü bir araç olarak kullanılabilir. Bu teknolojiler, laboratuvarın dijital dönüşüm sürecine önemli katkılar sunar (14).

Makine öğrenimi (Machine Learning, ML)

Makine öğrenimi, makinelerin verilerden öğrenmesini ve zamanla performansını iyileştirmesini sağlar. Bu teknoloji, algoritmalar ve modeller kullanarak veri setlerindeki desenleri keşfeder. Embriyoloji laboratuvarlarında, makine öğrenimi, veri analizi, karar destek sistemleri ve süreç optimizasyonu gibi birçok alanda uygulanabilir. Makine öğrenimi yöntemleri, öğrenme türüne ve veri işleme stratejisine göre 3 başlığa ayrılmıştır. İşte bu ayrımın temel özellikleri:

Denetimli öğrenme (Supervised Learning): Etiketli verilerle öğrenme modelidir. Model, giriş verileri ile beklenen çıktılar arasındaki ilişkileri öğrenerek gelecekteki tahminler için kullanılır. Örneğin embriyo görüntülerine dayalı implantasyon potansiyelinin tahmin edilmesi bu yönteme örnek verilebilir. İyi kalitede embriyolar (yüksek implantasyon potansiyeli) ve düşük kalitede embriyolar (düşük implantasyon potansiyeli) etiketlenerek bir model oluşturabilir. Bu model, yeni embriyo görüntülerini analiz ederek hangi embriyonun seçileceğine yardımcı olabilir.

Denetimsiz öğrenme (Unsupervised Learning): Etiketlenmemiş verilerle öğrenme modelidir. Sistem veriler arasındaki gizli desenleri veya gruplamaları keşfeder. Örnek olarak oosit veya sperm hücrelerinin gruplandırılması, denetimsiz öğrenmenin bir uygulaması olabilir. Farklı oositlerin olgunluk seviyelerine göre otomatik olarak gruplandırılması sağlanabilir. Bu, laboratuvar personelinin zaman kazanmasına ve daha standart bir değerlendirme yapılmasına olanak tanır.

Pekiştirmeli öğrenme (Reinforcement Learning): Ödül ve ceza mekanizmaları ile öğrenme modeli olarak tanımlanır. Model, belirli bir hedefe ulaşmak için en iyi stratejiyi öğrenir. Örneğin, bir algoritma, belirli sıcaklık ve gaz seviyelerinin embriyo gelişimine olan etkilerini analiz ederek ideal koşulları belirleyebilir. Ödül mekanizması, en iyi gelişimi sağlayan parametreleri optimize etmeyi hedefler.

Makine öğrenimi, laboratuvar süreçlerini hızlandırmak, analiz doğruluğunu artırmak ve bireysel uzman yorumlarından kaynaklanabilecek hataları azaltmak için güçlü bir araçtır. Denetimli, denetimsiz ve pekiştirmeli öğrenme yöntemleri, embriyoloji laboratuvarlarında hem rutin analizlerde hem de süreç optimizasyonunda devrim niteliğinde değişiklikler yaratabilir (15,16).

Konvolüsyonel sinir ağı (Convolutional Neural Network, CNN)

Konvolüsyonel sinir ağı, özellikle görüntü işleme ve bilgisayar görüşü için kullanılan bir yapay sinir ağı türüdür. Bu ağlar, görüntülerin sınıflandırılmasında ve analizinde etkilidir. Konvolüsyonel sinir ağı, ağın yapısal bileşenlerine ve işlevlerine göre ayrılmıştır. İşte bu ayrımın detayları:

Konvolüsyonel katmanları (Convolutional Layers): Girdiden özellik çıkaran katmanlardır. Konvolüsyonel katmanları, girdiden anlamlı özellikler çıkarmak için filtreler kullanır. Bu katmanlar, görüntüdeki kenarlar, dokular ve şekiller gibi önemli desenleri öğrenir. Embriyo görüntülerindeki hücre sayısının otomatik tespiti, konvolüsyonel katmanlarının etkili bir kullanımına örnek olabilir. Bu katmanlar, hücre sınırlarını algılayarak embriyo morfolojisi hakkında bilgi sağlayabilir.

Havuzlama katmanları (Pooling Layers): Görüntüdeki özelliklerin boyutunu küçültmek ve önemli bilgileri korumak için kullanılır. Genellikle maksimum veya ortalama değerler alınarak bilgi yoğunlaştırılır. Havuzlama katmanları, embriyo veya oosit görüntülerinin boyutunu küçültüp analiz sürecini hızlandırabilir.

Tam bağlantılı katmanlar (Fully Connected Layers): Sınıflandırma ve karar verme işlemlerini gerçekleştiren katmanlardır. Embriyoların implantasyon potansiyelinin sınıflandırılması, tam bağlantılı katmanların embriyoloji laboratuvarındaki bir uygulamasıdır.

Konvolüsyonel sinir ağı, görüntü tabanlı analizlerin hassasiyetini artırarak insan hatalarını azaltır. Hücrelerin sınıflandırılması, embriyo seçimi ve kültür parametrelerinin optimizasyonunda kullanılan bu yöntemler, laboratuvar süreçlerinin daha verimli ve objektif hale gelmesine olanak sağlar (17).

Derin öğrenme (Deep Learning)

Derin öğrenme, yapay zekanın bir alt dalıdır ve çok katmanlı sinir ağları kullanarak büyük veri setlerinden öğrenir. Bu teknik, karmaşık verilerden anlamlı bilgileri çıkarmak için kullanılır. Derin öğrenme tekniklerini kullanılan sinir ağı türlerine ve bu türlerin işlevlerine göre sınıflandırmak mümkündür, bu özellikler;

Derin sinir ağları (Deep Neural Networks, DNN): Birden fazla katmandan oluşan sinir ağlarıdır. Çok katmanlı yapıları sayesinde, girdilerden çıkarılan özellikleri daha karmaşık seviyelerde analiz edebilir. Bu ağlar, farklı embriyo parametrelerini analiz ederek, hangi embriyonun transfer için uygun olduğunu tahmin edebilir.

Tekrarlayan sinir ağları (Recurrent Neural Networks, RNN): Zamansal verileri işleyen sinir ağlarıdır. Örneğin, zaman atlamalı (time-lapse) görüntüler kullanılarak embriyonun gelişim hızı ve düzeni analiz edilebilir.

Generatif adversarial ağlar (Generative Adversarial Networks, GAN): Yeni veri örnekleri oluşturan sinir ağları embriyo ya da sperm görüntülerini simüle ederek eğitim veri setlerini genişletmek için kullanılabilir. Bu, makine öğrenimi modellerinin daha fazla veriyle eğitilmesini ve sonuçlarının iyileştirilmesini sağlar.

Derin öğrenme, embriyoloji laboratuvarlarındaki süreçleri otomatikleştirerek hem zaman hem de maliyet tasarrufu sağlar. Zaman atlamalı görüntü analizi, embriyo seçimi ve veri seti genişletme gibi uygulamalar, laboratuvar verimliliğini artırırken uzman yorumlarına olan bağımlılığı da azaltır (18-24).

