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Journal article on the Internet

Abood S. Quality improvement initiative in nursing homes: The ANA acts in an advisory role. Am J Nurs [serial on the Internet] 2002 [cited 12 Aug 2002]; 102. Available from: www.nursingworld.org/AJN/2002/june/wawatch.htm

Website

Cancer-pain.org [homepage on the Internet]. New York: Association of Cancer Online Resources [updated 16 May 2002; cited 9 Jul 2002]. Available from: www.cancer-pain.org

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The Intensive Care Society of Australia and New Zealand. Mechanical ventilation strategy in ARDS: Guidelines. Int Care J Aust 1996;164:282-4.

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Original Article / Orijinal Araştırma

Clinicopathological Characteristics and KRAS-mutation Incidence in Gastric Carcinomas

Mide Kanserlerinin Klinikopatolojik Özellikleri ve KRAS-mutasyon İnsidansı

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Abstract

Objectives: This study aimed to determine the frequency of KRAS mutations in patients with gastric adenocarcinoma (GAC) in Hatay Province and the relationship of these mutations with some pathological and clinical parameters, and to guide the diagnosis and treatment planning of patients.

Material and Method: Formalin-fixed, paraffin-embedded and histologically confirmed samples were used in the assessment of KRAS mutation. The sections were taken from the archive tissue samples of each case. Real-Time Polymerase Chain Reaction (RT-PCR) system was used to identify the mutations of codons 12 and 13 (exon 2) of the RAS gene. The mutations GLY12ALA (G12A), GLY12ASP (G12D), GLY12ARG (G12R), GLY12CYS (G12C), GLY12SER (G12S), GLY12VAL (G12V) and GLY13ASP (G13D) were investigated.

Results: The KRAS mutation rate was 2% and only G12D substitution was detected. In this case, the tumor was located in the small curvature. No statistical comparison could be carried out between KRAS mutation and clinicopathological factors due to the small number of the mutated cases. Tumor differentiation was found significantly different from WHO-2010 typing and primary tumor staging.

Conclusions: We have found the incidence of KRAS mutation to be 2%. Even though, KRAS mutation in GAC alone is not a prognostic or predictive marker, subtype-specific analysis can provide data that may affect the diagnosis, management and treatment of the disease.

Keywords: KRAS, gastric carcinoma, G12D, mutation

Öz

Amaç: Bu çalışmanın amacı, Hatay ilinde mide adenokarsinomlu (GAC) hastalarda KRAS mutasyonlarının sıklığını, bu mutasyonun bazı patolojik ve klinik parametrelerle ilişkisini belirlemek, hastaların tanı ve tedavi planlamasına rehberlik etmektir.

Gereç ve Yöntem: KRAS mutasyonunun değerlendirilmesinde formalinle fikse, parafine gömülmüş ve histolojik olarak tanıları doğrulanmış örnekler kullanıldı. Her vakanın arşiv doku örneklerinden kesitler alındı. RAS geninin 12 ve 13 kodonlarının (ekson 2) mutasyonlarını belirlemek için Gerçek Zamanlı Polimeraz Zincir Reaksiyonu (RT-PCR) sistemi kullanıldı. GLY12ALA (G12A), GLY12ASP (G12D), GLY12ARG (G12R), GLY12CYS (G12C), GLY12SER (G12S), GLY12VAL (G12V), GLY13ASP (G13D) mutasyonları çalışıldı.

Bulgular: KRAS mutasyon oranı %2 idi ve sadece G12D tespit edildi. Bu olguda, tümör küçük kurvatur yerleşimliydi. Mutasyonlu olgu sayısı az olduğundan KRAS mutasyonu ile klinikopatolojik faktörler arasında istatistiksel karşılaştırma yapılamadı. Tümör diferansiyasyonu ile WHO-2010 tiplemesi ve primer tümör evresi arasında anlamlı bir fark bulundu.

Sonuç: KRAS mutasyonu insidansını %2 olarak bulduk. GAC'deki KRAS mutasyonu tek başına prognostik veya prediktif bir belirteç olmasa da, alt tipe özgü analiz, hastalığın tanısını, yönetimini ve tedavisini etkileyebilecek veriler sağlayabilir.

Anahtar Kelimeler: KRAS, mide kanseri, G12D, mutasyon

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INTRODUCTION

Gastric cancers (GCs) are the 5th most common cancer type in the world and the 4th most common in males as well as being the 3rd most frequent cause of cancer-related deaths following lung and liver cancers.[1] As a general information, GCs are 2-fold more frequently seen in males than females. The current prevalence of GCs, molecular and geographical variants, variations in molecular levels, the complexity of treatment management and poor prognosis still pose a challenge for health professionals.[2] The GCs are mostly gastric adenocarcinoma (GAC), genetic and molecular pathways as well as factors such as Helicobacter pylori infection play an important role in its etiology.[3]

The differences between many countries and regions in terms of the frequency of GAC may be due to the genetic factors of the disease.[4] With increased identification of oncogenic mutations and cell signaling pathways, it has become possible to predict the subtypes of cancers and treatment success of targeted therapies has increased in various cancers.[5]

Rat sarcoma virus (RAS) proteins are located in the inner region of the cell membrane and mediate important cellular events such as cell growth, cell differentiation, cell skeleton organization, cell migration and signal transduction pathways that control membrane traffic, apoptosis, metastasis and angiogenesis. The RAS and phosphoinositide 3-kinase (PI3K) signaling pathway are the key signals that are activated in the different tumors.[4,6] Mutations in RAS and pathways mentioned previously have been detected in many types of cancer. Although the frequency of mutations in the RAS gene family varies depending on cancer type, approximately 30% of all cancers involve a point mutation in the RAS gene, and these mutations often occur in the Kirsten Rat Sarcoma Viral Oncogene Homolog (KRAS) gene.[7,8]

The KRAS gene is located at 12p12.1 and consists of 6 exons. The KRAS protein, a small GTPase, consists of 188-189 amino acids. Two mRNA isoforms, KRAS4A and KRAS4B emerge as a result of alternative splicing occurring in the KRAS gene. The KRAS mutation status is important in predicting treatment efficacy of drugs such as cetuximab in targeted therapy. KRAS is involved in the epidermal growth factor receptor (EGFR) pathway. These proteins often mediate the transmission of proliferative signals through the upstream of receptor tyrosine kinases and downstream cascades of protein kinases. Mutations in the KRAS gene induce uncontrolled activation of RAS protein.[9,10] As traditional knowledge, KRAS mutations are contradictory to EGFR mutations and can induce EGFR-RAS-RAF-MAP kinase steps independent of the EGFR mutation and inhibition of apoptosis. For this reason, KRAS proteins appear to be resistant to EGFR inhibitor drugs. However, KRAS mutations are known to be a negative predictor and the KRAS mutation status depends on the EGFR mutation state. Therefore, it is still debated whether EGFR inhibitors are useful for GAC.[4,11]

This study aimed to determine the frequency of KRAS mutations in patients with GAC in Hatay province and the relationship of these mutations with some pathological and clinical parameters, and to guide the diagnosis and treatment planning of patients.

MATERIAL AND METHOD

Data collection and ethical approval: The present study included 49 diagnosed as primary GAC between 2007 and 2016 at Hatay Mustafa Kemal University School of Medicine. The histopathological sections and clinical information of the cases were examined retrospectively. Age and gender of the patients, tumor diagnosis, WHO-2010 typing.[12] and primary tumor stage, grade of differentiation, lymphovascular invasion, lymph node involvement were recorded as the clinicopathological data. Tumor differentiation was evaluated as well, moderately or poorly differentiated according to WHO differentiation grading.[12] It was then grouped as high grade (moderately+poorly differentiation) and low grade (well-differentiation), and primary tumor stages were grouped as pT2 and pT3+pT4 for statistical analysis.

KRAS Mutation Analysis: Formalin-fixed, paraffin-embedded and histologically confirmed samples were used in the assessment of KRAS mutation. Three to four sections with 3-4 µm thickness were taken from the archive tissue samples of each case and transferred to sterile microcentrifuge tubes. Genomic DNA was extracted from the samples using DNA isolation kit (Qiagen, Hilden, Germany). Genomic DNA isolations were performed using these tissue samples. Real-Time Polymerase Chain Reaction (RT-PCR) system was performed to identify the mutations of codons 12 and 13 (exon 2) of the RAS gene. KRAS mutations were analyzed in the samples after DNA isolation.The commercially available KRAS RT-PCR kit (Qiagen, Hilden, Germany) was for this procedure. The detection of mutations with this kit consists of two stages; (i) evaluation of DNA quality, and (ii) RT-PCR reactions. The quality of the samples should be evaluated to use these samples for RT-PCR reactions, . The samples with appropriate DNA quality were used in the mutation detection stage. The mutations GLY12ALA (G12A), GLY12ASP (G12D), GLY12ARG (G12R), GLY12CYS (G12C), GLY12SER (G12S), GLY12VAL (G12V), GLY13ASP (G13D) were investigated using this KRAS RT-PCR kit.

The study protocol was approved by the Non-Interventional Clinical Research Ethics Board of Hatay Mustafa Kemal University (Decision Number: 2017/154). All procedures were carried out in accordance with the ethical rules and the principles of the Declaration of Helsinki.

Statistical Analysis

Statistical Analysis: SPSS Version 21.00 (NY, Armonk) was employed for statistical analysis. Kolmogorov Smirnov test was used to test normality of the distributions. Quantitative variables were expressed as mean and standard deviation

(SD) while categorical variables were expressed as number (n) and percentage (%). Chi-square test or Fisher's exact test was used to compare qualitative data. The differences between tumor differentiation groups regarding qualitative data were analyzed by Mann-Whitney U test. A p-value < 0.05 was considered statistically significant.

RESULTS

The clinicopathological characteristics of patients: The clinical and pathological characteristics of 49 participants were summarized in **Table 1**. The patient ages ranged between 30-90 years (min-max) while mean age was 62.37±16.79 years. The tumor diameter ranged between 14-105 mm (min-max) mm while mean tumor diameter was 61.85±24.31 mm. All the patients were diagnosed as GAC. According to WHO 2010 criteria, tubular GAC was found in majority of the patients (49%). Other subtypes were poorly cohesive (40.8%), mucinous (8.2%) and signet-ring cell (2.0%) carcinomas, respectively. According to assessment of primary tumor stage;, the majority of patients (69.4%) were pT4. Of the patients; 49.0%, 32.7% and 18.4% had poorly-differentiated, moderately-differentiated and well-differentiated tumors, respectively.

KRAS Mutation

The mutation rate of KRAS was 2% (1 in 49) and only one substitution, G12D, was detected. No statistical comparison could be carried out between KRAS mutation and clinicopathological factors due to the small number of the mutated cases.

Tumor Differentiation

Table 2 shows the comparison between tumor differentiation grades and some clinicopathological characteristics. In the comparison, Tumor differentiation was found significantly different from WHO-2010 typing and primary tumor staging. According to WHO-2010 typing, more than half of the tubular type cases (79.2%) were high grade. The number of the cases with signet-ring cell (n=1) and mucinous (n=4) type tumors was low for the evaluation .In primary tumor staging, the majority of patients (62.5%) in pT2 stage were low grade, whereas the majority of patients (90.2%) in pT3+pT4 stages were high grade.

DISCUSSION

The first report on KRAS mutations in GAC patients was published in 1986. Since then, many studies have investigated the status of KRAS mutations in GAC. Until recent times, the vast majority of studies have been conducted on Asian GAC patients. The largest Western study included 82 patients whereas while an Asian (China) study included 485 GAC patients.[5,13] However, nowadays, multicenter studies such as researches conducted on 1282 GAC patients in the largest have started to be published.[9]

Comparing the mutational pattern of GAC, The Cancer Genome Atlas (TCGA) study identified 25 significantly mutated genes in GAC including KRAS.[14] KRAS is a downstream effector of EGFR and activating mutation of KRAS is considered to stimulate the RAS/signaling pathway

Table 1. The clinical and pathological characteristics of 49 participants

Data		
Age (mean±SD)	62.37±16.79	
Tumor size (mean±SD)	61.85±24.31 mm	
	N	**%**
Gender		
Male	35	71.4
Female	14	28.6
Diagnosis		
Adenocarcinoma	49	100
WHO-2016 typing		
Tubular	24	49
Poorly cohesive	20	40.8
Signet-ring cell	1	2
Mucinous	4	8.2
T stage		
pT2	8	16.3
pT3	7	14.3
pT4	34	69.4
Tumor differentiation		
Poorly	24	49
Moderately	16	32.7
Well	9	18.4

SD: Standard Deviation

Table 2. Comparison between tumor differentiation and some clinicopathological characteristics

Category	Variable	Tumor Differentiation		p value
		High Grade	Low grade	
Gender				0.702
	Male	29 (82.9%)	6 (17.1%)	
	Female	11 (78.6%)	3 (21.4%)	
WHO-2016 typing				0.725
	Tubular	19 (79.2%)	5 (20.8%)	
	Others	21 (84.0%)	4 (16.0%)	
LVI				0.179
	Present	33 (86.8%)	5 (13.2%)	
	Absent	7 (63.6%)	4 (36.4%)	
LN Metastasis				0.259
	Present	27 (87.1%)	4 (12.9%)	
	Absent	13 (72.2%)	5 (27.8%)	
PSC				0.569
	Present	5 (100.0%)	0 (0.0%)	
	Absent	35 (79.55%)	9 (20.5%)	
DSC				1.00
	Present	3 (100.0%)	0 (0.0%)	
	Absent	37 (80.4%)	9 (19.6%)	
T stage				0.003*
	pT2	3 (37.5%)	5 (62.5%)	
	pT3+pT4	37 (90.2%)	4 (9.8%)	

LVI: Lymphovascular invasion, LN: Lymph node, PSC: Proximal surgical margin, DSC: Distal surgical margin

independently from EGFR activation. The recent studies suggest that KRAS activation and downstream signaling may affect the properties and functions of the tumor microenvironment.[9]

The status of KRAS mutation is important in predicting therapeutic efficacy of drugs such as cetuximab (anti-epidermal growth factor receptor) in targeted therapy. For example, KRAS is a crucial biological marker in predicting response to anti-EGFR treatment in colorectal cancers.[15]

In the traditional knowledge, GCs are 2-fold more frequently seen in males than females. Also Fu et al.[5] have found that the frequency of GAC males is 2-fold higher compared with females. In a multicenter study that involved 1282 GAC patients, the male/female ratio was 3/2.[9] In our study, the prevalence of men with GAC was more than 2-folds of that in female. This finding was partially consistent with literature data.[4,5]

The rate of KRAS mutation on 485 patients with GC (China) revealed that the rate of KRAS mutation was 4.1%.[5] In other studies, similar rates were detected in Japanese (4%-4.9%) and Chinese (4.5%) patients.[13,16,17] In a study carried out on 120 GAC patients in Iran, the KRAS mutation rates were 13.3% (codon 12) and 16.7% (codon 13).[4]

In a study performed on fresh frozen samples tissues of 595 GC patients from Italy and Singapore, KRAS mutation was reported to be 4%. The researchers also observed that KRAS mutations were more common in older patients.[18] In a multicenter study that involved 1282 GAC patients, the KRAS mutation rate was found to be 5%.[9] In a review of the literature, mean KRAS mutation rate in GAC patients was estimated to be 6.5%.[19]

In our study, KRAS mutation was detected in only one patient (G12D mutation), and its rate was 2%. Our findings were lower than the literature average. We consider that the small number of cases, racial differences in mutation rates, varying methodologies, and different analysis methods may be the factors leading to our findings.

Fu et al. have examined the relationship between KRAS mutation and some clinicopathological characteristics (gender, age, TNM stage, tumor location, and lymph node status) in GC patients. In their study, they have detected a significant correlation between KRAS G12D mutation and tumor location (p=0.020) and lymph node invasion (p=0.045). The researchers have determined that the G12D mutation was more concentrated in the upper and middle gastric locations and pNO type.[5]

Ayatollahi et al. have found that KRAS codon 12 mutation was related with tumor classification while KRAS codon 13 mutation was related with tumor site and tumor classification.[4] They have detected KRAS codon 12 and KRAS codon 13 mutations in half of the T1 cases and two-thirds of gastric fundus tumors, respectively. In another study, it was observed that GACs with KRAS mutations developed from the gastric antrum.[20] The mutational patterns of 77 genes were studied in 91 poorly cohesive GAC patients in South Korea, beside several gene mutations, KRAS mutations were significantly associated with tumor location (more commonly in upper 1/3 region), tumor depth (T1 versus T2+T3+T4), growth pattern of tumor and lymphovascular invasion-embolism.[21]

Hewit et al. have identified a significant relationship between KRAS mutation and tumor histology including 1282 GAC patients in countries such as Japan and England in their study. According to Lauren's classification, The highest (12%) and the lowest (2%) KRAS mutation rates were detected in mucinous and diffuse type GAC cases, respectively.[9] The prognostic significance of KRAS mutation in GAC is controversial. While no correlation was found between the existence of KRAS mutations and survival in GAC in some studies,[19] they were detected to be more associated with poor prognosis in the lung and colorectal cancers[22] whereas KRAS mutation has been determined to be associated with improved prognosis in ovarian cancer.[23]

Most of the KRAS-mutated cases were reported as moderately differentiated tumors by Ayatollahi et al.[4], Zhao et al.[20] reported KRAS-mutated cases as well-differentiated tumors. Ayatollahi et al.[4] observed that 50% of KRAS-mutated cases were T1 tumors. However, in other studies, no significant relationship was established between KRAS mutation and TNM stage.[24] In our study, there was only one case with mutation so no statistical comparison could be carried out between KRAS mutation and clinicopathological factors.

In our study, tumor differentiation was found significantly different from WHO-2010 typing and primary tumor staging. According to WHO-2016 typing, more than half of the tubular type cases (58.3%) were moderately-differentiated type. However, 90% of the poorly cohesive carcinomas were poorly-differentiated type. Besides, most of the tumors invading the serosa layer (pT4 tumor) were poorly (58.8%) and moderately (32.4%) differentiated GAC. The results obtained in the subserosa invasion (pT3 tumor) were similar to those reported in the serosa. However, the majority of the cases (62.5%) with muscularis propria invasion (pT2 tumor) were well-differentiated GAC. In primary tumor classification, the majority of patients (62%) were well-differentiated in pT2 stage whereas the majority of patients (58.8%) in pT4 were poorly differentiated.

Limitations

The small sampling size, inclusion of the cases only from a single institution (Hatay Mustafa Kemal University, Medical Faculty), investigation of only KRAS-gene types and inability to examine closely related genes (such as BRAF, PIK3CA) were the limitations of our study.

CONCLUSION

In our study, we found the incidence of KRAS mutation to be 2%. This result is different from Europe, Middle Eastern and the Far Eastern countries due to some factors limiting

our study as well as regional and racial variations. Although, KRAS mutation in GAC per se is not a prognostic or predictive marker, subtype-specific analyses may provide data that may affect the diagnosis, management and treatment planning of the disease. Besides, further comprehensive analyses and novel studies with larger sample sizes are needed for more precise outcomes.

ETHICAL DECLARATIONS

Ethics Committee Approval: The study protocol was approved by the Non-Interventional Clinical Research Ethics Board of Hatay Mustafa Kemal University (Decision No: 2017/154).

Informed Consent: Written consent was obtained from the families for their participation in the study.

Referee Evaluation Process: Externally peer-reviewed.

Conflict of Interest Statement: The authors have no conflicts of interest to declare.

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

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REFERENCES

1. IARC-2019. International Agency for Research on Cancer. http://gco.iarc.fr/today/home. Date of access: September 13, 2019.
2. Ferlay J, Soerjomataram I, Dikshit R, et al. Cancer incidence and mortality worldwide: sources, methods and major patterns in GLOBOCAN 2012. Int J Cancer 2015;136:E359-66.
3. Arnold M, Karim-Kos HE, Coebergh JW, et al. Recent trends in incidence of five common cancers in 26 European countries since 1988: analysis of the European Cancer Observatory. Eur. J Cancer 2015;51:1164-87.
4. Ayatollahi H, Tavassoli A, Jafarian AH, et al. KRAS codon 12 and 13 mutations in gastric cancer in the northeast Iran. Iran J Pathol 2018;13:167-72.
5. Fu XH, Chen ZT, Wang WH, et al. KRAS G12V mutation is an adverse prognostic factor of Chinese gastric cancer patients. J Cancer 2019;10:821-8.
6. Qu JL, Qu XJ, Zhao MF, et al. Gastric cancer exosomes promote tumour cell proliferation through PI3K/Akt and MAPK/ERK activation. Dig Liver Dis 2009;41:875-80.
7. Kelley JR, Duggan JM. Gastric cancer epidemiology and risk factors. J Clin Epidemiol 2003;56:1-9.
8. Schubbert S, Shannon K, Bollag G. Hyperactive Ras in developmental disorders and cancer. Nat Rev Canc 2007;7:295-308.
9. Hewitt LC, Saito Y, Wang T, et al. KRAS status is related to histological phenotype in gastric cancer: results from a large multicentre study. Gastric Cancer 2019;22:1193-203.
10. Kang JY, Park CK, Yeo CD, et al. Comparison of PNA clamping and direct sequencing for detecting KRAS mutations in matched tumour tissue, cell block, pleural effusion and serum from patients with malignant pleural effusion. Respirology 2015;20:138-46.
11. Liu Z-M, Liu L-N, Li M, Zhang Q-P, Cheng S-H, Lu S. Mutation detection of KRAS by high-resolution melting analysis in Chinese with gastric cancer. Oncology Reports 2009;22:515-20.
12. Bosman FT, Carneiro F, Hruban RH, Theise ND. WHO Classification ot Tumours of the Digestive System. (4th). IARC Press. (Lyon). 2010.
13. Van Grieken NC, Aoyama T, Chambers PA, et al. KRAS and BRAF mutations are rare and related to DNA mismatch repair deficiency in gastric cancer from the East and the West: results from a large international multicentre study. Br J Cancer 2013;108:1495-501.
14. TCGA. The Cancer Genome Atlas Research Network. Comprehensive molecular characterization of gastric adenocarcinoma. Nature 2014;513:202-9.
15. Lordick F, Kang YK, Chung HC, et al; Arbeitsgemeinschaft Internistische Onkologie and EXPAND Investigators. Capecitabine and cisplatin with or without cetuximab for patients with previously untreated advanced gastric cancer (EXPAND): a randomised, open-label phase 3 trial. Lancet Oncol 2013;14:490-9.
16. Lu W, Wei H, Li M, et al. Identification of KRAS and PIK3CA but not BRAF mutations in patients with gastric cancer. Mol Med Rep 2015;12:1219-24.
17. Takahashi N, Yamada Y, Taniguchi H, et al. Clinicopathological characteristics and prognostic roles of KRAS, BRAF, PIK3CA and NRAS mutations in advanced gastric cancer. BMC Res Notes 2014;7:271.
18. Polom K, Das K, Marrelli D, et al. KRAS Mutation in gastric cancer and prognostication associated with microsatellite instability status. Pathol Oncol Res 2019;25:333-40.
19. Hewitt LC, Hutchins GG, Melotte V, Saito Y, Grabsch HI. KRAS, BRAF and gastric cancer. Transl Gastrointest Cancer 2015;4:429-47.
20. Zhao W, Chan TL, Chu KM, et al. Mutations of BRAF and KRAS in gastric cancer and their association with microsatellite instability. Int J Cancer 2004;108:167-9.
21. Kwon CH, Kim YK, Lee S, et al. Gastric poorly cohesive carcinoma: a correlative study of mutational signatures and prognostic significance based on histopathological subtypes. Histopathology 2018;72:556-68.
22. Zhang J, Park D, Shin DM, Deng X. Targeting KRAS-mutant non-small cell lung cancer: challenges and opportunities. Acta Biochim Biophys Sin (Shanghai) 2016;48:11-6.
23. Nodin B, Zendehrokh N, Sundstrom M, Jirstrom K. Clinicopathological correlates and prognostic significance of KRAS mutation status in a pooled prospective cohort of epithelial ovarian cancer. Diagn Pathol 2013;8:106.
24. Lee KH, Lee JS, Suh C, et al. Clinicopathologic significance of the K-ras gene codon 12-point mutation in stomach cancer. an analysis of 140 cases. Cancer 1995;75:2794-801.

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Original Article / Orijinal Araştırma

Anatomical Variations in Chronic Otitis Media Surgery; Comparison of Tomography and Perioperative Findings

Kronik Otitis Media Cerrahisinde Anatomik Varyasyonlar; Tomografi ve Perioperatif Bulguların Karşılaştırılması

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Abstract

Aim: For a correct and adequate chronic otitis media surgery, it is necessary to define the anatomical structures correctly and to know their variations, otherwise, an increase in the complication rate is inevitable. This study aims to present the anatomical variations detected both in preoperative computerized tomography scanning and during operation, and complication rates encountered in 308 patients who underwent tympanomastoidectomy because of chronic otitis media in the light of current literature knowledge.

Material and Method: In this retrospective study, the files of 308 patients who underwent tympanomastoidectomy because of chronic otitis media in a tertiary clinic between September 2011 and July 2019 were scanned for encountered anatomical variations detected both in preoperative computerized tomography scanning and during operation and complications.

Results: There was Körner septum in 12 (3.8%) cases, dehiscence in the facial nerve tympanic segment in 12 (3.8%) cases, and lateral semicircular canal dehiscence (LSCD) in 4 (1.3%) cases. In 4 (1.3%) cases, we observed the dura was located downward and in 6 (1.9%) cases, the sigmoid vein was located anterosuperiorly.

Conclusion: Always being careful in terms of anatomical variations and complications during the operation will increase the success of the surgery. Knowing the anatomical variations and complications related to the temporal region is of great importance for clinicians dealing with ear surgery.

Keywords: Chronic otitis media, anatomical variation, tympanomastoidectomy, cholesteatoma

Öz

Amaç: Doğru ve yeterli bir kronik otitis media cerrahisi için anatomik yapıların doğru tanımlanması ve olası varyasyonlarının bilinmesi gereklidir, aksi takdirde komplikasyon oranının artması kaçınılmazdır. Bu çalışmada hem preoperatif bilgisayarlı tomografi taramasında hem de operasyon sırasında saptanan anatomik varyasyonları ve kronik otitis media nedeniyle timpanomastoidektomi uygulanan 308 hastada karşılaşılan komplikasyon oranlarını güncel literatür bilgileri ışığında sunmayı amaçladık.

Gereç ve Yöntem: Bu retrospektif çalışmada, Eylül 2011-Temmuz 2019 tarihleri arasında üçüncü basamak bir klinikte kronik otitis media nedeniyle timpanomastoidektomi uygulanan 308 hastanın dosyaları, karşılaşılan anatomik varyasyonlar açısından hem ameliyat öncesi bilgisayarlı tomografi taramasında hem de ameliyat sırasında not edilen bulgular ve komplikasyonlar açısından tarandı. .

Bulgular: 12 (%3,8) olguda Körner septum, 12 (%3,8) olguda timpanik segmentte fasiyal dehissans ve 4 (%1,3) olguda lateral semisirküler kanal dehissansı (LSCD) vardı. 4 (%1,3) olguda duranın aşağı, 6 (%1,9) olguda sigmoid venin anterosuperior yerleşimli olduğu görüldü.

Sonuç: Operasyon sırasında anatomik varyasyonlar ve olası komplikasyonlar açısından her zaman dikkatli olmak ameliyatın başarısını artıracaktır. Temporal bölgeyle ilgili anatomik varyasyonların ve komplikasyonların bilinmesi kulak cerrahisi ile uğraşan klinisyenler için büyük önem taşımaktadır.

Anahtar Kelimeler: Kronik otitis media, anatomik varyasyon, timpanomastoidektomi, kolesteatom

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INTRODUCTION

Chronic inflammation and infection of the middle ear and mastoid spaces characterize chronic otitis media (COM). Its main clinical findings are membrane perforation, intermittent or continuous discharge, and hearing loss. While the inactive type of COM, which has various forms, can be controlled with topical treatment, the active and cholesteatoma types are destructive and complicated. Surgery is the only treatment option for the eradication of cholesteatoma and to avoid the complications of COM.[1] The decision for the choice of surgical technique, preservation of higher hearing threshold, and prevention of complications such as infection, cerebral hernia, recurrence, and treatment failure is of particular importance. Computed tomography imaging of the temporal bone has been a standard procedure before surgery. CT reveals not only the extent of the pathologic process in the tympanic cavity and mastoid bone, but also shows potential complications and ossicular chain destruction.[2,3] In COM surgery, infected mastoid cells are usually cleaned by performing tympanomastoidectomy. For a correct and adequate tympanomastoidectomy, it is necessary to define correctly the anatomical structures and to know their variations, otherwise, an increase in the complication rate is inevitable. In this study, we present the anatomical variations detected both in preoperative computerized tomography scanning and during operation, and complication rates encountered in 308 patients who underwent tympanomastoidectomy because of chronic otitis media in the light of current literature knowledge.

MATERIAL AND METHOD

The study was carried out with the permission of Afyonkarahisar Health Sciences University, Clinical Research Ethics Committee (Date: 06.11.2020, Decision No: 2011-KAEK-2). All procedures were carried out in accordance with the ethical rules and the principles of the Declaration of Helsinki.

In this retrospective study, we scanned the files of 308 patients who underwent tympanomastoidectomy because of COM in a tertiary clinic between September 2011 and July 2019. Age, gender, complaints, history, physical examinations, and operation notes of all patients were scanned and recorded. Preoperative non-contrast temporal high-resolution computerized tomography (CT) was performed in all patients enrolled in the study in an average timeline of 1 week to 1 month before surgery. Patients included in the study had high-resolution temporal bone sections with a 6th generation 6-row spiral multi-slice CT device branded "Philips Brilliance 6 Amsterdam, The Netherlands" at the Department of Radiology of the same tertiary hospital. Images were taken as 120 kV, 200 mAs/section, collimation 6x0.75, pitch 0.417, rotation time 0.75 sec, image thickness 200 mm, matrix 512 thickness. The radiology department evaluated and reported findings of tomography images. Patients who were operated on for chronic otitis media but did not undergo mastoidectomy or atticotomy, and who underwent revision surgery, were excluded. The anatomical variations detected during the surgery and the high-resolution temporal bone CT findings got preoperatively were compared. We noted the intraoperative complications. All the participants gave verbal and written informed consent before the operation.

RESULTS

157 (51%) of the patients were female and 151 (49%) were male. The average age was 36 (8-72). 36 of the operations performed on the patients were radical mastoidectomy, 103 were modified radical mastoidectomy, 42 were tympanoplasty, and simple mastoidectomy, 27 were inside out atticotomy. During the operation, we detected cholesteatoma in the middle ear in 190 (62%) patients. We detected soft tissue in the middle ear or mastoid in these patients. As we encountered perioperatively anatomical variations; there was Körner septum in 12 (3.8%) cases, dehiscence in the facial nerve tympanic segment in 12 (3.8%) cases, and lateral semicircular canal dehiscence (LSCD) in 4 (1.3%) cases. In 4 (1.3%) cases, we observed the dura was located downward and in 6 (1.9%) cases the sigmoid vein was located anterosuperiorly. (**Table 1**) Upon review of preoperative CT reports; Körner septum was noted in 10 of 12 cases, dehiscence in the facial nerve was noted in 5 of 12 cases, LSCD was noted in 1 of 4 cases, downward located dura was noted in all 4 cases and anterosuperiorly located sigmoid vein was also noted in all 6 cases, respectively.(**Figure 1,2,3**) When the ossicular status of patients was examined during operation, we saw ossicular destruction in the incus in 259 patients (84%). Considering the tomography findings, the most ossicular destruction was seen in the incus of 210 patients (68%). Malleus was detected as destructed in 120 patients (38%) on CT and 166 patients (53%) in operation. Stapes was detected as destructed in 118 patients (38%) on CT and 102 patients (33%) in operation. According to the operation records, complications developed in 10 patients. When complications are examined; Two cases had stapes subluxation and perilymph leakage. We repaired perilymph leakage with perichondrium and cartilage fragments. In 4 of the cases, cerebrospinal fluid leakage occurred because of dura damage, and the damage was repaired. In one of these 4 cases, the dural plateau was exposed because of dehiscence, while in one, the dural plateau was located downward.

Table 1. Anatomical variations and complications detected in the operation

Variations	Number of patients
Körner septum	12 (3.8%)
Dehiscence of the facial nerve tympanic segment	12 (3.8%)
Lateral semicircular canal dehiscence	4 (1.3%)
Downward located dura	4 (1.3%)
Anterosuperiorly located sigmoid vein	6 (1.9%)

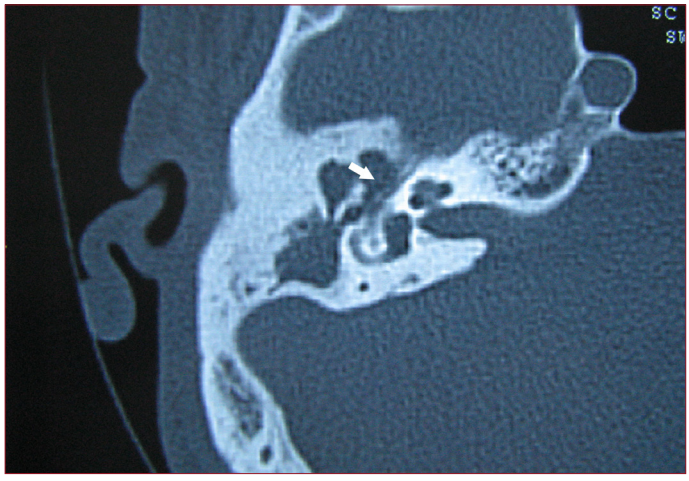

Figure 1. CT image. Dehiscence of the facial nerve tympanic segment, white arrow

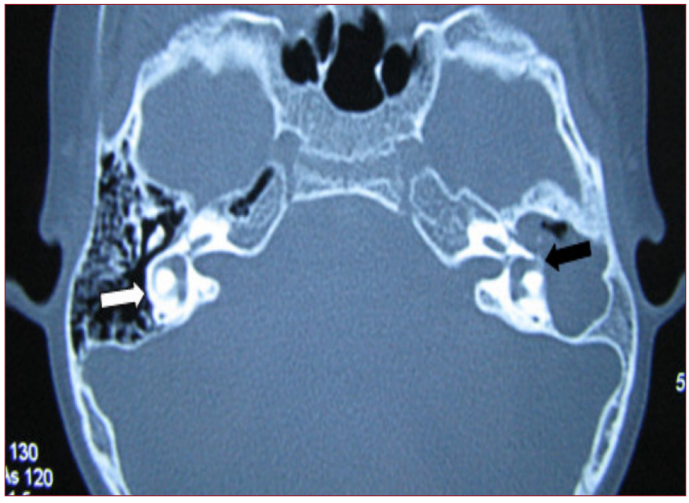

Figure 2. CT image.Lateral semicircular canal (LSSC), axial section, the white arrow: Right intact LSSC, Black arrow: Left LSSC dehiscence

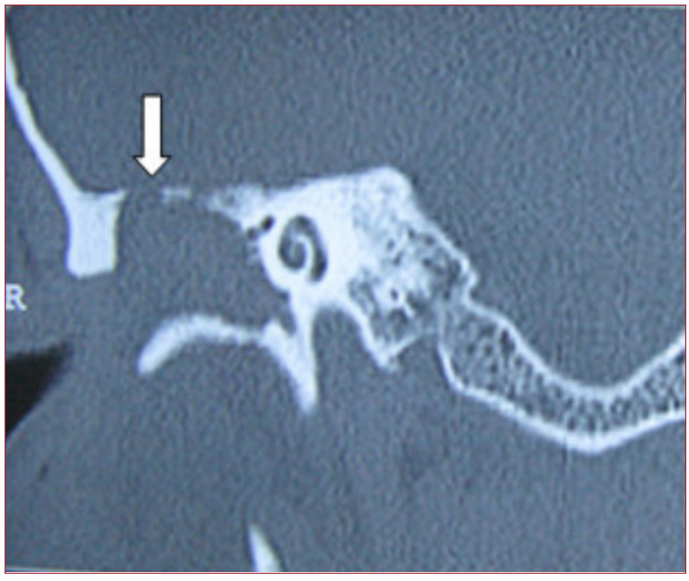

Figure 3. CT image. Dural bone defect (tegmen tympani), the white arrow (Coronal section, right ear)

DISCUSSION

Chronic otitis media (COM) is an inflammatory process in the middle ear that lasts longer than 3 months and is not completely cured by medical treatment, characterized by eardrum perforation, ear discharge, hearing loss.[4] COM is a middle ear disease that is characterized by inflammation characterized clinically by ossicular destruction. Ossicular resorption in COM with cholesteatoma is more serious than COM without cholesteatoma. In 80% of COMs with cholesteatoma, ossicular chain erosion is observed, while in non-cholesteatoma COM this rate decreases to 10-20%. [5] Many mechanisms related to osteoporosis in COM have been reported. These mechanisms are; chronic osteomyelitis, osteoclastic osteolysis, pressure necrosis, osteocytic osteolysis, melting through monocyte, melting through collagenase, acid phosphatase, and lysozyme, local pH changes, and vascular proliferation. These factors can lead to ossicular erosion, individually, or in combination. Ossicular resorption is one of the most important processes of COM. Because medical treatment can not control it. Besides, mostly conductive type, sensorineural hearing loss, and temporal bone and intracranial complications occur because of ossicular erosion.[6]

The Körner septum is a remnant of petrosquamous sutures. The incidence varies between 6.6% and 22.7%. If a Körner septum is encountered while working with a drill to find the antrum, an ineffective mastoidectomy is performed by leaving the rest of the infection uncleaned, considering that the antrum was reached by mistake.[7] Some studies have reported that the Körner septum causes atypical blockage and causes chronic middle ear infections.[8]

Congenital type of facial canal dehiscence can be up to 55% in normal temporal bones, and over 90% of them are just above the oval window and be less than 1 mm in size. [9] We know that most of the iatrogenic facial nerve injuries are caused by the poor understanding of intraoperative cue points, rather than the congenital anomaly of the facial canal or its secondary clearance to COM. The facial nerve injury rate was reported to be 0.6- 3.6% during middle ear surgery.[10] In a study, 55% of facial nerve dehiscence was encountered in 535 temporal bones. Facial canal dehiscences secondary to COM are approximately 80% in tympanic and proximal mastoid segment localization.[11] To avoid facial paralysis, which is important morbidity for the patient, the surgeon should not completely rely on CT, but if dehiscence or a close relationship of the disease with the facial nerve is reported on CT, we should take this point into consideration.

LSC dehiscence is seen in approximately 10% in COM with cholesteatoma. It is more common in recurrent and residual disease. In long-term COM cases; If vestibular symptoms and sensorineural hearing loss are present, erosion is expected in the otic capsule. The labyrinthine fistula is most commonly encountered in the lateral semicircular canal anterior convexity.[12]

The low-lying temporal lobe dura may cause difficulty in approaching the antrum and epitympanum, especially in closed cavity techniques. While the thinned tegmen can be seen on computed tomography, the operation finding may be in contrast. The opposite is also true. While dehiscence is detected in the operation, the tegmen may appear intact radiologically.[12] The thin bone lamella, which makes up the dural tegmen, is difficult to be assessed since it is difficult to distinguish the soft tissue right next to the lamella.[13] Therefore, the surgeon should be cautious when evaluating this situation.

Another complication for ear surgery is sigmoid sinus injury. A sigmoid sinus with bluish reflection is encountered at the posterior border of the mastoidectomy cavity.[14] Where the sigmoid sinus is located anteriorly, the chance of sigmoid sinus injury increases. The anteriorly located sigmoid sinus complicates the approach to the mastoid cavity and antrum. The sigmoid sinus is at risk of disease spread from neighboring mastoid cells. Sigmoid sinus wall erosion may occur and may become more susceptible to injury while cleaning infected soft tissues.[12]

CONCLUSION

The prerequisite for minimizing the complication rates in tympanomastoidectomy is to pay utmost attention to anatomical limits and markers, as in all surgical interventions. Even though we can make even though anatomical evaluations before the operation with computed tomography today, the findings of the tomography may not coincide with the findings of the temporal bone and especially in the presence of a cholesteatoma. Always being careful in terms of anatomical variations during the operation will increase the success of the surgery and decrease the complication rate. Knowing the anatomical variations and complications related to the temporal region is of great importance for clinicians dealing with ear surgery.

ETHICAL DECLARATIONS

Ethics Committee Approval: The study was carried out with the permission of Afyonkarahisar Health Sciences University, Clinical Research Ethics Committee (Date: 06.11.2020, Decision No: 2011-KAEK-2).

Informed Consent: Because the study was designed retrospectively, no written informed consent form was obtained from patients.

