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Middle Black Sea Journal of Health Science

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The Middle Black Sea Journal of Health Science, which is international journal, is published by Ordu University Institute of Health Sciences on behalf of the Middle Black Sea Universities Collaboration Platform

Aims and Scope

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The aim of the journal is to contribute to the international literature with clinical and experimental research articles, case reports, reviews and letters to the editor in the field of health sciences.

The target audience of the journal is all scientists working in the field of health, graduate students and researchers in this field.

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Middle Black Sea Journal of Health Science - adheres to the standards of publication ethics in health science research, Higher Education Council's Scientific Research and Publication Ethics Directive, Committee on Publication Ethics (COPE), Directory of Open Access Journals (DOAJ), Open Access Scholarly Publishers It also adopts the ethical publishing principles published by the Association (OASPA) and the World Association of Medical Editors (WAME).

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Middle Black Sea Journal of Health Science - adheres to the standards of publication ethics in health science researches, Higher Education Council's Scientific Research and Publication Ethics Directive, Committee on Publication Ethics (COPE), Directory of Open Access Journals (DOAJ), Open Access Scholarly Publishers It also adopts the ethical publishing principles published by the Association (OASPA) and the World Association of Medical Editors (WAME); The address for the principles expressed under the Principles of Transparency and Best Practice in Scholarly Publishing is given below.

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Middle Black Sea Journal of Health Science

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Author Contributions: Concept: …….., Design: …….., Literature search:……..... Data Collection and Processing: ……..., Analysis and Interpretation:……, Writing - …….

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Examples: Hypotension is one of the most common and critical problems in hemodialysis patients (1,2).

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Chapter in Edited Book: Hornbeck P. Assay for antibody production. In: Colign JE. Kruisbeek AM, Marguiles DH, editors. Current Protocols in Immunology. New York: Greene Publishing Associates; 1991. p. 105-32.

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Editor(s) as Author: Balows A. Mousier WJ, Herramaflfl KL, editors. Manual of Clinical Microbiology. Fifth Edition. Washington DC: IRL Press. 1990. p. 105-32.

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Revisions: Authors should mark the changes they made on the main text in color while submitting their article revision files. The responses to the referees should be specified in a separate Word file. Revised articles should be sent to the journal within one month following the decision letter. If the revised version of the article is not uploaded within the specified time, the revision option may be canceled. If the authors need additional time for revision, they are required to submit their extension requests to the journal before the end of one month.

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Structure

Title

Abstract should be structured with subheadings (Objective, Methods, Results, and Conclusion) (average 200-400 word)

Key words

Introduction

Methods

Results

Discussion

Conclusion

Acknowledgements

References (most 40)

Whole text should not exceed 4500 words except for resources and English summary.

b) Short papers: Prospective, retrospective and all kinds of experimental studies

Structure

Title

Abstract should be structured with subheadings (Objective, Methods, Results, and Conclusion) (average 200-400 word)

Key Words

Introduction

Methods

Results

Discussion

Conclusion

Acknowledgements

References (most 20)

Whole text should not exceed 2700 words except for resources and English summary.

c) Case Report: They are rarely seen articles which differs in diagnosis and treatment. They should be supported by enough photographs and diagrams.

Structure

Title

Abstract (average 100-300 word)

Key words

Introduction

Case report

Discussion

Conclusion

Acknowledgements

References (most 20)

Whole text should not exceed 2200 words except for resources and English summary.

d) Review articles

Structure

Title

Abstract (average 200-400 word)

Key words

Introduction

The compilation text also including appropriate sub-headings,

Conclusion

Acknowledgements

References (most 50)

Whole text should not exceed 6550 words except for resources and English summary.

AUGUST 2022 **VOLUME 8** **ISSUE 3**

CONTENTS

EDITORIAL

Our new issue

In the third issue of 2022, we present 15 research articles with the excitement of meeting you. In this issue, there are studies in different disciplines and a case report. I hope the research will be useful to you.

Many thanks to those who contributed to the publication of the magazine.

Hope to meet you in our fourth issue...

PhD, Assoc. Prof. Ülkü KARAMAN

Editor

Middle Black Sea Journal of Health Science / Mid Blac Sea J Health Sci

August 2022; 8(3):333-339

RESEARCH ARTICLE

DOI: 10.19127/mbsjohs.1072251

Impact of COVID-19 Outbreak on Retinopathy of Prematurity Screening

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Abstract

Objective: To evaluate the impact of COVID-19 outbreak on screening of premature babies for retinopathy of prematurity (ROP).

Methods: Medical records of infants who underwent ROP screening at Ordu University, Training and Research Hospital were reviewed, retrospectively. Sixty premature babies who were not brought into their follow-up visits and reported to the Child, Adolescent, Woman and Reproductive Health (CEKUS) unit between March 2020 and March 2021 were included. The patients were divided into 4 groups according to the timing of CEKUS reports; Group 1: March-May 2020, Group 2: June-August 2020, Group 3: September-November 2020, and Group 4: December 2020-February 2021.

Results: A total number of 60 babies were reported to the CEKUS unit between March 2020 and March 2021. While 18% of the patients were consulted from our neonatal intensive care unit (NICU), 82% of the infants were referred from other NICUs. The parents of only 17 (28%) of all patients were living in Ordu, additionally. Compared to the total number of patients reported to the CEKUS unit in the last year before the onset of the pandemic, a decrease in compliance with the appointments was observed after the announcement of the first COVID-19 case in Turkey ($p<0.001$). Adherence to the appointments increased in the period when COVID-19 patients decreased. When the COVID-19 cases began to rise again significantly after November (Group 4), the number of CEKUS reports increased correspondingly. However, there was no significant correlation between the number of CEKUS reports and the total number of COVID-19 cases in the groups ($p = 0.600$, $r = 0.400$).

Conclusion: In addition to the difficulty of screening for ROP since the onset of the COVID-19 outbreak, the follow up of babies who are not brought in has become a serious problem. A decrease in adherence to appointments was observed after the beginning of the COVID-19 pandemic. An institution such as our CEKUS unit may help the ophthalmologists and neonatologists to complete all screening sessions. Most babies that were not brought in to ROP screening, were also the ones referred from other NICUs and those who lived in neighboring cities, in our study. Therefore, increasing the number of ROP units may also prevent the non-adherence of the parents.

Keywords: COVID-19, premature, retinopathy of prematurity, screening

Suggested Citation: Keles Sahin A, Uzun A. Impact of COVID-19 Outbreak on Retinopathy of Prematurity Screening. Mid Blac Sea Journal of Health Sci, 2022;8(3):333-339.

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Note: This study was presented as oral presentation at 21st International Eastern Mediterranean Family Medicine Congress, 2022.

INTRODUCTION

Preterm infants with a low birth weight (BW) and small gestational age (GA) may develop a proliferative retinal vascular disorder which is known as retinopathy of prematurity (ROP), one of the leading causes of childhood blindness, worldwide (1). While patients lower than 1000 g of BW and 28 weeks of GA have an increased risk for severe ROP in high-income countries, the disease may be seen even in infants up to 2000 g of BW and up to 37 weeks of GA in developing areas (2). Regular eye examinations, timely screening and appropriate treatment are crucial to prevent severe visual loss in these babies.

Turkish Ophthalmological Association (TOA) and Turkish Neonatal Society (TNS) recommended that "all preterm babies smaller than 34 weeks or lower than 1700 g, and those bigger than 34 weeks and heavier than 1700 g receiving cardiopulmonary support and who were considered as risky by the attending clinician should be examined", in the revised National Guideline on ROP in 2021 (3). According to these national guidelines published by TOA and TNS, screening and follow-up of premature infants for ROP has been performed by the same experienced ophthalmologist at Ordu University, Training and Research Hospital since 2013. In 2019, we began to use a new protocol model for the follow up of babies who missed their visits at our hospital. When babies are not brought into their appointments, their families are reported to the Child, Adolescent, Woman and Reproductive Health (CEKUS) unit within the Provincial Health Directorate. The CEKUS unit informs the family physicians to refer the parents to the ROP unit. However, the use of this protocol is unfortunately not possible in all ROP units. Therefore, it is difficult to find parents who miss their babies' appointments. Especially in extraordinary situations such as pandemics, the importance of ensuring the continuity of ROP screening sessions and having a specific institution where premature infants can be reported when they are not brought into their appointments has emerged.

In the first year of the coronavirus disease (COVID-19) pandemic, elective examinations and surgeries were cancelled except for emergencies. In our ROP unit, screening and treatment for ROP continued in the same way, taking into account the principals recommended by the Infection Control Committee. Since the first case of COVID-19 was reported in Turkey, we have observed an increase in the number of patients reported to the CEKUS unit. In the current study, we aimed to evaluate the impact of COVID-19 outbreak on screening of premature babies for ROP.

METHODS

Medical records of infants who underwent screening for ROP at Ordu University, Training and Research Hospital were reviewed, retrospectively. Sixty premature babies who were not brought in to their appointments and reported to the CEKUS unit between March 2020 and March 2021 were included in the study. The demographics, BW and GA of patients, the timing of first examination and the neonatal intensive care unit (NICU) that consulted the infant were recorded. The clinical characteristics at last visit before discontinuation and at first visit after CEKUS report, and the interval between these two examinations were also reviewed, retrospectively. The patients were divided into 4 groups according to the timing of CEKUS reports; Group 1: March - May

2020, Group 2: June - August 2020, Group 3: September - November 2020, and Group 4: December 2020 - February 2021. The numbers of COVID-19 cases by groups were calculated by accessing the Ministry of Health COVID-19 Information Platform (4). The total number of patients reported to the CEKUS unit in the last year before the onset of the pandemic (between February 2019 and February 2020) was also recorded.

The study protocol was approved by Ordu University Clinical Research Ethics Committee (approval number: 2021/86), and the study procedures were conducted in accordance with the tenets of Helsinki Declaration. Since the study was performed based on retrospective data analysis, informed consent was not obtained.

Statistical analysis

All data were analyzed using the SPSS statistical software package, version 21.0 (SPSS Inc., Chicago, IL, USA). Data were expressed as means with ranges for continuous variables. Categorical variables were expressed as frequency (percentage) and compared using Pearson's chi-square test. A normality check was performed using the Kolmogorov–Smirnov test. The number of CEKUS reports in the groups was compared with the total number of COVID-19 cases in those months using the Spearman correlation coefficient. $P < 0.05$ was accepted as a statistically significant level.

RESULTS

A total number of 60 babies were reported to the CEKUS unit between March 2020 and March 2021. Demographics and clinical characteristics of all patients are given in Table 1. While 11 (18%) patients were consulted from our NICU, 49 (82%) patients were the ones who were referred from other NICUs in and around Ordu. Additionally, the parents of 17 (28%) babies were living in Ordu, and the parents of the remaining 43 (72%) infants were living in different cities.

As the total number of patients reported to the CEKUS unit in the last year before the onset of the pandemic was 14, a decrease in the adherence to the appointments was observed after the announcement of the first COVID-19 case in Turkey on March 10, 2020 ($p<0.001$). The number of CEKUS reports and COVID-19 cases according to the groups are given in Table 2. In the current study, there was no significant correlation between the number of CEKUS reports and the total number of COVID-19 cases in the groups ($p = 0.600$, $r = 0.400$). Most of the babies not brought in were the ones who were referred from other NICUs and those were living in neighboring cities. Adherence to the appointments increased in the period when COVID-19 patients decreased. However, as the COVID-19 cases began to rise again after November, the number of infants reported to the CEKUS unit increased correspondingly.

The mean postmenstrual ages at last visit before discontinuation and at first visit after CEKUS report were 39.3 (range: 35 - 47) weeks and 45.7 (range: 38-53) weeks, respectively. The interval between these two examinations was 6.1 (range: 3-10) weeks. Although in 46 (77%) of these babies, retinal vascularization reached temporal ora serrata at first visit following CEKUS report, retinal vascularization was still incomplete in 9 (15%) patients. Unfortunately, ROP was still persisting in 5 (8%) patients. None of the parents missed their baby's

appointments again. The patients whose retinal vascularization was completed, were referred to Pediatric Ophthalmology section for detailed ophthalmological evaluation.

Table 1. Demographics of patients (ROP: Retinopathy of prematurity, CEKUS: Child, Adolescent, Woman and Reproductive Health, PM: Postmenstrual)

Female / Male	31 patients (52%) / 29 patients (48%)
Gestational age	32.65 (range: 22 - 37) weeks
Birth weight	1971.2 (range: 730 - 3400) grams
The time of first examination (postpartum)	32.2 (range: 25 - 55) days
The time of last examination before CEKUS report (PM)	39.3 (range: 35 - 47) weeks
Retinal vascularization before CEKUS report	
Posterior to zone III	22 (37%) patients
Anterior to zone III	38 (63%) patients
The presence of ROP before CEKUS report	
No ROP	45 (75%) patients
Spontaneous regressed ROP	14 (23%) patients
ROP requiring treatment	1 (2%) patient

*Data are given as means with ranges (minimum–maximum) for continuous variables and as frequency (percentage) for categorical variables.

Table 2. Number of CEKUS reports and COVID-19 cases according to the groups (*Taken from: "https://covid19.saglik.gov.tr/TR-66935/genel-koronavirus-tablosu.html")

	Number of reports (%)	**Number of COVID-19 cases***	**P[a]**
Group 1	17 (28%)	163.941	0.600
Group 2	13 (22%)	106.191	
Group 3	8 (13%)	230.732	
Group 4	22 (37%)	2.200.724	
Total	**60 (100%)**	**2.701.588**	

*Data are given as frequency (percentage) for categorical variables. [a] Spearman correlation analysis

DISCUSSION

All premature babies smaller than 34 weeks of GA or lower than 1700 g of BW, and those bigger than 34 weeks and heavier than 1700 g receiving cardiopulmonary support and who were considered as risky by the attending clinician should be screened for ROP as recommended by TOA and TNS. Before the COVID-19 outbreak, screening and treatment of preterm infants for ROP in Ordu was relatively uneventful. Nevertheless, parents who miss their babies' appointments have always been a challenging issue for ophthalmologist in terms of medicolegal concerns. There is also no specific institution where premature infants can be reported when they are not

brought in to their appointments. However, the CEKUS unit within the Provincial Health Directorate taking responsibility in Ordu province works in coordination with the ROP unit and family physicians. Once a premature infant is missed from follow-up, the ophthalmologist reports the parents to CEKUS unit that informs the family physicians to refer the parents to the ROP unit.

During the COVID-19 pandemic, the screening, follow-up and treatment of ROP have been reported as urgent procedures by both the American Academy of Ophthalmology and TOA (5,6). In addition to the difficulty in ROP screening since the beginning of COVID-19 outbreak, failure in compliance with the appointments has become a serious problem. Katoch, et al discussed the impact of the COVID-19 pandemic on ROP services and found a decrease in the number of infants screened for ROP, consequently (7). The excess recommendation to reduce unnecessary hospital admissions, the lockdowns, travel restrictions, lack of transport facilities and the concerns of parents about their newborns and themselves seem to be causing these problems. Correspondingly, the parents of 72% of the infants were living in different cities, in our study. More than 80% of the babies who missed their appointments were the ones referred from other NICUs in and around Ordu, additionally.

The use of a virtual technology, telemedicine, has drawn significant attention during the COVID-19 pandemic (8,9). Ravindran et al screened 356 preterm babies in a 2-months period using a RetCam shuttle and reported that 57 infants had ROP and 6 of them underwent treatment for ROP (10). Guo et al reported that completing percentage of total online ROP screening appointments assisted by telemedicine network was higher than that of total face-to-face appointments during COVID-19 pandemic (11). Isaac et al defined that telemedicine screening for ROP is an economically feasible option depending on the location and the number of infants screened (12). Unfortunately, we could not use teleophthalmology due to the lack of technical infrastructure. Therefore, ROP screening procedures continued in the same way according to the recommendations of the Infection Control Committee during the outbreak.

There was a decrease in compliance with the appointments as the number of COVID-19 cases increased, in the current study. This non-adherence rate was higher in the parents of babies who were living in different cities and those referred from other NICUs. On the other hand, the absence of an institution where premature babies can be reported when they are not brought in to their appointments has become an even more important problem during the pandemic. However, the CEKUS unit in Ordu continued to work in coordination with the ROP unit and family physicians. That coordination between all these units during the first year of COVID-19 pandemic resulted in screening of all preterm babies, albeit late.

The present study also had some limitations. Although the CEKUS unit meticulously followed the infants who were not brought into their appointments, we did not evaluate why the parents missed these follow-ups. The study period was also limited to the first year of the pandemic. We ended the study after the first year for two reasons. First, it was accepted that the pandemic would continue, and the restrictions

were lifted. Second, vaccination against COVID-19 began after the first year.

CONCLUSION

In addition to the difficulty of ROP screening since the onset of the COVID-19 outbreak, the follow up of babies who are not brought in has become a serious problem. A specific institution that can follow up the babies may help the ophthalmologists and neonatologists to complete all screening sessions. Our protocol model between ROP and CEKUS units may serve as an example for other hospitals. Additionally, increasing the number of ROP units or having at least one ophthalmologist experienced in ROP in all hospitals with NICUs may prevent the non-adherence of the parents.

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RESEARCH ARTICLE

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Comparison of Limberg Flaps and Karydakis Flaps in The Treatment of Pilonidal Sinus Disease: A Single Physician Experience

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Abstract

Objective: Pilonidal sinus disease (PSD) is a chronic inflammatory disease that impacts quality of life. Many conservative and surgical approaches for treating PSD have been described, but the best surgical method is still up for debate. Our aim is to see whether there is a difference between Limberg flap (LF) and Karydakis flap (KF) procedures in patients with (PSD).

Methods: The study was designed retrospectively. Our research includes a comparison of two patient groups who had PSD surgery performed by a single physician between March 2016 and October 2020. The patients who underwent LF proceure were determined as Group 1, and the patients who underwent KF as Group 2 and the clinical and practical differences between these two techniques were analyzed.

Results: The mean age, duration of surgery and hospitalization were shorter in Group 2 (p=0.019, p=0.0001, p=0.0001, respectively). There was no significant difference between the two groups in terms of the remaining variables.

Conclusion: There was no significant difference between LF and KF procedures in terms of quality of life, recurrence and complications. However, the fact that KF procedure can be completed in a shorter time and patients can be discharged earlier makes this group one step ahead.

Key words: pilonidal sinus, recurrence, Karydakis flap, Limberg Flap.

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INTRODUCTION

Pilonidal sinus disease (PSD) is a chronic inflammatory disease that impacts quality of life and is more common in young males with pain and abscess, especially in the intergluteal region (1,2). It can be detected in people of all ages, but it is most common between the ages of 15 and 25. Although the etiology of the disease is uncertain, the most widely accepted theory is that it is caused by chronic irritation, foreign body reaction, and inflammation caused by body hair shedding in the intergluteal area. Obesity, excessive body hair, a history of smoking, a sedentary lifestyle, poor self-care, and a deep intergluteal groove are all risk factors for PSD (3-5). Many conservative and surgical approaches for treating PSD have been documented, but the best surgical method is still up for debate (6). Simple medical treatments such as local curettage, phenol injection, silver nitrate applications or electrocauterization can be applied in the cavity. In addition, several surgical procedures such as excision and primary repair, excision-marsupialization, secondary healing following excision, Karydakis operation (KF), V-Y-Z flap repair, and Limberg flap (LF) repair are commonly employed (7). In our study, we aimed to determine the clinical and practical differences between these two techniques.

METHODS

Our study was carried out retrospectively with the approval of the ethics committee of Recep Tayyip Erdogan University Faculty of Medicine. (Number:2022/14, date:20/01/2022).

The research comprises a comparison of two patient groups who underwent LF or KF procedures between March 2016 and October 2020 and were operated on by a single physician for PSD. Patients underwent LF procedure were assigned to Group 1, whereas those underwent KF procedure were assigned to Group 2.

Age, gender, Body Mass Index (BMI), American Society of Anesthesia (ASA) score, operation time, hospitalization time, postoperative complications (seroma, hematoma, wound infection, wound dehiscence, flap necrosis), postoperative pain and loss of sensation, duration of return to daily life and whether it recurred were recorded. Our study was retrospective, all patients included in the study were contacted by telephone. It was questioned whether they experienced pain and loss of sensation in the postoperative period, their return to daily life, and whether the disease recurred.

The patients were asked whether there was a decrease in the amount of sensation when the operation area was touched. It was accepted that loss of sensation developed in those who stated that there was a decrease. The duration of return to daily life was defined by asking how long after the operation the patients returned to their daily activities unaided and comfortable as in the preoperative period.

Patients who were operated for PSD and used other surgical techniques, patients who were re-operated for PSD recurrence, and patients whose telephone numbers could not be reached were excluded from the study.

Surgical Technique

First generation cephalosporin antibiotic prophylaxis is performed 30 minutes before surgery. After spinal anesthesia, prone Jack-knife position is maintained. Methylene blue was injected through the sinus orifice.

LF: A rhombic incision was made by performing clean surgical margins around the sinus before excision. The subcutaneous tissues were excised up to the presacral fascia and the sinus was completely excised. Then, an incision was made for the flap in the gluteal area, similar to the side lengths of the sinus tissue excised from the presacral area. After subcutaneous tissues were cut up to the gluteal muscle fascia, a flap was created by releasing it over the fascia. An absorbent drain was placed in the operation lodge. Subcutaneous tissues were approximated using 2/0 vicryl and the skin using 2/0 polypropylene sutures (Figure 1).

KF: The procedure was initiated with an asymmetric ellipsoid incision. If there was another orifis and/or a palpable cyst on the lateral line of the midline, the incision edge was shifted to the lesion. If there was no lesion observed, the incision side was randomly selected. The tissue was removed until the presacral fascia after the incision. Then, a flap extending through the entire incision, 1 cm below the edge of the midline, 2 cm inward, was prepared using cautery. The prepared flap was fixed to the other wound edge by the skin and subcutaneous sutures so that the midline was shifted (Figure 2).

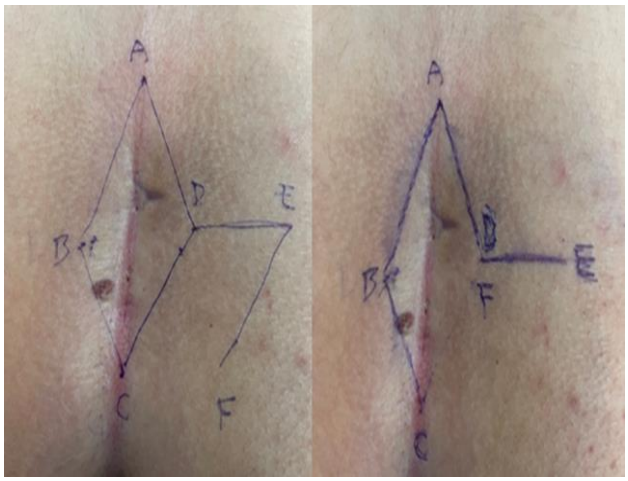

Figure 1. Limberg Flap

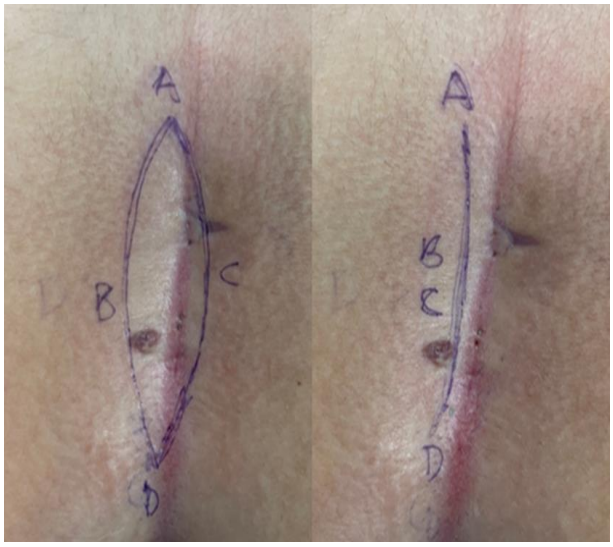

Figure 2. Karydakis Flap

Statistical Analysis

All analyzes were made using the SPSS 25 statistical package program. Descriptive statistics were given using mean ± standard

deviation for continuous variables and n (%) for categorical variables. The Mann-Whitney U test was used to determine the difference between the groups in the variables that did not show normal distribution, and the chi-square test was used to determine whether there was a difference between the categorical variables in terms of ratios. Statistically, $p<0.05$ values were considered significant.

RESULTS

Group 1 included 103 patients and Group 2 included 64. 126 (75.5%) were male and 41 (24.5%) were female. There was no significant difference between the groups in terms of gender (p=0.398). Mean age was lower in patients in Group 2 (p=0.019). No difference was observed in both groups according to BMI and ASA scores (p=0.754, p=0.057, respectively). While the mean operation time was 39±6 min in Group 1, it was 28±6 min in Group 2. The operation time was significantly shorter in the KF group (p=0.0001). The mean hospital stay was 2±1.3 days in Group 1, it was 1.4±1.1 days in Group 2. The duration of hospitalization was significantly shorter in the KF group (p=0.0001). (Table 1)

Postoperative complications developed in 21 (20.3%) patients in Group 1; in Group 2, 10 (15.6%) patients developed early postoperative complications. There was no significant difference between the two groups in terms of postoperative complications.

Recurrence was observed in 5 (4.9%) patients in Group 1, in 2 (3.1%) patients in Group 2. There was no significant difference between the two groups in terms of recurrence (p=0.455).

All patients were called by phone and asked about pain status, loss of sensation in the operation area, and when they returned to work and their normal lives. There was no difference between the two groups in terms of postoperative pain and sensory loss (p=0.422, p=0.258, respectively)

Table 1. Demographic features

	Limberg Flap n=103	Karydakis Flap n=64	P
Gender ,n(%)			
Male	80 (%77,7)	46 (%71.9)	0.398**
Female	23(%22.3)	18(%28.1)	
Age, (Mean±Sd)	27.87±10.23	23.78±7.07	**0.019***
BMI,n(%)			
Normal	47(%44.7)	27(%42.2)	0.754**
Overweight	57(%55.3)	37(%57.8)	
ASA,n(%)			
ASA1	64(%62.1)	51(%79.7)	
ASA2	35(%34)	12(%18.8)	0,057**
ASA3	4(%3.9)	1(%1.6)	
Duration of operation,(min) (Mean±Sd)	39.85±6.66	28.52±6.53	**0.0001***
Hospitalization Time (day)((Mean±Sd)	2.03±1.38	1.42±1.12	**0.0001***

*: Mann Whitney U test, **: Pearson Chi-Square test
ASA: American Society of Anesthesia, BMI: Body Mass Index.

There was no difference between the two groups in terms of returning to work and daily lives (p=0.622, p=0.200). (Table 2)

Table 2. Postoperative features

	Limberg Flap n=103	Karydakis Flap n=64	P
Seroma, n(%)			
No	91 (%88.3)	58 (%90.6)	0.645**
Yes	12 (%11.7)	6 (%9.4)	
Hematoma, n(%)			
No	100 (%97.1)	62 (%96.9)	0.636**
Yes	3 (%2.9)	2 (%3.1)	
Wound infection,n(%)			
No	100 (%97.1)	62 (%96.9)	0.636**
Yes	3 (%2.9)	2 (%3.1)	
Wound dehiscence, n(%)			
No	102 (%99)	64 (%100)	0.617**
Yes	1 (%0.6)	0 (%0)	
Flap necrosis, n(%)			
No	101 (%98.1)	64 (%100)	0.379**
Yes	2 (%1.9)	0 (%0)	
Recurrence, n(%)			
No			
Yes	98 (%95.1)	62 (%96.9)	0.455**
	5 (%4.9)	2 (%3.1)	
Postoperative pain, n(%)			
No	96 (%93.2)	62 (%96.9)	0.258**
Yes	7 (%6.8)	2 (%3.1)	
Sensory loss, n(%)		6	
No	96 (%93.2)	1 (%95.3)	0.422**
Yes	7 (%6.8)	3 (%4.7)	
Return to work, (day) (Mean±Sd)	8.49±3.45	8.14±2.69	0.622*
Return to normal life,(day) (Mean±Sd)	11.71±5.37	10.72±4.79	0.200*

*: Mann Whitney U test, **: Chi-Square (Fisher's Exact Test).

DISCUSSION

The incidence of PSD, which is one of the most common surgical diseases that general surgeons encounter, is 26/100.000, and the disease mostly affects young men (8). If the disease is not treated or treated inadequately, it causes morbidity by disrupting the comfort of life. Although the etiology of the disease is still controversial, it is a generally accepted hypothesis that it is an acquired disease and that the hair shedding from the body causes inflammation in the intergluteal area (9-11). The reason for the general acceptance of this theory may be the high recurrence rates of the disease, up to 30%, even after radical local excisions (12-14). In our study, most of the patients consisted of men in the ASA 1-2 group, consistent with the literature. The mean age of the patients participating in our study was young, in line with the literature, and the mean age was significantly lower in Group 2. Apart from male gender and excessive body hair, factors such as sedentary life, long-term sitting, family history, obesity, local trauma history, inadequate hygiene are also effective in the etiology of the disease (15). In our study, overweight patients were more common in both groups, in line with the literature, but it was not statistically significant. This may be due to the fact that overweight or obese patients are more prone to a sedentary lifestyle, have difficulties in hygiene, and the intergluteal space is deeper. Ates et al. reported shorter mean operative time and hospital stay in KF procedure than LF procedure (16). In our study, the mean operative time and hospital stay were shorter in Group 2. In the LF procedure, a separate flap is prepared over the gluteal muscle, and a larger surgical area is created. The longer duration of operation and hospital stay may be related to this.

After the acquired nature of the disease was explained, it was started to be investigated what should be considered for the ideal operation selection. The ideal operation should be simple

and include low complication rates. At the same time, midline flattening should be achieved with minimal surgical wound and therefore recurrence rates should be low (17,18). In recent years, LF and KF techniques have come to the fore with low complication and recurrence rates compared to other flap procedures (19). Ersoy et al. reported a randomized trial of 100 patients with short-term results of LF and KF (20). In their study, they revealed that a higher rate of wound infection developed in the KF group. In the study of Ates et al., on the contrary, it was reported that postoperative complications such as hematoma, seroma, wound infection and wound dehiscence were significantly lower in the KF group (16). Wound infection may be an inducer for recurrence. Factors causing infection include increased bacterial colonization, proximity of the wound to the anal canal, and moist wound site (9). In addition, seroma, hematoma and wound dehiscence accelerate the formation of wound infection (21). In our study, seroma, flap necrosis and wound dehiscence were observed more frequently in Group 1, and hematoma and wound infection were observed more frequently in Group 2, among the early postoperative complications. However, none of these data was statistically significant. Larger area surgery resulting in a larger potential space may be the cause of more seromas. In addition, the deterioration of arterial microcirculation at the ends of sharp-angle flaps and the decrease in regional blood circulation in patients undergoing LF may have predisposed to flap necrosis and wound dehiscence. In their study, Mentes et al. showed that the weakest region of the LF was the lower end of the flap in the intergluteal sulcus, and the most recurrences were from this region. In this study, they used a modified method and applied the rhombohedral excision asymmetrically and shifted the lower end of the flap to the lateral of the intergluteal sulcus (22). On the other hand, Can et al. compared the patients who underwent modified LF with KF and found that there was no difference between the groups in terms of early postoperative complication and recurrence rates (23). In our study, recurrence was observed in 5 (4.9%) patients in Group 1 and in 2 (3.1%) patients in Group 2, which was not statistically significant. In Group 1, the recurrence rate was slightly higher and recurrence developed from the lower end of the flap close to the anal canal and this was consistent with the literature. This may be due to the fact that the lower pole of the flap remains in the intergluteal sulcus during surgery and the suture line is macerated in a humid environment.

The development of pain and sensory loss that will affect the quality of life in the postoperative period is crucial in determining the effectiveness of the surgical technique used. Büyükakıncak et al. reported less loss of sensation in patients who underwent KF, and in

another study, postoperative pain was less in the KF group (7,16). In our study, we found less postoperative pain and loss of sensation in the KF procedure, but there was no significant difference between groups. In patients who underwent KF procedure, the injury was less because they were studied in a smaller surgical area, and therefore pain and loss of sensation may have developed less frequently. In determining the effect of the surgical procedures applied on the quality of life, the return period of the patients to their work and normal life has an important place. Ertan et al. evaluated the quality of life after surgical treatment of PSD in their study. They demonstrated that the quality of life was better in patients who underwent LF compared to other surgical procedures (24). In our study, no significant difference was found between the two groups.

Our research has some advantages and disadvantages. The fact that the operations were performed by a single surgeon in the study ensured that the technique was standard. This has contributed to minimizing the changes that may arise from technical differences. The retrospective nature of the study, the small number of patients and the lack of randomization may have negatively affected the results of the study.

Limitations

This study has several limitations. We may not have been able to detect early postoperative complications properly, as most of the patients we operated for PSD were discharged within one or two days. All patients were contacted by phone and inquired about pain after discharge, time to return to work and normal life, and recurrence. However, patients who had surgery a long time ago may have given incorrect information. In addition, even if the disease has recurred, patients may not be aware of it in the early period.

CONCLUSION

It was understood that there was no difference between the two methods in terms of quality of life, recurrence and complications. However, the fact that KF procedure can be completed in a shorter time and patients can be discharged earlier makes this group one step ahead. However, we think that deciding according to the patient and the characteristics of the disease is the most appropriate option in determining the surgical method to be applied.

Ethics Committee Approval: Approval was obtained from the ethics committee of our institution. Approval number:2022/14.

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Author Contributions: Idea, Design, Control, Data collection and analyzes, Analyses and Interpretation, Interpretation: M.U, T.A

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RESEARCH ARTICLE

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Lactate as a Predictor for Determining Invasive Intervention Time in non-ST-Segment Acute Coronary Syndromes

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Abstract

Objective: The aim was to evaluate the correlation of lactate levels measured at admission with the urgency of intervention in patients diagnosed with non-ST-segment acute coronary syndromes (NST-ACS).

Methods: This was a prospective observational study conducted in a research hospital between March 2020 and June 2021. Patients admitted to the emergency department with chest pain and diagnosed with NST-ACS were divided into four group according to the recommendations of the European Society of Cardiology (ESC) 2015 guidelines to determine the priority of invasive intervention. Lactate levels were measured from venous blood samples. Whether there was a difference in terms of lactate levels between patients who were recommended for early invasive intervention (within 24 hours) and patients who were recommended for late invasive intervention (within 72 hours) was investigated. The sample size was estimated with G*Power and statistical analysis was performed using SPSS 22.

Results: The mean age of the group recommended for early intervention was 62±11.45 years and the mean age of the group recommended for late intervention was 61±11.89 years. The time interval between the beginning of symptoms and admission to the emergency department was similar between the groups and the median was 4 hours. GRACE scores were significantly higher in the early intervention recommended group. There was no difference in terms of lactate levels between the groups. Correlations between GRACE scores and lactate levels were statistically non-significant ($p>0.05$).

Conclusion: Lactate alone was not a good predictor for risk analyses and determination of invasive intervention time in NST-ACS patients without urgent invasive intervention indications.

Key words: non-ST-segment acute coronary syndromes, early invasive intervention, late invasive intervention, lactate

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Note: This study was applied for oral presentation at the 1st international emergency medicine congress

INTRODUCTION

Acute coronary syndromes are among the leading causes of death around the world and invasive revascularization is the most important treatment modality to improve the outcomes of these cases (1, 2). For ST-segment elevation myocardial infarction (STMI), urgent revascularization is suggested; however, for non-ST-segment acute coronary syndromes (NST-ACS), the timing of revascularization is more complex. For very high-risk patients diagnosed with refractory angina, with associated heart failure, life-threatening ventricular arrhythmias, or hemodynamic instability, the guidelines are clear and the European Society of Cardiology (ESC) recommends urgent (within two hours) coronary intervention (3). However, the optimal timing of invasive intervention is still controversial for other risk groups among NST-ACS patients because of the conflicting results of recent studies (4, 5). The current recommendations also address highly complex scores and assessments and include subjective elements for which standardization is not possible. Therefore, the search for an easily accessible and reliable predictor that will clarify this issue is ongoing.

Lactate is known as a marker of metabolic stress response, and in critically ill patients, high levels are predictive for increased mortality (6). Recent studies have demonstrated that for the stressed heart lactate is an important fuel, and in many cardiac conditions such as coronary syndromes, cardiogenic shock, or cardiac arrest, hyperlactatemia is associated with worse outcomes (7, 8).

In this study we aimed to evaluate the correlation of lactate levels measured at admission to the emergency department with the urgency of intervention in patients diagnosed with NST-ACS who were recommended for early (within 24 hours) or late (within 72 hours) revascularization according to the current guidelines. Our hypotheses were if lactate levels might be higher at the early intervention recommended group and lactate alone might be deterministic for timing of intervention.

METHODS

This study conducted in a research hospital with the approval of the local ethics committee between March 2020 and June 2021. This was a prospective observational study. Patients admitted to the emergency department (ED) with chest pain and diagnosed with NST-ACS (patients with non ST-segment elevation myocardial infarction (NSTMI) and unstable angina (UA) were included), were evaluated after examination and follow-up. These patients were subdivided into four groups according to the recommendations of the ESC 2015 guidelines (3).

Group 1 consisted of patients with at least one of the very high-risk criteria, including hemodynamic instability or cardiogenic shock, ongoing or repeated chest pain despite medical treatment, life-threatening arrhythmias or cardiac arrest, mechanical complications due to myocardial infarction, acute heart failure, and recurrent dynamic ST-T wave changes. For Group 1, the guidelines clearly recommended urgent (within 2 hours) coronary intervention. Group 2 consisted of patients with at least one of the high-risk criteria, including a relevant rise or fall in troponin, dynamic ST or T wave changes, and Global Registry of Acute Coronary Events (GRACE) risk score above 140. For Group 2, the ESC recommended invasive intervention within 24 hours (early intervention). Group 3 consisted of

patients with at least one of the middle-risk criteria together with recurrent symptoms or proven ischemia in non-invasive tests. Middle-risk criteria were history of diabetes mellitus, renal failure (glomerular filtration rate of <60), congestive heart failure, early post-infarct angina, history of percutaneous coronary intervention, history of coronary artery bypass grafting, and GRACE score of 109-140. For this group, the ESC recommended late invasive intervention (within 72 hours). Group 4 consisted of patients with no risk factors and GRACE scores below 109. That group included selective patients without emergent revascularization necessity. The GRACE score is used to determine risk and mortality among acute coronary syndrome patients. The GRACE scores of these patients were calculated using an online application (MDCalc®).

As clearly stated by previous studies and guidelines for patients who require urgent (within 2 hour) invasive intervention, Group 1 was not included in the study. Since the main target of this study was to determine the predictive power of lactate in identifying the need for early (Group 2) and late (Group 3) revascularization in cases of NST-ACS, patients who did not need urgent revascularization (Group 4, patients who could be followed with a non-invasive strategy) were excluded from the study. Patients with STMI and chest trauma were also excluded.

Lactate levels were measured from venous blood samples together with blood gas analysis. Whether there was a difference in terms of lactate levels between patients who were recommended for early invasive intervention (Group 2, within 24 hours) and patients who were recommended for late invasive intervention (Group 3, within 72 hours) was investigated.

Since there was no coronary intervention laboratory in our hospital, all those patients included in the study were transferred to other hospitals. So definitive intervention timing of those cases were not known. Also study group of the patient did not affect the management of the patient in our hospital. However, because the primary goal of the study was to evaluate the difference of lactate levels between the groups which were determined according to ESC guidelines, not knowing the actual intervention time was not considered as a limitation in reaching the targeted goal.

Statistical Analysis

IBM SPSS Statistics for Windows 22.0 (IBM Corp. Armonk, NY, USA) was used for performing statistical analysis. First normal distribution of variables assessed with Kolmogorov-Smirnov test, then according to normality all variables were described in terms of mean ± standard deviation or median and interquartile range (IQR; 25-75%). Categorical variables were given as percentages. Student's t-test and Mann-Whitney U test were used to determine the statistical differences between the groups, for the parametric values and the non-parametric values, respectively. Correlations between lactate and GRACE scores were determined with Spearman's test. Values of $p<0.05$ were considered statistically significant.