Sperm Analizinde Yapay Zeka Uygulamaları

Sperm analizi, infertil çiftlerin değerlendirilmesinde ilk adımdır ve sperm motilitesi ile morfolojisinin değerlendirilmesi, potansiyel fertilizasyon kabiliyetini belirlemek için kritik öneme sahiptir. Manuel yöntemlerle yapılan sperm hareketlilik değerlendirmeleri, aynı ejakülatların hareketlilik parametreleri subjektif olarak değerlendirildiğinde %30–60 oranında varyasyonlar bildirilmiştir. Bu bağlamda, YZ sistemlerinin tanıtılması, sperm hareketliliğini değerlendirmede daha objektif bir yol sağlamayabilir (25). Bilgisayar destekli sperm analizi (Computer-Aided Sperm Analysis, CASA) sistemleri, sperm hücrelerini değerlendirir. Bu sistem sperm konsantrasyonunun (CASA-Conc), sperm motilitesi (CASA-Mot) ve sperm morfolojisinin (CASA-Morph) belirlenmesini sağlar, ancak otomasyon derecesi sistemler arasında değişiklik gösterebilir. CASA sistemi, faz-kontrast mikroskop, video kamera ve özel yazılıma sahip bir bilgisayardan oluşur. Başlangıçta yardımcı üreme teknikleri kliniklerinde spermatozoalarını değerlendirmek için geliştirilmiş olan bu sistem, 1986 yılında Hamilton Thorne şirketi tarafından aygır spermatozoaları için kullanılmış ve daha sonra diğer hayvan türleri için de uyarlanmıştır (26). CASA sistemleri ve modülleri, sadece sperm hareketliliği ve konsantrasyonunu değil, aynı zamanda morfoloji, DNA parçalanması (CASA-DNAf) ve membran bütünlüğü gibi daha az rutin olarak değerlendirilen diğer parametreleri de belirlemeye olanak tanımaktadır. Ayrıca, hasta boyu, toplam testis hacmi, toplam testosteron ve ejakülat hacmi verileri kullanılarak kromozomal anormalliklerin tahmininde büyük oranda doğruluk elde edildiği bildirilmiştir (27). CASA sistemi kullanılarak 1002 hastadan alınan sperm örneklerinin verileri değerlendirilmiş ve belirli anormal morfolojik formların kromatin paketlenmesi ve DNA parçalanma anormallikleri spermatozoaların ICSI sırasında kullanılması, fertilizasyon, embriyo gelişimi ve düşük oranları üzerinde etkili olduğu raporlanmıştır (28).

Girela ve arkadaşları, sperm sayısı ve hareketliliğini çevresel faktörler ve yaşam tarzına göre tahmin edebilen iki sinir ağı geliştirmiştir. Bu yöntem, pahalı testlere ve erken teşhis için yararlı olabileceğini düşünmüşlerdir. Erkek infertilitesini iyileştirmek amacıyla, yapay zeka teknikleri kullanılarak semen özelliklerini tahmin eden bir model geliştirilmiştir. 123 sağlıklı gönüllü üzerinde yaptıkları çalışmada, sperm konsantrasyonu ve hareketliliği anket verileriyle yüksek doğrulukla tahmin edilmiştir (29). Sahoo ve Kumar (2014), insan fertilizasyon oranını tahmin etmek için beş yapay zeka tekniği kullanmış ve sekiz özellik seçme yöntemi uygulamışlardır. Özellik seçim yöntemleri, yapay zeka tekniklerinin doğruluk oranını artırarak %94 doğruluk gibi yüksek performans elde edilmesini sağladığını bildirmişlerdir (30). Sperm kalitesinin tahminine yönelik YZ yöntemleri ile ilgili güncel yayınlar ve çalışmalar, yapay zekanın sperm analizi ve fertilizasyon oranlarının tahmini konusundaki potansiyelini ortaya koymaktadır. Bu yöntemler, sperm motilitesinin ve morfolojisinin daha hassas ve objektif bir şekilde değerlendirilmesine olanak tanımakta ve klinik uygulamalarda önemli bir yer edineceği düşünülmektedir.

Oosit Kalitesi Değerlendirmede Yapay Zeka Uygulamaları

Oosit kalitesi, Yardımcı Üreme Teknikleri döngülerinin başarı oranı için kritik öneme sahiptir, ancak oosit kalitesini doğru bir şekilde değerlendirmek için yöntemler hala eksiktir. YZ teknolojisinin büyük miktarda veriyi, özellikle video ve görüntüleri analiz edebilme yeteneği, oosit değerlendirmede

özellikle fayda sağlayabilir. İyi eğitilmiş bir model, hızlı hesaplama hızı ve yüksek doğruluk sunarak embriyologlara daha objektif oosit seçimi yapmalarında yardımcı olabilir. Oosit değerlendirmesi için çeşitli yapay zeka modelleri geliştirilmiş olup, bunların bazıları iyi performans gösterdiği bildirilmiştir (31). Oositlerin değerlendirilmesi ve seçimi için çeşitli stratejiler geliştirilmiştir. Ancak, normal morfolojideki oositlerin anöploidi olasılığı gibi sınırlamalar, kesin standartların ve yöntemlerin elde edilmesi için daha fazla çalışmaya ihtiyaç olduğunu bildirilmiştir. Cavalera ve arkadaşları (2024), fare oositlerinin in vitro maturasyon sürecindeki sitoplazmik hareket hızlarını partikül görüntü velosimetri (PIV) yöntemi ile analiz etmişlerdir. Elde edilen veriler, yapay sinir ağı kullanılarak değerlendirilmiş ve gelişimsel olarak yeterli veya yetersiz oositleri %91,03 doğrulukla belirleyebilen bir model geliştirdiklerini bildirmişlerdir. Bu yöntem, YÜT kliniklerinde oosit seçiminde non-invaziv ve yüksek doğruluklu bir yaklaşım sunarak, gebelik sonuçlarını iyileştirme potansiyeline sahip olduğunu belirtmişlerdir (32).

Embriyo Gelişimi ve Seçiminde Yapay Zeka Uygulamaları

Geleneksel embriyo seçiminde genellikle morfolojik değerlendirmelere dayanılır. Bu değerlendirme, embriyonun pronükleer aşamasından blastomerlerin sayısı, simetrisi ve fragmentasyonu gibi faktörleri gözlemlemeyi içerir (33). Embriyo seçiminde genellikle subjektif gelişimsel ve morfolojik özellikler kullanılır. Geleneksel olarak embriyo değerlendirmenin amacı, embriyoları implantasyon potansiyeline göre sıralamaktır. Bu bağlamda, YZ modelinin her embriyo için yaptığı tahminlerin sayısal değerleri sınırlı öneme sahiptir; önemli olan, embriyoların sıralamasının implantasyon olasılığıyla uyumlu olmasıdır (34). Embriyo transferi sürecinde, embriyoların değerlendirilmesi ve seçilmesi, başarılı bir gebelik elde etmek için kritik öneme sahiptir. Bu süreç, hangi embriyoların rahme transfer edileceğini belirlemeyi içerir. Ancak, geleneksel embriyo seçim yöntemlerinin, döngü başına elde edilen klinik gebelik oranı genellikle düşük kalmaktadır; bu oran yaklaşık olarak %30 civarındadır. Bu durum, her 100 embriyo transferinden sadece 30'unun başarılı bir şekilde gebeliğe yol açtığını gösterir. Geleneksel yöntemler, embriyoların kalitesini belirlemede ve en iyi embriyoyu seçmede sınırlamalar yaşayabilir, bu da klinik başarı oranlarını etkileyebilir. Bu nedenle, embriyo seçiminde daha etkili yöntemler ve teknolojiler geliştirmek, gebelik oranlarını artırmak için önemli bir hedef olmaktadır (35). Yapılan çalışmalarda çeşitli deneysel yöntemler geliştirilmiştir, bunlar arasında zaman-lapse görüntüleme, matematiksel ve istatistiksel araçlar ve bilgisayar destekli puanlamalar bulunmaktadır.