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REFERENCES

1. Mittal R, Lisi CV, Gerring R, et. al.Current concepts in the pathogenesis and treatment of chronic suppurative otitis media. J Med Microbiol 2015;64(10):1103-16.
2. Singh B, Maharaj TJ. Radical mastoidectomy: its place in otitic intracranial complications. J Laryngol Otol 1993;107:1113-8.
3. Aydil U, Köksal A, Özçelik T, Özgirgin N. Comparison of reformatted 2 D images with 3 D reconstructions based on images from multi-detector CT of the temporal bone in operated COM patients. Int Adv Otol 2010;6:337-41.
4. Qureishi A, Lee, Y, Belfield K, Birchall JP, Daniel M. Update on otitis media-prevention and treatment. Infect Drug Resist 2014;7:15-24.
5. Kurihara A, Toshima M, Yuasa R, Takasaka T. Bone destruction mechanisms in chronic otitis media with cholesteatoma: specific production by cholesteatoma tissue in culture of bone-resorbing activity attributable to interleukin -1 alpha. Ann Otol Rhinol Laryngol 1991;100(12):989-98.
6. Macri JR, Chole RA. Bone Erosion in Experimental Cholesteatoma- the Effect of Implanted Barriers. Otolaryngol Head Neck Surg 1985;93(1):3-16.
7. Tos M, editor.In: Manual of middle ear surgery. New York, Thieme Medical Publishers;1995 pp 50-61.
8. Proctor B, Nielson E, Proctor C. Petrosquamosal suture and lamina. Otolaryngol Head Neck Surg 1981;89:124-9.
9. Djeric D, Savic D. Otogenic facial paralysis: A histopathological study. Eur Arch Otorhinolaryngol 1990;247:143-6.
10. Sezgin Z , Külekçi M . Kronik Otitis Mediada Kulak Zarı Perforasyonları ve Kemik Zincir Patolojileri ile İşitme Kayıpları arasındaki İlişki. J Contemp Med 2016; 6(4):266-76.
11. Sheehy JL, Brackmann DE, Graham MD. Cholesteatoma surgery: residual and recurrent disease. A review of 1,024 cases. Ann. Otol. Rhinol 1977;86(4 Pt 1):451-62.
12. Singh A, Thakur R, Kumar R, Verma H, Irugu D. Grading of the Position of the Mastoid Tegmen in Human Temporal Bones-A Surgeon's Perspective. J Int Adv Otol 2020; 16(1):63-6.
13. Walshe P, McConn Walsh R, Brennan P, Walsh M. The role of computerized tomography in the preoperative assessment of chronic suppurative otitis media. Clin Otolaryngol Allied Sci 2002;27:95-7.
14. Kizilay A, Aladag I, Cokkeser Y, Ozturan O. Dural bone defects and encephalocele associated with chronic otitis media or its surgery. Kulak Burun Bogaz Ihtis Derg 2002;9(6):403-9.

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Original Article / Orijinal Araştırma

Evaluation of Individual Dependence and Reproducibility of Central Corneal Thickness Measurements with Anterior Segment Optical Coherence Tomography

Ön Segment Optik Koherens Tomografi ile Merkezi Kornea Kalınlığı Ölçümlerinin Bireysel Bağımlılık ve Tekrarlanabilirliğinin Değerlendirilmesi

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Abstract

Aim: To compare corneal thickness measurements made at different times and to evaluate their dependence on individuals.

Material and Method: The central corneal thickness(CCT) of the right eyes of 30 healthy young adults was measured by the first investigator at three different times by the Canon HS-100 Anterior Segment Optical Coherence Tomography (AS-OCT) method. In addition, the fourth measurements were made by the second researcher at a different time. The obtained values were compared.

Results: The mean age was 29.8±9.1 years. The mean CCT was 561.90±37.6 µm(micrometer) in the first measurement, 562.20±37.9 µm in the second measurement, and 562.80±37.7 µm in the third measurement. In the measurement of CCT by the second investigator, the mean was 562.20±38.0 µm. In statistical analysis, no significant difference was found between CCT values performed at different times ($p<0.05$). In addition, when the first measurement of the first researcher was compared with the first measurement of the second researcher, no significant difference was found between the CCT values of the two researchers ($p<0.05$).

Conclusion: Canon HS-100 AS-OCT device had very good reproducibility in the evaluation of CCT. There was no significant difference between the shots of different people. The use of OCT in daily practice is beneficial because it is both a non-contact method and has very good reproducibility in daily practice.

Keywords: Central corneal thickness, reproducibility, measurement

Öz

Amaç: Farklı zamanlarda yapılan kornea kalınlığı ölçümlerini karşılaştırmak ve kişilere bağımlılığını değerlendirmek.

Gereç ve Yöntem: 30 sağlıklı genç erişkinin sağ gözlerinin santral korneal kalınlığı (SKK) Canon HS-100 Ön Segment Optical Coherence Tomography (ÖS-OCT) yöntemi ile birinci araştırmacı tarafından üç ayrı zamanda ölçüldü. Ayrıca ikinci araştırmacı tarafından dördüncü ölçümleri farklı bir zamanda yapıldı. Elde edilen değerler karşılaştırıldı.

Bulgular: Yaş ortalaması 29.8±9.1 idi. Ortalama SKK birinci ölçümde 561,90±37,6 µm(mikrometre), ikinci ölçümde 562,20±37,9 µm, üçüncü ölçümde 562,80±37,7 µm idi. SKK'nın 2. araştırmacı tarafından ölçümünde ise ortalama 562,20±38,0 µm idi. İstatistiksel analizde farklı zamanlarda yapılan SKK değerleri arasında anlamlı fark bulunamamıştır ($p<0,05$). Ayrıca birinci araştırmacının ilk ölçümüyle, ikinci araştırmacının ilk ölçümü karşılaştırıldığında, iki araştırmacı arasındaki SKK değerleri arasında anlamlı fark bulunmadı ($p<0,05$).

Sonuç: Canon HS-100 ÖS-OCT cihazının SKK değerlendirilmesinde tekrarlanabilirliğinin çok iyi olduğu görüldü. Farklı kişilerin çekimleri arasında anlamlı bir farklılık görülmedi. Günlük pratikte hem non-kontakt bir yöntem olduğu, hem de tekrarlanabilirliği çok iyi olduğu için OCT'nin günlük pratikte kullanılması faydalıdır.

Anahtar Kelimeler: Santral korneal kalınlık, tekrarlanabilirlik, ölçüm

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INTRODUCTION

The cornea is a transparent, avascular layer located in the anterior part of the eyeball and makes up approximately 1/6 of the entire globe. The area of 2 mm in the center of the cornea is considered as the central cornea, and the central corneal thickness varies between 0.49 and 0.56 mm, although it shows personal variability. If it is over 0.6 mm, it indicates that the endothelial health is not well.[1] Mean CCT measurement has an important place in the diagnosis of many ophthalmological diseases and especially in follow-up criteria.[1]

It is an extra determining feature in diagnosing ocular hypertension, patient selection and surgical indication in refractive surgery, patient follow-up[2] in keratoconus, determination[3] of corneal edema and in patients with corneal problems such as cornea guttata, as it provides preliminary information about[4] post-op follow-up, especially in cataract surgery.

The fact that CCT is so critical has highlighted the search for non-contact measurement methods in order to eliminate the risk[5,6] of epithelial damage and infection of ultrasound pachymetry, which has been the gold standard for years. Today, non-contact measurement can be made with anterior segment optical coherence tomography (AS-OCT), corneal topography (CT), optical biometry (OB), and specular microscopy (SM) devices. Measurement with AS-OCT, one of these methods, is based on the interference principle. It produces tomographic image sections at the micron level by measuring the reflection delay time and intensity of infrared light of approximately 830-840 nm wavelength that is sent to the tissues and reflected from different tissues.[7,8]

Our aim in this study is to determine the variability of CCT measured with Canon HS-100 AS-OCT in repeated measurements or in measurements made by another researcher and to evaluate its reflection in clinical practice.

MATERIAL AND METHOD

This study was approved by the Noninterventional Ethics Committee of Firat University on 1 August 2019 with decision number 13; informed consent forms were obtained from the subjects. The right eyes of 30 patients were included in the study. Central corneal thickness values of the patients were measured with the AS-OCT (Canon HS-100, Tokyo, Japan) device. Patients who used contact lenses had a history of corneal pathology or trauma, and had undergone any ocular surgery were excluded from the study. 14 female and 16 male patients were included in the study. The mean age was 29.8±9.1 for females and 28.4±7.2 for males (**Table 1**).

Table 1. Gender distribution and mean ages in the group

	Female	Male
Number	14	16
Average age	29.8±9.1	28.4±7.2

Three measurements were made on the right eyes of the patients with 30 minutes intervals by the same investigator, and a fourth measurement was made by the second observer 1 hour after the third measurement. Statistics: IBM SPSS Statistics Version 22.0 package program was used for statistical analysis of the data. Categorical measurements were expressed as number and percentage, and continuous measurements were expressed as mean and standard deviation (median and minimum-maximum, where necessary). Whether continuous measurements provided the assumption of normal distribution was tested with the Shapiro Wilk test. The Dependent Groups T-test was used to compare dependent continuous measurements. Repeated measures analysis was used to compare the change over time of numerical measurements made on the same individuals at different times. The level of statistical significance was accepted as 0.05 in all tests.

RESULTS

The mean CCT was 561.90±37.6 µm in the first measurement, 562.20±37.9 µm in the second measurement, and 562.80±37.7 µm in the third measurement. In the measurement of CCT by the second researcher, the mean was 562.20±38.0 µm (**Table 2**).

Table 2. Mean CCT values of the groups

	SKK(Micrometer)- Std D.
Measurement 1	561.90±37.6 µm
Measurement 2	562.20±37.9 µm
Measurement 3	562.80±37.7 µm
Measurement 4	562.20±38.0 µm

µm: Micrometer

In statistical analysis, no significant difference was found between CCT values performed at different times ($p<0.05$). In addition, when the first measurement of the first investigator was compared with the first measurement of the second investigator, there was no significant difference in CCT measurements between the two researchers in the AS-OCT measurements ($p<0.05$) (**Table 3**).

Table 3. Comparison of CCT values between groups

	CCT (p value)
Measurement 1-Measurement 2	p<0.05
Measurement 1-Measurement 3	p<0.05
Measurement 2-Measurement 3	p<0.05
Measurement 1-Measurement 4	p<0.05

DISCUSSION

Accurate measurement of central corneal thickness in patients with ocular hypertension is important in predicting the critical importance of post-operative complications in refractive surgery and crosslinking surgeries.[9-11]

For this reason, it has become important to measure CCT with repetitive measurements and compare the values for the determination of device safety and accuracy. Differences in CCT measurement may result from calibration differences between instruments, as well as from the people who make the measurement or from making measurements on a small number of people. In our study, repeated measurements were made by the same person on the same device. And to determine the possible differences that may occur between individuals, a second researcher was re-measured. In our study, it was aimed to determine the reliability of the Canon HS-100 AS-OCT device and to determine whether there were personal changes in the measurements. According to the statistical analysis of AS-OCT measurements, the repeatability of the Canon HS-100 AS-OCT instrument was very good. The similarity of the measurement made by the second researcher once again confirmed the reliability of the device.

Considering similar studies, Köşker et.al.'s study showed that the device with the strongest reproducibility was OCT among the Combined Scheimpflug-Placido Disc System, Anterior Segment Optical Coherence Tomography, and Corvis Biomechanical Anterior Segment Analysis System.[13] Köşker et al. attributed the best reproducibility of CCT measurements in OCT to the minimization of the effects that may occur due to involuntary eye movement due to high section speed and better detection of corneal borders due to high resolution.[12,13]

In other studies, OCT and other non-contact, ultrasonic pachymetry (UP) methods were compared. Leung et al.[14], in their study to compare ultrasonic pachymetry and OCT in the measurement of mean CCT values, found that the measurements made with OCT were approximately 23 µm (4%) higher, although they were correlated with ultrasonic pachymetry.Contrary to this study, Grewal et al.[15] studied patients who had undergone keratoconus and laser in situ keratomileusis surgery and a normal healthy group. They reported that there was a statistically significant difference between the measurements made with Scheimpflug imaging, UP, and OCT, and the measurements made with UP were thicker in all groups.

Fishman et al.[16], on the other hand, did not find CCT values measured by UP and Orbscan topography to be compatible with each other but reported that there was no significant difference between CCT values measured by UP and OCT. They also demonstrated high reproducibility of OCT, which was consistent with our study.

As a result, it is important to have good repeatability of the device so that the clinician can follow the patient more reliably in ophthalmology practice. For this reason, the device should give similar values at different times, even in measurements made by other researchers. In our study, there was no significant difference between the measurements made with the Canon HS-100 AS-OCT device, both at different times and with different people, and the repeatability of the device was shown to be good. For this reason, we think that follow-up with the same device will be more meaningful in terms of treatment and indications, rather than mixing different technical devices in terms of CCT measurement in practical follow-up.

ETHICAL DECLARATIONS

Ethics Committee Approval: The study was carried out with the permission of Firat University Clinical Research Ethics Committee (Date: 01.08.2019, Decision No: 2019-13/12).

Informed Consent: Because the study was designed retrospectively, no written informed consent form was obtained from patients.

Referee Evaluation Process: Externally peer-reviewed.

Conflict of Interest Statement: The authors have no conflicts of interest to declare.

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

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

REFERENCES

1. Wang Z, Chen J, Yang B. Posterior corneal surface topographic changes after laser in situ keratomileusis are related to residual corneal bed thickness. Ophthalmology 1999;106(2):406-9.
2. Ucakhan OO, Ozkan M, Kanpolat A. Corneal thickness measurements in normal and keratoconic eyes: Pentacam comprehensive eye scanner versus noncontact specular microscopy and ultrasound pachymetry. Journal of cataract and refractive surgery 2006;32(6):970-7.
3. Holden BA, Mertz GW, McNally JJ. Corneal swelling response to contact lenses worn under extended wear conditions. Investigative ophthalmology & visual science 1983;24(2):218-26.
4. Auffarth GU, Wang L, Volcker HE. Keratoconus evaluation using the Orbscan Topography System. Journal of cataract and refractive surgery 2000;26(2):222-8.
5. Barkana Y, Gerber Y, Elbaz U, et al. Central corneal thickness measurement with the Pentacam Scheimpflug system, optical low-coherence reflectometry pachymeter, and ultrasound pachymetry. J Cataract Refract Surg 2005;31(9):1729-35.
6. Swarbrick HA, Wong G, O'Leary DJ. Corneal response to orthokeratology. Optom Vis Sci. 1998;75(11):791-9.
7. Kawana K, Tokunaga T, Miyata K, Okamoto F, Kiuchi T, Oshika T. Comparison of corneal thickness measurements using Orbscan II, non-contact specular microscopy, and ultrasonic pachymetry in eyes after laser in situ keratomileusis. Br J Ophthalmol 2004;88(4):466-8.
8. Piotrowiak I, Soldanska B, Burduk M, Kaluzny BJ, Kaluzny J. Measuring Corneal Thickness with SOCT, the Scheimpflug System, and Ultrasound Pachymetry. ISRN Ophthalmol 2012;2012:869319.
9. Coskunseven E, Jankov MR, 2nd, Hafezi F. Contralateral eye study of corneal collagen cross-linking with riboflavin and UVA irradiation in patients with keratoconus. Journal of refractive surgery (Thorofare, NJ : 1995) 2009;25(4):371-6.
10. Muallem MS, Yoo SH, Romano AC, Marangon FB, Schiffman JC, Culbertson WW. Flap and stromal bed thickness in laser in situ keratomileusis enhancement. J Cataract Refract Surg 2004;30(11):2295-302.
11. Randleman JB, Woodward M, Lynn MJ, Stulting RD. Risk assessment for ectasia after corneal refractive surgery. Ophthalmology 2008;115(1):37-50.

12. Kosker M, Calıskan S, Celikay O, Dogan AS, Kaya A, Gurdal C. Assesment of Central Corneal Thickness Using Corneal Dynamic Scheimpflug Analyzer Corvis ST, Sirius Kombine Scheimpflug-Placido Disk System and RTVue Anterior Segment Optical Coherence Tomography in Normal Eyes. Van Med J 2018;25(3):381-385.
13. Li Y, Tang M, Zhang X, Salaroli CH, Ramos JL, Huang D. Pachymetric mapping with Fourier-domain optical coherence tomography. J Cataract Refract Surg 2010;36(5):826-31.
14. Leung DY, Lam DK, Yeung BY, Lam DS. Comparison between central corneal thickness measurements by ultrasound pachymetry and optical coherence tomography. Clin Exper Ophthalmol 2006;34(8):751-4.
15. Grewal DS, Brar GS, Grewal SP. Assessment of central corneal thickness in normal, keratoconus, and post-laser in situ keratomileusis eyes using Scheimpflug imaging, spectral domain optical coherence tomography, and ultrasound pachymetry. J Cataract Refract Surg 2010;36(6):954-64.
16. Fishman GR, Pons ME, Seedor JA, Liebmann JM, Ritch R. Assessment of central corneal thickness using optical coherence tomography. J Cataract Refract Surg 2005;31(4):707-11.

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Original Article / Orijinal Araştırma

Depression and Anxiety Disorders in Patients with Hyperemesis Gravidarum and the Effect of This Disease on the Quality of Life

Hiperemezis Gravidarum Hastalarında Depresyon ve Anksiyete Bozuklukları ve Bu Hastalığın Yaşam Kalitesine Etkisi

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Abstract

Aim: Hyperemesis gravidarum can frequently lead to depression or anxiety in pregnant women. This situation can significantly deteriorate the quality of life of the pregnant woman. In our study, it was aimed to investigate the levels of depression and anxiety in patients with hyperemesis gravidarum, and to analyze the effect of hyperemesis on quality of life.

Materials and Methods: The study included 87 patients diagnosed with hyperemesis and 24 patients without hyperemesis admitted to our hospital between the dates of 01.04.2018-01.10.2018. All participants received Beck Anxiety Inventory, Beck Depression Inventory and 12-question quality of life (SF-12) forms.

Results: The mean age of the patients included in the study was 25.4±5.0 years (Age range: 17-39 years). Minimal anxiety and depression were detected in all participants. There was no significant difference between the group of patients diagnosed with hyperemesis and the control group in terms of mean depression score (p=0.161) and anxiety score (p=0.266). No significant difference was found in terms of the distribution of depression and anxiety levels between the groups (p=0.46 and p=0.557, respectively).

Conclusion: In conclusion, our findings show that anxiety and depression levels cannot be directly correlated with hyperemesis gravidarum. However, it is necessary to closely monitor the psychological status of pregnant women diagnosed with hyperemesis, to perform the necessary supportive treatments and to improve their quality of life.

Keywords: Hyperemesis gravidarum, Beck anxiety inventory, Beck depression inventory, anxiety, depression, life quality

Öz

Amaç: Hiperemezis gravidarum, hamile kadınlarda ciddi komplikasyonlardan daha sık depresyon veya anksiyete bozukluğuna yol açabilir. Bu durum hamile kadının yaşam kalitesini önemli ölçüde bozabilir. Çalışmamızda hiperemezis gravidarum hastalarında depresyon ve anksiyete düzeylerinin araştırılması ve hiperemezisin yaşam kalitesine etkisinin incelenmesi amaçlanmıştır.

Gereç ve Yöntem: Çalışmaya 01.04.2018-01.10.2018 tarihleri arasında hastanemize başvuran 87 hiperemezis tanısı almış, 24 hiperemezisli hasta dahil edildi. Tüm katılımcılar Beck Anksiyete Envanteri, Beck Depresyon Envanteri ve 12 soruluk yaşam kalitesi (SF-12) formlarını aldı.

Bulgular: Çalışmaya dahil edilen hastaların ortalama yaşı 25,4±5,0 yıl (Yaş aralığı: 17-39) idi. Tüm katılımcılarda mild anksiyete ve depresyon tespit edildi. Hiperemezis tanısı alan hasta grubu ile kontrol grubu arasında ortalama depresyon puanı (p=0,161) ve anksiyete puanı (p=0,266) açısından anlamlı bir fark yoktu. Gruplar arasında depresyon ve anksiyete düzeylerinin dağılımı açısından anlamlı fark bulunmadı (sırasıyla p=0,46 ve p=0,557).

Sonuç: Bulgularımız, anksiyete ve depresyon düzeylerinin hiperemezis gravidarum ile doğrudan ilişkili olamayacağını göstermektedir. Ancak hiperemezis tanısı almış gebelerin psikolojik durumlarının yakından izlenmesi, gerekli destek tedavilerinin yapılması ve yaşam kalitelerinin iyileştirilmesi gerekmektedir.

Anahtar Kelimeler: Hiperemezis gravidarum, Beck anksiyete envanteri, Beck depresyon envanteri, depresyon, yaşam kalitesi

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INTRODUCTION

Nausea and vomiting during pregnancy is a common condition. Nausea occurs in 50-90% of pregnant women in the first trimester period. It has been reported that the cause of nausea in pregnancy is increased human chorionic gonadotrop hormone (HCG) level.[1-3] Hyperemesis gravidarum is a stubborn and severe clinical picture with nausea and vomiting. Nutritional disorders, dehydration, electrolyte disorders, weight loss and catatonia can also be added to this manifestation. Hyperemesis gravidarum, which can be seen in 0.5-2% of pregnant women, may be at a grade that may require hospitalization of some patients.[1-5]

Although it has been stated that factors such as increased beta-HCG level, steroids, multiple pregnancy, increase in body mass index and hyperemesis gravidarum history may play a role in the development of the hyperemesis gravidarum manifestation, the exact cause has not been determined.[1,5-7] In some cases with severe hyperemesis gravidarum, serious complications such as Wernicke's encephalopathy and thromboembolism can be seen in the mother, and low birth weight, preterm delivery, developmental delay, some anomalies and mortality can be observed in the fetus. Therefore, rapid supportive therapy is important in hyperemesis gravidarum.[4-7]

Hyperemesis gravidarum can frequently lead to depression or anxiety in pregnant women. This situation can significantly deteriorate the quality of life of the pregnant woman.[6-8] In our study, it was aimed to investigate the levels of depression and anxiety in patients with hyperemesis gravidarum and to analyze the effect of hyperemesis on quality of life.

MATERIAL AND METHOD

This study was approved by the local ethics committee, and was planned prospectively.

Patients

The study group included 87 patients up to 20 weeks of gestation diagnosed with hyperemesis between the ages of 17 and 39 who applied to the gynecology outpatient clinics of our hospital between April and October 2018. A total of 24 patients without hyperemesis was included in the study as the control group. Pregnant women with single live pregnancy accompanied by ketosis accompanied by recurrent nausea, vomiting, and dehydration findings were included in the study, and those with additional systemic disease, smokers, signs of infection, those with a pre-diagnosis of abortus imminens, and those with fetal congenital malformation were excluded. The gestational age of the patients was determined using the first day of the last menstrual period, and was confirmed by ultrasonography.

Scales

Turkish versions of Beck Depression Inventory and Beck Anxiety Inventory were used to determine the depression and anxiety states of pregnant women. Physical and mental scoring was done for pregnant women using SF-12 (Short Form 36, Questionnaire of Evaluating Life Quality) life quality form consisting of 12 questions. The status of depression and anxiety was evaluated using the Beck Depression Inventory and Beck Anxiety Inventory[9,10]

Beck Depression Inventory

Turkish version of Beck Depression Inventory was used to determine the anxiety states of pregnant women. Questionnaire form consisting of 21 questions was used, and scoring between 0-63 was applied. The Beck Depression Inventory, developed by Beck et al.[9] in 1988, is a self assessment scale that is used to evaulate the findings of depression of individuals. Questionnaire form consisting of 21 questions was used, and scoring between 0-63 was applied. Answers to each question in the Beck Depression Inventory were scored from 0 to 3. The Beck Depression Inventory scores were classified as follows: 0-9 as no or minimal depression, 10-16 as mild depression, 17-23 as moderate depression, and 24-63 as severe depression.[9]

Beck Anxiety Inventory

Turkish version of Beck Anxiety Inventory was used to determine the anxiety states of pregnant women. Beck Anxiety Inventory, developed by Beck et al.[10] in 1998, is a self assessment scale that is used to evaulate the findings of anxiety of individuals. Validity and reliability were done by Ulusoy et al. Questionnaire form consisting of 21 questions was used, and scoring between 0-63 was applied. Answers to each question in the Beck Anxiety Inventory werde scored from 0 to 3. The Beck Anxiety Inventory scores were classified as follows: 0-7 as no or minimal anxiety, 8-15 as mild anxiety, 16-25 as moderate anxiety, and 24-63 as severe anxiety.[10]

SF-36 and SF-12 were developed due to its long application time.[11] While the Physical score -12 (Physical Component Summary Scores) score is obtained from the sub-dimensions of general health, physical functionality, physical role and body pain, the Mental score-12 (Mental Component Summary Scores) score is obtained from the sub-dimensions of social functionality, emotional role, mental health and energy. is obtained. Both Physical score-12 and Mental score-12 scores range from 0 to 100, with higher scores representing better health.[11]

Statistical Analysis

Statistical analysis was performed using SPSS 21.0 (IBM Corp. Released 2012. IBM SPSS Statistics for Windows, Version 21.0. Armonk, NY). Univariate analyses to identify variables associated with anxiety and depression were investigated using appropriate statistical tests such as Student's t-test, the chi-square test and Mann-Whitney U test. The Kruskal-Wallis test was used to compare the anxiety and depression scores between the two groups in terms of different variables. The association between ordinal variables was investigated, and correlation significance was calculated using the Spearman test. A 5% type 1 error was used for the statistical significance.

RESULTS

The mean age of the patients included in the study was 25.4±5.0 years (Age range: 17-39 years). The mean gestational week was 10.3±4.0 weeks (range: 4-27 weeks).

At least minimal anxiety and depression were detected in all participants. No significant differences were found between the hyperemesis and the control groups in terms of mean age (p=0.194), gestational week (p=0.082), number of gravida (p=0.506), number of parity (p=0.949), depression score (p=0.161), anxiety score (p=0.266), physical score (p=0.684) and mental score (p=0.263) (**Table 1**).

Table 1. Comparison of mean values of various variables between groups.

	Hiperemezis	Control	P
	Mean±SD	Mean±SD	
Age	25.8±4.8	24.3±5.4	0.194
Gestational week	10±3.7	11.6±4.9	0.082
Gravida	1.9±0.8	2±1	0.506
Parity	0.7±0.8	0.7±0.8	0.949
Depression score	15.4±9.2	12.4±9.7	0.161
Anxiety score	15.1±9.1	12.7±9.6	0.266
Physical score	42.1±7.7	42.8±9.4	0.684
Mental score	43.1±10.5	45.8±11.3	0.263

*SD: Standard deviation.

Severe depression was detected in seven (8.0%) patients in the hyperemesis group and two (8.3%) patients in the control group. Severe anxiety was detected in 14 (16.1%) patients in the hyperemesis group and in three (12.5%) patients in the control group. No significant difference was found in the distribution of depression and anxiety levels between the groups (p=0.46 and p=0.557, respectively) (**Table 2**).

Table 2. Comparison of depression and anxiety severity distributions and the mean scores between groups.

	Hyperemesis		Control		Total		p
	n	%	n	%	n	%	
Depression level							0.46
Minimal	28	32.2	11	45.8	39	35.1	
Mild	24	27.6	7	29.2	31	27.9	
Moderate	28	32.2	4	16.7	32	28.8	
Severe	7	8.0	2	8.3	9.0	8.1	
Total	87	100	24	100	111	100	
Anxiety level							0.557
Minimal	20	23.0	9	37.5	29	26.1	
Mild	32	36.8	7	29.2	39	35.1	
Moderate	21	24.1	5	20.8	26	23.4	
Severe	14	16.1	3	12.5	17	15.3	
Total	87	100	24	100	111	100	

In the correlation analysis, both depression and anxiety scores were found to be negatively correlated with SF-12 mental score (p<0.001; r=-0.538 and p<0.001; r=-0.539, respectively) and physical score (p<0.001; r=-0.426 and p<0.001; r=-0.436, respectively) in the hyperemesis group (**Table 3**).

Table 3. Correlation analysis between anxiety and depression scores and SF-12 mental and physical scores in Hyperemesis gravidarum group.

		Depression score	Anxiety score
Physical score	r	-0.426	-0.436
	p	<0.001	<0.001
Mental score	r	-0.538	-0.539
	p	<0.001	<0.001

DISCUSSION

Hyperemesis gravidarum is a clinical picture that can be caused by many endocrinological, psychosocial or biochemical factors. Although it does not occur very frequently in pregnant women, it may be at a grade that affects the quality of life in some pregnant women. Constant and severe nausea and vomiting can make pregnancy much more difficult, which even leads to unusual changes itself.[1,2,6,8]

It has been reported that pregnant women with hyperemesis gravidarum may develop depression and/or anxiety.[12-16] However, whether anxiety and depression is the result or cause of the hyperemesis gravidarum picture has not been definitively determined.[17,18] Aksu et al.[19] reported that hyperemesis had a psychiatric background in their study. However, London et al.[1] reported in their extensive meta-analysis that anxiety and depression were not the cause, but the result, of hyperemesis gravidarum. Seng et al.[12] and Fell et al.[13] reported that hyperemesis gravidarum was diagnosed with a significantly higher rate of psychiatric disorders in pregnant women. Simpson et al.[20] also supported this finding and reported that psychiatric disorder resolved with the end of pregnancy. Simsek et al.[18], Yildirim et al.[21] and Erginbas-Kender et al.[14] found significant depression and anxiety scores in pregnant women with hyperemesis gravidarum in their studies conducted in Turkey. Similarly, Özen et al.[15], Tan et al.[16] and Kasap[17] found that hyperemesis gravidarum was associated with depression and anxiety in their studies. Topalahmetoglu et al.[22] found that mean anxiety and depression scores were significantly higher in the hyperemesis group, and this was attributed to the socioeconomic status and the education level of the family. In our study, no significant difference was found between the groups in terms of the mean scores of both depression and anxiety. These differences among the studies may be due to differences in socioeconomic, educational and social relationship levels between the groups created in some studies. In other words, when the tables of the studies are examined, it can be seen that the groups could not be formed socio-demographically equivalent, and that anxiety and depression may be due to these differences rather than hyperemesis. All these data show that hyperemesis gravidarum can lead to depression and anxiety during pregnancy, but due to the wide range of factors, the situation can be variable in every pregnant woman, and in addition, the situation of depression and anxiety should be monitored carefully in pregnant women without hyperemesis.

According to the findings of the study conducted by Özen et al.[15], the rate of severe anxiety in pregnant women diagnosed with hyperemesis gravidarum was significantly higher than the control group, and the rate of minimal anxiety level was significantly lower ($p<0.001$; as the result of statistical analysis performed by us based on the data of that paper). According to the same study data, there was no difference between the groups in terms of distribution of depression levels ($p=0.06$; as the result of statistical analysis performed by us based on the data of that paper). In our study, the groups were similar in terms of both depression and distribution of anxiety levels. These data show that the presence of anxiety and/or depression may be associated with hyperemesis gravidarum, as well as the level of anxiety and depression may be different in pregnant women with hyperemesis. These findings show that pregnant women with hyperemesis should be closely monitored in terms of the presence of anxiety or depression, as well as the levels of these clinical pictures.

Özen et al.[15] determined that 96% of pregnant women diagnosed with hyperemesis gravidarum had at least minimal anxiety, and 88% had at least minimal depression. In our study, all pregnant women diagnosed with hyperemesis had at least minimal depression and anxiety. These findings show that the presence of depression and/or anxiety with hyperemesis table does not differ from the control groups, as well as that there are very high rates of depression and anxiety in these pregnant women. Therefore, not only the women with hyperemesis but also all pregnant women should be evaluated in terms of depression and anxiety.

It has been stated that hyperemesis gravidarum may be related with some-sociodemographic characteristics of pregnant woman.[1,6,23,24] Kamalak et al.[24], Simsek et al.[18] and Kasap[17] found that the number of parity history was significantly lower in pregnant women with hyperemesis compared to the control group. Erginbas-Kender et al.[14] also found that pregnant women with hyperemesis gravidarum had significantly lower numbers of parity and gravida in their studies. However, Özen et al.[15], Türkmen et al.[25] and Beyazit et al.[26] reported that there was no significant differences between hyperemesis and the control groups in terms of numbers of parity and gravida in their studies. In our study, no significant difference was found between hyperemesis gravidarum and control groups in terms of mean numbers of parity and gravida. These studies show that hyperemesis gravidarum may develop more frequently in those with less pregnancy experience, but that hyperemesis can also be seen frequently in some pregnant women who have more pregnancy experience.

The effect of the hyperemesis gravidarum on the quality of life can also be measured using SF-36 and its shortened version, SF-12, questionnaires, where physical and mental scores can be evaluated.[26,27] Tan et al.[28] found the physical and mental scores in all pregnant women in the range of 40-50%, and found that the mean mental score in the hyperemesis group was significantly lower than the control group. Munch et al.[29] found mental and physical scores in the range of 35-43% in their studies, and reported a significantly lower mean score in the hyperemesis group compared to the control group. In our study, physical and mental scores in all pregnant women were in the range of 40-50%, and there was no significant difference between hyperemesis and control groups in terms of both physical and mental mean scores. These data show that mental and physical scores are below the middle levels in all pregnant women. However, in the correlation analysis conducted in our study, both depression and anxiety scores were found to be negatively correlated with SF-12 mental and physical scores in the hyperemesis group. This finding shows that as the levels of anxiety and depression increase, the mental and physical score and therefore the quality of life decrease in pregnant women with hyperemesis.

There were some limitations in our study. Since our study was a cross-sectional study, the post-pregnancy status of the pregnant women was not followed, and it was not possible to evaluate whether the hyperemesis gravidarum was related to preterm birth, low birth weight or postpartum depression. In our study, since the hyperemesis level was not classified, it could not be analyzed whether the factors examined had an effect on the hyperemesis level.

In conclusion, our study data show that anxiety and depression levels cannot be directly associated with hyperemesis gravidarum. However, it is necessary to closely monitor the psychological status of pregnant women diagnosed with hyperemesis, to perform necessary supportive treatments and to improve their quality of life.

ETHICAL DECLARATIONS

Ethics Committee Approval: Ethics committee number 602 was taken from Gazi Yaşargil Training and Research Hospital on 16.10.2020.

Informed Consent: All patients signed the free and informed consent form.

Referee Evaluation Process: Externally peer-reviewed.

Conflict of Interest Statement: The authors have no conflicts of interest to declare.

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

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

REFERENCES

1. London V, Grube S, Sherer DM, Abulafia O. Hyperemesis Gravidarum: A Review of Recent Literature. Pharmacology 2017;100:161-71.
2. Dean CR, Shemar M, Ostrowski GAU, Painter RC. Management of severe pregnancy sickness and hyperemesis gravidarum. BMJ 2018;363:k5000.
3. Abramowitz A, Miller ES, Wisner KL. Treatment options for hyperemesis gravidarum. Arch Womens Ment Health 2017;20:363-72.
4. Dean CR, Bruin CM, O'Hara ME, et al. The chance of recurrence of hyperemesis gravidarum: A systematic review. Eur J Obstet Gynecol Reprod Biol X 2019;5:100105.

5. Austin K, Wilson K, Saha S. Hyperemesis Gravidarum. Nutr Clin Pract 2019;34:226-41.
6. Tamay AG, Kuscu NK. Hyperemesis gravidarum: current aspect. J Obstet Gynaecol 2011;31:708-12.
7. Ioannidou P, Papanikolaou D, Mikos T, Mastorakos G, Goulis DG. Predictive factors of Hyperemesis Gravidarum: A systematic review. Eur J Obstet Gynecol Reprod Biol 2019;238:178-87.
8. Yanikkerem E, Ildan Calim S, Göker A, Oruc Koltan S, Koyuncu FM. Opinions and needs of pregnant women with hyperemesis gravidarum. Gümüshane University Journal of Health Sciences 2012;1:269-83.
9. Beck, A. T., Ward, C., & Mendelson, M. Beck depression inventory (BDI). Arch Gen Psychiatry, 1961;4(6):561-571.
10. Ulusoy M, Sahin, N, Erkmen H. Turkish version of the Beck Anxiety Inventory; Psychometric Properties. Journal of Cognitive Psychotherapy 1998;12:163-172.
11. Gandek B, Ware JE., Aaronson NK. Cross-Validation of Item Selection and Scoring for the SF-12 Health Survey in Nine Countries: Results from the IQOLA Project, Journal of Clinical Epidemiology, 1998;51(11):1171-1178.
12. Seng JS, Schrot JA, van De Ven C, Liberzon I. Service use data analysis of pre-pregnancy psychiatric and somatic diagnoses in women with hyperemesis gravidarum. J Psychosom Obstet Gynaecol 2007;28:209-17.
13. Fell DB, Dodds L, Joseph KS, Allen VM, Butler B. Risk factors for hyperemesis gravidarum requiring hospital admission during pregnancy. Obstet Gynecol 2006;107:277-84.
14. Erginbas Kender E, Yüksel G, Ger C, Özer Ü. Eating attitudes, depression and anxiety levels of patients with hyperemesis gravidarum hospitalized in an obstetrics and gynecology clinic. Düsünen Adam The Journal of Psychiatry and Neurological Sciences 2015;28:119-26.
15. Özen O, Mihmanli V, Cetinkaya N, Yumusak R, Ciftci Y, Gökcen I. Evaluation of anxiety and depression in hyperemesis gravidarum patients. Okmeydani Tip Dergisi. 2013;29:143-6.
16. Tan PC, Vani S, Lim BK, Omar SZ. Anxiety and depression in hyperemesis gravidarum: prevalence, risk factors and correlation with clinical severity. Eur J Obstet Gynecol Reprod Biol 2010;149:153-8.
17. Kasap E. Depression And Anxiety Test Scores In patients with hyperemesis gravidarum. Selcuk Med J 2018;34:155-9.
18. Simsek Y, Celik Ö, Yilmaz E, Karaer A, Yildirim E, Yologlu S. Assesment of anxiety and depression levels of pregnant women with hyperemesis gravidarum in a case-control study. J Turkish-German Gynecol Assoc 2012;13:32-6.
19. Aksu E, Albayrak Y, Beyazyüz E, et al. Distinct temperament and character traits in patients with hyperemesis gravidarum. Gynecol Endocrinol 2019:1-5. [Epub ahead of print]
20. Simpson SW, Goodwin TM, Robins SB, et al. Psychological factors and hyperemesis gravidarum. J Womens Health Gend Based Med 2001;10:471-7.
21. Yildirim E, Demir E. The relationship of hyperemesis gravidarum with sleep disorders, anxiety and depression. J Obstet Gynaecol 2019;39:793-8.
22. Topalahmetoglu Y, Altay MM, Akdag Cirik D, et al. Depression and anxiety disorder in hyperemesis gravidarum: A prospective case-control study. Turk J Obstet Gynecol 2017;14:214-9.
23. Uguz F, Gezginc K, Kayhan F, Cicek E, Kantarci AH. Is hyperemesis gravidarum associated with mood, anxiety and personality disorders: a case-control study. Gen Hosp Psychiatry 2012;34:398-402.
24. Kamalak Z, Kösüs N, Kösüs A, Hizli D, Ayrim A, Kurt G. Is there any effect of demographic features on development of hyperemesis gravidarum in the Turkish population? Turk J Med Sci 2013;43:995-9.
25. Türkmen H. The effect of hyperemesis gravidarum on prenatal adaptation and quality of life: a prospective case-control study. J Psychosom Obstet Gynaecol 2019:1-8. [Epub ahead of print]
26. Yildirim E, Demir E. The relationship of hyperemesis gravidarum with sleep disorders, anxiety and depression. J Obstet Gynaecol 2019;39:793-8.
27. Wood H, McKellar LV, Lightbody M. Nausea and vomiting in pregnancy: blooming or bloomin' awful? A review of the literature. Women Birth 2013;26:100-4.
28. Tan A, Lowe S, Henry A. Nausea and vomiting of pregnancy: Effects on quality of life and day-to-day function. Aust N Z J Obstet Gynaecol 2018;58:278-90.
29. Munch S, Korst LM, Hernandez GD, Romero R, Goodwin TM. Health-related quality of life in women with nausea and vomiting of pregnancy: the importance of psychosocial context. J Perinatol 2011;31:10-20.

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Original Article / Orijinal Araştırma

The Effect of a Weight-Loss Diet in Women Doing Reformer Pilates: A 12-Week Evaluation

Aletli Pilates Yapan Kadınlara Uygulanan Zayıflama Diyetinin Etkisi: 12 Haftalık Değerlendirme

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Abstract

Aim: This study aims to define the effect of a weight-loss diet on body composition in women doing reformer pilates for 12 weeks. It compares dietary habits in subject groups with and without a weight-loss diet and macro and micronutrient intakes at the beginning and end of the study.

Material and Method: A total of 49 women (≥18 age, n=49) were randomly allocated to either a control (CG: reformer pilates; n=23) or a study (SG: reformer pilates+weight-loss diet; n=26) group. In both groups, subjects did pilates for 45 minutes a day three times a week for a total of 12 weeks. Their body weight (kg), waist circumference (cm), hip circumference (cm), neck circumference (cm), mid-upper arm circumference (cm), body composition, waist/height ratio, and body mass index (BMI; kg/m²) were evaluated at the beginning and the third month of the study. Dietary habits of all subjects were questioned, their 24-hour retrospective food consumption was taken, and their physical activity levels were evaluated through the International Physical Activity Questionnaire (Short Form).

Results: The use of vitamin and mineral supplements in SG was lower than CG (p=0.003). The twelve-week evaluation showed a significantly higher increase in dietary protein and calcium levels in SG than CG (p<0.05). In SG, a significantly higher decrease was determined in body weight, BMI, waist circumference, hip circumference, and waist/height ratio, and a higher increase in Basal Metabolic Rate, body muscle, and body water, compared to CG (p<0.05).

Conclusion: Pilates combined with a weight-loss diet has more positive effects on body composition than pilates alone. Providing dietary training and counseling for women who practice reformer pilates will increase the health benefits of exercise.

Keywords: Pilates-based exercises, weight loss, diet, women, body composition

Öz

Amaç: Bu araştırmada 12 haftalık sürede kadınlarda aletli pilatesin vücut kompozisyonuna tek başına veya zayıflama diyeti ile birlikte etkisinin karşılaştırılması amaçlanmıştır. Çalışmanın diğer amacı ise zayıflama diyeti yapan ve yapmayan grupların beslenme alışkanlıkları ve çalışmanın başlangıcı ve sonundaki makro ve mikro besin ögesi alımlarını karşılaştırmaktır.