G*Power for Mac OS X (version 3.1.9.2; Heinrich Heine University Düsseldorf, Düsseldorf, Germany) was used to estimate the sample size. In order to detect a medium effect size difference between the two groups (effect size: 0.5), assuming a 2-sided value of $\alpha=0.05$, we anticipated a sample size of 67

patients for each group to achieve 80% power. After those calculations, we decided to include 140 participants (70 in each group) in the study.

RESULTS

The mean age of the group recommended for early intervention was 62±11.45 years and 28 of these patients were female; the mean age of the group recommended for late intervention was 61±11.89 years and 16 of these patients were female. The time interval between the beginning of symptoms and ED admission were similar between the groups and the median was 4 hours. The frequency of comorbid conditions was also similar between the groups. GRACE scores were significantly higher in the group recommended for early intervention. The ED treatment modality of the group recommended for late intervention was generally only acetylsalicylic acid; in the group recommended for early intervention, most of the patients were given both acetylsalicylic acid and low-molecular-weight heparin. Since there was no coronary intensive care unit in our hospital, all patients were referred for further treatment. General characteristics of the patients are given in Table 1.

Table 1: General characteristics of the patients in both groups

Variables	Patients recommended for early intervention (Group 2), n=70	Patients recommended for late intervention (Group 3), n=70	p
Age, years	62±11.45	61±11.89	0.56
Gender			**0.03**
Female	28	16	
Male	42	54	
Comorbid conditions			
CAD	34	30	0.50
DM	21	22	0.86
HT	38	35	0.61
COPD	5	7	0.55
HL	11	5	0.11
Time interval (beginning of symptoms to ED arrival)	4 hours (IQR: 2-8 hours)	4 hours (IQR: 3-12 hours)	0.53
GRACE score	105±28.37	93±26.08	**0.012**
ED management			
Acetylsalicylic acid	10	66	**<0.001**
Acetylsalicylic acid + low-molecular-weight heparin	60	4	

Table 2: Blood gas analysis and lactate levels in venous blood samples

Variables	Patients recommended for early intervention (Group 2), n=70	Patients recommended for late intervention (Group 3), n=70	P
pH	7.37 (IQR: 7.35-7.41)	7.38 (IQR: 7.35-7.40)	0.56
PCO_2 (mmHg)	39.33±7.59	40.85±5.52	0.18
HCO_3 (mmol/L)	25.54±4.05	24.76±3.23	0.21
Base excess	0.85 (IQR: -2.5-3)	0.65 (IQR: -1.85-2.25)	0.87
Lactate (mmol/L)	2.20 (IQR: 1.49-2.87)	1.98 (IQR: 1.53-2.61)	0.33

Abbreviations: pCO2, partial carbon dioxide pressure; HCO3, bicarbonate; IQR, interquartile range.
Variables are given as mean ± standard deviation (if normally distributed) and median (IQR: 25-75%) (if not normally distributed).

Abbreviations: CAD, Coronary artery disease; DM, diabetes mellitus; HT, hypertension; COPD, chronic obstructive pulmonary disease; HL, hyperlipidemia; GRACE: Global Registry of Acute Coronary Events; ED, emergency department; IQR, interquartile range.

Variables are given as numbers, mean ± standard deviation (if normally distributed), and median (IQR: 25-75%) (if not normally distributed).

Blood gas analysis and lactate levels were compared between the groups. There was no difference in terms of pH levels, partial carbon dioxide pressure, bicarbonate levels, base excess, and lactate levels between the groups. Results are given in Table 2. Correlations between GRACE score and lactate levels were also checked; the results were statistically non-significant ($p>0.05$).

DISCUSSION

This study has demonstrated no difference in terms of lactate levels between NST-ACS patients recommended for early invasive intervention and those recommended for late invasive intervention. There was also no correlation between the GRACE scores and lactate levels of Group 2 and Group 3 NST-ACS patients as defined according to ESC guidelines.

Despite cardiac troponin playing an essential role in the assessment of acute coronary syndrome patients, for the NST-ACS group it is still very challenging to identify high-risk patients and invasive treatment priority and the necessity for a simple predictor still remains (9). In acute coronary syndromes, due to impaired tissue perfusion, oxygen delivery to cells is decreased and that leads cells to preferentially use glycolysis rather than oxidative phosphorylation to produce energy, which results in increased lactate production (10). Several studies have demonstrated that high lactate levels were a predictor of mortality in acute coronary syndromes (1, 6, 10). However, when those studies are analyzed, it is seen that they included high-risk patient groups with hemodynamic instability such as STMI cases or Killip class II and III heart failure (6, 10, 11). The reason for not finding a significant difference in our study might be due to the exclusion of unstable groups (STMI cases and Group 1 NST-ACS patients) and the comparison of relatively stable groups.

The normal blood lactate concentration is around 1 mmol/L and even mild increases, with values of >1.5 mmol/L, were associated with higher mortality rates in critically ill patients (12). In our study, mortality was not an outcome; however, in both groups the median lactate levels were higher than 1.5 mmol/L (2.20 mmol/L in the early intervention group and 1.98 mmol/L in the late intervention group). Although the accepted threshold values might differ between studies, lactate levels above 2 mmol/L are generally considered abnormal (13). Gjesdal et al. determined an abnormal lactate level of ≥2.5 mmol/L in their study, which analyzed blood lactate level as a predictor of short-term mortality in patients with ACS complicated with heart failure (11). In another study, Demers et al. defined the peak lactate level as 4 mmol/L during cardiopulmonary bypass in adult cardiac operations (14). From this point of view, in our study, it is demonstrated that the lactate levels of the groups were close to the abnormal limit and were even higher in the group for which early invasive intervention was recommended, as expected. However, since those values did not show a statistically significant difference between the groups, a predictive role of lactate in

determining the groups in which early or late invasive intervention should be recommended has not been demonstrated.

This study also analyzed the correlation of lactate levels and GRACE scores. In a study conducted with patients hospitalized in an intensive care unit with the diagnosis of acute coronary syndrome, a significant correlation was shown between GRACE scores and lactate levels (15). However, in that study, the sample size was small, the clinical severity of the selected ACS patients was unclear, and the strength of the correlation was quite weak (r=0.3) (15). In another study conducted with STMI patients, Hu et al. demonstrated that the combination of lactate and GRACE score was not superior to the original GRACE score alone in predicting mortality (16). In our study, there was also no significant correlation between GRACE scores and lactate levels.

Limitations

This study had some limitations. First, since invasive interventions were not performed in our hospital, all of these patients were referred and their subsequent outcomes (timing of invasive intervention, mortality, complications, etc.) could not be followed. Second, lactate level was measured just once, when the patient was first admitted to the hospital. The time interval between the onset of complaints and sample collection could not be standardized.

CONCLUSION

In this study analyzing the predictive role of lactate in the differentiation of NST-ACS patient groups for whom early (in the first 24 hours) or late (in the first 72 hours) invasive intervention was recommended, no significant difference was found between the groups in terms of lactate levels. There was also no correlation between lactate and GRACE scores. In conclusion, lactate alone was not a good predictor for risk analyses and determination of invasive intervention time in NST-ACS cases.

Ethics Committee Approval: Ethical approval was obtained from Keçiören Research Hospital with file number 2012-KAEK-15/2067 (Date 12.02.2020)

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The Relationship Between E-Health Literacy with Post-Traumatic Stress Symptoms of Nurses During the Pandemic

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Abstract

Objective: During the pandemic, health employees carry an emotional burden and specific psychological problems about caring for infected patients. This research was conducted to determine nurses' e-Health literacy levels and post-traumatic stress symptoms status in the COVID-19 pandemic and to examine the relationship between them.

Methods: The study was planned in descriptive, and correlational types, consisting of 172 nurses working in two state hospitals in Turkey during the COVID-19 pandemic. In the study, the whole universe was tried to be reached. The sample selection method was not applied. The Nurse Identification Form, e-Health Literacy Scale (eHEALS), and the Impact of Events Scale-Revised (IES-R) were applied online using GOOGLE forms in the study. Due to a lack of answers, the study started online on June 8, 2020, and ended on September 16, 2020. The Mann-Whitney U test was applied in two-group comparisons, and the Kruskal-Wallis test was used to test differences among three groups. The Mann-Whitney U test was performed to test the significance of pairwise differences using Bonferroni correction to adjust for multiple comparisons. A p-value of <0.05 was considered statistically significant.

Results: The median score of e-health literacy level was 32 for those with undergraduate and graduate education. The median eHEALS score of nurses who think that the internet is very useful in accessing health resources is 32,5. The scale score of the impact of events was found to be high in nurses working in the emergency services, experiencing changes in their social, occupational, or other areas during the epidemic, having different stress factors in the work environment excluding COVID-19. The nurses' e-Health literacy median score is 32, the impact of events scale median score is 30. There is no statistically significant relationship between nurses' e-Health literacy levels and post-traumatic stress symptoms.

Conclusion: Although there is arelationship between e-Health literacy levels and nurses' post-traumatic stress symptoms status, the e-Health literacy status was higher than average, and the severity of post-traumatic stress symptoms was mild.

Key words: Coronavirus, Health Literacy, Nurses, Post-Traumatic Stress

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INTRODUCTION

Pandemics affected mental health in addition to physical health (1). Healthcare staff professionals experience mental problems like anxiety, depressive disorder, post-traumatic stress disorder, sleep disturbance, negative emotions of fear, agony, and concern that themselves or their families are infected with COVID-19 during the pandemic process (2–5). A study conducted in China states that COVID-19 has a significant psychological impact on nurses, and working in the emergency room, worrying about the family, being affected by COVID-19 and negative coping style are risk factors for psychological distress (4). A study conducted with nurses in Turkey during the COVID-19 period determined that nurses feel fear and anxiety, their obsessions increase, and they have depressive symptoms (6).

In addition, care demands on nurses and care assistants have also increased in the community during COVID-19. The nature of care itself and new ways of working are potentially highly stressful for staff. Nurses are not only experiencing an increase in the volume and intensity of their work but are having to accommodate new protocols and a very "new normal." Other stressors for nurses are limited resources, lack of access to antigen or antibody testing, and discomfort and fatigue from long shifts wearing full personal protective equipment (7). In a study of Filipino Nurses, the majority of nurses reported that they were not fully prepared to manage COVID-19 patients, and only 20.3% reported being willing to care for COVID-19 patients (3). The excessive transmissibility of the COVID-19 virus, deadly outcomes, and direct contact of health workers with the virus due to their occupation leave them at risk of post-traumatic stress disorders (8,9). In a global sense, the increase in the case and death numbers and thoughts about getting sick or dying increase the stress levels of nurses (2).

Another source of stress in the pandemic process is the spread of misinformation about COVID-19 in the media. During times of public crises, media must ensure to communicate crisis information efficiently and effectively to the general public. But televised transmissions are not fact-checked and are being aired with the single aim to become the number one media outlet and win the rating war (10). Therefore, COVID-19 being a new virus, having little information about it, the unlimited confusing, contradictory, mistaken, speculative, and sensational information about COVID-19 in the media increase the perceived risk, threat, fear, and panic about the pandemic among health workers and cause individuals to imagine the worst scenarios, endanger efforts to manage COVID-19 and experience stress levels which overwhelm coping mechanisms (8,11,12). Communicating accurate and reliable information from trustworthy sources in a timely and effective manner, questioning the accuracy of acquired information, and reducing unwanted media exposure will reduce post-traumatic stress disorders reactions (12,13,14). In this situation, the e-Health literacy concept comes to the fore. It is stated that a high level of e-Health literacy can reduce psychological problems in the literature (15,16). E-health literacy is based on the concepts of health and media literacy and focuses on the information obtained about health in the internet environment, trust levels, ways to, and reasons for accessing information (13,17). Having the basic skills of e-health literacy ensures more effective use of web search strategies and recognition of high-quality

health information (18). In a study, it was reported that 37.8% of nurses had dysfunctional anxiety levels. This may be because nurses have a wider knowledge of the nature of COVID-19, its transmission and symptoms, and measures to prevent the disease than the general population (3). Important responsibilities fall to health employees, especially nurses, about this topic. This research was conducted to determine the e-Health literacy levels which are important factors in reaching accurate and reliable information and post-traumatic stress disorder status of nurses in the COVID-19 pandemic and to examine the relationship between them. This relationship will reveal the importance of e-health literacy in the management of traumatic stress in the COVID-19 process. In addition, it will allow nurses to benefit from e-health literacy in the management of the stress created by the public's misinformation.

METHODS

Study Design

This descriptive and correlational study was completed with nurses working in two state hospitals during the COVID-19 pandemic.

Sampling Population

The Nurse Identification Form, e-Health Literacy Scale, and the Impact of Events Scale-Revised were applied online using GOOGLE forms in the study. The study link was sent via WhatsApp to nurses in Ordu State Hospital and Ordu University Training and Research Hospital in Turkey. Nurses were also reached through the Nurses Association provincial branch Whatsapp group. In the study, the whole universe was tried to be reached. Nurses who agreed to participate voluntarily and worked actively in the field during the COVID-19 process were included in the study. The sample selection method was not applied. The study started on 8 June and the questionnaire continued until the final answer was received. The survey was terminated on September 16 due to no response. The number of nurses working in the hospitals where the study was conducted was 330. However, 185 nurses were reached during the study period. 13 nurses were not included in the study because they gave incomplete answers to the questions. The study sample consisted of 172 nurses. Study results filled out via Google forms were automatically saved in the system.

Data Collection Tools

Nurse Identification Form (NIF)

The personal information form consisted of two parts. The first part included sociodemographic questions. The second part included questions about the clinics of employment and work experience during the pandemic and department of employment in this study are based on the literature (19-21).

The Impact of Event Scale-Revised (IES-R)

The Impact of Event Scale-Revised (IES-R) was developed by Horowitz et al., (1979) and revised by Weiss and Marmar (1997). The scale aims to determine the stress of traumatized patients. On the scale, there are 22 questions rated between 0 and 4 about the severity of symptoms in the last 7 days. The maximum score that can be obtained from the scale is 88. The IES-R contains 3 subdimensions of re-experiencing (questions 1, 2, 3, 6, 9, 14, 16, 20), avoidance (questions 5, 7, 8 11, 12, 13, 17, 22) and overstimulation (4, 10, 15, 18, 19, 21 questions). Validity and reliability were done by Corapcıoğlu et al. (2006). Cronbach’s alpha value was found to be 0.94 (22). The Cronbach alpha value in this study was 0.939. Total IES-R score was graded for severity from normal (0–23), mild (24–32), moderate (33–36),

and severe psychological impact (> 37). A cut-off score of 24 is used to define post-traumatic stress disorder of clinical concern (23). The IES-R scale was confirmed for use in studies about the psychological effect of COVID-19 conducted in Asia (24) and Europe (25) to determine the scope of the psychological impact after exposure to a traumatic event.

The e-Health Literacy Scale (eHEALS)

The e-Health Literacy Scale (eHEALS) was developed by Norman and Skinner (2006). Validity and reliability were done by Tamer Gencer (2017). The scale was developed to determine traditional literacy, health-related literacy, information retrieval, scientific research, media literacy, and computer literacy (13). The scale consists of 2 items about internet use and 8 items that measure internet attitude. The scale items have a 5-point Likert type rating method as "1= strongly disagree, 2= disagree, 3= undecided, 4= agree, 5= agree". The lowest score is 8, and the highest is 40. High scores from the scale indicate high levels of e-health literacy. Cronbach's alpha coefficient of the scale was found to be 0.78 (26). In our study, Cronbach's alpha coefficient of the scale was found to be 0.919.

Statistical Analysis

Statistical analysis was performed using Statistical Package for SPSS 22.0. Descriptive data are expressed as frequency, percentage, mean ranks, median, interquartile range, standard deviation, minimum, and maximum values. The Kolmogorov-Smirnov test and kurtosis-skewness value were used to determine whether the data were distributed normally. For a distribution to be considered suitable for a normal distribution, the skewness and kurtosis coefficients must be between +1 and -1 (27). As mean total e-Health Literacy Scale and Impact of Event Scale-Revised scores did not show normal distribution, the use of nonparametric tests as appropriate for data analysis. The Mann-Whitney U test was applied in two-group comparisons, and the Kruskal-Wallis test was used to test differences among three groups. The Mann-Whitney U test was performed to test the significance of pairwise differences using Bonferroni correction to adjust for multiple comparisons. A p-value of <0.05 was considered statistically significant. Cronbach's alpha coefficients were used for reliability analyses of the scales. Spearman correlation coefficient test was used to evaluate the relationship between eHEALS and sub-dimensions of IES-R.

RESULTS

According to the sociodemographic data of nurses participating in the study, the mean eHEALS and IES-R points are compared in Table 1. The eHEALS score of nurses under the age of 40 was higher than those aged 40 and above, which was statistically significant ($p<0.05$).

When the eHEALS score was analyzed according to education level, there was a statistically significant difference between those with undergraduate and graduate education levels. Those with postgraduate education had a higher eHEALS score ($p<0.05$) (Table 1).

When the IES-R scores were examined according to the clinics worked during the pandemic process, a statistically significant difference was found between those working in the pandemic service and those working in the emergency services. While 16.6% of the nurses were working in the emergency department, 14% were working in the pandemic service. The IES-R score of nurses working in the

emergency department was higher than those working in the pandemic service and it was statistically significant (p<0.05). There was no difference between other clinics. 47.7% of the nurses experienced a change of place in the institution during the pandemic process. The eHEALS score of nurses who experienced a change of location in the institution was lower than those who did not change their location (p<0.05). %61.6 of the nurses experienced lost social, occupational, or other activity areas. The IES-R score of nurses who had lost social, occupational, or other activity areas was higher than those who had not experienced any loss and the difference was statistically significant (p<0.05).

Table 1. Comparison of eHEALS and IES-R Points According to Sociodemographic Features of Nurses (n=172)

Sociodemographic Features	n	%	eHEALS Mean Ranks/ Median (IQR)	p	IES-R Mean Ranks/ Median (IQR)	p
Gender						
Female	152	88.4	88.14/32(2)	.222[a]	88.10/30(24.75)	.245[a]
Male	20	11.6	74.03/32(10.25)		74.33/22.50(21.75)	
Age group						
<40	130	75.6	90.67/32(2.25)	**.047**[a]	87.95/30(23.25)	.500[a]
≥40	42	24.4	73.58/31(5.50)		82.00/27.50(27.50)	
Marital status						
Married	87	50.6	90.89/32(4)	.242[a]	82.45/31(28)	.291[a]
Single	85	49.4	82.21/32(2)		90.46/28(21.50)	
Number of children						
0	95	55.2	91.03/32(2)		90.24/32(24)	
1	29	16.8	94.69/32(2.50)	.133[b]	93.45/36(25)	.244[b]
2	40	23.3	72.14/31(7.25)		77.09/27.50(26.25)	
3	8	4.7	74.88/31(7.25)		64.00/23.50(16.25)	
Annual income level						
Income less than expenses	37	21.5	75.42/31(11)	.248[b]	90.41/30(22.50)	.199[b]
Income equal to expenses	94	54.7	91.13/32(2.50)		90.28/30(24.50)	
Income more than expenses	41	23.8	85.89/32(2)		74.32/22(21.50)	
Educational Level						
High School	7	4.1	96.57/32(6)		97.64/32(19)	
Associate Degree	13	7.6	68.12/31(6.50)	**.026**[b]	86.81732(25)	.268[b]
Undergraduate degree	122	70.9	82.44/32(3)		82.18/27(24.25)	
Postgraduate	30	17.4	108.62/32(5.75)		101.35/39(16)	
Duration of Professional experience (years)						
0-9	92	53.5	87.27/32(3)		90.42/32(24)	
10-19	48	27.9	90.45/32(2.50)	.687[b]	81.67/28(20)	.610[b]
20-29	29	16.8	79.52/32(4)		80.52/30(31.50)	
30 and above	3	1.8	66.00/22(0)		104.17/32(0)	

Note. IES-R: The Impact of Event Scale; eHEALS: The eHealth Literacy Scale; IQR: Inter Quantile Range
[a] Mann-Whitney U test[b]KruskalWallis test
p values <0.05 were considered statistically significant and shown in bold.

Of nurses, 25% stated that they witnessed someone who died during the COVID-19 period, and those who witnessed this had statistically significantly higher eHEALS scores than those who had not witnessed this type of death (p<0.05). There was a statistical difference between nurses who lost their patients and friend in terms of eHEALS score. The eHEALS score of nurses who witnessed the death of their patients was statistically significantly higher than nurses who lost their friends (p<0.05) (Table 2).

82% of the nurses stated that there are different stressors in the working environment. Nurses who stated this had a higher IES-R mean score, which was statistically significant (p<0.05), (Table 2). 59.9% of the nurses thought they were moderate knowledge about COVID-19, and 33.1% were a lot of knowledge. When the eHEALS score was examined according to the nurses' knowledge about COVID-19, there was a statistical difference between those who think they have moderate knowledge and those who think they have a lot of knowledge.

Table 2. Comparison of Working Features of Nurses During COVID-19 Pandemic With eHEALS Points and IES-R Points (n= 172)

			eHEALS		IES-R	
Information related to pandemic	**n**	**%**	**Mean Ranks/ Median (IQR)**	**p**	**Mean Ranks/ Median (IQR)**	**p**
Department of employment during a pandemic						
Internal medicine	50	29.4	94.94/32(2.25)		81.56/29(22)	
Surgical	46	26.7	68.83/31(4.75)	.067[b]	88.14/29(19.50)	**.016**[b]
Operating room	7	4	99.64/32(10)		94.00/40(23)	
Intensive care	16	9.3	102.53/32(0.75)		103.34/43(31.50)	
Pandemic service	24	14.0	82.46/32(6.75)		58.50/21.50(20.25)	
Emergency service	29	16.6	91.31/32(5)		104.43/36(25.50)	
Did you experience location changes in the organization/area during the pandemic?				**.047**[a]		.50[a]
No	90	52.3	90.67/32(3)		85.82/30(26.25)	
Yes	82	47.7	73.58/32(2)		87.24/30(22.50)	
Did you experience changes/loss in social, professional, or other important areas of activity in your life during the pandemic?				.288[a]		**.005**[a]
No	66	38.4	81.52/32(3.25)		73.05/36(24.50)	
Yes	106	61.6	89.60/32(2)		94.87/24(23)	
Did you witness someone dying due to COVID-19?				**.014**[a]		.142[a]
No	129	75	81.25/32(3)		83.28/29(25)	
Yes	43	25	102.26/32(3)		93.16/36(22)	
Degree of closeness n=43						
Relative	5	11.6	19.70/32(9.50)	**.034**[b]	21.50/30(27)	.720[b]
Friend	3	7.0	5.17/27(0)		27.67/39(0)	
Patient	35	81.4	23.77/32(3)		21.59/32(23)	
Did you receive any psychological support during the pandemic?				.359[a]		.057[a]
No	165	95.9	87.20/32(3)		85.01/29(24)	
Yes	7	4.1	70.00/31(7)		121.64/36(23)	
Were there other stress factors experienced in your work environment?				.081[a]		**.004**[a]
No	31	18.0	72.72/30(5)		63.18/22(17)	
Yes	141	82.0	89.83/32(2.50)		91.63/32(24.50)	
Stress factors in work environments*						
Confusion about duties	38	12.5	32(6.25)		40(28.50)	
Work intensity	36	11.9	32(3.75)		31(18.25)	
Team incompatibility	37	12.2	32(2.50)		38(19)	
Material	28	9.2	32(8)		39(25)	
Management	31	10.2	32(4)		40(19)	
Pay inequality/wages	48	15.8	32(3)		36(17.50)	
Inadequate personnel	55	18.2	32(4)		40(24)	
Excessive bureaucracy	30	9.9	32(3.75)		30(27.25)	

Note. IES-R: The Impact of Event Scale; eHEALS: The eHealth Literacy Scale; IQR: Inter Quantile Range
[a]Mann Whitney U Test. [b]Kruskal Wallis Test.
*Than one response was given (analysis could not be done due to multiple responses)
p values <0.05 were considered statistically significant and shown in bold.

Table 3. Comparison of Nurses' Internet Usage With eHEALS and IES-R Scores (n=172)

Internet Use Status	n	%	eHEALS Mean Ranks/ Median(IQR)	p	IES-R Mean Ranks/Median(IQR)	p
24/7 internet access						
No	5	2.9	48.10/29(4.50)	.073[a]	100.0/36(22.50)	.538[a]
Yes	167	97.1	87.65/32(2)		86.10/30(24)	
How beneficial do you think the internet is in assisting you to make decisions about your health?						
Not beneficial at all	5	2.9	50.20/29(3.50)	.050[b]	94.20/36(7)	.889[b]
Not beneficial	22	12.8	77.11/32(3.25)		94.39/33(26)	
Undecided	22	12.8	71.68/31(8.25)		81.66/27(24.25)	
Beneficial	117	68.0	93.73/32(3)		86.12/29(25)	
Very beneficial	6	3.5	64.50/24(19.75)		76.42/32.50(27.25)	
How important do you think the internet is for you to access health resources?						
Not beneficial at all	2	1.2	33.75/27(0)	**<.001**[b]	98.25/34(0)	.300[b]
Not beneficial	14	8.1	54.00/29.50(4.25)		74.21/25.50(21.25)	
Undecided	9	5.2	62.50/31(19)		69.67/24(15.50)	
Beneficial	115	66.9	85.82/32(2)		85.02/28(25)	
Very beneficial	32	18.6	113.20/32.50(7)		101.19/40(25.25)	
Information about COVID-19						
A little	12	7.0	72.71/31 (6.25)	**.038**[b]	69.67/22(24.25)	.064[b]
Moderate	103	59.9	80.83/32(3)		93.63/32(25)	
A lot	57	33.1	99.66/32(5)		77.17/26(22.50)	
	n	**%**	**Median(IQR)**		**Median(IQR)**	
Sources where information related to COVID-19 was obtain*						
Official internet pages	110	25.9	32(3)		29(23.25)	
Unofficial internet pages	72	17.0	32(5)		38(26)	
Scientific e-publications	33	7.8	32(6.50)		37(24)	
In-service training	24	5.7	32(7.75)		39.50(26.75)	
Managers and colleagues	59	13.9	31(4)		30(20)	
Television. radio. newspapers	74	17.5	32(4.25)		30(23.50)	
Panels and Meetings	12	2.8	31(9)		40(36.75)	
Printed journals	21	5.0	32(14)		40(30)	
Social Media	19	4.5	30(12)		40(35)	

Note. IES-R: The Impact of Event Scale; eHEALS: The eHealth Literacy Scale; IQR: Inter Quantile Range.
[a]Mann Whitney U Test. [b]Kruskal Wallis Test
*Than one response was given (analysis could not be done due to multiple responses)
p values <0.05 were considered statistically significant and shown in bold.

Table 4. Median Points on IES-R Subscales and Score, and eHEALS Scores for Nurses

Scales	Median (IQR)	Minimum	Maximum
Intrusion	12 (8.75)	0	29
Avoidance	12 (8)	0	27
Hyperarousal	6 (8)	0	22
IES-R	30 (24)	1	78
eHEALS	32 (3)	8	40

Note. IES-R: The Impact of Event Scale; eHEALS: The eHealth Literacy Scale; IQR: Inter Quantile Range

Table 5. Spearman Correlation Between Thoughts About Internet Use And IES-R Mean Points With eHEALS Mean Points of Nurses

Scales	eHEALS	
	r	p
IES-R	-0.035	0.652
Daily internet use duration	0.234	0.002*
The benefit of the internet in making decisions about health	0.154	0.044*
Importance of the internet for access to health resources	0.343	<0.001*

Note. IES-R: The Impact of Event Scale; eHEALS: The eHealth Literacy Scale; IQR: Inter Quantile Range
*Correlation is significant at the 0.05 level (2-tailed).

When the importance of the Internet in accessing health resources was examined, 1.2% of the nurses did not find it beneficial at all, while 66.9% find it beneficial. There was a statistical difference between those who did not find it beneficial, those who found it beneficial, and those who found it very beneficial. eHEALS score increased as the level of finding benefits increased ($p<0.05$), (Table 3). Although not included in the table, it was determined that nurses used the internet for an average of 4.18 ± 2.38 hours a day, and a statistically significant relationship was found between internet usage duration and eHEALS internet attitude sub-dimension ($p<0.05$).

While nurses' IES-R median score (IQR) was 30 (mild (24–32), their eHEALS score median was 32, (Table 4).

There was no statistically significant relationship between the IES-R and eHEALS scores of nurses ($p<0.05$). However, a statistically significant and positive close relationship was found between the nurses' eHEALS score and daily duration of internet use ($p <0.05$), the benefit of the internet in helping make decisions about health ($p <0.05$), and the importance of accessing health resources on the internet ($p <.001$), (Table 5).

DISCUSSION

Paying attention to the individual's e-Health literacy status is effective in improving health outcomes and reducing the individual and social effects of COVID-19. Responsibility for this topic falls to nurses (11). According to the study findings, the eHEALS scores of nurses under the age of 40 were higher than those of nurses aged 40 and over, which was statistically significant. In a study conducted on healthcare professionals in Ethiopia, most of the participants with high eHEALS scores were between the ages of 21-29 (18), and in Akturk's study of women between the ages of 18-49, the eHEALS score was higher in individuals under 38 years of age (19). In addition, Akturk reported that the eHEALS score decreased as age increased and Knitza et al. reported that there was a negative correlation between age and eHEALS score (19,28).

Considering the educational status of nurses, the e-Health literacy score is higher in those with undergraduate and graduate education levels. One of the factors increasing e-health literacy status in the literature was stated to be educational status (18). A study by Ertas et al. (2019) about adult individuals, those with undergraduate and postgraduate education had higher e-Health literacy (29). Additionally, research into European health literacy including eight EU member states identified that the health literacy points increased as the general educational level increased (30).

When the IES-R points are examined according to the department of employment, the highest points were obtained by emergency service nurses, and this result was identified to be significant. In a study conducted on healthcare workers during the pandemic period, it was stated that those who cared for COVID-19 positive patients and those working in the emergency, intensive care, respiratory and infectious diseases clinics had higher levels of fear, anxiety, and depression (21). Studies showed that HCWs who work in emergency departments, intensive care units, and isolation wards have a greater risk of developing adverse psychiatric outcomes than those in other job departments (21). The high-stress levels among emergency service workers may be associated with this department being

the most active, intense, stressful, and complicated within health organizations (31).

The IES-R points of nurses participating in the study who had experienced changes/loss in social, professional, or other important areas of activity during the pandemic were higher compared to those who had not experienced this and the difference was significant in statistical terms. During the pandemic, nurses have to fulfill duties related to their jobs, in addition to their social responsibility and roles; however, they experienced difficulties in filling social roles as mother, father, child, and partner due to the transmission risk of COVID-19 (32). With the different social roles and responsibilities undertaken by nurses affected by this pressure, they also remained at risk in psychological terms (2).

Professional difficulties experienced by nurses are included among factors increasing stress and in this study, the highest cause of stress was stated to be management problems, inadequate personnel, problems related to duties, followed by material problems, and team incompatibility (2). Nurses exposed to stressors in the work environment had higher mean IES-R points and this was statistically significant. A study by Que et al. stated that health workers were exposed to similar stress factors, while the study by Bostan et al. stated that health employees assessed their working and social conditions at moderate levels and had high anxiety levels (33,34). In addition, the eHEALS scores of nurses who experienced a change of place in the institution were lower than those who did not experience change. In the literature, individuals who perceive their health status to be good physically and mentally had high health literacy scores (19). During the COVID-19 period, nurses worked in circulation between newly-opened pandemic clinics (32).

As the daily internet use of the participating nurses increased, their eHEALS scores also increased significantly. Additionally, the majority of nurses stated that the internet was beneficial and very beneficial for their access to health resources, these nurses had higher e-Health literacy points and were significant in terms of statistics. As the daily internet usage time of the nurses participating in the study increased, their eHEALS scores also increased significantly. Based on this, it was reported that it would be beneficial to initiate cognitive behavioral therapy online or on smartphones, which will have positive effects such as combating anxiety, preventing depression, and alleviating maladaptive coping behaviors by use of relaxation techniques for nurses whose mental health is affected during the pandemic (21).

There was a statistically significant positive correlation identified between the daily internet use duration of nurses with those who thought the internet was beneficial to make decisions about health and those who thought the internet was important for their access to health resources. A study of students in the health sciences faculty found 39.7% of students thought the internet was beneficial for decisions related to health, while 55% stated the internet was important for access to health resources (35). In the literature, as literacy skill levels increase, there are increases noted for perceived usefulness of computers, diversity, the intensity of internet use, and use of computers with duty-focused aims (16).

More than half of nurses stated they had moderate levels of knowledge about COVID-19, and as their stated knowledge levels increased, e-Health literacy

status increased statistically significantly. Similar to the study by Ergun et al., (2020), health employees stated they had moderate levels of knowledge and attitudes about infectious diseases (36). In this study, those obtaining information from scientific e-publications, official websites, and printed journals had higher mean eHEALS points compared to those using other sources

The mean IES-R points for nurses participating in the study were found to be mild levels. A study of nurses working in South Korea during the MERS epidemic observed mild levels of post-traumatic stress disorders, similar to our study (37). A study about the psychological effects of COVID-19 in the general population in Saudi Arabia found that participants had lower levels of post-traumatic stress symptoms than our study results (38). Other studies in the literature observed that the group with the highest stress levels among health employees was nurses (33, 39, 40).

In the study by Ergun et al. (2019), the mean eHEALS points of 25.98±0.27 were close to the average (26). Considering the e-Health literacy scale score range between 8 and 40, it was determined that the e-Health literacy status of the nurses in our study was higher than the average. A study of health employees in Vietnam without contact with COVID-19 stated that the eHEALS points for nurses were 32.7±4.6, similar to our study (4).

The results of the study did not identify a significant correlation between e-Health literacy and post-traumatic stress symptom. Yang et al. study in China found a statistically significant and negative relationship between e-Health literacy with depression, insomnia, and post-traumatic stress disorder (40). Additionally, stated that well-developed good levels of e-Health literacy may reduce psychological problems, a study in South Korea found low health literacy level was significantly associated with high levels of depressive symptoms and a study in Vietnam stated that high health literacy may protect against fear (38-40).

Limitations

This study was carried out at two state hospitals. For this reason, the results of the study are limited only to nurses from these hospitals. The nurses participating in the study were reached only online. The nurses participating in the study were reached only online cause of COVID-19. A limitation of this study is that no larger sample can be reached to determine the relations of e-Health Literacy Status with Post-Traumatic Stress symptoms

CONCLUSIONS

The e-Health literacy status of the nurses in the study was higher than average, and the severity of post-traumatic stress symptoms was mild. There is no relationship between e-Health literacy levels and nurses' post-traumatic stress symptoms status. Nurses should develop their health literacy skills in managing the traumatic stress that occurs during the infectious disease process. In addition, due to their important role in public health, they should support the development of e-health literacy skills of the people. To increase the level of health literacy of nurses, it is necessary to raise the level of education, not act in the institution, understand the importance of the internet in accessing health resources, and have above-average knowledge about COVID-19. To reduce the post-traumatic stress symptom of nurses, it is necessary to eliminate the stress factors of work intensity, team incompatibility, material, management, pay inequality, inadequate personnel,

excessive bureaucracy, confusion about duties in the working environment. Studies with larger samples are needed to reveal the relationship between e-health literacy and traumatic stress levels.

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RESEARCH ARTICLE

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Comparison of Preparedness Levels of Health Personnel and Hospitals They Work in for Disasters and Emergencies

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Abstract

Objective: All communities around the world can face a devastating disaster at any time. Therefore, it is of great importance for hospitals to maintain their medical care functions in cases of injuries that may occur after disasters. An effective disaster response in critical situations in hospitals requires not only well-planned and coordinated efforts but also well-trained and experienced professional staff. Our purpose was to investigate and compare the preparedness levels of health professionals and hospitals they work in for disasters and emergencies.

Methods: The questionnaire used for the evaluation of health personnel was developed by the authors. The questionnaire has items on the participants' demographic characteristics, assessment of hospital preparedness for disasters and emergencies (42 items) and assessment of health personnel preparedness for disasters and emergencies (29 items). Responses given to the items had options: "yes" or "no". Each response given by the participants was scored as "1" for the "Yes" answer and "0" for the "No" answer. Then statistical analysis was performed.

Results: The mean score obtained from the first part of the questionnaire was 26.0±13.28. The question that received the highest number 223 (91.4%) of "yes" answers from the participants was "Are there any emergency exit signs?" The mean score obtained from the second part of the questionnaire was 12.6±11.41. The question that received the highest number 162 (66.4%) of "yes" answers from the participants was "Do you know the phone numbers you need to call in an emergency (fire department, police)?" There was a positive and highly significant relationship between the hospital's preparedness for disasters and emergencies and health personnel's preparedness for disasters and emergencies ($p<0.001$).

Conclusion: In the study, most of the health personnel thought that the hospital they worked in was prepared for disasters. It can be said that the construction of hospitals based on certain standards, and their management according to certain rules affect health personnel's thoughts about their preparedness for disasters. However, health personnel think that their level of preparedness for disasters is low. Given important roles of health personnel in coping with disasters, health personnel are expected to know all stages of hospital disaster plans and to be capable of giving the necessary response in disaster situations.

Key words: Hospital management, health personnel, nurse, emergency, disaster preparedness

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INTRODUCTION

Disasters have affected people's lives physically, socially and economically throughout the ages. Due to the environmental, social, economic and political changes that have occurred in recent years, disasters have increased in frequency, and therefore have affected societies more (1,2). Among the factors causing this increase are overpopulation and increasing urbanization, climate change, increase in travel frequency, trade activities, terrorism threat, and infectious disease epidemics. It is important to be prepared for disasters all the time, because when and where disasters can occur is not known (3,4).

All communities around the world can face a devastating disaster at any time. Therefore, it is of great importance for hospitals to maintain their medical care functions in cases of injuries that may occur after disasters (5-7). In hospitals, health services are provided uninterruptedly due to the nature of the service provided, and these services are provided by health professionals working in many different fields. Nurses, physicians, dentists, pharmacists, paramedics, and many other health professionals provide uninterrupted health care during disasters (8-10). Hospitals providing uninterrupted service play an active role in responding to disasters with their emergency services, patient care and treatment services, advanced diagnostic tests and institutional support services. The emergency capacities of departments such as emergency services, intensive care units and operating theaters, and the preparedness of physicians, nurses, paramedics and other health personnel working in these departments for emergencies play a key role in case disasters affect masses (11-14).

An effective disaster response in critical situations in hospitals requires not only well-planned and coordinated efforts but also well-trained and experienced professional staff. Personnel working in emergency response units are also frequently faced with emergencies in the routine period. However, health personnel working in other units may not have the critical knowledge and experience needed in emergencies and disasters, and therefore, they may have difficulty performing their tasks effectively under the chaotic and stressful conditions created by disasters (14-16). Therefore, to have health personnel adequately prepared for disasters and emergencies, first, they should be given training and be taught exercises that will provide the necessary knowledge, skills and attitudes so that they can adequately respond to emergencies when they occur (17-19).

The region where this study was conducted is at a high risk of having disasters such as earthquakes, floods, fires and landslides. The study was carried out with health personnel working in three different public hospitals in Sinop, a province of Turkey, along the Black Sea who volunteered to participate in the study. The main purpose of the authors of this study was to investigate the preparedness of the aforementioned public hospitals and health personnel for disasters and emergencies working in these hospitals from their perspectives.

The authors' other aim was to determine whether there was a significant difference between the participating health personnel's preparedness for disasters and emergencies in terms of variables such as sex, education level, length of service in the profession and in the hospital, and their experiences in disasters and emergencies.

In the study, hospitals' and health personnel's preparedness for disasters and emergencies was discussed separately and it was expected to be a source for future studies. The study is also expected to provide guidance for relevant institutions and organizations when they plan and perform preparatory activities.