Time-lapse görüntüleme (TLG), embriyoların gelişim aşaması ve morfokinetikleri hakkında sürekli bilgi sağlayarak embriyo değerlendirmesine katkıda bulunan bir sistemdir. TLG, geleneksel embriyo kültür yöntemlerine modern optik sistemler ekleyerek embriyo gelişimini düzenli olarak görüntüler ve yakalar. Bu teknoloji, embriyo gelişimindeki değişimleri sürekli ve objektif bir şekilde izlemeyi sağlar, böylece iki pronükleusun görünümünü kaçırma olasılığını ortadan kaldırır ve embriyoların doğru değerlendirme oranını artırır. TLG, embriyo gelişimi için stabil bir dış ortam sunar ve gelişim sürecini daha doğru bir şekilde kaydederek embriyoların gelişim potansiyelini tahmin etmeyi mümkün kılar. Bu sayede, yüksek kaliteli tek embriyo seçimi yaparak klinik gebelik ve canlı doğum oranlarını artırılabileceği bildirilmiştir (36). Embriyonik gelişim sırasında, blastomerlerin tamamen bölündüğü zamanlar ve bu süreçteki aşamalar, embriyonun gelişim potansiyelini öngörmede kritik öneme sahiptir. Araştırmalar, başarılı implantasyon gösteren embriyoların 2-hücreli, 3-hücreli, 4-hücreli, 5-hücreli ve 8-hücreli aşamalara, implantasyon göstermeyen embriyolardan daha hızlı geçtiğini ortaya koymuştur. Bu bulgular, hızlı bölünme oranına sahip embriyoların daha yüksek implantasyon potansiyeline sahip olduğunu gösteren geleneksel morfolojik değerlendirmelerle uyumludur. Bu bağlamda araştırmacılar bu döngülerin kayıt altına alındığı ve hesaplandığı yapay zeka modellerinin gebelik oranlarında etkileyebileceğini bildirmişlerdir (37,38). Başka çalışmada Zou Yaoyu ve arkadaşları, euploid embriyoların bölünme süresinin aneuploid embriyolarınkinden anlamlı derecede uzun olduğunu bulmuşlardır. Ayrıca, euploid embriyoların tüm gelişim aşamalarındaki bölünme sürelerinin aneuploid embriyolarınkinden daha erken olduğunu göstermişlerdir (39). TLG kültüründe embriyoların düzenli olarak görüntülenmesi, embriyoların düzenli olarak ışığa maruz kalma riskini artırabilir. Bazı çalışmalar, kısa dalga boylu ışığa uzun süre maruz kalan embriyoların anomali geliştirme olasılığının daha yüksek olduğunu belirtmiştir. Ancak, diğer çalışmalar TLG inkübatöründe bulunan embriyoların normal fertilizasyon oranı ve embriyo implantasyon oranı ile geleneksel inkübatörde bulunan embriyoların oranları arasında belirgin bir anomali bulunmamıştır (40). Sonuç olarak TLG kullanılarak yapılan embriyo dinamikleri değerlendirmesi, laboratuvar ve klinik doktorlar açısından embriyo seçiminde bilimsel ve objektif veriler sağlayarak daha iyi kararlar verilmesine yardımcı olabileceği düşünülmektedir (41).

Santos Filho ve arkadaşları yarı otomatik derecelendirme ile insan blastokist görüntülerinin morfolojik analizini gerçekleştiren bir model geliştirmişlerdir. Model, iç hücre kütlesi (ICM) ve trofektoderm (TE) kalitesini değerlendirmek için iki destek vektör makinesi (SVM) sınıflandırıcısı kullanmışlardır. Sonuç olarak bu yöntemle daha hassas ve objektif bir embriyo değerlendirmesi yapılabileceğini raporlamışlardır (42). İnsan blastokistlerinin trofektoderm (TE) bölgesini belirlemek için tam otomatik bir yöntem geliştirilmiş. Bu yöntem, Retinex algoritmasını kullanarak görüntü kalitesini artırmış ve TE bölgelerini %87,8 doğruluk oranıyla tespit ettiğini bildirmişlerdir (43). Bu gelişmelerle, transfer edilecek embriyoyu seçme sürecinde embriyo morfolojisi açısından objektif ve nicel bir değerlendirme sağlanabileceğini düşünülmüştür. Ancak, bu alandaki yapay zeka algoritmaları ve yöntemler üzerinde daha fazla çalışma ve doğrulama gereklidir.

Sonuç

Sonuç olarak, yapay zeka yardımcı üreme teknikleri alanında ileri yeni teknikler ve tedavi yöntemleri yaratma potansiyeline sahiptir. YZ, sperm analizi, oosit kalitesi değerlendirmesi ve embriyo seçimi gibi çeşitli alanlarda önemli iyileştirmeler sağlayabilir. Sperm analizi, sperm motilitesini ve morfolojisini değerlendirerek yüksek kaliteli spermleri seçmeye yardımcı olabilir. Bilgisayar destekli sperm analiz sistemleri (CASA) ve çeşitli YZ teknikleri, sperm kalitesini daha doğru bir şekilde tahmin etmek için geliştirilmiştir. Oosit kalitesinin değerlendirilmesi, YÜT başarı oranını artırmada kritik bir rol oynadığı bildirilmiştir. YZ, oositlerin gelişimini izleyerek ve kaliteyi değerlendirerek en iyi fertilizasyon potansiyeline sahip olanları seçebilir. Ayrıca kişiselleştirilmiş yaklaşımlar, yapay zeka tekniklerini kullanarak bireyselleştirilmiş tedavi planları oluşturmayı hedefler. Özellikle, infertilite tedavisinde, hastaların özel ihtiyaçlarına göre tedavi yöntemlerini optimize eder. Bu yaklaşımlar, büyük veri setlerinden elde edilen desenleri ve bilgileri kullanarak her hastaya özgü çözümler sunabilir. Kişiselleştirilmiş yaklaşımlar, YZ 'nin uygulama alanlarından biridir ve bireylerin spesifik tedavi ihtiyaçlarına odaklanmayı hedeflemektedir.

Embriyo değerlendirilmesi ve seçimi, YÜT laboratuvarlarında YZ uygulamaları için doğal bir başlangıç noktasıdır. Embriyo seçiminde subjektif gelişimsel ve morfolojik özellikler kullanılırken, YZ destekli algoritmalar bu süreci daha objektif ve nicel hale getirebilir. Time-Lapse görüntüleme ve çeşitli YZ yöntemleri, embriyo morfolojik analizleri için önemli veriler sunabilir. YZ' nin, YÜT döngüsündeki tüm verileri bütünleştirerek daha iyi sonuçlar elde etme potansiyeli olduğu düşünülmektedir. Genetik testlerle normal embriyoları anormal embriyolardan ayırt edebilme potansiyeli, maliyetleri düşürebilir ve anormal doğum oranlarını azaltabilir. Gelecekte, YZ 'nin kalite kontrolü ve kültür sistemlerinin izlenmesi gibi pratik uygulamaları da değerlendirilebilir. Derin öğrenme ve diğer son teknoloji makine öğrenimi algoritmaları hâlâ başlangıç aşamasındadır ve daha fazla araştırmaya ihtiyaç duymaktadır. Mevcut çalışmaların temel sınırlamaları, eğitilen modelin performansını, uygulanabilirliğini ve kullanım alanlarının genişletilmesini önemli ölçüde etkileyen verilerin niceliği ve kalitesinden kaynaklanmaktadır. Büyük ölçekli randomize kontrollü çalışmalar ve algoritmaların dış geçerliliğini test etmek için daha ileri araştırmalar gerekmektedir. YZ uygulamaları hâlâ nispeten sınırlıdır ve genellikle yarı otomatiktir. Kişiselleştirilmiş teşhis ve tedavi yöntemleri ve otomatik YZ destekli üreme sistemleri hakkında daha fazla araştırmaya ihtiyaç duyulmaktadır. YZ, basit ve tekrar eden görevlerin üstesinden gelerek zaman ve emek tasarrufu sağlarken, kullanıcıların modellerinin tahminlerini dikkatli bir şekilde değerlendirmesi önem arz etmektedir (44- 46).