Gereç ve Yöntem: Kadınlar (≥18 yaş, n=49), kontrol (CG: Reformer pilates, n=23) ya da çalışma (SG: Reformer pilates+Zayıflama diyeti, n=23) grubu olarak rastgele iki gruba ayrılmıştır. Katılımcılar, 12 hafta boyunca günde 45 dakika olmak üzere haftada üç kez pilates yapmıştır. Vücut ağırlığı (kg), bel çevresi (cm), kalça çevresi (cm), boyun çevresi (cm), üst orta kol çevresi (cm), vücut kompozisyonu, bel/boy oranı ve beden kütle indeksi (BKİ; kg/m²) çalışmanın başlangıcında ve üçüncü ayda değerlendirilmiştir. Tüm katılımcıların beslenme alışkanlıkları ve 24 saatlik geriye yönelik besin tüketim kayıtları sorgulanmış ve fiziksel aktivite düzeyleri Uluslararası Fiziksel Aktivite Anketi (Kısa Form) (IPAQ) kullanılarak değerlendirilmiştir.

Bulgular: Çalışma grubunda vitamin ve mineral desteği kullanımının kontrol grubundan daha düşük olduğu saptanmıştır (p=0,003). On iki haftalık değerlendirme sonucunda, SG'de CG'ye göre diyetle alınan protein ve kalsiyum düzeyinin anlamlı olarak daha fazla arttığı belirlenmiştir (p<0,05). SG'de, CG'ye göre vücut ağırlığı, BKİ, bel çevresi, kalça çevresi, bel/boy oranının anlamlı olarak daha fazla azaldığı; bazal metabolizma hızı, vücut kas oranının ve vücut su oranının daha fazla arttığı gözlenmiştir (p<0,05).

Sonuç: Pilates ile birlikte zayıflama diyetinin, tek başına pilates uygulamasına göre vücut kompozisyonu üzerine daha fazla olumlu etkisinin olduğu belirlenmiştir. Aletli pilates yapan kadınlara beslenme eğitimi ve danışmanlığı verilerek uygulanan egzersizden sağlanacak sağlık yararlarının artırılabileceği düşünülmektedir.

Anahtar Kelimeler: Pilates, aletli pilates, beslenme, kadın, vücut kompozisyonu

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INTRODUCTION

Pilates is a specific exercise program developed by Joseph Pilates (1880-1967) after World War I as a comprehensive method of muscle stretching and strengthening to build a robust body under the philosophy of mind control over the body. Initially adopted only by athletes and dancers, pilates has become popular in general sports activities and rehabilitation programs in recent years.[1] In the twentieth century, it became widely known among women in particular. Women generally prefer reformer pilates exercises for aesthetic purposes such as losing weight, slimming, staying in shape, strengthening muscles, getting rid of muscle pain, and gaining flexibility.[2]

The literature does not suggest any consensus on whether physical activity is effective in ensuring total body weight loss and improving body composition. Typically, brisk walking or running is recommended for improving health-related variables.[3] Exercises, such as pilates, benefitting the physiological, psychological, and motor functions of the body are also promoted for improving aerobic fitness, muscle mass, and body composition.[1,3] Reformer Pilates is the practice of regular pilates exercises on a system consisting of a platform, bars, straps, and resistance springs.[4] Such exercises not only make our body stronger and more flexible but also fix bad posture, teach us how to breathe correctly, and enable us to move smoothly at an ideal pace. A reformer can provide many benefits such as increasing the balance control of the body, improving joint mobility, and giving strength and flexibility to the muscles, thus lengthening them.[5-7]

Despite the growing popularity of pilates, there are a limited number of studies conducted on its effects on body composition, and the results are controversial.[1,2] These studies recommend the use of devices such as bone mineral densitometry (DEXA) to precisely determine body composition. Lack of rigorous experimental designs with reliable and accurate results, unavailability of certified pilates instructors, and inability to control individual diet plans are the most critical limitations of not clarifying the effects of pilates on body composition.[1] A weight-loss diet alone or an exercise program combined with such diet is much more effective in creating changes in body composition than exercise alone. It is known that following a weight-loss diet along with an exercise program for a year affects body composition more positively than diet alone.[8] In addition to all these, studies evaluating the dietary status of women who exercise are insufficient.[9] In light of this, we hypothesized that the combination of reformer pilates and weight loss diet can more positively affect body composition than reformer pilates alone.

MATERIAL AND METHOD

Experimental Approach to the Problem

We conducted a randomized controlled clinical trial evaluating the effects of a 12-week weight loss diet intervention on body composition, muscle strength, and physical performance of reformer pilates women. This study took place from September to December 2020. All subjects were informed about the benefits and risks of the investigation and signed an informed consent form before the beginning of the study, which was approved by the Ethics Committee of İzmir Kâtip Çelebi University (Decision No: 629) and in line with the Declaration of Helsinki, good clinical practices, and applicable laws and regulations. The trial also registered at ClinicalTrials.gov under the process NCT04880525.

Subjects

Female subjects who were 18 years old and above, did not regularly practice pilates, and were physically independent to perform basic daily activities were included in the study. From a total of 50 candidates who were initially contacted and screened, 49 agreed to participate in the study. A flow diagram of the subjects is presented in **Figure 1**.

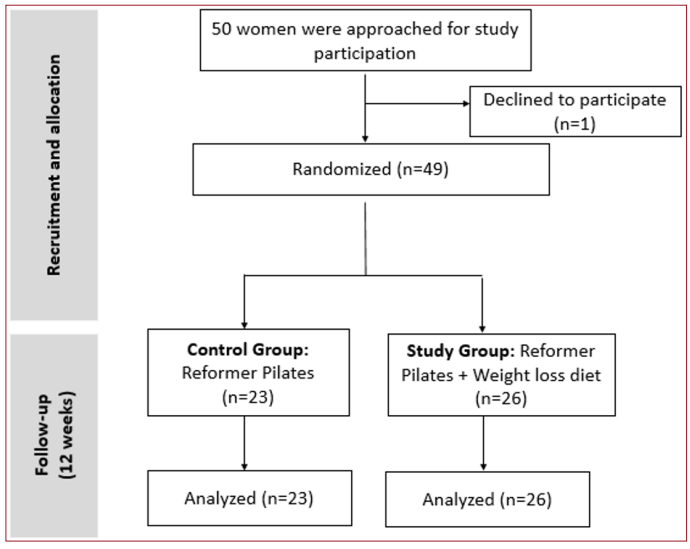

Figure 1. Research flow plan

Sample Size Calculation: Power analysis based on body fat percentages in a similar study[10] on pilates showed that it was optimum to work with a minimum of 28 and a maximum of 69 subjects at 0.40 effect size, 95% power, and 5% type-1 error. As such, 49 subjects were included in the study who started doing reformer Pilates in the gym.

Randomization: The subjects were randomly allocated to either Study Group (SG, n=26) or Control Group (CG, n=23), in a 1:1 ratio, using a computer-generated random-numbers table. Women and investigators were blinded to group assignment. Allocations were performed in sealed, opaque, and consecutively numbered envelopes stored locked. Then, they were opened by an independent administrator who was not involved in the baseline evaluation, outcome assessment, or intervention procedures.

Procedure: Subjects allocated to the SG and CG received 3 sessions of pilates exercises (45 minutes per session) every week for a total of 12 weeks. The intervention was always

performed by a well-trained instructor in the same local exercise center. A pilates training program was designed to improve muscle strength, resistance, and flexibility, and exercise difficulty was set to the basic-intermediate level (10 repetitions per exercise). Exercise intensity was gradually increased. Each session was divided into 3 periods: warm-up (10 minutes), main pilates training activity (25 minutes), and cool-down (10 minutes). During the previous week, subjects were familiarized with the correct execution of the movements, the powerhouse, and the principles of the pilates method. Exercises targeted the lower body, trunk, and upper body areas, both in an isolated manner and through comprehensive routines that involved all areas at once. In weeks 1 and 2, exercises were performed in the sitting and standing position respectively. The rest of the intervention (weeks 3-12) also involved floor exercises. Subjects needed to attend the 80% of the training sessions at minimum to be included in the analysis. The participants were monitored in case of any possible complications, such as fatigue, dizziness, headache, feeling light-headed, shortness of breath, decreased reflexes, numbness in hands or feet, any sort of pain, and cold sweating.

Dietary Intervention: Women in the SG adopted a personalized weight loss diet in addition to the pilates exercise. These diet plans were customized to provide 45-60% of the energy from carbohydrates, 10-20% from protein, and 20-35% from fat, in line with Turkey Dietary Guidelines. No dietary or nutritional intervention was applied to the individuals in the CG. The status of women in the CG on any diet was often questioned.

Survey Form: The study plan consisted of two stages. In the former, a face-to-face interview method was used to question subjects about their socio-demographic characteristics, dietary habits, physical activity levels, food consumption records, and anthropometric measurements. In the latter, the subjects were divided into two groups as control and the study group. After the 12-week study, anthropometric measurements and food consumption records of the individuals were taken.

Determination of Socio-Demographic Characteristics and Physical Activity Levels

The subjects were questioned about their age, physical activity level, marital status, educational background, profession, and presence of a disease diagnosed by a physician. Their physical activity levels were inquired by means of the International Physical Activity Questionnaire (Short Form) (IPAQ-SF). This form consisted of seven questions and provided information about the time spent sitting, walking, moderate and vigorous activities.[11] The total score included the duration (minutes) and frequency (days) of the activities performed. Physical activity levels were classified as physically inactive (<600 MET -min/week), low physical activity (600-3000 MET -min/week), and adequate physical activity (with health benefits) (>3000 MET -min/week).[11]

Evaluation of Dietary Habits and Dietary Status

In this section, general dietary habits of the subjects were evaluated, such as the number of main meals and snacks they consumed, if they skipped main meals and snacks, the reasons for skipping meals, and the food they consumed as snacks.

To determine the dietary status of each subject, their 24-hour food consumption records were taken retrospectively and the portion contents and grams were evaluated. After defining the amount of food consumed each day, their daily energy, macro, and micronutrient intake was questioned through the Nutrition Information Systems Package Program (BEBİS, Ebispro for Windows, Germany).[12] Subjects' food consumption records were taken once a month for three months.

Anthropometric Measurements

All anthropometric measurements were evaluated by a standardized investigator dietitian who had been trained on this subject. Subjects' body compositions were measured by the BIA method and using the TANITA BC 532 InnerScan (Tokyo, Japan) model device, with bare feet and without any metal accessories on. Their body weight (kg), waist circumference (cm), hip circumference (cm), neck circumference (cm), mid-upper arm circumference (cm), and body composition analysis [body fat (%), body water (%), and body muscle (%)] were evaluated at the beginning and end of the study. In addition to these, their waist/height ratio and body mass index (BMI; kg/m^2) were analyzed at the beginning and in the third month.

Statistical Analysis

IBM SPSS Statistics 22.0 (IBM Corp, Armonk, New York, USA) statistical package program was used for statistical analysis. Descriptive statistics for both groups were presented as unit number (n), percentage (%), mean±standard deviation with Pearson chi-square test, and independent samples t-test. The normal distribution of the numerical variable data was evaluated via the Shapiro Wilk normality test and Q-Q graphs. The baseline and third-month measurements were compared by ANOVA, if repetitive. In all comparisons, the value of $p<0.05$ was considered statistically significant.

RESULTS

Table 1 shows the variables of the subjects' demographic characteristics and dietary habits. The mean age is 33.81±9.77 years in SG and 32.52±11.89 years in CG. The mean age of the women in both groups is similar (p=0.68). Average MET values are 4572.00±1680.18 in SG and 4399.30±1716.13 in CG, and the physical activity levels are sufficient and similar in both groups (p>0.05). 92.4% of SG and 95.7% of CG have a high school diploma or above, and subjects in both groups have a similar educational background. 42.3% of SG and 56.5% of CG work in the private sector, and the professional distributions in both groups are similar (p>0.05). Diagnosed disease rate is 23.1% in SG and 34.8% in CG. Endocrine diseases are the most commonly diagnosed diseases in these groups (83.3% and 62.5%, respectively). 34.6% of the subjects in SG and 39.1% of

the subjects in CG skip meals, and the most frequently skipped meals are lunch (55.6%) and dinner (44.4%), respectively. In both groups, subjects stated that they skipped meals as they were not in the habit of having lunch (42.9% and 43.8%, respectively). 30.8% of SG consumes 1000-1500 mL, and 34.8% of CG consumes 2000 mL (and above) of water. The use of vitamin-mineral supplements in CG (43.9%) is higher than in SG (3.8%) (p=0.003) (**Table 1**).

Table 2 shows the comparison of macro and micronutrient intakes of subjects in SG and CG at the beginning and the end of the third month. Baseline and third-month results showed that energy intake and energy from carbohydrates decreased in both groups, and there was no significant difference between (p>0.05). Energy from protein and calcium intake increased in both groups compared to the baseline, and the increase was higher in the group following a diet (p=0.014 and p=0.017, respectively). Compared to the baseline, energy from fat decreased in SG and increased in CG, and fiber intake increased in SG and decreased in CG. However, this difference is not statistically significant (p>0.05). Vitamin C, vitamin B12, zinc, and iron, which are micronutrient elements, increased in SG and decreased in CG. The difference between groups is not statistically significant (p>0.05) (**Table 2**).

Table 1. Demographic characteristics and dietary habits of participants

Variable	Study group (n=26)	Control group (n=23)	Total (n=49)	p
Age (year) (X±SD)	33.81±9.77	32.52±11.89	33.20±10.61	0.68
MET (min/week)(X±SD)	4572.00±1680.18	4399.30±1716.13	4451.52±1687.52	0.72
	n (%)	n (%)	n (%)	
Marital Status				
Married	13 (50.0%)	6 (26.1%)	19 (38.8%)	0.16
Not married	13 (50.0%)	17 (73.9%)	30 (61.2%)	
Education Status				
Literate	1 (3.8%)	1 (4.3%)	2 (4.1%)	0.86
Secondary school	1(3.8%)	0 (0.0%)	1 (2.0%)	
High school	8 (30.8%)	8 (34.8%)	16 (32.7%)	
Bachelor degree	12 (46.2%)	10 (43.5%)	22 (44.9%)	
Graduate degree	4 (15.4%)	4 (17.4%)	8 (16.3%)	
Profession				
Not working	1 (3.8%)	2 (8.7%)	3 (6.2%)	0.86
Student	6 (23.1%)	5 (21.7%)	11 (22.4%)	
Officer	3 (11.5%)	2 (8.7%)	5 (10.2%)	
Housewife	1(3.8%)	0 (0.0%)	1 (2.0%)	
Retired	2 (7.7%)	1 (4.3%)	3 (6.2%)	
Self-employment	2 (7.7%)	0 (0.0%)	2 (4.1%)	
Private sector	11 (42.3%)	13 (56.5%)	24 (48.9%)	
Disease diagnosed by a physician				
Yes	6 (23.1%)	8 (34.8%)	14 (28.6%)	0.55
No	20 (76.9%)	15 (65.2%)	35 (71.4%)	
Diseases				
Endocrine diseases	5 (83.3%)	5 (62.5%)	10 (71.4%)	0.58
Other diseases	1 (16.7%)	3 (37.5%)	4 (28.6%)	
Skipping meal				
Yes	9 (34.6%)	9 (39.1%)	18 (36.7%)	0.98
No	17 (65.4%)	14 (60.9%)	31 (63.3%)	
Skipped meal				
Breakfast	4 (44.4%)	2 (22.2%)	6 (31.6%)	0.06
Lunch	5 (55.6%)	3 (33.3%)	9 (47.4%)	
Dinner	0 (0.0%)	4 (44.5%)	4 (21.0%)	
Reason for skipping meal**				
I don't have time	6 (28.6%)	2 (12.5%)	8 (21.6%)	0.08
I have no habit	9 (42.9%)	7 (43.8%)	16 (44.4%)	
I have no appetite	3 (14.3%)	2 (12.5%)	5 (13.9%)	
Food is not prepared	3 (14.3%)	3 (18.8%)	6 (16.7%)	
I want to lose weight	0 (0.0%)	1 (6.3%)	1 (2.7%)	
I am afraid of gaining weight	0 (0.0%)	1 (6.3%)	1 (2.7%)	
Water consumption (mL)				
0-500	4 (15.4%)	2 (8.7%)	6 (12.3%)	0.08
500-1000	6 (23.1%)	4 (17.4%)	10 (20.4%)	
1000-1500	8 (30.8%)	4 (17.4%)	12 (24.5%)	
1500-1999	5 (19.2%)	5 (21.7%)	10 (20.4%)	
≥2000 mL	3 (11.5%)	8 (34.8%)	11 (22.4%)	
Using vitamin-mineral supplements				
Yes	1 (3.8%)	10 (43.5%)	11 (22.4%)	0.00*
No	25 (96.2%)	13 (56.5%)	38 (77.6%)	

MET: Metabolic Equivalent of Task, Pearson Chi-Square, Independent Samples t test, *p<0.05, ** More than 1 answers were given.

Table 2. Macro and micro nutrient intake of participants at the beginning and end of the 12 weeks

Variable		Study Group (n=26)	Control Group (n=23)	Total (n=49)	p
		Mean±SD	Mean±SD	Mean±SD	
Energy (kkaL)	Before	1310.79±505.37	1823.16±3196.54	1541.60±2188.14	0.18
	After	1062.46±245.25	1231.65±365.39	1144±313.12	
Carbohydrate (%)	Before	39.08±13.34	37.35±15.15	38.12±13.99	0.24
	After	35.58±10.28	34.78±9.68	35.06±9.86	
Protein (%)	Before	18.12±9.27	20.39±6.88	19.60±8.66	0.01*
	After	23.65±3.61	21.78±4.39	22.84±4.05	
Fat (%)	Before	42.69±8.47	42.26±12.28	42.22±10.39	0.84
	After	40.81±10.59	43.30±9.37	42.06±9.92	
Fiber (g)	Before	13.95±8.32	36.20±99.04	24.19±67.57	0.65
	After	19.69±10.38	21.43±9.59	20.52±9.85	
Vitamin C (mg)	Before	67.16±64.43	212.59±618.27	133.75±423.26	0.44
	After	101.78±104.08	82.94±61.79	93.59±85.74	
Vitamin B12 (mg)	Before	4.34±3.03	12.86±41.51	8.25±28.23	0.44
	After	5.36±2.86	5.24±2.84	5.28±2.80	
Zinc (mg)	Before	7.36±3.71	10.15±8.81	8.75±6.65	0.95
	After	8.06±2.75	9.56±2.74	8.77±2.79	
Calcium (mg)	Before	624.84±258.74	728.51±491.73	673.59±381.31	0.02*
	After	901.11±459.48	791.15±199.98	845.53±359.82	
Iron (mg)	Before	7.92±4.00	14.92±25.65	11.19±17.77	0.96
	After	11.40±9.39	11.16±3.45	11.26±7.09	

Repeated-measures ANOVA, *p<0.05

Table 3 shows the comparison of the anthropometric measurements of the subjects at the beginning and in the third month. Compared to CG, SG had a higher decrease in body weight, BMI, waist circumference, hip circumference, waist/height ratio, and a higher increase in basal metabolic rate (BMR), body muscle ratio, and body water ratio (p<0.05). Reduction in neck circumference was more dramatic in the control group (p=0.01). Upper middle arm circumference decreased in SG and increased in CG; however, the difference between the two groups was not significant (p>0.05) (**Table 3**).

Table 3. Anthropometric measurements of participants at the beginning and end of the 12 weeks

Variable		Study Group (n=26)	Control Group (n=23)	Total (n=49)	p
		Mean±SD	Mean±SD	Mean±SD	
Body weight (kg)	Before	67.10±10.94	61.68±10.63	64.59±10.92	0.00*
	After	63.63±9.63	60.65±10.20	62.24±9.81	
BMI (kg/m²)	Before	24.53±3.48	22.44±3.84	23.53±3.73	0.00*
	After	23.28±3.12	22.23±3.59	22.75±3.33	
WC (cm)	Before	78.12±13.27	73.07±9.32	87.18±70.72	0.00*
	After	71.77±10.89	69.48±9.25	70.72±10.01	
HC (cm)	Before	104.63±11.39	99.17±9.11	102.15±10.54	0.00*
	After	98.15±9.26	95.43±7.54	96.96±8.45	
NC (cm)	Before	32.50±1.86	32.30±2.24	32.42±2.01	0.01*
	After	32.31±1.64	32.00±2.13	32.16±1.86	
WC/Height	Before	0.47±0.08	0.44±0.06	0.45±0.07	0.00*
	After	0.43±0.07	0.42±0.06	0.42±0.06	
MUAC (cm)	Before	27.42±6.10	25.35±6.66	26.48±6.33	0.75
	After	26.73±2.03	25.57±3.26	26.16±2.69	
Fat mass (%)	Before	31.21±4.85	27.58±7.77	29.60±6.55	0.00*
	After	28.36±4.22	26.55±6.69	27.55±5.49	
Body water (%)	Before	48.44±2.96	50.58±4.79	49.38±4.02	0.00*
	After	50.66±3.00	51.09±4.79	51.05±3.89	
FFM (%)	Before	43.40±4.05	40.81±3.23	42.17±3.83	0.98
	After	43.23±4.10	40.96±4.02	42.22±4.16	
BMR (kkaL)	Before	1378.77±130.45	1341.30±105.37	1365.44±119.24	0.00*
	After	1426.50±137.80	1368.39±126.70	1399.80±125.43	

BMI: Body mass index, BMR: Basal metabolic rate, FFM: Fat free mass, HC: Hip circumference, MUAC: Mid upper arm circumference, NC: Neck circumference, WC: Waist circumference Repeated-measures ANOVA, *p<0.05

DISCUSSION

Body composition refers to the different tissues that make up the total body mass, usually expressed in muscle, fat, bone, and residual mass. Age, gender, muscle structure, physical activity level, diseases, and nutrition can affect body composition.[10] Diet is affected by the dietary habits of a society and its social, economic, and cultural conditions.[13]

Many studies report a positive correlation between physical activity level and educational background.[14,15] A higher level of education may help individuals see the benefits of physical activity and engage in such activities, especially in their spare time.[16] A meta-analysis on this subject suggests that doing physical activities in one's spare time is not associated with educational background.[17] 53.3% of the subjects in Basoglu et al.'s study (2018) on exercise dependence and 41.6% in de Souza Ferraz et al.'s (2020) study had bachelor's degrees.[18, 19] The subjects in this study have a high level of education (65.3% of them have bachelor's degrees or above), which is a critical factor in their physical activity levels.

The World Health Organization's Guidelines on Physical Activity and Sedentary Behavior Guide (2020) recommend that adults perform 150-300 minutes of medium intensity or 75-150 minutes of high intensity or a combination of medium and high intensity aerobic physical activities on a weekly basis. Regular exercises promoting muscular endurance are recommended for all age groups.[20] Data from the Turkey Nutrition and Health Survey 2019 show that 37.6% of individuals aged 19 and over do not follow this recommendation.[21] Physical inactivity, which is one of the common risk factors of chronic diseases, ranks fourth in the worldwide risk factors leading to death and is responsible for 15% of all-cause deaths in Turkey.[20,21] Following a healthy diet and increasing your physical activity level are among the key recommendations that should be taken to age healthily and minimize old age-related health risks. Regular physical activity together with a healthy diet plays a critical role in preventing chronic diseases.[20] In this study, only a small group of subjects (28.6%) were diagnosed by a physician, which maybe thanks to the fact they had exercising habits, and most of them had endocrine diseases (71.4%).

Dietary habits play a critical role in the physical and mental health of individuals. An insufficient number of meals, inconvenient meal times, and skipping meals are among the factors that negatively affect an adequate and balanced diet. The frequency of food consumption and the amount and ratio of energy and nutrients per meal is essential in maintaining the body's physiological balance and protecting the organs.[22] Peker and Yağmur's study (2018) showed that subjects regularly had dinner and skipped lunch most frequently.[23] Following the literature, this study suggested that subjects skipped meals, which may negatively affect their adequate and balanced diet and exercise program.

Water, defined as the essential element of life, assumes a vital role in maintaining cellular homeostasis. Analyzing water consumption is critical in studies conducted on diet. Australian Nutrition and Physical Activity Study 2011-2012 results show that water consumption decreases with aging in adults.[24] Turkey Dietary Guidelines 2015 recommends that adults consume 2-2.5 liters of fluid a day, and the fluid consumed should be water in particular.[25] A study conducted on adolescents found that 39.9% of the subjects drank 6-10 glasses of water a day.[26] Our study suggested that 24.5% of the subjects drank 1000-1500 mL of water at the beginning. Considering that physical activity increases fluid loss in the body, it is critical to take an adequate amount of fluid when exercising.

Nutritional supplements containing vitamins and minerals are widely used today. However, under the principles of an adequate and balanced diet, it is recommended that they taken within a diet. It is reported that few nutritional supplements boost performance, and they generally cause health problems.[27] A study conducted on 723 people in Brazil showed that 64.7% of the subjects who attended the gym used vitamin-mineral supplements.[28] In the study conducted on bodybuilding men, 64.0% of the subjects used nutritional supplements.[27] In this study, unlike the literature, 77.6% of the subjects did not use vitamin-mineral supplements. It is good news that the vast majority of the subjects do not use such supplements to increase exercise performance.

It is known that personalized healthy diet programs have positive effects on body weight and body fat loss.[8] Turkey Dietary Guidelines 2015 recommends that women aged 18-64 should consume energy from carbohydrates by 45-60%, protein by 10-20%, and fat by 20-35%.[25] It was found that the average energy, protein, carbohydrate, mono and polyunsaturated fatty acids, fiber, and sodium intakes of women who exercised in the postmenopausal period were significantly lower than the dietary reference intake (DRI) value.[29] A similar study found that the energy and fat intakes of women were above the DRI while their protein and calcium intakes were below the DRI.[30] In our study, neither group could meet the recommendations specified in the guidelines. At the beginning and the end of the study, the energy from carbohydrates was low and energy from fat was high. At the beginning, energy from protein (19.6%) complied with the recommendations in Turkey Dietary Guidelines. At the end, however, it was above (22.8%) what was recommended. It suggests that subjects increase their protein intake to promote muscle gain with exercise. Also, the protein intake of women who were on a weight-loss diet was higher than those who were not. Factors such as the inability to comply with the dietician's recommendations and consuming more protein thinking that it increases the metabolic rate may have led the women on a weight-loss diet into increasing their protein intake. Similarly, a study involving exercise and dietary interventions applied to overweight and obese women found that energy and fat intake decreased and protein and carbohydrate intake increased.[31]

A study conducted on people who exercised found that their calcium intake was above the DRI value, while another showed that it was below the DRI.[29,30] It was found that the calcium intake was higher in the study group than in the other. The recommendation to consume more dairy products, thought to be effective for maintaining electrolyte balance before or after exercise, improving exercise performance, and reducing body weight, may have been effective in this case.

It is suggested that regular physical activity has positive effects on body composition, depending on the type of exercise.[1,3] This study showed that the study group had a higher decrease in body weight, BMI, waist circumference, hip circumference, and waist/height ratio and a higher increase in BMR, muscle, and water ratio than the control group. A similar study found a significant difference in body weight, BMI, waist circumference, lean body mass, and BMR after 8 weeks of pilates compared to the baseline values.[32] In contrast to this study, no significant improvement in fat and muscle mass was observed in another study.[33]

Our study has several strengths and weaknesses. Its primary limitation is that no content was defined for the weight-loss diet and/or it was designed in a randomized controlled manner, thus preventing dietary treatment from being standardized. Only women of childbearing age were included in the study. The subjects do not represent all age groups and sexes, making it difficult for us to refer to the general population. Food consumption records of the subjects were taken once every month with the 24-hour recall method, which does not indicate their overall nutritional status. Future studies should include a three-day food consumption record for each month and monitor compliance with personalized diet programs.

Studies on the effect of pilates alone or in combination with a weight-loss diet on dietary habits and anthropometric measurements are inadequate. This is one of the strengths of our study. Maximum care was taken and ethical rules were in place. The statistical data obtained made a significant contribution to the literature. New studies should be conducted to comprehensively evaluate the data obtained within the scope of this study.

CONCLUSION

Following a weight-loss diet and doing reformer pilates led to positive changes in subjects' body composition compared to reformer pilates alone and increased dietary protein and calcium intake. Our results support that a combination of diet and reformer pilates may be more effective in women doing reformer pilates than exercise alone. Randomized controlled studies are needed to evaluate the effect of nutritional intervention on people doing pilates of different ages, sex, and disease status.

ETHICAL DECLARATIONS

Ethics Committee Approval: The study was carried out with the permission of İzmir Kâtip Çelebi University Non-interventional Clinical Research Ethics Committee (Date: 13.02.2020, Decision No: 629).

Informed Consent: All women signed the free and informed consent form.

Referee Evaluation Process: Externally peer-reviewed.

Conflict of Interest Statement: The authors have no conflicts of interest to declare.

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

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REFERENCES

1. Aladro-Gonzalvo AR, Machado-Díaz M, Moncada-Jiménez J, Hernández-Elizondo J, Araya-Vargas G. The effect of pilates exercises on body composition: a systematic review. J Bodyw Mov Ther. 2012;16(1):109-14.
2. Şavkin R, Aslan UB. The effect of pilates exercise on body composition in sedentary overweight and obese women. J Sports Med Phys Fitness. 2017;57(11):1464-70.
3. Rayes ABR, de Lira CAB, Viana RB, et al. The effects of pilates vs. aerobic training on cardiorespiratory fitness, isokinetic muscular strength, body composition, and functional tasks outcomes for individuals who are overweight/obese: a clinical trial. PeerJ 2019;7:e6022.
4. Roller M, Kachingwe A, Beling J, Ickes DM, Cabot A, Shrier G. Pilates reformer exercises for fall risk reduction in older adults: A randomized controlled trial. J Bodyw Mov Ther 2018;22(4):983-98.
5. Aka H, İbiş S, Arıcı R. Kadınlara uygulanan 8 haftalık reformer pilates egzersizlerinin vücut kompozisyonuna ve bazı fiziksel uygunluk parametrelerine etkisi. GUSBD. 2020;5(4):573-89.
6. Pekel HA, Aydos L, Uzun A, Bozoğlu MS, Demirel M. The effect of zumba and reformer exercises on female body composition. IJOEEC. 2020;5(11):2316-39.
7. Kaya M, Paktaş Y, Topçu İ, Karabacak E. Pilates reformer egzersizlerinin sedanter kadınlarda vücut ağırlığı, kas çevresi ve esneklik düzeylerine etkilerinin incelenmesi. Sivas Cumhuriyet Univ Sports Sci J. 2020; 1(3):130-9.
8. Vassilopoulou E, Piperari G, Christoforou C. Is Zumba® fitness effective to manage overweight without dietary intervention?. AJNE. 2016;1(3):113-21.
9. Aragon AA, Schoenfeld BJ, Wildman R, et al. International society of sports nutrition position stand: diets and body composition. J Int Soc Sports Nutr. 2017;14(1):16.
10. Fourie M, Gildenhuys GM, Shaw I, Shaw BS, Toriola AL, Goon DT. Effects of a mat pilates programme on body composition in elderly women. West Indian Med J. 2013;62(6):524-8.
11. IPAQ-SF Research Committee. Guidelines for data processing and analysis of the International Physical Activity Questionnaire (IPAQ-SF)-short and long forms. 2005 [cited 2021 Mar 15] Available from: http://www. IPAQ-SF. ki. se/scoring. pdf.
12. BEBİS Programı, B. B. S. P. Ebispro for Windows, Stutgart, Germany; Turkish version BEBİS; Data Bases: Bundeslebenmittelschlüssell, 11.3 and other sorces.18

13. Schoufour JD, de Jonge EA, Kiefte-de Jong JC, et al. Socio-economic indicators and diet quality in an older population. Maturitas. 2018;107:71-7.
14. Macías R, Garrido-Muñoz M, Tejero-González CM, Lucia A, López-Adán E, Rodríguez-Romo G. Prevalence of leisure-time sedentary behaviour and sociodemographic correlates: a cross-sectional study in Spanish adults. BMC Public Health. 2014;14(1):972.
15. Farrell L, Hollingsworth B, Propper C, Shields MA. The socioeconomics gradient in physical inactivity: Evidence from one million adults in England. Soc Sci Med. 2014;123:55-63.
16. Del Duca GF, Nahas MV, Garcia LMT, Mota J, Hallal PC, Peres MA. Prevalence and sociodemographic correlates of all domains of physical activity in Brazilian adults. Prev Med Rep. 2013;56(2):99-102.
17. Beenackers MA, Kamphuis CB, Giskes K, et al. Socioeconomic inequalities in occupational, leisure-time, and transport related physical activity among European adults: a systematic review. Int J Behav Nutr Phys Act. 2012;9(1):1-23.
18. Basoglu UD. Exercise Addiction: A Comparison between the Individuals Who Exercise for Physical Recreation and Who Receive Personal Exercise Training. J Educ Train Stud 2018;6(12):21-5.
19. de Souza Ferraz V, Cruz ADFC, Ferreira MAM, et al. Efeito do Método Pilates sobre a Função Sexual, a Força da Musculatura do Assoalho Pélvico e a Qualidade de Vida em Mulheres Sobreviventes do Câncer de Mama. Revista Brasileira de Cancerologia. 2020;66(2).
20. Bull FC, Al-Ansari SS, Biddle S, et al. World Health Organization 2020 guidelines on physical activity and sedentary behaviour. Br J Sports Med. 2020;54(24):1451-62.
21. T.C. Sağlık Bakanlığı. Türkiye beslenme ve sağlık araştırması 2019. T.C. Sağlık Bakanlığı Halk Sağlığı Genel Müdürlüğü, Publication Number: 1132, Ankara, 2019 [cited 2021 Apr 9]; Available from: https://hsgm.saglik.gov.tr/depo/birimler/saglikli-beslenme-hareketli-hayat-db/Yayinlar/kitaplar/TBSA_RAPOR_KITAP_20.08.pdf
22. Paoli A, Tinsley G, Bianco A, Moro T. The influence of meal frequency and timing on health in humans: the role of fasting. Nutrients. 2019;11(4):719.
23. Peker A, Yağmur C. Yetişkin şişman kadınlarda zayıflama diyeti ve egzersiz uygulamasının vücut ağırlık kaybı ile vücut bileşimi ve antropometrik ölçümler üzerine etkisi. Ç.Ü. Müh. Mim. Fak. Dergisi. 2018; 35(6):81-90.
24. Zhixian JM, Zhang M, Sui Z, Rangan AM. Water consumption among Australian population: Results from 2011-12 National Nutrition and Physical Activity Survey. Obes Res Clin Pract. 2019;13(1):112-3.
25. T.C. Sağlık Bakanlığı. Türkiye beslenme rehberi 2015 (TÜBER). T.C. Sağlık Bakanlığı Halk Sağlığı Müdürlüğü Publication Number: 1031, Ankara, 2016.
26. Nişancı Kılınç F, Çakır B, Durmaz SE. Spor yapan adölesanlar optimal düzeyde besleniyor mu? Obezite durumları ve Akdeniz Diyeti'ne uyum düzeyleri. Turkiye Klinikleri J Sports Sci. 2020;12(1):49-57.
27. Özdoğan Y, Karataş E, Uçar A. Vücut geliştirme sporu yapan erkeklerin beslenme alışkanlıkları ve ergojenik besin destekleri kullanma durumları. AUHSJ. 2018;9(4):378-84.
28. Lacerda FMM, Carvalho WRG, Hortegal EV, Cabral NAL, Veloso HJF. Factors associated with dietary supplement use by people who exercise at gyms. Rev Saude Publica. 2015;49:63.
29. Ranasinghe C, Shettigar PG, Garg M. Dietary intake, physical activity and body mass index among postmenopausal women. J Midlife Health. 2017;8(4):163.
30. Kashyap A, Chhabra P. Assessment of nutritional ıntake and nutritional knowledge of rural post-menopausal women. IJSHR. 2019; 4(3):68-73.
31. Castro EA, Carraça EV, Cupeiro R, et al. The effects of the type of exercise and physical activity on eating behavior and body composition in overweight and obese subjects. Nutrients. 2020;12(2):557.
32. Cakmakçi O. The effect of 8 week plates exercise on body composition in obese women. Coll Antropol. 2011; 35(4):1045-50.
33. Aibar-Almazán A, Martínez-Amat A, Cruz-Díaz D, et al. The influence of pilates exercises on body composition, muscle strength, and gait speed in community-dwelling older women: A randomized controlled trial. J Strength Cond Res 2020;10.1519/JSC.0000000000003790.

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Original Article / Orijinal Araştırma

The Predictors of Early Mortality in Geriatric Patients who Hospitalized to the Intensive Care Unit with Aspiration Pneumonia

Aspirasyon Pnömonisi ile Yoğun Bakım Ünitesine Yatan Geriatrik Hastalarda Erken Mortalite Belirteçleri

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Abstract

Aim: In the geriatric group, aspiration pneumonia is one of the most common causes of Intensive Care Unit admission. Multiple comorbidities related with systemic diseases, as well as dementia, frailty and difficulty in swallowing or protecting the airway may all contribute the development of the AP in the geriatric age. Furthermore, many other variables may influence the outcome of this patient group. In this study, it is aimed to determine the parameters that may have an effect on the intensive care mortality.

Material and Method: 221 patients aged ≥ 80 years who were admitted to the third level ICU with the diagnosis of aspiration pneumonia were retrospectively analyzed. They were divided into two groups according to the 28-day outcome (survived-nonsurvived). The admission levels of arterial blood Ph and pCO_2 and lactate , blood urea, creatinine, potassium (K) and sodium (Na) levels, APACHE II, Glaskow Coma Scale (GCS), modified shock index (MSI) and the aspiration pneumonia's source (community-acquired aspiration pneumonia (CA-AP) or healthcare-associated aspiration pneumonia (HCA-AP))were recorded.The effects of these variables on 28-day mortality were analyzed.

Results: The presence of HCA-AP, GCS and APACHEII scores were found to be significantly correlated between the two groups. ROC analysis were done for those variables and cutoff points werecalculated. Logistic regression analysis showed that, APACHE II (>22.5,AUC:0.812,P=0.00), GCS (<9, AUC:0.730, G=0.00) and the presence of HCA-AP as the most relivient predictors of mortality.

Conclusion: Although many variables are significant in predicting the first 28 days of mortality in ICU admission of geriatric patients with aspiration pneumonia, the presence of HCA-AP, high hospitalization APACHE II score and low GCS score were significant independent variables in predicting intensive care mortality.

Keywords: Aspiration pneumonia, geriatrics, mortality predictors, intensive care units, healthcare-associated aspiration pneumonia

Öz

Amaç: Geriatrik grupta aspirasyon pnömonisi en sık Yoğun Bakıma yatış nedenlerinden biridir. Sistemik hastalıklarla ilişkili çoklu komorbiditelerin yanı sıra demans, kırılganlık ve yutma veya hava yolunu koruma güçlüğü geriatrik yaşta aspirasyon pnömonisinin oluşumuna katkıda bulunabilir. Ayrıca, diğer birçok değişken bu hasta grubunun sonucunu etkileyebilir. Bu çalışmada yoğun bakım mortalitesine etkisi olabilecek parametrelerin belirlenmesi amaçlanmıştır.

Materyal ve Metod: Aspirasyon pnömonisi tanısı ile üçüncü basamak yoğun bakım ünitesine yatırılan 80 yaş ve üzeri 221 hasta retrospektif olarak incelendi. 28 günlük sonuçlara göre iki gruba ayrıldılar (hayatta kalanlar ve hayatta kalmayanlar). Arteriyel kan Ph ve pCO_2 ve laktat, kan üre, kreatinin, potasyum (K) ve sodyum (Na) seviyeleri, APACHE II, Glaskow Koma Ölçeği (GCS), modifiye şok indeksi (MSI) ve aspirasyon pnömonisinin kaynağı (toplum kökenli aspirasyon pnömonisi (CA-AP) veya sağlık hizmeti ile ilişkili aspirasyon pnömonisi (HCA-AP)) kaydedildi. Bu değişkenlerin 28 günlük mortalite üzerindeki etkileri analiz edildi.

Bulgular: HCA-AP, GCS ve APACHEII skorlarının varlığı iki grup arasında anlamlı olarak ilişkili bulundu. Bu değişkenler için ROC analizi yapıldı ve kesme noktaları hesaplandı. Lojistik regresyon analizi, APACHEII (>22.5, AUC:0.812,P=0.00) ve GCS'nin (<9, AUC:0.730, P=0.00) HCA-AP varlığı ilebirlikte mortalitenin en belirgin bağımlı belirleyicileri olduğunu gösterdi (p<0.05, olasılık oranı 7.68, 3,23 sırasıyla).

Sonuç: Aspirasyon pnömonisi olan geriatrik hastaların yoğun bakım ünitesine yatışlarında ilk 28 günlük mortaliteyi öngörmede birçok değişken anlamlı olmakla birlikte, HCA-AP varlığı, yüksek yatış APACHE II skoru ve düşük GCS skoru anlamlı bağımsız değişkenlerdi.