METHODS

The population of this descriptive study consisted of 775 health personnel working actively in three different public hospitals in Sinop, Turkey. Of these personnel, 452 volunteered to participate in the study. The study data were collected between December 2019 and January 2020 using the Hospital Personnel's Preparedness for Disasters and Emergencies Questionnaire prepared by the authors based on the pertinent literature. The questionnaire was distributed to the participants after they were informed about the study. However, 244 participants completed and returned the questionnaires. It took them approximately 10 minutes to complete the questionnaire.

The questionnaire has three parts. In the first part, the participants' characteristics, such as sex, age, occupation, length of service in the profession and length of service in the hospital were questioned. The second part consists of 42 questions with yes/no options asked to determine the hospital's preparedness for disasters and emergencies. The third part consists of 29 questions with yes/no options asked to determine the health personnel's preparedness for disasters and emergencies.

Responses given to the questions in the 2nd and 3rd parts were rated by giving 1 point to the "yes" answer and 0 points to the "no" answer. The sum of the scores of all the items yields the score for the overall questionnaire. The distributions of the responses are given in Table 2 and 3. The participants' demographic characteristics are given in Table 3.

Comparative statistics regarding the hospital's preparedness for disasters and emergencies in terms of health personnel's characteristics such as sex, age, education level, occupation, and having previously worked in a hospital during a disaster, are presented in Table 4. Comparative statistics regarding the health personnel's preparedness for disasters and emergencies in terms of their characteristics, such as sex, age, education level, occupation, and having previously worked in a hospital during a disaster, are presented in Table 5. The relationship between the hospital's and health personnel's preparedness for disasters and emergencies is presented in Table 6. Data were analysed using IBM SPSS V23. Whether the data were normally distributed was tested with the Kolmogorov-Smirnov and Shapiro-Wilk tests. The Mann Whitney U test and Kruskal Wallis test were used to compare the data that were not normally distributed. The relationship between the variables was investigated by Spearman's correlation analysis. Data that were not normally distributed are presented as the mean (minimum – maximum). P-values less than 0.05 were considered statistically significant.

RESULTS

The distribution of the participants' demographic characteristics is presented in Table 1. Of the participants, 71.7% were women, 55.3% had a bachelor's degree, 26.2% had an associate degree, 9.8% had a master's degree, 8.6% were high school graduates, 69.7% were nurses, 30.3% were technicians, 57% worked in the inpatient unit, 29.1% worked in the outpatient clinic, 10.7% worked in the operating theatre, 3.3% worked in the intensive care unit, and 9.8% previously worked during a disaster.

Table 1. Distribution of demographic other characteristics of the participants

	(n)	(%)
Gender		
Women	175	71.7
Men	69	28.3
Educational status		
High school	21	8.6
Associate degree	64	26.2
Bachelor's degree	135	55.3
Master's degree	24	9.8
Profession		
Nurse	170	69.7
Technician	74	30.3
Unit worked in		
Inpatient clinic	139	57.0
Operating theatre	26	10.7
Outpatient clinic	71	29.1
Intensive care unit	8	3.3
Have you worked in any hospital during a disaster before?		
No	220	90.2
Yes	24	9.8

The distribution of the responses given to 42 questions asked to determine the hospital's preparedness for disasters and emergencies are presented in Table 2. The mean score for the hospital's preparedness for disasters and emergencies was 26.07±13.28. The question that received the highest number [223 (91.4%)] of "yes" answers from the participants was "Are there any emergency exit signs?" The question that received the highest number [144 (59%)] of "no" answers from the participants was "Was the personnel information list shared with local governments (provincial/district disaster management center)?"

The distribution of the responses given to 29 questions asked to determine the health personnel's preparedness for disasters and emergencies are presented in Table 3. The mean score for the health personnel's preparedness for disasters and emergencies was 12.65±11.41. The question that received the highest number [162 (66.4%)] of "yes" answers from the participants was "Do you know the phone numbers you need to call in an emergency (fire department, police)?". The question that received the highest number [160 (65.5%)] of "no" answers from the participants was "Have you read the current disaster and emergency plan?"

Comparisons of the scores for the hospitals' preparedness for disasters and emergencies in terms of the participants' descriptive characteristics are presented in Table 4. Their scores differed according to their education level (p=0.011). The mean scores obtained by high school graduates, and those with an associate degree, bachelor's degree and master's degree were 32, 31, 26, and 31.5 respectively. The difference stemmed from the fact that the participants with a bachelor's degree obtained lower scores than did the other participants. Their mean scores also differed according to the variable "having worked in a hospital during a disaster" (p=0.043). While the mean score obtained by those who previously worked in a hospital during a disaster was 31.5 and SD is 13.47, the mean score obtained by those who did not work was 29 and SD is 10.31. There were no differences between the participants' mean scores in terms of the variables such as sex, occupation, unit worked in, length of service in the hospital, and length of service in the profession (p>0.050).

Comparisons of the scores for the health personnel's preparedness for disasters and emergencies in terms of their descriptive characteristics are presented in Table 5. There was a difference between the participants' mean scores in terms of the sex variable (p=0.017). While the mean score obtained by the female participants was 7 and SD is 10.90, the mean score obtained by the male participants was 21 and SD is 12.05. There was a difference between the participants' mean scores in terms of the educational status variable (p=0.016). The mean scores obtained by high school graduates, those with an associate degree, those with a bachelor's degree and those with a master's degree were 9, 14, 6, and 14 respectively and their SD is respectively 12.14, 10.53, 11.16, 12.14. The difference stemmed from the fact that the participants with an associate degree and master's degree obtained higher scores than did the high school graduates and the

participants with a bachelor's degree. Their mean scores also differed according to the variable "having worked in a hospital during a disaster" (p=0.009). While the mean score obtained by those who previously worked in a hospital during a disaster was 26 and SD is 11.37, the mean score obtained by those who did not work was 9 and SD is 11.24. There were no differences between the participants' mean scores in terms of the variables such as occupation, unit worked in, length of service in the hospital, and length of service in the profession (p>0.050).

The relationship between the hospital's and health personnel's preparedness for disasters and emergencies is presented in Table 6. As is seen in Table 6, there was a positive high-level significant relationship between the hospital's and health personnel's preparedness for disasters and emergencies (p<0.001).

Table 1. Distribution of responses given to questions on hospitals' preparedness for disasters and emergencies

	Yes	No
Is the hospital you work in prepared for disasters and emergencies?	169 (69.3)*	75 (30.7)*
Has the hazard level been determined for disasters and emergencies?	163 (66.8)	81 (33.2)
Is there a disaster and emergency plan?	198 (81.1)	46 (18.9)
Is there an emergency response plan?	184 (75.4)	60 (24.6)
Have you been informed about the current disaster and emergency plan?	129 (52.9)	115 (47.1)
Is there an incident management team for disasters and emergencies?	191 (78.3)	53 (21.7)
Have workflow instructions been created for disasters and emergencies?	169 (69.3)	75 (30.7)
Has an incident management center been determined for disasters and emergencies?	163 (66.8)	81 (33.2)
Has a hazard and vulnerability analysis been performed?	140 (57.4)	104 (42.6)
Have you been informed about the workflow instructions to be implemented in emergencies?	139 (57)	105 (43)
Have precautions been taken against the risk of fire (such as fire extinguisher, alarm system)?	211 (86.5)	33 (13.5)
Have precautions been taken against the earthquake and the risks it will cause (such as fixing of cabinets)?	127 (52)	117 (48)
Is there a designated assembly area for emergencies?	188 (77)	56 (23)
Is there an emergency alert system to communicate in disasters and emergencies?	217 (88.9)	27 (11.1)
Are there any emergency exit signs?	223 (91.4)	21 (8.6)
Is there a place that can be used as a shelter in case of chemical disasters and emergencies?	138 (56.6)	106 (43.4)
Is disaster and emergency preparedness training being provided?	171 (70.1)	73 (29.9)
Are emergency drills held?	181 (74.2)	63 (25.8)
Have necessary precautions been taken against a possible chemical event?	121 (49.6)	123 (50.4)
Have necessary precautions been taken against situations affecting the maintenance of tasks (such as power cuts)?	179 (73.4)	65 (26.6)
Are emergency supplies checked and maintained at regular intervals?	182 (74.6)	62 (25.4)
Have you been informed about your responsibilities and tasks in case of disaster?	126 (51.6)	118 (48.4)
Are forms to be used in a disaster and emergency available?	138 (56.6)	106 (43.4)
Are event notification flowcharts available?	141 (57.8)	103 (42.2)
Are event-specific plans available?	133 (54.5)	111 (45.5)
Have the personnel to be assigned in a disaster and emergency been determined?	155 (63.5)	89 (36.5)
Have the persons who will take charge in a disaster and emergency been informed about the tasks they will do?	155 (63.5)	89 (36.5)
Have places, areas and spaces that can be used in case of a disaster or emergency been determined?	147 (60.2)	97 (39.8)
Are there considerations for hazard mitigation (building reinforcement, etc.)?	113 (46.3)	131 (53.7)
Are disaster and emergency responses available for all hazards?	121 (49.6)	123 (50.4)
Are improvements available for all hazards?	125 (51.2)	119 (48.8)
Are emergency contact numbers available?	163 (66.8)	81 (33.2)
Have evacuation routes been determined?	151 (61.9)	93 (38.1)
Are charts of infrastructure systems (natural gas etc.) available?	127 (52)	117 (48)
Is the list of emergency response companies and suppliers of critical materials available?	113 (46.3)	131 (53.7)
Are there maps or sketches showing hospital facilities and danger zones (gas station, etc.)?	116 (47.5)	128 (52.5)
Have personnel with special needs (patient, disabled) been taken into account?	133 (54.5)	111 (45.5)
Is personnel information list available?	141 (57.8)	103 (42.2)
Is it the personnel information list updated regularly?	127 (52)	117 (48)
Was it the personnel information list prepared after the hazard and risk analysis?	122 (50)	122 (50)
Was it the personnel information list prepared in cooperation with local governments?	132 (54.1)	112 (45.9)
Was it the personnel information list shared with local governments (provincial/district disaster management center)?	100 (41)	144 (59)

*Number (Percentage)

Table3. Distribution of the answers given to the questions on the health personnel's level of preparedness for disaster

	Yes	No
read the current disaster and emergency plan?"	84 (34.4)*	(65.6)*
participated in the preparation and updating of the disaster and emergency plan?	105 (43)	139 (57)
attended disaster and emergency preparedness training?	118 (48.4)	6 (51.6)
participated in disaster and emergency drills?	157 (64.3)	7 (35.7)
nowledgeable about the emergency color code?	102 (41.8)	2 (58.2)
now the scope of event levels (level 1, level 2, level 3) in case of disaster and emergency?	116 (47.5)	8 (52.5)
now how to make event notification in case of disaster and emergency?	128 (52.5)	6 (47.5)
now who to contact at the hospital in case of a disaster?	94 (38.5)	0 (61.5)
ave information on how to make an event notification to the Ministry of Health in case of a disaster?	96 (39.3)	8 (60.7)
nsider yourself knowledgeable enough about disaster preparedness and disaster management?	114 (46.7)	0 (53.3)
now your responsibilities and duties in disasters and emergencies?	103 (42.2)	1 (57.8)
now the limits of your knowledge, skills and authority in disasters, and when you will exceed them?	115 (47.1)	9 (52.9)
now the accepted triages used in disasters?	104 (42.6)	0 (57.4)
nowledgeable about the procedure that should be implemented for patients exposed to chemical, biological, al and nuclear events?	125 (51.2)	9 (48.8)
nowledgeable about the procedure that should be implemented for the patient diagnosed with an infectious disease?	112 (45.9)	2 (54.1)
nowledgeable about the procedure that should be implemented for the personal belongings of people who present to al in case of disaster?	115 (47.1)	9 (52.9)
nowledgeable about the rules that must be followed regarding the hospital staff's uniforms and personnel ID cards in saster?	93 (38.1)	1 (61.9)
nowledgeable about the information to be recorded in the hospital and the forms to be filled in case of a disaster?	93 (38.1)	1 (61.9)
nowledgeable about the situation (case) reports and their scopes that will be prepared in case of disaster?	104 (42.6)	0 (57.4)
nowledgeable about how to implement emergency response plans, evacuation procedures and similar functions?	98 (40.2)	6 (59.8)
nowledgeable about the procedure to be implemented in case of fire and explosions in the hospital?	96 (39.3)	8 (60.7)
nowledgeable about the procedure to be implemented when a gas leak occurs in the hospital?	95 (38.9)	9 (61.1)
nowledgeable about the procedure to be implemented during an earthquake in the hospital?	94 (38.5)	0 (61.5)
nowledgeable about the procedures to be implemented during terrorism and sabotage in the hospital?	94 (38.5)	0 (61.5)
nowledgeable about the procedures to be implemented in the event of a chemical incident in the hospital?	94 (38.5)	0 (61.5)
nowledgeable about the procedures to be implemented in case of a possible evacuation at the hospital?	98 (40.2)	6 (59.8)
nowledgeable about the procedures to be implemented in the environmental risks due to the installation errors in ital?	96 (39.3)	8 (60.7)
cnow the phone numbers you need to call in an emergency (fire department, police)?"	162 (66.4)	2 (33.6)
ave a defined task to do during disasters or emergencies?	84 (34.4)	0 (65.6)

*Number (Percentage)

Table 4. Comparisons of the scores for the hospital's preparedness for disasters and emergencies in terms of the participants' descriptive characteristics

	Mean (min-max)	Test statistics	p
Sex			
Women	28 (0 - 42)	U=6960	0.063
Men	33 (0 - 42)		
Educational status			
High school	32 (0 - 42)ab	χ^2=11.144	**0.011**
Associate degree	31 (5 - 42)a		
Bachelor's degree	26 (0 - 42)b		
Master's degree	31.5 (4 - 42)ab		
Profession			
Nurse	30 (0 - 42)	U=5606	0.176
Technician	28.5 (0 - 42)		
Unit worked in			
Inpatient clinic	29 (0 - 42)	χ^2=1.803	0.614
Operating theatre	31.5 (1 - 42)		
Outpatient clinic	29 (0 - 42)		
Intensive care unit	30.5 (24 - 42)		
Have you worked in any hospital during a disaster before?			
No	29 (0 - 42)	U=3304.5	**0.043**
Yes	31.5 (13 - 42)		
Length of service in the hospital			
<5 years	29 (0 - 42)	χ^2=5.533	0.137
5-9 years	31.5 (2 - 42)		
10-20 years	25.5 (0 - 42)		
≥21 years	33 (2 - 42)		
Length of service in the profession			
<5 years	30 (0 - 42)	χ^2=0.664	0.882
5-9 years	31 (2 - 42)		
10-20 years	28 (0 - 42)		
≥21 years	30.5 (0 - 42)		

U: Mann Whitney U test χ^2: Kruskal Wallis test

Table 5. Health personnel's preparedness for disasters and emergencies in terms of their socio demographic characteristics

	Mean (min-max)	Test statistics	p
Sex			
Women	7 (0 - 29)	U=7212	**0.017**
Men	21 (0 - 29)		
Educational status			
High school	9 (0 - 29)ab	χ^2=10.367	**0.016**
Associate degree	14 (0 - 29)a		
Bachelor's degree	6 (0 - 29)b		
Master's degree	14 (0 - 29)ab		
Profession			
Nurse	9.5 (0 - 29)	U=6021	0.593
Technician	10 (0 - 29)		
Unit worked in			
Inpatient clinic	8 (0 - 29)	χ^2=0.830	0.842
Operating theatre	6 (0 - 29)		
Outpatient clinic	10 (0 - 29)		
Intensive care unit	10 (3 - 29)		
Have you worked in any hospital during a disaster before?			
No	9 (0 - 29)	U=3492.0	**0.009**
Yes	26 (0 - 29)		
Length of service in the hospital			
<5 years	10 (0 - 29)	χ^2=3.362	0.339
5-9 years	9 (0 - 29)		
10-20 years	6 (0 - 29)		
≥21 years	12 (0 - 29)		
Length of service in the profession			
<5 years	11 (0 - 29)	χ^2=1.756	0.624
5-9 years	9.5 (0 - 29)		
10-20 years	8 (0 - 29)		
≥21 years	7 (0 - 29)		

U: Mann Whitney U test χ^2: Kruskal Wallis test

Table 6. Relationship between the hospital's and health personnel's preparedness for disasters and emergencies

		Hospital's preparedness for disasters and emergencies
Health personnel's preparedness for disasters and emergencies	r	0.737
	p	**<0.001**

r: Spearman's correlation coefficient

DISCUSSION

The analysis of the results of the study demonstrated that most of the health personnel who participated in the present study considered that the hospital they worked in was prepared for disasters and emergencies (Table 1). However, the answers given by the health personnel to the questions about their preparation for disasters and emergencies indicated that they thought that they were generally not prepared (Table 2). The review of the literature demonstrated that many studies were conducted on preparedness for disasters and emergencies.

In a study conducted with nurses, their level of perception of preparedness for disasters and emergencies was determined to be low (18). In another study conducted in the literature, the authors stated that health personnel needed to learn about disaster preparedness more (17). In Khalaileh et al.'s study conducted with nurses, the authors stated that the participants were less prepared for emergencies such as biological and chemical weapons attacks (20).

In Bayraktar and Yildirim's study conducted with senior nursing students, the students reported that disaster-nursing courses should be included in the nursing education curriculum (21). In a study conducted with paramedics, it was stated that paramedics should receive disaster response training, that training is important in terms of disaster

preparedness, and that the inclusion of these trainings in the paramedic-training curriculum could provide paramedics with the competence and ability to respond effectively to disasters and mass events (22). In a study conducted in 25 hospitals in 2018, an investigation of hospitals' preparedness for disasters demonstrated that these hospitals were not adequately prepared for disasters, although they had been faced with disasters in the last 5 years (23). In Labrague et al.'s study conducted with nurses, 57.7% of the participants stated that they were not knowledgeable about the protocols to be followed in the event of a disaster in the hospital they worked in (24). The results of study are consistent with those of studies conducted previously. The health personnel often did not perceive themselves prepared for disasters and emergencies, and they thought that the health institutions they worked in often did not make adequate preparations.

According to the analysis of the demographic characteristics of the participants, more than 70% of the participants were women, and most of them had undergraduate or higher education (Table 3). Only 9.8% of the participants took part in disaster responses. In a study conducted with 1341 nurses, 67.3% of the participants were women and 91.3% had a nursing diploma (25). In Koca and Arkan's study conducted with nursing students, the majority of the participants were women and had no disaster response experience (26). The present study, also aimed to determine which characteristics of health personnel led to differences regarding their evaluation of hospitals' preparedness for disasters and emergencies.

The analysis performed in accordance with this aim revealed statistically significant differences between the participants' scores for the hospital's preparedness for disasters and emergencies in terms of the variables such as educational status and previous disaster response experience (Table 4). In the modelling study conducted by Mcneill et al., it was found that disaster response experience positively affected preparedness (27). In a study conducted with participants from 27 countries in Europe, 15% had a disaster response experience on the job. While 56% of the participants who had disaster response experience, were knowledgeable about the procedure to be performed in case of a disaster, this rate was 23% in those who did not have disaster response experience (28). In a study conducted to investigate a postdisaster situation in Taiwan, healthcare professionals stated that the hospital they worked in was inadequate in terms of disaster preparedness and that they had difficulties in maintaining services (29).

The study, the factors affecting the health personnel's level of preparedness for disasters were also analysed (Table 5). The analysis revealed significant differences between them in terms of variables such as sex, education level and disaster experience. In a study conducted with 973 nurses published in 2016, no significant relationship was determined between disaster experience and being prepared for a disaster (30). In their study, Najafi et al. concluded that experiencing a disaster had a significant effect on disaster preparedness, but factors such as sex and education level did not have a significant effect (31). In another study conducted with nurses, 56.7% of the participants stated that they worked in a hospital during a disaster. The level of preparedness for disasters among emergency room nurses, who previously received disaster training and gained experience in disasters, and whose length of

service in the profession was long was significantly higher than it was in those working in other units (32).

It can be said that the effect of sex and educational status on disaster preparedness is limited. It can also be said that longer professional experience and having previously taken part in disaster responses contribute more positively to taking action when an emergency or disaster is faced, and that these experienced people can take an active role in the planning, and interventions to be made.

In the present study, investigated whether there was a significant relationship between the hospital's preparedness for disasters and emergencies and the health personnel's level of preparedness for disasters (Table 6). According to the results of the analysis, a positive and highly significant relationship was determined. In a study conducted in Italy to determine the level of preparedness for disasters in 15 hospitals, it was reported that the preparedness level was inadequate in 12 hospitals and adequate only in 3 hospitals. In the same study, the importance of preparing the hospital for disaster and training the staff simultaneously was mentioned (33). In a study conducted to compare the disaster preparedness level of hospitals located in a rural area and in a city center, a statistically significant relationship was determined between the location of the hospitals and the perceived preparedness for disasters and emergencies. The preparedness levels of hospitals for disasters located in the city center were higher (34). Health institutions with the necessary equipment may not be sufficient for their preparedness for disasters and emergencies. Therefore, a health institution's capability to maintain its functions in an emergency depends on health personnel's ability to continue working physically and psychologically.

CONCLUSIONS

In the present study, most of the health personnel thought that the hospital they worked in was prepared for disasters. It can be said that the construction of hospitals based on certain standards, and their management according to certain rules affect health personnel's thoughts about their preparedness for disasters. However, health personnel think that their level of preparedness for disasters is low. Given the important roles of health personnel in coping with disasters, health personnel are expected to know all stages of hospital disaster plans and to be capable of giving the necessary response in disaster situations. The number of activities such as planning, exercises and training that will raise awareness of health personnel working in all hospitals about disaster preparedness should be increased and their effectiveness should be ensured.

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Safety Feeling and Satisfaction Rates of Syrians Under Temporary Protection in Turkey's Eastern Province

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Abstract

Objective: This study aims to determine safety feeling and satisfaction rates of Syrians under temporary protection in an eastern province of Turkey.

Methods: This study is a cross-sectional study. The study was conducted among Syrians under temporary protection over the age of 18 living in a province in the eastern Anatolian region of Turkey.

Results: The average time of living of the Syrians in Turkey was 24.36 ± 15.46. 53.9% of the participants were women, and 46.1% were men. The average age of women was 37.18±11.59, while the average age of men was 37.59 ± 11.10. The average number of people staying at home was 6.95 ± 3.05. 69.6% of the participants in the study had a nuclear family structure. The ratio of disabled family members was 13.1%. 70.8% of those included in the study considers returning to Syria again. There was a positive correlation between the increase in family income and age and the average feeling of being safe. The average score of feeling safe was significantly higher in those who did not have the idea of returning to Syria.

Conclusion: It has been observed that people do not have problems in accessing health services and the education of their children, but they have problems mostly due to language and economic difficulties.

Key words: Refugee, Migration, Syrians.

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INTRODUCTION

Throughout history, individuals or groups have continually migrated for economic and social reasons, to work or achieve a better life. As another factor, they were forced to migrate due to some reasons such as war or epidemic (1). Migration, signifying people's movement to achieve the better, has sometimes resulted from the change and sometimes the cause (2).

Immigrants bring their value judgments, cultural structures, and identities with them (1). Migration forces both individuals and society to a new cultural form in addition to the economic, social, and cultural changes it brings. Situated on a major migration route, Turkey experienced many masses immigration. The Syrians under the temporary protection are the last ring of this immigration (2,3). The refugee problem is a severe problem that has existed worldwide for multiple years and is getting bigger with each passing day. The Syrian war, which caused the worst refugee crisis since World War II, left 12 million people desperate in need of help (4). The number of Syrians who came to Turkey under temporary protection is increasing every day, and the number of Syrians under temporary protection exceeded 4 million people (5).

The society, religious beliefs, and homeland perception of the individual are influential in the formation of individual identity. While these elements reveal where and how a person belongs, they are also the answer to who they are Immigration creates identity crises, traumas, and uncertainties due to the deprivation of belonging of people who are displaced (6). Those who apply for immigration status may have to live in the country they migrated to for a long time with or without a temporary visa (7).

In a study performed among asylum seekers in developed countries, they may be exposed to communication challenges, poverty, discrimination, general health problems, infectious diseases, nutritional deficiencies, particularly vitamin D deficiency, diabetes, and reproductive health (7). Screening of the health status of immigrants is widespread. Nevertheless, there is little information to verify these screenings' effectiveness, as immigrants have limited communication with service lines and are lost for screening purposes (7).

The need for security is defined in the literature as "the requirement to have a safe, stable, attachment, resistance, protection needs, fearless, free from anxiety and confusion, structured, orderly, regulated, principled, lawful, with definite borders and powerful protectors." Security need is also included in the basic needs category in Maslow's hierarchy of needs (2).

Social relationships and attachment experiences are also essential for the individual to feel socially secure and, accordingly, in emotional states' regulation. Individuals' positive emotions experienced in their social relationships are essential to have a positive mood and comprehend their social rank. Studies reveal that attachment experiences strengthen the individual's feelings of trust and social connectedness. In this case, they are essential for mood and brain maturation (8).

In a study performed in the Netherlands, the proportion of Dutch people who sometimes feel unsafe was found to be 36%, while this rate was found to be 40% for those of immigrant origin who are not from Western countries (9). A study conducted among Syrians living in Lebanon discovered that 27% of Syrians do not feel safe (10). When Kaya asked about how safe they feel in Istanbul to Syrians

under temporary protection, the majority expressed a sense of security (91.8%), while 6.8% mentioned the uneasiness in security in the city (4).

Turkey, which hosts the largest number of Syrians globally, is a country under heavy responsibility for providing protection, security, residence, and access to essential services to all the Syrians (4). Hence, they feel insecure, and the satisfaction levels of Syrians living in Turkey are significant. Since the number of Syrians who took refuge in Turkey is significant, and they are included in the social and economic lives in various provinces of Turkey other than the asylum centers, they culturally interact with the local community, the significance of the subject increases for the Turkish people and Syrians.

This study was carried out to determine the demographic characteristics of Syrians under temporary protection, their feeling of safety and satisfaction, and the measures that the relevant institutions can take in the light of the findings.

METHODS

This study is a cross-sectional study. In this study conducted among Syrians aged 18 and over; 3,946 Syrians under temporary protection aged 18 and over in a province in the eastern Anatolian region of Turkey constituted the study's universe, according to the records dated 1 March 2018 of Elazığ Governorship Social Assistance and Solidarity Foundation Provincial Directorate (SYDV). In determining the number of individuals to be included, the following formula was used: n = Nt2pq/d2 (N-1) + t2. With a 95% confidence interval, 40% prevalence, and 2% deviation, the number of people included in the sample was calculated as the sample group of 337 people. From the list of names and addresses of Syrians living in Elazığ, taken from the Social Assistance and Solidarity Foundation (SYDV), the people's names and addresses in the sample were determined using a randomized scale of numbers. 336 of the 337 people through repeated visits were reached. The temporary protection status and being Syrian over 18 years old constitute the criteria for inclusion in the study.

The questionnaire form prepared in light of the significant literature consists of 3 parts. The first part comprises the questions about the people's socio-demographic characteristics, while the second part includes the questions about their attitudes and behaviors in addition to some habits, and the third part covers Social Security and Satisfaction Scale questions.

Feeling in social security can be described as the degree of perceiving the social world in which an individual lives as safe, peaceful, and relaxing. It includes feelings of attachment, belonging, and satisfaction they encounter in social situations towards other people around the individual. Gilbert et al. developed social Safeness and Pleasure Scale (8). It was adapted to Turkish by Akın et al. (Akın 2015: 439-440). The answers have the following meanings: (0) Never, (1) Rarely, (2) Occasionally, (3) Usually, and (4) Always (11).

After applying the pre-test to 15 Syrians, and the questions were determined to be understandable, the questionnaires were administered by interviewers who knew Arabic using a face-to-face interview technique. Participation in the questionnaire was voluntary, and the questionnaires were directed after the participants were informed and signed the consent form.

The study's field application was performed between 15.04.2018 and 15.05.2018.

The study's administrative permission was received from the SYDV, and ethical permission was obtained from Fırat University Social and Human Sciences Scientific Research and Publication Ethics Board.

Statistical Analysis

The obtained data were recorded in the SPSS 22 program, and error checks, tables, and statistical analyzes were performed through this software. Kolmogorov Smirnov test was applied for normality distribution. The means are presented with standard deviations. X^2, t-test, and variance analysis were used as statistical analysis methods. The significance limit was defined as $p < 0.05$.

RESULTS

34.8% of the participants live for 0 to 12 months in Turkey, while 20.8% live for 13 to 24 months. 27.7% live for 25 to 36 months, and 16.7% live for more than 37 months in Turkey. The average time of living of the Syrians in Turkey was 24.36 ± 15.46. 53.9% of the participants were women, and 46.1% were men. The average age of women was 37.18±11.59, while the average age of men was 37.59 ± 11.10 (37.37 ±11.11 in total) (Table 1).

Table 1. Distribution of some demographic characteristics of Syrians by gender.

Variables	Male n(%)	Female n(%)	X^2	p
Age				
35 years and under	74 (46.5)	85(53.5)		
36-55 years	67(45.3)	81(54.7)	0.109	p=0.947
56 years and over	14(48.3)	15(51.7)		
Married	142(52.0)	131(48.0)		
Single/Divorced	12(80.0)	6(20.0)	41.770	p=0.000
Spouse Dead	1(2.0)	44(98.0)		
Educational Level				
Illiterate	10(20.4)	39(79.6)		
Literate	29(35.8)	52(64.2)		
Primary School Graduate	40(51.9)	37(48.1)	27.196	p =0.000
Secondary School Graduate	36(58.1)	26(41.9)		
High school and equivalent school graduate	23(54.8)	19(45.2)		
Post-graduate graduate	17(68.0)	8(32.0)		
Education Status of Spouse				
Illiterate	16(57.1)	12(42.9)		
Literate	47(44.8)	58(55.2)		
Primary School Graduate	42(51.2)	40(48.8)		
Secondary School Graduate	17(39.5)	26(60.5)	7.084	p=0.214
High school and equivalent school graduate	14(34.1)	27(65.9)		
Post-graduate	5(29.4)	12(70.6)		
How does this person earn a living?				
Working	129 (90.8)	13(9.2)	197,872	P=0.000
Spouse is working	1(1.2)	84(98.8)	92.533	P=0.000
Spends the savings	64(44.4)	80(55.6)	0.284	P=0.591
With Social Aids	71(41.0)	102(59.0)	3,719	p=0.054
With the help of neighbors	13(34.2)	25(65.8)	2.450	P=0.118
Help of Relatives	37(36.3)	65(63.7)	5.726	P=0.017
Over 18, working	27(36.0)	48(64.0)	3.988	P=0.046
Under 18 years old, working	32(47.1)	36(52.9)	0.030	P=0.864

47.3% of the participants were aged 35 and below, 48% were married, 38.6% have not completed any school, 48.5% receive social assistance, 97.6% have an income below the minimum wage (Table 1). 51.8% of the participants were housewives, 19% workers, 14.9% self-employed, 7.1% artisans, and 7.1% do not work. The average per capita income in Turkey was estimated as $ 127.78 ± 75.38. The average number of people staying at home (min 2, max 30) was equal to 6.95 ± 3.05.

69.6% (234 people) of the participants in the study had a nuclear family structure. While 76.8% (258 people) of the houses where the participants were visited were staying in a single-family, 17.0% (57 people) had two families, and 6.2% (21 people) had three or more families.

81.0% (258) of the study participants have a relative who stayed in Syria and could not come together. When the proximity of the relative who stayed in Syria is considered; 8.8% (24 people) asserted that they left their spouse, 32.4% (88 people) their mother or father, 15.8% (43 people) their siblings, 43.0% (117 people) any first-degree relatives in Syria.

55.1% of the participants (185 people) stated that any of their relatives died in the civil war. The ratio of disabled family members was 13.1% (44 people). 9.9% of the Syrian women stated that they were pregnant at the time of the survey. The number of pregnancies of women on average was 4.41 ± 2.43 (min; 0 max; 12), the number of live births was 4.25 ± 2.42 (min: 0, Max: 12), while the average number of living children was 3.65 ± 1.94 (min: 0, max: 10).

Table 2. Distribution of problems experienced by Syrians in Elazığ by gender.

Problems Experienced	Male n (%)	Female n (%)	X^2	p
About health	8 (5.2)	4 (2.2)	X^2=2.112	p=146
About Social Life	17 (11.0)	24 (13.3)	X^2=0.409	p=0.474
Regarding the Economic Situation	132 (85.2)	159 (87.8)	X^2=0.519	p=0.471
Language problem	135 (87.1)	168 (92.8)	X^2=3.085	p=0.079
Children's Education Problem	2 (1.3)	2 (1.1%)	X^2=0.024	p=0.876

Table 3. Distribution of the participants' average social safeness and pleasure scale score, according to some factors.

Variables	Mean±SD		p
Gender			
Male	24.28 ± 6.93	t:18.255	p=0.211
Female	25.10±5.04		
Marital status			
Married	24.70 ± 6.26		
Divorced/Single	25.78±6.03	f: 0.314	p=730
Spouse Dead	24.49 ± 4.06		
Education status (n = 336)			
Illiterate	24.29 ± 5.68		
Literate	25.30 ± 5.82		
Primary education	23.26 ± 6.25	f:2.016	
Secondary School Graduate	24.98 ± 5.50		p=0.076
High school and equivalent school graduate	25.00 ± 6.71		
College or university graduate	27.16 ± 5.35		
Education status of spouse n = 316			
Illiterate	23.57±5.21		
Literate	25.20 ± 6.35		
Primary education	23.63 ± 5.78	f: 1.663	
Secondary School Graduate	25.23 ± 5.53		p=0.143
High school and equivalent school graduate	24.76 ± 5.90		
College or university graduate	27.35±4.88		
Family type			
Nuclear family	24.72±5.79	t: 0.273	p=0.785
Extended family	24.91±6.27		

f= One-Way Anova, t= Independent simple t test

The most frequently mentioned problem stems from language and economic situation (Table 2). There was no significant difference between the participants in terms of gender, marital status, education level, family type and safety feeling and satisfaction (p>0.05), (Table 3). The mean score of

Safety feeling and satisfaction was significantly higher in those who did not plan to return to Syria and did not work in any job ($p<0.05$), (Table 4).

While there was a significant relationship between safeness and income status and age ($p<0.05$), no relationship was found with the length of stay in Turkey ($p>0.05$), (Table 5).

70.8% of the participants (238 people) thought of returning to Syria again; 29.2% (98 people) declared that they do not intend to return. 83.7% (82 people) of those who do not intend to return to Syria declared that they do not intend to return due to reasons such as lack of life security, 16.3% (16 people), the possibility of having financial difficulty in Syria, and since the people lost all the belongings in Syria. 13.9% of Syrians living in Elazığ (45 people) had received compliance training in Turkey, 86.1% (278 people) affirmed any adjustment training.

Table 4. Distribution of the Average Score of Safeness and Pleasure According to Some Factors.

Variables	Mean ± SD		p
Work carried out in Turkey			
Housewife	25.04 ± 5.06		
Worker	25.36 ± 7.09		
Freelancer	23.42 ± 6.20	f: 2.869	
Non-working	26.42 ± 6.75		p=0.023
Total	21.79 ± 6.92		
***Receiving any aid**			
Receiving aid	25.07 ± 5.61	t: 2.941	p=0.473
Not receiving aid	24.94 ± 6.73		
Status of experiencing economic, education, language etc. problems			
Not experienced	27.50±7.78	f:0.720	p=0.541
Experiencing one of these problems	24.81±7.15		
Experiencing two of these problems	24.47 ± 5.46		
Experiencing three of these problems	24.78 ± 5.97		
Anybody was lost in your family during war?			
Yes	25.95 ± 5.45	t:1.608	p=0.183
No	24.57 ± 6.05		
Relative who stayed in Syria			
Yes	25.05±5.94	t:0.993	p=0.042
No	23.36±6.05		
Having a disabled member in the family			
Yes	24.36±5.35	t: 0.581	p=0.668
No	24.78 ± 6.09		
Having a family member died during the war			
Yes	24.75 ± 5.41	t: 0.581	p=0.932
No	24.70 ± 6.65		
Thought of returning to Syria			
Yes	24.29±5.98	t: 4.281	p=0.039
No	25.78±5.91		
Status of receiving cohesion training			
Yes	24.40±5.96	t: 204	p=0.652
No	24.83 ± 5.94		

* Social assistance, help of neighbors and relatives
f= One-Way Anova, t= Independent simple t test

Table 5. Examining the relationship between safeness and age and income status.

Variables	Correlation Coefficient		
Feeling safe and age relationship	r=0.176	p=0.001	R^2=3%
Feeling safe and family income status	r=0.149	p=0.006	R^2=2%
Feeling safe and time spent in Turkey	r=0.093	p=0.090	R^2=0%

DISCUSSION

When the problems encountered by the participants regarding social life are explored in our study, the most common problems were determined to be related to language (90.2%) and economic challenges (86.6%). The rate of those who reported problems with health services (3.6%) and children's access to educational institutions (1.2%) was

determined to be relatively low. There was no significant difference between the difficulties encountered and gender (p> 0.05).

The language problem is a factor that leads to social reactions and differences in culture and life (12). Immigrants are experiencing integration problems and the language barrier makes their integration into Turkish society even more difficult (4). In the report written by Celik, it was declared that Syrians mostly faced language and unemployment problems (13). It was ascertained that 23.2% of them had problems in social cohesion (14). “The fact that problems arising from differences in language, culture, and lifestyle have a significant place among Syrians and locals creates a problem in cohesion (13). 66.9% of Turkish people believe that they will not be able to adapt to Syrians. It was ascertained that approximately 50% of the Turkish people participating in the study do not want to be neighbors with Syrians, and 70.3% do not regard themselves as close culturally (15). It seems that there are challenges in terms of social acceptance. It may be advantageous to take the essential precautions and work on cohesion and provide language learning support.

The second most common problem identified among the participants is economic challenges. Studies performed in Istanbul discovered that the proportion of Syrians encountering unemployment ranged from 30.4% to 33.4% (4,15). It was ascertained in the AFAD (Disaster and Emergency Management Presidency) 2017 report that 33.4% of Syrian respondents perceive the job lines that they can work sufficiently or rather sufficient (14). Finding a job opportunity is one of the reasons why Syrians come into urban areas (4). The study of Balkan et al. reveals that Syrians work for low wages (16). In the 2013 International Labor Organization's evaluation of the employment types of Syrian refugees in Lebanon, it was declared that the majority of the refugees were unskilled or semi-skilled, often working in informal or temporary/seasonal jobs and often failed to secure job security and regular income (17). Concerning unemployment, social exclusion, gender discrimination, language problem, lack of childcare, and abuse by the employer are asserted as other unemployment problems. Most Syrians are unskilled workers, unfamiliar with the industrial concept, and language problems cause unemployment. Although granting a work permit to Syrians is not sufficient, it is stated in the sources that vocational training and language training can decrease the unemployment problem (18).

Our study concluded that 3.6% of the participants had problems in getting health services. It is stated in the AFAD report that 8.20% of the Syrians under temporary protection living outside the camps are not satisfied with the health services, and 13.6% of them have problems in terms of health care due to financial problems (14). In a study conducted among Syrians in Lebanon, only 22% of the participants asserted that they could reach the services at all times (10). A study conducted in Istanbul discovered that 7.8% people had problems in accessing social services (4).

In our study, 1.2% of the participants stated that they had problems with their children's education. A published report stated that there are difficulties in education due to local reasons and language (12). In a report published in 2013, it was stated that Syrians living outside the camps who can access Turkish schools are limited to those who have a passport, are registered with the police and have a residence

permit, and only 10% of the children of Syrians have access to education (19). The problem in reaching school stems from child labor, curriculum and language problems, early marriage, and trouble for reaching school (20). It has been recorded that most Turkish people support the education of the children of Syrian families (13). In our study, it was observed that there are very rare problems in accessing education, unlike other studies.