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Olgu Sunumu

Düzeltilmemiş büyük arter transpozisyonu ve pulmoner hipertansiyonu olan gebenin sezaryenle doğumunda anestezi yönetimi

Management of anesthesia during cesarean delivery of a pregnant woman with uncorrected transposition of the great arteries and pulmonary hypertension

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Öz

Bu olgu sunumunda konjenital büyük arter transpozisyonu ve pulmoner hipertansiyon (PH) tanısı olan gebenin sezaryenle doğumunda perinatoloji, kardiyoloji ve anestezi ekibinin multidisipliner yönetimini sunmayı amaçladık. ASA IV 36 haftalık düzeltilmemiş büyük arter transpozisyonu ve PH tanısı olan gebenin sezaryenle doğumu için kombine spinal epidural blok tekniğini ve uterotonik olarak sentetik oksitosin analoğu karbetosin tercih ederek anne ve bebek için sorunsuz başarılı bir per- ve postoperatif yönetim gerçekleştirdik.

Anahtar Kelimeler: Sezaryen doğum, Kombine spinal epidural anestezi, büyük arter transpozisyonu, pulmoner hipertansiyon

Abstract

In this case report, we aimed to present the multidisciplinary management of the perinatology, cardiology and anesthesia team during the cesarean delivery of a pregnant woman with congenital great artery transposition and pulmonary hypertension (PH). We achieved a smooth and successful per- and postoperative management for the mother and the baby by choosing the combined spinal epidural block technique and the synthetic oxytocin analogue carbetocin as an uterotonic for the cesarean delivery of an ASA IV 36-week pregnant woman diagnosed with uncorrected great artery transposition and PH.

Keywords: Cesaren delivery, combined spinal epidural anesthesia, transposition of great arteries, pulmonary hypertension

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Giriş

Gebelikte düzeltilmemiş konjenital büyük arter transpozisyonu ile beraber pulmoner hipertansiyon (PH) olması maternal ve fetal/neonatal advers sonuçları olabilen bir klinik durumdur. Kardiyovasküler hastalıklar Amerika Birleşik Devletleri'nde yılda 4 milyon gebeliğin yaklaşık %1-4'ünü etkilemekte ve gelişmiş ülkelerde konjenital kalp hastalığına bağlı maternal morbidite ve mortalitenin %0.5-11 olduğu bildirilmiştir [1, 2].

Obstetrik anestezi ve kalp hastalığında pratik klinik uygulama önerilerine göre artan bu morbidite ve mortalite nedeniyle kalp hastalığı olan kadınlarda gebeliğin güvenli yönetimi uygun anestezi, kardiyak ve obstetrik bakım gerektirmektedir [2, 3]. Kardiyolog-perinatolog-anestezist multidisipliner olarak doğum ve anestezi yönetimi için gebe hastaları kardiyak hastalık etiyolojisi ve ciddiyetine göre risk sınıflandırması yapmalıdır. Anestezi/analjezi tekniği olarak genellikle nöraksiyel blok uygundur ve anestezist acil sezaryenle doğum, postpartum kanama ve aritmiler gibi obstetrik ve kardiyak acil durumları öngörmelidir [3]. Bu olgu sunumunda ASA IV 36 haftalık düzeltilmemiş büyük arter transpozisyonu ve PH tanısı olan gebenin sezaryenle doğumu için perinatoloji, kardiyoloji ve anestezi ekibinin multidisipliner yönetimini sunmayı amaçladık.

Olgu Sunumu

Otuz sekiz yaşında konjenital büyük arter transpozisyonu olan ancak düzeltme operasyonu geçirmemiş ve PH gelişmiş beta blokür ve asprin kullanan mulitpar ASA IV gebe, 36.6 gestasyonel haftada hastanemize başvuruyor (G3, P2, vücut kitle indeks: 34. 5 kg/m2). Doğum şekli tercihi için ilgili bölümlere konsülte ediliyor. Gebe hastanın öyküsünde sorunsuz rejyonel anestezi ile yönetilmiş 2 sezaryenle doğum ve hipotirodi nedeniyle levotiron kullanımı mevcut. Kardiyoloji tarafından New York Heart Association (NYHA) sınıf III olarak değerlendirilen olgunun pansistolik üfürümü ve dekstrokardisi yanında pulmoner venleri sol atriyuma, sol atriyumu sağ ventriküle, sağ ventrikülü de aortaya açılmakta olup, EKG'si normal sinüs ritmindeydi. Modifiye World Health Organization (mWHO) gebelik risk kategorisi ise III olarak belirlendi. Pulmoner arterde maksimum 120 mmHg (ortalama 77 mmHg) sistolik gradiyent, ASD ve VSD saptandı. Kardiyoloji-perinatoloji-anestezi ekibi tarafından sezaryen kararı alınırken anestezi tekniği olarak kombine spinal epidural (KSE) blok seçilerek postoperatif anestezi bakım ünitesi (PABÜ) takibi planlandı. Gebe olgudan sezaryen ve anestezi için yazılı onam alındıktan sonra standart hemodinamik monitörizasyon yapıldı ve intravenöz (İV) yol açıldı. Preoperatif vital bulguları; nabız 110 atım/dk, kan basıncı 147/87 mmHg (ortalama 106 mmHg), oksijen satürasyonu %82 olan hastaya nazal kanül ile 4 L/dk %100 oksijen desteği sağlandı. Hastaya İV metoklopramid 10 mg yapıldıktan sonra oturur pozisyonda L3-L4 intervertebral aralığından epidural aralık direnç kaybı yöntemi ile bulunduktan sonra iğne içinden iğne yöntemi ile spinal aralığa ulaşılarak KSE blok yapıldı. Subaraknoid aralığa 7.5 mg (1.5 mL) hiperbarik bupivakain (heavy bupivacaine, 0.5% buvasin, 4 mL ampül, VEM ilaç), 100 mcg morfin + 10 mcg fentanil verildikten sonra epidural kateter yerleştirilip hasta supin pozisyonda yatırıldı ve operasyon masası sola tilt yapıldı. Hastanın kan basıncı non-invaziv olarak 2 dakika (dk) aralıklarla ölçüldü. KSE bloktan 4 dk sonra kan basıncı 97/47 mmHg'ye düşünce 5 mg İV efedrin verildi ve 2 dk sonra kan basıncı 79/41 mmHg'ye düşünce 10 mg İV efedrin daha uygulandı. Hastanın duyusal blok seviyesi T6 dermatomunda iken epidural kateterden 6. dk'da 60 mg (3 mL) %2 lidokain uygulandı. Blok seviyesi T4 'e ulaşınca cerrahinin başlamasına izin verildi. Hastanın kan basıncı 95/58 mmHg iken tekrar 5 mg İV efedrin yapıldı. Hastanın ağrı hissetmesi üzerine 8. dk'da epidural kateterden 20 mg %2 lidokain daha uygulandı. KSE blok uygulamasından 15 dk sonra doğan yenidoğanın 1. ve 5.dk APGAR skoru 9 ve 10 idi. Kord kan gazında pH: 7.32, pCO2: 45.6 mmHg, HCO3: 20.3 meq/L, Laktat: 1.8 mmol/L, BE: -2.8 idi. Göbek kordonu klemplendikten sonra hastaya 100 mcg İV karbetosin uygulandı. Ameliyat 1 saat sürdü ve hastanın tahmin edilen kan kaybı ortalama 350 mL idi. Postoperatif multimodal analjezi epidural kateterden %0.125 bupivakain, İV parasetamol ve deksketoprofen ile sağlandı. Olgu yakın takip açısından PABÜ'ye devredilirken oksijen satürasyonu %82, kan basıncı 124/75 mmHg ve nabız 100 atım/dk idi. PABÜ'de kardiyoloji ve perinatoloji ekibi ile multidisipliner yakın takip sonrasında postoperatif 2. günde sorunsuz olarak servisine devredildi.