Anahtar Kelimeler: Aspirasyon pnömonisi, geriatri, mortalite öngörücüleri, yoğun bakım üniteleri, sağlık hizmeti ilişkili aspirasyon pnömonisi

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INTRODUCTION

Caused by aspiration of colonized oropharyngeal secretions, aspiration pneumonia (AP) is one of the most important causes of intensive care hospitalization and high mortality, especially in elderly patients with neurological problems or those in nursing homes.[1-3] Among geriatric patients, those over the age of 80 and referred to as very elderly patients need increasingly more follow-up in the intensive care unit (ICU), and in addition to multiple comorbidities associated with systemic diseases, dementia, frailty, difficulty in swallowing or in maintaining the airway contribute to the increase in AP.[4,5]

AP is a clinical condition difficult to be diagnosed. It is defined as the history of witnessed aspiration, the presence of infiltration in the zones consistent with aspiration in lung imaging, and laboratory results consistent with infection in the elderly with oral dysphagia due to comorbid conditions.[6,7]

The diagnosis of AP that increases with age is also supported by various studies. In one study, dysphagia was detected at a rate of 15% in patients older than 65 years, and in another one, AP was found almost six times more in patients older than 75 years of age compared to those aged 60.[4,8] In another study, a water swallow test was conducted on 134 patients with a mean age of 84 who were hospitalized for pneumonia, and oropharyngeal dysphagia was reported with a rate of 55%.[9]

In AP, it is necessary to estimate the bacteriological agent and to arrange a treatment based on the severity of the disease. Therefore, while estimating the source of AP, it is of importance to determine whether it is community-acquired aspiration pneumonia (CA-AP) or healthcare-associated aspiration pneumonia (HCA-AP). In general, 7-10 days of treatment is sufficient in CA-AP patients who come from home and do not have a history of recent hospitalization and antibiotic use while long-term treatment (14-21 days, up to weeks or months) is required in complicated cases such as necrotizing pneumonia or lung abscess.[10,11]

Mortality rates ranging from 0% to 85% due to AP have been reported in the literature, and this rate increases with age in very elderly patients.[12]

The aim of this study is to reveal the demographic and clinical parameters that affect the treatment results and mortality in the very elderly patient group hospitalized due to AP in the ICU in our clinic.

MATERIAL AND METHOD

The study was conducted by following the ethical principles stated in the Declaration of Helsinki, "Good Medical Practice Guidelines" and "Good Laboratory Practice Guidelines". The study was carried out with the permission of Haydarpasa Numune Training and Research Hospital Ethics Committee (Date: 06.09.2021, Decision No: E-62977267-000-11783).

The data of the patients who were followed up in the Level 3 ICU for 5 years were reviewed retrospectively, and out of the very elderly patients over the age of 80 who were admitted to the ICU from the emergency department with the diagnosis of AP for the first time, a total of 221 whose data could be accessed were included in the study. They were divided into two groups according to the 28-day outcome (survivors-nonsurvivors). Group 1 represents the survivor group while Group 2 represents the group with intensive care mortality.

The diagnosis of AP was made according to the following clinical criteria:[6,13]

- Presence of newly emerging infiltration in a location consistent with aspiration in lung imaging (lung radiography or tomography),
- Presence of at least one of the major criteria (cough, sputum, chills-shivering-fever) or at least two of the minor criteria (dyspnea, pleuritic chest pain, change in consciousness, auscultation findings consistent with consolidation in physical examination, high or low white blood cell in the hemogram control >12.000/mm³ or <4000/mm³) for the diagnosis of pneumonia,
- History of witnessed aspiration or ongoing dysphagia, or presence of aspiration symptoms such as coughing, bruising, and dyspnea after each intake.

The admission levels of arterial blood pH (power of Hydrogen) and pCO_2 (Partial pressure of carbon dioxide) and lactate, Blood Urea Nitrogen (BUN), creatinine, potassium (K) and sodium (Na) levels, Acute Physiology and Chronic Health Evaluation (APACHE) score, Glasgow Coma Scale (GCS) score, modified shock index (MSI) and the aspiration pneumonia's source (community-acquired aspiration pneumonia (CA-AP) or healthcare-associated aspiration pneumonia (HCA-AP)) were recorded.

When evaluating aspiration pneumonia according to its source, the definitions in the guidelines related to pneumonia were taken into account. Community-acquired pneumonia (CAP) is an acute infection of the pulmonary parenchyma in a patient who has acquired the infection in the community while healthcare-associated pneumonia (HCAP) is an infection that is closely associated with acute care hospitals or observed in inpatients of chronic care institutions, and it is mostly caused by multi-drug-resistant bacteria.[14,15] Hospital Acquired Pneumonia (HAP) is defined as pneumonia that occurs at least 48 hours after admission to the hospital, or that is not in the incubation period at the time of admission or develops 48 hours after discharge from the hospital.[14] Therefore, the patients who fell under this definition were excluded from the study as they had transient hospital flora, the duration of their treatment before intensive care varied and due to difficulties in diagnosing.

Among the variables between Group 1 and Group 2, those that had an effect on 28-day intensive care mortality were determined, and cut-off values for these markers were given.

Statistical Analysis

In the statistical analysis of the findings obtained in the study, IBM SPSS Statistics 22 (IBM SPSS, Turkey) software

was used. The conformity of the parameters to the normal distribution was evaluated via the Shapiro-Wilks test, which showed that the parameters were normally distributed. While analyzing the study data, descriptive statistical methods (mean, standard deviation, median, frequency) were used and independent samples T-test was used to compare the quantitative data. Pearson Chi-Square test was used to compare the qualitative data. Binary logistic regression analysis was performed for the data found significant in the univariate analyses and independent risk factors were determined to show mortality. ROC curves were prepared for the significant quantitative data, and sensitivity and specificity were calculated. Significance was evaluated at p<0.05.

RESULT

A total of 221 patients with a mean age of 85.0 years who were diagnosed with AP and followed in the ICU were included in the study (Table 1). The patients were divided into two groups according to the presence of 28-day intensive care mortality-106 patients were discharged from the ICU, and 115 patients died. There was no difference between the groups in terms of demographic data and comorbid diseases (**Table 1**). While 53.8% of the patients had HCA-AP, 46.2% had CA-AP.

HCA-AP was significantly higher in the mortality group and was an independent risk factor that increased mortality 2.6-fold (Odds ratio: 0.374, 95%CI 0.186-0.753, p:0.006) (**Table 2**). Mortality was 66.3% in 119 patients with HCA-AP and this rate was 35.2% in 102 patients with CA-AP.

Table 1. Factors affecting 28 day ICU mortality

	Mortality (-) n:106	Mortality (+) n:115	Univariate	Multivariate
Age	84.46±3.96	85.50±4.62	0.08a	
Gender Female Male	 67 (%63.2) 39 (%36.8)	 73(%63.5) 42(%36.5)	0.54b	
Comorbid diseases	38 (%35.8)	38 (%33.0)	0.72a	
HCA-AP CA-AP	40 (%37.7) 66 (%62.3)	79 (%68.7) 36 (%31.3)	0.00a	0.006c
APACHE II	19.96±6.67	28.03±6.06	0.00b	0.000c
GCS	12.42±3.10	9.32±4.01	0.00b	0.003c
SI	0.21±0.41	0.55±0.72	0.00b	0.206c
MSI	0.72±0.61	1.00±0.84	0.01b	0.415c
BUN	53.05±36.22	62.18±34.67	0.05b	0.787c
Creatinine	1.54±1.69	1.80±2.08	0.42b	
Sodium	138.75±7.16	142.22±11.38	0.00b	0.961c
Glucose	162.27±107.28	151.87±80.68	0.41b	
Potassium	3.79±0.88	3.94±1.01	0.23b	
pH	7.00±0.10	6.96±0.18	0.05b	0.999c
pCO_2	40.89±23.46	42.43±26.8	0.67b	
Lactate	2.23±5.60	3.10±3.47	0.17b	

aPearsonChi-square, bT-Test, cBinarylogistic, p<0.05 statisticallysignificant, DM: DiabetesMellitus, HCA-AP: Healthcare-associated aspiration pneumonia, CA-AP: Community-acquired aspiration pneumonia, APACHE II: Acute Physiology and Chronic Health Evaluation, GCS: Glasgow Coma Scale, SI: Shock Index, MSI: ModifiedShock Index, BUN: Blood Urea Nitrogen, pH: power of Hydrogen, pCO_2: Partial pressure of carbon dioxide

Table 2. Binary logistic regresion analysis for the factors affecting mortality

	Sig.	Odds Ratio	95,0% C.I.	
			Lower	Upper
HCA-AP	0.006	0.374	0.186	0.753
APACHE II	0.000	1.162	1.093	1.235
GCS	0.003	0.862	0.782	0.951

HCA-AP: Healthcare-associated aspiration pneumonia, APACHE II: Acute Physiology and Chronic Health Evaluation, GCS: Glasgow Coma Scale

APACHEII scores were significantly higher in the mortality group and were an independent risk factor for indicating mortality (OR: 1.16, %95 CI 1,093-1,235, p:0,00) (Table 2). In the ROC analysis, mortality was observed in the patients with APACHEII >22.5 with a sensitivity of 81.7% and a specificity of 32.1% (**Figure 1, Table 3**).

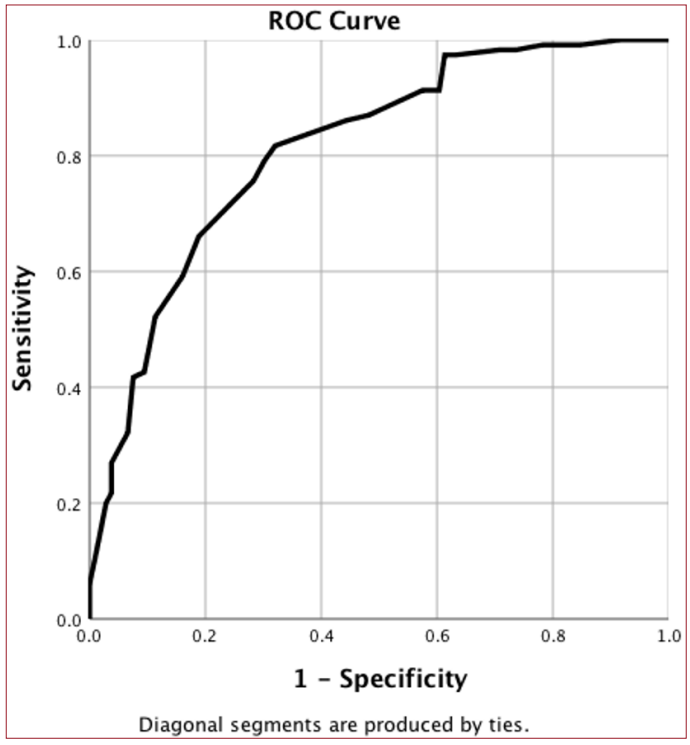

Figure 1. ROC curvesfor APACHEII

In the analyses performed, it was observed that the GCS was significantly lower in the mortality group and each unit decrease in GCS increases mortality 1.16 times as an independent factor in showing mortality (Table 2). In the ROC analysis, mortality was expected in the patients with GCS<9 with a sensitivity of 82.1% and a specificity of 47.8% (**Figure 2, Table 3**).

SI, MSI values, Na and BUN levels were found to be higher in the mortality group. And initial Ph levels were to be found lower in mortality group. However, when these parameters were included in the multivariate analysis, they were not found to be risk factors for predicting mortality.And the other laboratory markers we evaluated were similar between the two groups (**Table 1**).

Table 3. ROC analysis of APACHE II and GCS

Test Result Variable(s)	Area Under Curve (AUC)	Std. Errora	Asymptotic Sig.b	Value	Sensitivity %	Specificity %
APACHEII	.812	.029	.000	>22.5	81.7	32.1
GCS	.730	.034	.000	<9	82.1	47.8

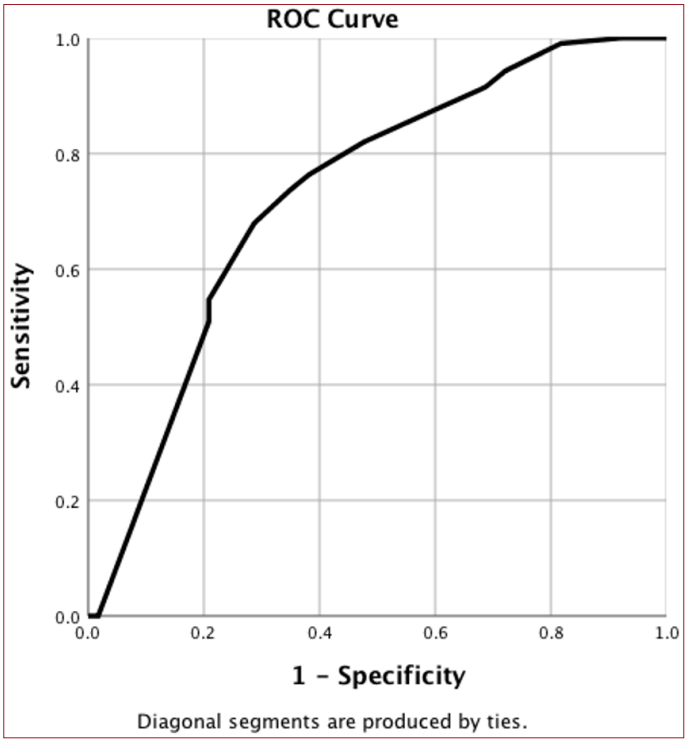

Figure 2. ROC curvesfor GCS

DISCUSSION

In this study, in which we examined 221 patients over 80 years of age who needed ICU follow-up due to AP and its effect on intensive care mortality, we found that the presence of HCA-AP, high hospitalization APACHE II score and low GCS score were significant independent variables in predicting intensive care mortality.

Studies related to AP have been done either in children or in the elderly. In studies conducted with elderly patients in parallel with ours, it was reported that the incidence in CAP was 15%, while it was found to be 30% in HCAP.[16] Similarly, Marik also stated in his study that AP accounted for 15% of CAPs, and this rate was lower than potential due to occult aspirations and difficulties in diagnosis.[17] However, in a study in which 628 patients with AP were examined, it was reported that CA-AP was higher.[7] In our study 53.8% of the patients had HCA-AP, 46.2% had CA-AP.

Although the varying rates in AP-related mortality draw attention, generally AP has higher mortality compared to isolated CAP. Lanspa et al.[7] also revealed in their study that the rates of hospitalization and intensive care hospitalization due to AP with all reasons (HCA-AP+ CA-AP) were higher than those due to isolated CAP, regardless of the source (99% vs. 58%; n=628 and 38% vs. 14%, respectively). Attention is drawn to the fragile features of AP patients and the severity of the causative disease.

The source of AP also has a significant effect on mortality. For example, while the 30-day mortality rate was found 21% in a study in which CA-AP was more intense, there are also studies with higher mortality rates reaching up to 65%.[7,18,19] The high mortality rates were attributed to the aspirated oropharyngeal colonization being composed of different microorganisms (especially gram-negative bacilli and anaerobic organisms) and the association of AP with the underlying fragile disease. More resistant microorganisms were detected, especially in those with HCA-AP.[18,19] In our study, the total intensive care mortality rate due to AP was 52% while it was 66.4% in HCA-AP and 35.2% in CA-AP.

In a study examining 95 elderly patients diagnosed with AP who had been living in a nursing home for a long time (HCA-AP), mortality was found to be 36%.This rate was found to be almost 1.5 times higher in our study. However, our study is different in that all of our patients consisted of severe cases requiring ICU follow-up, and that is why we think our mortality rate was higher in HCA-AP. Unlike our study, hospitalization APACHE II score was not shown as an independent mortality indicator in this study.[19]

There are studies showing that high APACHE II score is associated with mortality in medical ICUs.[20] In a study examining pneumonia-related ICU follow-up, the APACHE II score, which was predicted as a mortality indicator, was reported as 29.8.[21] In our study, an APACHE II score >22.5 was an independent variable in predicting mortality. The lower APACHE II score in our study was attributed to the older age of our patient group.

Although a low GCS score is associated with the inability to protect the airway, the risk of aspiration and the need for intubation, the opposite is also argued.[22-24] The relationship between GCS and mortality has been studied mostly in trauma groups and has been associated with traumatic neurological deficit. However, there are not enough studies examining the relationship between aging-related neurological deficit and decrease in airway reflexes and GCS. In our study, we found that a GCS score<8 during ICU admission was an independent variable in determining mortality in very elderly patients with AP.

Shock index and MSI are used as mortality indicators in medical ICU in recent studies. Namita et al. found that increases in the MSI cut-off point >1.3 were associated with ICU mortality in early septic shock.[25] Özgültekin et al. conducted a study with an elderly age group (>65) and found that the higher the rate the MSI value the more the mortality rate in medical ICU (the cut-off point O the

modified shock index is >1.4, which has a sensitivity of 47.1% and a specificity of 80.9%).[26] In our study, The MSI value in very elderly patient group with AP that not show any predictive value for ICU mortality.

Hypernatremia is one of the most common electrolyte abnormalities in elderly patients and is associated with a high mortality rate.[27] A study showed that pneumonia patients over 80 years of age with higher Na levels and worse renal function had higher mortality.[28] Similarly, high Na and BUN and low pH values were found to be associated with mortality in the univariate analysis but not as independent prognostic factors of mortality in our study.

There are limitations to our study. the study was planned retrospectively and that an analysis could not be made according to the bacteriological agent. Therefore, we could not determine the microbiological factor for the etiology of CA-AP and HCA-AP. However, the unique aspect of our study is that all of our patients were over the age of 80 and admitted to the ICU with the diagnosis of AP.

CONCLUSION

Our results indicate that HCA-AP, APACHE II and GCS are the strongest independent indicators of mortality of geriatric patients with AP in the first 28 days.

ETHICAL DECLARATIONS

Ethics Committee Approval: The study was carried out with the permission of Haydarpasa Numune Training and Research Hospital Ethics Committee (Date: 06.09.2021, Decision No: E-62977267-000-11783).

Informed Consent: All patients signed the free and informed consent form.

Referee Evaluation Process: Externally peer-reviewed.

Conflict of Interest Statement: The authors have no conflicts of interest to declare.

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

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REFERENCES

1. Torres A, Serra-Batlles J, Ferrer Aet al. Severe community-acquired pneumonia. Epidemiology and prognostic factors. Am Rev Respir Dis 1991;144(2):312-8.
2. Teramoto S. Clinical Significance of Aspiration Pneumonia and Diffuse Aspiration Bronchiolitis in the Elderly. J Gerontol Geriatr Res 2013;03(01).
3. Luk JK, Chan DK. Preventing aspiration pneumonia in older people: do we have the 'know-how'? Hong Kong Med J 2014;20(5):421-7.
4. Mitchell SL, Kiely DK, Lipsitz LA. The Risk Factors and Impact on Survival of Feeding Tube Placement in Nursing Home Residents With Severe Cognitive Impairment. Arch Intern Med 1997;157(3):327-32.
5. Ding X, Lian H,Wang X. Management of Very Old Patients in Intensive Care Units. Aging Dis 2021;12(2):614-24.
6. Komiya K, Ishii H, Kadota J. Health care-associated Pneumonia and Aspiration Pneumonia. Aging Dis 2014;6(1):27-37.
7. Lanspa MJ, Jones BE, Brown SM, Dean NC. Mortality, morbidity, and disease severity of patients with aspiration pneumonia. J Hosp Med 2013;8(2):83-90.
8. Kaplan V, Angus DC, Griffin MF, Clermont G, Scott Watson R, Linde-Zwirble WT. Hospitalized community-acquired pneumonia in the elderly: age- and sex-related patterns of care and outcome in the United States. Am J Respir Crit Care Med 2002;165(6):766-72.
9. Cabre M, Serra-Prat M, Palomera E, Almirall J, Pallares R, Clavé P. Prevalence and prognostic implications of dysphagia in elderly patients with pneumonia. Age Ageing 2010;39(1):39-45.
10. Lode H. Microbiological and clinical aspects of aspiration pneumonia. J Antimicrob Chemother 1988;21:83-90.
11. Ott SR, Lode H. [Diagnosisandtherapy of aspirationpneumonia]. DtschMedWochenschr. 2006;131(12):624-8.
12. Hickling KG, Howard R. A retrospective survey of treatment and mortality in aspiration pneumonia. Intensive Care Med. 1988;14(6):617-22.
13. Janda M, Scheeren TW, Nöldge-Schomburg GF. Management of pulmonaryaspiration. Best Pract Res Clin Anaesthesiol 2006;20(3):409-27.
14. American Thoracic Society; Infectious Diseases Society of America. Guidelines for the management of adults with hospital-acquired, ventilator-associated, and health care-associated pneumonia. Am J Respir Crit Care Med. 2005;171(4):388-416.
15. Metlay JP, Waterer GW, Long AC, et al. Diagnosisand treatment of adults with community-acquired Pneumonia. An official clinical practice guideline of the American Thoracic Society and Infectious Diseases Society of America. Am J Respir Crit Care Med 2019; 200:e45.
16. Komiya K, Ishii H, Kadota J. Healthcare-associated Pneumonia and Aspiration Pneumonia. Aging Dis. 2014;6(1):27-37.
17. Marik PE. Aspiration pneumonitis and aspiration pneumonia. N Engl J Med. 2001;344(9):665-71.
18. Pikus L, Levine MS, Yang YX, et al. Video fluoroscopic studies of swallowing dysfunction and the relative risk of pneumonia. Am J Roentgenol. 2003;180:1613-6.
19. El-Solh AA, Pietrantoni C, Bhat A, et al. Microbiology of severe aspiration pneumonia in institutionalized elderly. Am J Respir Crit Care Med. 2003;167(12):1650-4.
20. Godinjak A, Iglica A, Rama A, et al. Predictivevalue of SAPS II and APACHE II scoring systems for patient outcome in a medical intensive care unit. Acta Med Acad. 2016;45(2):97-103.
21. Altas OF, Kizilkaya M. The Effects of Neutrophil-Lymphocyte Ratio, Platelet-Lymphocyte Ratio and Prognostic Markers in Determining the Mortality in Patients Diagnosed With Pneumonia in Intensive Care. Medeni Med J. 2021;36(2):130-7.
22. Eizadi-Mood N, Saghaei M, Alfred S, et al. Comparative evaluation of Glasgow coma score and gag reflex in predicting aspiration pneumonitis in acute poisoning. J Crit Care 2009;24:470.e9-470.15.
23. Montassier E, Le Conte P. Aspiration pneumonia and severe self-poisoning: about the necessity of early airway management. J Emerg Med. 2012;43:122-3.
24. Abdallah A, Demaerschalk BM, Kimweri D, et al. A comparison of the Full Outline of Unresponsiveness (FOUR) and Glasgow ComaScale (GCS) scores in predicting mortality among patients with reduced level of consciousness in Uganda. Neurocrit Care. 2020;32(3):734-41.
25. Jayaprakash N, Gajic O, Frank RD, Smischney N. Elevated modified shock index in early sepsis is associated with myocardial dysfunction and mortality. J CritCare. 2018;43:30-5.

26. Özgültekin A, Çiyiltepe F. Do shock index and modified shock index have any prognostic value in severely ill elderly, medical patients with multiple comorbidities? Int J Gerontol 2019;13:76-80
27. Schlanger LE, Bailey JL, Sands JM. Electrolytes in theaging. Adv Chronic Kidney Dis. 2010;17(4):308-19.
28. Pinargote H, Ramos JM, Zurita A, Portilla J. Clinical features and outcomes of aspiration pneumonia and non-aspiration pneumonia in octogenarians and nonagenarians admitted in a General Internal Medicine Unit. Rev Esp Quimioter. 2015;28(6):310-3.

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Original Article / Orijinal Araştırma

Investigation of The Effects of Two Nonpharmacological Methods; Using Pacifiers and Maternal Holding, On Pain of Neonates in The Outpatient Clinic and Neonatal Intensive Care Unit

Sağlam Çocuk Polikliniğinde ve Yenidoğan Yoğun Bakım Ünitesinde Farmakolojik Olmayan Ağrı Giderme Yöntemlerinden Emzik Verme ve Anne Kucağının Yenidoğan Ağrısı Üzerine Etkisinin İncelenmesi

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Abstract

Introduction: The most important purpose in neonatal pain management is to minimize the pain felt by newborns and to help the newborn cope with pain. This study planned to examine the effects of two non-pharmacological methods, using pacifiers or maternal holding, on neonates' pain admitted to the outpatient clinic (OC) and hospitalized in the Neonatal Intensive Care Unit (NICU).

Material and Method: Ninety newborns (30 used pacifier, 30 maternal holding,30 control) who applied to the OC and 60 newborns (30 used pacifiers, 30 control) admitted to the NICU were prospectively included in this study. The Neonatal Infant Pain Scale (NIPS) was used to evaluate behavioral responses to pain perception. Physiological parameters of newborns and their duration of crying were also evaluated.

Results: When the NIPS scores were analyzed in OC group during and after the procedure, the lowest score was found in the group using pacifiers ($p<0.001$). As for the NICU patients, both during and after the procedure, NIPS scores were found to be significantly lower in the pacifier users ($p<0.001$). It was observed that giving pacifiers and maternal holding had positive effects on physiological parameters and duration of crying in OC patients ($p<0.05$). No significant difference in the NIPS score was found between OC and NICU group.

Conclusion: This study showed that giving pacifiers and maternal holding during the procedure of blood sampling decreased the NIPS score, restored the changes in physiological parameters and decreased the duration of crying.

Keywords: Neonatal pain, NIPS, pacifier, maternal holding

Öz

Amaç: Yenidoğan ağrı yönetiminde en önemli amaç, yenidoğanların hissettiği ağrıyı en aza indirmek ve yenidoğanın ağrı ile baş etmesine yardım etmektir. Bu çalışmada non-farmakolojik yöntemlerden emzik verme ve anne kucağının yenidoğanda ağrı üzerine etkilerini incelemek amaçlandı.

Gereç ve Yöntem: Sağlam çocuk polikliniğine ayaktan başvuran 90 yenidoğan (30 emzik, 30 anne kucağı, 30 kontrol) ve aynı dönemde yenidoğan yoğun bakım ünitesinde(YYBÜ) yatarak izlenen 60 yenidoğan (30 emzik, 30 kontrol) çalışmaya dahil edildi. Ağrıya davranışsal yanıtları değerlendirmede Yenidoğan Bebek Ağrı Ölçeği (NIPS) kullanıldı. Ayrıca yenidoğanların fizyolojik parametreleri ile ağlama süreleri de değerlendirildi.

Bulgular: Sağlam çocuk grubunda NIPS skoru işlem sırasında ve sonrasında değerlendirildiğinde emzik verilen grupta en düşük bulundu ($p<0,001$). YYBÜ grubunda işlem sırasında ve sonrasında NIPS skorunun emzik verilen grupta anlamlı olarak düşük olduğu saptandı ($p<0,001$). Emzik verilen grupta daha belirgin olmak üzere emzik verme ve anne kucağının fizyolojik parametreler ve ağlama süreleri üzerine olumlu etkileri olduğu görüldü ($p<0,05$). Sağlam çocuk ve YYBÜ grubu arasında NIPS skorunda anlamlı bir fark bulunmadı.

Sonuç: Çalışmamızda yenidoğana ağrılı işlem sırasında emzik vermenin ve anne kucağının NIPS skorunu azalttığı, fizyolojik parametrelerdeki değişimi düzelttiği ve ağlama süresini azalttığı görüldü.

Anahtar Sözcükler: Yenidoğanda ağrı, NIPS, emzik verme, anne kucağı

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INTRODUCTION

One of the most important points in the evaluation of pain is that all attempts causing pain in adults will also cause pain in newborns. Studies have shown that newborns perceive and react to pain even during intrauterine period.[1-3] In the literature, it has been reported that a large number of painful interventions may adversely affect the clinical course of newborns, their behavior, the development of their brains and senses, the adaptation to the external world and the family-baby interaction.[4-7]

It is accepted that the conditions causing pain are manifested by negative behavioral, physiological and metabolic responses.[4,5,8] Because of the lack of verbal communication with newborns, pain can be assessed by behavioral and physiological responses. Behavioral responses include crying, facial expressions, breathing patterns, hand and leg movements, wakefulness whereas physiological responses are heart rate, respiration, blood pressure, body temperature and oxygen saturation. Among these, the most obvious response is crying.[8,9]

Pain management in newborns can be achieved by pharmacological and non-pharmacological methods.[6-11,13-19] The drugs used as pharmacological methods are limited due to side effects that may occur in the newborn. Therefore, there has been an increased interest in non-pharmacological methods recently. These methods include position change, oral sucrose administration, mathernal holding, breastfeeding, reducing environmental stimulant, rocking, music and touching.[9-11,19]

In the intensive care units newborns have to face off numerous stressful or painful diagnostic and therapeutic procedures and uncomfortable interventions. Cumulative early life painful and stressful experiences, during critical neurodevelopmental windows is one of the major unsolved issues of neonatal intensive care.[4,5] In the other hand, infant isolation and parental separation can effect the response of painful stimuli in the NICU. Also in outpatient clinics (OC) newborns have to face off painful procedures. There are a lot of studies that investigate the the effects of pharmacological and non-pharmacological methods during painful procedures in the NICU.[5,7] Is the perception of pain same among newborns admitted to the OC and hospitalized in the NICU? This is an important issue that needs to be clarified.

This study planned to examine the effects of two non-pharmacological methods, using pacifiers or maternal holding, on neonates' pain. Another purpose of this study was to evaluate the differences in the perception of pain among newborns admitted to the outpatient clinic and hospitalized in the NICU. This was the first study that compared pain responses of newborns who applied to the outpatient clinic and hospitalized newborns at NICU and simultaneously assessing respiratory rate and oxygen saturation.

MATERIAL AND METHOD

A total of 90 newborns who were admitted to the Outpatient Clinic of Our Hospital, between September 2016 and June 2017, were included in the study, and 60 newborns who were hospitalized in the NICU during the same period. The newborns in Outpatient Clinic were randomly divided into three groups during blood sampling, each consisting of 30 newborns, as a pacifier, maternal holding (mother's lap and skin-to-skin contact) and the control group (without the use of a pain relief method in a supine position). The newborns in the NICU were randomly divided into two groups of 30 neonates during blood sampling, as a pacifier and control group (without the use of a pain relief method in a supine position).

This study groups included the newborns who were born between 37-41 weeks of gestation, aged less than 30 days postnatally, and who underwent blood sampling from the back of hand at a one try by venous route were included in the study. Patients with central nervous system disease, who are intubated, who are using antiepileptic and anesthetic drugs or history of such use, with major congenital anomalies and for whom family consent could not be obtained were not included in the study.

Our study was performed receiving the approval consent by the local ethics committee of our hospital, with the consent dated 28.09.2016 and NO.0657. Written consent was obtained from the families for their participation in the study. All procedures were carried out in accordance with the ethical rules and the principles of the Declaration of Helsinki.

The recorded data included: patient's age (day), gestational age (week), gender, anthropometric measurements (weight at birth, length at birth, head circumference at birth, actual weight), reason for blood sampling, type of delivery (Normal Spontaneous Vaginal Delivery, Caesarean Section), hospitalization time (day), hospitalization date (day / month / year), physiological changes before/during/after (2 minutes later) blood sampling, duration of procedure, duration of crying and their NIPS scores.

In this study, the blood sampling procedure in the Outpatient Clinic was performed by a same nurse. Likewise, in the NICU, blood was collected by an another nurse. All patients' NIPS scores and vital signs were evaluated and recorded by a same physician at the clinic.

Braun IRT 6020 ThermoScan Thermometer was used to measure body temperature before and after the blood collection. The Nihon Kohden BSM-2301K bedside monitor was used to evaluate the changes in oxygen saturation and heart rate before, during and after the blood collection. 21G x 1,5 inch needle was used for blood sampling from the newborns in our hospital.

Behavioral responses of the newborn to pain were evaluated with the Neonatal Infant Pain Scale (NIPS). It is a test that evaluates behavioral responses to painful procedures in preterm and term babies.[12] The Scale consists of 6 behavioral

sections, including facial expressions, crying, breathing, arm and leg movements, and alertness. While 2 different points (0-1 points) are given for other behaviors except crying, 3 different points (0-1-2) are given for crying. Total score ranges from 0 to 7. High scores indicate that the severity of pain increases. Physiological changes, processing time and duration of crying were synchronously recorded before- during- after the procedure.

SPSS 20.0 for Windows was used for data coding and statistical analysis. This analysis included Pearson's Chi-Square test for the categorical variables, Student-T test for the significance of the difference in mean values between two independent groups with parametric distribution, One Way Anova test for the significance of the difference among more than two groups in terms of average values. Post-hoc tests were performed on the statistically significant results obtained from One Way Anova test.

RESULTS

Two patient groups 90 patients who were admitted to the Outpatient Clinic and 60 patients in the NICU were included in this study. There was no significant difference between the two groups in terms of gestation week, birth weight, length at birth , head circumference, actual weight, gender and delivery type ($p>0.05$). Mean age of blood sampling was 6.5±5.0 days in the outpatient children group and 3.4±2.9 days in the intensive care group ($p<0.05$).

In the Outpatient Clinic, NIPS scores were significantly different in three groups during the procedure: the lowest score was obtained in the pacifier group, while the highest score was found in the control group ($p<0.001$). After the procedure, NIPS score in the pacifier group was observed significantly lower than the maternal holding and control groups ($p<0.001$). There was no significant difference between the maternal holding and control groups in terms of NIPS score ($p> 0.05$) (**Table 1**).

There was no significant difference among the groups in terms of heart rate, respiratory rate and oxygen saturation values before the procedure. During the procedure, increase in heart rate was significantly different in all three groups ($p<0.001$). The increase in heart rate of the pacifier group was lowest while the highest increase was found in the control group. After the procedure, there was no significant difference in the heart rate increase between the maternal holding and control groups ($p>0.05$); whereas the increase in heart rate of the pacifier group was significantly lower than that of the other two groups ($p<0.001$). After the procedure, there was no significant difference between the increase in respiratory rate of the maternal holding and the pacifier group ($p>0.05$), but the increase in respiratory rate of these two groups was significantly lower than that of the control group ($p=0.001$). The oxygen saturation was the highest in the pacifier group and the lowest in the control group during the procedure ($p<0.001$). After the procedure, oxygen saturation was significantly higher in the pacifier group ($p<0.001$), but there was no significant difference between the maternal holding and control groups ($p>0.05$) (**Table 1**).

The duration of crying was significantly different in three groups ($p<0.001$). It was the highest in the control group, while the lowest in the pacifiers group.

In the intensive care group, the NIPS score was significantly lower in the pacifier group both during and after the procedure ($p<0.001$) (**Table 2**).

While there was no significant difference in the heart rate values in the intensive care group before and after the procedure ($p=0.071$, $p=0.053$), increase in heart rate was significantly lower in the pacifier group during the procedure ($p<0.001$). There was no significant difference in respiratory rate in the intensive care group before the procedure ($p=0,628$), but increase in respiratory rate was significantly lower in the pacifier group after the procedure ($p=0,004$). While oxygen saturation was significantly higher in the control group in the intensive care group before the procedure ($p=0.022$), it was significantly higher in the pacifier group during the procedure ($p<0.001$). There was no significant difference in oxygen saturation values between the groups after the procedure ($p=0.214$) (**Table 2**).

In the intensive care group the duration of crying in those who used a pacifier was significantly lower than it was in the control group ($p<0.001$).

Table 1. Changes in NIPS score and physiological values in outpatient clinic group

	Pacifier (n=30) M±SD	Maternal Holding (n=30) M±SD	Control (n=30) M±SD	p*
NIPS. during procedure	2.0±2.0	5.6±1.1	6.5±0.5	**<0.001**
NIPS. after procedure	0.3±0.8	2.3±1.8	3.1±1.6	**<0.001**
Heart rate before procedure (beat/mn)	131.8±6.7	133.2±9.8	129.3±7.0	0.166
Heart rate during procedure (beat/mn)	138.6±6.9	157.1±11.8	165.3±9.7	**<0.001**
Heart rate after procedure (beat/mn)	134.6±7.5	143.9±9.0	143.3±7.6	**<0.001**
Respiratory rate before procedure	34.8±3.3	34.1±3.1	35.2±3.8	0.450
Respiratory rate after procedure	35.7±3.9	36.8±4.5	39.8±4.4	**0.001**
SpO_2 before procedure (%)	97.8±0.3	98.0±1.0	97.6±0.9	0.264
SpO_2 during procedure (%)	96.4±1.0	93.7±2.2	92.2±2.3	**<0.001**
SpO_2 after procedure (%)	97.4±0.8	96.1±1.8	95.4±1.6	**<0.001**

M±SD: Mean±standard deviation, mn: minute, SpO_2: oxygen saturation, NIPS: Neonatal Infant Pain Scale, *: One Way Anova test, $p<0.05$ was considered statistically significant

Table 2. Changes in NIPS score and physiological values in intensive care group

	Pacifier (n=30) M±SD	Control (n=30) M±SD	p*
NIPS during procedure	2.4±1.7	6.2±1.0	**0.001**
NIPS after procedure	0.6±0.8	3.4±1.8	**<0.001**
Heart rate before procedure (beat/mn)	139.1±17.0	131.4±15.0	0.071
Heart rate during procedure (beat/mn)	145.4±17.1	162.7±13.8	**<0.001**
Heart rate after procedure (beat/mn)	139.8±15.1	147.8±16.0	0.053
Respiratory rate before procedure	37.3±4.6	38.2±8.5	0.628
Respiratory rate after procedure	38.3±5.1	44.1±8.1	**0.004**
SpO_2 before procedure (%)	96.7±2.2	97.8±1.1	**0.022**
SpO_2 during procedure (%)	94.8±2.4	92.1±2.9	**<0.001**
SpO_2 after procedure (%)	95.8±2.2	95.0±2.6	0.214

M±SD: Mean±standard deviation, mn: minute, SpO_2: oxygen saturation, NIPS: Neonatal Infant Pain Scale, *: Student t Test, p<0.05 was considered statistically significant

During and after the procedure, no significant difference in the NIPS was found between the pacifiers group in outpatient and intensive care group (in order of p=0.734, p=0.218) (**Table 3**).

Table 3. Changes in NIPS scores between the pacifiers group in outpatient clinic and in the intensive care groups

	Outpatient clinic pacifier group (n=30) M±SD	Intensive care pacifier group (n=30) M±SD	p*
NIPS during procedure	2.6±2.0	2.4±1.7	0.734
NIPS after procedure	0.3±0.8	0.6±0.8	0.218

M±SD: Mean±standard deviation, NIPS: Neonatal Infant Pain Scale, *: Student t test, p<0.05 was considered statistically significant

There were no significant differences in the increase in heart rate, increase in respiratory rate and oxygen saturation values between the groups of patients who were given pacifiers in the outpatient clinic and neonatal intensive care groups.

DISCUSSION

Many painful medical interventions are often used for newborns who need treatment and care especially in NICU. Newborns whose pain is controlled can have a stronger immune system, shorter hospital stay, and increased growth rates.[5,6]

Reduction of pain by a pacifier can be achieved with the help of sucking reflex and sense of touch. It is reported that the feeling that babies receive with sucking is a superior feeling and sucking a pacifier is a satisfying feeling in a child, causing distraction from the pain. Therefore, using pacifiers in children younger than three months is effective and easy to use for reducing pain.[13-16]

Akdovan evaluated the behavioral response and physiological changes in pain with NIPS before, during and after taking a heel blood sample, by separating newborns into three groups of 30 patients (pacifier, holding in arms, control). As a result of the study, the NIPS score was significantly lower in the pacifier group compared to the holding in arms and the control group, while there was no significant difference in the NIPS score in the holding in arms and control groups.[16] In our study, in accordance with this study the use of pacifiers significantly reduced the NIPS score in both OC and NICU patients.

Campos carried out a study on 60 newborns that examined the effect of rocking and pacifiers on decreasing the pain stress while taking a heel blood sample. He found out that pacifiers significantly decreased the changes in heart rate in comparison to rockings. In our study, similar to Campos's, it was seen that giving a pacifier to newborns during the painful procedure had positive effects on increased heart rate compared to the control group and it was found statistically significant.[13]

Liaw et al. studied the effect of using pacifiers or sucrose on physiological parameters in newborns who were vaccinated against hepatitis.[15] The study included 165 newborns and the newborns were divided into 3 groups as pacifier, sucrose and control group. At the end of the study, they found that the increase in heart rate and respiratory rate were significantly lower in both groups compared to the control group. As a result of this study, Liaw et al. suggested using of sucrose or a pacifier in a newborn during the painful interventional procedure. Although the patients evaluated in that study underwent intramuscular injection method for a painful procedure, pacifiers had positive effects on heart rate and respiratory rate compared to control group, which is similar to our study.

In 2000, Corbo et al. found that nonnutritive sucking had no effect on respiratory rate or transcutaneous oxygen tension, but reduced the time of crying and the heart rate increase during the procedure.[14] In our study pacifiers significantly reduced duration of crying and heart rate, respiratory rate during and after procedure in OC patients. So we suggest that pacifier using have positive effects on physiological parametres.

Although maternal holding is an important intervention that provides relief, the responses during this procedure should be observed. Despite the fact that taking the baby on the maternal holding may reduce the sensitivity to pain, a rigid holding may cause excessive stimulation of the baby and hypersensitivity by increasing the basal metabolic rate. In addition, a slight, inaccurate touch may cause agitation.[17]

Phillips et al. compared the analgesic effect of breastfeeding, maternal holding and pacifier in 96 newborns in their study.[18] As a result of the study, it was determined that the breastfeeding group and the pacifier with maternal holding group were crying less than the only pacifier group. Despite the differences in the methods, in our study it was observed that the maternal holding had a positive effect on the duration of crying and physiological parametres.