Our study ascertained that 70.8% of the participants are planning to return to Syria. It was concluded that 83.7% of the participants who did not have the idea of returning did not want to return due to life safety concerns. In a study conducted by UNHRC in Jordan in 2019, it was discovered that Syrians did not want to return due to comparable reservations (UNHRC 2020) (21). It was resolved in the AFAD report that 76.7% of the participants had the idea of returning to Syria (14). The studies conducted by UNHRC between 2016-2019 reveal that some Syrians returned to Syria (230,000 people from Turkey) (UNHRC 2020) (22). Again, in a report published by the UNHC, it was discovered that 5.9% of the Syrian refugees in Egypt, Iraq, Lebanon, and Jordan are considering returning to Syria within one year, and 75% have the hope of returning to Syria one day (23). It was concluded that Syrians under temporary protection did not fulfill the minimum return conditions for return due to the lack of security, essential services, and Syria's economic opportunities. They could not return due to the compulsory military service for men (24). Ensuring humanitarian conditions in Syria can undoubtedly accelerate returns.

It has been determined that Syrians under temporary protection living in camps have no difficulty in accessing basic services such as health and education (12). Hence, camp lives can be more active. In the ORSAM report published in 2015, it was asserted that Syrians could stay longer than expected (12).

Although no significant difference was detected in our study, it was observed that female participants felt more secure compared to male participants. Similar results were obtained in a comparable study conducted among Syrians in Lebanon (10). A study conducted in Istanbul determined that female participants were more extreme in feeling safe and not than men.4Although there was no significant difference, a study conducted in Malatya discovered that women felt less safe (25). Studies are proving that men feel more secure than women (26). Studies are confirming that gender does not affect the state of feeling safe (27). Another study detected that 91% of male participants felt safe, while 76% of female participants felt safe (28). These differences may arise from the differences of the study groups. Also, immigrant women stay more at home while men have to meet the requirements outside of the home to reduce the safeness in men (28).

Our study concluded that the average score of safeness in the non-working group was significantly lower than the working group. Studies are proving that there is a relationship between income status and safeness (26). The average score of safeness was found in our study to be higher, although not significant, among those who declared that they did not experience any problems and did not have the idea of returning to Syria, and those who stated that they had a problem and had the idea of returning to Syria. This is an expected result. There was no difference between the group that received cohesion training and

the group who did not in terms of the average score of safeness. Only 13.9% of the participants declared that they received cohesion training and 91.1% of those who received cohesion training stated that they received 1-hour cohesion training.

When the relationship between age and safeness was investigated in our study, no relationship was observed (25, 26). When the relationship between income status and safeness was considered in our study, it was observed that the average score of safeness increased significantly as income increased. In the study conducted by Konak and Kork in Malatya, no stable relationship was detected between increased income and safeness, and no relationship was discovered between age and safeness (25). A study conducted by Wood et al. concluded that the income level in the slums affects the feeling of self-safety, and it is higher in people having a high income (26).

No relationship could be detected between the safeness and time spent in Turkey. In the study conducted by Wood et al., no relationship was observed between settlement duration and self-confidence (26). In the study conducted in Lebanon, it was discovered that Syrians living at home feel more relaxed than those living in other settlements (10).

CONCLUSIONS

It is seen that the majority of the participants in the study are under the age of 55. Working areas should be increased and social support activities should be carried out for the young population. It may be appropriate to provide support to reach older people in education.

It has been observed that people do not have problems in accessing health services and the education of their children, but mostly due to language and economic difficulties. Language education should be supported.

Ethics Committee Approval: This study was performed after approval by the local ethics committee (approval number: KSU-08.01.2020/02).

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RESEARCH ARTICLE

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Functional Outcomes of Patients Treated with Fibula Strut Graft and Double Plate in the Treatment of Recalcitrant Humerus Nonunions

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Abstract

Objective: Recalcitrant humerus nonunion is challenging to treat, and plate fixation is a common treatment choice. This study aimed to determine the efficiency of double plating combined with nonvascularized autologous fibular strut allograft in the treatment of atrophic and defective humerus nonunions.

Methods: Fourteen patients were surgically treated for recalcitrant humerus nonunions. Demographic data (age, gender, dominant side), clinical features, and previous surgical records of the patients were recorded preoperatively. Preoperative Visual Analogous Scale (VAS) and Constant-Murley scores of the patients were recorded before the surgery.

Results: 10 (71.4%) of the patients were female, and 4 (28.5%) were male. The mean age was 53.07±9.69 (range, 39-67). 9 (64.3%) of the patients had nonunions on the dominant side. The mean follow-up was 11.14±1.9 months. The complete union was observed in all patients, and the mean union time was 5.1±0.63 months (range, 4.2-6.0). The mean preoperative VAS score was 7.29 ± 0.91 (range, 6-9), and the mean postoperative VAS score was 0.93 ± 0.92 (range, 0-3). VAS scores improved after the surgery ($p<0.001$). The mean preoperative Constant-Murley score was 53.57 ± 12.17 (range 34-72), and the mean postoperative Constant-Murley score was 86.00 ± 9.21. Constant-Murley scores improved after the surgery ($p<0.001$). Gender ($p=0.635$), dominant side involvement ($p=0.112$), and age ($p=0.925$) did not correlate with union time.

Conclusion: Double plating with autologous nonvascularized fibular grafts is a successful treatment option for recalcitrant humerus atrophic nonunions, especially with bony defects.

Key words: Recalcitrant humerus nonunion, Double plating, nonvascularized fibular grafts

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INTRODUCTION

Humerus fractures are common, accounting for 5-8% of all fractures. Several surgical and conservative methods for treating humerus fractures are well-defined in the literature. Nonunion rates after conservative treatment of the humerus fractures are 2-10%, which is reported as 30% after surgical management (1-3). Most of these fractures occur in the proximal one-third portion or have a proximal butterfly fragment (4). Complex fractures, inadequate fixation, smoking and alcohol consumption, infections, diabetes mellitus, malnutrition, and early brace removal are reported etiological factors for humerus nonunion (5). Implanted implants and infections after multiple surgeries lead to bony defects, osteopenia, necrotic bone, scars in the connective tissue, metallosis, and instability, which are the obstacles to surgical treatment (6).

Humerus nonunions can be successfully treated with osteosynthesis with single or double plates, intramedullary nailing, Ilizarov fixators, and bone grafting. Success rates with these methods or combinations are reported as 82-95% in the literature (7). Compression plating combined with intramedullary fibular strut allografts is a previously defined surgical technique for treating atrophic and osteopenic humerus nonunions (8, 9). The aim of this study is to determine the efficiency of double plating combined with nonvascularized autologous fibular strut allograft in the treatment of atrophic and defective humerus nonunions after failed surgeries.

METHODS

Fourteen patients surgically treated for recalcitrant humerus nonunions in our clinic between 2009 and 2018 were retrospectively evaluated. Institutional Review Board approval from Amasya University was obtained. Written and verbal informed consent of the patients was taken.

Demographic data, clinical features, and previous surgical records of the patients were recorded preoperatively. CBC, ESR, and serum CRP values of the patients were tested to diagnose probable infection. Patients with a history of previous surgery for humerus fractures, having bony defects, and no infection are included in this study. Patients with infection, pathological fractures, malunions too distal for intramedullary fibular graft usage, and patients without bony defects were excluded from the study. Preoperative Visual Analogous Scale (VAS) and Constant-Murley scores of the patients were recorded before the surgery (10).

Surgical Technique:

All the patients were operated under general anesthesia and in the supine position. The same surgeon operated all of the patients. Previous surgical scars and nonunion lines were considered for the skin incision. The radial and musculocutaneous nerves were identified and protected during the soft tissue dissection. Existing implants were removed, and the nonunion line was exposed. All of the fibrous and bony necrotic tissues in the nonunion line were removed. Samples from the nonunion line were taken for culture. Obstructed medullary canals, both proximal and distal to the nonunion line, were curetted and drilled. Two two-cm skin incisions were done in the distal and proximal ends of the 10-cm middle portion of the fibula. Soft tissue was dissected, and fibular osteotomy was performed from these incisions. Neighboring soft tissue was dissected, and 10-cm long autologous fibular strut graft was harvested.

Soft tissue on the graft was removed, and the graft was decorticated to fit the intramedullary canal of the humerus. The graft was positioned as the middle point of the graft will be in the nonunion line. Bony alignment was carefully evaluated to prevent rotation. One 3.5-mm LC-DCP plate was applied from the lateral aspect of the humerus, and another plate was applied from the anterior aspect after that. Both plates were implanted in a manner as at least four screws were implanted in the proximal part and at least four in the distal part of the humerus. The longest possible plate was implanted according to the site of the nonunion. The periosteum was protected as far as possible.

No splints were utilized in the postoperative period. Passive shoulder and elbow movements were started on the first postoperative day. Active range-of-motion exercises were started after the radiological union.reached

Statistical Analysis

Power analysis was performed with the G*Power version 3.1.9.7 software (11). According to the power calculations for the study performed by Feng et al. (12), only four patients were needed to compare the mean Constant-Murley scores between the groups.

Statistical analysis was performed using SPSS version 27.0 (SPSS, Inc., Chicago, IL). Frequency distributions were expressed as number and percentage, continuous variables as mean ± standard deviation. Normality of the data was tested with the Kolmogorov-Smirnov test, and since all the distributions of the variables were normal, parametric tests were used. The p-value of less than 0.05 was considered significant.

RESULTS

Ten (71.4%) of the patients were female, and four (28.5%) were male. The mean age was 53.07±9.69 (range, 39-67). Nine (64.3%) of the patients had nonunions on the dominant side. The mean follow-up was 11.1±1.9 months. A complete union was observed in all patients, and the mean union time was 5.1±0.63 months (range, 4.2-6.0) (Figures 1, 2). Patients' data are summarized in Table 1.

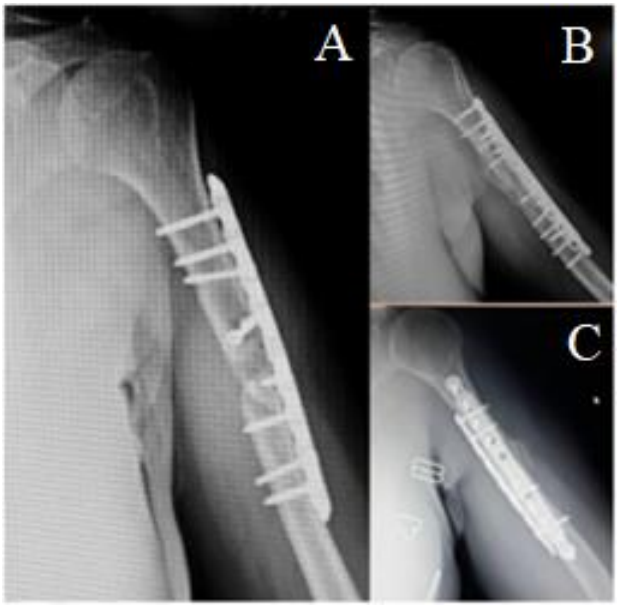


Figure-1. 49 years old women A-B) preoperative, C) postoperative 60th days D) postoperative 100th days

Nine of the patients were operated once, and five of them were operated twice in another center, and these surgeries failed. Four of them had intramedullary nailing, and ten of them had plate-screw osteosynthesis.

The mean preoperative VAS score was 7.29 ± 0.91 (range, 6-9), and the mean postoperative VAS score was 0.93 ± 0.92 (range, 0-3). VAS scores improved after the surgery (the paired samples t-test, $p<0.001$).

The mean preoperative Constant-Murley score was 53.57 ± 12.17 (range 34-72), and the mean postoperative Constant-Murley score was 86.00 ± 9.21. Constant-Murley scores improved after the surgery (the paired samples t-test, p<0.001).

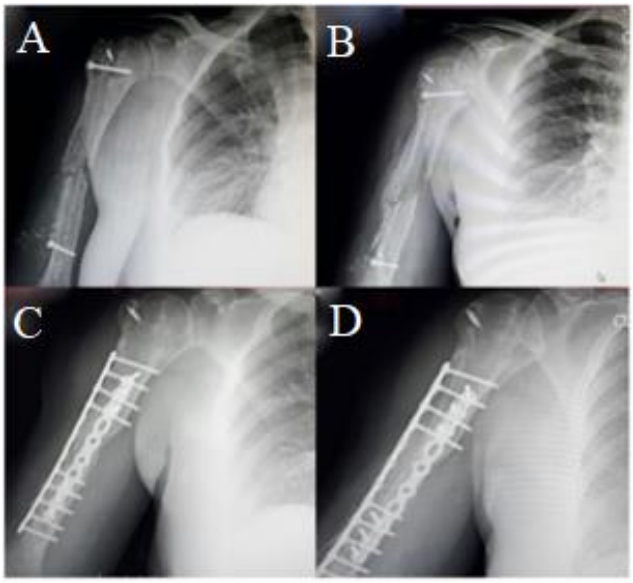


Figure-2: 47 years old women, A) preoperative, B) postoperative 60th days and C) postoperative 90th days

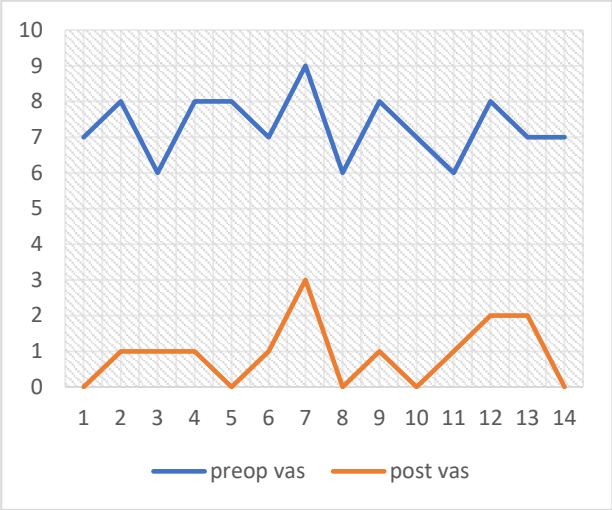
Gender did not affect the postoperative VAS score (Independent-Samples t-test, p=0.428), union time (Independent-Samples t-test, p=0.679), or postoperative Constant-Murley score (Independent-Samples t-test, p=0.999).

Dominant side involvement did not affect the postoperative VAS score (Independent-Samples t-test, p=0.055), union time (Independent-Samples t-test, p=0.068), or postoperative Constant-Murley score (Independent-Samples t-test, p=0.366).

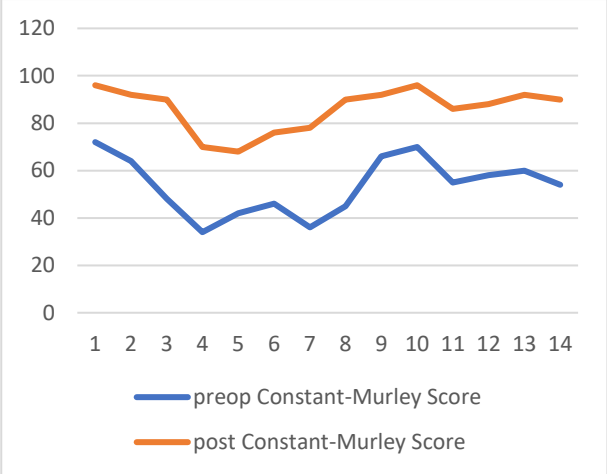
Age did not correlate with union time (Pearson correlation test, r=0.0584, p=0.842), postoperative VAS score (Pearson correlation test, r=0.147, p=0.614) or postoperative Constant-Murley score (Pearson correlation test, r=0.4944, p=0.072).

Table 1. Patients' data

Patient No	Gender	Age (Years)	Affected Side	Union Time (Months)	Follow Up Time (Months)
1	Female	49	R-dominant	5,50	11
2	Female	47	R-dominant	4,20	13
3	Male	54	L-nondominant	5,50	12
4	Female	67	L-nondominant	6,50	14
5	Female	48	R-dominant	4,60	10
6	Female	65	R-dominant	5,00	9
7	Male	62	L-dominant	4,80	10
8	Male	43	L-nondominant	6,00	8
9	Female	57	R-dominant	5,20	12
10	Female	42	L-nondominant	5,00	11
11	Male	65	L-dominant	4,60	10
12	Female	39	R-dominant	5,50	9
13	Female	44	R-dominant	4,50	13
14	Female	61	L-nondominant	4,60	14



Graphic-1. Preoperative and Postoperative VAS Scores



Graphic-2. Preoperative and Postoperative Constant-Murley Scores

DISCUSSION

Recalcitrant humerus nonunions are hard-to-treat for both the patients and the surgeons. Patients generally complain about pain and inability to move. Co-existing problems such as obesity, diabetes mellitus, osteoporosis, alcoholism, and smoking habit may complicate the treatment (13, 14). Dissection may be more complex with previous unsuccessful surgical attempts and previous implants. Neurovascular structures are more prone to injuries.

Various techniques for managing humerus nonunions are well-defined in the literature, but the old standard technique is still debatable (8, 9, 15). Several studies showed that plate-screw systems and bone grafts can achieve union in more than 90% of the patients (16-18). The main disadvantage of this technique is the necessity for comprehensive dissections. Especially the radial nerve is at risk of injury with this technique, having an incidence of 5%, which are mostly transient (19, 20).

Results of intramedullary nailing are also a matter of debate. Siedel nails have a success rate of 30-60% (21) and using unreamed nails with bone grafts yields a 100% success rate (22). Martinez et al. compared plates and intramedullary nails in 50 patients, and with the combination of iliac crest autografts, they observed union in all patients (22).

Ilizarov external fixator is another option for the treatment of humeral nonunions. Some studies reported fewer complication rates with this technique (23, 24). This fixator is especially reasonable for patients having active infections and skin problems. Disadvantages of this technique are pin-tract infections, long treatment durations, and discomfort.

We achieved union in all the patients with plate-screw osteosynthesis. An extended anterolateral approach was used in all the patients, considering the previous incision scars. We dissected and preserved the radial nerve in all the surgeries despite the adhesions resulting from previous surgeries, and none of our patients experienced radial nerve injury (Figure-1).

Osteoporosis and osteopenia may complicate the treatment of recalcitrant humerus nonunions. These can be seen because of elderly age, previous surgeries, and disuse. Overlapping the bone erosions

of previous plates, previous screw holes, and bone loss because of the loose screws with osteopenia may make a stable fixation with plate-screws impossible (23). Utilization of 6.5 mm cancellous screws instead of 4.5 mm cortical screws and poly-methyl methacrylate (PMMA) usage are described to increase stability. On the other hand, PMMA may end up with foreign body reactions, infections, and deteriorated blood circulation of the bone, probably due to increased local temperature (24). Extramedullary or intramedullary fibular grafts are described as a means of increasing the stability of fixation. Wright et al. was the first author who described the usage of intramedullary fibular strut grafts to treat humerus malunions. They reported that intramedullary fibular grafts are intramedullary splints and the quadricortical usage of screws are biomechanically equivalent to PMMA and bicortical screws (9). While extramedullary grafts result with extended dissections, intramedullary applications do not disturb the vasculature of the bone with dissections (9, 18). Fibula may be used as allografts, vascularised or non-vascularised autografts. Vascularised fibular grafts are good choices, especially when the bony defect is wide and segmental (17, 25-27).

On the other hand, it is technically demanding. Non-vascularised fibular grafts are easier to harvest and lead to less donor site morbidity. Some authors reported successful results with non-vascularized fibular grafts (9, 28-30). Using plates with intramedullary grafts may damage both the endosteal and periosteal blood flow, and some authors advocated grafts shorter than 6 cm because of this (25). Iatrogenic fracture is another risk of intramedullary grafts especially with osteoporotic bones. We used 10-cm long non-vascularised fibular autografts, regardless of the size of the bony defect. After the stripping of the soft tissue, the graft was attentively decorticated according to the width of the humeral medulla. In order to protect stability after decortication, we did not let the fibular medulla open. We adjusted the graft in a manner that the graft did not make the humerus crack while maintaining stability. None of the patients complained about the donor side morbidity (Figure-2).

Plate-screw systems were reported to have an 83-100% success rate in the treatment of humerus nonunions either alone or with the combination of several grafts (31). Hierholzer et al. conducted a study with 78 patients and treated them with several graft combinations and locking compression plates. They used autologous iliac crest grafts in 45 patients and demineralised bone matrix (DBM) in 33 patients. They reported 100% union rate with iliac crest grafts and 97% union rate with DBM. Twenty of the patients treated with iliac crest grafts complained about prolonged pain at the donor site and superficial infections and irrigation and debridement was necessary in one patient (32). Reed et al. analysed the specimens taken from the nonunion lines in 22 nonunion patients. They reported that the vasculature of the 11 atrophic nonunions and 11 hypertrophic nonunions were same (33). Willis et al. reported 95% union rates with locked compression plates and intramedullary strut allografts in a study performed with 20 patients. They also reported that the biological status of the nonunion site is more important than the type of the graft. They advocated that stable fixation with an allograft which does not cause additional morbidity

is sufficient for the treatment of nonunions of the humerus (34). While single plating is reported to have good or excellent results, double plating is shown to increase compressive and torsional forces (34-36). We applied double LC-DCP plating with autologous non-vascularised fibular grafts. All our patients were operated before at least once and had atrophic nonunions with bony defects. Their bone qualities were poor. They were excluded from social life and work for long durations. Because of this, our main aim was to acquire perfect stability. We thoroughly debrided the nonunion line, removed all the necrotic bone and soft tissue. We applied the longest possible plate to maximise the stability. We used autologous fibular grafts and even if its osteoinductive effect is less than autologous cancellous bone grafts have, we did not add extra grafts. We made minimal incisions to harvest the graft and did our best to protect the soft tissue. We did not have any complications except the prolonged donor site pain in two patients. We could start early rehabilitation with the help of stable fixation. We achieved full union in all our patients. Feng et al also reported a 100% union rate and better Constant-Murley scores with this method (12). They reported the mean union time as 6.4 ± 1.8 months, which is slightly longer than reported in our study, 5.1±0.63 months.

The limitations of this study are its retrospective nature and limited number of the patients. Recalcitrant humerus nonunions are not common in daily practice. Because of the limited number of the cases, we could not have a control group. On the other hand, previous reports about humerus nonunions have similar sizes. It is possible to compare graft types and fixation methods with sufficient number of cases.

As a result, double LC-DCP plating with autologous nonvascularised fibular grafts is a successful treatment option for recalcitrant humerus atrophic nonunions, especially with bony defects. Autologous fibular grafts are important because they increase stability, quadricortical course of the screws enhance mechanical power of the plate fixation and they have osteoinductive property. 90°double plating increases the tensile and compressive forces in the nonunion line and diminishes the failure rates.

Ethics Committee Approval: Ethical approval was obtained from the local ethics committee at Amasya University with file number 2021/133

Author Contributions: Concept: SK Design: SK, MB. Literature search: SK, MB, Data Collection and Processing: SK, MB Analysis or Interpretation: SK, MB, Writing: SK, MB.

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

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RESEARCH ARTICLE **DOI:** 10.19127/mbsjohs.1094658

A Bibliometric Analysis of Publications on Scabies

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Abstract

Objective: Scabies is an ectoparasites caused by "*Sarcoptes scabiei* (*S. scabiei*) var. hominis" and can affect everyone regardless of gender, age and race. Scabies is caused by infestation with the ectoparasite *S. scabiei* var hominis and its incidence has increased in recent years. Bibliometric analysis uses a statistical method of academic literature in a certain research area. This study aimed to perform the bibliometric analysis of literature with scabies.

Methods: All data of this study were included from the provided by Web of Science databases. It was used the keyword "scabies" for our study. All studies published between 1970 and December 2021 were included.

Results: A total of 1924 publications were found. The most published fields were dermatology, general medicine, and infectious disease (31.20%, 10.92%, and 9.83%, respectively). The peak year of urticaria literature was 2019, with 5.85%. The United States was the most productive country, with 334 publications. Australia ranks second with 172 publications following the United States, while France takes third with 132 publications.

Conclusion: This study analyzed the publications with scabies bibliometric analyses. It was determined that the most frequently discussed subjects were *S. scabiei* and treatment of scabies. This study can help the scientific community and policymakers to collaborate and discover possible treatments for scabies and prevent its spread.

Key words: Scabies, Bibliometrics, Publication Trends

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INTRODUCTION

Scabies is an ectoparasites caused by "*S. scabiei* var. hominis" and can affect everyone regardless of gender, age and race. Transmission from person to person occurs either directly through sexual intercourse, communal life, close touch, or indirectly through the personal belongings of patients with scabies. The female mite, which is less than 0.5 mm in size, enters the skin and the antigenic structure on the exoskeleton produces a hypersensitivity reaction together with the saliva, secretions, and eggs of the mite (1, 2). The most common symptom of the disease is itching. Itching wakes the person up at night and increases in a warm environment. The presence of other itchy individuals in the family is another important finding supporting the diagnosis of scabies (3).

Scabies is classified as a neglected tropical disease by the World Health Organization (WHO) with estimated 455 million annual incidences (4). In recent years, the incidence of scabies has risen significantly in Turkey, as in other countries. The reasons behind this are the difficulties in making the correct diagnosis and the resistance to treatment. Many physicians, particularly dermatologists and family physicians, frequently encounter this disease in their daily practice and experience difficulties in diagnosis and treatment from time to time. If it is not treated, itbecomes a public health issue as it spreads quickly, especially in communal living conditions. Among the drugs used in the treatment are permethrin, phenothrin, sulfur, benzyl benzoate, crotamiton, ivermectin, malathion from topical agents, and oral ivermectin from systemic agents (5-7).

Bibliometrics is the quantitative analysis of scientific literature that helps assess the cross-sectional and longitudinal academic productivity of countries, institutions, journals, or authors (8, 9). Moreover, bibliometric analysis allows estimating the past scientific impacts, resources, and competitiveness of countries and/or continents (10).

Many fields in dermatology like psoriasis have extensively been explored through bibliometric analysis (11). Nevertheless, to the best of our knowledge, a limited number of bibliometric studies have investigated scabies in the literature. By analyzing keywords, topics, countries, and other characteristics, this study used bibliometric analysis and visual presentation instruments to examine the knowledge base and future directions related to scabies research. This study aimed to examine scabies literature utilizing the Thomson Reuters Web of Science (WoS) database. This examination could reveal current patterns and trends of scabies literature and pave the path for new and more scabies publications.

METHODS

This study did not involve data collection or intervention in clinical trials. Thus, it did not need approval from an ethical committee.

The study was done using bibliometric networks by VOSviewer software (Vosviewer, 2020). The publication period was restricted from 1970 to December 2021 for 51 years. In the WoS database, the study was done under the heading "topic" for the Social Science Citation Index studies. Accordingly, studies published in the Journals of the Social Science Citation Index (SSCI) in the WoS databases have been examined. A total of 1924 publications were reached using the keyword "scabies." The final version has been printed, and the English-language publications have been received. A total of 1924

documents were retrieved by selecting the "article" option (congress papers, excluding books, book chapters, etc.) for predetermined keywords. Study results are stored to include all basic article information such as keywords, author(s), references, title, abstract, and more.

RESULTS

A total of 1924 publications were retrieved from the WoS database. The period of the publication was restricted from 1970 to December 2021 with the following strategy: TS = 'scabies'.

Studies on scabies published in the WoS database journals and scanned in the SSCI index have been examined. First, the distribution of these publications by year is shown in Figure 1.

According to Figure 1, as of December 20, 2021, when the research data were obtained, the highest number of studies on the Scabies title was conducted in 2019. Following 2019, in which 5.85% of the total studies were carried out, 2021saw the second-highest number of studies. In 2021, when this research was conducted, 4.87% of the total number of studies was published in journals scanned in the Science Citation Index (SCI).

Then, the categories of the studies containing the title Scabies and included in the bibliometric analysis were determined. Figure 2 demonstrates the categories of publications in journals scanned in SCI.

According to Figure 2, the Dermatology category, which makes up 31.20% of the total publications, ranks first. Following this category, General Internal Medicine is in second place with 10.92%, and Infectious Diseases is in third place with 9.83%. Although they do not have rates as high as the top three categories, Community Health, Tropical Medicine, Pediatrics, Parasitology, Veterinary Medicine, Microbiology, and Immunology respectively pursue them.

After the categories were determined, the bibliometric analysis process was started. In this process, firstly, the distribution of studies titled Scabies published between 1970 and 2021 according to countries was examined with the VOSviewer program. Figure 3 shows the results of this review.

As seen in Figure 3, the USA has the most publications on scabies, with 334 studies. Australia comes in second with 172 studies, followed by France with 132 studies. Pursuing the first three countries, England ranked fourth with 118 studies, while Germany ranked fifth with 89 studies. On the other hand, Turkey is in the mid-rank with 23 studies.

Keywords used in 1,924 studies titled Scabies published between 1970 and 2021 in journals scanned in SCI were determined. Figure 4 depicts the obtained map.

According to Figure 4, the phrase "scabies" ranks first with its use in 246 different studies. The term "*S. scabiei*" is in second place with 50 studies, while "ivermectin" is in third place with 48 studies.

In the journals scanned in SCI, the most frequently used keywords were determined in the 100 most cited studies out of 1,924 titled Scabies published between 1970 and 2021. Figure 5 illustrates the obtained map.

According to Figure 5, the first two most frequently used keywords are "scabies" with 15 usages and "ivermectin" with 4 usages, respectively. The terms "*S. scabiei*" and "permethrin" are ranked third with 3 usages each.

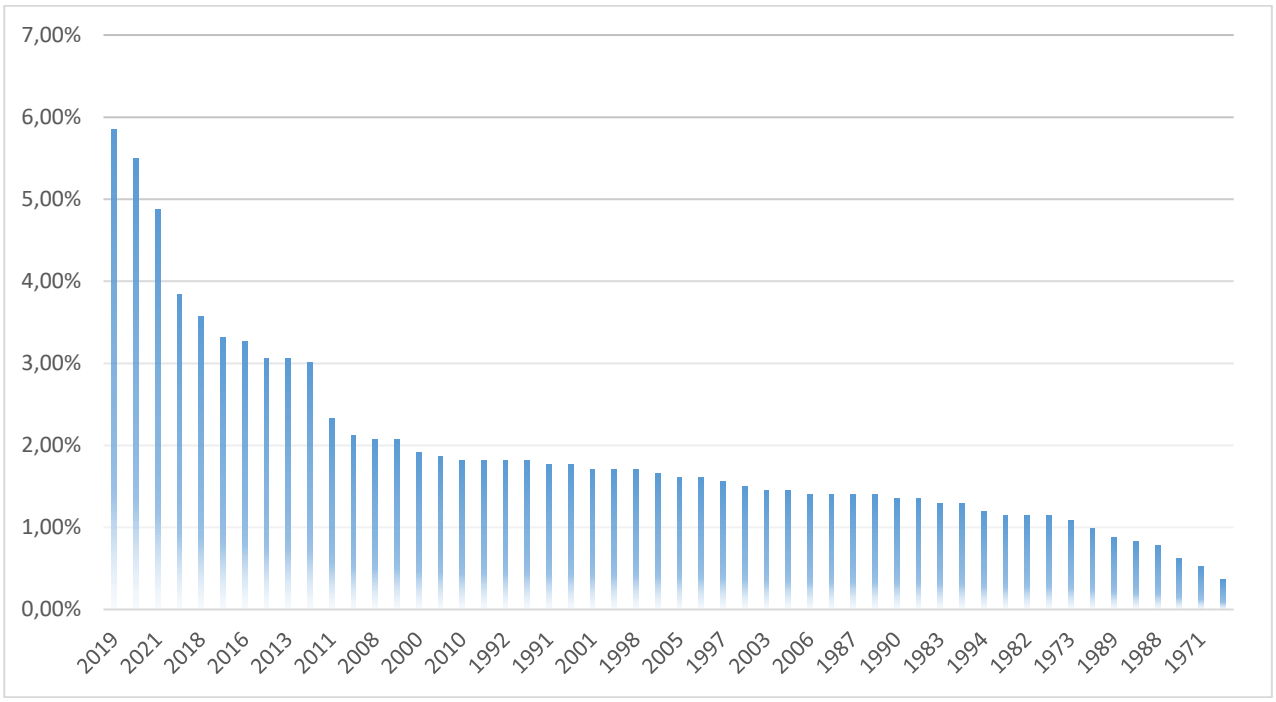

Figure 1. Distribution of publications by year

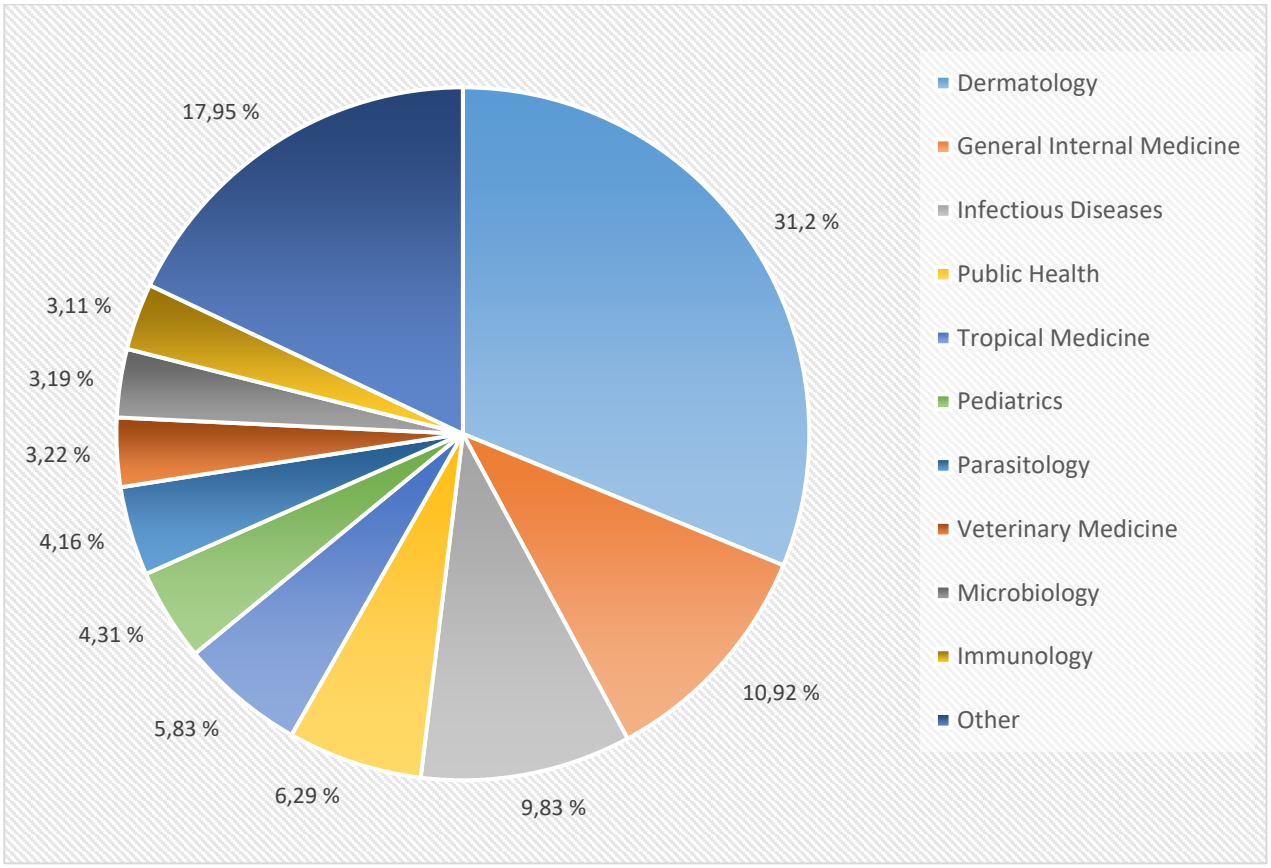

Figure 2. Categories of publications included in bibliometric analysis

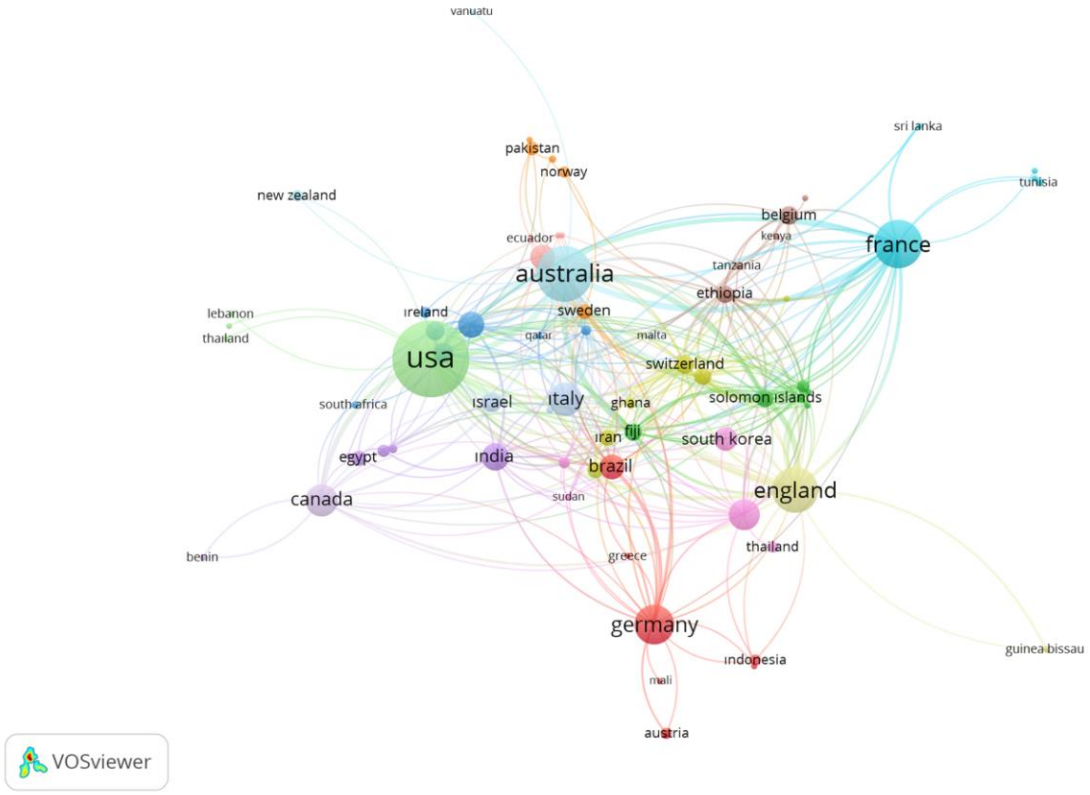

Figure 3. Countries that contribute to publications on scabies

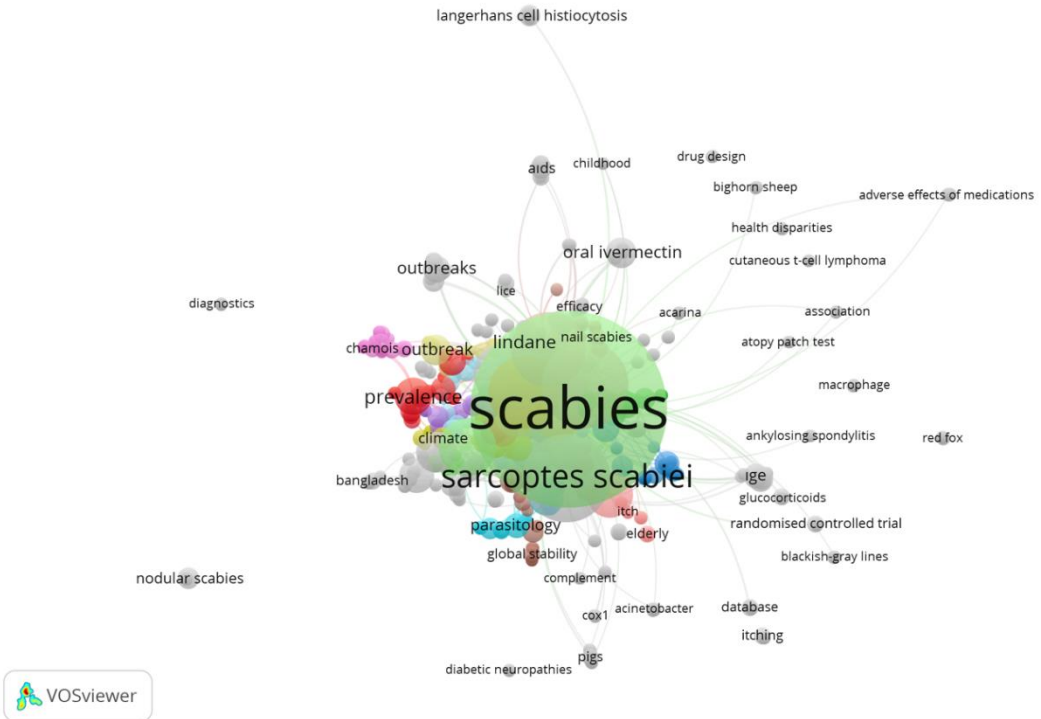

Figure 4. Keywords used in studies titled scabies

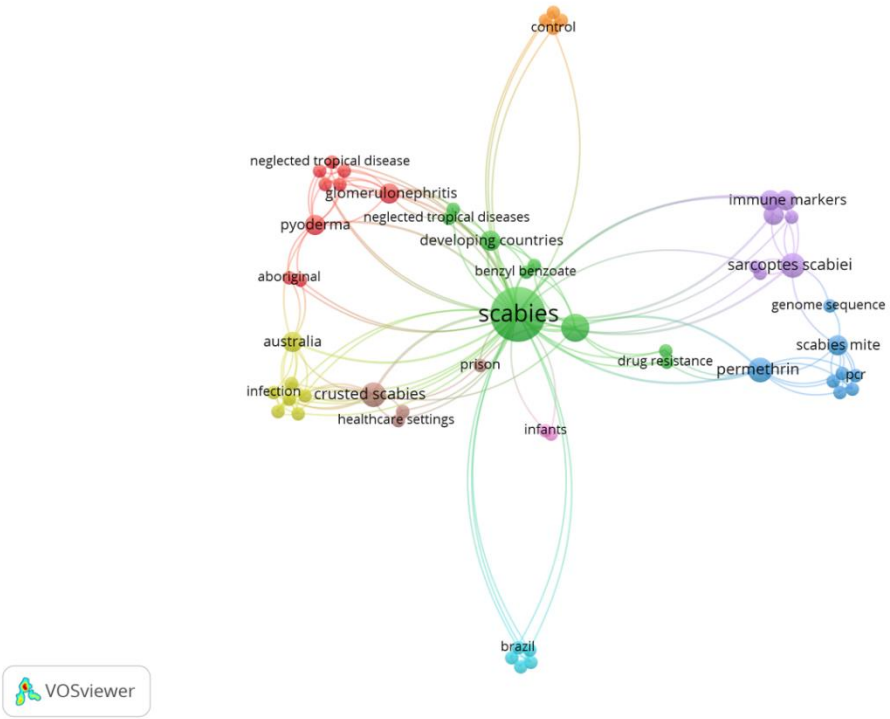

Figure 5. Keywords used in the top 100 most cited studies published with the title scabies

DISCUSSION

The bibliometric analysis examines countries and organizations, publication trends and citations, contributing authors, and expectations in a scientific field using statistical, graphical, and mathematical approaches. The bibliometric analysis could deliver messages in a certain area to researchers and physicians. It also provides both qualitative and quantitative literature data (12). Country productivity, literature trend, authors, and the distribution of studies by country are all included in bibliometric reports (13, 14).