Tartışma

Bu olgu sunumunda; multipar ASA IV 36 haftalık düzeltilmemiş büyük arter transpozisyonu ve PH tanısı olan gebenin önce NYHA-kalp yetmezliği ve mWHO-gebelik risk kategorisi sınıflaması yapıldıktan sonra alınan sezaryenle doğum kararı ve anestezisi için de KSE blok tekniği ile uterotonik olarak sentetik oksitosin analoğu karbetosini tercih ederek gerçekleştirdiğimiz sorunsuz başarılı bir per- ve postoperatif

multidisipliner yönetim literatür eşliğinde tartışılarak sunuldu.

Pulmoner hipertansiyon prevalansı ise %1-3 olup, 15-30/ 1, 000,000 gebede maternal mortalite %9-28'dir [1]. Ciddi derecede yüksek pulmoner arter basıncı (PAB) ve pulmoner vasküler rezistans (PVR) varlığında ve önceden sağ ventrikül disfonksiyonu olan hastalarda risk artar. Ortalama (mean) pulmoner arter basıncı (mPAB) istirahatte 25 mmHg'den yüksek olduğunda PH ortaya çıkar [1]. PH, pulmoner arterlerin progresif daralması PVR ve mPAB'nin artmasına, kalp debisini azalmasına ve sonunda sağ kalp yetmezliğine neden olabilir [4, 5]. Postpartum dönemde önyük (preload) artar ve ilk birkaç hafta boyunca sistemik vasküler tonus artıp kardiyak debi azalır ki bu da kardiyak komorbiditesi olan gebelerin dekompanzasyon mekanizmasını açıklar.

2004-2014 yılları arasında Amerika Birleşik Devletleri'nde kardiyak olmayan cerrahi geçiren 17 milyon -gebe olan/ olmayan hastaların yatışlarının incelendiği bir çalışmada, PH tanısı konmuş hastalarda perioperatif kardiyovasküler olayların (ölüm, miyokard enfarktüsü veya inme), PH olmayanlara kıyasla 4 kat daha fazla olduğu ve PH tanısı konmuş hastaların yalnızca %2.4'ünde (herhangi bir PH tanısı olan cerrahi hastanın %2.4ü), cerrahi yatışların yaklaşık %13'ünde olumsuz kardiyovasküler olaylar meydana geldiği rapor edilmiştir [6].

Gebelik sırasında kardiyovasküler hastalığın yönetimi ile ilgili optimal anestezi teknikleri hakkında spesifik öneriler yoktur. Rızası olduğu takdirde sağlıklı gebeler için sezaryenle doğumun anestezi seçimi özellikle zor havayolu olmak üzere risklerin önlenmesi için genel anestezi yerine nöraksiyal anestezidir (spinal, epidural veya KSE blok). Dolayısıyla dünyada yaygın olarak elektif ASA II sağlıklı gebelerde tıbbi bir kontrendikasyon yoksa ilk tercih anestezi yöntemi tek doz spinal bloktur. Ancak tek doz spinal blok, kardiyak komorbiditesi olan ASA IV gebelerde azalan sistemik vasküler rezistans (SVR) ile epidural veya KSE'ye göre daha hızlı kardiyopulmoner dekompanzasyona neden olur. Diğer taraftan genel anestezide de endotrakeal entübasyon ve ekstübasyona verilen hemodinamik yanıtı öngörülemeyeceğinden konjenital kalp hastalığı olan obstetrik hastalarda, iyi titre edilmiş lokal anestezik-opioid kombinasyonuyla yapılan KSE blok optimal olabilir [7].

Genelde konjential kalp hastalığı olan kadınlar, düzeltme operasyonu geçirdikten sonra gebe kalırlar böylece mWHO gebelik risk kategorisi ve dolayısıyla morbidite ve/veya mortalite oranı da iyileşir. Ancak halen ülkemizde ve bazı Afrika ülkelerinde düzeltilmemiş konjenital kalp hastalığı olan gebe kalan kadınlara rastlamak ve bu gebelere de sezaryenle doğum için anestezi verilmesi gerekebilmektedir. Literatürde ciddi PH tanılı gebede çift (double) epidural kateterle ve düzeltilmemiş konjenital fallot tetralojili ASA IV 35 haftalık mWHO gebelik risk kategorisi III olan gebede KSE blok ile sezaryenle doğum gerçekleştirilmiştir. [8, 9]. 2016 yılında Yılmaz ve arkadaşları [10] 31. gebelik haftasında vajinal hemoraji ile gelen efor dispnesi olan gebenin fizik muayenesinde perioral siyanoz, SpO2 %75 ve pansistolik üfürüm tespit ettikten sonra transtorasik ekokardiyografi ile hastaya büyük arter transpozisyonu tanısı koymuşlardır. Yeni tanı alan bu olguya acil sezaryen için monitörizasyonu takiben hızlı seri indüksiyon ile entübe edilerek genel anestezi verilmiştir [10]. Biz ise, double epidural kateter ile blok veya genel anestezi uygulamak yerine NYHA Sınıf III ve maternal kardiyovasküler risk kategorisi mWHO'ya göre III. gruba dahil olan düzeltilmemiş büyük arter transpozisyonu ve PH tanısı olan gebe olgumuzda daha önce de düzeltilmemiş fallot tetralojili gebe olgumuzdaki [9] gibi lokal anestezik+opioid ile uygulanan KSE blok tekniğini tercih ettik.

Postpartum kanama (PPK), kalp hastalığı olan gebe kadınlarda olmayanlara göre iki kat daha fazla meydana gelebilir. Özellikle kardiyovasküler komorbiditesi olan hastalarda uterus atonisi ve majör PPK'nın önlenmesi ve/veya tedavisinde uterotonikler ile erken resüsitasyon büyük önem taşır. Göbek kordonu klemplendikten sonra rutin uygulanan ilk tercih uterotonik genellikle oksitosindir. Ancak İV bolus dozların SVR üzerine azaltıcı etkisi olduğu için özellikle kardiyak hastalığı olan gebelerde oksitosin, dikkatle titre edilerek İV infüzyonla uygulanır. Diğer uterotoniklerden karboprost ve metil-ergonovin ise yan etki profili nedeniyle birçok kardiyovasküler hastalıklı gebelerde pek tercih edilmez. Çünkü karboprostun PVR'yi %100 ve PAB'yi %125 arttırdığı gösterilmiştir. Ayrıca bronkospazm, anormal ventilasyon/perfüzyon oranları, artmış intrapulmoner şant, hipoksemi ve ölümle sonuçlanan durumlar bildirilmiştir. Metil-ergonovin ise alfa-adrenerjik agonist etkisiyle SVR'yi arttırarak hipertansiyon, preeklampsi, anevrizma veya koroner arter hastalığı olan gebelerde göreceli olarak kontrendikedir [3]. Ancak şimdiye kadar kardiyak gebe hastalarda %100 güvenli olmamasına rağmen oksitosin kullanılmıştır [8-10]. Bu olgu sunumumuzda ise oksitosine göre plazma yarı ömrü daha uzun bir sentetik oksitosin

analoğu olan karbetosin İV 100 mcg uygulanarak hem rutin uterus tonusu sağlanırken hem de olası atoniye bağlı PPK riskine karşı da önlem alınmıştır.