The environment of NICU is stressful for babies. Separation from parents and experiencing recurrent pain constitutes the most important stressful events. Since babies followed

up in intensive care will be candidates for chronic pain in the future. However it is thought that the pain threshold of patients admitted to the outpatient clinic and intensive care patients may be different. So in this study, patients who were admitted to Outpatient Clinic and patients who were in NICU were compared in terms of the differences in the perception of pain in the newborns, but no statistically significant data were obtained. In our study mean age of blood sampling was earlier in the intensive care group. The NIPS score differences may not have been found between the two groups; as the NICU group have not been exposed to reccurrent painful procedure.

In this study, according to the institutional rules and conditions maternal holding group was not possible taken in the NICU. In addition, the fact that the mothers of newborns in the NICU could not be reached at any time was effective in taking this decision. This is one of the limitations of our study. We couldn't adressed the reason for admission to the hospital and reason for blood sampling. This is another limitation of our study.

CONCLUSION

We found that pacifiers helped to reduce the NIPS score, restored the changes in physiological parameters and decreased the duration of crying during the painful procedures. In addition, we found that the maternal holding reduced the NIPS score, restored the change in physiological parameters and decreased duration of crying, though not as much as a pacifier. The maternal holding, though not as effective as a pacifier, can be applied with the pacifier or alone if the doctor or the parents do not want the use of the pacifier. On the basis of all these, it shall be beneficial to give a pacifier to all infants who can suck a pacifier during painful procedures.

As seen in our study, pain is not negligible in newborns and pain level should be determined by using pain scale during interventional procedures to be applied to newborns. Each unit should establish a care plan with non-pharmacological and pharmacological methods, and necessary interventions should be made to reduce pain. Correct pain management will support the development of infants and reduce stress symptoms.

ETHICAL DECLARATIONS

Ethics Committee Approval: Permission for the study was obtained from the Education, Planning and Coordination Board of Ankara Training and Research Hospital at the meeting numbered 658, dated 05.10.2016, with the decision numbered 5526.

Informed Consent: Written consent was obtained from the families for their participation in the study.

Referee Evaluation Process: Externally peer-reviewed.

Conflict of Interest Statement: The authors have no conflicts of interest to declare.

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

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REFERENCES

1. Smith RP, Gitau R, Glover V et al. Pain and stress in the human fetus. Eur J Obstetr Gynecol Reprod Biol 2000;92:161-5.
2. Perry M, Tan Z, Chen J et al. Neonatal Pain: Perceptions and Current Practice. Crit Care Nurs Clin North Am. 2018;30(4):549-61.
3. Simons SHP, Tibboel D. Pain perception development and maturation. Semin Fetal Neonatal Med 2006;11:227-31.
4. Walker SM. Long-term effects of neonatal pain. Semin Fetal Neonatal Med. 2019 ;24(4):101005.
5. Cong X, Wu J, Vittner D et al. The impact of cumulative pain/stress on neurobehavioral development of preterm infants in the NICU. Early Hum Dev 2017;108:9-16
6. Committee on fetus and newborn and section on anesthesiology and pain medicine. Prevention and Management of Procedural Pain in the Neonate: An Update. Pediatrics. 2016;137(2):e20154271.
7. Squillaro A, Mahdi EM, Tran N et al. Managing Procedural Pain in the Neonate Using an Opioid-sparing Approach. Clin Ther. 2019;41(9):1701-13
8. Field T. Preterm newborn pain research review. Infant Behav Dev. 2017;49:141-50.
9. Dur S, Balci S. Assessing Neonatal Pain, Duration of Crying and Procedure Time following Use of Automatic or Manual Heel Lances: A Randomized Controlled Study. J Trop Pediatr 2018;64(6):488-94.
10. Harrison D, Reszel J, Bueno M et al. Breastfeeding for procedural pain in infants beyond the neonatal period. Cochrane Database Syst Rev. 2016;10(10):CD011248.
11. Cignacco E, Hamers JPH, Stoffel L et al. The efficacy of non-pharmacological interventions in the management of procedural pain in preterm and term neonates. A systematic literature review. Eur J Pain 2007;11:139-52.
12. Lawrence J, Alcock D, McGrath P et al. The devolopment of a tool to assess neonatal pain. Neonatal Network 1993;12(6):59-64.
13. Campos RG. Rocking and pacifiers: Two comforting interventions for heelstick pain. Res Nurs Health 1994;17(5):321-31.
14. Corbo MG, Mansi G, Stagni A et al. Nonnutritive Sucking during Heelstick Procedures Decreases Behavioral Distress in the Newborn Infant. Biology of the Neonate 2000:77(3):162-167.
15. Liaw JJ, Zeng WP, Yang L et al. Nonnutritive sucking and oral sucrose relieve neonatal pain during intramuscular injection of hepatitis vaccine. J Pain Symptom Manag 2011;42:918-30.
16. Akdovan T. Sağlıklı yenidoğanlarda ağrının değerlendirilmesi, emzik verme ve kucağa alma yönteminin etkisinin incelenmesi (Tez). İstanbul: Marmara Üniversitesi Sağlık Bilimleri Enstitüsü; 1999.
17. Merenstein GB, Gardner SL. Handbook of neonatal intensive care. 4th ed. Mosby, St. Louis, MO; 1998.
18. Phillips RM, Chantry CJ, Gallagher MP. Analgesic effects of breast-feeding or pacifier use with maternal holding in term infants. Ambul Pediatr 2005;5(6):359-64.
19. Stevens B, Yamada J, Ohlsson A et al. Sucrose for analgesia in newborn infants undergoing painful procedures. Cochrane Database Syst Rev. 2016;7(7):CD001069.

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Original Article / Orijinal Araştırma

Our Experience with Patients Diagnosed with Ischemic Colitis by Colonoscopy

Kolonoskopide İskemik Kolit Tespit Edilen Hastalar ile Deneyimimiz

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Abstract

Aim: Ischemic colitis (IC) is one of the most common causes of lower gastrointestinal bleeding, especially in patients over 60 years of age. In this study, we investigated the clinical and demographic characteristics of patients with IC detected by colonoscopy.

Material and Method: This study was conducted retrospectively by examining the records of patients who underwent colonoscopy for various reasons between January 2014 and December 2017. Patients with an IC pre-diagnosis in the colonoscopy reports were included in the study. A total of 130 patients were found; 18 patients were excluded from the study due to lack of data and the study was conducted with 112 patients.

Results: Definitive IC was diagnosed in 56 of the 112 patients who had a preliminary diagnosis by colonoscopy (50%). The average age of patients diagnosed with definitive IC was 68; 30 were male and 26 were female. IC patients presented to the hospital with complaints of abdominal pain, hematochezia, diarrhea, and fever. IC most frequently affected the left colon. In the Doppler findings of patients with IC, all mesenteric vessels and aortas were normal in the large majority of patients (70%). When predisposing factors that may cause IC were examined, hypertension was observed in 59% of patients, coronary artery disease in 59%, diabetes mellitus in 21%, and heart failure in 18%. The vast majority of patients improved with medical therapy (89%). Six patients underwent surgery for colon resection (11%); 4 of these patients recovered but 2 died due to extensive thromboembolic disease and associated extensive ischemia (4%).

Conclusion: IC is a disease that presents with symptoms such as bloody diarrhea and abdominal pain, especially in elderly male patients with predisposing risk factors. It is frequently seen in the left colon, responds well to medical treatment, and should be considered in every patient with acute diarrhea and abdominal pain.

Keywords: Ischemic colitis, colonoscopy, lower gastrointestinal bleeding, bloody diarrhea

Öz

Amaç: İskemik kolit (İK) özellikle 60 yaş üstündeki hastalarda alt gastrointestinal kanamanın en sık görülen sebeplerinden biridir. Bu çalışmada kolonoskopide İK tespit edilen hastalarının klinik ve demografik özelliklerini araştırdık.

Gereç ve Yöntem: Bu çalışma Ocak 2014-Aralık 2017 tarihleri arasında çeşitli sebeplerle kolonoskopi yapılan hastaların hasta kayıtları incelenerek retrospektif olarak yapılmıştır. Kolonoskopi raporlarında İK ön tanısı olan hastalar çalışmaya alınmıştır. Toplan 130 hasta bulunmuş, 18 hasta veri eksikliği nedeniyle çalışmadan dışlanmış ve çalışma 112 hasta ile yapılmıştır.

Bulgular: Kolonoskopide İK ön tanısı olan 112 hastanın 56'sında kesin İK tanısı konulmuştur (%50). Kesin İK tanısı alan hastaların yaş ortalaması 68 olup hastaların 30'u erkek, 26'sı ise kadın idi. İK hastalarının en sık karın ağrısı, hematokezya, ishal ve ateş şikayeti ile hastaneye başvurduğu görülmüştür. İskemik kolitin en sık sol kolonu tuttuğu görülmüştür. İK tanılı hastaların doppler bulgularında hastaların büyük çoğunluğunda tüm mezenter damarlar ve aort normaldi (%70). İK'e sebep olabilecek predispozan faktörler incelendiğinde hastaların %59'unda hipertansiyon, %59'unda koroner arter hastalığı, %21'inde diyabetes mellitus ve %18'inde kalp yetmezliği izlendi. Hastaların büyük çoğunluğu medikal tedavi ile düzelmiştir (%89). 6 hasta kolon rezeksiyonu için cerrahiye verilmiş (%11), bu hastalardan 4'ü iyileşmiş ancak iki hasta yaygın tromboembolik durum ve buna bağlı geniş iskemi nedeniyle exitus olmuştur (%4).

Sonuç: İK özellikle predispozan risk faktörlerinin olduğu yaşlı erkek hastalarda kanlı ishal ve karın ağrısı ile semptom veren, sıklıkla sol kolonu tutan ve medikal tedaviye iyi yanıt veren bir hastalık olup akut ishal ve karın ağrısı olan her hastada akla gelmelidir.

Anahtar kelimeler: İskemik kolit, kolonoskopi, alt gastrointestinal kanama, kanlı ishal

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INTRODUCTION

Decreased intestinal blood flow due to arterial or venous occlusion and arterial vasospasm causes intestinal ischemia.[1] Ischemic colitis (IC) (or colonic ischemia) is the form of intestinal ischemia affecting the large intestine.[2] It is one of the most common causes of lower gastrointestinal bleeding and bloody diarrhea, especially in patients over the age of 60.[3] Endoscopic involvement can range from superficial damage to the mucosa and submucosal layer to full thickness necrosis of the colon wall. Most attacks are temporary and resolve spontaneously, but severe disease may result in necrosis.[4] The disease affects elderly patients in particular and both sexes equally. Its classic clinical presentation includes abdominal pain, diarrhea, and rectal bleeding.[5] Numerous predisposing factors have been demonstrated to trigger IC. The best known of these are diabetes mellitus (DM), coronary artery disease (CAD), hypertension (HT), and thromboembolic events.[6,7] IC can be confused with many diseases, especially inflammatory bowel diseases, due to its location and clinical presentation.[8] Often other diagnoses can be made in patients who are considered to have IC by colonoscopy. In the treatment of IC, the vasoconstrictive agents taken by patients should be discontinued and the patient should undergo bowel rest. If the patient has symptoms of ileus, a nasogastric tube should be inserted. Most patients receive medical treatment first, but in cases in which no benefit has been achieved surgery may be required.[9,10] In the literature, studies on this subject are limited. In addition to the compatibility between the colonoscopic view and the final diagnosis, the effectiveness of medical treatment is not fully known. In the present study, we investigated the clinical and demographic characteristics and treatment responses of IC patients in addition to other diagnoses in patients with IC by colonoscopy.

MATERIAL AND METHOD

This study was carried out retrospectively by examining the records of patients who underwent colonoscopy for various reasons in the Gastroenterology Clinic of our hospital between January 2014 and December 2017. Patients with a pre-diagnosis or definitive diagnosis of IC in their colonoscopy reports were included in the study. A total of 130 patients were found; 18 patients were excluded from the study due to lack of data and the study was conducted with 112 patients. IC was diagnosed using a combination of clinical, endoscopic, radiological, and pathological findings by two experienced gastroenterologists. The study then continued with IC patients. The patients' complaints at presentation, predisposing factors, demographic characteristics, and laboratory results were recorded from their files. The colonoscopy findings of the patients were examined and the locations of involvement and endoscopic findings were noted. Biopsies were taken from all patients for pathological diagnosis and all patients were examined by Doppler ultrasonography for vascular pathologies. The oral intake of patients with suspected IC was discontinued. Intravenous fluid support and broad-spectrum antibiotic therapy were initiated. Patients who were unresponsive to treatment and had widespread necrotic ischemia or peritonitis at first admission were referred for surgery. The statistical evaluation was performed using the Statistical Package for the Social Sciences (SPSS) for Windows 20 (IBM SPSS Inc., Chicago, IL, USA). The normality of the data distribution was evaluated by the Kolmogorov-Smirnov test. Among the numerical variables, those with normal distribution are shown as mean±standard deviation, and those without normal distribution are shown as median (min-max). Categorical variables are expressed as numbers and percentages. Since the study was retrospective, written consent was not obtained from the patients. The study was conducted in accordance with the ethical standards specified in the 1964 Declaration of Helsinki. In our study, research and publication ethics were followed and the rules were followed. Ethical approval was taken from Ethics Committee of Turkey Yüksek İhtisas Training and Research Hospital (Date: 07.05.2018, Decision No: 39).

RESULTS

Our study was conducted with 112 patients who were thought to have been pre-diagnosed with IC by colonoscopy. The average age of the patients was 64 and 76 were male and 36 were female. In the final examination, 56 of these patients were shown to have IC (50%). Of the remaining 56 patients, 23 of them had nonspecific colitis (20%), 12 ulcerative colitis (11%), 8 Crohn's disease (7%), 6 colon adenocarcinoma (5%), 3 colonic lymphoma (3%), 2 infectious colitis (2%), and 2 sigmoid volvulus (2%). The data of the patients evaluated with a pre-diagnosis of IC are given in **Table 1**.

Table 1. Patients evaluated with ischemic colitis prediagnosis

	n (%)
Gender (Male / Famale)	76 (68%)/36 (32%)
Age (Avg.)	64±8.4
Definitive diagnosis of ischemic colitis	56/112 (50%)
Definitive diagnoses other than ischemic colitis	
Non-specific colitis	23 (20%)
Ulcerative colitis	12 (11%)
Crohn's disease	8 (7%)
Colon adenocarcinoma	6 (5%)
Colonic lymphoma	3 (3%)
Infectious colitis	2 (2%)
Sigmoid volvulus	2 (2%)

The 56 patients diagnosed with definite IC had an average age of 68 and 30 of them were male and 26 were female. IC patients were most frequently admitted to hospital with abdominal pain and less frequently with hematochezia, diarrhea, and fever. It was found that IC most commonly affects the sigmoid colon and descending colon, and less frequently the splenic flexure, rectum, transverse colon,

hepatic flexure, ascending colon, and cecum, respectively. When the endoscopic findings were examined, it was observed that the majority of the patients had hyperemia, edema, and ulcers, and less frequently fragility, loss of the typical vascular pattern, hemorrhage, ecchymosis, stenosis, granularity, and necrosis. The demographic and clinical characteristics of the patients with IC are given in **Table 2**.

When the patients who were biopsied with the pre-diagnosis of IC and later diagnosed with definite IC were examined, the biopsy result was compatible with IC in 28 patients (50%), with non-specific colitis in 18 patients (32%), with focal active colitis in 7 patients (13%), and with 3 chronic active colitis in 3 patients (5%). All mesentery vessels and aortas were normal in the majority of patients (70%) in the Doppler findings of patients with a diagnosis of IC. Thrombus in the mesentery vessels or aorta was detected in 16% of the patients, aortic aneurysm in 5%, and plaque and thickening in the aorta in 5%. In addition, stenosis was found in the superior mesenteric artery in 7% of the patients and in the two celiac arteries in 4%. In the examination, chronic thrombus in the hepatic veins was observed in two patients (4%). When the predisposing factors that may cause IC were examined, 59% of them had hypertension and 59% had coronary artery disease. In addition, diabetes mellitus was observed in 12 patients (21%), heart failure in 10 patients (18%), and atrial fibrillation in 5 patients (9%). It was learned that 4 patients had experienced a condition with hypotension in the previous 6 months (7%). Furthermore, 4 patients had a history of deep vein thrombosis or pulmonary thromboembolism in the previous 6 months (7%). Four patients had chronic renal failure (7%) and one patient had underlying pancreatic cancer (2%). It was learned that three patients underwent aortic valve replacement (5%) and two patients had mitral valve replacement (5%). The predisposing factors in the patients with IC are given in **Table 3**.

When the laboratory results of the patients were examined, the mean white blood cell value of the patients was 13.1 × 103/μL, the mean hemoglobin value was 12.8 g/dL, and the mean C-reactive protein was 90 mg/L. The other laboratory values were within the normal limits. The laboratory results of the patients are given in **Table 4**.

The treatment endpoints are given in **Table 5**. The majority of patients recovered with medical therapy (89%). Six patients underwent surgery for colon resection (11%); 4 of these patients recovered, but 2 died due to extensive thromboembolic disease and related extensive ischemia (4%).

Table 2. Demographic and clinical characteristics of patients diagnosed with ischemic colitis

	n (%)
Gender (Male / Famale)	30 (54%)/26 (46%)
Age (Avg.)	68±7.5
Symptoms	
Abdominal pain	49 (88%)
hematochezia	30 (54%)
Diarrhea	11(20%)
Fever	11 (20%)
Disease Involvement	
Rectum	26 (46%)
Sigmoid colon	44 (79%)
Descending colon	40 (71%)
Splenic flexure	31 (55%)
Transverse colon	19 (34%)
Hepatic flexure	7 (13%)
Ascending colon	4 (7%)
Cecum	4 (7%)
Endoscopic Findings	
Hyperemia	45 (80%)
Edema	44 (79%)
Ulcer	34 (61%)
Fragility	25 (45%)
loss of the typical vascular pattern	22 (39%)
Haemorrhage	13 (23%)
Ecchymosis	13 (23%)
Narrowness	8 (14%)
Granularity	7 (13%)
Necrosis	4 (7%)
Biopsy results	
Ischemic colitis	28 (50%)
Non-specific colitis	18 (32%)
Focal active colitis	7 (13%)
Chronic active colitis	3 (5%)
Doppler findings	
Normal vascular flow	39 (70%)
Thromboembolism	9 (16%)
Calcification-plaque in the aorta	4 (7%)
Aortic Aneurysm	3 (5%)
Budd chiari syndrome	2 (4%)
SMA stenosis	4 (7%)
Stenosis in the celiac artery	2 (4%)

SMA: superior mesenteric artery

Table 3. Predisposing factors in ischemic colitis patients

	n (%)
Hypertension	33 (59%)
Coronary artery disease	33 (59%)
Diabetes mellitus	12 (21%)
Heart failure	10 (18%)
Atrial fibrillation	5 (9%)
Chronic renal failure	4 (7%)
Shock-hypotension	4 (7%)
History of deep vein thrombosis or pulmonary embolism	4 (7%)
Aortic valve replacement	3 (5%)
Mitral valve replacement	2 (4%)
Pancreatic cancer	1 (2%)
Heart transplant	1 (2%)
Primary pulmonary hypertension	1 (2%)
Operated aortic aneurysm	1 (2%)

Table 4. Laboratory findings of ischemic colitis patients	
White blood cell count (x10^3/uL)	13.1
Hemoglobin (g/dl)	12.8
Platelet (x10^3/uL)	210
INR	1.25
AST (U/L)	23
ALT (U/L)	16
LDH (U/L)	245
Creatinine (mg/dL)	1.21
Amylase (U/L)	65
C-reactive protein (mg/L)	90

INR: international normalized ratio, AST: aspartate aminotransferase, ALT: alanine transaminase, LDH: lactate dehydrogenase

Table 5. Treatment endpoints	
	n (%)
Response to medical therapy	50/56 (89%)
Surgery requirement	6/56 (11%)
Exitus	2 (4%)

DISCUSSION

In the present study, patients with suspected IC on colonoscopy were examined and it was found that only half of those who were considered to have IC actually had it. It was also seen that IC is an important cause of lower gastrointestinal bleeding, especially in elderly patients, and often affects the left colon. It was found that it is difficult to differentiate from infectious colitis or inflammatory bowel diseases in terms of endoscopic findings. Although arterial or venous occlusion is the most common etiology, Doppler findings are normal in most patients. It was seen that the most important risk factors for the disease are underlying diseases such as DM, HT, and CAD. In addition, it was understood in the present study that IC patients respond very well to medical treatment.

In our study, IC was diagnosed based on a detailed histological, radiological, and clinical evaluation in only half of the patients who were considered to have IC as a result of colonoscopy. We think that the main reason for this situation is that the endoscopic appearance of IC is very similar to that of inflammatory bowel diseases and infectious colitis. In previous studies, it was found that these diseases were difficult to differentiate between. It has been stated that pathological examination, clinical examination, and imaging are essential for differentiation.[11] Compared to IC patients, patients with ulcerative colitis have a longer course of the disease and a lower incidence of cardiovascular comorbidity. It is important to examine the underlying diseases in detail in these patient groups. Another condition that needs to be differentiated from IC is the nonspecific colitis picture that develops mostly due to infectious causes or the intake of nonsteroidal anti-inflammatory drugs. As a matter of fact, nonspecific colitis was detected in a significant portion of the patients who did not develop IC in our study. Other important differential diagnoses in our study were Crohn's disease, malignancies, and volvulus. Imaging methods are recommended, especially when the differential diagnosis with Crohn's disease is insufficient.[12]

IC was found to be more common in elderly patients in our study. Most of the previous studies with IC have shown that patients are elderly and IC is an important cause of lower gastrointestinal bleeding in elderly patients.[4,6] In our study, IC was observed to occur more frequently in men. There are conflicting results in previous studies on this subject. Choi et al. showed that IC is more common in women and severe IC is more common in men.[13] In the study by Medina et al., which included 53 patients, it was observed that 30 of the patients were male.[14]

In our study, in accordance with the literature, the most common clinical findings were abdominal pain, diarrhea, and hematochezia. In a previous study, it was shown that IC was the cause in almost one fifth of the patients who underwent colonoscopy due to lower gastrointestinal bleeding.[15] In another case-control study, it was shown that abdominal pain may be associated with IC, especially in the presence of hemodialysis, diabetes mellitus, hypertension, and hypoalbuminemia in elderly patients presenting with lower abdominal pain, with or without lower GIS bleeding.[16] In our study, it was thought that the cause of fever in some patients might be systemic infection developing secondary to IC invasion.

In our study, it was shown once again that IC mostly affects the left colon. As is known, mesenteric arteries nourish the colon by forming anastomoses directly or with other vessels. Ischemia is more common in these anastomoses due to insufficient perfusion of the rectosigmoid and sphenic flexure segments. When our study findings are examined, we see that the entire left colon is usually involved instead of an isolated area in the left colon. Right colon involvement is very low. It is also known that IC involving the right colon has a more severe course.[17] In the study conducted by Sun et al., right-sided IC, shock, or arterial hypotension (<90 mmHg) and peritonitis findings were shown as the most important markers in determining the severity of IC. In fact, the right colon involvement IC in both patients who died in our study supports the above findings.

When the endoscopies of IC patients are examined, it is seen that nonspecific hyperemia, edema, and ulcers are observed in most patients. The same findings can be seen in many diseases, especially ulcerative colitis. Additionally, a single, linear ulcer running along the anti-mesenteric colonic wall, the single-stripe sign, favors the diagnosis of IC. Zuckerman et al. reported the presence of the colonic single-stripe sign greater than 5 cm in length, with 89% of the lesions identified in an isolated segment of the left colon. A preceding ischemic event was noted in 62% of these patients.[18,19] Biopsy is recommended because endoscopic appearance may be insufficient for diagnosis. However, there may be situations in which the biopsy is nondiagnostic.[20] Various types of colitis may have similar appearances. However, the combination of histopathology, clinical, and endoscopic data allows accurate classification in most cases.[21] In fact, when the patients who

were finally diagnosed with IC were examined in our study, it was seen that the biopsy results of half of the patients were not typical for IC. For this reason, it is important that the diagnosis of IC is made by experienced people based on a histological evaluation and taking into account the imaging and clinical conditions. In our study, it was observed that the vessels are patent in most patients with imaging methods. That suggests that this situation may be due to temporary occlusion of the underlying predisposing factors rather than complete occlusion of the vessels feeding the colon. Sometimes, imaging methods are insufficient to show arterial or venous occlusion. In such cases, angiography is considered the gold standard method. However, it is not generally preferred because it is an invasive procedure.

When the risk factors for IC were examined in our study, the most frequent findings were HT, CAD, DM, heart failure, and atrial fibrillation. In the study by Choi et al., the predisposing risk factors were very similar to our findings.[13] In their study, in contrast to ours, it was stated that stroke, hyperlipidemia, and thyroid diseases also pose risks for the development of IC. In another study, almost 75% of the patients had HT; DM, CAH, and stroke have an important place in etiology; and it was emphasized that peripheral artery disease and COPD should be considered risk factors.[22]

When the laboratory results of our patients were examined, it was seen that CRP and white cell values increased in patients due to the underlying disease and possible secondary infection, and mild anemia developed due to bloody diarrhea and hematochezia. Some of our patients had symptoms of organ failure due to severe IC and complications. However, our study showed that parameters such as LDH and amylase, which are generally used to show ischemia, do not increase in correlation with the disease, as expected.

Overall 89% of the patients in our study recovered after medical treatment. In previous studies, it was emphasized that the main treatment for IC is conservative medicine, but surgery should be performed in cases of complications such as peritonitis or necrosis.[2,9] In medical treatment, it is very important to correct the underlying disease and to eliminate the drugs and predisposing factors that will cause ischemia. Early antibiotic therapy (combination of quinolone and metronidazole) has been found to be very beneficial, especially in patients with bloody diarrhea and high white blood cell and CRP values. The most important reason for failure in treatment is delay in diagnosis, advanced age of the patients, the severity of the underlying disease, and the patients' additional comorbid diseases.[23,24]

In our study, the mortality rate was quite low (4%). There are different rates in the literature in terms of mortality. The mortality rate was 11% in the study by Brandt et al.[22] In another study, a mortality rate of around 29% was found.[25] In these studies, it was shown that mortality is significantly increased especially with right colon or pancolonic involvement. The main reason for such obvious differences between studies is the difference in the patients included. We think that especially the 29% mortality rate may be related to the advanced age patient group including multiple risk factors in the study.

The most important limitation of our study is the small number of patients. In addition, our information regarding the long-term follow-up and recurrence of the patients due to insufficient follow-up data is lacking.

In conclusion, IC presents with bloody diarrhea and abdominal pain, especially in elderly male patients with predisposing risk factors. It is a disease that involves the left colon and responds well to medical treatment and should be considered in every patient with acute diarrhea and abdominal pain.

ETHICAL DECLARATIONS

Ethics Committee Approval: Ethical approval was taken from Ethics Committee of Turkey Yüksek İhtisas Training and Research Hospital (Date: 07.05.2018, Decision No: 39).

Informed Consent: Because the study was designed retrospectively, no written informed consent form was obtained from patients.

Referee Evaluation Process: Externally peer-reviewed.

Conflict of Interest Statement: The authors have no conflicts of interest to declare.

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

REFERENCES

1. Renner P, Kienle K, Dahlke MH, et al. Intestinal ischemia:current treatment concepts. Langenbecks Arch Surg 2011;396 (1):3-11.
2. Misiakos EP, Tsapralis D, Karatzas T, et al. Advents in the Diagnosis and Management of Ischemic Colitis. Front Surg 2017;4:47.
3. Fitzgerald JF, Hernandez LO, III. Ischemic colitis. Clin Colon Rectal Surg 2015: 28:93-8.
4. Yngvadottir Y, Karlsdottir BR, Hreinsson JP, et al. The incidence and outcome of ischemic colitis in a population-based setting. Scand J Gastroenterol 2017; 52:704-10.
5. Cruz C, Abujudeh HH, Nazarian RM, Thrall JH. Ischemic colitis:spectrum of CT findings, sites of involvement and severity. Emerg Radiol 2015;22:357-65.
6. Longstreth GF, Yao JF. Epidemiology, clinical features, high risk factors, and outcome of acute large bowel ischemia. Clin Gastroenterol Hepatol 2009; 7:1075-80.
7. Noh M, Yang SS, Jung SW, Park JH, Im YC, Kim KY. Poor prognostic factors in patients who underwent surgery for acute non-occlusive ischemic colitis. World J Emerg Surg 2015; 10:12.
8. Mohanapriya T, Balaji Singh K, Arulappan T, Shobhana R. Ischemic colitis. Indian J Surg 2012; 74:396-400.
9. Washington C, Carmichael JC. Management of ischemic colitis. Clin Colon Rectal Surg 2012; 25:228-35.
10. Moninska P, Fichna J. Ischemic colitis:current diagnosis and treatment. Curr Drug Targets 2015;16:209-18.
11. Lyu G, Li J, Liu AL, Zhao YX, Yang H, Qian JM. Zhonghua Nei Ke Za Zhi 2016;55(6):466-9.

12. Chen M, Remer EM, Liu X, Lopez R, Shen B. Identification of the distinguishing features of Crohn's disease and ischemic colitis using computed tomographic enterography. Gastroenterol Rep (Oxf) 2017;5(3):219-25.
13. Choi SR, Jee SR, Song GA, et al. Predictive Factors for Severe Outcomes in Ischemic Colitis. Gut Liver 2015;9(6):761-6.
14. Medina C, Vilaseca J, Videla S, Fabra R, Armengol-Miro JR, Malagelada JR. Outcome of patients with ischemic colitis:review of fifty-three cases. Dis Colon Rectum 2004;47(2):180-4.
15. Hreinsson J P, Gumundsson S, Kalaitzakis E, Björnsson E S. Lower gastrointestinal bleeding:incidence, etiology, and outcomes in a population-based setting. Eur J Gastroenterol Hepatol 2013;25(1):37-43.
16. 16 Park C J, Jang M K, Shin W G. et al. Can we predict the development of ischemic colitis among patients with lower abdominal pain? Dis Colon Rectum 2007;50(2):232-8.
17. Sun D, Wang C, Yang L, Liu M, Chen F. The predictors of the severity of ischaemic colitis:a systematic review of 2823 patients from 22 studies. Colorectal Dis 2016;18(10):949-58.
18. Zuckerman GR, Prakash C, Merriman RB, Sawhney MS, DeSchryver-Kecskemeti K, Clouse RE. The colon single-stripe sign and its relationship to ischemic colitis. Am J Gastroenterol. 2003;98(9):2018-22.
19. Parikh MP, Satiya J, Berger-Saunderson M, Gupta NM, Sanaka MR. The Colonic Single Stripe Sign:A Case of Ischemic Colitis. Cureus. 2019;11(5):e4622.
20. Jessurun J. The Differential Diagnosis of Acute Colitis: Clues to a Specific Diagnosis. Surg Pathol Clin 2017;10(4):863-85.
21. Cerilli LA, Greenson JK. The differential diagnosis of colitis in endoscopic biopsy specimens:a review article. Arch Pathol Lab Med 2012;136(8):854-64.
22. Brandt LJ, Feuerstadt P, Blaszka MC. Anatomic patterns, patient characteristics, and clinical outcomes in ischemic colitis:a study of 313 cases supported by histology. Am J Gastroenterol 2010;105(10):2245-53.
23. Beck DE, de Aguilar-Nascimento JE. Surgical management and outcome in acute ischemic colitis. Ochsner J 2011;11(3):282-5.
24. Rania H, Mériam S, Rym E, et al. Ischemic colitis in five points:an update 2013. Tunis Med 2014;92(5):299-303.
25. Gilshtein H, Hallon K, Kluger Y. Ischemic colitis caused increased early and delayed mortality. World J Emerg Surg 2018;13:31.

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Original Article / Orijinal Araştırma

Evaluation of Factors Affecting Outcomes in Neonates with Enterostomy

Enterostomili Yenidoğanlarda Sonuçları Etkileyen Faktörlerin Değerlendirilmesi

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Abstract

Introduction: The aim of this study is to evaluate the neonatal enterostomies performed in our clinic in the last 7 years and to İdentify factors affecting outcomes in neonates with enterostomy.

Material and Method: From January 2015 to September 2021, 34 newborns who underwent enterostomy procedure as part of the treatment for a variety of intestinal disorders were included in the study. Medical records were reviewed retrospectively for birth week, birth weight, gender, primary intestinal disease, type of stoma, age at stoma closure, complications and mortality.

Results: Of 34 patients, 12 were female (35.3%) and 22 were male (64.7%). The mean birth weight of the patients was 2602±927 g, and the average week of birth was 36±3.2 weeks. Ileostomy was performed in 14 patients (41.2%), and colostomy was performed in 20 (58.8%) patients. Hirschprung's disease was the commonest bowel anomaly (n=13, 38.2%) requiring enterostomy and second anomaly was anorectal malformation (n=8, 23.5%). Complications developed in 5 patients (14.7%); stomal prolapse in 4 and parastomal hernia in 1. A statistically significant difference was found between complications and low birth weight (p=0.038). Mortality developed in 5 patients (14.7%). However, mortality was significantly higher in patients with low birth week (p=0.033).

Conclusions: Enterostomy is usually a temporary procedure in neonates and is closed when the primary disease is corrected. Considering the complications and mortality, maximum care should be taken during and after surgery, especially in low birth weight or week-old infants who undergone enterostomy.

Keywords: Enterostomy, ileostomy, colostomy, complication

Öz

Giriş: Bu çalışmanın amacı kliniğimizde son 7 yılda yapılan yenidoğan enterostomilerini değerlendirmek ve ve enterostomili yenidoğanlarda sonuçları etkileyen faktörleri belirlemek.

Gereç ve Yöntem: Ocak 2015-Eylül 2021 tarihleri arasında, çeşitli bağırsak hastalıklarında tedavisinin bir parçası olarak enterostomi prosedürü uygulanan 34 yenidoğanın tıbbi kayıtları, doğum haftası, doğum ağırlığı, cinsiyet, birincil bağrsak hastalığı, stoma türü, stoma kapanma yaşı, komplikasyonlar ve mortalite açısından geriye dönük olarak gözden geçirildi.

Bulgular: 34 hastanın 12'si (%35,3) kadın, 22'si (%64,7) erkekti. Hastaların ortalama doğum ağırlığı 2602±927 gr, ortalama doğum haftası 36±3,2 haftaydı. 14 hastaya (%41,2) ileostomi, 20 (%58,8) hastaya kolostomi uygulandı. Hirschprung hastalığı (n=13, %38,2) enterostomi gerektiren en yaygın bağırsak anomalisi, ikinci anomali ise (n=8, %23,5) anorektal malformasyondu. 5 hastada komplikasyon gelişti(%14,7). Gelişen komplikasyon; 4 prolapsus, 1 fasya açıklığı. Doğum ağırlıkları karşılaştırıldığında komplikasyon gelişmesinde istatistiksel olarak anlamlı fark bulundu (p=0,038). 5 hastada (%14,7) mortalite gelişti. Doğum haftası mortalite açısından karşılaştırıldığında aralarında anlamlı fark bulundu (p=0,033).

Sonuç: Enterostomi genellikle yenidoğanlarda geçici bir işlemdir ve birincil hastalık düzeltildiğinde kapatılır. Komplikasyonlar ve mortalite göz önüne alındığında, özellikle enterostomi uygulanan düşük doğum ağırlıklı veya düşük doğum haftası olan bebeklerde ameliyat sırasında ve sonrasında azami özen gösterilmelidir.

Anahtar Kelimeler: Enterostomi, ileostomi, kolostomi, komplikasyon

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INTRODUCTION

Enterostomy is a life-saving procedure in many congenital and acquired gastrointestinal system diseases that occur in the neonatal period. It can be applied as in emergency situations such as intestinal perforation, necrosis and obstruction.[1-4] It can also be performed as a palliative surgery until corrective surgery is performed in some congenital anomalies such as anorectal malformations (ARMs), Hirschprung's disease (HD), cloacal exstrophy.[1,2,5] Stoma may be necessary at any level of the gastrointestinal tract. In newborns, stomas are usually opened temporarily until the associated disease is corrected.[6] The frequent complications associated with enterostomy formation are prolapse, retraction, stenosis or necrosis of the stoma, parastomal hernia and breakdown of the skin.[2]

The aim of this study is to evaluate the neonatal enterostomies performed in our clinic in the last 7 years and to İdentify factors affecting outcomes in neonates with enterostomy.

MATERIAL AND METHOD

Ethical approval

Permission from the institutional review board was obtained before the study (IRB approval number: 19/299). Informed consent was obtained from the patients.

Study Design

The medical records of newborns (aged 0 to 28 days) who underwent enterostomy procedure in our clinic between January 2015 and September 2021 were reviewed retrospectively. The patients were analyzed for birth week, birth weight, gender, primary intestinal disease, type of stoma, age at stoma closure, complications and mortality. Three patients with missing data were excluded from the study.

Statistical Analysis

Data were analyzed using SPSS 22.0 (IBM Inc., Chicago, IL, USA). Chi-Square test was used to compare nominal variables. The odds-ratio was used in order to evaluate other data. In all analyses, $p<0.05$ was considered as statistically significant.

RESULTS

Thirty-four patients were included in the study. Of these, 12 were female (35.3%) and 22 were male (64.7%). The mean birth weight of the patients was 2602±927 g, and the average week of birth was 36±3.2 weeks. Ileostomy was performed in 14 patients (41.2%), and colostomy was performed in 20 patients (58.8%). The primary intestinal diseases of the patients and the types of enterostomy according to these diseases are given in **Table 1**. The mean hospital stay of the patients was 33±38 days. After the primary bowel disease was corrected, the enterostomy of 24 patients was closed. The mean age at closure of enterostomies was 13±8months.

Table 1. primary disease and enterostomy type in patients

Primary disease	n	%	ileostomy	colostomy
ARM*	8	23.5	0	8
Hirschprung's Disease	13	38.2	4	9
Intestinal Atresia	3	8.8	3	0
Perforation	5	14.7	4	1
NEC#	2	5.9	1	1
Other	3	8.8	2	1
Total	34	100	14	20

ARM= Anorectal Malformation, NEC=Necrotizan Enterocolitis

Complications developed in 5 patients (14.7%); Stomal prolapse in 4 and parastomal hernia in 1 (**Table 2**). While the mean birth weight was 1726±985g in patients with complications, it was 2753±845g without complications. The birth weights of the patients with complications were significantly lower than those without complications ($p=0.038$). The week of delivery was 33.8±4.8 weeks in patients with complications, while it was 36.3±2.7 weeks in patients without complications. There was no significant difference between the week of delivery and complications ($p=0.295$).

Table 2. Characteristics of neonates with complications

Complication	Type of Stoma	Birth Week	Birth Weight	Primary Disease
Prolapse	Ileostomy	1150 g	29 week	Perforation
Prolapse	Ileostomy	2680 g	38 week	HD*
Prolapse	Ileostomy	900 g	28 week	HD*
Prolapse	Colostomy	2940 g	37 week	ARM#
Parastomal Hernia	Ileostomy	990 g	36 week	Intestinal Atresia

HD= Hirschprung's Disease, ARM= Anorectal Malformation

Mortality developed in 5 patients (14.7%) (**Table 3**). While the birth weight was 2239±777 g in patients with mortality, it was 2665±948 g in surviving patients. Birth weight of the patients was not associated with mortality ($p=0.477$). The mean week of delivery was 33.8±2.6 in patients with mortality, while it was 36.3±3.1 in surviving patients. Mortality was significantly higher in patients with low birth week ($p=0.033$).

Table 3. Characteristics of patients with mortality

Mortality	Type of Stoma	Birth Week	Birth Weight	Primary Disease
1	Ileostomy	29	1150	Perforation
2	Colostomy	35	2750	Other
3	Ileostomy	35	2850	Perforation
4	Ileostomy	35	1675	HD*
5	Ileostomy	35	2770	Ileal Atresia

HD= Hirschprung's Disease

DISCUSSION

Although some forms of enterostomy have been performed throughout history, Littre examined a 6-day-old dead infant with ARM in 1710 and reported that enterostomy could be lifesaving.[7] Over the next 75 years, Duret and Freer performed the colostmy procedure in infants with ARM.[7]

Enterostomy is performed in the neonatal period as a life-saving procedure in emergencies or as elective surgery to protect the gastrointestinal tract until existing congenital anomaly is corrected.[3,8] Enterostomies can be performed at any level of the gastrointestinal tract in neonatal period depending on the clinical condition and primary disease of the patient.

In our study, the two most common intestinal anomalies requiring enterostomy were HD (38.2%) and ARM (23.5%), respectively. This finding is similar to other studies in the literature.[8] Although it is stated in the literature that enterostomy is frequently performed in patients with necrotizin enterocolitis (NEC), it was applied to only 2 patients in our study.[2,4]

The frequent complications associated with enterostomy formation are prolapse, retraction, stenosis or necrosis of the stoma, parastomal hernia and breakdown of the skin.[2] After enterostomy closure, complications such as anastomotic leakage and bowel obstruction may ocur.[2] The overall of our complication rate is 14.7% following enterostomy procedure; it is lower than the complication rate reported as 32-80.5% in literature.[2,8] The complication rates for colostomy in infants have been well documented by Mollitt et al.[6] including a 12% rate of prolapse and a 6% rate of stenosis. Reported complication rates are as high as 68% in neonates with NEC.[2] We think that the reason for our low complication rates is due to the low number of patients with NEC. Because Wolf et al.[2] showed that patients with NEC are more prone to enterostomy complications.