Scabies is one of the most common diseases in the world and a significant global public health issue. Because the incidence of scabies has increased, recent research focused on treatment and control strategies for scabies (3). Future research priorities are to further define the burden of disease, to develop standardized approaches for diagnosis and population burden estimation. These priorities also include the improvement of new diagnoses and treatments and large-scale community control strategies (15).

Because scabies can be hard to detect, diagnosis is frequently delayed, resulting in costly epidemic management. Scabies affects over 200 million people worldwide and is a disease with a high prevalence, especially in resource-poor tropical regions (16).

In their bibliometric research on scabies covering the years 2009-2018, Singh et al. reported that the countries with the most studies on scabies were the USA, India, and Australia, respectively. They also found that the most common keywords were "scabies, *S. scabiei*, and ivermectin" (17).

Bansal, in his bibliometric research on scabies covering the years 2001-2015, found that the highest number of studies on scabies were conducted in 2015 with 137 studies, and the number of publications has increased gradually in recent years (18).

In this study, it was determined that the United States was the most productive country with 334

publications. Australia ranks second with 172 publications following the United States, while France takes third with 132 publications. According to the categorization of publications, the dermatology category, which accounts for 31.20% of total publications, comes first. General internal medicine ranks second with 10.92%, following the dermatology category, while the infectious diseases category is third with 9.83%. Over the past five decades, the number of scabies studies have gradually increased. Since 1970, most publications on "scabies" have been made in 2019, with 5.85%.

In this study, it was found that the most commonly used keywords in publications were "scabies, *S.scabiei* and ivermectin." According to the keywords used in the top 100 most cited studies published with the title scabies are "scabies, ivermectin, *S. scabiei*, and permethrin". Therefore, keyword analysis demonstrates that top keywords are more about diseases and their remedies.

This study reveals some hot topics of scabies research, such as "*S. scabiei*, ivermectin, and permethrin". This can be explained by the fact that scabies has been seen quite frequently in recent years and the difficulties experienced in the treatment.

A limitation of this study is that it only searched the WoS database for publications, so it only looked at studies from 1970 and beyond. Because databases containing more journals were not searched, a smaller number of studies were found. This study was included only one term as the subject to avoid incomprehensive results.

CONCLUSION

This study provided a detailed bibliometric analysis of studies on scabies. Accordingly, articles on scabies were published between 1970 and 2021, and an increasing trend was seen in the number of publications. The studies on Scabies have been systematically evaluated so far and it can be concluded which subject's studies are lacking and on which subjects studies can be done. This study can help the scientific community and policymakers to collaborate and discover possible treatments for scabies and prevent its spread.

Ethics Committee Approval: This study did not involve data collection or intervention in clinical trials. Thus, it did not need approval from an ethical committee.

Peer-review: Externally peer-reviewed.

Author Contributions: Concept: Design Literature Search: Data Collection and Processing: Analysis or Interpretation: Writing: M.T.

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

Financial Disclosure: The author declared that this study hasn't received no financial support.

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Menstrual Cycle Characteristics, Premenstrual Syndrome, and Anxiety in Midwifery Student Infected and Not Infected with COVID-19: A Comparative Study

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Abstract

Objective: Periods of crisis, fear, and stress target hypothalamic-gonadal axis of women in reproductive age and can have an impact on menstrual symptoms. This study was conducted to evaluate menstrual cycle, premenstrual syndrome and anxiety in midwifery students with or without COVID-19 disease.

Methods: In this descriptive and comparative study, 216 young girls infected with COVID-19 in the last 6 months were compared with 634 midwifery students, who were not infected yet. "Personal Description Form", "Premenstrual Syndrome Scale (PMSS)" and "State-Trait Anxiety Inventory (STAI)" were used to collect data.

Results: In the study, it was determined that the mean scores of PMSS and STAI of midwifery students, who had COVID-19 disease were higher than those who did not. It was determined that the difference between the mean scores of PMSS and STAI of midwifery students had COVID-19 was statistically significant, while the difference between the mean scores of PMSS and STAI of midwifery students who did not have COVID-19 disease was not statistically significant. The difference between the prolongation of the two cycle intervals and the reduction of menstrual bleeding in midwifery students with and without COVID-19 disease was found to be statistically significant.

Conclusion: The difference between the prolongation of the two cycle intervals and the reduction of menstrual bleeding in midwifery students with and without COVID-19 disease was found to be statistically significant. In addition, the study revealed that being diagnosed with COVID-19 increased the premenstrual symptoms and anxiety levels of single young girls.

Key words: Midwifery students, COVID-19, Premenstrual syndrome, Anxiety, Menstrual period, Menstrual irregularit

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INTRODUCTION

It has been reported that COVID-19 can negatively affect sexual and reproductive health (1), and women will be affected more by these issues in the long term (2). The angiotensin-converting enzyme-2 (ACE2) receptor, which is recognized as the specific receptor of the SARS-CoV-2 virus (3), was also seen in ovarian granulosa cells in an animal study (4). This suggests that the ovaries may be targeted by SARS-CoV-2 (4). ACE2 is found in the uterus and ovaries, which are vitally important for a healthy menstrual cycle (5). The menstrual cycle involves complicated interactions among various tissues, hormones, and organ systems (6). Many women of reproductive age experience one or multiple emotional or physical changes before their menstrual period or during menstrual bleeding (7). Physiological and psychological changes observed prior to the menstrual period are defined as Premenstrual Syndrome (PMS). PMS affects the activities of daily living and social performance of women and leads to mood disorders. PMS also causes serious complications related to mood disorders (8).

Since the onset of the COVID-19 pandemic, there have been debates on social media and blogs that demonstrate menstrual changes, including the duration, frequency, and volume (more severe bleeding and coagulation) of women's menstrual period, increased dysmenorrhea, and exacerbating PMS (9). Although the menstrual cycles of women who have contracted COVID-19 are reported to be regular, it was stated that COVID-19 has a potentially harmful effect on ovarian reserves and endocrine functions (10).

COVID-19 not only creates negative effects on various systems (5) but also leads to loneliness, social isolation, and financial pressure, thus significantly affecting the mental health of many individuals. It was stated that the fear and anxiety of being infected by COVID-19 led to uncertainty and increases in psychological problems are observed the most in young individuals between the ages of 18 and 24, as well as women (11). It was determined that the increase in anxiety and stress levels associated with the COVID-19 pandemic is significant enough to affect the characteristics of the menstrual cycle (12). Periods of crisis, fear, and stress target the hypothalamic-gonadal axis of women of reproductive age and can have an impact on menstrual symptoms (5,13,14). This situation can result in functional hypothalamic amenorrhea and chronic anovulation, which do not originate from any underlying organic cause (11). While irregular and prolonged menstrual cycles are associated with early death risk, amenorrhea can be an indicator of reduced fertility that may be associated with chronic diseases (9).

It is believed that reproductive health in this pandemic period is an important issue that should not be neglected. A limited number of studies examining changes in women's menstrual cycles in the pandemic period were encountered in the literature (4,6,10,12). Accordingly, the aim of this study was to identify different symptoms and changes in menstrual cycles in the pandemic period experienced by young women who were infected and those who were not infected with COVID-19 and determine their PMS and anxiety levels. Considering the importance of the menstrual cycle for women, it is thought that the study will significantly contribute to healthcare professionals in their evaluation of menstrual cycle changes in the pandemic period in young women who were infected with COVID-19.

METHODS

Research and design

This descriptive and comparative study was carried out between December 2021 and January 2022. The participants were selected by using the virtual snowball (chain-referral) sampling method, which is a purposive sampling method. The data were collected via Google Forms by using the online self-report method. The population of the study consisted of approximately 10,000 students studying in the Midwifery Department of a university in Turkey in the spring semester of the 2020-2021 academic year (15). As a result of the power analysis that was performed, the minimum required sample size was calculated as 623 participants with a 0.05 margin of error, at an 80% representative power, and in a 99% confidence interval, and the study was completed with 850 participants. In the study, the data of 216 young women infected with COVID-19 within the last 6 months were compared to those of 634 young women who had not been infected with COVID-19 (n=850).

Inclusion Criteria

- ✓ Being unmarried,
- ✓ Being between 18 and 25 years of age,
- ✓ Having a regular menstrual cycle.

Exclusion Criteria

- ✓ Using contraceptive pills,
- ✓ Not responding to research questions.

Data Collection Tools

The data were collected using an "Identifying Information Form", the "Premenstrual Syndrome Scale", and the "State Anxiety Inventory."

Identifying Information Form

The form that was prepared by the researchers by reviewing the relevant literature (6,12,16) consisted of 28 questions inquiring about the participants' sociodemographic characteristics, as well as their menstrual characteristics.

Premenstrual Syndrome Scale (PMSS)

The reliability and validity study of the scale was carried out by Gencdogan in 2006. The scale, which is used to determine premenstrual symptoms and severity, is a 5-point Likert-type scale consisting of 44 items. The scale has nine subscales, which are depressive mood, anxiety, anger, exhaustion, depressive thoughts, pain, appetite changes, and abdominal bloating. The minimum and maximum total scores on the scale are 44 and 220. A high score is indicative of intense premenstrual symptoms. The Cronbach's alpha coefficient of the scale was reported as 0.750 (17). In this study, the Cronbach's alpha coefficient was determined as 0.975.

State Anxiety Inventory (STAI-I)

The Turkish validity and reliability study of the State Anxiety Inventory, developed by Spielberger et al. in 1970 as a part of the State-Trait Anxiety Inventory, was conducted by Oner and Le Compte in 1985. It includes statements that measure how the individual feels at a given moment. The 20-item inventory with a 4-point scoring system has 10 negative and 10 positive statements. The negative statements are scored as "not at all = 1", "somewhat = 2", "moderately = 3", and "very much so = 4". The positive statements, on the other hand, are inversely scored. The minimum and maximum scores to be obtained from the inventory are 20 and 80. Higher scores indicate higher levels of anxiety As a result of the validity and reliability studies conducted while adapting the inventory to Turkish, the scale was found to be reliable. Additionally, as a result of the reliability study carried out by the researcher, the

scale' internal consistency coefficient was found to be 0.870, and the scale was considered reliable (18). In this study, the internal consistency coefficient of the scale was determined as 0.905.

Data Collection

The data collection tools were prepared on the Google Forms platform. The form started with a question inquiring whether the participants voluntarily agreed to participate in the study. The first part of the form included the Identifying Information Form, the second part consisted of PMSS, and the third part included STAI-I. Later, the form was sent online through WhatsApp and Instagram to with midwifery students in the age group of 18-25 who agreed to participate in the study. It took about 10 minutes to fill out the form

Statistical Analysis

The normal distribution of the data was checked using the Kolmogorov-Smirnov test. As it was found that the skewness value of the model was between -2 and +2, it was determined that the data met normality assumptions (19). The data were analyzed by creating a dataset in the IBM SPSS Statistics for Windows Version 25.0 package software. In the statistical analysis, mean, percentage, standard deviation, Chi-squared test, independent-samples t-test, and correlation analysis were used. In the interpretation of the results, the level of statistical significance was accepted as $p<0.05$.

RESULTS

The descriptive characteristics of the midwifery students who were included in the study are presented in Table 1. The mean age of the participants was 20.35±3.05, 43.3% were first-year students, 94.2% were unemployed, the mothers of 90.5% were unemployed, the fathers of 68.4% were employed, 65.5% had a moderate level of income, 75.2% had nuclear families, 89.5% were non-smokers, 76.1% did not have boyfriends, and their mean BMI value was 21.44±3.49. It was also found that 85.9% of the participants did not experience a change in the numbers of their bleeding days in the pandemic period, the period between two consecutive cycles was prolonged among 14.6% of them, it was sometimes prolonged in 15.4%, menstrual bleeding increased in 16.9%, menstrual bleeding decreased in 17.5%, menstrual pain increased in 33.1%, the number of hygienic pads used per day increased in 22.3%, and the number of pads per day decreased in 6.8% (Table 1).

The minimum and maximum scores to be obtained from the total STAI-I and PMSS and the subscales of PMSS, and the mean scores of the participants are presented in Table 3. Among the participants, those who had been infected with COVID-19 had mean scores of 22.69±7.23 in the depressive mood subscale, 17.58±7.35 in the anxiety subscale19.75±6.19 in the fatigue subscale, 15.41±5.60 in the irritability subscale, 18.77±7.25 in the depressive thoughts subscale, 8.89±3.23 in the pain subscale, 8.64±3.57 in the appetite changes subscale, 8.57±3.04 in the sleep changes subscale, 8.58±3.66 in the abdominal bloating subscale, and 135.46±33.47 in the overall PMSS, whereas their mean total STAI-I score was 47.21±9.11. The participants who had not been infected with COVID-19 had mean scores of 22.54±7.15 in the depressive mood subscale, 17.58±6.66 in the anxiety subscale, 19.36±5.93 in the exhaustion subscale, 15.12±5.28 in the anger subscale, 18.88±7.16 in the depressive

Table 1. Descriptive characteristics of young girls participating in the study

Variable	**Mean ± (SD)**	
Age (years)	20.35±3.05	
BMI (kg/weight^2)	21.44±3.49	
Age of Menarche (years)	13.40±1.51	
Menstrual Bleeding time	5.93±1.47	
Cycle duration (days)	28.36±5.47	
	n	**%**
Class		
1	368	43.3
2	136	16.0
3	153	18.0
4	194	22.8
Mother's educational status		
Primary school	590	69.4
Middle School	137	16.1
High school	87	10.2
University and above	37	4.3
Working status		
Working	49	5.8
Not working	801	94.2
Mother's working status		
Working	81	9.5
Not working	769	90.5
Father's working status		
Working	581	68.4
Not working	269	31.6
Income status		
Low	278	32.7
Middle	557	65.5
High	15	1.8
Living place		
Province	461	54.2
District	221	26.0
Village-Town	168	18.8
Family structure		
Core	639	75.2
Traditional	182	21.4
Broken	29	3.4
Smoking status		
Yes	89	10.5
No	761	89.5
Status of having a boyfriend		
Yes	203	23.9
No	647	76.1
Has your menstrual period decreased during the pandemic period?		
Yes	52	6.1
No	730	85.9
Sometimes	68	8.0
Has your two-cycle interval been extended during the pandemic period?		
Yes	124	14.6
No	595	70.0
Sometimes	131	15.4
Did your menstrual bleeding increase during the pandemic period?		
Yes before	53	6.2
Yes in the middle	66	7.8
Yes after	25	2.9
No it hasn't changed	706	83.1
Did your menstrual bleeding decrease during the pandemic period?		
Yes before	30	3.5
Yes in the middle	53	6.2
Yes after	66	7.8
No it hasn't changed	701	82.5
Did your pain increase during the menstrual bleeding during the pandemic period?		
Yes before	154	18.1
Yes in the middle	138	16.2
Yes after	15	1.8
No it hasn't changed	543	63.9
Did the number of pads you use daily increase during the pandemic period?		
Yes	190	22.3
No	660	77.7
Has the number of pads you use daily decreased during the pandemic period?		
Yes	58	6.8
No	792	93.2
Total 850 100		

SD = Standard Deviation

thoughts subscale, 8.89±3.18 in the pain subscale, 8.80±3.39 in the appetite changes subscale, 8.50±3.15 in the sleep changes subscale, 8.59±3.57 in the abdominal bloating subscale, and 128.31±37.38 in the overall PMSS, whereas their mean total STAI-I score was 41.88±9.83 (Table 2).

The results of the comparison of the participants who had been infected with COVID-19 and those who had not been infected with COVID-19 according to their menstrual cycle characteristics are presented in Table 3. It was determined that the two groups had significantly different rates of having a prolonged interval between two consecutive cycles and experiencing a decrease in menstrual bleeding (respectively, p=0.037 and p=0.047), while the differences between the groups in terms of the presence of PMS and increase in menstrual bleeding, increase in pain in the menstruation period, and increase or decrease in the numbers of pads used per day were not statistically significant (p>0.05) (Table 3). The results of the comparison of the mean scale scores of the participants who had been infected with COVID-19 and those who had not been infected with COVID-19 are presented in Table 4. According to these results, the differences between the PMSS and STAI-I scores of the two groups were statistically significant (p<0.05) (Table 4).

Table 2. The lowest and highest scores that can be taken from the total and sub-dimensions of the scale and the average scores of the young girls participating in the study

		Infected with COVID-19 (n=216)		Not infected with COVID-19 (n=634)	
Variables	**Min-Max that can be taken**	**X ±SD**	**Received min/max points**	**X ±SD**	**Received min/max points**
Depressive affect	7-35	22.69±7.23	7-35	22.54±7.15	7-35
Anxiety	7-35	17.58±7.35	7-35	17.58±6.66	7-35
Fatigue	6-30	19.75±6.19	6-30	19.36±5.93	6-30
Irritability	5-25	15.41±5.60	5-25	15.12±5.28	5-25
Depressive thoughts	7-35	18.77±7.25	7-35	18.88±7.16	7-35
Pain	3-15	8.89±3.23	3-15	8.89±3.18	3-15
Appetite changes	3-15	8.64±3.57	3-15	8.80±3.39	3-15
Sleep changes	3-15	8.57±3.04	3-15	8.50±3.15	3-15
Swelling	3-15	8.58±3.66	3-15	8.59±3.57	3-15
PMSS total	44-220	135.46±33.4	46-216	128.31±37.38	44-220
STAI total	20-80	47.21±9.11	22-75	41.88±9.83	20-80

PMSS; Premenstrual Syndrome Scale, STAI: State Anxiety İnventory, SD = Standard Deviation

Table 3. Comparison of young girls infected and not infected COVID-19 disease according to menstrual cycle characteristics (n=850)

	Infected with COVID-19 (n=216)		Not infected with COVID-19 (n=634)		
Menstrual Cycle Characteristics	**n**	**%**	**n**	**%**	**Test and p value**
Two-Cycle ınterval ıncrease situation					
Yes	41	19.0	83	13.1	X^2=6.612
No	83	69.4	445	70.2	**p=.037**
Sometimes	124	11.6	106	16.7	
Menstrual bleeding ıncrease status					
Yes at the beginning	10	7.4	20	5.8	X^2=2.924
Yes in the middle	20	8.8	33	7.4	p=.404
Yes finally	21	4.2	46	2.6	
No it hasn't changed	165	79.6	536	84.2	
Menstrual bleeding decrease status					
Yes at the beginning	10	4.6	20	3.2	X^2=7.96
Yes in the middle	20	9.3	33	5.2	**p=.047**
Yes finally	21	9.7	45	7.1	
No it hasn't changed	165	76.4	536	84.5	
Increase in pain in the menstruation period					
Yes at the beginning	44	20.4	110	18.1	
Yes in the middle	38	17.6	100	16.2	X^2=2.645
Yes finally	2	0.9	13	1.8	p=.450
No it hasn't changed	132	61.1	411	63.9	
Has your daily pad number increased?					
Yes	51	23.6	139	21.9	X^2=.264
No	165	76.4	495	78.1	p=.335
Has your daily pads decreased?					
Yes	19	8.8	139	6.2	X^2=1.773
No	197	91.2	495	93.8	p=.183

X^2: Pearson chi-square test

Table 4. Comparison of the mean scores obtained from the scales of young girls infected and not infected COVID-19 disease

Scales	İnfected with COVID-19 (n=216)	Not infected with COVID-19 (n=634)	Test and p value
PMSS Total	135.52±33.47	128.31±37.38	t=2.513 **p=.012**
STAI Total	47.21±9.11	41.88±9.83	t=7.282 **p<.001**

PMSS; Premenstrual Syndrome Scale, STAI: State Anxiety İnventory

DISCUSSION

In this study, in which premenstrual cycle characteristics, premenstrual syndrome characteristics, and anxiety levels of unmarried midwifery students in the age range of 18-25 who had regular menstrual cycles in the pre-pandemic period were analyzed, more than one-fourth (25.4%) of the participants were found to consist of those who had been infected with COVID-19. The results of this study revealed that being infected with COVID-19 changed the menstrual cycle characteristics of the participants, and it significantly increased their PMS and anxiety levels.

There are various types of viruses (e.g., HIV, HCV) that affect the menstrual cycle (20-22). However, the effects of the virus causing COVID-19 (SARS-CoV-2) on the menstrual cycle are not clear (4). Nevertheless, COVID-19 has physical and psychological impacts on individuals, and menstruation is negatively affected by external factors such as infections, medicinal treatments, and the stress that is experienced (4,12,23). In this study, it was determined that intervals between two consecutive cycles increased while menstrual bleeding decreased in the participants who had been infected with COVID-19 (respectively, p=.037 and p=.047) (Table 3). In a similar study conducted to investigate the effects of SARS-CoV-2 infection on the menstrual cycles of 237 women of reproductive age who had been infected with COVID-19, it was found that the menstrual cycle intervals of one-fifth of the women increased, and menstrual bleeding decreased in 20% of them (4). Similarly, in a study in which women who had been infected with COVID-19 on severe and moderate levels were compared to determine the relationship between COVID-19 and ovarian function, it was found that menstrual irregularity and amenorrhea were observed more in the women who had severe COVID-19 in comparison to those who had moderate COVID-19 (10). In a prospective study conducted by Khan et al. on women infected with COVID-19 to determine the relationship between SARS-CoV-2 infection and changes in the menstrual cycle, it was determined that women experienced changes in their menstrual cycles in the post-COVID-19 period, and they menstruated less frequently. Additionally, it was found that those who experienced more COVID-19 symptoms had more changes in their menstrual cycles (6). These findings demonstrated that contracting COVID-19 can affect the menstrual cycle and supported the findings of this study. In a study conducted on women in the age group of 18-45 who had regular menstrual cycles in the pre-pandemic period regardless of their previous COVID-19 infection status, the women were found to have used fewer pads in their menstrual period in the COVID-19 pandemic period in comparison to the number of pads they used in the pre-pandemic period, which showed that their menstrual bleeding frequencies decreased (12).

In this study, it was found that the participants who had experienced COVID-19 infection had

significantly higher total PMSS scores compared to those who had not been infected with COVID-19 and having been infected with COVID-19 significantly increased PMS levels ($p<0.05$) (Table 4). Previous research has supported the finding of this study, and it was determined that viral infections could increase the severity of menstrual symptoms such as PMS by affecting the individual's immune system (9,24). Khan et al. determined an increase in the PMS symptoms of women who had been infected with COVID-19 in the post-COVID-19 period (6). In a study conducted by Davis et al. to determine the long-term effects of COVID-19, it was determined that more than one-third of the participating women experienced increases in symptoms before and during menstruation (25). Similar results have been obtained in studies that were carried out to determine the relationship between different infections and PMS (24,26). In a study conducted on 865 women infected with COVID-19 to determine the effects of sexually transmitted diseases on PMS, the presence of infection was determined to increase PMS (24). In a similar study conducted by Doyle et al. to determine the relationship between sexually transmitted diseases and PMS, it was observed that the presence of bacterial or viral infections increased PMS symptoms (26). These results showed that contracting COVID-19 can increase PMS, which supported the findings of this study.

In this study, the mean STAI-I score of the participants who had been infected with COVID-19 was higher compared to the mean score of those who had not been infected with COVID-19, and having been infected with COVID-19 significantly increased anxiety levels ($p<0.05$) (Table 4). Similar to the finding of this study, in a study conducted to identify the anxiety levels of individuals in the COVID-19 pandemic period, the anxiety levels of those who had been COVID-19-positive were found to be higher in comparison to those who had not contracted the disease (27). Additionally, in a study in which 34 studies with up to 3 months of follow-up periods following the diagnosis of COVID-19 were examined to determine physical and mental health complications after COVID-19 infection, it was found that individuals commonly experienced anxiety in the post-COVID-19 period (28). These results supported the finding of this study, and they showed that having COVID-19 may increase anxiety.

Limitations

This study had some significant limitations. Firstly, the data were collected through self-reports. Another important limitation was that as self-reporting menstrual cycles may pose a measurement error, the data collected in this study were based on self-reports which were subject to prejudices. Besides, the factors investigated in the study (menstruation characteristics, PMS, anxiety) can vary in time. Although a retrospective approach was suitable for this study, a prospective or longitudinal approach can be adopted in future studies. Finally, though the study was based on a probabilistic sampling method, the data were collected from university students within a certain age range in Turkey. Therefore, the results cannot be generalized to all midwifery students. On the other hand, the study presents solid evidence regarding the evaluation of menstrual cycle characteristics, premenstrual syndrome, and anxiety in midwifery students who had been infected with COVID-19 and those who had not been infected with COVID-19. The strength of our study was the number of participants. Another

strong point was that there is no other study comparing midwifery students infected and not infected with COVID-19 in terms of PMS characteristics.

CONCLUSIONS

The results of this study revealed that having been infected with COVID-19 affected the menstruation characteristics of the unmarried midwifery students who participated in the study, increased their menstrual cycle intervals, and decreased their menstrual bleeding. Moreover, it was determined that having been infected with COVID-19 the premenstrual symptoms and anxiety levels of the participants. Diagnosing risk factors and applying the necessary physical and psychological midwifery approaches is rather important so that the menstrual cycle, which is accepted as a physical and psychological process, does not lose its normal characteristics. It is recommended to follow up midwifery students infected with COVID-19 and those who have menstrual anomalies and PMS symptoms at home to prevent both waste of medical resources and hospital infections. It is also recommended to plan and implement future studies to determine whether menstrual cycle parameters and PMS levels will return to their normal course after the pandemic period is over. Furthermore, psycho-educational interventions are recommended to lower the anxiety levels of midwifery students infected with COVID-19.

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Ethics Committee Approval: Ethical approval for the study was obtained from Inonu University Medical Sciences Scientific Research and Publication Ethics Committee (Decision No: 2021/2871). The participants were informed about the study, and voluntary participants were included in the study after they gave their consent on the Google Forms document.

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Effects of Uric Acid on Disease Severity and Mortality in Hospitalized Covid-19 Patients

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Abstract

Objective: High and low uric acid (UA) levels in the general population are associated with mortality. Information on the association of UA levels with clinical outcomes in COVID-19 patients is contradictory. We investigated the relationship between UA levels and clinical endpoints in COVID-19 patients.

Methods: Laboratory and clinical parameters, including UA at the admission of hospitalized COVID-19 patients, were recorded retrospectively. Binary logistic regression analysis determined risk factors for mortality and the intensive care unit (ICU) needs.

Results: This study included 708 patients (57.1% men), and the median age was 63 (18-98) years. Two hundred and three (28.7%) patients needed ICU, and 107 (15.7%) died. Uric acid levels were significantly higher in the deceased (6.5 vs. 4.9; p<0.001). Uric acid levels were similar in patients who needed ICU and those who did not (5 vs. 5.1; p=0.348). High UA (>median value 5.1 mg/dL) group have higher mortality rate (22.4% vs. 9.5%; p<0.001). In multivariate analyses, a high UA level was a risk factor for mortality [OR 1.93 (1.08 – 3.44); p=0.026]. In addition, age [OR 1.03 (1.01 – 1.05); p=0.004], albumin [OR 0.30 (0.17 - 0.52); P<0.001], neutrophil-to-lymphocyte ratio [OR 1.04 (1.01 – 1.06); p=0.003] and procalcitonin [OR 1.06 (1.0 – 1.11); p=0.048] was associated with mortality. A high UA level was not a risk factor for ICU need (p=0.780).

Conclusion: High serum UA level affects mortality in COVID-19 patients. Risk assessment for the prognosis of patients can be made according to the UA levels at admission.

Key words: COVID-19, intensive care, mortality, uric acid

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INTRODUCTION

Coronavirus disease (COVID-19) was reported firstly in December 2019 and announced as a pandemic later. The first case of COVID-19 in Turkey was reported on March 10, 2020, and as of May 12, 2022, the total number of cases has exceeded 14 million (1). Patients with COVID-19 may be asymptomatic or have a serious life-threatening illness. Initially, mild cases may become severely symptomatic afterward. The need for ICU and mortality rates increase in patients with a severe course (2,3). For this reason, it is essential to estimate the risk levels and prognosis during the initial evaluation of patients or at admission. Various laboratory parameters were used to predict the prognosis in patients with COVID-19 (4,5).

Although uric acid (UA) is the end product of purine metabolism, increased UA levels have various pathophysiological effects, such as oxidative stress and inflammation (6). There is a relationship between increased UA levels and mortality, especially cardiovascular, in the general population (7). In some studies, low UA levels cause an increase in cardiovascular mortality, suggesting the existence of a "U"-shaped relationship (8,9). Different results are noteworthy in studies on the association of UA levels with mortality in COVID-19 patients. Studies report an increase in mortality with only hyperuricemia (10) or only hypouricemia (11), or both (12).

This study aimed to determine whether serum UA levels at admission in hospitalized patients were associated with clinical endpoints such as ICU need and mortality.

METHODS

This study was approved by the local ethics committee and was conducted to the Declaration of Helsinki. Among the adult COVID-19 patients aged 18 years and older, hospitalized in Ondokuz Mayıs University Hospital between January 1, 2021, and March 1, 2022, and whose diagnosis was confirmed by PCR, whose UA level at admission were included in the study. Patients under 18 years of age or those whose UA level was not measured at admission were excluded from the study. All biochemical parameters, including UA, at admission [blood urea nitrogen (BUN), creatinine, sodium, potassium, alanine aminotransferase (ALT), glucose, albumin, D-dimer], inflammation markers [white blood cell (WBC) and lymphocyte cell count, C-reactive protein (CRP), procalcitonin, neutrophil-lymphocyte ratio (NLR)] and hematological parameters [Hemoglobin, platelet count, mean platelet volume (MPV), red cell distribution width (RDW)] were recorded to be used in the analysis. Comorbid diseases and demographic characteristics were obtained from the medical records. The primary endpoint was the need for ICU or in-hospital death after hospitalization.

Statistical Analysis

Data were analyzed with IBM SPSS Statistics for Windows, version 23 (IBM Corp., Armonk, N.Y., USA). Analysis results were presented as mean ± standard deviation and median (minimum-maximum) for continuous variables and frequency and percentage for categorical variables. Conformity to normal distribution was evaluated with the Kolmogorov-Smirnov test. The Mann-Whitney U test compared the data not normally distributed according to the paired groups. The chi-square test was used to determine a relationship between two categorical variables. Spearmans' correlation analysis was performed in the correlation analysis between serum UA levels and the inflammation markers. Binary

logistic regression analysis examined the risk factors affecting mortality and admission to ICU. ROC analysis determined the cut-off value of UA according to mortality. The significance level was taken as $p<0.05$.

RESULTS

Seven hundred and eight people, 404 (57.1%) men, were included, and the median age was 63 (18-98) years. Of the patients, 41.2% had hypertension, 22.5% had diabetes mellitus, and 19.2% had chronic kidney disease. Pneumonia was detected in 85.7 of the patients at admission. Median UA level was 5.1 mg/dl. The clinical features and the laboratory parameters of the patients are shown in Table 1.

Table 1. Patients' demographic characteristics, comorbid diseases, and laboratory parameters at admission

		n (%)	
Gender (Female)		304 (42,9)	
Presence of pneumonia		607 (85,7)	
Chronic kidney disease		136 (19,2)	
Hypertension		292 (41,2)	
Diabetes mellitus		159 (22,5)	
Coronary artery disease		157 (22,2)	
Heart failure		37 (5,2)	
Pulmonary disease		50 (7,1)	
	n	**Mean ± SD**	**Median (min - max)**
Age (year)	708	60,88 ± 15,87	63 (18 - 98)
Uric acid (mg/dL)	708	5,57 ± 2,51	5,1 (0,1 - 20)
Albumin (g/dL)	637	3,53 ± 0,61	3,56 (1,5 - 5,1)
CRP (mg/dL)	704	58,88 ± 68,91	26,64 (0,02 - 342)
D-dimer (ng/mL)	684	1959,04 ± 6982,16	656,5 (50 - 100000)
Procalcitonin (ng/mL)	660	1,1 ± 6,05	0,1 (0,02 - 100)
BUN (mg/dL)	704	23,69 ± 21,13	17,45 (3,2 - 189,2)
Creatinine (mg/dL)	708	1,29 ± 1,24	0,97 (0,35 - 10,98)
Glucose (mg/dL)	707	151,7 ± 79,78	125 (40 - 608)
Sodium (mEq/L)	708	137,07 ± 4,54	138 (111 - 145)
Potassium (mEq/L)	708	4,33 ± 0,58	4,3 (2,69 - 6,65)
ALT (U/L)	704	33,5 ± 67,18	21 (2,7 - 1508)
WBC ($x10^3/\mu L$)	708	7,83 ± 7	6,58 (0,18 - 116,95)
Hemoglobin (gr/dL)	708	12,41 ± 2,16	12,6 (0 - 18,7)
Platelet ($x10^3/\mu L$)	708	218,08 ± 93,12	203,5 (2 - 659)
Lymphocyte count ($x10^3/\mu L$)	708	1,42 ± 3,86	1,13 (0,06 - 101,3)
NLR	701	7,79 ± 10,1	4,14 (0,07 - 110,25)
MPV (fL)	692	10,28 ± 0,97	10,2 (8 - 13,9)

SD: Standart Deviation, CRP: C-Reactive Protein; BUN: Blood Urea Nitrogen; ALT: Alanine aminotransferase; WBC: White blood cell; NLR: Neutrophil-Lymphocyte Ratio, MPV: Mean Platelet Volume

Comparison of patient groups in terms of intensive care unit need and mortality

The need for ICU developed in 203 (28.7%) patients, and UA levels were similar in patients who needed ICU and did not need it (5 vs. 5.1 mg/dL; p=0.348). Among the comorbid diseases, only heart failure was more common in patients hospitalized in the ICU (8.9% vs. 3.8%; p=0.006). The comparison of admission laboratory parameters and comorbid diseases according to the need for intensive care is shown in Table 2.

Table 2. Comparison of patients according to the need for intensive care unit and mortality

	Intensive care unit need			Mortality		
	Yes	No	p	Yes	No	p
Uric acid (mg/dL)	5,00 (0,1 - 16,60)	5,10 (0,90 - 20,00)	0,348	6,50 (1,00 - 20,00)	4,90 (0,1 - 17,70)	**<0,001**
Albumin (gr/dL)	3,66 (1,61 - 5,10)	3,20 (1,50 - 4,90)	**<0,001**	3,11 (1,50 - 4,32)	3,63 (1,61 - 5,10)	**<0,001**
NLR	**7,69 (0,07 - 66,64)**	**3,47 (0,10 - 110,25)**	**<0,001**	9,73 (0,30 - 66,64)	3,64 (0,07 - 110,25)	**<0,001**
CRP (mg/dL)	25,00 (0,02 - 342,00)	33,20 (0,10 - 318,00)	0,098	61,90 (0,91 - 318,00)	24,50 (0,02 - 342,00)	**<0,001**
D-dimer (ng/mL)	540 (50 - 100000)	1064 (100 - 100000)	**<0,001**	1070 (120 - 30145)	588 (50 - 100000)	**<0,001**
Procalcitonin (ng/mL)	0,09 (0,02 - 45,45)	0,23 (0,03 - 100,00)	**<0,001**	0,43 (0,04 - 100,00)	0,09 (0,02 - 45,45)	**<0,001**
BUN (mg/dL)	17,20 (3,20 - 189,20)	18,20 (3,50 - 152,90)	0,174	21,50 (6,70 - 152,90)	16,90 (3,20 - 189,20)	**<0,001**
Creatinine (mg/dL)	0,96 (0,36 - 10,36)	0,98 (0,35 - 10,98)	0,552	1,16 (0,35 - 7,64)	0,94 (0,36 - 10,98)	**<0,001**
Glucose (mg/dL)	124,50 (40 - 497)	131 (66 - 608)	0,354	121 (43 - 535)	125,50 (40 - 608)	0,455
Sodyum (mEq/L)	138 (111 - 145)	137 (123 - 145)	**0,001**	137 (116 - 145)	138 (111 - 145)	**0,010**
Potasyum (mEq/L)	4,30 (2,80 - 6,65)	4,30 (2,69 - 6,37)	0,926	4,38 (2,69 - 6,37)	4,30 (2,80 - 6,65)	0,094
ALT (U/L)	20,80 (2,70 - 282,20)	21 (3 - 1508)	0,779	18,60 (3 - 1508)	21,00 (2,70 - 594,00)	0,131
WBC (x10^3/µL)	6,26 (0,18 - 113,02)	7,33 (1,36 - 116,95)	**<0,001**	7,38 (1,36 - 29,79)	6,37 (0,18 - 116,95)	**0,017**
Hemoglobin (gr/dL)	13,00 (0,00 - 18,00)	11,80 (6,00 - 18,70)	**<0,001**	11,60 (6,00 - 15,90)	12,90 (0,00 - 18,70)	**<0,001**
Platelet (x10^3/µL)	207,00 (2,00 - 659,00)	185 (9 - 534)	**0,003**	184 (30 - 534)	206 (2 - 659)	0,054
MPV (fL)	10,10 (8,00 - 13,00)	10,30 (8,40 - 13,90)	**0,004**	10,30 (8,60 - 13,90)	10,20 (8,00 - 13,00)	**0,005**
Diabetes mellitus (%)	22,4	22,7	0,935	26,1	21,8	0,313
Chronic kidney disease (%)	19,4	18,7	0,834	16,2	19,8	0,383
Hypertension (%)	39,2	46,3	0,083	47,7	40	0,130
Coronary artery disease (%)	21,4	24,1	0,425	25,2	21,6	0,400
Heart failure (%)	3,8	8,9	**0,006**	7,2	4,9	0,307

NLR: Neutrophil-Lymphocyte Ratio, CRP: C-Reactive Protein; BUN: Blood Urea Nitrogen; ALT: Alanine aminotransferase; WBC: White blood cell; MPV: Mean Platelet Volume

One hundred and eleven (15.7%) patients died. The median UA levels of those who died were significantly higher than those who survived (6.5 vs. 4.9 mg/dL; p<0.001). There was no difference between the groups in terms of comorbid diseases. In Table 2, patients who died and those who survived were compared with admission laboratory parameters and comorbid conditions.