Sonuç olarak ASA IV 36 haftalık mWHO gebelik risk kategorisi III olan düzeltilmemiş büyük arter transpozisyonu ve PH tanısı olan gebenin sezaryenle doğumu için KSE blok tekniğini ve uterotonik olarak sentetik oksitosin analoğu olan karbetosini tercih ederek anne ve bebek için sorunsuz başarılı bir per- ve postoperatif multidisipliner bir yönetim gerçekleştirdik.

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Letter to Editor

Bile Duct Dilatation

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Bile Duct Dilatation

I read with interest the article by Olcucuoglu et al. [1].'The article titled "Retrospective Analysis of Unexplained Main Bile Duct Dilatation by Magnetic Resonance Cholangiopancreatography" was published in the 1/2024 issue of the journal. Congratulations to the authors for this article.

Dilatation of the common bile duct has become a common finding due to the increased frequency of abdominal ultrasonography for various reasons. There are non-invasive diagnostic methods such as magnetic resonance cholangiopancreatography (MRCP) and invasive diagnostic methods such as EUS (endoscopic ultrasonography) and ERCP (endoscopic retrograde cholangiopancreatography) that we can use for etiologic investigation after dilatation of the common bile duct is detected[2]. The most preferred method in daily practice is MRCP as it is a non-invasive method. Although advances in MR technology have improved the specificity of MRCP for visualization of biliary abnormalities, it still has limitations such as the need to use contrast and the inability to provide histologic diagnosis[3]. There is no standardized algorithm for the approach and choices after this stage. The diagnosis and/or treatment method to be chosen at this stage should be a personalized choice for the patient.

The most common causes of dilatation of the common bile duct of unknown origin reported in the literature are benign biliary stricture, choledocholithiasis, gallbladder stones, cholangiocarcinoma, and periampullary diverticulum.Another rare but missed cause of common bile duct dilatation is sphincter of oddi dysfunction (SOD). SOD is a clinical condition diagnosed with biliary pain, transaminitis and bile duct dilatation. Patients diagnosed after exclusion of other causes usually experience partial symptomatic relief with sphincterotomy. In this study, evaluation of 7 patients who could not be diagnosed with ERCP and EUS in terms of SOD may be considered.

In conclusion, it was emphasized that ERCP (Endoscopic Retrograde Cholangiopancreatography) may be the first choice in biliary stricture due to the necessity of histological diagnosis and biopsy, while EUS may be the first choice if choledocholithiasis is considered[4]. In daily practice, there is a need for algorithms that can guide the clinician in these choices and reduce unnecessary costs. These algorithms should include liver function tests, patient complaints, comorbidities, demographic characteristics such as age and gender, in addition to non-invasive imaging.

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Letter to Editor

Myelodysplastic Syndrome and Artificial Intelligence

Miyelodisplastik sendrom ve yapay zeka

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Myelodysplastic Syndrome (MDS); is a clonal disease characterized by dysplasia, ineffective erythropoiesis, cytopenias and the risk of transformation to acute leukemia, first described by Di Guglielma in the 1920s. Various classifications have been used since the disease was defined. The most recent World Health Organization Hematolymphoid Tumors Classification 5th edition and International Consensus Classification changed the MDS classification in 2022 [1].

The most commonly used prognostic scoring system for risk classification is R-IPSS (revised international prognostic scoring system). In a study conducted by Sabile et al. in 2022, it was reported that 152 gene-based molecular IPSS was more accurate than R-IPSS [2]. Despite changes in prognostic scoring systems and individual treatment planning in addition to classification, treatment response remains below expectations. The only curative treatment option is allogeneic stem cell transplantation, which has a high transplant-related mortality rate. There are publications in the literature on the use of artificial intelligence in the diagnosis of many hematological malignancies (acute lymphoblastic leukemia, acute myeloid leukemia, multiple myeloma).

In a review prepared by Elshoeibi et al. in 2023, studies on the use of artificial intelligence in the diagnosis of MDS were summarized. In the studies mentioned in the review, one or more of the parameters such as microscopic images of dysplastic cells, blast count, complete blood count values, flow cytometric results, real-time deformability cytometry and Myelodysplastic Syndrome- Complete blood count (MDS-CBC) score were used in artificial intelligence databases for the diagnosis of MDS [3].

The difficulty of using artificial intelligence in the diagnosis of MDS compared to other hematological malignancies is the use of multiple parameters for diagnosis and risk classification. In the artificial intelligence that will be used in the diagnosis of MDS, the accuracy rate will increase if the database includes all the factors that are effective in the diagnosis and risk classification as much as possible. Artificial intelligence applications that will be implemented using a database that includes as many factors as possible can guide the clinician in the diagnosis of MDS and even in individual treatment choices. Studies with as many patients as possible are needed on this subject.

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Etik kurallar: Klinik araştırmaların protokolü etik komitesi tarafından onaylanmış olmalıdır. İnsanlar üzerinde yapılan tüm çalışmalarda, "Yöntem ve Gereçler" bölümünde çalışmanın ilgili komite tarafından onaylandığı veya çalışmanın Helsinki İlkeler Deklerasyonuna (www.wma.net/e/policy/b3.htm) uyularak gerçekleştirildiğine dair bir cümle yer almalıdır. Çalışmaya dahil edilen tüm insanların bilgilendirilmiş onam formunu imzaladığı metin içinde belirtilmelidir. Turkish Journal of Clinics and Laboratory gönderilen yazıların Helsinki Deklarasyonuna uygun olarak yapıldığını, kurumsal etik ve yasal izinlerin alındığını varsayacak ve bu konuda sorumluluk kabul etmeyecektir.

Çalışmada "Hayvan" öğesi kullanılmış ise yazarlar, makalenin Gereç ve Yöntemler bölümünde Guide for the Care and Use of Laboratory Animals (www.nap.edu/catalog/5140.html) prensipleri doğrultusunda çalışmalarında hayvan haklarını koruduklarını ve kurumlarının etik kurullarından onay aldıklarını belirtmek zorundadır.

Teşekkür yazısı: Varsa kaynaklardan sonra yazılmalıdır.

Maddi destek ve çıkar ilişkisi: Makale sonunda varsa çalışmayı maddi olarak destekleyen kişi ve kuruluşlar ve varsa bu kuruluşların yazarlarla olan çıkar ilişkileri belirtilmelidir. (Olmaması durumu da "Çalışmayı maddi olarak destekleyen kişi/kuruluş yoktur ve yazarların herhangi bir çıkar dayalı ilişkisi yoktur" şeklinde yazılmalıdır.

Kaynaklar: Kaynaklar makalede geliş sırasına göre yazılmalıdır. Kaynaktaki yazar sayısı 6 veya daha az ise tüm yazarlar belirtilmeli, 7 veya daha fazla ise ilk 3 isim yazılıp ve ark. ("et al") eklenmelidir. Kaynak yazımı için kullanılan format Index Medicus'ta belirtilen şekilde olmalıdır (www.icmje.org). Kaynak listesinde yalnızca yayınlanmış ya da yayınlanması kabul edilmiş veya DOI numarası almış çalışmalar yer almalıdır. Dergi kısaltmaları "Cumulated Index Medicus" ta kullanılan stile uymalıdır. Kaynak sayısının araştırmalarda 25 ve derlemelerde 60, olgu sunumlarında 10, editöre mektupta 5 ile sınırlandırılmasına özen gösterilmelidir. Kaynaklar metinde cümle sonunda nokta işaretinden hemen önce köşeli parantez kullanılarak belirtilmelidir. Örneğin [4,5]. Kaynakların doğruluğundan yazar(lar) sorumludur. Yerli ve yabancı kaynakların sentezine önem verilmelidir.

Şekil ve tablo başlıkları: Başlıklar kaynaklardan sonra yazılmalıdır.

4. Şekiller: Her biri ayrı bir görüntü dosyası (jpg) olarak gönderilmelidir.