Complications were significantly higher in children with low birth weight in our study, and the most common complication was stomal prolapse. Parastoma hernia developed in only one patient weighting less than 1000 g and having and ileostomy. We think that this is due to insufficient development of the abdominal wall and fascia in low-weight babies. Of the 5 patients who developed complications, 4 had ileostomy. This result suggests that complications are more common in patients with ileostomy. Enterostomy was closed in 70.5% of patients after treatment of the primary disease was completed. Our mortality rate was 14.7% and mortality was significantly higher in premature babies. None of the deaths were due to enterostomy and its complications. Although this study presented some important findings related to neonatal enterostomies, the low number of patients is a great limitation of this study.

CONCLUSION

Although enterostomy is a life-saving procedure in newborns, some complications may ocur after the procedure. The most common complication is stomal prolapse, and it is more common in low-birth-weight babies with an ileostomy. Mortality due to primary enterostomy is very rare, and it is mostly associated with low gestational age.

ETHICAL DECLARATIONS

Ethics Committee Approval: This article was approved by the Ethics Committee of Süleyman Demirel University, Faculty of Medicine, numbered 19/299.

Informed Consent: Because the study was designed retrospectively, no written informed consent form was obtained from patients.

Referee Evaluation Process: Externally peer-reviewed.

Conflict of Interest Statement: The authors have no conflicts of interest to declare.

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

REFERENCES

1. Weber TR, Tracy TF Jr, Silen ML, Powell MA. Enterostomy and its closure in newborns. Arch Surg. 1995;130(5):534-7.
2. Wolf L, Gfroerer S, Fiegel H, Rolle U. Complications of newborn enterostomies. World J Clin Cases. 2018;6(16):1101-10
3. Steinau G, Ruhl KM, Hörnchen H, Schumpelick V. Enterostomy complications in infancy and childhood. Langenbecks Arch Surg. 2001;386(5):346-9.
4. Musemeche CA, Kosloske AM, Ricketts RR. Enterostomy in necrotizing enterocolitis: an analysis of techniques and timing of closure. J Pediatr Surg. 1987;22(6):479-83.
5. Pena A, Migotto-Krieger M, Levitt MA. Colostomy in anorectal malformations: a procedure with serious but preventable complications. J Pediatr Surg. 2006;41(4):748-56.
6. Mollitt DL, Malangoni MA, Ballantine TV, Grosfeld JL. Colostomy complications in children: An analysis of 146 cases. Arch Surg 1980;115(4):455-8.
7. Ein SH. Divided loop colostomy that does not prolapse. Am J Surg. 1984;147(2):250-2.
8. Ekenze SO, Agugua-Obianyo NE, Amah CC. Colostomy for large bowel anomalies in children: a case controlled study. Int J Surg. 2007;5(4):273-7.

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Original Article / Orijinal Araştırma

Nursing Students 'Thoughts About Distance Education in The Covid-19 Pandemic Process: A Phenomenological Approach

Covid-19 Pandemi Sürecinde Hemşirelik Öğrencilerinin Uzaktan Eğitime İlişkin Düşünceleri: Fenomenolojik Bir Yaklaşım

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Abstract

Aim: This study was conducted to determine nursing students' thoughts on distance education during the Covid-19 pandemic process.

Material and Method: The experiences of nursing students regarding distance education were conveyed with a phenomenological approach. The data were collected with 23 nursing students using a semi-structured interview form and an online environment. Colaizzi's phenomenological method was used in the analysis of the data.

Results: As a result of the coding, 5 main themes were determined in the Covid-19 process, one of the expressions of nursing students, as 1) their thoughts about distance education and clinical practices, 2) difficulties encountered, 3) coping methods, 4) anxieties and worries, 5) solutions recommendations.

Conclusion: It was determined that nursing students experienced problems in distance education and clinical applications during the Covid-19 pandemic process. Among these problems are problems related to distance education infrastructure, limited sources, asynchronous education and communication problems, academic assignments, and examinations. It is thought that the results will allow institutions that provide nursing education and contribute to future academic studies.

Keywords: Covid-19, pandemia, distance education, nursing students, phenomenological approach.

Öz

Amaç: Bu çalışma, hemşirelik öğrencilerinin Covid-19 pandemi sürecinde uzaktan eğitime ilişkin düşüncelerini saptamak amacıyla yapılmıştır.

Gereç ve Yöntem: Hemşirelik öğrencilerinin uzaktan eğitime ilişkin deneyimleri fenomenolojik yaklaşım ile aktarılmıştır. Veriler, yarı yapılandırılmış görüşme formu ile çevrimiçi ortam kullanılarak 23 hemşirelik öğrencisi ile toplanmıştır. Verilerin analizinde Colaizzi'nin fenomenolojik yöntemi kullanılmıştır.

Bulgular: Yapılan kodlamalar sonucunda hemşirelik öğrencilerinin ifadelerinden Covid-19 sürecinde 1) uzaktan eğitime ve klinik uygulamalara yönelik düşünceleri, 2) yaşadıkları problemler, 3) başetme yöntemleri, 4) kaygı ve endişeleri, 5) çözüm önerileri şeklinde 5 ana tema belirlenmiştir.

Sonuç: Hemşirelik öğrencilerinin Covid-19 pandemi sürecinde uzaktan eğitim ve klinik uygulamalara yönelik problemler yaşadıkları belirlenmiştir. Bu problemler arasında uzaktan eğitim altyapısına ilişkin sorunlar, sınırlı kaynaklar, eş zamansız eğitim ve iletişim sorunları, akademik ödevler ve sınavlar yer almaktadır. Sonuçların hemşirelik eğitimi veren kurumlara ve gelecek akademik çalışmalara katkı sağlayacağı düşünülmektedir.

Anahtar Kelimeler: Covid-19, pandemi, uzaktan eğitim, hemşirelik öğrencileri, fenomenolojik yaklaşım.

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INTRODUCTION

Coronavirus (COVID-19) emerged as a severe acute respiratory syndrome in Wuhan City-Hubei Province, China in December 2019.[1,2]

After the virus had globally spread, in Turkey the first COVID-19 case was detected on the 10th of March, 2020. According to the data and findings that have been registered since the 11th of March, 2020 when the World Health Organization (WHO) announced that the disease was a global pandemic; it is reported that there have been 37.534.235 COVID-19 cases and 1.077.636 people have died from the disease all over the world.[3] COVID-19 pandemic, affecting the whole world, influences many dimensions of daily life significantly.[4-6] When the relevant education literature is reviewed, it is seen that the education has been continued with online courses, academic assignments, and examinations in many countries. [7,8] In Turkey; it was announced that formal face-to-face courses would not be provided during the spring semester of the 2019-2020 academic year and the distance learning process was initiated Council of Higher Education (CHE).[9] As in medical faculties, faculties of dentistry, veterinary schools, and faculties of pharmacy, which provide the applied courses in health during the pandemics; nursing education has been negatively hit, too. Due to the nursing distance education programs that were hastily designed; both nursing students and academician nurses faced numerous problems and were negatively affected.[6,10-12]

Some of the problems of the universities that offer nursing education are poor distance educational materials and infrastructure, students lacking technological devices for distance education such as computers, telephones, and insufficient and bad network connection. With distance education, nursing students could not perform face-to-face clinical practices and ended the academic term without touching a patient. To answer these needs accompanied by COVID-19; all the academicians that taught health education began clinical applied courses with small student groups via by giving online assignments, examinations, and case presentations.[11,13-18]

The literature support for adequate qualitative studies conducted with nursing students in this field could not be reached. For this reason, this study was conducted to determine nursing students' thoughts on distance education during the COVID-19 pandemic process.

MATERIAL AND METHOD

This study was planned in the phenomenological type. Purposeful and snowball sampling methods were applied to the study group. The students who volunteered to participate in the study from the 1st, 2nd, 3rd, 4th year nursing students who received distance education were included in the purposeful sample. The sample was (a) receiving distance education during the Covid-19 pandemic, (b) who can understand and speak Turkish, and (c) who agreed to participate in the study. The primary purpose of phenomenological studies is not to generalize, but to understand the phenomena in depth.[19] In phenomenological studies, no rule has been determined regarding the number of samples, and phenomenological studies with in-depth interviews are conducted with a small sample group of 5 to 25 participants.[20] The interviews were terminated when the data saturation was reached. Nursing students were also asked to convey their feelings and thoughts in writing so that they could express their feelings better, and researchers were asked to send them to their e-mail addresses.

Data Collection

An individual interview was conducted using the online environment (skype) on the days and times convenient for the students. The interviews were held between July 16 and August 1, 2020. Interviews were conducted with the nursing students participating in the study by giving pseudonyms. For the interviews to be conducted in a healthily, the students were ensured to be in a quiet room by the researchers, and the interviews were carried out on Skype for an average of 35-40 minutes. Audio recorded during the interviews. When the answers given by the participants of the study to the study questions started to be similar; It is known that the study has reached data saturation and the data collection process has been stopped.[19] It was completed with 23 nursing students who met the inclusion criteria of the study and agreed to participate in the study. The data were collected with the data collection form and interview form prepared by the researcher by scanning the literature.[11,21-24] The open-ended questions in the questionnaire form and semi-structured interview form, which were created by the researchers in line with the literature, were asked to the students and the answers given by the students to the questions were put in writing. The missing data were completed by combining the written documents as a result of the data obtained from the interviews and the answers to the questionnaire questions sent by the students. The formulated meaning is organized into categories and theme clusters as described by Colaizzi. The main categories, themes, and sub-themes related to students' opinions on distance education were determined.

Data Analysis

In the data analysis of this study, Colaizzi's seven-step descriptive phenomenological method was used (**Figure 1**).[25] SPSS 24 package program was used in the analysis of the quantitative data part of the study. In the analysis of the qualitative data part of the study, the text documents obtained from the students' answers to the questions during the online interview were repeatedly read by the researchers, compared with the written documents received by e-mail from the students and combined in the computer environment. The documents transferred to the MAXQODA 11 software program were read several times by the researchers and the forms were codenamed M1, M², M3, ..., M²3. In the next stage, meaningful and relevant expressions were selected and categorized under certain themes. In the

next stage, findings and real experiences of nursing students regarding distance education were written in detail by combining the findings. Detailed descriptions were turned into short descriptions by the researchers. The visual form of the data obtained from the interviews is given in **Figure 2**.

RESULTS

The distribution of nursing students according to their socio-demographic characteristics is given in **Table 1**. The minimum age of the students participating in the study is 18 and maximum 23 years old and their average age is 20.34±1.32, 78.3% are female, 43.5% are nursing second grade, 60.9% are middle income, 78.3% live in hostels. It is seen that 100.0% of them used social media, 60.9% of them used Instagram as the most frequently used social media, and their academic grade point averages were 3.09±0.29 (**Table 1**).

Thematic Results

As a result of in-depth interviews with nursing students, 5 main themes; their thoughts on distance education and clinical practices were determined as "the problems they experienced", "coping methods", "anxiety and worries", "solution suggestions". The themes and sub-themes obtained from the interviews are given in **Table 2**.

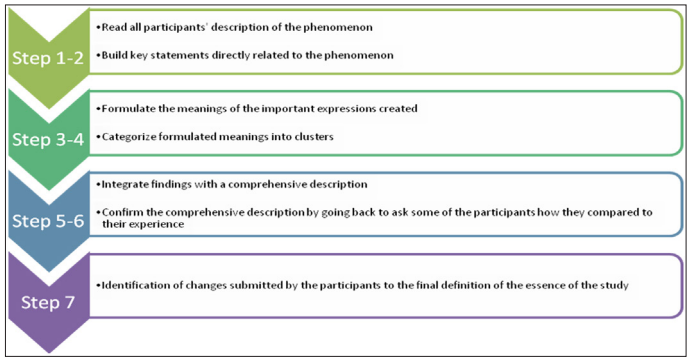

Figure 1. Colaizzi's Phenomenological Data Analysis Steps

Themes 1: Views about distance education and about the effects of distance education upon clinical practices

Nursing students thought that distance education was necessary and it was the correct action to launch distance education during the pandemic period but distance education turned out not to be a productive and effective teaching method. Two sub-themes were identified for positive and negative dimensions of distance education. Some of the statements were as follows:

Table 1. Distribution of nursing students by socio-demographic and some variability characteristics

Code	Age	Gender	General grade point avarege	Status of using distance education before
M1	20	Woman	3,19	No
M²	20	Woman	3,44	No
M3	20	Woman	3,33	No
M4	21	Woman	3,00	No
M5	21	Woman	3,12	No
M6	19	Woman	3,00	No
M7	22	Woman	3,00	No
M8	19	Male	3,30	No
M9	20	Woman	3,00	No
M10	19	Woman	2,78	No
M11	19	Woman	3,40	No
M12	20	Woman	3,00	No
M13	20	Woman	2,50	No
M14	19	Woman	3,00	No
M15	19	Woman	2,89	No
M16	20	Woman	3,57	No
M17	18	Woman	2,58	No
M18	23	Male	2,65	Yes
M19	22	Woman	3,34	Yes
M²0	21	Woman	2,88	No
M²1	22	Woman	3,50	No
M²2	21	Woman	3,35	No
M²3	23	Woman	3,30	Yes

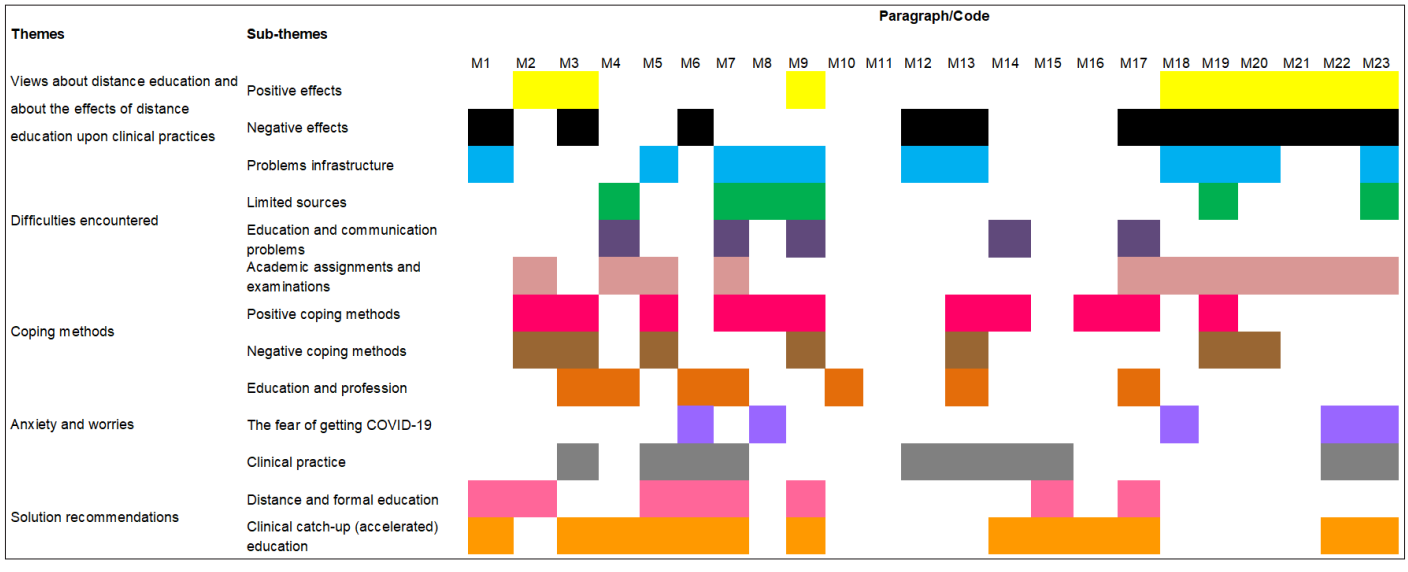

Figure 2. The visual form of the data obtained from the interviews is given.

Table 2. Category, theme, and sub-themes derived from the interviews

Category	Theme	Sub-themes
	Views about distance education and about the effects of distance education upon clinical practices	Positive effects Negative effects
	Difficulties encountered	Problems related to distance education infrastructure Limited sources Asynchronous education and communication problems Academic assignments and examinations
	Coping methods	Positive coping methods Negative coping methods
	Anxiety and worries	Education and profession The fear of getting COVID-19 Clinical practice
	Solution recommendations	Distance and formal education Clinical catch-up (accelerated) education

Sub-themes 1.1. Positive effects

Some of the statements of the subtheme were presented below:

"Learning theoretical subjects through distance education was a normal process during a pandemic in terms of protecting both ourselves and our families and of continuing our education regularly … (M²), (M3), (M9), (M18), (M19), (M²1), (M²2)

"We can watch the online courses at will and whenever we want to and thus saved time … It is good for us to select the date and breaks of online courses…" (M²3), (M²0), (M19)

Sub-themes 1.2. Negative effects

Some of the statements made by students were given as follows:

"Since we should have clinical practice as a part of our profession, I think that distance education might be problematic and learning through distance education does not have any effects upon clinical practice …" (M1), (M3), (M12), (M13), (M17), (M²2), (M²3)

"With the possibility to cheat in online examinations, students may get unfair exam scores… It is disturbing to stay in front of the computer all the time …Distance education restricts social life…I was unable to have the chance to listen to all the courses…" (M6), (M12), (M18), (M19), (M²0), (M²1)

Themes 2. Difficulties Encountered

The theme "Difficulties Encountered" was discussed under four sub-themes. These are "problems related to distance education infrastructure", "limited sources ", "problems related to synchronous education and communication" and "academic assignments and examinations".

Sub-themes 2.1: Problems related to distance education infrastructure

Some of the statements made were below:

"I had problems related to the busy system … Course videos could not be played and I had to study them in PDF format… Since I had been unable to watch all course videos, I thought I was undertrained in theoretical courses…" (M1), (M5), (M7), (M8), (M9), (M12), (M13), (M18), (M19), (M²0), (M²3).

Sub-themes 2.2: Limited sources

Some of the statements made were as follows:

"It was quite difficult for me to follow the academic topics discussed by the instructors via smartphone because I did not have a computer at home …" (M4)

"Due to internet-related problems, I failed to watch the courses regularly; which made me stay away from education…" (M7), (M8), (M9), (M19), (M²3)

Sub-themes 2.3: Asynchronous education and communication

Some of the statements were as follows:

"Since courses were taught asynchronously, we were watching the videos later and we could not learn courses with instructors; our learning productivity was minimized…" (M4), (M7), (M14)

"I do not think I understood the courses enough… I noticed that I learn and understand courses better in the face to face education…" (M9), (M17)

Sub-themes 2.4: Academic assignments and examinations

Some of the statements were presented as follows:

"Assignments given instead of applied courses were challenging…because examinations were online, unfairness was possible in academic grades due to the possibility to cheat in the examinations…" (M²), (M5), (M7), (M18), (M19), (M²0), (M²1)

"I think that assignment grades and examination system were poor and unjust … Assignment preparation process made me learn the academic subjects in detail…" (M4), (M7), (M17), (M²2), (M²3)

Themes 3: Coping Methods

Nursing students told that they had studied a lot so that they could finish distance education courses and they joined the online courses at a time that they determined.

Sub-themes 3.1. Positive coping methods

Some of the statements were presented as follows:

"I started to study more… I took examinations at an early hour of the day…I watched more videos about applied

courses and tried to fill the academic gap through different sources… I later listened to courses again…" (M²), (M3), (M5), (M7), (M8), (M9), (M13), (M14), (M16), (M17)

"I try to find a place with an internet connection to eliminate my internet related problems …" (M7), (M19)

Sub-themes 3.2. Negative coping methods

Some of the statements made were below:

"I tried to close my academic gaps about the courses and system but I was not successful very much… Since courses were taught asynchronously, I could not ask questions and it was difficult…" (M²), (M3), (M5), (M9)

"I could not find any solutions to course videos with bad sound quality. I tried to understand the course in this way…" (M13), (M19), (M²0)

Themes 4: Anxieties and Worries

Of nursing students' anxieties and worries were the fears that they would not be well-trained nurses and employed if the education continued in this way, they might catch COVID 19, the pandemic could spread and last longer, formal education could not be resumed and they might poorly be trained in clinical practices

Sub-themes 4.1. Education and profession

"I do not think I will be a good nurse if distance education goes on… I am anxious that the pandemic will result in bad outcomes for nursing and will continue… I am anxious that I won't be a good nurse in the future…" (M4), (M6), (M10), (M13)

"I think we fell behind in theoretical and applied for courses and could not learn courses enough…" (M3), (M4), (M7), (M17)

Sub-themes 4.2. The fear of getting COVID 19

"I have my fears to contract COVID 19 and to remain unemployed after graduation…" (M6), (M18)

"I have my fears that the outbreak would last for a longer time and lead to dramatic changes in our lives…" (M6), (M8), (M²2), (M²3)

Sub-themes 4.3. Clinical practice

"I am worried that the pandemic may bring negative outcomes for -particularly- applied nursing courses… It is not effective to learn applied courses via distance education… Clinical practices have been interrupted…" (M5), (M6), (M7), (M12), (M²2), (M²3)

"I am worried that applied courses will have been learned insufficiently… if the pandemic should continue, I am worried about applied courses…("M3), (M7), (M13), (M14), (M15), (M²3)

Themes 5: Solution Recommendations

Nursing students' future solution recommendations are that everybody should access to distance education, distance education infrastructure should be arranged according to academic departments, education should be face to face and given with a limited number of students, the number of optional courses should be increased, assignments and examinations should be arranged, -apart from courses- different videos should be uploaded to the system and clinical catch-up (accelerated) training should be implemented because the students will clinically be undertrained.

Sub-themes 5.1. Distance and formal education

"By teaching us at school, at certain hours, in certain classrooms and groups; we may have face to face courses…" (M1), (M²), (M9), (M15), (M17)

"During a pandemic period; distance education should be maintained to prevent the outbreak but face to face education should be initiated as soon as possible because distance education is ineffective…" (M²), (M5), (M6), (M7)

Sub-themes 5.2. Clinical catch-up (accelerated) education

"Through distance education, we learned the clinical courses inadequately… We could not serve an internship… Next year, we need to receive catch-up education…" (M1), (M3), (M4), (M5), (M6), (M7), (M9), (M14), (M15), (M16), (M17), (M²2), (M²3)

DISCUSSION

With the COVID-19 pandemic, a hasty and unprepared transition to distance education became inevitable. There were shortcomings and limits as well as strengths of distance education. Among these shortcomings and limits were the restrictions imposed with the pandemic, poor technological and internet infrastructure, students' insufficient equipment like computers, limited sources, distance education infrastructure deficiencies, and anxieties, and worries about graduation. Therefore, distance education should be well planned and implemented.[6,7,17]

In this study; nursing students expressed both positive and negative views about distance education and its implementation in clinical practices but they thought that it was not a productive and effective educational method. When the literature was investigated; results similar to our study findings were seen and distance education had positive effects upon students. Accordingly, students considered distance education less expensive had chances to re-listen to the recorded courses at times that they wanted to, and -as a result- saved time.[6,21,24] As for negative effects; it is seen that distance education did not fill the gap created by the inability to provide face to face education, prevented the students from focusing on courses, reduced their socialization, deprived them of cultural interaction, interrupted their education due to infrastructure problems and limited sources, complicated a reliable assessment and evaluation process, produced drawbacks in applied courses, led to poor online education due to physical factors and brought ambiguity for future.[21,24,26] With these results; we are of the opinion that distance education had both positive and negative effects but was not proper for applied sciences such as the nursing profession and thus, distance education infrastructure should be optimally structured and strengthened and its deficiencies should be eliminated for applied professions.

It is argued that distance education may complicate a reliable and secure assessment and evaluation and students with no sufficient technological means will experience difficulties in distance education.[21] In the current study; nursing students' Problems related to distance education infrastructure were as follows: they often suffered from internet disconnections, had difficulties connecting the system and playing course videos; as for the Limited sources; the students did not have computers nor internet connection or had a poor internet connection at home, did not have a comfortable study environment, had problems related to different computer operating programs and had to learn applied for courses asynchronously via distance education but nursing was an applied and practical profession; as for Asynchronous education and communication; the students suggested that learning courses asynchronously prevented them from listening to instructors and learning courses effectively, lowered their course productivity, caused communication problems; as for Academic assignments and examinations; the students pointed out that assignments and examinations were insufficient and unfair. When the literature was looked at; findings similar to ours were noted and poor infrastructure of internet/computer and lack of sources interrupted their education, made a reliable and secure assessment and evaluation difficult, weakened the courses that required application and practice, and lowered student-instructor communication.[11,17,21,27,28] These results made us conclude that distance education infrastructure should be strengthened, sources should be enriched, courses should be given asynchronously and synchronously depending on the qualities of the professions, assignments and examinations should be securely and safely uploaded to the system in a way that will prevent cheating in exams and solutions to these problems should be found.

In this study; nursing students employed positive/negative coping methods in distance education during the COVID-19 pandemic, studied more, participated in courses at times that they determined, and tried to somehow get connected to the internet. Yet, there were also those who failed to cope with problems and -therefore- tried to be patient. Since the number of relevant studies was limited, no sufficient amount of literature support could be found; which made us suggest that students should be encouraged and backed to use positive coping methods in order to solve these problems.

The ambiguity of COVID-19 pandemic and distance education, which led to a hasty and unprepared transition, increased anxiety and fear in students, and complicated efforts to focus on courses.[11,22,29-33] In this study; the nursing students' Anxieties and worries about distance education in the COVID-19 pandemic involved the fears that they would not be good nurses and employed if the education continued in this way, they might catch COVID 19, pandemic could spread and last longer, formal education could not be resumed and they might fall behind in clinical practices. In literature are similar results indicating that students feel hopeless and fearful, are afraid that both they and family members can contract the disease and have fear of death.[11,21]

Among the Solution Recommendations; nursing students underlined the necessity that everybody should have an access to distance education, distance education infrastructure should be arranged and planned according to academic departments, education should be realized with a limited number of participants and face to face, the number of optional courses should be increased, assignments and examinations should be re-designed, different videos should be uploaded to system apart from courses and clinical catch-up (accelerated) training should be implemented because they are poorly trained. The literature points out that instead of distance education, other alternative methods should be developed, different materials[26] and web interfaces should be designed for applied courses,[11, 17,24] course curriculum should be changed and updated after COVID-19 vaccine has been found and universities should support those students who live in rural areas and do not have internet access.[17]

CONCLUSION

The study provides an in-depth view of nursing students' experiences in distance education. Opinions about the positive and negative effects of distance education, students' coping methods, and shortcomings can contribute to distance education students and educators. Research can be expanded by looking at other nationwide educational programs.

ETHICAL DECLARATIONS

Ethics Commite Approval: Ethics approval was obtained from the Selcuk University Non-Interventional Clinical Research Ethics Committee (Decision No: 2020/317). This study was conducted in accordance with the Good Clinical Practices and Reporting Standards of Qualitative Researches of the Declaration of Helsinki.

Informed Consent: All patients signed the free and informed consent form.

Referee Evaluation Process: Externally peer-reviewed.

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REFERENCES

1. An P, Song P, Lian K, Wang YCT. Manifestations Of Novel Coronavirus Pneumonia: A Case Report. Balkan Med J 2020; 37(3): 163.
2. Lu H, Stratton CW, Tang YW. Outbreak Of Pneumonia Of Unknown Etiology In Wuhan, China: The Mystery And The Miracle. J Med Virol 2020; 92(4):401-2.
3. World Health Organizations (WHO) Announces COVID-19 Outbreak A Pandemic. Http://Www.Euro.Who.İnt/En/Health-Topics/Health-Emergencies/Coronavirus-Covid-19/News/News/2020/3/Who-Announces-Covid-19-Outbreak-A-Pandemic.Update:April, 2020.

4. Aslan R. Epidemics, Pandemics and Covid-19 from history to present. Details Magazine 2020; 8:85-6.
5. Kurnaz E, Serçemeli MA. Research on the perspectives of academicians on distance education and distance accounting education in the period of Covid-19 Pandemic. Int J Soc Sci Academic 2020;(3):262-88.
6. Sahu P. Closure of universities due to coronavirus disease 2019 (COVID-19): Impact on education and mental health of students and academic staff. Cureus 2020;12(4): e7541.
7. Dockery M, Bawa S. Working from home in the COVID-19 lockdown: Bentley: WA: Bankwest Curtin Economics Centre Research Brief COVID-19; 2020.
8. Telli SG, Altun D. The Coronavirus and the unavoidable rise of online (online) education. J Unv Study 2020;3(1):25-34.
9. CHE (2020): New Decision Taken by Higher Education Institution for Final Year Students in Nursing Programs. Press briefing [cited 7 September 2020]. Https://www.Yok.Gov.Tr.
10. Brooks SK, Smith LE, Webster RK, Weston D, Woodland L, Hall I, Rubin GJ. The impact of unplanned school closure on children's social contact: Rapid Evidence Review. Eurosurveillance 2020; 25(13):188-200.
11. Kürtüncü M, Kurt A. Problems experienced by nursing students about distance education during the Covid-19 pandemic. J Eurasian Soc and Economic Res 2020; 7(5):66-77.
12. Owusu-Fordjour C, Koomson C, Hanson D. The impact of covid-19 on learning-the perspective of the ghanaian student. Europe J Educ Stud 2020; 7(3): 88-101.
13. Alea LA, Fabrea MF, Roldan RDA, Farooqi AZ. Teachers' Covid-19 awareness, distance learning education experiences and perceptions towards institutional readiness and challenges. IJLTER 2020; 19(6):127-44.
14. Kissler SM, Tedijanto C, Goldstein E, Yonatan HG, Marc L. Projecting the transmission dynamics of SARS-Cov-2 Through The Postpandemic Period. Science 2020;368(2020), 860-8.
15. Rose S.Medical student education in the time of COVID-19 (Published Online Ahead Of Print March 31). JAMA 2020;323(21):2131-2.
16. Viner RM, Russell SJ, Croker H, et al. School Closure And Management Practices During Coronavirus Outbreaks İncluding COVID-19: A Rapid Systematic Review. Lancet Child Adolescent Health 2020;4(5):397-404.
17. Wang C, Cheng Z, Yue XG, Mcaleer M. Risk management of Covid-19 by universities in china: multidisciplinary digital publishing institute. JRFM 2020;13(2):36.
18. Di Domenico L, Pullano G, Pullano G, Hens N, Colizza V. Expected impact of school closure and telework to mitigate covid-19 epidemic in france. COVID-19 outbreak assessment. Epicx Lab 2020;15.
19. Yıldırım A, Şimşek H. Qualitative research methods in social sciences. 11. Baskı, Seçkin Publishing; 2018; 101-427.
20. Zhu N, Zhang D, Wang W et al. A Novel Coronavirus from patients with pneumonia in China, 2019. New England J Med 2020;382(8):727-33.
21. Arı AG, Kanat MH. Teachers' views on Covid-19 (Coronavirus). Yüzüncü Yıl University Institute of Social Sciences J (Epidemic Special Issue) 2020; 459-92.
22. Bozkurt A. Coronavirus (Covid-19) Pandemic process and evaluations on education in the world after the pandemic: new normal and new education paradigm. Open Educ App and Res J 2020;6(3):112-42.
23. Karadağ E, Yucel C. Distance education at universities during the new type of Coronavirus pandemic: an evaluation study within the scope of undergraduate students. J Higher Educat 2020;10(2):181-92.
24. Keskin M, Derya Ö. Evaluation of students' feedback on web-based distance education in the covid-19 process. IKCUSBFD 2020;5(2):59-67.
25. Morrow R, Rodriguez A, King N. Colaizzi's descriptive phenomenological method. The Psychologist 2015;28(8):643-4.
26. Koç E. An Evaluation of distance learning in higher education through the eyes of course instructors. Akdeniz Unv Fac of Educ J 2020;3(1):25-39.
27. Ozyurek A, Cetin A, Yildirim R, Evirgen N, Ergun S. An analysis of the child-parent interaction in different cultures according to teachers viewpoint. Int J Soc Res 2016;9(43):1477-84.
28. Sintema EJ. Effect Of COVID-19 On The Performance Of Grade 12 Students: Implications For STEM Education. Eurasia J Math, Sci & Tech Educ 2020;16(7): 1-6.
29. Khan AR, Ratele K, Arendse N. Men, suicide, and Covid-19: Critical masculinity analyses and interventions. Postdigital Sci and Educ 2020; 1-6.
30. O'Sullivan V. Non-Human Animal Trauma During the Pandemic. Postdigital Sci and Educ 2020;1-9.
31. Rajkumar RP. COVID-19 and mental health: A review of the existing literature. Asian J Psyc, 2020;52(220):102066.
32. Cao W, Fang Z, Hou G, Han M, Xu X, Dong J, Zheng J. The psychological impact of the COVID-19 epidemic on college students in China. Psyc Res, 2020; 287:112934.
33. Lee J. Mental health effects of school closures during Covid-19. Lancet Child Adolescent Health 2020;395:912-20.

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Original Article / Orijinal Araştırma

Palliative Care in Primary and Metastatic Brain Tumors

Primer ve Metastazik Beyin Tümörlerinde Palyatif Bakım

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Abstract

Introduction: Early palliative care interventions and structured advance care planning can improve symptom control and quality of life in patients with a brain tumor. In this study, we aimed to investigate symptoms, hospital discharge conditions, and the length of stay of patients with primary and metastatic brain tumors in our palliative care center (PCC).

Material and Method: Ninety-one patients; who had been followed-up in the PCC with the diagnosis of a primary or metastatic brain tumor were included in this retrospective study. Demographic characteristics, Glasgow Coma Scale (GCS) scores, Karnofsky Performance Scale (KPS) scores, hospital discharge status, and symptoms of the patients included in the study were compared.

Results: The mean age of the patients was 60.67 years; 59.3% were male, and the mean length of hospital stay was 29.26 days. The rates of PEG, tracheostomy, seizures, and paresis symptoms were significantly higher in patients with a primary brain tumor ($p<0.05$). The rates of death in the hospital were significantly higher in patients with metastatic tumors and low GCS scores ($p=0.032$ and $p=0.00$, respectively).

Conclusion: We observed differences in clinical findings and prognoses between primary and metastatic brain tumor patients during the follow-up in PCC. Further to advances in treatment methods, we believe that identifying the need for palliative care and appropriate symptom management will improve the quality of life in brain tumor patients with poor prognosis.

Keywords: Brain tumors, palliative care, discharge status, seizure

Öz

Giriş: Erken Palyatif bakım müdahaleleri ve yapılandırılmış ileri bakım planlaması, beyin tümörü hastalarında semptom kontrolünü ve yaşam kalitesini artırabilir. Bu çalışmada palyatif bakım merkezimizde (PBM) primer ve metastatik beyin tümörü tanısı alan hastaların semptomlarını, çıkış durumlarını ve yatış sürelerini araştırmayı amaçladık.

Gereç ve Yöntem: Bu retrospektif çalışmada palyatif bakım servisinde primer ve metastatik beyin tümörü tanısı ile izlenen 91 hasta alındı. Çalışmaya alınan hastaların demografik özellikleri, glaskow koma skalası (GCS), Karnofsky Performans Skalası (KPS), çıkış durumu, hastanede yatış süresi ve semptomları karşılaştırıldı.

Bulgular: Hastaların yaş ortalaması 60,67 yıldı, %59,3'ü erkekti ve yatış süreleri ortalama 29,26 gündü. Primer beyin tümörü olan hastalarda PEG, trakeostomi durumu ve nöbet, parezi semptomu oranları anlamlı derecede fazla idi ($p<0,05$). Metastatik tümörü olanlarda ve GCS düşük olanlarda çıkış durumu exitus olanlar anlamlı derecede fazla idi ($p=0,032$, $p=0,00$).

Sonuç: Primer ve metastatik beyin tümörü olan hastaların palyatif bakımda izlemleri sırasında bulgularında ve klinik prognozlarında farklılıklar olduğu gördük. Tedavilerdeki ilerlemelere rağmen zayıf prognoza sahip beyin tümörlerinin palyatif bakım ihtiyaçlarının belirlenip, semptomların iyi yönetilmesinin, bu hastalarda yaşam kalitesini artıracağını düşünüyoruz.

Anahtar Kelimeler: Beyin tümörleri, palyatif bakım, çıkış durumu, nöbet

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INTRODUCTION

Despite major advances in cancer therapeutics over the past decade, cancer patients continue to suffer from significant morbidity. Furthermore, mortality rates in cancer remain high.[1] Brain tumors account for nearly 1.4% of all cancers.[2] Malignant gliomas are tumors of glial origin, accounting for almost 70% of primary brain cancer diagnoses. Survival in malignant gliomas is less than two years.[3,4] Cranial metastases are more common than primary brain tumors. Secondary brain tumors develop in 20-40% of systemic malignancies at a point in time during the disease course.[5] With a mean survival of 1-6 months depending on the histology and the treatment applied, brain metastases significantly shorten the average life expectancy.[6]

Studies have shown that early integration of palliative care acts favorably on the quality of life, survival, mood of the patient, caregiver burden, and treatment.[7] The life-limiting nature of gliomas and secondary brain tumors and the presence of specific symptoms due to neurological impairments require an early and multidisciplinary palliative care approach.[8,9] Studies investigating whether differences exist in the palliative care needs of such patients are scarce and patients need to be evaluated more thoroughly in order for their specific needs to be addressed.[10]

In this study, we aimed to investigate the rates of percutaneous endoscopic gastrostomy (PEG), tracheostomy, pressure ulcers (PU); Glasgow Coma Scale (GCS) and Karnofsky Performance Scale (KPS) scores, and the effects of symptoms such as seizures, paresis, pain, and depression on the length of hospital stay (LOS) and discharge statuses in patients diagnosed with primary or metastatic brain tumors, who had been under follow-up in our palliative care center (PCC).

MATERIAL AND METHOD

This retrospective study was approved by the Ethics Committee of Dışkapı Yıldırım Beyazıt Training and Research Hospital (date: 06/04/2020; approval no: 85/03). All procedures were carried out in accordance with the principles of the Declaration of Helsinki. The files of 99 patients followed-up in our hospital's PCC with the diagnosis of a primary or metastatic brain tumor in the period between 1 January 2014 and 1 January 2020 were reviewed retrospectively. Eight patients; who had missing data in patient files and who had been hospitalized for one day or shorter, were excluded from the study. The symptoms observed in the patients were classified as pain, paresis, seizures, and depression. The ages and gender of the study patients; the presence of percutaneous endoscopic gastrostomy (PEG), tracheostomies, and pressure ulcers (PU); LOS in the hospital, the patient status at the time of hospital discharge [to home or to the intensive care unit (ICU) or the patient's death in the hospital], and symptoms (seizure, paresis, pain, and depression) of the patients included in the study were compared.

The diagnosis of depression was made by a psychiatrist according to the criteria of the classification of psychiatric disorders, the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV).[11] The severity of pain was evaluated using the Visual Analogue Scale (VAS).[12] VAS is a continuous scale comprising a horizontal or a vertical line, usually 10 centimeters (100 mm) in length. Patients with a VAS score between 0 and 2 cm were considered pain-free.[13]

GCS was used for neurological evaluation and determining the consciousness level of the patient. GCS is evaluated according to the verbal response, motor response, and the eye-opening reaction of the patient. A calculated total score of 15 indicates the best response, whereas a score of 3 indicates the poorest response that can be obtained from the patient.[14] The Karnofsky performance scale was used to rate functional impairment in the study patients.[15,16] The Karnofsky performance scale scores range from 0 to 100. A score between 80 and 100 indicates that the patient is able to carry on normal activities; a score between 50 and 70 indicates that the patient is unable to work but can meet most of the personal needs, and a score between 0 and 40 indicates that the patient is unable to carry on self-care.

Statistical Analysis

The study data were transferred to the SPSS Statistics 23 package program to perform the statistical analyses. Data were summarized as frequencies (numbers and percentages) for the categorical variables. Descriptive statistics (mean, standard deviation, median, minimum, and maximum) were used for the numerical variables. The Kolmogorov-Smirnov normality analysis revealed that the numerical variables did not conform to a normal distribution. For this reason, non-parametric statistical methods were used in the study. The differences between two independent groups were assessed by the Mann-Whitney U analysis. The Kruskal-Wallis analysis was used to evaluate the differences between more than two independent groups. The relationships between two independent categorical variables were assessed using the Chi-Square analysis. The relationships between two independent numerical variables were interpreted using Spearman's rho correlation coefficient. A value of 0.05 was considered to indicate statistical significance.

RESULTS

Eight patients; who had incomplete records and who had been hospitalized for one day or for a shorter period, were excluded from the study. A total of 91 patients; of which 37 (40.7%) were women and 54 (59.3%) were men, were included in the study. The mean age of the patients was 60.67 years and the mean LOS was 29.26 days. Of the patients; 69.2% had a primary brain tumor, 30.8% had a metastatic brain tumor, 56% had a PEG, 46.2% had a tracheostomy, and 51.6% had PU. Death occurred in 51.6% of the patients; 30.8% of the patients were discharged to home, and 17.6% of the patients were transferred to ICU. Seizures, paresis, pain, and depression

were found in 80.2%, 78%, 64.8%, and 34.1% of the patients, respectively. The mean GCS score of the patients was 8. The mean KPS score was 10-40 points in 82 (90.1%) patients and 50-70 points in 9 (9.9%) patients (**Table 1**).

Having a primary or metastatic brain tumor was statistically significantly associated with age, the presence of a PEG, tracheostomy, or PU; and the presence of paresis or seizure symptoms ($p<0.05$). The age of the patients with a metastatic brain tumor was significantly higher compared to primary brain tumor patients ($p=0.001$). The rates of having a PEG, tracheostomy, and PU, and having paresis or seizures were significantly higher in primary brain tumor patients compared to metastatic brain tumor patients (**Table 2**).