When all patients were divided into groups according to the median value (5.1 mg/dl below and above) and laboratory reference values (normal range 3-6.5 mg/dl), no significant difference was observed between the groups in terms of ICU need. However, significantly higher mortality rates were observed in the groups with higher UA levels than the median and reference values (p<0.001). Table 3 shows the need for ICU and mortality rates by UA groups.

Tablo 3. Distribution of endpoints by different serum uric acid level groups

	According to median						
	Low UA (≤5,1 mg/dL)	High UA (5,1>mg/dL)	p	Low UA (≤3 mg/dL)	Normal (3,1-6,5 mg/dL)	High UA (>6,5 mg/dL)	p
Intensive care need	27,7	29,7	0,559	25,7[a]	34,7[a]	33[a]	0,085
Death	9,5	22,4	**<0,001**	9,8[a]	18,1[a, b]	27,9[b]	**<0,001**

[a,b,c] The chi-square test was used and the groups with the same letter were statistically similar . UA: Uric acid

- **Univariate and multivariate binary logistic regression analyses for intensive care unit need and mortality**

The results of logistic regression analyses for ICU needs are shown in Table 4. In univariate and multivariate analyses, high UA levels compared to the median value were a risk factor for the need for ICU (p=0.780). When analyses were performed according to laboratory reference values, UA levels were not associated with the need for ICU (low; p=0.855 and high; p=0.917). Analyses showed that pneumonia was the most important factor for ICU needs [OR 27.92 (5.43 – 143.48); p<0.001]. Albumin [OR 0.42 (0.28 - 0.65); p<0.001], NLR [OR 1.04 (1.02 - 1.06); p=0.001], D-dimer [OR 1 (1 - 1); p=0.039], hemoglobin [OR 0.90 (0.81 – 1.0); p=0.041] and platelet count [OR 0.997 (0.995 – 1.0); p=0.027] were other factors associated with the ICU need.

Table 4. Binary logistic regression analysis results for intensive care need in COVID-19 patients

Factors	**Univariate**			**Multivariate**		
	OR (%95 CI)	p	AR	OR (%95 CI)	p	AR
Gender (Male)	1,063 (0,764 - 1,478)	0,716	71,3	1,022 (0,652 - 1,601)	0,924	75,4
Pneumonia (Yes)	24,506 (5,983 - 100,376)	**<0,001**	71,3	27,915 (5,431 – 143,476)	**<0,001**	
Age	1,018 (1,007 - 1,029)	**0,001**	71,3	0,999 (0,984 - 1,014)	0,861	
Albumin	0,27 (0,195 - 0,372)	**<0,001**	73,0	0,422 (0,276 - 0,645)	**<0,001**	
NLR	1,065 (1,044 - 1,086)	**<0,001**	72,8	1,037 (1,016 - 1,058)	**0,001**	
CRP	1,004 (1,002 - 1,006)	**0,001**	71,3	0,998 (0,995 - 1,001)	0,177	
D-dimer	1 (1 - 1)	0,051	71,5	1 (1 - 1)	**0,039**	
Procalcitonin	1,061 (1,015 - 1,109)	**0,008**	71,1	1,014 (0,979 - 1,051)	0,433	
BUN	1,003 (0,996 - 1,01)	0,435	71,3	0,993 (0,98 - 1,007)	0,344	
Creatinine	1,083 (0,958 - 1,224)	0,204	71,3	1,141 (0,924 - 1,409)	0,220	
Glucose	1,001 (0,999 - 1,003)	0,176	71,3	1,002 (0,999 - 1,004)	0,175	
Sodium	0,948 (0,916 - 0,982)	**0,003**	70,6	0,984 (0,94 - 1,03)	0,495	
Potassium	1,02 (0,771 - 1,349)	0,889	71,3	0,831 (0,582 - 1,186)	0,308	
ALT	1,002 (0,999 - 1,004)	0,208	71,4	1,001 (0,997 - 1,005)	0,568	
Hemoglobin	1,031 (1,001 - 1,063)	**0,043**	71,3	0,896 (0,806 - 0,995)	**0,041**	
Platelet	0,812 (0,751 - 0,878)	**<0,001**	71,6	0,997 (0,995 - 1)	**0,027**	
MPV	0,998 (0,996 - 1)	**0,018**	71,3	1,094 (0,88 - 1,362)	0,418	
Uric acid (High)	1,102 (0,796 – 1,527)	**0,559**	71,3	0,94 (0,608 - 1,452)	0,780	

NLR: Neutrophil-Lymphocyte Ratio, CRP: C-Reactive Protein; BUN: Blood Urea Nitrogen; ALT: Alanine Transaminase; MPV: Mean Platelet Volume, AR: Accuracy rate

Table 5 shows the results of univariate and multivariate logistic regression analysis for mortality. Univariate and multivariate analyses showed that UA level higher than the median value was the risk factor for mortality [OR 2.74 (1.78 – 4.22); p<0.001 and OR 1.93 (1.08 – 3.44); p=0.026]. In addition, older age [OR 1.03 (1.01 – 1.05); p=0.004], lower serum albumin levels [OR 0.30 (0.17 - 0.52); P<0.001], higher neutrophil-to-lymphocyte ratio [OR 1.04 (1.01 – 1.06); p=0.003] and higher procalcitonin levels [OR 1.06 (1.0 – 1.11); p=0.048] were associated with mortality.

Similarly, when multivariate analyses were performed according to laboratory reference values, high UA levels were found to be a risk factor for mortality [OR 1.90 (1.01 - 3.58)); p=0.046], while low UA levels are not to be a risk for mortality [OR 1.80 (0.76 – 4.24); p=0.182].

Table 5. Binary logistic regression analysis results for mortality in COVID-19 patients

Factors	Univariate		Multivariate	
	OR (%95 CI)	p	OR (%95 CI)	p
Gender (Male)	1,344 (0,885 - 2,042)	0,165	1,244 (0,692 - 2,238)	0,465
Pneumonia (Yes)	5,189 (1,868 - 14,414)	**0,002**	0,213 (0,043 - 1,067)	0,060
Age	1,046 (1,03 - 1,063)	**<0,001**	1,031 (1,009 - 1,053)	**0,004**
Albumin	0,193 (0,129 - 0,288)	**<0,001**	0,297 (0,17 - 0,518)	**<0,001**
NLR	1,06 (1,04 - 1,08)	**<0,001**	1,035 (1,012 - 1,058)	**0,003**
CRP	1,006 (1,004 - 1,009)	**<0,001**	1,001 (0,997 - 1,005)	0,596
D-dimer	1 (1 - 1)	0,349	1 (1 - 1)	0,537
Procalcitonin	1,109 (1,044 - 1,178)	**0,001**	1,055 (1,001 - 1,113)	**0,048**
BUN	1,013 (1,005 - 1,021)	**0,001**	1,004 (0,988 - 1,021)	0,608
Creatinine	1,22 (1,072 - 1,388)	**0,003**	1,022 (0,791 - 1,322)	0,867
Glucose	1 (0,997 - 1,003)	0,990	0,999 (0,995 - 1,002)	0,524
Sodium	0,938 (0,901 - 0,977)	**0,002**	0,984 (0,928 - 1,042)	0,577
Potassium	1,409 (1,001 - 1,983)	0,050	1,015 (0,648 - 1,59)	0,949
ALT	1,001 (0,999 - 1,004)	0,291	1,001 (0,998 - 1,003)	0,629
Hemoglobin	0,8 (0,729 - 0,878)	**<0,001**	0,931 (0,821 - 1,057)	0,271
Platelet	0,999 (0,996 - 1,001)	0,253	1 (0,997 - 1,003)	0,980
MPV	1,463 (1,192 - 1,796)	**<0,001**	1,306 (0,987 - 1,728)	0,062
Uric acid (High)	2,739 (1,779 – 4,218)	**<0,001**	1,929 (1,082 - 3,439)	**0,026**

NLR: Neutrophil-Lymphocyte Ratio; CRP: C-Reactive Protein; BUN: Blood Urea Nitrogen; ALT: Alanine Aminotransferase; MPV: Mean Platelet Volume

ROC analysis for uric acid levels in predicting mortality and the association between uric acid levels and inflammation markers

When the serum UA cut-off value was 5.9 mg/dL in estimating the mortality, the area under the curve (AUC) was obtained as 0.654 (p<0.001). The sensitivity and specificity of the cut-off value were 59.46% and 67.34% (Figure). The correlation analyses, serum UA levels were correlated with procalcitonin (r:0.310; p<0.001), NLR (r:0.102; p=0.007) and MPV (r:0.104; p=0.006), while there was no correlation between CRP and UA levels (p=0.704) (Table 6).

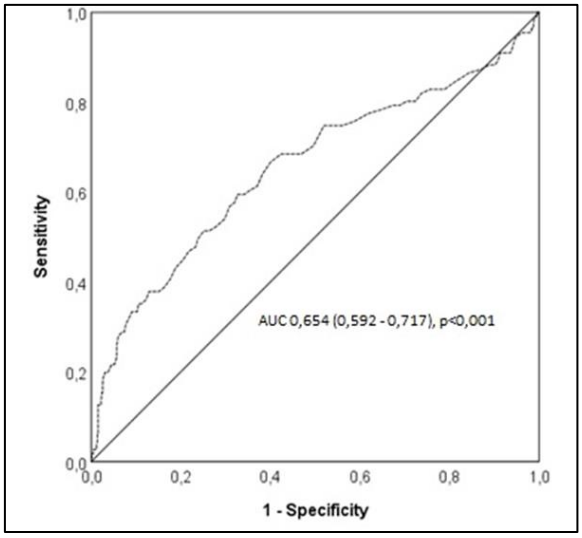

Figure. ROC curves showed the predictive value of uric acid level in predicting mortality.

Table 6. Correlation analysis of uric acid levels and inflammation parameters

	Uric acid levels	
	r	p
NLR	0,102	**0,007**
CRP	0,034	0,366
Procalcitonin	0,31	**<0,001**
MPV	0,104	**0,006**
Albumin	-0,059	0,136
D-dimer	0,023	0,549

NLR: Neutrophil-Lymphocyte Ratio, CRP: C-Reactive Protein; MPV: Mean Platelet Volume

DISCUSSION

We showed that UA levels at admission were higher in hospitalized COVID-19 patients, those who needed ICU, and those who died. In addition, high UA levels at admission were associated with in-hospital mortality.

Although high UA levels are often thought to indicate tissue damage and cell destruction or impaired excretion, it causes various pathologies by itself. For example, hyperuricemia causes cardiovascular diseases by different mechanisms (6). It is also associated with increased CV death (13,14). There are similar relationships between serum UA levels and infectious diseases. The study by Liu et al. in 954 ICU patients with sepsis showed that high UA level was associated with mortality (HR: 1.65) and AKI (HR:1.77) (15). In a study conducted on ICU patients with sepsis, UA levels were higher in patients with acute respiratory distress syndrome (ARDS) and who died. The same study showed that the last UA level>4.5 mg/dL increased mortality (2.638 times) (16). This study found high UA levels (according to the median value) at admission increased mortality by 1.93 times. Similarly, Ting Zeng et al. reported that the rate of hyperuricemia (>400 μmol/L) was 23.6% in patients who died due to COVID-19 and high UA levels increased mortality by 3.17 times (17). In a study conducted in China that included 1854 patients with COVID-19, high serum UA values (≥ 423 μmol/) increased the risk of mortality (OR: 3.94) (12). Another large study including 854 patients showed that high UA levels increase the risk of acute kidney injury (OR: 2.8), major adverse kidney events (OR: 2.5), and mortality (OR: 1.7). Notably, the UA level caused a gradual increase in all three endpoints from 4.5 mg/dl (10).

Depending on the severity of the disease, COVID-19 patients may require admission to the ICU. There was no correlation between UA levels and ICU needs in this study. However, some studies showed that high UA levels affected the disease severity in COVID-19 patients. In a study, high serum UA levels were associated with disease severity in COVID-19 patients, but different definitions were used for disease severity, except for the need for ICU (18). Bo Chen et al. showed that high serum UA values increased the risk of composite outcome (OR: 2.60) and mechanical ventilation (OR: 3.01). However, in the same study, similar to our results, the increase in UA levels did not cause an increase in the risk of ICU need (12).

It is still unclear how UA elevation affects clinical outcomes in COVID-19 patients. However, some speculative mechanisms can be suggested. The binding of the SARS-CoV-2 virus to the respiratory system is via the angiotensin-converting enzyme2 (ACE2) receptor. S protein on the virus binds to the ACE2 protein in type 2 alveolar cells, and the virus is replicated in the host cells. Infected host cells initiate inflammatory cascades and cause the release of chemokines and cytokines. (19). The entry of the S protein-ACE2 complex into the cell decreases ACE2 functions and, therefore, increases tissue angiotensin II (Ang-II) concentration (20). High levels of Ang-II can promote the inflammatory processes, the release of inflammatory cytokines, and eventually lead to ARDS. Ang-II increases can facilitate the virus's entry into the cell and increase tissue damage due to inflammation through pro-inflammatory cytokines. Liu et al. showed that the Ang-II levels were markedly increased, and high Ang-II levels were associated with viral load and lung damage in COVID-19 patients (21). High UA levels may cause an increase in mortality in these patients by activating the renin-angiotensin-aldosterone system (RAAS). Uric acid can increase RAAS activation. Min-A Yu et al. showed that UA stimulated mRNA expression of RAAS components and receptors in human

vascular endothelial cells (22). Increased inflammation is responsible for tissue damage in COVID-19 patients. Uric acid increases inflammation by activation of the NLRP3 inflammasome (23). Some studies have shown a correlation between UA levels and inflammation markers in COVID-19 patients. Even a decrease in inflammation markers has been noted in patients receiving UA-lowering therapy (17, 18). In this study, inflammation parameters were high both in patients who needed ICU and in patients who died, and a correlation was found between UA levels and inflammation parameters. Increased oxidative stress due to high UA may be responsible for the negative effect on disease prognosis in COVID-19 patients. Uric acid increases oxidative stress (24). A study showed that high UA levels were correlated with increased oxidative stress and inversely correlated with decreased antioxidant capacity in COVID-19 patients (18).

In some studies, it has been found that low UA levels were associated with mortality and disease severity in COVID-19 patients (11,25). Uric acid has antioxidant properties (26), and these antioxidant effects are evident at low UA levels (6). Decreased antioxidant capacity due to low UA levels could increase mortality in these patients. Bo Chen et al. also showed that high and low admission UA levels were associated with clinical endpoints (U-shaped) (12). We found no association between low UA levels at admission and mortality. However, previous studies have shown that hypouricemia developing during hospitalization affects mortality (11,27,28). However, in most of our patients, UA levels were not rechecked during hospitalization, so we could not comment on whether there was a relationship between low UA levels and clinical endpoints.

Our study has some limitations. First of all, the most important limitations of our study are that it is retrospective, and only the patients whose UA levels were measured were included in the study. In addition, we didn't know the course of UA was not in most of the patients during the hospitalization. Another significant limitation of our study is that drugs (such as diuretics and allopurinol) that may affect uric acid levels are not recorded. On the other hand, it has many patients and presents real-life data of patients with various comorbid diseases.

CONCLUSIONS

High serum UA levels at admission were associated with mortality in COVID-19 patients and could be considered in the risk assessment of patients.

Ethics Committee Approval: Ethics committee approval was received for this study from the Clinical Research Ethics Committee of Ondokuz Mayıs University. (Ethical committee date 27.03.2022 and no: 2022/163)

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The Prognostic Significance of Lactate Dehydrogenase Albumin Ratio in Elderly COVID-19 Patients

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Abstract

Objective: An acute respiratory disease caused by a novel coronavirus emerged in December 2019. This disease associated with the novel coronavirus quickly spread across the world, leading to significant fatalities. Reliable predictors of disease mortality and severity are therefore needed in order to decide on clinical follow-up or earlier clinical intervention. This study was performed around the hypothesis that the LDH/ALB ratio would yield more sensitive results in predicting the potential relationship between disease severity and mortality in patients with COVID-19 aged over 65.

Methods: COVID-19 patients aged over 65 presenting to a tertiary emergency department between August and October 2021, were investigated in this single-center, retrospective study. All patients over 65 presenting to the emergency department and diagnosed with COVID-19 were included. The study population was constituted following the application of the inclusion and exclusion criteria. Pulmonary involvement percentages and laboratory parameters were compared against patient mortality and thoracic tomography.

Results: The relationship between patients' lactate dehydrogenase/albumin ratios and mortality status was evaluated. The optimal cut-off value for the lactate dehydrogenase/albumin ratio in predicting mortality was 9.6 (AUC:0.815, sensitivity 75.9%, specificity 76.3%, p=0.001). The relationship between patients' lactate dehydrogenase/albumin ratios and severity of pulmonary involvement was also examined. The cut-off value for severe pulmonary involvement was 11.2 (AUC:0.946, sensitivity 93.6%, specificity 87.4%, p=0.001).

Conclusion: In conclusion, LDH/ALB ratio could be used to predict mortality and severity of pulmonary involvement in elderly COVID-19 patients.

Key words: *COVID-19, Elderly Patients, Lactate Dehydrogenase Albumin Ratio, Emergency Medicine*

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INTRODUCTION

Coronavirus disease 2019 (COVID-19), caused by the novel severe acute respiratory virus coronavirus 2 (SARSCoV-2) first appeared in December 2019, and quickly spread across the world. A pandemic was declared on 11 March, 2020. By 23 January, 2022, the public health problem COVID-19 had infected approximately 340 million people worldwide and resulted in approximately 5 million deaths (1). The mortality rate is particularly high among patients over 65 and with comorbidities such as hypertension, chronic respiratory and heart disease, diabetes, kidney failure, and malignancy. For these reasons, various biomarkers are needed to predict disease severity and mortality in these patients (2,3).

Since it reflects the scale of cellular damage, serum lactate dehydrogenase (LDH) elevation has been linked to increased infection severity. Some studies have suggested that LDH levels can be employed as a prognostic factor in determining the severity of various infectious diseases (4,5). Low albumin (ALB) levels have been associated with multiple inflammatory disorders as a negative acute phase reactant. Although the pathogenesis is not fully understood, levels of ALB are thought to decrease due to the escape of ALB into the interstitial space as a result of increased capillary permeability (6,7). However, since serum ALB levels can also be low in conditions such as liver diseases and malnutrition, ALB measurement, together with other parameters, is recommended to yield more reliable results (8).

A limited number of studies have evaluated the LDH/ALB ratio as a prognostic factor in infectious diseases. In the present study, we hypothesized that the LDH/ALB ratio would be capable of use as a prognostic factor in patients with COVID-19. This study was performed around the hypothesis that the LDH/ALB ratio would yield more sensitive results in predicting the potential relationship between disease severity and mortality in patients with COVID-19 aged over 65.

METHODS

Study design

This single-center, retrospective study was performed with COVID-19 patients over 65 presenting to the emergency department (ED) of a tertiary training and research hospital in Turkey between August and October 2021. The data for elderly patients with diagnoses of COVID-19 confirmed by positive reverse transcription-PCR (RT-PCR) of nasopharyngeal swabs were retrieved from the hospital's electronic medical records and reviewed. Approval for the study was granted by the local ethical committee before the data were scanned (decision number 2022/22). The retrieved data contained only clinical information and included no personally identifiable information.

Inclusion criteria: Patients aged over 65, presenting to the emergency department, diagnosed with COVID-19, and not meeting the exclusion criteria were included in the study.

Exclusion criteria: Patients with active neoplasia, transferred from another institution, refusing diagnosis and treatment, with deficient information in the data record system, patients without thoracic computed tomography (CT), trauma patients or with hemolysis at laboratory tests were excluded.

The data retrieved included patients' demographic information, known comorbidities, routine laboratory tests during the diagnosis and treatment of COVID-19, thoracic computed tomography (CT) images, length of hospital stay, and discharge status. All

patient data were calculated using laboratory and imaging findings at the time of presentation to the emergency department.

Pulmonary involvement was classified as a percentage following thoracic CT examinations. Accordingly, 0-25% involvement was classified as mild, 25%-50% as moderate, and greater than 50% as severe disease.

Endpoints

The primary endpoint of this study was the prognostic value of the LDH/ALB ratio in predicting mortality in elderly patients with COVID-19. The secondary endpoint was to determine the predictive power of the LDH/ALB ratio in differentiating patients with and without severe pulmonary involvement based on thoracic CT.

Statistical Analysis

All statistical analyses were performed on Jamovi v.1.6 software (Jamovi Project Computer Software, version 1.6. Sidney, Australia). Type 1 errors of 5% were applied in all analyses. According to the normality status, continuous variables were expressed as mean and standard deviation (SD) or median and interquartile ranges (IQR). The Shapiro-Wilk test and Q-Q plots were applied to evaluate whether or not data were normally distributed. Categorical data were presented as frequency (n) and percentage (%). According to the distribution pattern, continuous variables were compared using the t-test or Mann-Whitney U test. A receiver operating curve (ROC) was produced to determine the cut-off levels of the LDH/ALB ratio for mortality and severity of pulmonary involvement. Finally, sensitivity, specificity, likelihood ratios (+LR and -LR), positive and negative predictive values were calculated for the LDH/ALB ratio.

RESULTS

8187 patients presented to ED with suspected or diagnosed COVID-19 during the study period. Two hundred six patients were included in the study following application of the inclusion and exclusion criteria, 91 (44.2%) men and 115 (55.8%) women. The patient flow chart is shown in Figure 1. The median age of the patients was 77 (IQR 70-83) years, and the mortality rate in these patients was 26.2% (54/206). Analysis of thoracic CT revealed severe involvement in 31 (15%) cases. The characteristics of patients' demographics, medical history, and the data of the hospitalizations are shown in Table 1.

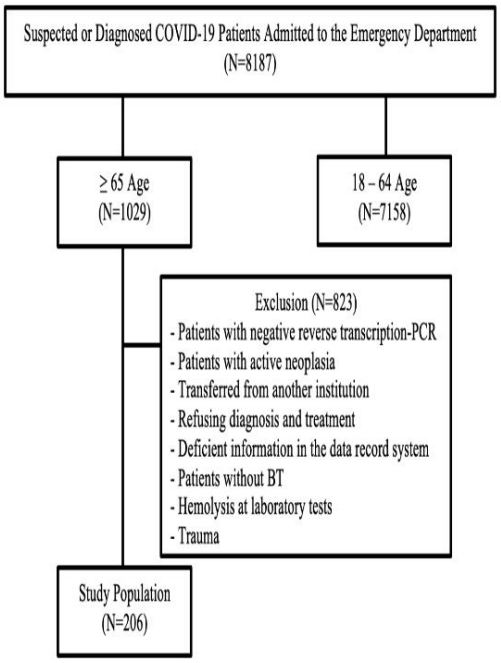

Figure 1. Flow Chart

The summary statistics of patients' laboratory values are shown in Table 2. The statistical analysis regarding mortality revealed that neutrophil, lymphocyte, platelet, sodium, AST, CRP, troponin T, D-dimer, fibrinogen, ferritin, LDH, ALB, creatinine, and the LDH /ALB ratio were significant predictors. In addition, WBC, neutrophil, ALT, AST, CRP,

troponin T, D-dimer, fibrinogen, ferritin, LDH, and ALB were found statistically significant in differentiating patients with severe pulmonary involvement. The relationship between the LDH/ALB ratio and mortality was also evaluated. The median LDH/ALB ratio was higher in the non-surviving group than in the surviving group (12 (IQR 9.6-16.4) and 6.7 (IQR 5.1-9.4), respectively, p =0.001). The optimal cut off value of the LDH/ALB ratio to predict mortality was 9.6, exhibited a sensitivity of 75.9% and a specificity of 76.3% (Area under the curve; AUC, 0.815 (95% confidence interval (CI): 0.747-0.882, p =0.001).

Table 1. The Patients' Demographic Data, Comorbidities, and Lengths of Hospital Stay

		According to Mortality		According to Tomographic Involvement	
	All Patients (n=206)	**No Mortality (n=152)**	**Mortality (n=54)**	**Mild-Moderate Involvement (n=175)**	**Severe Involvement (n=31)**
Gender					
Male	91 (44.2%)	59 (28.7%)	32 (15.5%)	75 (36.4%)	16 (7.8%)
Female	115 (55.8%)	93 (45.1%)	22 (10.7%)	100 (48.5%)	15 (7.3%)
Age (Years)	77 (IQR 70-83)	76.5 (IQR 70-83)	79 (IQR 72.3-84.8)	77 (IQR 70-83)	80 (IQR 75.5-84)
Comorbidities					
Hypertension	145 (70.4%)	105 (51.0%)	40 (19.4%)	123 (59.7%)	22 (10.7%)
Diabetes	68 (33.0%)	46 (22.3%)	22 (10.7%)	56 (27.2%)	12 (5.8%)
CAD	52 (25.2%)	32 (15.5%)	20 (9.7%)	42 (20.3%)	10 (4.9%)
Stroke	21 (10.2%)	17 (8.3%)	4 (1.9%)	19 (9.2%)	2 (1.0%)
CHF	26 (12.6%)	13 (6.3%)	13 (6.3%)	23 (11.1%)	3 (1.5%)
CRF	31 (15.0%)	15 (7.3%)	16 (7.7%)	25 (12.1%)	6 (2.9%)
COPD	25 (12.1%)	17 (8.2%)	8 (3.9%)	21 (10.2%)	4 (1.9%)
Dementia	18 (8.7%)	10 (4.8%)	8 (3.9%)	16 (7.7%)	2 (1.0%)
Hepatitis B	2 (1.0%)	0 (0%)	2 (1.0%)	0 (0%)	2 (1.0%)
Immunodeficiency	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Length of Hospitalization (Days)	6 (IQR 0-11)	5 (IQR 0-11)	6.5 (IQR 3-12)	6 (IQR 0-10.5)	7 (IQR 3-18)

***CAD**: Coronary Artery Disease, **CHF**: Congestive Heart Failure, **CRF**: Chronic Renal Failure, **COPD**: Chronic Obstructive Pulmonary Disease, **IQR:** Interquartile Range*

***Note:** Normally distributed data are expressed as Mean ± SD (Min.-Max.), and abnormally distributed data as Median (IQR 25-75)*

In addition, patients' LDH/ALB ratios were higher in the group with severe tomographic involvement than in the non-severe group (median:16.3; IQR: 13.3-19.7, and 7; IQR: 5.3-9.7, respectively, p=0.001). The AUC value of the LDH/ALB ratio for predicting severe tomographic involvement was 0.946 (95% CI: 0.907-0.985, p =0.001). At a threshold value of 11.2 (sensitivity 93.6% and specificity 87.4%), the LDH/ALB ratio supports the detection of patients with severe tomographic involvement as an influential predictive factor.

The cut-off values of the LDH/ALB ratio for mortality and severe tomographic involvement and a receiver operating curve (ROC) analysis are shown in Table 3 and Figure 2.

Table 2. Patients' Laboratory Indices

		According to Mortality			According to Tomographic Involvement		
	All Patients (n=206)	**No Mortality (n=152)**	**Mortality (n=54)**	**P Value**	**Mild-Moderate Involvement (n=175)**	**Severe Involvement (n=31)**	**P Value**
WBC (10^3/uL)	7 (IQR 5.4-9.4)	6.9 (IQR 5.5-8.6)	8.4 (IQR 4.7-11.4)	0.106	6.9 (IQR 5.4-8.7)	9 (IQR 5.7-10.9)	**0.034**
Neutrophil (10^3/uL)	5 (IQR 3.6-7.4)	4.8 (IQR 3.6-6.5)	6 (IQR 3.6-9.9)	**0.020**	4.9 (IQR 3.4-6.6)	6.7 (IQR 4.4-9.2)	**0.010**
Lymphocyte (10^3/uL)	1.1 (IQR 0.8-1.6)	1.2 (IQR 0.8-1.7)	0.8 (IQR 0.6-1.2)	**0.001**	1.1 (IQR 0.8-1.6)	0.9 (IQR 0.5-1.4)	0.174
Platelet (10^3/uL)	179 (IQR 139-243)	185 (IQR 147-252)	165 (IQR 114-211)	**0.015**	176 (IQR 140-244)	181 (125-220)	0.343
Sodium (mmol/L)	135 (IQR 132-137)	136 (IQR 133-137)	134 (IQR 130-137)	**0.037**	136 (IQR 133-137)	134 (IQR 127-138)	0.080
Potassium (mmol/L)	4.3 ± 0.5 (2.7-6.3)	4.3 ± 0.5 (2.7-5.4)	4.4 ± 0.7 (2.7-6.3)	0.100	4.3 ± 0.5 (2.7-5.4)	4.4 ± 0.8 (2.7-6.3)	0.520
Chlorine (mmol/L)	101(IQR 98-104)	101 (IQR 98-103)	101 (IQR 97.3-104)	0.765	101 (IQR 98-103)	101 (IQR 95-105)	0.727
ALT (U/L)	18.5 (IQR 14-31)	18 (IQR 14-28)	20 (IQR 13.3-32.5)	0.646	17 (IQR 13-27)	31 (IQR 21.5-48.5)	**0.001**
AST (U/L)	28.5 (IQR 20-46.8)	27 (IQR 19-41)	43 (IQR 26.3-61)	**0.001**	27 (IQR 19-40)	52 (IQR 43.5-105)	**0.001**
CRP (mg/L)	96 (IQR 29.3-164)	74 (IQR 20.9-131)	151 (IQR 79.3-195)	**0.001**	77 (IQR 24-139)	168 (IQR 96-225)	**0.001**
Troponin T (ng/L)	14.2 (IQR 6.7-35.5)	10.5 (IQR 5-22.1)	35.8 (IQR 18.9-145)	**0.001**	13 (IQR 5.9-29)	35 (IQR 19.5-101)	**0.001**
D-Dimer (µg/mL)	0.6 (IQR 0.3-1)	0.5 (IQR 0.3-0.9)	0.8 (IQR 0.4-2.1)	**0.009**	0.5 (IQR 0.3-0.9)	1 (IQR 0.5-2.4)	**0.001**
Fibrinogen (mg/dL)	489 (IQR 398-594)	478 (IQR 391-556)	546 (IQR 441-676)	**0.002**	478 (IQR 391-569)	579 (IQR 503-699)	**0.001**
Ferritin (ng/mL)	545 (IQR 270-1103)	440 (IQR 213-851)	967 (IQR 409-1601)	**0.001**	481 (IQR 256-960)	997 (IQR 470-1507)	**0.009**
LDH (U/L)	264 (IQR 205-369)	241 (IQR 196-320)	394 (IQR 307-512)	**0.001**	245 (IQR 198-333)	488 (IQR 442-647)	**0.001**
ALB (g/L)	35.4 ± 4.2 (24-45)	36.3 ± 4.2 (24-45)	32.9 ± 2.9 (24-40)	**0.001**	36 ± 4.2 (24-45)	32.3 ± 2.8 (24-36)	**0.001**
Creatine (mg/dL)	1.1 (IQR 0.8-1.5)	1 (IQR 0.8-1.3)	1.4 (IQR 1.1-2.1)	**0.001**	1.1 (IQR 0.9-1.5)	1.3 (IQR 0.8-1.7)	0.685
LDH/ALB Ratio	7.9 (IQR 5.5-10.9)	6.7 (IQR 5.1-9.4)	12 (IQR 9.6-16.4)	**0.001**	7 (IQR 5.3-9.7)	16.3 (IQR 13.3-19.7)	**0.001**

WBC: *White Blood Cell,* ***ALT****: Alanine Transaminase* ***AST****: Aspartate Transaminase* ***CRP****: C-reactive protein* ***LDH****: Lactate dehydrogenase,* ***ALB:*** *Albumin* ***IQR:*** *Interquartile Range*
Note: *Normally distributed data are expressed as mean ± SD (Min.-Max.) and abnormally distributed data as median (IQR 25-75) values*
Note 2: *Student's t-test was used for normally distributed data and the Mann Whitney U test for abnormally distributed data.*

Table 3. The Cut-off Values of the LDH/ALB Ratio for Mortality and Severe Tomographic Involvement

	LDH/ALB Ratio for Mortality	**LDH/ALB Ratio for Severe Tomographic Involvement**
AUC ± SD	0.815 ± 0.034	0.946 ± 0.020
95% CI	0.747-0.882	0.907-0.985
Cut-off	9.6	11.2
Sensitivity (%)	75.9 (62.4-86.5)	93.6 (78.6-99.2)
Specificity (%)	76.3 (68.8-82.8)	87.4 (81.6-92.0)
+ LR	3.2 (2.3-4.4)	7.44 (5.0-11.1)
- LR	0.32 (0.2-0.5)	0.07 (0.02-0.3)
PPV (%)	53.3 (45.2-61.1)	56.9 (46.9-66.3)
NPV (%)	89.9 (84.6-93.5)	98.7 (95.2-99.7)
Accuracy (%)	76.2 (69.8-81.9)	88.4 (83.2-92.4)
P Value	0.001	0.001

LDH: *Lactate Dehydrogenase,* ***ALB:*** *Albumin,* ***AUC:*** *Area Under the Curve,* ***SD:*** *Standard Deviation,* ***LR:*** *Likelihood Ratio,*
PPV: *Positive Predictive Value,* ***NPV:*** *Negative Predictive Value,* ***CI:*** *Confidence Interval*

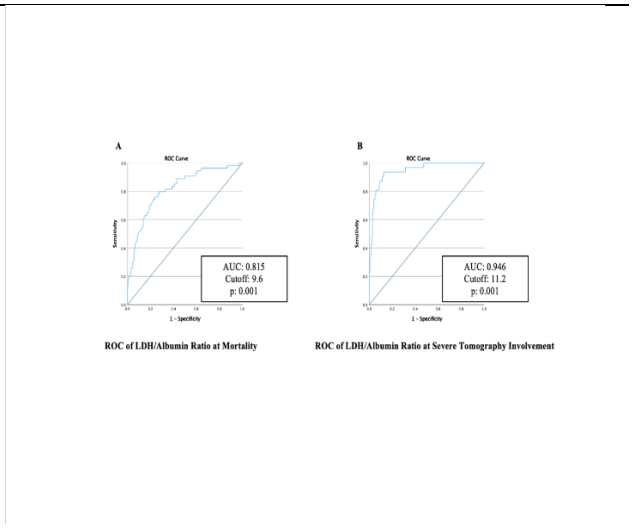

Figure 2. ROC Curve and Cutoff Value of Lactate Dehydrogenase/Albumin Ratio at Mortality and Severe Tomography Involvement

DISCUSSION

COVID-19 disease remains a significant public health problem that has led to more than 5 million deaths worldwide. Consequently, an essential part of health service resources was set aside to fight the pandemic. Reliable markers of disease severity and mortality are therefore needed in terms of efficient use of health service resources and for earlier clinical intervention and predicting patient outcomes (9).

The present study investigated the relationship between the LDH/ALB ratio and mortality and severe pulmonary involvement in patients with COVID-19 disease. The results show that the LDH/ALB ratio can be evaluated as a prognostic marker during laboratory evaluation at initial presentation to the ED. ROC analysis revealed an AUC of 0.815 (cut-off: 9.6) with a sensitivity of 75.9 and a specificity of 76.3 (+LR: 3.2, -LR: 0.32) in mortality prediction. Furthermore, the LDH/ALB ratio showed better accuracy in identifying severe pulmonary involvement with an AUC of 0.946 (cut-off: 11.2; sensitivity: 93.6%, specificity: 87.4%, +LR: 7.44, -LR: 0.07). These results showed that this ratio could be combined with other laboratory parameters to predict mortality and

might be useful for ruling out severe pulmonary involvement.

LDH, an important enzyme in glycolysis, plays a vital role in the conversion of lactate to pyruvate in cells, and its levels rise following tissue breakdown. Higher serum LDH levels have been linked to several diseases, including malignancies, infectious diseases, and liver diseases (10,11). Since LDH is also present in lung tissue, LDH level elevation may be expected in association with pneumonia in patients with severe COVID-19 infection (9).

The levels of various markers also decrease in infectious diseases together with the emerging inflammatory response. Although the mechanisms responsible for hypoalbuminemia in COVID-19 have not been fully elucidated, this is thought to derive from increased vascular permeability and a shortened ALB half-life. Decreased ALB levels have been associated with poor outcomes (12,13). However, since there may be variability in levels in various comorbid conditions, we think that the combined use of these two markers may yield more accurate results than their use alone.

In literature, a few studies have investigated whether the LDH/ALB ratio is a prognostic factor for infectious conditions. Jeon et al. reported that the LDH/ALB ratio could be employed as an independent predictor of in-hospital mortality in patients with infection followed-up in the intensive care department, citing 81.5% sensitivity and 41.2% specificity (8). Yan et al. reported that the LDH/ALB ratio was significant in determining the risk of post-stroke pneumonia in patients undergoing acute ischemic stroke (AUC: 0.762 (95% CI, 0.737-0.786) (14). In the study by Lee et al., they found that the LDH/ALB ratio could be an independent prognostic factor for in-hospital mortality in patients with lower respiratory tract disease (15).

To the best of our knowledge, the present study is the first to investigate the prognostic significance of the LDH/ALB ratio in elderly patients with COVID-19 and its usefulness in predicting the severity of pulmonary involvement. Various biomarkers have been compared against CT involvement levels in patients with COVID, and their diagnostic significance has been discussed. Serin et al. compared CT involvement status with the LDH/lymphocyte ratio and concluded that this was of diagnostic value in COVID-19 disease, with 76.4% sensitivity and 59.60% specificity (4). Tan et al. reported correlation between CRP and thoracic CT findings (16).

Limitations

There are some limitations of this study. The first one is the nature of the single-center investigation that limits the generalize our results. Second, due to the study design, it included elderly patients with various comorbid conditions. We think that LDH and ALB values may vary depending on the underlying disease. Therefore, we employed the LDH/ALB ratio to obviate this. Finally, our data represent those at initial presentation to hospital, and LDH and ALB levels during hospitalization were not included. We think that further studies are now needed to investigate this subject, which we consider to be of considerable importance, in greater detail.

CONCLUSION

The LDH/Albumin ratio calculated from the LDH and Albumin levels routinely measured within laboratory parameters can be used to predict mortality and severity of pulmonary involvement in elderly COVID-19 patients. The LDH/ALB ratio appears to be useful as an initial prognostic indicator as it shows

a good AUC for elderly COVID-19 patients. We think that our study will shed light on future studies for infective diseases.

Ethics Committee Approval: Ethics committee approval was received for this study from the Clinical Research Ethics Committee of Recep Tayyip Erdogan University Faculty of Medicine (ethics committee date and no: 2022/22).