Makalenin basıma kabulünden sonra "Dizginin ilk düzeltme nüshası" sorumlu yazara e-mail yoluyla gönderilecektir. Bu metinde sadece yazım hataları düzeltilecek, ekleme çıkartma yapılmayacaktır. Sorumlu yazar düzeltmeleri 2 gün içinde bir dosya halinde e-mail ile yayın idare merkezine bildirecektir.

Kaynak Yazım Örnekleri

Dergilerden yapılan alıntı;

Özpolat B, Gürpınar ÖA, Ayva EŞ, Gazyağcı S, Niyaz M. The effect of Basic Fibroblast Growth Factor and adipose tissue derived mesenchymal stem cells on wound healing, epithelization and angiogenesis in a tracheal resection and end to end anastomosis rat model. Turk Gogus Kalp Dama 2013; 21: 1010-19.

Kitaptan yapılan alıntı;

Tos M. Cartilage tympanoplasty. 1st ed. Stuttgart-New York: Georg Thieme Verlag; 2009.

Tek yazar ve editörü olan kitaptan alıntı;

Neinstein LS. The office visit, interview techniques, and recommendations to parents. In: Neinstein LS (ed). Adolescent Health Care. A practical guide. 3rd ed. Baltimore: Williams&Wilkins; 1996: 46-60.

Çoklu yazar ve editörü olan kitaptan alıntı;

Schulz JE, Parran T Jr: Principles of identification and intervention. In:Principles of Addicton Medicine, Graham AW. Shultz TK (eds). American Society of Addiction Medicine, 3rd ed. Baltimore: Williams&Wilkins; 1998:1-10.

Eğer editör aynı zamanda kitap içinde bölüm yazarı ise;

Diener HC, Wilkinson M (editors). Drug-induced headache. In: Headache. First ed., New York: Springer-Verlag;1988:45-67.

Doktora/Lisans Tezinden alıntı;

Kılıç C. General Health Survey: A Study of Reliability and Validity. phD Thesis, Hacettepe University Faculty of Medicine, Department of Psychiatrics, Ankara; 1992.

Bir internet sitesinden alıntı;

Sitenin adı, URL adresi, yazar adları, ulaşım tarihi detaylı olarak verilmelidir.

DOI numarası vermek;

Joos S, Musselmann B, Szecsenyi J. Integration of Complementary and Alternative Medicine into Family Practice in Germany: Result of National Survey. Evid Based Complement Alternat Med 2011 (doi: 10.1093/ecam/nep019).

Diğer referans stilleri için "ICMJE Uniform Requirements for Manuscripts Submitted to Biomedical Journals: Sample References" sayfasını ziyaret ediniz.

Bilimsel sorumluluk beyanı: Kabul edilen bir makalenin yayınlanmasından önce her yazar, araştırmaya, içeriğinin sorumluluğunu paylaşmaya yetecek boyutta katıldığını beyan etmelidir. Bu katılım şu konularda olabilir:

a. Deneylerin konsept ve dizaynlarının oluşturulması, veya verilerin toplanması, analizi ya da ifade edilmesi;

b. Makalenin taslağının hazırlanması veya bilimsel içeriğinin gözden geçirilmesi

c. Makalenin basılmaya hazır son halinin onaylanması.

Yazının bir başka yere yayın için gönderilmediğinin beyanı: "Bu çalışmanın içindeki materyalin tamamı ya da bir kısmının daha önce herhangi bir yerde yayınlanmadığını, ve halihazırda da yayın için başka bir yerde değerlendirilmede olmadığını beyan ederim. Bu, 400 kelimeye kadar olan özetler hariç, sempozyumlar, bilgi aktarımları, kitaplar, davet üzerine yazılan makaleler, elektronik formatta gönderimler ve her türden ön bildirileri içerir."

Sponsorluk beyanı: Yazarlar aşağıda belirtilen alanlarda, varsa çalışmaya sponsorluk edenlerin rollerini beyan etmelidirler:

1. Çalışmanın dizaynı

2. Veri toplanması, analizi ve sonuçların yorumlanması

3. Raporun yazılması

Kontrol listesi:

1. Editöre sunum sayfası (Sorumlu yazar tarafından yazılmış olmalıdır)

2. Başlık sayfası (Makale başlığı/kısa başlık Türkçe ve İngilizce, Yazarlar, kurumları, sorumlu yazar posta adresi, tüm yazarların e-mail adresleri, sorumlu yazarın telefon numarası)

3. Makalenin metin sayfası (Makale başlığı/kısa başlık Türkçe ve İngilizce, Özet/anahtar kelimeler, Summary/keywords, makale metni, kaynaklar, tablo ve şekil başlıkları, tablolar, şekiller)

4. Tablo ve grafikler metin içinde olmalıdır.

5. Şekiller (En az 300 dpi çözünürlükte) ayrı bir veya daha fazla dosya halinde gönderilmelidir.

TURKISH JOURNAL of CLINICS and LABORATORY

Türk Klinik ve Laboratuvar Dergisi

Turkish Journal of Clinics and Laboratory - Türk Klinik ve Laboratuvar Dergisi

Tıp dergilerine gönderilecek makalelerin standart gereksinmeleri ile ilgili tüm bilgileri www.icmje.org internet adresinde bulabilirsiniz

Amaç ve kapsam: "Turkish Journal of Clinics and Laboratory", hakemli, açık erişimli ve periyodik olarak çıkan, DNT Ortadoğu Yayıncılık A.Ş. ye ait bir dergidir. Hedefimiz uluslararası bir tabanda hastalıkların teşhis ve tedavisinde yenilikler içeren yüksek kalitede bilimsel makaleler yayınlamaktır. Yılda dört kez çıkan bir bilimsel bir tıp dergisidir. Hakemli bir dergi olarak gelen yazılar konsültanlar tarafından, öncelikle, biyomedikal makalelere ait Uluslararası Tıp Dergileri Editörleri Komitesi (www.icmje.org adresinden ulaşılabilir) tarafından tanımlanan standart gereksinimler ile ilgili ortak kurallara uygunluğu açısından değerlendirilir. Tıbbın her dalı ile ilgili retrospektif/prospektif klinik ve laboratuar çalışmalar, ilginç olgu sunumları, davet üzerine yazılan derlemeler, editöre mektuplar, orijinal görüntüler, kısa raporlar ve cerrahi teknik yazılarıları yayımlayan bilimsel, uluslar arası hakemli bir dergidir. Başka bir dergide yayımlanmış veya değerlendirilmek üzere gönderilmiş yazılar veya dergi kurallarına göre hazırlanmamış yazılar değerlendirme için kabul edilmez.

On-line makale gönderimi: Tüm yazışmalar ve yazı gönderimleri dergipark üzerinden http://dergipark.gov.tr/tjcl yapılmalıdır. Yazı gönderimi için detaylı bilgi bu internet adresinden edinilebilir. Gönderilen her yazı için özel bir numara verilecek ve yazının alındığı e-posta yolu ile teyid edilecektir. Makalelerin "full-text" pdf formuna http://dergipark.gov.tr/tjcl linkinden ulaşılabilir.

Açık erişim politikası: Turkish Journal of Clinics and Laboratory açık erişimi olan bir dergidir. Kullanıcı lar yazıların tam metnine ulaşabilir, kaynak gösterilerek tüm makaleler bilimsel çalışmalarda kullanılabilir.

Aşağıdaki rehber dergiye gönderilen makalelerde aranan standartları göstermektedir. Bu uluslararası format, makale değerlendirme ve basım aşamalarının hızla yapılmasını sağlayacaktır.

Yazarlara Bilgi: Yazıların tüm bilimsel sorumluluğunu yazar(lar)a aittir. Editör, yardımcı editör ve yayıncı dergide yayınlanan yazılar için herhangi bir sorumluluk kabul etmez.