Table 1. Demographic characteristics of patients

(n=91)	Mean±standard deviation	Median (Min.-Max.)
Age (Year)	60.67±13.528	60.0 (36.0-98.0)
Length of Stay (Days)	29.26±25.870	22.0 (6.0-180.0)
GCS	7.69±1.787	8.0 (4.0-12.0)
	Number	**%**
Gender		
Female	37	40.7
Male	54	59.3
PEG		
Yes	51	56.0
No	40	44.0
Tracheostomy		
Yes	42	46.2
No	49	53.8
PU		
Yes	47	51.6
No	44	48.4
Discharge Status		
Home	28	30.8
Exitus	47	51.6
ICU	16	17.6
Pain		
Yes	59	64.8
No	32	35.2
Paresis		
Yes	71	78.0
No	20	22.0
Seizure		
Yes	73	80.2
No	18	19.8
Depression		
Yes	31	34.1
No	60	65.9
Tumor		
Primary	63	69.2
Metastatic	28	30.8
KPS		
10-40	82	90,1
50-70	9	9,9

ICU: Intensive care unit, PEG: Percutaneous endoscopic gastrostomy, PU: Pressure ulcers, GCS: Glasgow Coma Scale, KPS: Karnofsky Performance Scale

Table 2. Examination of the relationship between tumors and variables

	Primary Tumor		Metastatic Tumor		Z	p
	Median (Min.-Max.)		Median (Min.-Max.)			
Age (Year)	55 (36-88)		68 (39-98)		-3.429	0.001*
GCS	8 (4-12)		7 (5-11)		-1.442	0.149
	Number	**%**	**Number**	**%**	**X2**	**p**
Gender						
Female	24	64.9	13	35.1	0.558	0.455
Male	39	72.2	15	27.8		
PEG						
Yes	43	84.3	8	15.7	12.391	0.000*
No	20	50.0	20	50.0		
Tracheostomy						
Yes	35	83.3	7	16.7	7.282	0.007*
No	28	57.1	21	42.9		
PU						
Yes	41	87.2	6	12.8	14.790	0.000*
No	22	50.0	22	50.0		
Pain						
Yes	40	67.8	19	32.2	0.162	0.687
No	23	71.9	9	28.1		
Paresis						
Yes	59	83.1	12	16.9	29.166	0.000*
No	4	20.0	16	80.0		
Seizure						
Yes	59	80.8	14	19.2	23.277	0.000*
No	4	22.2	14	77.8		
Depression						
Yes	18	58.1	13	41.9	2.752	0.097
No	45	75.0	15	25.0		
KPS						
10-40	55	67.1	27	32.9	1.812	0.178
50-70	8	88.9	1	11.1		

Z: Mann Whitney U X2: Chi-Square Analysis *: p<0.05. PEG: Percutaneous endoscopic gastrostomy, PU: Pressure ulcers, GCS: Glasgow Coma Scale, KPS: Karnofsky Performance Scale

LOS was statistically significantly associated with the presence of a PEG, tracheostomy, or PU; the PCC discharge status and the presence of paresis or seizures ($p<0.05$). LOS was significantly longer in patients without a PEG, tracheostomy, or PU. LOS was significantly long in metastatic tumor patients and in patients having no seizures. LOS was significantly higher in patients; who had died in the hospital, compared to patients discharged to home ($p=0.039$). A negative and low-level statistically significant relationship was found between age and LOS (**Table 3**).

The hospital discharge status was statistically significantly associated with the presence of primary or metastatic brain tumors and GCS scores ($p<0.05$). While significantly more patients with primary brain tumors were discharged to home, the mortality rate was significantly higher in patients with metastatic brain tumors. The mortality rate was significantly high in patients with low GCS scores (**Table 4**).

Table 3. Examination of the relationship between the length of stay and variables

	Length of hospitalization		Statistical Analysis	p
	Number	Median (Min.-Max.)		
Gender				
Female	37	58 (36-90)	Z=-1.093	0.274
Male	54	60 (43-98)		
PEG				
Yes	51	55 (36-98)	Z=-2.216	0.027*
No	40	63,5 (44-88)		
Tracheostomy				
Yes	42	53,5 (36-75)	Z=-2.980	0.003*
No	49	61 (36-98)		
PU				
Yes	47	60 (36-98)	Z=-2.021	0.043*
No	44	59 (36-90)		
Discharge Status				
1.Home	28	53 (36-88)	KW=6.484	0.039* Difference: EX-Home
2.Exitus	47	63 (36-98)		
3. ICU	16	55 (44-87)		
Pain				
Yes	59	57 (36-98)	Z=-1.129	0.259
No	32	63 (39-87)		
Paresis				
Yes	71	59 (36-98)	Z=-0.634	0,526
No	20	62,5 (36-87)		
Seizure				
Yes	73	55 (36-98)	Z=-2.621	0.009*
No	18	64 (36-90)		
Depression				
Yes	31	60 (36-98)	Z=-0.206	0.837
No	60	59,5 (36-90)		
Tumor				
Primary	63	55 (36-88)	Z=-2.081	0.037*
Metastatic	28	68 (39-98)		
KPS				
10-40	82	21.5 (6-180)	Z=-0.726	0.468
50-70	9	24 (10-56)		
	Number	r	p	
Age	91	-0.231	0.028*	
GCS	91	0.131	0.215	

Z: Mann Whitney U KW: Kruskal Wallis *: p<0.05 r: Spearman's Rho Correlation Coefficient.
PEG: Percutaneous endoscopic gastrostomy, PU: Pressure ulcers, GCS: Glasgow Coma Scale, KPS: Karnofsky Performance Scale

DISCUSSION

The life-limiting nature of primary brain tumors and the presence of specific symptoms due to neurological impairment require an early and appropriate palliative care approach.[17] Brain metastases are the most common cerebral malignancies, in which most of the symptoms occur due to direct brain compression caused by the tumor or edema. Palliative care has an essential role in approaching patients with brain metastasis and managing their symptoms.[9] Of the patients followed-up in our palliative care center; 69.2% had been diagnosed with primary brain tumors and 30.8% had been diagnosed with metastatic brain tumors. The mean age of the patients was 60.67 years; 59.3% of the patients were men, and the mean LOS was 29.26 days.

Studies have documented the potential value of PEG tube placement in patients with nutritional and swallowing problems such as those with head and neck cancer. In patients with cancer, enteral tube feeding is often required due to dysphagia, odynophagia, side effects during or after treatment, dehydration, and weight loss.[18] There is very little research on PEG placement in patients with brain tumors receiving palliative care.[19] The use of tracheostomy during the palliative care process in cancer patients aims to relieve symptoms, provide comfort, facilitate daily life activities, and achieve long-term optimization survival period.[20] In our study, the rates of tracheostomy (83.3%) and PEG (84.3%) were significantly high in patients with primary brain tumors. We thought that such high rates of tracheostomy and PEG could be explained by the longer-term survival of primary brain tumor patients compared to patients with metastatic brain tumors. The study by Jakobsen et al.[21] demonstrated that advanced age, proximity to death, long hospital stays, and a poor clinical condition increased the risk of PU development. In our study, PU was significantly more common in patients diagnosed with primary brain tumors compared to patients with metastatic brain tumors. We thought that this finding could result from the high rate of paresis, higher rates of discharge to home despite a longer hospital stay, and the longer survival of patients with primary brain tumors compared to metastatic tumor patients.

The clinical findings of brain tumors depend on the location, histological type, and size of the tumor. Typical symptoms include increased intracranial pressure and focal neurological findings. Seizures are frequent complications occurring in 70% of primary brain tumor patients and in 40% of patients with brain metastases.[22] Consistent with our study, Ostgathe et al.[23] found out that the symptoms of paresis and seizures were more frequent in primary brain tumors than metastatic brain tumors. It is estimated that 50% of patients with brain tumors have depressive symptoms.[24] In our study, we identified depression in 34.1% and pain in 64.8% of the palliative care patients with primary or metastatic brain tumors; however, we did not detect a statistically significant difference between the two groups.

It has been demonstrated in the literature that the mortality rate is higher in metastatic brain tumor patients compared to patients with primary brain tumors and other palliative care patients.[23] The prognosis of metastatic brain tumors is poor and the average survival is 6-12 months.[25] Similarly, the mortality rate was significantly high and the length of hospital stay was long in metastatic brain tumor patients in our study. We think that the poor clinical condition of these patients prolonged their stay in palliative care. It has been previously shown that low GCS scores are associated with a long LOS and a close proximity to death in serious diseases and injuries.[26]

Table 4. Examination of the relationship between discharge condition and variables

	Discharge Status						K.W.	p
	1.Home		2.EX		3. ICU			
	Median (Min.-Max.)		Median (Min.-Max.)		Median (Min.-Max.)			
Age (Year)	53 (36-88)		63 (36-98)		55 (44-87)		4.205	0.122
GCS	9 (6-12)		7 (4-10)		8 (7-11)		30.124	0.000* Difference: 2-1,3
	Number	%	Number	%	Number	%	X2	p
Gender								
Female	15	40.5	17	45.9	5	13.5	2.914	0.233
Male	13	24.1	30	55.6	11	20.4		
PEG								
Yes	18	35.3	22	43.1	11	21.6	3.448	0.178
No	10	25.0	25	62.5	5	12.5		
Tracheostomy								
Yes	18	42.9	18	42.9	6	14.3	5.353	0.069
No	10	20.4	29	59.2	10	20.4		
PU								
Yes	14	29.8	25	53.2	8	17.0	0.093	0.955
No	14	31.8	22	50.0	8	18.2		
Pain								
Yes	14	23.7	33	55.9	12	20.3	4.024	0.134
No	14	43.8	14	43.8	4	12.5		
Paresis								
Yes	21	29.6	37	52.1	13	18.3	0.260	0.878
No	7	35.0	10	50.0	3	15.0		
Seizure								
Yes	26	35.6	34	46.6	13	17.8	4.668	0.097
No	2	11.1	13	72.2	3	16.7		
Depression								
Yes	11	35.5	18	58.1	2	6.5	4.027	0.133
No	17	28.3	29	48.3	14	23.3		
Tumor								
Primary	24	38.1a	27	42.9a	12	19.0a	6.885	0.032*
Metastatic	4	14.3b	20	71.4b	4	14.3a		
KPS								
10-40	19	23.2	47	57.3	16	19.5	-	-
50-70	9	100.0	0	0.0	0	0.0		

K.W.: Kruskal Wallis X2: Chi-Square Analysis *: p<0.05. PEG: Percutaneous endoscopic gastrostomy, PU: Pressure ulcers, GCS: Glasgow Coma Scale, KPS: Karnofsky Performance Scale

In our study, we found that the mortality rate was significantly high in patients with low GCS. Although studies have shown that performance status is an independent predictor of survival in patients with cancer, no significant relationship was found between KPS and LOS or discharge status in our study. [27]

Our study had limitations such as the small number of patients and the lack of a control group.

CONCLUSION

In our study, we observed that there were differences in the findings and clinical prognoses in patients with primary and secondary brain tumors during the follow-up in palliative care. In patients with primary brain tumors, the rates of having a PEG, a tracheostomy, seizures, and paresis symptoms were significantly high. While mortality was significantly high in patients with metastatic tumors and low GCS scores, the rate of "discharged to home" status was significantly high in patients with primary brain tumors. Further to advances in treatment, we are of the opinion that identifying palliative care needs and providing appropriate symptom management will improve the quality of life in brain tumor patients with poor prognosis.

ETHICAL DECLARATIONS

Ethics Committee Approval: The study was carried out with the permission of Dışkapı Yıldırım Beyazıt Training and Research Hospital Ethics Committee (Date: 06/04/2020, Decision No: 85/03).

Informed Consent: Because the study was designed retrospectively, no written informed consent form was obtained from patients.

Referee Evaluation Process: Externally peer-reviewed.

Conflict of Interest Statement: The authors have no conflicts of interest to declare.

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

REFERENCES

1. Siegel RL, Miller KD, Jemal A. Cancer statistics, 2018. CA Cancer J Clin 2018;68(1):7-30.
2. Lyon JG, Mokarram N, Saxena T, Carroll SL, Bellamkonda RV. Engineering Challenges for Brain Tumor Immunotherapy. Adv Drug Deliv Rev 2017;114:19-32.
3. Wen PY, Kesari S. Malignant gliomas in adults. N Engl J Med 2008;359:492-507.
4. Stupp R, Mason WP, Van Den Bent MJ, et al. Radiotherapy plus concomitant and adjuvant temozolomide for glioblastoma. N Engl J Med 2005;352(10):987-96.
5. Taillibert S, Delattre JY. Palliative care in patients with brain metastases. Curr Opin Oncol 2005;17(6):588-92.
6. Pease NJ, Edwards A, Moss LJ. Effectiveness of whole brain radiotherapy in the treatment of brain metastases: a systematic review. Palliat Med 2005;19(4):288-99.
7. Golla H, Nettekoven C, Bausewein C, et al. Effect of early palliative care for patients with glioblastoma (EPCOG): a randomised phase III clinical trial protocol. BMJ Open 2020;10(1): e034378.
8. Pace A, Dirven L, Koekkoek JAF, et al. European Association for Neuro-Oncology (EANO) guidelines for palliative care in adults with glioma. Lancet Oncol 2017;18(6):330-40.
9. Noh T, Walbert T. Brain metastasis: clinical manifestations, symptom management, and palliative care. Handb Clin Neurol 2018;149:75-88.
10. Ayling OGS, Goldman R, Bernstein M. Glioblastoma, the Neurosurgeon, and Neuro-Palliative Care. Handb Clin Neurol 2018;149:75-88.
11. American Psychiatric Association, Diagnostic and Statistical Manual of Mental Disorders , 19944th edition Washington, DC American Psychiatric Association.
12. Mc Cormack HM, Horne DJ, Sheather S. Clinical applications of visual analogue scales: a critical review. Psychol Med 1988;18:1007-19.
13. Aicher B, Peil H, Peil B, Diener H-C. Pain measurement: Visual Analogue Scale (VAS) and Verbal Rating Scale (VRS) in clinical trials with OTC analgesics in headache. Cephalalgia 2012;32(3):185-97.
14. Teasdale G. Jennet B. Assesment of coma and impaired consicousness: A practical scale. Lancet 1974;2(7872):81-4.
15. Çeltek NY, Süren M, Demir O, Okan İ. Karnofsky Performance Scale validity and reliability of Turkish palliative cancer patients. Turk J Med Sci. 2019; 49:894-8
16. Aras M, Delialioğlu ÜS, Atalay N, Selçuk ST. Kanser hastalarının rehabilitasyon gereksinimi. Türk Fiz Tıp Rehab Derg 2009;55(3):25-9.
17. Hemminger LE, Pittman CA, Korones DN, et al. Palliative and end-of-life care in glioblastoma: defining and measuring opportunities to improve care. Neurooncol Pract 2017;4(3):182-8.
18. Lucendo AJ, Friginal-Ruiz AB. Percutaneous endoscopic gastrostomy: An update on its indications, management, complications, and care. Rev Esp Enferm Dig. 2014;106(8):529-39.
19. Schmidt E. [Percutaneous endoscopic gastrostomy-tube for a patient with glioblastoma to enable his admission into a nursing home]. Wien Med Wochenschr. 2010;160(13-14):328-30.
20. Chan T, Devaiah AK. Tracheostomy in palliative care. Otolaryngol Clin North Am. 2009;42(1):133-41.
21. Jakobsen TBT, Pittureri C, Seganti P, et al. Incidence and prevalence of pressure ulcers in cancer patients admitted to hospice: A multicentre prospective cohort study. Int Wound J 2020;17(3):641-9.
22. Alajbegović A, Loga N, Alajbegović S, Suljić E. Characteristics of symptomatic epilepsy in patients with brain tumours. Bosn J Basic Med Sci. 2009;9(1):81-4.
23. Ostgathe C, Gaertner J, Kotterba M, et al. Differential palliative care issues in patients with primary and secondary brain tumours. Support Care Cancer 2010;18(9):1157-63.
24. Pranckeviciene A, Bunevicius A. Depression screening in patients with brain tumors: a review. CNS oncology 2015;4(2):71-8.
25. Soffiettia R, Cornub P, Delattrec JY, et al. EFNS guidelines on diagnosis and treatment of brain metastases: report of an EFNS Task Force, Eur J Neurol 2006;13:674-81.
26. Clark DE, Ryan LM. Concurrent Prediction of Hospital Mortality and Length of Stay from Risk Factors on Admission. Health Serv Res 2002;37(3):631-45.
27. Boland JW, Allgar V, Boland EG, Kaasa S, Hjermstad MJ, Johnson MJ. Predictors and trajectory of performance status in patients with advanced cancer: A secondary data analysis of the international European Palliative Care Cancer Symptom study. Palliat Med 2019;33(2):206-12.

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Original Article / Orijinal Araştırma

Evaluation of Surgical Procedures Needed for Refugees in a Tertiary Center in Turkey

Türkiye'de Bir Üçüncü Basamak Merkezdeki Mülteciler için Gerekli Cerrahi İşlemlerin Değerlendirilmesi

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Abstract

Objective: Surgical procedures are critical components of healthcare services; however, they are usually neglected during public health interventions due to misperceived high costs and limited benefits. Estimating surgical needs for refugee individuals in the host country would help humanitarian aid planning and strategical development of national surgery capacity for resource allocation. The present research aimed to analyze the surgical procedures of refugees.

Material and Method: 2703 of 15725 hospitalized refugee patients, underwent a surgical procedure during February 2015 and December 2018. Demographic data of the patients such as age and gender, risk classification according to the American Society of Anesthesiologists (ASA), the anesthesia type, type of the surgical procedures, intraoperative blood transfusion rates, admission incidence to intensive care unit (ICU), and mortality rates were recorded. The surgical procedures divided into groups according to the surgical branches and analyzed.

Results: Distribution of two-thirds of the surgical procedures among medical branches was obstetrics and gynecology, orthopedics and traumatology, general surgery and plastic, reconstructive, and aesthetic surgery. The most common surgical procedures were C-section, appendectomy, disorders of bone integrity, and wrist injuries.

Conclusion: Approximately one sixth of the refugee patients treated in our hospital underwent various surgical procedures. Our results should be taken into account by governments in planning humanitarian assistance, budgeting sources, and improving surgical capacity for the rapidly growing number of refugees worldwide. In addition, the support of international organizations such as WHO (World Health Organization) will be needed for a country to meet the health expenses arising from these refugees.
Keywords: Healthcare, refugee, surgery

Öz

Amaç: Cerrahi işlemler sağlık hizmetlerinin kritik bileşenleridir; ancak yanlış algılanan yüksek maliyetler ve sınırlı faydalar nedeniyle halk sağlığı müdahaleleri sırasında genellikle ihmal edilirler. Ev sahibi ülkedeki mülteci bireyler için cerrahi ihtiyaçların tahmin edilmesi, insani yardım planlamasına ve kaynak tahsisi için ulusal cerrahi kapasitesinin stratejik olarak geliştirilmesine yardımcı olacaktır. Bu araştırma ile mültecilerin cerrahi prosedürlerini analiz etmeyi amaçladık.

Gereç ve Yöntem: Şubat 2015 ve Aralık 2018 tarihleri arasında hastaneye yatırılan 15725 mülteci hastadan 2703'ü cerrahi işlem geçirdi. Hastaların yaş ve cinsiyet gibi demografik verileri, American Society of Anesthesiologists'e (ASA) göre risk sınıflandırması, anestezi tipi, anestezi tipi cerrahi işlemler, intraoperatif kan transfüzyon oranları, yoğun bakım ünitesine (YBÜ) kabul oranları ve ölüm oranları kaydedildi. Cerrahi işlemler cerrahi branşlara göre gruplara ayrılarak analiz edildi.

Bulgular: Cerrahi işlemlerin üçte ikisinin tıp dallarına göre dağılımı kadın hastalıkları ve doğum, ortopedi ve travmatoloji, genel cerrahi ve plastik, rekonstrüktif ve estetik cerrahiydi. En yaygın cerrahi prosedürler sezaryen, apendektomi, kemik bütünlüğü bozuklukları ve el bileği yaralanmalarıydı.

Sonuç: Hastanemizde tedavi gören mülteci hastaların yaklaşık altıda birine çeşitli cerrahi işlemler uygulandı. Sonuçlarımız, insani yardımın planlanmasında, kaynakların bütçelenmesinde ve dünya çapında hızla artan sayıda mülteci için cerrahi kapasitenin geliştirilmesinde hükümetler tarafından dikkate alınmalıdır. Ayrıca bir ülkenin bu mültecilerden kaynaklanan sağlık harcamalarını karşılayabilmesi için DSÖ (Dünya Sağlık Örgütü) gibi uluslararası kuruluşların desteğine ihtiyaç duyulacaktır.

Anahtar Kelimeler: Halk sağlığı, mülteci, cerrahi

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INTRODUCTION

An asylum-seeker is identified as an individual who leaves his/her country, takes a refugee to another country and requests international protection because of concerns about his/her life due to war, conflict, attack, natural disaster or about discrimination of race, religion, social status, political view or national identity. According to the report published by the United Nations (UN) High Commissary for Refugees and International UN Department of Economic and Social Affairs, the number of the refugees and those who were forced to leave their home-places has reached to 70.8 million.[1]

Turkey has become a country of asylum and an intense receiving country by the refugee influx which has started with Balkan countries and continued with Middle East, Africa, Asia, and Iraq in 1988 and 1991.[2] Since Turkey is a safe and close country for Syria, Turkey was preferred much for migration after the civil war occurred in Syria.

The refugee rights are preserved within the frame of international law, and the refugees have right of asylum and receiving healthcare services. For the refugees worldwide, 2.78 million surgical procedures are performed every year.[3] However, a limited number of governments and humanitarian aid organizations makes a plan for basic surgical needs of displaced people.[4] However, the estimation of surgical needs for refugee individuals in the host country would help humanitarian aid planning and strategical development of national surgery capacity for resource allocation. The present research aimed to make an analysis on the surgical procedures most of which are performed on Syrian refugees and to evaluate the incidence of surgery need.

MATERIAL AND METHOD

The study was carried out with the permission of Medical Speciality Committee of Konya Training and Research Hospital (Date: 1.11.2018, Decision No: 48929119/774). All procedures were carried out in accordance with the ethical rules and the principles of the Declaration of Helsinki.

The refugee patients who referred to KTRH and had surgery between 1 February 2015 and 31 December 2018 were enrolled into the study. Demographic and surgical procedure data of the patients were accessed from the hospital information system. Total number of refugee patients between 2015 and 2018 were accessed from statistics department of the hospital. Demographic data of the patients such as age and gender, risk classification according to American Society of Anesthesiologists (ASA), the anesthesia type, type of the surgical procedures, intraoperative blood transfusion rate (Erythrocyte suspension; ES or Fresh frozen plasma; FFP), admission incidence to intensive care unit (ICU), and mortality rates were recorded. The surgical procedures implemented were divided into groups according to surgical branches. Diagnoses of the diseases which require surgical procedure most were grouped by diagnosis coding system of "International Statistical Classification of Diseases and Related Health Problems" (ICD-10) in the database recommended by the World Health Organization. Also, diagnoses of the surgical procedures performed on the patients who have died in ICU were classified according to ICD 10 coding system. The surgical procedures were evaluated in 5 groups as follows; A: specific surgical procedures and interventions; B: special surgical procedures and interventions; C: large surgical procedures and interventions; D: moderate surgical procedures and interventions; E: minor surgical procedures and interventions.[5]

Statistical Method

The data obtained in this study were transferred into SPSS for Windows 15.0 (Statistical Package for Social Sciences) computer program and the analyses required were performed on this program. Descriptive statistical methods were used for data evaluation. Continuous data were presented in mean±standard deviation (SD) whereas qualitative data were presented in number and percent.

RESULTS

Totally 262,124 refugee patients have referred to KTRH between February 2015 and December 2018; patients' distribution, according to the years, was presented in **Table 1**. It was detected that 5.9% of the patients were hospitalized, and 17.1% of the hospitalized patients have undergone a surgical procedure. The patients who have undergone a surgical procedure included 1,213 females and 1,490 males with an age average of 26.60±16.47. Distribution of the patients according to age and gender was presented in **Figure 1**, and distribution by ASA classification was shown in **Figure 2**.

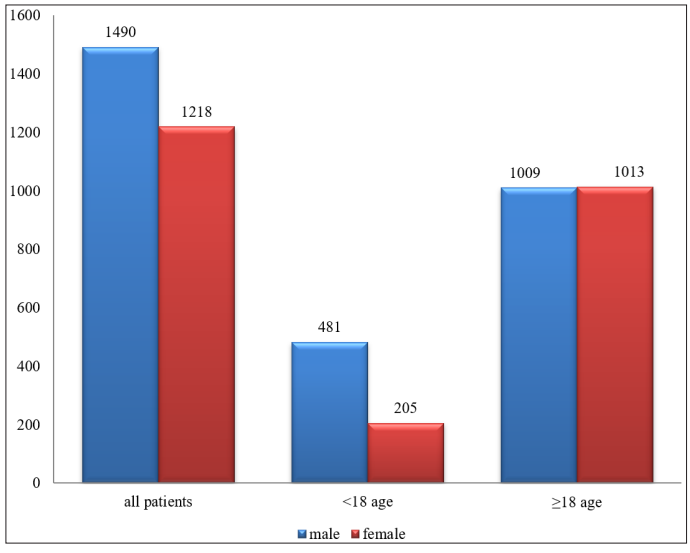

Figure 1. Gender distribution of the patients

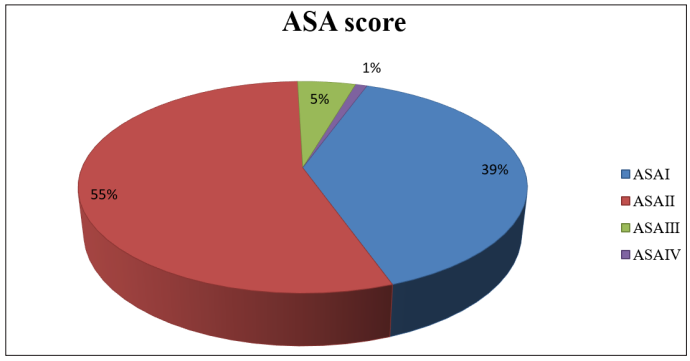

Figure 2. Patient distribution according to ASA classification

Table 1. Patients' Distribution According to Years

	Polyclinic and emergency department referral (n)	Number of the patients hospitalized (n)	Number of the patients who had surgical procedure (n)
2015	19.226	1.519	490
2016	54.744	3.263	1.233
2017	96.144	5.453	475
2018	92.010	5.490	505
Total patient	262.124	15.725	2.703

The general distribution of total surgical procedures according to medical branches for all years was Obstetrics and Gynaecology (24.3%), Orthopaedics and Traumatology (19.1%), General Surgery (14.7%), Plastic, Reconstructive and Aesthetic Surgery (8.7%), Paediatric Surgery (7.9%), Ear-Nose-Throat (7.2%), Urology (5.8%), Neurosurgery (4.6%), Cardiothoracic Surgery (2.7%), Thoracic Surgery (2.3%), Ophthalmic Surgery (2.4%) and Dental Surgery (0.2%). The distribution of the surgical procedures for each medical branch according to each year presented in **Table 2**.

In refugee patients, the most frequently diagnosed diseases requiring surgical intervention, grouped according to the ICD-10 diagnostic coding system is given in **Table 3**.

Table 2. Distribution of All Surgical Procedures According to the Branches

	2015 n (%)	2016 n (%)	2017 n (%)	2018 n (%)
NRS	13 (2.7)	64 (5.2)	28 (5.9)	19 (3.8)
ORTHO	124 (25.3)	234 (19.0)	67 (14.1)	92 (18.2)
PREC	51 (10.4)	94 (7.6)	43 (9.1)	48 (9.5)
URO	31 (6.3)	61 (4.9)	36 (7.6)	29 (5.7)
PC	35 (7.1)	87 (7.1)	54 (11.4)	38 (7.5)
DS	0 (0.0)	5 (0.4)	1 (0.2)	0 (0.0)
GC	72 (14.7)	199 (16.1)	69 (14.5)	58 (11.5)
TC	14 (2.9)	26 (2.1)	9 (1.9)	14 (2.8)
OC	13 (2.7)	20 (1.6)	16 (3.4)	15 (3.0)
ENT	26 (5.3)	123 (10.0)	18 (3.8)	28 (5.5)
OB/GYN	92 (18.8)	283 (23.0)	131 (27.6)	151 (29.9)
CVC	19 (3.9)	37 (3.0)	3 (0.6)	13 (2.6)
TOTAL	490 (100)	1233 (100)	475 (100)	505 (100)

NRS: Neurosurgery; ORTHO: Orthopaedics and Traumatology, PREC: Plastic, Reconstructive and Aesthetic Surgery; URO: Urology; PC: Paediatric Surgery; DS: Dental Surgery; GS: General Surgery; TS: Thoracic Surgery; OS: Ophthalmic Surgery; ENT: Ear-Nose-Throat; OB/GYN: Obstetrics and Gynaecology; CVS: Cardiovascular Surgery

Table 3. ICD Diagnosis Codes Used in Surgical Procedures of the Patients

ICD Diagnosis Codes for surgical clinics	n (%)
1.Plastic, Reconstructive and Aesthetic Surgery	
1.1.(S69) Other and unspecified injuries of wrist, hand and finger(s)	49 (20.8)
1.2.(S66) Injury of muscle, fascia and tendon at wrist and hand level	41 (17.4)
1.3.(Q35)(Q36)(Q37) Cleft palate/cleft lip/cleft lip and palate	11 (4.7)
1.4.Other	135 (57.1)
2. Ophthalmic Surgery	
2.1.(H26) Cataract, other	12 (18.8)
2.2.(H18) Other disorders of the cornea	10 (15.6)
2.3.(H50) Strabismus, other	9 (14.1)
2.4. Other	33 (51.5)
3. Orthopedics and Traumatology	
3.1.(M84) Disorder of continuity of bone	244 (47.2)
3.2.(M17) Gonarthrosis	58 (11.2)
3.3.(Z47) Monitoring related to removal of broken plate and other internal fixator	55 (10.6)
3.4. Other	160 (31.0)
4. General Surgery	
4.1.(K35) Acute appendicitis	130 (32.7)
4.2.(K40) Inguinal hernia	72 (18.1)
4.3.(K80) Cholelithiasis	62 (15.6)
4.4. Other	134 (33.6)
5. Neurosurgery	
5.1.(M53) Other and unspecified dorsopathies, not elsewhere classified	31 (25.0)
5.2.(M51) Intervertebral disc disorders, other	26 (21.0)
5.3.(Q03) Congenital hydrocephalus	15 (12.1)
5.4. Other	52 (41.9)
6. Urology	
6.1.(N21) Calculus of lower urinary tract	68 (43.3)
6.2.(N20) Calculus of kidney and ureter	31 (19.7)
6.3.(N40) Benign prostate hypertrophy	9 (5.7)
6.4.Other	49 (31.3)
7. Paediatric Surgery	
7.1.(K40) Inguinal hernia	65 (30.4)
7.2.(Q53) Undescended testicle	25 (11.7)
7.3.(K35) Acute appendicitis	23 (10.7)
7.4.Other	101 (47.2)
8. Thoracic Surgery	
8.1.(J29) Other disorders of the lung	16 (25.4)
8.2.(C34) Malignant neoplasm of bronchus and lung	7 (11.1)
8.3.Other	40 (63.5)
9. Ear-Nose-Throat	
9.1.(J34) Other and unspecified disorders of nose and nasal sinuses	63 (32.3)
9.2.(J35) Chronic diseases of tonsils and adenoids	77 (39.5)
9.3. Other	55 (28.2)
10. Obstetrics and Gynaecology	
10.1.(O66) Non-progressive labour, other (C section)	571 (86.9)
10.2.(O06) Abortion, undefined	36 (5.5)
10.3.(N93) Other abnormal uterine and vaginal bleeding, other	8 (1.2)
10.4. Other	42 (6.4)
11. Cardiovascular Surgery	
11.1.(I73) Other peripheral vascular diseases, other	20 (27.8)
11.2.(I25) Chronic ischemic heart disease	15 (20.8)
11.3. Other	37 (51.4)

The most common surgical diagnoses in refugee patients were specified by ICD codes; other diagnoses were included in the "other" option.

Distribution of other surgical procedure groups is presented in **Table 4**. Sixty seven (2.5%) patients had a procedure due to cancer.

Table 4. Surgery groups and numbers

Surgery Group	n (%)
A	419 (15.5)
B	796 (29.4)
C	1139 (42.1)
D	241 (8.9)
E	108 (4.0)
Total	2703 (100)

A: Specific surgical procedures and interventions; B: special surgical procedures and interventions; C: large surgical procedures and interventions; D: moderate surgical procedures and interventions; E: minor surgical procedures and interventions.

General anesthesia was the most common type of anesthesia 1273 (47.1%) for surgical procedures performed in patients (**Figure 3**).

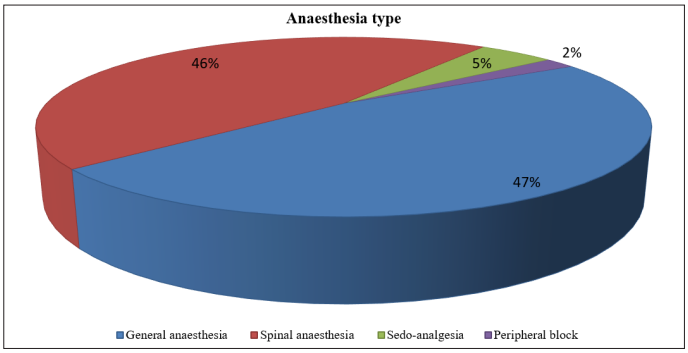

Figure 3. Distribution of the patients according to anaesthesia type

The number of patients who needed blood and blood products during the intraoperative and postoperative period was 234 (8.65%). ES used in 110 (47%) patients; FFP used in 66 (28%) patients, and both ES and FFP used in 58 (24%) patients. The ratio of the patients who admitted intensive care in the postoperative period was 6.8% (n=184). Postoperative mortality developed in 0.8% of 2,703 patients who had undergone a surgical procedure. The surgical procedures performed and ICD-10 diagnoses is shown in detail in **Table 5**.

Table 5. The ICD Diagnosis and the Distribution According to Surgical Clinics of the Patients Who have Developed Mortality

Surgical Clinic	ICD Diagnoses	n (%)
CVS	(I25) Chronic ischemic heart disease	3 (14.1)
	(I34) Mitral valve disorders	1 (4.8)
	(I35) Aortic valve disorders	1 (4.8)
	(I73) Other peripheral vascular diseases	2 (9.5)
GS	(K63) Other disorders of the colon	2 (9.5)
	(C18) Malignant neoplasm of colon	2 (9.5)
NRS	(C71) Malignant neoplasm of brain	2 (9.5)
	(S06) Intracranial injury	2 (9.5)
	(I61) Intracerebral haemorrhage	1 (4.8)
ORTHO	(I26) Pulmonary embolism	1 (4.8)
OB/GYN	(O96) Obstetric death, due to undefined reason	1 (4.8)
PC	(K44) Diaphragmatic hernia	1 (4.8)
ENT	(J35) Chronic diseases of tonsils and adenoids	1 (4.8)
TS	(C34) Malignant neoplasm of bronchus and lung	1 (4.8)
Total number		21 (100)

CVS: Cardiovascular Surgery; GS: General Surgery; NRS: Neurosurgery; ORTHO: Orthopaedics and Traumatology; OB/GYN: Obstetrics and Gynaecology; PC: Paediatric Surgery; ENT: Ear-Nose-Throat; TS: Thoracic Surgery.

DISCUSSION

Turkey stands as a country with the largest refugee population after the migration of more than 3 million Syrians. Political issues are being discussed widely, less is known about the refugees discussed much, less known about its effects on the Turkish health care system.[6-10] There is no data present in the literature, regarding basic surgical procedures performed on refugees. According to the results of this study, it was found that 17% of the refugee patients who were hospitalized in KTRH had undergone a surgical procedure. It has been determined that the surgical clinics that perform the highest number of procedures were obstetrics and gynecology, orthopedics and traumatology, general surgery and plastic, reconstructive and aesthetic surgery departments were respectively. Additionally the most common procedures were C-section, appendectomy, disorders of bone integrity and wrist injuries.

Migration due to war is a serious problem that causes different issues and affects the life of a human. The most aggrieved group is women and children. Refugees have a high fertility rate due to religious beliefs, traditions, political reasons, increasing the population, especially wanting a boy, finding help for household chores.[11] A report on surgical procedures performed on the refugees and asylum-seekers revealed that obstetric and paediatric procedures consisted of a significant part of all operations.[3] In our study, it determined that the highest number of operations in all years was in the obstetrics clinic, and 86.7% of this number was consist of C-section cases. Furthermore, in the present study, the fact that C-section cases constitute approximately 21% of the total number of operated patients can be explained as the reason for group C operations to be higher than other surgery groups.

War is an environment that can affect maternal physiology and children for generations due to the devastating effects of trauma, infectious disease, chemical weapons, and poor nutrition on the biological system.[12,13]

It was reported that perinatal mortality and morbidity doubled and congenital malformations increased from 0.4% to 3% during Sarajevo war.[14] In a study conducted in Yemen, it is revealed that the incidence of congenital anomalies doubled after the war.[15] In a recent study, it was reported that 85 of 479 refugee patients who referred to plastic, reconstructive and aesthetic surgery clinic, had congenital anomalies, and most common congenital abnormalities was cleft palate, cleft lip and hypospadias.[8] In the present study, 11 patients operated because of the cleft palate-cleft lip, and 23 patients underwent surgery due to hypospadias. These results show that the rate of congenital anomaly increases in post-war births.

During the war, exposure to chemical weapons, contamination, and viral infections are several factors blamed for the development of cancers in people.[16] In our study, the rate of cancer cases who underwent surgery in 3 years found to be 2.5%. However, the chance of curative treatment is low, and the incidence of morbidity and mortality is high due to the advanced diagnosis in cancer cases and accompanying additional chronic

problems. In our study, it determined that one-fifth of the cases with mortality were cancer.

Psychosocial risk factors such as low socioeconomic status, lack of social support, life stress, depression, anxiety, and hostility caused by war and migrations have shown to increase the risk of developing coronary heart disease and worsen the clinical process and prognosis.[17,18] The studies comparing refugee patients and non-refugee patients showed that the incidence of coronary heart disease increased in refugee patients.[19,20] Hedlund et al. reported an increase in the incidence of acute myocardial infarction in refugees during the first years of migration, regardless of socioeconomic status.[21] In this study, 72 (2.7%) patients underwent surgery in the cardiovascular surgery clinic for coronary artery bypass graft, heart valve replacement, or peripheral vascular disease, and these cases followed up in the postoperative intensive care unit. Seven of these patients died in the postoperative period. All of these suggest that there is a close relationship between the stress of the migration process and coronary heart disease.

Millions of refugees who forced to leave their countries because of civil war contend with surviving in the host countries. It would be occupational accidents due to reasons such as refugees working in heavy jobs in the countries they are in, job inexperience, lack of experience, and not giving importance to work and worker safety. Since the refugees also work in heavy-duties that require intense labor power, there may be an increase in bone fractures and orthopedic as well as plastic surgery procedures related to work accidents. Although the refugees are physically, socially, and psychologically affected by the war, they had to adopt current social life. A good indicator for this issue is that we showed refugee patients also underwent elective surgical procedures such as; septoplasty/rhinoplasty by 2.7%, mammoplasty in 0.2%, strabismus surgery by 0.3%, cataract surgery by 0.5%.

The location and type of surgical procedure are among the most critical factors in the selection of the anesthesia method to be applied for a surgical procedure. Other factors are the general health status of the patient, the preference of the anesthesiologist's and the patient's, the advantages of this method. Staikou et al. reported that anesthetists in Greece prefer general anesthesia for the refugees and asylum-seekers living in rural areas, and did not prefer regional anesthesia due to language and religious barriers.[22] However, Yazar et al. performed a questionnaire study on Turkish anesthesiologists, which investigate the preference for perioperative anesthesia methods on refugee and asylum-seeker patients, and they reported that 31% of the anesthesiologists prefer general anesthesia rather than regional anesthesia.[23] When the anesthesia methods applied in this study considered, the rates of use of general anesthesia and spinal anesthesia were similar. It was thought that the presence of interpreters and overcoming the language barrier might contribute to this result in our institution.

Intense population increase following the war and migration has caused an increase of demand in health care services. In a recent study reviewing the patient profiles operated in the period covering the years 2009-2014 in Kilis, which is a border province to Syria, reported an increase in the number of A and E group surgeries over the years. The increase in the number of operations in group A and E, especially after 2011, is consistent with the history of the civil war in Syria.[24] In our study, the number of C group surgeries was higher than other groups due to C-Section procedures. War-related trauma cases primarily treating in health units located in the provinces closest to the border. However, our hospital is in a city far from the border, and this difference may have been effective in the small number of group A operations.

Limitation of this study include a retrospective design and since this study was conducted in a single center, it cannot be generalized to the whole country.

There was a limited number of data in the literature regarding the results related to surgery due to trauma or war injury in refugee patients in our country.[8,24] However, elective surgical procedures are also required in these patients, possibly related to the length of the refugee period. We found that one-fifth of the refugee patients admitted to our hospital needed a surgical procedure. The most common surgeries performed in obstetrics and gynaecology, orthopaedics and traumatology, general surgery and plastic, reconstructive and aesthetic surgery fields. The most common surgical procedures were C-section, appendectomy, disorders of bone integrity, and wrist injuries. In addition, it is possible to that a much more intense and complex picture may arise from the situation reflected in our study center due to the relatively intense migration to the health institutions in our country close to the Syrian border. It is apparent that due to the ongoing war in the Middle East, migration to Turkey will continue increasingly and as a consequence demand for health services will keep rising. Therefore, this study, which describes the current situation from a surgical point of view, is to be considered to contribute to the planning of future project areas and priorities.