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Upper Gastrointestinal Bleeding: Do Emergency Endoscopic Evaluations Affect Clinical Outcomes?

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Abstract

Objective: We aimed to reveal the effect of time from admission to endoscopy on clinical outcomes such as mortality, rebleeding, and prolonged hospitalization among patients with acute upper gastrointestinal bleeding.

Methods: Patients aged ≥18 years with acute upper gastrointestinal bleeding were enrolled in the study. Those who had variceal bleeding during endoscopy, those whose hospital stay was shorter than 24 hours, those who did not undergo endoscopy, and those who underwent endoscopy after 24 hours were excluded from the study. Clinical findings, routine laboratory test results, and imaging findings of the patients were retrospectively reviewed through the hospital's records system.

Results: A total of 252 patients were enrolled in the study. At admission, 30.2% (76) of patients were at clinically high risk of death or rebleeding, 71.8% had melena, and 51.2% had hematemesis. While 72 (28.6%) of the patients had high-risk endoscopic stigmata, 89 (35.3%) had low-risk endoscopic stigmata. The median hospital stay was 6 (1-91) days. In-hospital mortality occurred in 8 (3.2%) cases, rebleeding developed in 16 (6.3%) cases, endoscopic intervention was required in 103 (40.9%) cases, and prolonged hospital stay was required in 43 (17.1%) cases. High-risk endoscopic stigmata were identified in 63 (34.1%) cases in the urgent group and in 9 (13.4%) in the early group (p=0.001). Endoscopic intervention was required in 47.0% cases in the urgent group, while the incidence was 23.9% in the early group (p=0.001).

Conclusion: While no significant difference was found between the urgent and early groups in terms of mortality and re-bleeding, the need for endoscopic intervention and the incidence of high-risk endoscopic stigmata were found to be significantly higher in the urgent group.

Key words: Endoscopy, Outcome, Upper gastrointestinal bleeding

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INTRODUCTION

When upper gastrointestinal bleeding (UGIB) is mentioned, bleeding from the mouth to the Treitz ligament in the proximal duodenum comes to mind (1). UGIB, one of the common reasons for admission to the emergency department, may result in serious morbidity and mortality. Despite advancements in medical and endoscopic treatments, the death rate from UGIB remains high (2-4). Scoring systems intended to identify the risk status of patients with UGIB have been developed, among which the Glasgow-Blatchford score (GBS) and Rockall score are commonly used (5, 6). Patients with a GBS of 2 or lower are considered to be at low risk and they are suitable candidates for outpatient treatment (7). On the other hand, the lower limit of the GBS for high-risk patients is not clear, but patients with a GBS of higher than 2 have been shown to have a higher risk of rebleeding and increased mortality (8). Many studies have shown mortality rates of up to 25% among high-risk patients (2, 9).

Endoscopy is the primary technique used in diagnosis and treatment to determine the focus of bleeding and to perform hemostatic treatment in cases of actively bleeding lesions (10, 11). Several randomized clinical studies and two meta-analyses conducted in recent years have revealed the beneficial effects of endoscopic therapy in reducing the incidence of rebleeding, the need for surgical interventions, and mortality rates among patients with UGIB (12-14). Time from admission to endoscopy after UGIB has been accepted as a quality standard for both patients and the endoscopy unit by the National Institute for Health and Clinical Excellence (NICE) (11), the European Society of Gastrointestinal Endoscopy (ESGE) (15), and the Joint Advisory Group on Gastrointestinal Endoscopy (JAG) (16).

Recently, studies on times from admission to endoscopy and clinical outcomes have intensified, but the results of various studies evaluating the relationship between times from admission to endoscopy and mortality differ (17-28). In the present study, we aim to reveal the effect of times from admission to endoscopy on clinical outcomes such as mortality, intensive care stay, and prolonged hospitalization among patients with UGIB with the intention of adding our results to the current body of literature.

METHODS

Study Area

This study included patients ≥18 years of age who were diagnosed with acute UGIB between 2019 and 2020. Those who had variceal bleeding during endoscopy, those whose hospital stay was shorter than 24 hours, those who did not undergo endoscopy, those who underwent endoscopy after 24 hours, and those diagnosed with lower gastrointestinal bleeding by colonoscopy were excluded from the study (figure1). Among the patients enrolled in the study, those who underwent endoscopy less than 12 hours after admission to the hospital were assigned to the urgent group, while those who underwent endoscopy after 12 to 24 hours were assigned to the early group.

Data collection and definitions

Age, gender, compliance at admission, heart rate at admission, mean blood pressure, major comorbidities, medications associated with bleeding, endoscopic bleeding etiologies, endoscopic Forrest classification, need for endoscopic intervention, length of hospital stay, and presence of rebleeding and mortality were clinically obtained from patient

files and recorded. Patients' laboratory parameters at admission were collected from electronic medical records, including data on white blood cell count, neutrophils, lymphocytes, hemoglobin, hematocrit, platelets, blood urea nitrogen, alanine aminotransferase, aspartate aminotransferase, gamma-glutamyl transpeptidase, lactate dehydrogenase, amylase, albumin, activated partial thromboplastin time, international normalized ratio, and lactate.

Patients with any of the symptoms of hematemesis, melena, or hematochezia at presentation and no lower gastrointestinal bleeding were considered to have UGIB. Patients who were of clinically high risk at admission were defined as those having a GBS of ≥12. Cases of high-risk endoscopic stigmata were assigned to Forrest classes 1A, 1B, and 2A. Hospital stays of 14 days or longer were defined as prolonged hospitalization.

Clinical outcomes

The primary endpoints of this study were determined to be in-hospital mortality, rebleeding rates, and the primary composite outcome including them, while secondary endpoints were the need for endoscopic intervention and prolonged hospitalization.

Statistical Analysis

Statistical analysis was conducted using IBM SPSS Statistics 26.0 for Windows (IBM Corp., Armonk, NY, USA). The frequency of the variables was expressed as number (n) and percentage (%). Data were evaluated for normality by performing the Shapiro-Wilk test. Continuous variables with normal distribution were presented as mean ± standard deviation, while those with non-normal distribution were presented as median (interquartile range). Pairwise comparisons of continuous variables with normal distribution were performed with Student t-tests, while pairwise comparisons of data with non-normal distribution were performed with Mann-Whitney U tests. Categorical variables were compared with Pearson chi-square tests. Univariate logistic regression analysis was performed using the appropriate parameters thought to be associated with the primary composite outcome. Parameters with a significance value of $p<0.1$ according to univariate analysis were included in the stepwise multivariate logistic regression analysis. Odds ratios (ORs) were calculated with 95% confidence intervals. In all analyses, $p<0.05$ was consider ed to be statistically significant.

RESULTS

Baseline patient characteristics at admission

Of the 252 patients enrolled in this study, 170 (67.5%) were men and 82 (32.5%) were women. The mean age of the overall population was 64.8±18.4 years. Of the patients, 71.8% had melena and 51.2% had hematemesis at admission. No accompanying comorbidity was observed in 69 (27.4%) cases, while 130 (51.6%) patients had hypertension, 60 (23.8%) had diabetes mellitus, and 97 (38.5%) had ischemic heart disease. One hundred patients did not use any drugs associated with bleeding, while 49 (19.4%) patients used anticoagulants, 80 (31.7%) used antiplatelets, and 54 (21.4%) used nonsteroidal anti-inflammatory drugs. Table 1 shows the baseline clinical features at admission.

Clinical characteristics of patients during follow-up Of the 252 patients, 30.2% (n=76) were at clinically high risk of death or rebleeding. Urgent endoscopy was performed for 27% (n=50) of the high-risk patients. The etiology of UGIB primarily

included duodenal ulcer (31.3%), gastric ulcer (18.7%), malignant ulcer (9.5%), and esophagitis (7.1%), while the etiology could not be specified in 9.1% of cases. While 72 (28.6%) of patients had high-risk endoscopic stigmata, 89 (35.3) had low-risk endoscopic stigmata. The median hospital stay was 6 (1-91) days. In-hospital mortality occurred in 8 (3.2%) cases, rebleeding developed in 16 (6.3%) cases, endoscopic intervention was required in 103 (40.9%) cases, and prolonged hospital stay was required in 43 (17.1%) cases (figure 2). Clinical characteristics during follow-up are summarized in Table 2.

Table 1. Baseline clinical features of patients at admission

Variable	n (%)
Overall	252 (100)
Age, years (mean ± SD)	64.8±18.4
Male	170 (67.5)
Main complaint on admission	
Melena	181 (71.8)
Hematemesis	129 (51.2)
Hematochezia	19 (7.5)
Syncope	26 (10.3)
Major comorbidities	
None	69 (27.4)
Hypertension	130 (51.6)
Diabetes mellitus	60 (23.8)
Cerebrovascular disease	24 (9.5)
Liver disease	2 (0.8)
Chronic renal impairment	27 (10.7)
Ischemic heart disease	97 (38.5)
Congestive cardiac failure	31 (12.3)
Arrhythmia	51 (20.2)
Chronic obstructive airways disease	22 (8.7)
Malignancy	33 (13.1)
Bleeding risk medications	
None	100 (39.7)
Anticoagulant drug	49 (19.4)
Warfarin	19 (7.5)
Heparin/low-molecular-weight heparin	8 (3.2)
Direct oral anticoagulant	23 (9.1)
Antiplatelet drug	80 (31.7)
Nonsteroidal anti-inflammatory drugs	54 (21.4)

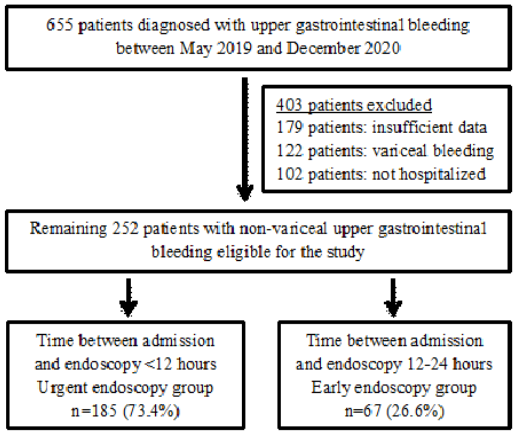

Figure 1. A flowchart showing patient selection

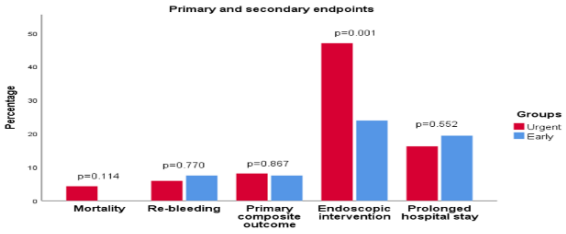

Figure 2. Comparison of urgent and early groups for primary and secondary endpoints

Clinical characteristics of patients during follow-up

Of the 252 patients, 30.2% (n=76) were at clinically high risk of death or rebleeding. Urgent endoscopy was performed for 27% (n=50) of the high-risk patients. The etiology of UGIB primarily included duodenal ulcer (31.3%), gastric ulcer (18.7%), malignant ulcer (9.5%), and esophagitis (7.1%), while the etiology could not be specified in 9.1% of cases. While 72 (28.6%) of patients had high-risk endoscopic stigmata, 89 (35.3) had low-risk endoscopic stigmata. The median hospital stay was 6 (1-91) days. In-hospital mortality occurred in 8 (3.2%) cases, rebleeding developed in 16 (6.3%) cases, endoscopic intervention was required in 103 (40.9%) cases, and prolonged hospital stay was required in 43 (17.1%) cases (figure 2). Clinical characteristics during follow-up are summarized in Table 2.

Clinical and laboratory differences between the urgent and early groups

High-risk endoscopic stigmata were observed in 63 (34.1%) cases in the urgent group and in 9 (13.4%)

in the early group (p=0.001). Endoscopic intervention was required in 47.0% cases in the urgent group and 23.9% in the early group (p=0.001). In terms of other clinical parameters, there were no significant differences between the urgent group and early group. The hemoglobin level at admission was found to be 9.98±2.62 g/dL in the urgent group and 8.64±2.95 g/dL in the early group, being statistically significantly lower in the early group. No significant differences were found for other laboratory parameters (Table 3).

Table 2. Clinical characteristics of patients during follow-up

Variable	n (%)
Clinical high risk at admission (death or rebleeding)*	**76 (30.2)**
Urgent endoscopy	50 (65.8)
Early endoscopy	26 (34.2)
Time to endoscopy	
<12 hours	**185 (73.4)**
12-24 hours	**67 (26.6)**
Etiology	
Unspecified	23 (9.1)
Duodenal ulcer	79 (31.3)
Gastric ulcer	47 (18.7)
Gastroduodenal ulcer	10 (4.0)
Esophageal ulcer	10 (4.0)
Esophagitis	18 (7.1)
Mallory-Weiss	7 (2.8)
Malignant ulcer	24 (9.5)
Angiodysplasia	8 (3.2)
Dieulafoy's lesion	3 (1.2)
Erosive gastritis/bulbitis	13 (5.2)
Other	10 (4.0)
Forrest classification	
Not reported	**91 (36.1)**
High-risk endoscopic stigmata	**72 (28.6**)
IA	1 (0.4)
IB	44 (17.5)
IIA	27 (10.7)
Low-risk endoscopic stigmata	89 (35.3)
IIB	12 (4.8)
IIC	18 (7.1)
III	59 (23.4)
Length of hospital stay, days, median (min-max)	**6** (1-94)
Primary endpoint	
In-hospital mortality	**8 (3.2)**
Rebleeding	**16 (6.3)**
Primary composite outcome**	**20 (7.9)**
Secondary endpoints	
Endoscopic intervention	**103 (40.9)**
Prolonged hospital stay	**43 (17.1)**

*Includes patients with a Glasgow-Blatchford score of 12 or higher at admission
**Primary composite outcome includes in-hospital mortality and rebleeding
IQR: Interquartile range

Predictors of primary composite outcome.

Univariate and multivariate regression analyses were conducted for the primary composite outcome. Accordingly, in univariate analysis, diabetes mellitus (OR: 2.904; 95% CI: 1.141-7.390; p=0.025), heart rate (OR: 1.028, 95% CI: 1.005-1.051; p=0.015), and high-risk endoscopic stigmata (OR: 2.742; 95% CI: 1.089-6.904; p=0.032) were significantly associated with primary composite outcome. In multivariate analysis, male gender (OR: 5.656; 95% CI: 1.333-23.998; p=0.019), diabetes mellitus (OR: 2.941; 95% CI: 1.073-8.064; p=0.036), congestive heart failure (OR: 5.813; 95% CI: 1.560-21.656; p=0.009), heart rate (OR: 1.030; 95% CI: 1.005-1.055; p=0.017), and high-risk endoscopic stigmata (OR: 3.450; 95% CI: 1.246-9.551; p=0.017) were found to be significantly associated with primary composite outcome. Other clinical and laboratory parameters were not significantly associated with primary composite outcome (Table 4).

DISCUSSION

In terms of primary endpoints (in-hospital mortality and rebleeding), statistical analyses revealed no significant differences between patients who underwent urgent endoscopy and those who underwent early endoscopy. No significant differences were found in terms of length of hospital stay as a secondary endpoint, while the need for endoscopic intervention was found to be statistically significantly different for the patients who underwent emergency endoscopy.

An international consensus report recommended performing endoscopy within the first 24 hours for patients presenting with UGIB, while it offered no recommendations in support of or against endoscopy

within 12 hours for patients at high risk of bleeding and death (17). Three recent randomized controlled trials (18-20) and two systemic compilations (21, 22) reported that endoscopy performed between 2 hours and 12 hours for patients with upper gastrointestinal bleeding did not reduce mortality. Randomized controlled studies showed that the risk status of patients was not taken into account during the planning of endoscopy. In a recent study conducted by James et al. (23), endoscopy performed within 6 hours after gastroenterology consultation for patients with UGIB who were at high risk of bleeding and death (GBS of >12) was not found to be associated with lower mortality compared to endoscopy performed between the 6th and 24th hours. In that study, randomization was performed approximately 7 to 8 hours after patients presented with bleeding (23).

Table 3. Comparison of clinical and laboratory parameters between urgent and early endoscopy groups

Variable	Urgent group (n=185)	Early group (n=67)	p
Clinical parameters			
Main complaint on admission			
Melena	135 (73.0%)	46 (68.7%)	0.501
Hematemesis	99 (53.5%)	30 (44.8%)	0.220
Hematochezia	14 (7.6%)	5 (7.5%)	0.978
Syncope	18 (9.7%)	8 (11.9%)	0.610
Heart rate, per minute (mean ± SD)	91.96±18.11	87.96±17.62	0.120
Mean blood pressure, mmHg (mean ± SD)	80.93±14.38	79.42±12.74	0.450
Clinical high risk at admission (death or rebleeding)	50 (27.0%)	26 (38.8%)	0.072
High-risk endoscopic stigmata	63 (34.1%)	9 (13.4%)	0.001
Length of hospital stay, days, median (min-max)	6 (1-94)	7 (1-32)	0.905
Primary endpoint			
In-hospital mortality	8 (4.3%)	0 (0.0%)	0.114
Rebleeding	11 (5.9%)	5 (7.5%)	0.770
Primary composite outcome	15 (8.1%)	5 (7.5%)	0.867
Secondary endpoints			
Endoscopic intervention	87 (47.0%)	16 (23.9%)	0.001
Prolonged hospital stay	30 (16.2%)	13 (19.4%)	0.552
Laboratory parameters*			
White blood cells (10^3/µL)	9.6 (7.3-13.6)	9.4 (6.7-11.8)	0.258
Neutrophils (10^3/µL)	7.2 (5.3-10.8)	7.6 (4.9-10.2)	0.441
Lymphocytes (10^3/µL)	1.41 (0.96-1.96)	1.22 (0.88-1.93)	0.132
Hemoglobin (g/dL)	9.98±2.62	8.64±2.95	0.001
Hematocrit (%)	30.34±7.45	26.80±8.47	0.002
Platelets (10^3/µL)	256 (199-340)	263 (205-333)	0.840
Blood urea nitrogen (mg/dL)	36.9 (25.7-56.0)	35.9 (23.8-56.0)	0.587
Alanine aminotransferase (U/L)	16 (12-24)	15 (11-26)	0.727
Aspartate aminotransferase (U/L)	19 (15-25)	19 (14-26)	0.973
Gamma-glutamyl transpeptidase (U/L)	23 (14-40)	18.5 (13-43)	0.266
Lactate dehydrogenase (U/L)	198 (160-249)	195 (151-234)	0.327
Amylase (U/L)	55 (40-76)	52 (35-85)	0.636
Albumin (g/dL)	3.49±0.63	3.44±0.60	0.525
aPTT, seconds	24.0 (21.6-27.3)	24.1 (21.3-30.7)	0.964
INR	1.14 (1.06-1.29)	1.16 (1.06-1.34)	0.433
Lactate (mmol/L)	1.73 (1.17-2.39)	1.79 (1.25-3.04)	0.174

*Normally distributed parameters are expressed as mean ± SD, non-normally distributed parameters are expressed as median (IQR)
IQR: Interquartile range, aPTT: activated partial thromboplastin time, INR: international normalized ratio

Table 4. Univariate and multivariate analyses of predictors of primary composite outcome

Variable	Univariate analysis		Multivariate analysis	
	OR (95% CI)	p	OR (95% CI)	p
Clinical parameters				
Age	1.019 (0.991-1.048)	0.191		
Male gender	2.926 (0.832-10.285)	0.094	5.656 (1.333-23.998)	0.019
Diabetes mellitus	2.904 (1.141-7.390)	0.025	2.941 (1.073-8.064)	0.036
Ischemic heart disease	2.075 (0.827-5.208)	0.120		
Congestive cardiac failure	2.641 (0.887-7.865)	0.081	5.813 (1.560-21.656)	0.009
Arrhythmia	2.301 (0.867-6.104)	0.094		
Chronic obstructive airway disease	2.972 (0.898-9.835)	0.074		
Heart rate	1.028 (1.005-1.051)	0.015	1.030 (1.005-1.055)	0.017
Mean blood pressure	0.993 (0.960-1.026)	0.657		
Clinical high risk at admission (death or rebleeding)	2.015 (0.799-5.084)	0.138		
High-risk endoscopic stigmata	2.742 (1.089-6.904)	0.032	3.450 (1.246-9.551)	0.017
Laboratory parameters				
Hemoglobin	0.927 (0.784-1.096)	0.375		
Platelets	1.001 (0.998-1.003)	0.584		
Blood urea nitrogen	1.005 (0.990-1.020)	0.553		
Aspartate aminotransferase	1.005 (1.000-1.011)	0.054		
Gamma-glutamyl transpeptidase	1.002 (0.999-1.006)	0.164		
Albumin	0.943 (0.879-1.011)	0.099		
aPTT	1.003 (0.970-1.037)	0.849		
INR	1.041 (0.750-1.446)	0.810		

aPTT: Activated partial thromboplastin time, INR: international normalized ratio

In our study, no significant relationship was found between times from admission to endoscopy and rates of mortality or rebleeding. We think this was because there was no relationship between risk planning at admission and urgent or early endoscopy planning. Likewise, 27% of the patients who underwent emergency endoscopy were found to be at high risk at the time of admission. In studies where endoscopy planning was performed according to risk classifications at the time of admission (24, 25), a correlation was found between mortality and time from admission to endoscopy. In a cohort study conducted by Cho et al. with a large number of participants, times between 6 and 24 hours from admission to endoscopy were compared among patients with UGIB (24) who had no high-risk varicose veins and endoscopy performed within 6 hours was found to be an independent predictor of lower mortality but was not associated with rebleeding. In another study conducted by Laursen et al. (25), endoscopy performed within 6 to 24 hours from admission was found to be associated with lower in-hospital mortality among hemodynamically stable patients, while the times from admission to endoscopy associated with the lowest mortality were between 6 and 24 hours among hemodynamically unstable patients.

The study conducted by James et al. showed that high-risk stigmata on endoscopy were more common in patients undergoing urgent endoscopy. Acid suppression treatment was administered for patients in the early endoscopy group and signs of active bleeding and major bleeding were observed to decrease among patients who received acid suppression treatment for longer periods until endoscopy (23). In our study, high-risk findings on endoscopy and the need for endoscopic treatment were observed to be statistically significantly more common in the urgent endoscopy group than the early endoscopy group. This supports findings achieved

with high-dose acid suppression treatment before endoscopy (26). Based on these findings, we can say that urgent endoscopy has a positive effect on mortality in patients found to be at high risk at the time of admission. Furthermore, we found that acid suppression treatment performed before endoscopy for stable low-risk patients reduced the signs of major bleeding and the need for endoscopic treatment. We accordingly suggest that the duration of internal medicine/gastroenterological evaluations and risk analyses of patients presenting with UGIB after admission to the emergency department were closely associated with the clinical outcomes of urgent/early endoscopy.

Limitations

The retrospective design of this study was its main limitation. Another limitation was the lack of data on vital conditions and detailed anamneses of patients due to the retrospective design.

CONCLUSION

In conclusion, in our study, there was no significant difference in mortality or rebleeding rates among patients who underwent urgent endoscopy, and we found both the need for endoscopic treatment and the rate of high risk endoscopic stigmata on to be statistically significantly higher in this group. Prospective studies involving larger numbers of cases are needed to allow for the use of our results in clinical practice.

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RESEARCH ARTICLE

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In Twin Pregnancies, Zinc and Iron Decreased, while Copper Increased Minimally

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Abstract

Objective: Along with the increase in the frequency of multiple pregnancies, an increase is observed in the frequency of feto-maternal negativities. In our study, we aimed to determine the iron, ferritin, hemoglobin, zinc, and copper levels in second-trimester multiparous twin pregnancies and compare them with the values in singleton pregnancies and healthy women with the same demographic characteristics.

Methods: Three groups were created in the study; control group, single pregnancy group, and twin pregnancy group. Fasting venous blood samples were taken from individuals. Iron, zinc, copper, and ferritin levels were measured.

Results: Compared with the control group, the ferritin (Fe), and zinc (Zn) values of the individuals in the single and twin pregnancy groups were statistically low while copper (Cu) levels were significantly high ($p<0.05$). Also, when compared with individuals in a single pregnancy group, a statistically significant decrease was found in Fe, and Zn levels in the twin pregnancy group ($p<0.05$). Although there was a minimal increase in Cu levels, this increase was not statistically significant in the twin pregnancy group.

Conclusion: Since changes in trace element levels can lead to feto-maternal adverse effects, we think that dietary habits should be monitored, and zinc, copper, ferritin, and iron levels should be followed in pregnant women.

Key words: Twin pregnancy, iron, zinc, copper, ferritin.

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INTRODUCTION

The rate of twin pregnancies in all pregnancies is approximately 1-2% (1). In multiple pregnancies, an increase has been seen in recent years, and the reason for this is the development of reproductive techniques and advanced maternal age (2). The increase in the frequency of multiple pregnancies is accompanied by negativities related to maternal and fetus health. It has been reported that twin gestation is more likely to suffer pregnancy complications such as neonatal deaths, preterm birth, pregnancy-related hypertension, early membrane rupture, diabetes, preeclampsia, and intrauterine growth retardation, than those with a singleton gestation (3, 4). Many physiological changes occur during pregnancy. One of them is anemia which develops due to hemodilution. Despite a 30-50% increase in blood volume, a 17-30% increase in erythrocyte volume causes hemodilution and causes physiological anemia (5). According to the World Health Organization (WHO) data, anemia during pregnancy is observed in 51% of pregnant women. The majority of anemia cases are iron-deficiency anemia (6). According to the WHO, this condition, defined as gestational anemia, is when hemoglobin (Hb) levels are below 11 g / dl during pregnancy (7). Iron is involved in many metabolic processes in the body. In iron deficiency, pregnant women and fetuses are negatively affected. A positive correlation was found between iron deficiency in the mother and decreasing iron in the fetus. As a result of iron deficiency, myelination disorder in the fetus and brain development are disrupted, and cognitive development is affected by hypoxia occurring in the brain due to hemoglobin deficiency (8, 9). Iron deficiency anemia has been shown to cause low birth weight and prematurity (10, 11). Also, iron deficiency anemia can cause diseases such as hemorrhage, heart failure, and preeclampsia in pregnant women and increases the risk of death (12). In studies conducted, it has been found that iron anemia was observed in twin pregnancies more than single pregnancies (13). Serum ferritin levels are a non-invasive, safe indicator of total iron stores in the body (14). Ferritin level below 12 µg/l has been supporting the diagnosis of iron deficiency anemia. Trace elements are found in many reactions in the organism as a cofactor. Zinc and copper are essential trace elements. Zinc is the element in the structure of metalloenzymes such as DNA polymerase, RNA polymerase, superoxide dismutase, carbonic anhydrase, alkaline phosphatase, carboxypeptidase, and alcohol dehydrogenase (15). Also, studies are showing that zinc has a protective role against oxidative stress. Copper, another trace element, is found in the structure of enzymes such as superoxide dismutase (SOD), cytochrome oxidase, lysyl oxidase, tyrosinase, and regulates metabolic reactions (16).

In this study, we aimed to determine the levels of iron, ferritin, zinc, and copper in second-trimester multiparous-twin pregnant without any known risk factors and compare the values of women with singleton pregnancy with the same demographic characteristics.

METHODS

Study design:

This prospective study was performed after approval by the local ethics committee (approval number: KSU-08.01.2020/02). This study was conducted in patients who applied to the Obstetrics and Gynecology outpatient clinic of Necip Fazil City Hospital for routine pregnancy follow-up between February 2020 and January 2021. Three groups were

created in the study (n=26/per group). These groups are; Control group == Group I (= healthy, non-pregnant women), single pregnancy group = Group II (2nd trimester), and twin pregnancy group = Group III (2nd trimester). Control group women between the ages of 25,2 ± 1,9 years, single pregnancy group women between the ages of 26,2 ± 2,8 years, twin pregnancy group women between the ages of 28,1 ± 5,2 years. All pregnant women were in the 16.2 ± 3.1 th week of pregnancy. Pregnant women who did not have any known risk factors including high blood pressure, autoimmune disease, obesity, and did not smoke and use any preparations were accepted. The control group consisted of completely healthy women of similar age group. Fasting venous blood samples were taken from individuals. Iron, zinc, copper, and ferritin levels were measured.

Biochemical analyzes:

Obtaining serum samples from study groups

Fasting blood was collected of pregnant women who did not eat or drink anything other than water for at least eight hours during the night. Then, blood samples were centrifuged at 4500 rpm for 10 minutes to obtain serum samples, and were frozen in microcentrifuge tubes at -80°C and stored until the study day.

Estimation of Iron and Ferritin levels: Iron and ferritin levels were assayed according to the manufacturer's instructions by using the autoanalyzer (Cobas e 601 module, Roche Diagnostics, F.Hoffmann-La Roche Ltd., Kaiseraugst, Switzerland).

Estimation of Zinc and Copper levels: For zinc measurement, samples were diluted with 5% glycerol for until ¼ zinc solution was formed. For Cu measurement, samples were irrigated with 10% glycerol until ½ copper solution was formed. The levels of both trace elements were determined by using atomic absorption spectrophotometer (Perkin Elmer A Analyst, model 800, USA).

Statistical Analysis

Statistical data comparisons were made using a standard software package (SPSS 20 for Windows; SPSS Inc., Chicago, IL, USA). Differences between groups were evaluated by one-way ANOVA, followed by the least significant differences (LSD) tests. All values were given as mean ± SEM. P values <0.05 were considered significant.

RESULTS

Zinc (Zn) levels (µg/dl) were 53.20 ± 12.37 in Group I, 68.9 ± 3.4 in Group II, 90.91 ± 8.03 in Group III, respectively. Copper (Cu) levels (µg/dl) were observed to be 139.31 ± 33.97 in Group I: 132.42 ± 28.10 in Group II, and 120.43 ± 5.33 in Group III, respectively. Iron levels (µg/dl) were determined as 35.62 ± 12.20 in Group I, 48.61 ± 15.38 in Group II, 94.53 ± 23.61 in Group III, respectively. Ferritin levels (µg/L) were found to be 9.71 ± 6.48 in Group I, 13.62 ± 6.42 in Group II, and 30.56 ± 16.31 in Group III, respectively. In light of these numerical data, there was no statistically significant difference between the ages of the groups. Compared with the control group, individuals in the single pregnancies group had statistically low Fe, Ferritin, and Zn levels, but Cu levels were significantly higher (figures 1A, B, C, D). The situation was the same in comparing the individuals in the twin-pregnancy group with the control group (figures 1A, B, C, D). Also, when compared with individuals in the single pregnancies group, a statistically significant decrease in Fe, Ferritin and Zn levels was found in the twin-pregnancy group (figures 1A, B, C). Although there

was a minimal increase in Cu levels in the twin pregnancy group compared to single pregnancies group, this increase was not statistically significant (figure 1D).

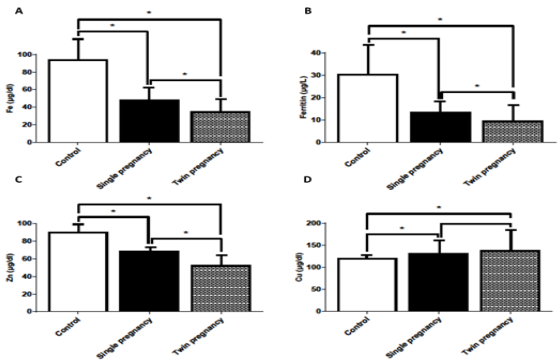

Figure 1. Compared serum Fe, Ferritin, Zn and Cu levels with the control group

Hematological parameters evaluations. A. Iron (Fe) levels, B. Ferritin levels, C. Zinc (Zn) levels, D. Copper (Cu) levels. The results are shown as mean ± standart error mean (SEM) (n=26 / group). The symbol " * " indicates that p <0.05.

DISCUSSION

Twin pregnancy rate has been increasing in recent years. In a study, it was observed that the rate of twin pregnancy in the United States in the last forty years increased by approximately 80%, and in 2016, one out of every 30 births was found to be twin births (17). Pregnancy due to advanced maternal age and assisted reproductive techniques were shown as the reason for this increase (2). The increase in the rate of twin pregnancy increases fetal and maternal risks. Maternally, pregnancy diabetes, hypertension, postpartum hemorrhage, anemia, uterine rupture, congenital losses; fatally, prematurity, and intrauterine growth retardation are seen more frequently in twin pregnancies than single pregnancies (18, 19). It is stated that some of these negative effects are caused by wrong and incomplete nutrition, trace element insufficiency, and wrong physical exercise (20). In the case of twin pregnancy, the mother's body consumes approximately 10% more resting energy than single pregnancies and therefore requires 40% more calories (21, 22). In this case, the food which mother consumed is important in terms of consisting of trace elements. One of these trace elements, iron, is known as the cofactor of many enzymes in both fetus and pregnant. Its effects include DNA synthesis-repair, steroid hormone production, neurotransmitter synthesis, detoxification of foreign and harmful compounds, as well as synthesis and oxygen transport (23, 24). The prevalence of anemia during pregnancy is quite high. The majority of them are iron deficiency anemia, rate of anemia in all pregnant women has been determined as between 2% and 26% (25). A large number of fetal and maternal complications can occur due to anemia. Among them, maternally, sepsis, susceptibility to infection, increased postpartum hemorrhage; in fetus, motor-mental retardation, low birth weight, premature birth, premature rupture of membranes, and death are known (26-28). In our study, iron levels were lower in pregnant women compared to the control group. Moreover, in twin pregnancies, it was found to be lower iron levels than single pregnancies. Therefore, twin pregnancies carry more risks in terms of the complications mentioned above. It has been determined that ferritin is an indicator of body iron stores and its levels decrease in pregnant women (29). In our study, ferritin levels were lower in pregnant women compared to the control group. As with iron levels, ferritin levels were found to be lower in twin pregnancies compared to singleton pregnancies. Zinc, another trace element, is very important for both mother and baby. A positive correlation was found between serum zinc levels of mothers and infants.

Zinc has many different functions such as DNA, RNA and protein synthesis, stabilization of cell membranes, endothelial development, synthesis and use of some hormones, immunity development, antioxidant system development, and participation in the structure of enzymes (30). In studies, it has been shown that zinc deficiency in the mother causes adverse effects in the mother and baby, such as early membrane rupture, early and unexpected sudden abortions, prematurity, retardation of intrauterine growth, fetal neurological defects (31, 32). In our study, we found that zinc levels were significantly lower in pregnant women, especially in twin pregnancy, compared to other groups.

Copper is a trace element in the structure of enzymes such as SOD, cytochrome oxidase, lysyl oxidase, tyrosinase, which are involved in many metabolic events (33). Studies are showing that copper levels increase or decrease during pregnancy (34, 35). It has been reported that increased copper levels in some studies and decreased copper levels in others increase oxidative stress and damage DNA. It is thought to exert this adverse effect by decreasing the level of SOD, an antioxidant enzyme, or by increasing the formation of the hydroxyl radical (36, 37). In our study, we found that copper levels were higher in pregnant women than non-pregnant women. Also, although there was no statistically significant difference between twin pregnancies and single pregnancies, copper values were higher in twin pregnancies.

CONCLUSIONS

In the light of these results, we think that changes in trace element levels may cause adverse maternal and fetal effects. Nutritional habits are important in pregnant women, especially in twin pregnancies, and so zinc, copper, ferritin and iron levels should be followed during pregnancy period.

Ethics Committee Approval: This study was performed after approval by the local ethics committee (approval number: KSU-08.01.2020/02).

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Temperament, Character, Personality Characteristics and Eating Attitudes of People Seeking Bariatric Surgery

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Abstract

Objective: This study aimed to analyze differences in temperament, character, personality characteristics and eating attitudes between the patients seeking bariatric surgery for the treatment of obesity and the general population.

Methods: The candidates for bariatric surgery were assessed pre-operatively using the Temperament-Character Inventory (TCI) and Personality Belief Questionnaire (PBQ) for personality characteristics, and the Eating Attitudes Test (EAT) for their eating behavior.

Results: The candidates for bariatric surgery had higher scores on the Impulsivity and Compassionate sub-dimensions of the TCI, whilst the score on the Self sub-dimension was lower than in the controls. No significant differences were found between patients and controls in the subscales of the Personality Belief Questionnaire. The candidates for bariatric surgery were found to have more impaired eating habits.

Conclusion: This study demonstrates that certain personality characteristics may both cause obesity and may be effective in the treatment method used to treat obesity. Taking into account the personality characteristics of patients and assessing their eating patterns when determining therapeutic approaches to obesity, including bariatric surgery, may be beneficial in achieving effective, long-term results in weight control. In patients scheduled for bariatric surgery for the treatment of obesity, providing individualized psychiatric support to develop their impulsivity-related self-control skills may enhance the success of obesity treatment.

Key words: Obesity, Bariatric Surgery, Temperament, Character, Personality, Eating Attitudes

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INTRODUCTION

Obesity, which is now a major health problem worldwide, is a complex and chronic disease in which genetic and environmental risk factors are involved (1). According to the World Health Organization (WHO) statistics, 39% (1.9 billion) of adults aged over 18 are overweight and 13% (650 million) are obese (2). The combination of psychological intervention, physical exercise and dietary strategies is proving to be effective in helping people with obesity, the prevalence of which is increasing at an alarming rate, to lose weight.

Personality consists of habitual patterns of behavior, thought and emotion that are unique to the individual and remains relatively stable over time (3). Temperament and character constitute the two core components of personality as well as the end product of the interaction between these two components and influence eating behavior and the outcomes of obesity treatment (4).

Obese and overweight individuals have been found to differ from the normal population in terms of personality traits (5). Personality characteristics may play a key role as both a risk factor and a protective factor in the development of excess weight and obesity (6). It is further reported that there is a relationship between the eating patterns and disorders and the personality characteristics. It is therefore argued that personality characteristics may affect the outcomes of weight management interventions (3,5).

Nowadays, surgery is recommended and widely performed as the most effective treatment option for obesity (6-8). Bariatric surgery is being hailed as the most effective treatment for morbid obesity, which has become popular worldwide and provides significant and permanent long-term weight loss compared to other treatment methods (diet, cognitive behavioral therapy, medication, exercise) (1,9,10). Studies examining the personality characteristics of obese patients who underwent bariatric surgery have shown that certain personality characteristics can be predictive of short- and long-term success in obesity treatment (3,11,12).

The studies about bariatric surgery show that certain groups of patients face difficulties in changing their lifestyle and eating attitudes after bariatric surgery, so they usually put on weight for some time after the operation (1). It is also reported that although there is a significant improvement in quality of life after bariatric surgery, some psychological problems may develop in the long term (1). It is recommended that new strategies be developed for selecting and monitoring patients based on psychological factors for bariatric surgery (9). Therefore, for the treatment of obesity, it has become important to determine the personality characteristics of those seeking treatment through invasive interventional methods such as bariatric surgery and to provide the necessary psychiatric interventions. This study was designed to analyze the personality characteristics, temperament and character, and eating attitudes of patients seeking bariatric surgery.

METHODS

Sample and Subjects

This study was performed at the Trabzon Kanuni Training and Research Hospital between May 2017 and July 2018 with patients who were scheduled to undergo bariatric surgery for the treatment of obesity. The study involved 76 patients aged 18 years and over, who were scheduled for bariatric surgery and agreed to participate in the study, and 71 controls. For the study, an ethics committee approval was obtained

from the Scientific Research Council of the Trabzon Kanuni Training and Research Hospital, on April 5, 2017 under number 2017/11.

The patients scheduled for bariatric surgery were assessed by a general surgeon, a psychiatrist and a specialist in endocrinology and metabolism. For this operation to be performed on patients, they must obtain confirmation from all three branches that they are fit for the procedure. The eligibility of patients for bariatric surgery was assessed on the basis of the updated criteria for 2013 set by the National Institute of Health (NIH) (13). According to NIH criteria, patients who are scheduled for bariatric surgery must be between the ages of 18 and 65, have a body mass index (BMI) ≥ 40 kg/m2 or a BMI of 35-40 kg/m2 with one or more comorbidities or a BMI of 30-35 kg/m2 plus diabetes or metabolic syndrome, have failed prior medical treatment for obesity, and have no untreated cancer or untreated substance abuse or psychiatric disorder (14). The study data were obtained during the preoperative psychiatric assessment of the patients.