Dergi adının kısaltması: Turk J Clin Lab

Yazışma adresi: Yazılar e-mail yoluyla sorumlu yazar tarafından, Dergipark ta yer alan Turkish Journal of Clinics and Laboratory linkine girip kayıt olduktan sonra gönderilmelidir.

Makale dili: Makale dili Türkçe ve İngilizcedir. İngilizce makaleler gönderilmeden önce profesyonel bir dil uzmanı tarafından kontrol edilmelidir. Yazıdaki yazım ve gramer hataları içerik değişmeyecek şekilde İngilizce dil danışmanı tarafından düzeltilebilir. Türkçe yazılan yazılarda düzgün bir Türkçe kullanımı önemlidir. Bu amaçla, Türk Dil Kurumu Sözlük ve Yazım Kılavuzu yazım dilinde esas alınmalıdır.

Makalenin başka bir yerde yayımlanmamıştır ibaresi: Her yazar makalenin bir bölümünün veya tamamının başka bir yerde yayımlanmadığını ve aynı anda bir diğer dergide değerlendirilme sürecinde olmadığını, editöre sunum sayfasında belirtmelidirler. 400 kelimeden az özetler kapsam dışıdır. Kongrelerde sunulan sözlü veya poster bildirilerin, başlık sayfasında kongre adı, yer ve tarih verilerek belirtilmesi gereklidir. Dergide yayımlanan yazıların her türlü sorumluluğu (etik, bilimsel, yasal, vb.) yazarlara aittir.

Değerlendirme: Dergiye gönderilen yazılar format ve plagiarism açısından değerlendirilir. Formata uygun olmayan yazılar değerlendirilmeden sorumlu yazara geri gönderilir. Bu tarz bir zaman kaybının olmaması için yazım kuralları gözden geçirilmelidir. Basım için gönderilen tüm yazılar iki veya daha fazla yerli/yabancı hakem tarafından değerlendirilir. Makalelerin değerlendirilmesi, bilimsel önemi, orijinalliği göz önüne alınarak yapılır. Yayıma kabul edilen yazılar editörler kurulu tarafından içerik değiştirilmeden yazarlara haber verilerek yeniden düzenlenebilir. Makalenin dergiye gönderilmesi veya basıma kabul edilmesi sonrası isim sırası değiştirilemez, yazar ismi eklenip çıkartılamaz.

Basıma kabul edilmesi: Editör ve hakemlerin uygunluk vermesi sonrası makalenin gönderim tarihi esas alınarak basım sırasına alınır. Her yazı için bir doi numarası alınır.

Yayın hakları devri: http:/www.dergipark.ulakbim.gov.tr/tjclinlab adresi üzerinden online olarak gönderilmelidir. 1976 Copyright Act'e göre, yayımlanmak üzere kabul edilen yazıların her türlü yayın hakkı yayıncıya aittir.

Makale genel yazım kuralları: Yazılar Microsoft Word programı (7.0 ve üst versiyon) ile çift satır aralıklı ve 12 punto olarak, her sayfanın iki yanında ve alt ve üst kısmında 2,5 cm boşluk bırakılarak yazılmalıdır. Yazı stili Times New roman olmalıdır. "System International" (SI) unitler kullanılmalıdır. Şekil tablo ve grafikler metin içinde refere edilmelidir. Kısaltmalar, kelimenin ilk geçtiği yerde parantez içinde verilmelidir. Türkçe makalelerde %50 bitişik yazılmalı, aynı şekilde İngilizcelerde de 50% bitişik olmalıdır. Türkçede ondalık sayılarda virgül kullanılmalı (55,78) İngilizce yazılarda nokta (55.78) kullanılmalıdır. Derleme 4000, orijinal çalışma 2500, olgu sunumu 1200, editöre mektup 500 kelimeyi geçmemelidir. Özet sayfasından sonraki sayfalar numaralandırılmalıdır.

Yazının bölümleri

1. Sunum sayfası: Yazının Turkish Journal of Clinics and Laboratory 'de yayınlanmak üzere değerlendirilmesi isteğinin belirtildiği, makalenin sorumlu yazarı tarafından dergi editörüne hitaben gönderdiği yazıdır. Bu kısımda makalenin bir bölümünün veya tamamının başka bir yerde yayımlanmadığını ve aynı anda bir diğer dergide değerlendirilme sürecinde olmadığını, maddi destek ve çıkar ilişkisi durumu belirtmelidir.

2. Başlık sayfası: Sayfa başında gönderilen makalenin kategorisi belirtilmedir (Klinik analiz, orijinal çalışma, deneysel çalışma, olgu sunumu vs).

Başlık: Kısa ve net bir başlık olmalıdır. Kısaltma içermemelidir. Türkçe ve İngilizce yazılmalı ve kısa başlık (runing title) Türkçe ve İngilizce olarak eklenmelidir. Tüm yazarların ad ve soyadları yazıldıktan sonra üst simge ile 1'den itibaren numaralandırılıp, unvanları, çalıştıkları kurum, klinik ve şehir yazar isimleri altına eklenmelidir.

Bu sayfada "sorumlu yazar" belirtilmeli isim, açık adres, telefon ve e-posta bilgileri eklenmelidir.

Kongrelerde sunulan sözlü veya poster bildirilerin, başlık sayfasında kongre adı, yer ve tarih verilerek belirtilmesi gereklidir.

3. Makale dosyası: (Yazar ve kurum isimleri bulunmamalıdır)

Başlık: Kısa ve net bir başlık olmalıdır. Kısaltma içermemelidir. Türkçe ve İngilizce yazılmalı ve kısa başlık (runing title) Türkçe ve İngilizce olarak eklenmelidir.

Özet: Türkçe ve İngilizce yazılmalıdır. Orijinal çalışmalarda özetler, Amaç (Aim), Gereç ve Yöntemler (Material and Methods), Bulgular (Results) ve Sonuçlar (Conclusion) bölümlerine ayrılmalı ve 250 sözcüğü geçmemelidir. Olgu sunumları ve benzerlerinde özetler, kısa ve tek paragraflık olmalıdır (150 kelime), Derlemelerde 300 kelimeyi geçmemelidir.

Anahtar kelimeler: Türkçe ve İngilizce özetlerin sonlarında bulunmalıdır. En az 3 en fazla 6 adet yazılmalıdır. Kelimeler birbirlerinden noktalı virgül ile ayrılmalıdır. İngilizce anahtar kelimeler "Medical Subject Headings (MESH)" e uygun olarak verilmelidir. (www.nlm.nih.gov/mesh/MBrowser.html). Türkçe anahtar kelimeler "Türkiye Bilim Terimleri' ne uygun olarak verilmelidir (www.bilimterimleri.com). Bulunamaması durumunda birebir Türkçe tercümesi verilmelidir.

Metin bölümleri: Orijinal makaleler; Giriş, Gereç ve Yöntemler, Bulgular, Tartışma olarak düzenlenmelidir. Olgu sunumları; Giriş, Olgu sunumu, Tartışma olarak düzenlenmelidir. Şekil, fotoğraf, tablo ve grafiklerin metin içinde geçtiği yerler ilgili cümlenin sonunda belirtilmeli metin içine yerleştirilmemelidir. Kullanılan kısaltmalar altındaki açıklamada belirtilmelidir. Daha önce basılmış şekil, resim, tablo ve grafik kullanılmış ise yazılı izin alınmalıdır ve bu izin açıklama olarak şekil, resim, tablo ve grafik açıklamasında belirtilmelidir. Tablolar metin sonuna eklenmelidir. Resimler/fotoğraf kalitesi en az 300dpi olmalıdır.