Materials

For this study, the researchers created a socio-demographic data form including variables such as age, gender, education, height/weight, diet history of the subjects. Following a psychiatric assessment in the pre-operative period, the candidates for bariatric surgery were administered the Temperament-Character Inventory (TCI) and the Personality Belief Questionnaire (PBQ). Their eating patterns were assessed using the Eating Attitude Test. A control group was then formed from members of the general population who were compatible with the bariatric surgery patient group in terms of gender, age and education.

The body mass index (BMI), was used to define obesity. Accordingly, an individual was classified as thin when the BMI was <18.50, normal when the BMI was 18.50-24.99, overweight when the BMI was 25.0-29.99, grade 1 obese when the BMI was 30.0-34.99, grade 2 obese when the BMI was 35.0-39.99, and morbidly obese when the BMI was >40.0 (15).

The Temperament and Character Inventory (TCI) is a true-false scale developed to measure 7 dimensions of personality, consisting of 240 question items. Cloninger's psychobiological personality theory suggests that there are four different dimensions of temperament that are genetically independent of each other and invariant in terms of socio-cultural effects. These dimensions of temperament include Novelty Seeking, Harm Avoidance, Reward Dependence, and Persistence. Additionally, there are three different dimensions of character, Self-Management, Cooperation and Self-Transcendence, which affect the personal and social activity that matures in adulthood (16,17). Each dimension of the TCI has its own sub-dimensions. The Turkish validity and reliability study of the scale was conducted by Köse et al. in 2004 (18). The TCI is reported to be a useful tool for defining patient subgroups and determining personality characteristics in obesity. In recent years, it has gained widespread use in the examination of obesity (3).

The Personality Belief Questionnaire (PBQ) was first developed by Beck et al. for the Axis II disorders on the basis of cognitive theory and clinical observations. The questionnaire consists of schemas made up of specific beliefs and assumptions developed for the personality disorders. Those schemas correspond to 9 personality disorders in the

DSM-IV, Avoidant, Dependent, Passive-Aggressive, Obsessive-Compulsive, Antisocial, Narcissistic, Histrionic, Schizoid and Paranoid. It consists of 14 question items scoring from 0 to 4 (0: I don't believe at all, 4: I strongly believe) for each personality disorder and contains 126 items in total (19). The Turkish validity and reliability study of the original version of the PBQ was performed by Türkçapar et al. (20).

The Eating Attitude Test (EAT) was developed to assess patients with eating disorders (21). The Turkish validity and reliability study of the scale was conducted by Savaşır&Erol (22). The cut-off point of the test is 30 points. The test can be used as a screening tool in studying the risky eating attitudes (23).

Statistical Analysis

The data obtained were statistically analyzed using the SPSS 25.0 package program. The descriptive statistics were reported as mean ± standard deviation for continuous numerical variables. The categorical variables were presented as number of cases (n) and percentage (%). Whether there was a difference between the groups was assessed using an Independent Sample T-Test. $p<0.05$ was considered statistically significant.

RESULTS

Sociodemographic Characteristics

The patients seeking bariatric surgery for the treatment of obesity had a mean age of 36.9±1 and a mean BMI of 45.5±5 kg/m2. Of the patients, 76.3% were female, and 89.5% had been on a diet at least once to control their weight at some point in their lives. At the time of assessment, 36.8% had some type of physical illness and 25% had a psychiatric illness. Another 28.9% were receiving treatment for a past or present psychiatric disorder. No significant difference existed between the patient and control groups in terms of age and gender. Table 1 shows the sociodemographic characteristics of the patient and control groups.

Table 1. Comparison of sociodemographic characteristics in bariatric surgery candidates and controls.

	Seeking for bariatric surgery (n/%)	**Controls (n/%)**
Sex		
Male	18 (23.7)	17 (23.9)
Female	58 (76.3)	54 (76.1)
Age		
18-24	12 (15.8)	11 (15.5)
25-34	22 (28.9)	22 (31.0)
35-44	22 (28.9)	15 (21.1)
45-54	18 (23.7)	18 (25.4)
55-64	2 (2.6)	5 (7.0)
Education		
Primary school	25 (32.9)	13 (18.3)
High school	25 (32.9)	21 (29.6)
University	26 (34.2)	37 (52.1)
BMI*		
Underweight	-	3 (4.2)
Normal	-	28 (39.4)
Risk of obesity	-	29 (40.8)
Grade 1 (mild) obesity	-	7 (9.9)
Grade 2 (moderate) obesity	8 (10.5)	2 (2.8)
Morbid obesity	68 (89.5)	2 (2.8)
Age (Mean±SD, years)**	36.9±1	37.7±8
Mean BMI (kg/m^2)	45.5±5 (min35.7, max 59.5)	25.9±5 (min16.9, max 42.5)
Total	76 (100.0)	71 (100.0)

Data from the Temperament and Character Inventory

In the TCI of patients seeking bariatric surgery, the Impulsivity sub-dimension of the Novelty Seeking dimension and the Compassionate sub-dimension of the Cooperativeness dimension were found to be significantly higher than the patient group, whereas the Self-forgetfulness sub-dimension of the Self-Transcendence dimension was found to be significantly lower than the patient group ($p<0.05$). No significant difference was found between the TCI dimension and sub-dimension scores in terms of genders ($p>0.05$). Table 2 shows the TCI scores for the patient and control groups.

Table 2. Comparison of Temperament and Character Inventory scores in bariatric surgery candidates and controls.

TCI*	Dimensions	Seeking for bariatric surgery (n=76)	Controls (n=71)	p
		Mean± SD	Mean± SD	
	Novelty Seeking	17.9±4.3	17.0±3.9	0.6
	Exploratory	6.4±1.9	6.1±2.0	0.6
T	Impulsiveness	3.3±2.1	3.2±1.5	**0.03**
E	Extravagance	4.9±2.0	4.6±1.8	0.4
M	Disorderliness	3.3±1.5	3.2±1.6	0.6
P	**Harm avoidance**	14.3±5.3	17.3±6.2	0.4
E	Anticipatory worry	4.2±2.0	5.2±2.3	0.5
R	Fear of uncertainty	3.9±1.5	4.5±1.7	0.3
A	Shyness	2.5±2.1	3.6±2.1	0.9
M	Fatigability	3.7±2.0	4.0±2.3	0.5
E	**Reward dependence**	14.6±3.6	13.9±3.4	0.9
N	Sentimentality	7.2±1.8	6.7±2.2	0.1
T	Attachment	5.0±2.0	4.7±2.0	0.9
	Dependence	2.3±1.2	2.4±1.3	0.9
	Persistence	4.8±1.8	5.2±1.6	0.3
	Self-directedness	31.2±6.2	31.0±6.0	0.9
	Responsibility	5.8±1.9	5.7±1.8	0.8
	Purposefulness	5.8±1.2	5.8±1.4	0.1
	Resourcefulness	3.7±1.1	3.7±1.2	0.8
C	Self-acceptance	6.7±2.6	6.7±2.8	0.9
H	Congruentness	9.1±1.9	9.3±1.8	0.9
A	**Cooperativeness**	32.5±4.5	30.4±4.7	0.5
R	Social acceptance	6.7±1.5	6.4±1.4	0.9
A	Empathy	4.8±1.4	4.6±1.3	0.4
C	Helpfulness	4.9±1.1	4.9±1.3	0.4
T	Compassionate	8.7±1.7	7.3±2.6	**0.001**
E	Purehearted	7.3±1.1	7.2±1.2	0.6
R	**Self-transcendence**	18.2±5.2	18.4±5.2	0.6
	Self-forgetfulness	5.2±2.5	5.9±2.0	**0.005**
	Transpersonal identification	5.5±1.9	5.3±2.0	0.6
	Spiritual acceptance	7.5±2.8	7.2±2.7	0.4
	Other Total	7.0±1.8	6.8±1.6	0.8
	TOTAL	140.3±11.8	139.6±10.6	0.3

*TCI: Temperament and Character Inventory
Note: Significant differences are marked in bold type.

Data from Personality Belief Questionnaire

No significant differences were found in the PBQ subscales between patients seeking bariatric surgery and the control group ($p>0.05$). Also, there was no significant difference between the PBQ subscales in terms of gender ($p>0.05$). Table 3 presents the data from PBQ.

Table 3. Comparison of Personality Belief Questionnairescores in bariatric surgery candidates and controls.

PBQ* Subscales	Seeking for bariatric surgery (n=76)	Controls (n=71)	T test, domain and effect size				
	Mean±SD	Mean±SD	p	t	df	Cohen's d	r
Avoidant	13.3±5.5	13.4±5.6	0.85	-0.14	145	-0.02	-0.01
Dependent	7.6±5.1	7.5±5.1	0.98	0.10	145	0.02	0.01
Passive-agressive	13.4±5.6	13.4±5.7	0.90	0.03	145	0.01	0.00
Obsessive-compulsive	13.6±5.5	13.8±5.5	0.83	-0.30	145	-0.05	-0.02
Antisocial	9.8±6.6	9.9±6.6	0.92	-0.08	145	-0.01	-0.01
Narcissistic	8.7±4.8	8.8±4.9	0.87	-0.06	145	-0.01	-0.01
Histrionic	6.1±4.6	6.0±4.6	0.85	0.05	145	0.01	0.00
Schizoid	12.8±5.9	12.9±5.9	0.99	-0.08	145	-0.01	-0.01
Paranoid	11.8±6.5	11.7±6.6	0.82	0.12	145	0.02	0.01

*PBQ: Personality Belief Questionnaire

Results of the Eating Attitude Test

In 10.5% (n=8) of patients seeking bariatric surgery and 5.6% (n=4) of the control group, eating disorders were detected. The mean EAT score was 18.3±8 (min 4, max 37) in the candidates for bariatric surgery, and 13.1±8 (min 1, max 39) in the control group. Although mean EAT scores were higher in the candidates for bariatric surgery, there was no statistically significant difference between the two groups (p>0.05). No significant difference was found between the genders in the EAT scores (p>0.05). Table 4 presents the data from the EAT.

Table 4: Comparison of Personality Eating Attitude Test scores in bariatric surgery candidates and controls.

EAT*	Seeking for bariatric surgery (n=76)	Controls (n=71)	T test, domain and effect size				
EAT-mean	18.3±9	13.1±8	p	t	df	Cohen's d	r
EAT- impaired eating attitude	% 10.5	% 5.6	0.2	3.7	145	0.6	0.3
Total	76	71					

*EAT: Eating Attitude Test

DISCUSSION

Sociodemographic data

The majority of patients (76.3%) seeking bariatric surgery for the treatment of obesity in our study were female. The patients had a mean age of 36.9±1 years and a mean BMI of 45.5±5 kg/m2. In a study involving women seeking treatment for obesity, patients were found to have an average age of 48 years and an average BMI of 37.8 kg/m2 (3). Another study conducted with a large population of bariatric surgery patients found that the patients, 84.7% of whom were female, had a mean age of 35 years and a mean BMI of 43.3 kg/m2 (9). In a similar study, the patients seeking bariatric surgery, the majority of whom were female, were reported to have a mean age of about 36 years, and a mean BMI of about 46 kg/m2 (1). In another study conducted in Turkey with candidates for bariatric surgery, the patients, 80.6% of whom were female, were reported to have a mean age of 37.5 years, and a mean BMI of about 45 kg/m2, which is similar to our study (10). The data we obtained are consistent with those from similar studies.

In our study, 36.8% of the patients seeking bariatric surgery had any physical condition at the time of assessment, 14.5% had any psychiatric condition in the past, and 25% had any psychiatric diagnosis at the time of assessment. The prevalence of comorbid medical and psychiatric illnesses is reported to be high in individuals assessed prior to

bariatric surgery (10). In Turkey, the rate of lifetime psychiatric disorders in candidates for bariatric surgery was reported to be around 39% to 56%, whilst the rate of comorbid physical diseases was reported to be around 44% to 64% (10,24). In light of the data we obtained, there are some differences in rates of psychiatric disorders and physical diseases in bariatric surgery candidates from previous studies. This may be due to being effective in different factors in leading patients to seek bariatric surgery (such as amelioration of comorbid conditions such as diabetes caused by obesity or aesthetic concerns that may be associated with psychiatric diseases).

Scores from the Temperament-Character Inventory

Our study found that scores on the Impulsivity sub-dimension of the Novelty Seeking dimension of the TCI were significantly higher in candidates for bariatric surgery. The most consistent finding in studies examining obesity is that impulsivity is a risk factor for obesity (6). Impulsivity refers to the lack of the ability to inhibit automatic behavior (25). Those with a high impulsivity score are people who make quick decisions, who are unable to control their impulses and who are agitated. They usually act on their instincts and intuitions (26). Impulsivity plays a crucial role in the emergence and continuation of binge eating patterns. Individuals with a high level of impulsivity tend to eat in a more unhealthy way. Impulsivity may therefore contribute to the excessive weight gain that occurs in obesity and affect the outcomes of bariatric surgery (25,27).

Morbidly obese individuals were found to have high scores on the impulsivity subscale (28). Eating behavior acts as an emotion stabilizer that helps to correct negative moods in stressful situations (10). Both emotional eating and uncontrolled eating, which are common among obese people, can be regarded as a reflection of the impulsivity in these individuals (10). Impulsiviness scores are reported to be high, especially in people who seek bariatric surgery for the treatment of obesity. Yet, it is reported that impulsivity adversely affects the outcomes of bariatric surgery (25). Our study found that Impulsiviness scores were elevated in those seeking bariatric surgery, which is in parallel to the literature. Impulsivity may also be a factor that leads people to choose bariatric surgery for the treatment of obesity.

The Compassionate sub-dimension of the Cooperativeness dimension of the TCI was found to be significantly higher in patients seeking bariatric surgery in this study. Those who score high on this subscale are described as compassionate, forgiving, charitable and generous individuals. These individuals do not like to take revenge and generally try not to hold grudges, even if they are treated very badly (26). Compassionate for others has not been sufficiently researched in terms of dietary habits and weight loss. It is argued, however, that compassion may help people with obesity to better cope with the social stigma induced by the condition (29). Given that the people seeking bariatric surgery in our study were mostly morbidly obese, it is possible that high levels of compassion may have prevented these individuals from being affected by the stigma of obesity during their weight gain, and thus from seeking obesity treatment in the early stages, leading to a gradual increase in weight to morbidly obese levels.

No significant differences were found in the Harm Avoidance, Reward Dependence, Persistence and Self-Management dimensions of the TCI and the sub-

dimensions thereof in patients seeking bariatric surgery. The results of studies on the personality characteristics of people suffering from obesity or candidates for bariatric surgery show certain differences. There is evidence that several different assessment tools (such as the MMPI, the Five-Factor Personality Scale or the Temperament Character Inventory, etc.) are used in studies (6). There are also inconsistencies in the results of studies using the TCI (1,8,9,30). Although personality characteristics have an impact on weight changes throughout the life course, what factors lead individuals to different treatment options, including personality characteristics for the treatment of obesity, remains unclear. Therefore, there might not be a significant difference in the scores of the other dimensions and sub-dimensions of the TCI in patients seeking bariatric surgery.

Scores from the Personality Belief Questionnaire

In this study, no differences were found in any of the PBQ subscales in those seeking bariatric surgery. Cluster C disorders, such as avoidant, anxious, dependent and obsessive-compulsive personality disorders, and especially borderline personality disorder, are reported to be more common than cluster B personality disorders in candidates for bariatric surgery (31,32). Owing to the small sample size, sufficient data to reflect personality characteristics could not be obtained in this study.

Scores from the Eating Attitude Test

Our study found that the mean EAT score of patients seeking bariatric surgery was 18.3 and the rate of eating disorders was 10.5%. The studies with candidates for bariatric surgery revealed that the average EAT scores ranged from about 21 to 24 and that the rate of problematic eating behavior ranged from 23% to 35% (10,24,33). That the mean EAT score in our study was lower than those reported in previous studies may be due to the fact that patients were concerned about this issue due to the assessment of their suitability for bariatric surgery and wanted to masquerade as being more moderate in their eating behavior.

CONCLUSIONS

Our study found that people who seek bariatric surgery for obesity treatment have higher levels of impulsivity and are more compassionate individuals. With regard to emotional eating, impulsivity can lead to weight gain and a predisposition to obesity, as well as causing people to resort to riskier methods such as surgery to treat obesity.

Obesity is a multi-systemic disorder, in the development of which genetic, social, cultural and dietary factors as well as psychiatric components are involved. The personality-related factors are effective both in the process leading to obesity and in the treatment thereof. Therefore, particularly in cases where riskier treatment methods such as surgery are to be applied, considering differences in patients' personality characteristics would facilitate adherence to the treatment process and yield effective and long-term results in terms of weight control.

There are some limitations in our study. First, the reasons why patients prefer bariatric surgery for the treatment of obesity have not been investigated. Second, the psychiatric evaluation of the patients was made just before the surgery. Therefore, they may have tried to make themselves look better than they are, to be approved for bariatric surgery.

This study shows that it may be useful to assess personality characteristics and eating behaviors in the course of a psychiatric evaluation to determine

therapeutic approaches to obesity. In the psychiatric assessment prior to bariatric surgery, it may be advantageous to consider personality characteristics and to define patient subgroups, as obesity may affect the long-term success of the treatment. Providing an individualized psychiatric treatment program to develop and strengthen self-control skills in patients scheduled for bariatric surgery for obesity treatment may increase the success of the treatment.

Ethics Committee Approval: For the study, an ethics committee approval was obtained from the Scientific Research Council of the Trabzon Kanuni Training and Research Hospital, on April 5, 2017, under number 2017/11.

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RESEARCH ARTICLE

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Lumboperitoneal Shunt Preference in Treatment of Patients with Normal Pressure Hydrocephalus

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Abstract

Objective: To demonstrate the advantages of Lumboperitoneal (LP) shunt surgery applied to patients with normal pressure hydrocephalus (NPH).

Methods: Preoperative, intraoperative and postoperative data of 20 patients who underwent LP shunt surgery for NPH between 01/01/2012 and 07/04/2022 at the Neurosurgery Clinic of Ordu University Training and Research Hospital were analyzed. The demographic, clinical and laboratory data of the patients as well as their medical records were reviewed. Patients who underwent LP shunt with the diagnosis of normal pressure hydrocephalus in our clinic were screened retrospectively, and the success rates and complications after the surgical intervention applied to these patients were recorded.

Results: Statistically significant improvements were recorded in Modified Ranking Scale Scores and Mini-Mental State Examination Scores at the end of the first year. The incidence of Gait Disturbance did not differ significantly by gender, The incidence of dementia did not differ significantly by gender, The incidence of urinary incontinence showed a significant change according to gender While all of the women diagnosed with normal pressure hydrocephalus had urinary incontinence in the preoperative period, this rate was seen in only 66.7% of the men. Gait disturbance improved in 80%, urinary incontinence in 60%, and cognitive functions in 60% of patients. No neurogenic complication developed in our operated patients. Wound infection occurred at the abdominal incision site in only two patients (10%). Subcutaneous hematoma occurred in the abdominal region in one patient (5%).

Conclusion: LP shunt surgery has a lower complication rate than VP shunt surgery and is a more easily applicable surgical technique. LPS surgery is a safe and minimally invasive treatment method. It has lower complication rates compared to VPS . LPS surgery is an effective surgical technique. It can be used as an alternative to the VPS procedure in the treatment of NPH patients

Key words: Lumboperitoneal shunt, Normal pressure hydrocephalus, Cerebro-spinal fluid

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INTRODUCTION

Normal pressure hydrocephalus (NPH) is a syndrome described by Adams and Hakim in 1965. This syndrome is predominantly seen in the elderly and its major symptoms are gait disturbance, dementia, and urinary incontinence (1). NPH rarely presents with symptoms of mania, depression or psychosis, and these psychiatric disorders may complicate the diagnosis (2). The aim of shunt surgery is to transfer cerebrospinal fluid (CSF) to the peritoneum, pleura or atrium through a shunt system. Historically, although ventriculoperitoneal shunt (VPS) surgery was widely performed, Lumboperitoneal shunt (LPS) surgery, which is a minimally invasive technique, has become the more preferred method today (3). LPS is one of the common and effective surgical treatment methods used today and is used in the treatment of normal pressure hydrocephalus, pseudotumor cerebri, and CSF fistula (4). LPS can be applied relatively easily and the operation time of LPS is shorter. The risk of subdural hematoma, intracranial hemorrhages, seizures, and shunt dysfunction, which are complications that may occur after all shunt surgery treatments, is lower. In addition, there is a randomized controlled trial showing which procedure is more effective and safer (5). Ventricular catheter placement may be difficult in patients with small ventricles. Therefore, LPS surgery may be preferred in patients with small ventricles (6,7,8,9,10).

Lumboperitoneal shunt is an effective and safe procedure for communicating hydrocephalus (6,11). The improvement of the patient's symptoms after lumbar puncture is valuable for diagnosis. Brain magnetic resonance imaging (MRI) and Computed tomography (CT) should be carefully evaluated in the preoperative period. LPS systems consist of 3 main parts: lumbar catheter, valve and a peritoneal catheter (12). LPS surgery provided high clinical success rates in all patients included in our study. Clinical outcomes such as improvement in preoperative symptoms and improved quality of life were comparable to VPS procedures (13). The diagnosis of INPH remains controversial since the lack of widely accepted and standardized criteria (5). As a result of their study, Xie D. et al. showed that LPS and VPS have similar curative effects in the treatment of normal pressure hydrocephalus, but LPS can prevent intraparenchymal hemorrhage caused by ventricular puncture (14). Over the past few decades, a great deal of attention has been given with the respect to the best treatment for INPH. There are some studies suggesting no significant differences among the different shunts used, which are mainly retrospective design (15). Hong Wei Yang et al. showed in an experimental study that deletions in CWH43 cause idiopathic NPH (16). Massimiliano Todisco et al. showed in a study that postoperative reduction of PWM (periventricular white matter) hyperintensities may be a useful MRI marker surrogate for the clinical efficacy of LPS (17). Tong Sun et al. showed in their study that the presence of RBCs in the preoperative CSF is a risk for early shunt obstruction in patients with a diagnosis of PHH (post-hemorrhagic hydrocephalus) treated with LPS (18).

METHODS

The clinical data of 20 patients diagnosed with NPH who were treated with LPS surgery in the Neurosurgery Department of Ordu University Training and Research Hospital, covering the last 10 years, were retrospectively analyzed. These data are follow-up examination findings obtained from

medical charts and neuroradiological examinations of patients. Demographically, age, gender, clinical symptoms of the patient and Lumbar puncture opening pressure, imaging of brain tissue, complications, pre and postoperative outcome scale scores (Modified Rankin Score (mRS) and Mini Mental Status Examination (MMSE) score) were evaluated. We had 20 NPH patients included in the study, of which 8 (40%) were female and 12 (60%) were male. The mean age was 75 years. (Min=62, Max=86) years.

Clinical Manifestation

Gait disturbance was the most common symptom and was present in 90% of our patients. This was followed by dementia (80%) and urinary incontinence (60%). The classic triad of this syndrome was detected only in 60%. In addition to these symptoms, headache was present in 60% of patients and dizziness was present in 20%.

Imaging Examination

CT and MRI were routinely performed on each patient for diagnosis and follow-up, and the size of the ventricles and the structure of the brain parenchyma were examined. The presence of pathologies that may cause obstruction in the CSF circulation pathways and intracranial masses that may cause increased intracranial pressure were investigated.

Patient Selection

A rutine lumbar puncture was performed in all patients who presented with clinical and radiological symptoms suggesting NPH. The opening pressure in the LP ranged from 100 to 260 mm H_2O. Lumbar punctures were repeated for 2 days and 30 ml of CSF was drained each time. Patients with significant clinical improvement after LP were considered candidates for LPS.

Surgical Technique

All patients were given general anesthesia and endotracheal intubation was performed. C-arm fluoroscopy was used to detect the L4-5 intervertebral space. All patients were typically placed in the lateral decubitus position. Afterwards, the patients were stained sterile and covered with a sterile drape. Lumbar and abdominal skin incisions were made. The proximal end of the lumboperitoneal shunt was placed in the lumbar spinal subarachnoid space. CSF flow was observed. This catheter was combined with a medium pressure shunt pump. The upper end of the distal catheter, which was advanced through a tunnel opened under the skin, was connected to the shunt pump. The lower end of the distal catheter was sent to the peritoneum. Both surgical incisions were closed in accordance with the anatomical method.

Statistical Analysis

Categorical data were expressed as frequency (n) and percentage (%). Frequency analysis was used to summarize and report the data. Likelihood Ratio Chi-Squared test was used to test for association between two nominal variables. All comparisons were two-tailed and p-value less than 5% was considered statistically significant. Statistical analyses were performed using the SPSS v28 (IBM Inc., Chicago, IL, USA) statistical software.

RESULTS

At the end of the first year of our patients who underwent LPS surgery, 80% of gait disturbance, 60% of cognitive functions and 60% of urinary incontinence improved. No neurogenic complication developed in our operated patients (Table 1). Wound infection occurred at the abdominal incision site in

only two patients (10%). Subcutaneous hematoma occurred in the abdominal region in one patient (5%). These patients received iv antibiotic treatment and medical treatment. No shunt revision was required in any patient. At the end of the 6th month, the complaints of headache and dizziness resolved in all our patients.

The incidence of Gait Disturbance did not differ significantly by gender (p=0.763), The incidence of dementia did not differ significantly by gender (p=0.651), The incidence of urinary incontinence showed a significant change according to gender (p=0.001), Urinary incontinence was seen in all women, while it was seen in 66.7% of men.

Table 1. Relations of symptoms by age and gender

		Gender						p
		Male		Female		*Total*		
		n	%	n	%	*n*	*%*	
Gait Disturbance	No	1	8.3	1	12.5	*2*	*10.0*	0.763
	Yes	11	91.7	7	87.5	*18*	*90.0*	χ^2=0.091
	Total	*12*	*100.0*	*8*	*100.0*	*20*	*100.0*	
Dementia	No	2	16.7	2	25.0	*4*	*20.0*	0.651
	Yes	10	83.3	6	75.0	*16*	*80.0*	χ^2=0.205
	Total	*12*	*100.0*	*8*	*100.0*	*20*	*100.0*	
Urinary incontinence	No	8	66.7	0	0.0	*8*	*40.0*	**0.001**
	Yes	4	33.3	8	100.0	*12*	*60.0*	χ^2=11.644
	Total	*12*	*100.0*	*8*	*100.0*	*20*	*100.0*	

χ^2:Likelihood Ratio Chi-Square

DISCUSSION

It is characterized by normal pressure hydrocephalus, gait disturbance, urinary incontinence, and dementia (Hakim-Adams syndrome). The three characteristic symptoms of Hakim-Adams syndrome are present in almost 50% of cases, but the present combination of the two symptoms should be considered for diagnosis (19). The pathophysiology of NPH is still not fully understood. A widely accepted theory is low venous compliance in the basal ganglia and thalamus (19). The aim of the treatment is to restore the functional capacity of the patient. Until now, diagnostic tests were not sufficient to establish the diagnosis and predict the postoperative outcome. For the treatment of NPH, VPS, endoscopic third ventriculostomy and LPS are the main treatment options. However, there are some questions that need to be answered about which technique is effective and what type of shunt should be used (20). Preoperative provocative testing with large volume lumbar CSF drainage or extended lumbar drainage has shown positive results in NPH (21,22,23,24,25). LPS surgery is a safe, effective treatment method, it is still up-to-date and used in the treatment of many diseases. Pseudotumor cerebri, post-operative pseudomeningocele, CSF fistula treatment, treatment of NPH and communican hydrocephalus are among these (8,26,27). LPS surgery case series usually includes adult patients in the medical literature. The underlying pathological causes in these patients are hydrocephalus secondary to complications of head trauma, NPH secondary to subarachnoid hemorrhage, and idiopathic NPH (6,28). Patients diagnosed with NPH in the adult age group were included in our study. In our study, it was

decided to treat NPH patients with LPS, considering the response to benefit from LP, the patient's symptoms, and neuroradiological evaluations. CT was preferred in the early period for postoperative control and MRI was preferred for long-term follow-up. Although positive results have been reported, occlusion and shunt dysfunction may occur following LPS surgery, and a shunt revision surgery may be required. Moreover, LPS surgery should be avoided in the presence of cerebellar tonsillar herniation, infection and arachnoiditis (29). Related disadvantages are orthostatic over drainage and difficulty in function evaluation (11). Unsuccessful injection attempts have been reported in a few series (30). Patients with severe kyphoscoliotic deformity and calcified ligamentum flavum should not be selected for LP shunting (11,31). LPS surgery can cause neurological or non-neurological complications. Many surgeons are hesitant to use LP shunts due to the high complication rates reported in several series in previous years and the difficulty in evaluating function (5). The optimal benefit of this procedure can be achieved using appropriate patient selection and meticulous surgical technique (32). One of the biggest advantages of LPS surgery over VP surgery is that it is devoid of the risk of intracranial complications such as intracerebral hemorrhage, seizures and shunt malposition. This advantage is one of the main factors that makes it increasingly preferred (6,8,9).

CONCLUSION

LPS surgery is a safe and minimally invasive treatment method. It has lower complication rates compared to VPS (18). LPS surgery is an effective surgical technique. It can be used as an alternative to the VPS procedure in the treatment of NPH patients (33).

Ethics Committee Approval: Ethics committee approval was received for this study from the Clinical Research Ethics Committee of Ordu University Faculty of Medicine (ethics committee date and no: 2022/114).

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CASE REPORT **DOI:** 10.19127/mbsjohs.1081469

Mandible Fracture After Radiotherapy: Case Report

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Abstract

Oral cancers are among the most common types of cancer. Squamous cell carcinoma accounts for approximately %90 of oral cancers. The prognosis in oral squamous cell carcinomas differs depending on the treatment and the size of the lesion. Treatment options for squamous cell carcinomas include marginal resection, radiotherapy and chemotherapy. Although radiotherapy is an effective treatment option in head and neck cancers, it is known to cause some complications. Treatment options for squamous cell carcinomas include. In this case report, the complication of mandibular fracture seen after radiotherapy treatment is presented.

A 77-year-old female patient who was treated at the medical oncology clinic with the diagnosis of oral squamous cell carcinoma was referred to our clinic for pathological mandibular fracture and extraoral fistula caused by radiotherapy. As a result of intraoral examination, it was observed that the ramus was exposed due to pathological fracture in the right mandible corpus region. After the antimicrobial washing in the mouth, sequestrotomy was performed. Palliative treatment of the patient was performed, then the patient was followed up with telemedicine methods.

A detailed evaluation should be made before oral surgery in patients with a history of radiotherapy from the head and neck region. Precautions should be taken against the possible risk of osteoradionecrosis.

Keywords: Pathological fracture, radiotherapy, osteoradionecrosis

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INTRODUCTION

Squamous cell carcinoma (SCC) is the 8th most common type of cancer. In addition, these cancer type; constitute approximately 90% of oral cancers (1). SCC is thought to occur spontaneously or as a result of mutation in oral keratinocytes. (2). Smoking and alcohol consumption are risk factors that can cause mutations. Moreover; There are also risk factors such as oral health level, malnutrition and decreased immune response (3). SCC is frequently seen on the floor of the mouth and tongue. Other localizations are the hard and soft palate, alveolar crests, and buccal mucosa (4, 5).

Prognosis in oral SCC varies depending on the the patient's medical condition, treatment type and lesion size (3). The factors affecting the cancer treatment plan are as follows; degree of local invasion, presence of distant metastases, regional lymph node involvement, age and general health of the patient (6). Marginal resection, removal of cervical lymph nodes, radiotherapy and chemotherapy are the treatment options in SCC (3).

In spite of radiotherapy is an effective treatment option in head and neck cancers, it is known to cause some complications (7). In the literature, it has been stated that the tissues become hypocellular, hypovascular and hypoxic as a result of radiotherapy (8). Another important complication thought to occur due to tissue hypoxia and its consequences is osteoradionecrosis. (9, 10).

According to the accepted definition in the literature, osteoradionecrosis is defined as a condition in which the irradiated bone is exposed through the wound and continues without healing for 3-6 months (11, 12). Oral and systemic manifestations of osteoradionecrosis can be seen in the irradiated bone as a result of many etiological factors such as tooth extraction, chronic infection and surgical treatment (10, 13). These clinical findings can be listed as chronic pain, numbness, trismus, dysphagia, orocutaneous fistula and systemic infections (14). Osteoradionecrosis may have a chronic or progressive clinical course, as well as cause pathological fractures (11).

Pathological fractures are treated with reconstruction plates applied after resection in indicated cases. Flap surgeries can be performed in advanced cases (7).

CASE

A 77-year-old female patient was referred for mandibular fracture and extraoral fistula. In the detailed anamnesis, it was learned that the patient had undergone radiotherapy with the diagnosis of SCC. (Fig. 1,2)

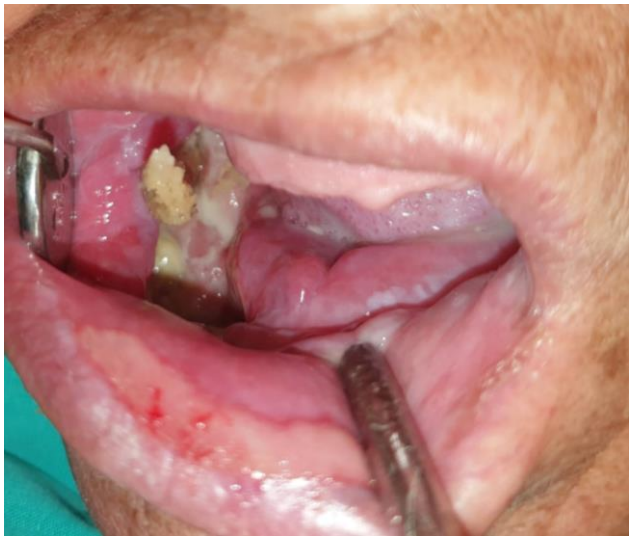

Figure 1. Exposed necrotic ramus

In the patient's anamnesis, there was no surgical procedure that could cause trauma to the relevant region after radiotherapy. As a result of intraoral and radiological examination, it was observed that the ramus was exposed due to pathological fracture in the right mandible corpus region. (Figure 3)

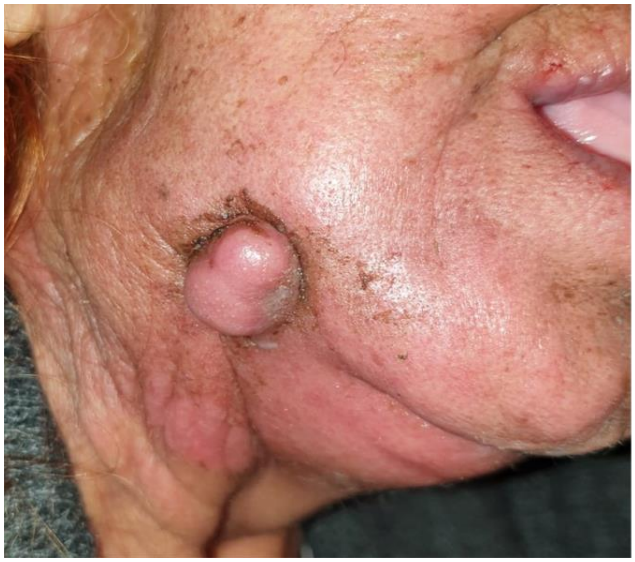

Figure 2. Extraoral fistula

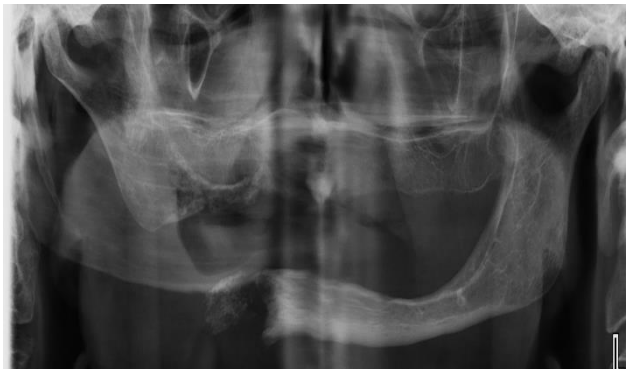

Figure 3. Panoramic radiography

It was determined that there was drainage from the extraoral fistula associated with the fracture. line. Considering the current medical condition of the patient, palliative treatment was planned. Surgical treatment was postponed until the patient's medical condition stabilized. After the antimicrobial washing in the mouth, sequestrotomy was performed. (Figure 4)

The patient was prescribed intravenous antibiotics and intravenous analgesics. Due to the patient's medical condition, controls could be made through telemedicine. Although there was a regression in the signs of infection in the 2-week follow-up, it was learned that the patient's medical condition worsened in the course of time, and the patient died at the end of 2 months.

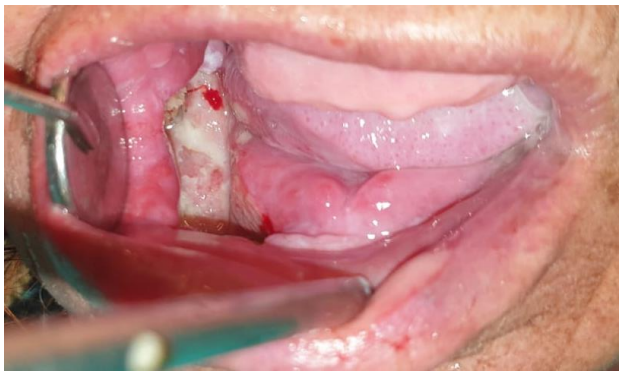

Figure 4. Intraoral view after sequestrotomy

DISCUSSION

Osteoradionecrosis, which was first defined as radiation osteoitis by Ewing in 1926. Osteoradionecrosis can be seen after radiotherapy in head and neck cancers (13). There is no consensus in the literature about how long after radiotherapy osteoradionecrosis can be seen. Cases of osteoradionecrosis reported 2 months after radiotherapy, as well as cases reported after 45 years have been reported (8). In our case, mandibular fracture due to osteoradionecrosis was determined 2 months after radiotherapy.

Osteoradionecrosis is seen 24 times more frequently in the mandible than in the maxilla (8). The posterior region of the mandible is affected more frequently than other parts of the mandible due to its dense bone structure and lack of vascularization (10). There are different opinions in the literature about the relationship between edentulous jaws and osteoradionecrosis. It is thought that being edentulous for a long time before radiotherapy may protect from osteoradionecrosis, but newly formed edentulism may increase osteoradionecrosis (15-17). In our case, it was learned that tooth extraction was performed

from the relevant region 6 months before radiotherapy.

According to the osteoradionecrosis classification defined by Notani et al., pathological fractures and fistulas are classified as Stage III, as in our case (18).

Reconstruction plates, fibula, scapula and iliac grafts are preferred in pathological fractures; Tissue transfer and regional flaps can be applied for soft tissue defects (19). As in the case report of Pandey et al., a reconstruction plate can be applied after partial resection or resection can be performed without applying a plate (13, 20). Gassner et al. applied a plate after resection and used a latissimus dorsi flap for the soft tissue defect (7).

In stage III and stage IV cancer cases, palliative treatment is performed as the patients cannot tolerate the surgical procedure. Similar to our case, in Floriano et al.'s case, palliative treatment was performed for unilateral pathological fracture, and it was reported that a fracture occurred in the contralateral jaw in the controls (21).

CONCLUSION

In patients with a history of radiotherapy from the head and neck region, a detailed evaluation should be made before oral surgery. Precautions should be taken against the possible risk of osteoradionecrosis.

Ethics Committee Approval: The consent form was filled out in participant.

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Author Contributions: Concept: F.A, H.A, Design: F.A, H.A, Literature search: F.A, H.A, Data Collection and Processing: F.A, H.A, Analysis or Interpretation F.A, H.A, Writing: F.A, H.A.

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