ETHICAL DECLARATIONS

Ethics Committee Approval: The study was carried out with the permission of Medical Speciality Committee of Konya Training and Research Hospital (Date: 1.11.2018, Decision No: 48929119/774).

Informed Consent: All patients signed the free and informed consent form.

Referee Evaluation Process: Externally peer-reviewed.

Conflict of Interest Statement: The authors have no conflicts of interest to declare.

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

REFERENCES

1. UNHCR (2018) https://www.unhcr.org/globaltrends2018 (Accesed at 20.12.2019).
2. Kirisci K. Refugee movements and Turkey. International migration (Geneva, Switzerland). 1991; 29(4): 545.
3. Zha Y, Stewart B, Lee E, Remick KN, Rothstein DH, Groen RS, et al. Global estimation of surgical procedures needed for forcibly displaced persons. World journal of surgery 2016; 40(11): 2628-34.
4. Meara JG, Leather AJ, Hagander L, Alkire BC, Alonso N, Ameh EA, et al. Global Surgery 2030: evidence and solutions for achieving health, welfare, and economic development. The Lancet. 2015; 386(9993): 569-624.
5. Turkish Medical Association. Available from: http://www.ttb.org.tr/mevzuat/2005ek/sb_yonerge/044.html.
6. Buyuktiryaki M, Canpolat FE, Dizdar EA, Okur N, Simsek GK. Neonatal outcomes of Syrian refugees delivered in a tertiary hospital in Ankara, Turkey. Conflict and health 2015; 9(1): 38.
7. Gungor ES, Seval O, Ilhan G, Verit FF. Do Syrian refugees have increased risk for worser pregnancy outcomes? Results of a tertiary center in Istanbul. Turkish journal of obstetrics and gynecology 2018; 15(1): 23.
8. Bilgen F, Ural A, Bekerecioglu M. Evaluation of Syrian Patients Treated in Our Clinic. Medical Journal of Kahramanmaras Sütcü İmam Univercity 2018; 14(1): 6-9.
9. Oguz S, Tuygun N, Polat E, Akça H, Karacan CD. War and children: Effect of Syria civil war on a pediatric emergency department, 750 km away from the border. J Pediatr Emerg Intensive Care Med 2016; 3(3): 135.
10. Ozdemir U, Tolunay O, Atmis A, Pehlivan D, Celik T, Kazgan ST, et al. Characteristics of refugee patients followed in the pediatric intensive care. J Pediatr Emerg Intensive Care Med 2016; 3(2): 86.
11. Yildirim A. Border Marriage and Border Polygyny. Antropoloji 2001; 29: 131-62.
12. Griffiths BB, Hunter RG. Neuroepigenetics of stress. Neuroscience 2014; 275: 420-35.
13. Gunduz M, Sekmenli T, Ciftci I. Reflection of Syrian Refugees to Pediatric Surgery. Int J Cur Res Rev 2018; 10: 21-4.
14. Simic S, Idrizbegovic S, Jaganjac N, Boloban H, Puvacic J, Gallic A, et al. Nutritional effects of the siege on new-born babies in Sarajevo. European journal of clinical nutrition 1995; 49: S33.
15. Abol-Gaith FM, Ismail NA, Al-Mutawakel AA. The Neonatal Congenital Anomalies: Incidence and Risk Factors Before and After the war at Al-Thawrah Hospital-Sana'a, Yemen. Assiut Scientific Nursing Journal 2019; 7(19): 32-40.
16. Blackadar CB. Historical review of the causes of cancer. World journal of clinical oncology 2016; 7(1): 54.
17. Albus C. Psychological and social factors in coronary heart disease. Annals of medicine 2010; 42(7): 487-94.
18. Roohafza H, Talaei M, Sadeghi M, Mackie M, Sarafzadegan N. Association between acute and chronic life events on acute coronary syndrome: a case-control study. Journal of Cardiovascular Nursing 2010; 25(5): E1-E7.
19. Byberg S, Agyemang C, Zwisler AD, Krasnik A, Norredam M. Cardiovascular disease incidence and survival: are migrants always worse off?. European journal of epidemiology 2016; 31(7): 667-77.
20. Bo A, Zinckernagel L, Krasnik A, Petersen, JH, Norredam, M. Coronary heart disease incidence among non-Western immigrants compared to Danish-born people: effect of country of birth, migrant status, and income. European journal of preventive cardiology. 2015; 22(10): 1281-89.
21. Hedlund E, Lange A, Hammar N. Acute myocardial infarction incidence in immigrants to Sweden. Country of birth, time since immigration, and time trends over 20 years. European journal of epidemiology 2007; 22(8): 493-503.
22. Staikou C, Makris A, Theodoraki K, Tsaroucha A, Douma A, Moka E, et al. Current practice in obstetric anesthesia and analgesia in public hospitals of Greece: a 2016 national survey. Balkan medical journal 2018; 35(5): 394.
23. Yazar MA, Tire Y, Kozanhan B. Communication difficulties in perioperative anesthesia management for immigrant and refugee patients. Medicine Science 2019; 8: 375-80.
24. Kepekci AB. The Effects of Syrian Immigrants on Our Health System: Kilis State Hospital Operating Room Case Profile Changes over Years. Eurasian Journal of Medical Investigation 2019; 3(2): 127-131.

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Original Article / Orijinal Araştırma

Determination of Radiography Requirement with Physical Examination in Elbow Trauma

Dirsek Travmasında Fizik Muayene Bulguları ile Radyografi Gerekliliğinin Belirlenmesi

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Abstract

Objective: The purpose of this study was to estimate the presence of fracture and to determine radiography requirements through results obtained by evaluating the physical examination findings in elbow injury.

Material and Method: This was a single center prospective study. All patients were evaluated in terms of trauma mechanism, inspection findings, presence of pain at palpation, pain with active movement, circulatory examination and loss of sensation. Sensitivity, specificity, positive and negative predictive value (NPV) were determined for each sign and each examination finding.

Results: The study was performed with 47 patients. Fracture was determined in 10 patients (21.2%). Presence of pain at the elbow extansion, forearm supination (FS), medial epicondyle (ME) palpation and forearm pronation tests exhibited high sensitivity (100%, 100%, 90%, and 80%, respectively) and high NPV (100%, 95%, 96.4%, and 91%, respectively) for elbow fracture. These four tests produced significant p values (0.088, 0.012, 0.001, and 0.079, respectively) in elbow fractures. Combining the pain at FS and ME palpation tests exhibited 90% sensitivity, and 96.7% NPV.

Conclusions: Positivity on any one of the four tests employed increases the probability of fracture and is sufficient for elbow radiography to be recommended in patients presenting due to elbow injury. However, radiography may not be required if combined FS and ME palpation test findings are negative in this patients.

Keywords: Elbow fracture, physical examination, radiography requirement, emergency medicine

Öz

Amaç: Bu çalışmada dirsek travmasında fizik muayene ve dirsek eklem fonksiyonlarını ölçen bazı testlerin yapılması ve bu veriler ışığında hangi hastalarda kırık olabileceğinin değerlendirilmesi amaçlanmaktadır.

Gereç ve Yöntem: Bu prospektif klinik çalışmada, tüm hastalar travmanın mekanizması, inspeksiyon bulguları, palpasyon ile ağrı varlığı, aktif hareket ile ağrı varlığı, dolaşım muayenesi ve duyu kaybı açısından değerlendirildi. Tüm semptom ve bulguların sensitivite, spesivite, pozitif prediktif değer ve negatif prediktif değerleri (NPD) istatistiksel olarak belirlendi.

Bulgular: Çalışma 47 hasta ile yürütüldü. Toplamda 10 hastada kırık saptandı (%21,2). Dirsek ekstansiyonu, ön kol supinasyonu (ÖS), medial epikondil (ME) palpasyonu ve ön kol pronasyon testleri ile ağrı varlığının dirsek kırığı için sensitivitesi yüksekti (sırasıyla, %100, %100, %90 ve %80). Dirsek kırığı için bu 4 testin p değeri anlamlı olarak tespit edildi (sırasıyla, 0,088, 0,012, 0,001, and 0,079). ÖS ve ME palpasyon testlerinin birlikte değerlendirilmesinin sensitivitesi %90 ve NPD'si %96,7 olarak tespit edildi.

Sonuç: Kullanılan bu dört testten herhangi birinin pozitif olması kırık olasılığını arttırır ve dirsek yaralanması nedeniyle başvuran hastalarda dirsek radyografisinin önerilmesi için yeterlidir. Ancak bu hastalarda birlikte değerlendirilen ÖS ve ME palpasyon testi bulguları negatif ise radyografi gerekmeyebilir.

Anahtar Kelimeler: Dirsek kırığı, fizik muayene, radyografi gerekliliği, acil servis

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INTRODUCTION

Elbow traumas constitute 2-3% of emergency department presentations.[1,2] The most feared event following acute elbow trauma is complex fracture accompanied by severe neurovascular injury. Cases of missed fracture may also occur under some conditions, such as a simple and undisplaced fracture.[3] The diagnosis of an existing fracture is important since disability may be observed following elbow injuries. However, there is still no specific agreed procedure for the identification of elbow traumas.[4-9]

The ability to determine fractures on direct x-rays in some patients with normal physical examination obliges physicians to request large numbers of x-ray tests. This prolongs emergency department stays, and leads to patients being unnecessarily exposed to radiation, and to increased treatment costs. Results showing that x-ray is not necessary in every case of wrist trauma in recent studies revealed a need for procedures to be followed in elbow trauma.[5-11] Some studies intended to identify those patients for whom x-ray should be requested have reported that extension tests at physical examination may be sufficient,[9] while the most recent studies have shown that the elbow extension test and fracture point tenderness test cannot by themselves exclude elbow injury.[12]

The purpose of this study was to perform various tests measuring elbow joint functions in patients presenting to the emergency department with acute elbow trauma and to identify those patients in whom fractures may be present in the light of the data obtained. The ultimate purpose of all these evaluations was to identify a procedure in the light of clinical examination for determining the need for x-ray requests in patients presenting to hospital with wrist trauma.

MATERIAL AND METHOD

Study Design and Setting

This prospective, single-center study was conducted in an university hospital teaching emergency medicine assistant physicians (50.000 ED visits annually). The study was performed between December 2015 and August 2016 following receipt of ethical committee approval (No. 2013/8).

Patients aged over 18, with elbow trauma and presenting to the emergency department within the first 72 h, and consenting to participate were included in the study. Patients with multiple trauma, clouded consciousness, known neuromuscular disease, trauma in the contralateral elbow or forearm, with open fracture or with another distracting injury were excluded from the study. All patients were examined, and an examination form specially designed for this study was completed for all patients. All patients were evaluated in terms of trauma mechanism, inspection findings, presence of pain at palpation medial epicondyle (ME), lateral epicondyle (LE), olecranon, and radial head (RH), ulnar and median nerve sensation tests, radial-brachial and ulnar artery pulse examination, pain during elbow flexion (EF) and elbow extension (EE), and pain during forearm pronation (FP) and forearm supination (FS).

Methods and Measurements

The emergency department physicians taking part in the study were instructed concerning the standard elbow examination techniques used in it. The examination results of the patients assessed using these techniques were recorded onto a form produced for the study. The physicians examined patients in terms of deformity findings in the affected region, and presence of ecchymosis and swelling, and the data obtained were recorded on the study form. Each patient was evaluated for tenderness when the medial ME, LE, olecranon, and RH were touched. The radial, ulnar, and brachial artery pulses were palpated, and circulation examination was performed. Median and ulnar nerve sensation examinations were performed, and the presence of sensory loss was noted. Patients were also evaluated for presence of pain with active movements (pain at EE and EF, and pain at FP and FS), and the results were recorded on the study form.

Once the physical examinations were complete, and irrespective of the physical examination findings, all patients were sent to the radiology unit for two-sided radiography (anteroposterior and lateral). The recordings were made with a digital x-ray device (Konica Minolta Aero Dr X70). The radiography results were reported by an experienced radiologist blinded to the study findings. Patients with suspected fracture but in whom this could not be confirmed with radiography underwent computerized joint tomography, the results of which were reported by the same radiologist. Computerized joint tomography was performed using a Siemens Sensation 16 Slice device. The presence and location of fracture were recorded for patients with fractures diagnoses using radiography and tomography.

Radiographic examination of elbow bone traumas represented the primary end point for establishing the validity of the proposed criteria in order to determine their predictive value in producing a clinical decision-making tool for the management of such patients. The predictive value of each individual criterion was first calculated separately. Combinations of findings exhibiting the highest predictive values for fracture were then evaluated together.

Statistical Analysis

Statistical analysis was performed on SPSS (Chicago, IL) 21.0 software. Descriptive characteristics (side affected, mechanism of trauma, and dominant hand) were expressed as numbers and percentages. Sensitivity, specificity, and positive and negative predictive values (NPV) for all symptoms and examination findings were expressed as percentages. Incidences of symptoms between fracture and non-fracture groups were analyzed using the Pearson $\chi 2$ and Fisher exact tests. P values < 0.05 were regarded as statistically significant.

RESULTS

Eighty-seven patients presenting to our emergency departments during the study period were included. Twenty-two patients with multiple traumas, two with open fractures,

six unwilling to take part, and 10 with missing records were excluded from the study, which was finally performed with 47 patients. Men represented 78.7% (n=37) of the patients in the study and women 21.3% (n=10). Trauma mechanisms involved falling onto the elbow in 68.1% of cases (n=32), sports injuries in 10.6% (n=5), vehicular accidents in 2.1% (n=1), and other injuries in 19.1% (n=9). Right hand dominance was present in the great majority of patients (97.9%), and the right elbow was the most commonly affected region (59.6%). Fracture was determined in 10 patients (21.2%). The pathological findings of these 10 subjects with fractures are shown in **Table 1**.

The data, and predictive values, of patients with or without fracture determined at physical examination, point palpation and active movements are shown in **Table 2**. Among the clinical findings, pain occurring with EE exhibited the highest sensitivity values, with sensitivity and NPV of 100%. The second highest sensitivity values, at 90%, were pain occurring with FS and ME palpation and NPV of 95.4% and 96.4%, respectively. Pain occurring with FP exhibited sensitivity of 80% and NPV of 91%. These four tests with significant p values (0.088, 0.012, 0.001, 0.079, respectively) in elbow fracture. We also evaluated the sensitivity in determining the presence of fracture by combining the pain test with the FS and ME palpation, these tests with the highest p value (<0.001). The combination of these two tests exhibited 90% sensitivity, 81% specificity, and NPV 96.7%.

Table 1. Details of patients with fractures on elbow radiographs

Radiological diagnosis	Number of patients	Percentage (%)
Radial head fracture	3	30
Medial epicondyle fracture	2	20
Lateral epicondyle fracture	2	20
Supracondylar fracture	1	10
Radial head dislocation	1	10
Proximal ulna fracture	1	10
Total	10	100

Table 2. Predictive values of clinical findings

Findings		Fracture (+) (n=10)	Fracture (-) (n=37)	P value χ2	Sensitivity % (95% CI)	Spesificity % (95% CI)	PPV % (95% CI)	NPV % (95% CI)
Inspection								
Deformity	+	4	6	0.186	40 (13.6-72.6)	83.7 (67.3-93.2)	40 (13.6-72.6)	83.7 (67.3-93.2)
	-	6	31					
Ecchymose	+	4	11	0.704	40 (13.6-72.6)	70.2 (52.8-83.5)	26.6 (8.9-5.5)	81.2 (62.9-92.1)
	-	6	26					
Edema	+	7	16	0.168	70 (35.3-92)	56.7 (39.6-72.4)	30.4 (14-53)	87.5 (66.5-96.7)
	-	3	21					
Pain with palpation								
Medial epicondyle (ME)	+	9	10	0.001	90 (54.1-99.4)	72.9 (55.6-85.6)	47.3 (25.2-71)	96.4 (79.7-99.8)
	-	1	27					
Lateral epicondyle (LE)	+	7	16	0.168	70 (35.3-92)	56.7 (39.6-72.4)	30.4 (14-53)	87.5 (66.5-96.7)
	-	3	21					
Olecranon	+	7	16	0.168	70 (35.3-92)	56.7 (39.6-72.4)	30.4 (14-53)	87.5 (66.5-96.7)
	-	3	21					
Radial head (RH)	+	6	15	0.229	60 (27.3-86.3)	59.4 (42.1-74.8)	28.5 (12.1-52.3)	84.6 (64.2-95)
	-	4	22					
Pain with active movement								
Elbow flexion (EF)	+	9	24	0.242	90 (54.1-99.4)	35.1 (20.7-52.5)	27.2 (14-45.7)	92.8 (64.1-99.6)
	-	1	13					
Elbow extension (EE)	+	10	26	0.088	100 (65.5-100)	39.7 (16.4-47.1)	27.7 (14.7-45.4)	100 (67.8-100)
	-	0	11					
Forearm supination (FS)	+	9	16	0.012	90 (54.1-99.4)	56.7 (39.6-72.4)	36 (18.7-57.3)	95.4 (75.1-99.7)
	-	1	21					
Forearm pronation FP)	+	8	17	0.079	80 (44.2-96.4)	54 (37.1-70.1)	32 (15.7-53.5)	91 (69.3-98.4)
	-	2	20					
Circulatory examination								
Brachial artery pulse	+	10	36	1.000	100 (65.5-100)	2.7 (0.1-15.8)	21.7 (11.4-36.7)	100 (5.4-100)
	-	0	1					
Radial artery pulse	+	10	36	1.000	100 (65.5-100)	2.7 (0.1-15.8)	21.7 (11.4-36.7)	100 (5.4-100)
	-	0	1					
Ulnar artery pulse	+	9	36	0.384	90 (54.1-99.4)	2.7 (0.1-15.8)	20 (10-35)	50 (26.6-97.3)
	-	1	1					
Loss of sensation								
Ulnar nerve	+	0	1	1.000	0 (0-34.4)	97.2 (84.1-99.8)	0 (0-94.5)	78.2 (63.2-88.5)
	-	10	36					
Median nerve	+	1	0	0.213	10 (0.5-45.8)	100 (88.2-100)	100 (5.4-100)	80.4 (65.6-90.1)
	-	9	37					
Combined test								
FS + ME palpation	+	9	7	<0.001	90 (54.1-99.4)	81 (64.2-91.4)	56.2 (30.5-79.2)	96.7 (81.4-99.8)
	-	1	30					

PPV: positive predictive value, NPV: negative predictive value

DISCUSSION

We determined that pain at EE was 100% sensitive for diagnosis of fracture. The occurrence of pain with the FS and palpation of the ME in patients with trauma was 90% sensitive in diagnosing fracture, while pain at FP was 80% sensitive in the presence of pain. These four tests, being capable of rapid, simple and practical application, emerged as physical examination findings with high sensitivity and significant p values in determining the presence of fracture in elbow injuries. When we evaluated FS and palpation of the ME of the humerus, the two tests with the highest p values, this combination exhibited 90% sensitivity in identifying the presence of fracture.

Due to a lack of specific rules concerning which patients should be sent for radiography in elbow trauma, one of the most common reasons for presentation to the emergency department, a number of studies have been performed on this subject.[1,2] One study of 145 patients by Hawksworth et al.[9] described the EE test as an important marker in showing the presence of injury, with sensitivity of 90.7% and specificity of 69.5%. They also reported that if the patient is able to achieve full extension, the probability of significant injury is only 9.3%. In a similar study of 114 patients, Docherty et al.[8] described full extension as a practical marker in the emergency department, with 97% sensitivity and 69% specificity, and reported that this test reduced radiography requirements in patients presenting with elbow trauma by 50%. All of the patients with determined fractures in our study were unable to achieve full EE, and the EE test exhibited 100% sensitivity and 39.5% specificity in identifying the presence of fracture. Our study confirms those previous studies, revealing a high probability of injury in patients with positive EE tests, and the need to refer these for radiography.

Appelboam et al.[4] reported a NPV for the EE test of 98.4%, with a negative likelihood ratio of 0.03. Based on these values, they concluded that EE had high specificity and NPV, that the test was practicable in the emergency department, and that radiography requirements for patients presenting with elbow trauma would be reduced by a quarter. They also concluded that the likelihood of fracture appearing at x-ray on patients unable to achieve full extension was approximately 50%. We obtained similar results in the present study, with EE exhibiting 100% sensitivity and NPV in determining the presence of fracture.

Lennon et al.[2] concluded that a patient able to perform the same range of elbow movements in both elbows, affected and unaffected by trauma, could safely be discharged, that there was no need for patients able to perform normal extension, flexion and supination to be sent for x-ray, but that there was a risk, albeit a low one, of inability to identify pathology at x-ray in adult patients even if physical examination is normal. Darracq et al.[13] expressed a different opinion, reporting that equal ranges of elbow movement in both arms, affected and unaffected by trauma, considerably reduced the probability of determining fracture in these patients. In our study, EE, FS and FP tests and presence of pain at palpation of the ME had high sensitivity and specificity, whereas the EF test was not statistically significant in determining the presence of fracture. A combination of FS and ME palpation tests was statistically significant (p=<0.001) and exhibited 90% sensitivity.

Arundel et al.[14] reported that a combination of the ability to perform full extension, absence of pain or tenderness with application of pressure to either the RH, the olecranon or the ME, and the absence of contusion-ecchymosis was 100% sensitive and 24% specific in determining fracture in elbow trauma. In our study, the presence of pain at palpation of the RH and olecranon was not statistically significant in determining the presence of fracture (p=0.229, 0.168, respectively), and only pain at pressure on the medial epicondyle was significant (p=0001), with sensitivity of 90% and specificity of 72.9%. The EE test in the present study was 100% specific. The statistical significance of FS and ME palpation tests was higher in our study, and due to the high sensitivity, specificity and NPV values of a combination of these two tests in identifying the presence of fracture, we think that this combination is suitable for determining the presence of fracture in the emergency department. Kim et al.[12] also reported that the use of the EE test alone or the single point tenderness test alone could not exclude elbow injuries. In our study, too, use of the EE test alone was not appropriate, while a combination of FS and ME palpation tests was more suitable.

Limitations

The principal limitation of this study is the low patient number. The main reason for this low number is that only isolated elbow traumas were included and injuries accompanying multitrauma were excluded. A second important limitation is that range of elbow movement was not included in the physical examination findings. According to Darracq et al.'s study[13], the addition of these parameters with high sensitivity in determining elbow traumas to physical examination findings, and to the combination of results obtained will result in more significant results in determining the presence of fracture.

CONCLUSIONS

Positivity on any one of the four tests (EE, FS, ME palpation, and FP tests) employed increases the probability of fracture and is sufficient for elbow radiography to be recommended in patients presenting due to elbow injury. However, radiography may not be required if combined FS and ME palpation test findings are negative in this patients, and this can significantly reduce the numbers of non-essential radiographs performed.

ETHICAL DECLARATIONS

Ethics Committee Approval: For this research; Karadeniz Technical University Faculty of Medicine Ethic Council approval was obtained (Date: 29,08,2013 number: 2013/35).

Informed Consent: All patients signed the free and informed consent form.

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REFERENCES

1. Freed HA, Shields NN. Most frequently overlooked radiographically apparent fractures in a teaching hospital emergency department. Ann Emerg Med. 1984;13(10):900-4.
2. Lennon RI, Riyat MS, Hilliam R, Anathkrishnan G, Alderson G. Can a normal range of elbow movement predict a normal elbow x ray? Emerg Med J. 2007;24(2):86-8.
3. Nalbantoğlu U, Gereli A. Fracture dislocations of the elbow: overview and classification. TOTBID Derg 2014; 12:51-56.
4. Appelboam A, Reuben AD, Benger JR, et al. Elbow extension test to rule out elbow fracture: multicentre, prospective validation and observational study of diagnostic accuracy in adults and children. BMJ. 2008;337:a2428.
5. Stiell IG, Greenberg GH, McKnight RD, et al. Decision rules for the use of radiography in acute ankle injuries. Refinement and prospective validation. JAMA. 1993;269(9):1127-32.
6. Stiell IG, Wells GA, McDowell I, et al. Use of radiography in acute knee injuries: need for clinical decision rules. Acad Emerg Med 1995;2:966-73.
7. Perry JJ, Stiell IG. Impact of clinical decision rules on clinical care of traumatic injuries to the foot and ankle, knee, cervical spine, and head. Injury 2006;37:1157-65.
8. Docherty MA, Schwab RA, Ma OJ. Can elbow extension be used as a test of clinically significant injury? South Med J 2002;95:539-41.
9. Hawksworth CR, Freeland P. Inability to fully extend the injured elbow: an indicator of significant injury. Arch Emerg Med 1991;8:253-6
10. Turkmen S, Cansu A, Karaca Y, et al. Determination of radiography requirement in wrist trauma. Am J Emerg Med. 2015;33(9):1269-72.
11. Karaca Y, Turkmen S, Cansu A, et al. A study to develop clinical decision rules for the use of radiography in wrist trauma: Karadeniz wrist rules. Am J Emerg Med. 2016;34(11):2074-8.
12. Jie KE, van Dam LF, Verhagen TF, Hammacher ER. Extension test and ossal point tenderness cannot accurately exclude significant injury in acute elbow trauma. Ann Emerg Med. 2014;64(1):74-8.
13. Darracq MA, Vinson DR, Panacek EA. Preservation of active range of motion after acute elbow trauma predicts absence of elbow fracture. Am J Emerg Med. 2008;26(7):779-82
14. Arundel D, Williams P, Townend W. Deriving the East Riding Elbow Rule (ER2): a maximally sensitive decision tool for elbow injury. Emerg Med J. 2014;31(5):380-3.

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Original Article / Orijinal Araştırma

Psychoeducation Sessions with Caregivers of Patients with Terminal Stage Cancer, A Qualitative Study

Terminal Dönem Kanserli Hastaların Bakım Verenleri ile Psikoeğitim Oturumları, Niteliksel Bir Çalışma

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Abstract

Aim: The aim of this study was to evaluate the psychoeducation sessions we held with the caregivers of advanced terminal cancer patients in our palliative care center in terms of the physical, psychological, social and economic problems experienced by the participants.

Material and Method: It is a qualitative study in which the impressions of the palliative care team were evaluated in the psychoeducation sessions held with the caregiver relatives of terminal cancer patients between September 1 and December 31, 2019 at Tokat Gaziosmanpaşa University Palliative Care Center. A total of 68 caregiver relatives attended 11 sessions. In the sessions, notes were taken by the palliative care team with the permission of the participants. By categorizing the data, the most common problems and needs of the relatives of the patients were determined.

Results: The mean age of the participants was 47.8±13.9 and 60.3% were female. The most common physical problems in the participants wereinsomnia, headache and loss of appetite. Participants stated their emotional changes as helplessness, stress, anger, sadness and loneliness. The lack of knowledge about the disease and treatment process was observed in the majority of the participants. In our psychoeducation sessions, the participants stated that talking about their feelings and experiences and feeling that they were understood made them 'very comfortable and realized that they desperately needed it'.

Conclusion: Meeting with the relatives of patients who have similar problems and enabling them to express their problems in the presence of experts will be beneficial in terms of awareness, insight and education.

Keywords: Cancer, caregiver, palliative care

Öz

Amaç: Palyatif bakım merkezimizde ileri evre terminal dönem kanser hastalarının bakım veren yakınları ile yaptığımız psikoeğitim oturumlarının, katılımcıların yaşadığı fiziksel, psikolojik, sosyal ve ekonomik sorunlar açısından değerlendirilmesi amaçlanmıştır.

Gereç ve Yöntem: Tokat Gaziosmanpaşa Üniversitesi Palyatif Bakım Merkezi'nde 1 Eylül- 31Aralık 2019 tarihleri arasında terminal dönem kanserli hastaların bakım veren yakınları ile yapılan psikoeğitim oturumlarında palyatif bakım ekibinin izlenimlerinin değerlendirildiği niteliksel bir çalışmadır. 11 oturuma toplam 68 bakım veren hasta yakını katılmıştır. Oturumlarda, katılımcılardan izin alınarak palyatif bakım ekibi tarafından notlar alındı. Veriler kategorize edilerek hasta yakınlarının en sık yaşadıkları problemler ve gereksinimler saptanmıştır.

Bulgular: Katılımcıların ortalama yaşı 47,8±13,9 ve %60,3'i kadındı. Katılımcılarda en sık karşılaşılan fiziksel sorunlar; uykusuzluk, baş ağrısı ve iştahsızlık olduğu görülmüştür. Katılımcılar yaşadıkları duygu değişimlerini çaresizlik, stres, öfke, üzüntü ve yalnızlık olarak belirtmişlerdir. Hastalık ve tedavi sürecine ilişkin bilgi eksikliği katılımcıların çoğunluğunda gözlemlendi. Psikoeğitim oturumlarımızda, katılımcılar yaşadıkları duygu ve deneyimlere ilişkin konuşmanın ve anlaşıldıkları hissetmenin, kendilerini 'çok rahatlattığını ve buna fazlasıyla ihtiyaç duyduklarının farkına vardıklarını' ifade ettiler.

Sonuç: Benzer sorunlar yaşayan hasta yakınları ile buluşup uzmanlar eşliğinde sorunlarının dile getirmelerinin sağlanması farkındalık, içgörü ve eğitim anlamında fayda sağlayacaktır.

Anahtar Kelimeler: Kanser, bakım veren, palyatif bakım

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INTRODUCTION

Cancer, one of the most important problems of modern medicine and human beings today, is perceived in society as a disease that evokes death in pain, together with uncertain medical status. It is a chronic disease that consists of many psychological and social components and affects the family and social environment of the person as well as the patient. It creates feelings such as fear, hopelessness, helplessness, guilt, abandonment in the patient. Learning of having cancer creates a situation that requires the individual to adapt to the threat of illness and death from a healthy life.[1,2]

The World Health Organization has defined palliative care as a patient-centered treatment approach aimed at early detection and treatment of physical, psychosocial and spiritual problems, especially pain, in order to increase the quality of life of patients and their relatives who encounter a life-threatening illness.[3] Beyond being a patient-focused approach, palliative care also evaluates and tries to resolve the psychosocial and spiritual needs of patients' relatives.[4] Since the caregiver is in the daily life of the patient, as his/her responsibilities and burden increase, she/he enters into a one-way, dependent and long-term obligation that forces his life.[5,6] As much as the caregiving to a loved one provides positive emotions such as satisfaction and love; it can also cause negative emotions such as anger, grief, guilt, anxiety, fear and sadness.[7,8] However, caregivers are one of the main sources of emotional and social support for the patient in the face of the difficulties of the disease and treatment.

Informing in advance about the problems that may be caused by the care burden enable the caregivers to pass this process more easily. As an example of the difficulties experienced by caregivers; psychological difficulties, physical health problems, social and economic difficulties, feeling of not being in control, deterioration of interpersonal relations.[9] Collaborating with the professional team helps caregivers cope with the process. Considering that palliative care is not only patient-focused, it also deals with the physical and mental needs of patients' relatives; It has been reported in previous studies that caregivers should be added to treatment programs and adaptation processes should be followed.[10] For these purposes, psychoeducation sessions are organized for patients and their relatives in many professional palliative care centers. Psychoeducation as a definition is an educational intervention that helps people and their relatives to accept the current illness and thus leads them to cooperate for treatment.[11] The aim of psychoeducation is to identify the psychological, social, economic, interpersonal and physical health problems that patients and their relatives encounter during the caregiving process and to provide solutions or support in line with their needs. The psychosocial problems and needs of patients' relatives should be evaluated holistically. Physical, emotional and social problems that occur in patients and their relatives are handled comprehensively in palliative care units and solutions are sought.

There are limited number of studies in the literature on the difficulties experienced by the relatives of the patients. In this study, we aimed to evaluate the psychoeducational sessions we conducted in our palliative care center in terms of physical, psychological, social and economic problems experienced by the caregivers and to contribute to the literature.

MATERIAL AND METHOD

Focus Group Discussions

The study was carried out with the permission of Tokat Gaziosmanpaşa University School of Medicine Ethical Committe (Date: 09.01.2020, Decision No: 19-KAEK-264). All procedures were carried out in accordance with the ethical rules and the principles of the Declaration of Helsinki. It is a qualitative study in which the impressions of the palliative care team were evaluated in the psychoeducation sessions that carried out with patients' caregivers, held between September 1 and December 31, 2019 about caregivers' experiences during this disease stage. The information obtained from the relatives of patients taking care of terminal cancer patients who voluntarily participated in our study was used. We took participants' written consent in order to publish their shares. Our interviews were held with 5-8 participants. A total of 68 caregiver relatives attended 11 sessions. The notes taken by the palliative care team in the sessions were categorized and the most common problems and needs of the relatives of the patients were determined. The inclusion criteria were that the participants being older than 18 years of age and having no communication problems.

Psychoeducation Sessions

Relatives of patients who cared for patients with cancer in Tokat Gaziosmanpaşa University Palliative Care Center attended the sessions. Sessions were held once a week in the training room of the Palliative Care Unit and it was carried out by a team of 1 psychologist, 1 responsible physician and 1 nurse. At the beginning of the session, patient relatives and team members introduce themselves. An educational presentation about palliative care goals and operations was made for the relatives of the patients. The purpose of the group sessions was conveyed to the relatives of the patients. Patient relatives filled out the sociodemographic data form prepared by us. Relatives of patients were asked to share the difficulties they have experienced during the patient care process, their feelings and experiences, and the methods they use to cope with these problems. During the group sessions attended by the relatives of the patients, the topics discussed, the problems they experienced and the emotions they expressed are observed and notes were taken with the permission of the participants.

RESULTS

Eleven sessions were held between September and December 2019, and a total of 68 patient relatives participated in the study. The mean age of the participants was 47.8±13.9 and 60.3% were female. Demographic data are shown in **Table 1**.

Table 1. Age, gender and kinship data of participants

Mean Age		47.8±13.9
Gender	Female	41 (60.3%)
	Male	27 (39.7%)
Kinship	Child	38 (55.9%)
	Partner	24 (35.3%)
	Sibling	6 (8.8%)

Participants were asked to share their own experiences, problems and psychological states regarding the diagnosis and treatment processes of the disease. When the answers of the participants were examined, the most common physical problems were insomnia, headaches and loss of appetite. Participants who had chronic illnesses (diabetes mellutis, hypertension, etc.) stated that they had health problems because they disrupted their own health checks and treatments. However, younger participants who cared for their parents stated that they had their own cancer screening examinations after learning the diagnosis of the disease and that they experienced intense fear of illness and death. Examples of the caregivers' sharing about their own health status were given below.

"I was admitted to the hospital to be operated on for a herniated disc. The surgery was postponed because my blood pressure was high. Meanwhile, my husband had become this disease. Since then, I take care of my husband. My pain increased a lot, but now I forgot myself." (Patient's wife, 74 years old)

"Bel fıtığından ötürü ameliyat olmak için hastaneye yattım. Tansiyonum yüksek gittiği için ameliyatı ertelediler. O arada kocamın bu hastalığı çıktı. O gün bugündür kocamın bakımını yapıyorum. Ağrılarım çok arttı ama artık unuttum ben kendimi."

"After learning of my mother's illness, the fear of cancer and death took over my mind. I don't want to experience the same things… (Crying)… My brothers and I both had our check-ups. Any problem was not detected, thank goodness. But I'm so afraid." (Patient's daughter, 42 years old)

"Annemin hastalığını öğrendikten sonra kanser ve ölüm korkusu aklımı esir aldı. Aynı şeyleri yaşamak istemiyorum… (Ağlamalar)… Kardeşlerim de ben de kontrollerimizi yaptırdık. Bir şey çıkmadı çok şükür. Ama çok korkuyorum."

In our study, the participants stated the emotional changes they experienced as helplessness, stress, anger, sadness and loneliness. In our sessions, it was observed that the relatives of the patients had a lot of difficulty because of the anger of the patients they cared for and they did not know how to deal with it. The facts that patients were exposed to their anger, the feeling of 'inadequacy' they feel as a result and their 'not being able to complain' to anyone around them because they are afraid of social judgment has been expressed by caregivers as being driven into complete despair and loneliness. However, when the relatives of the patients were encouraged in our interviews, they stated that; not anger or criticism, despite the difficult caregiving self-sacrifice they have made; on the contrary, they emphasized their expectations of appreciation from their patients and their environment. Relatives of the patients, who stated that their lives changed drastically after the diagnosis of their patients, felt very restricted, especially in terms of freedom.

Lack of information about the disease and treatment process was observed in the majority of the participants. It was observed that the relatives of the patients did not feel confident enough about 'care', they expected help, and some caregivers had problems due to the financial burden of the necessary materials. It was observed that some relatives of the patients complained about not getting enough information about the course of the disease. The fact that the length of this process cannot be clearly predicted and that there is no positive development in the course of the disease makes this situation "unbearable" in the words of the patient's relatives. However, it was observed that they were hesitant to inform the patients about their diagnosis and treatment processes, and when they decided to tell, they did not know how to say it, which created a serious psychological burden. In addition, it was observed that some patients' reluctance to accept their illness and their insistence on continuing their routine physical activities put their relatives in a difficult situation. A few of the participants' shares on the subject are given below.

"My husband is a very good person. He does not hurt anyone. It drives me crazy that he suffers like this and that the disease never regresses and that I can't do anything. I am very sorry. I get mad at myself about the old days. If I had taken care of him more, maybe this disease would have been detected at an earlier stage… (Crying)…" (Patient's wife, 64 years old)

"Benim kocam çok iyi bir insandır. Hiç kimseyi incitmez. Onun böyle acı çekmesi ve hastalığın hiç gerilememesi, benim de elimden bir şey gelmemesi çıldırtıyor beni. Çok üzülüyorum. Eskileri düşünüp kendime kızıyorum. Onunla daha çok ilgilenseydim belki daha erken evrede anlaşılırdı bu hastalık… (Ağlamalar)…"

"He gets angry with me when he has pain. Do not pay no attention about that he is staying calmly on the bed nowadays. He did not give me peace when he was healthy. He would get angry at the smallest thing and kick me out of the house. I am caring him for God's sake." (Patient's wife, 53 years old)

"Ağrıları oldukça bana kızıyor. Sen bakma hocam şimdi böyle sakin sakin yattığına. Az çektirmedi bana sağlığında da. En ufak şeye kızıp kovardı beni evden. Ben şimdi Allah rızası için bakıyorum kendisine."

"My daughters are very angry with me. They say, 'Aren't we your children?' My sister's illness turned my life upside down, too. I go home, I can't be sufficient for my family, I come to the hospital, I can't be sufficient for my patient. I'm not sleepy or anything. My psychological status is so bad… (Crying)…" (Patient's sister, 39 years old)

"Kızlarım bana çok kızıyor. 'Biz senin çocukların değil miyiz?' diyorlar. Ablamın hastalığı benim de hayatımı alt üst etti. Eve gidiyorum oraya yetemiyorum, hastaneye geliyorum hastama yetemiyorum. Ne uykum kaldı ne bir şey. Psikolojim çok kötü… (Ağlamalar)…"

"I can't remember the last time I did something for myself or went out for coffee with a friend. Problems continue at work. I used all my leave. Aside from the burden of the disease, the fear of being unemployed keeps me awake." (Patient' son, 34 years old)

"En son ne zaman kendim için bir şey yaptım, ne zaman bir arkadaşımla kahve içmeye çıktım hatırlamıyorum. İş yerinde de sorunlar devam ediyor. İzinlerimin hepsini kullandım. Hastalığın yükü bir yana işsiz kalma korkusu uykularımı kaçırıyor."

When the relatives of the patients were asked how they tried to relax themselves psychologically during this difficult process, it was seen that one of the most frequently used methods was religious activities. The belief in God and the belief that illness is a "test" given by God made this situation "more bearable", in the words of caregivers, for the relatives of the patients. In addition, another issue that attracted our attention was the emphasis of caregivers that they felt 'much more competent' during the periods when they could receive social support from their close circle.

Through our psychoeducational sessions, which only focused on caregivers, the participants stated that talking about their feelings and experiences made them 'very comfortable and realized that they desperately needed it'.

DISCUSSION

Our study was carried out by evaluating the impressions and notes of our team in the psychoeducation sessions we held with the caregivers of the terminal cancer patients we followed in our palliative care service. During the group sessions with the relatives of the patients, the participants were asked to express their feelings and share the problems they experienced. It has been observed that relatives of cancer patients generally experience emotional and psychological problems. It has been beneficial in terms of talking about effective coping mechanisms regarding the problems they experience during the caregiving process and discussing the alternative options.

In our study, besides the responses of the participants stating that health problems increased during the caregiving process, the responses of the participants stated that they had health check-ups more regularly in order not to experience a similar process with the patients they care for. This situation may be regarded as a positive result by the reason of increased awareness about cancer. Similar results have been shown in the literature. In a study conducted with 120 participants caring for their relatives with cancer diagnosis, it was reported that the health of all participants was adversely affected.[12] Aktas et al. in the qualitative study consisting the relatives of patients receiving chemotherapy, the participants stated that they ignored their health for some time due to the long sickness period they experienced. On the other hand, the same study showed that the relatives gained increased awareness against the cancer during their caregiver function and acted promptly about the screenings.[13]

In our sessions, the participants shared about the social, economic and psychological difficulties they experienced during the caregiving process. Apart from the mood changes such as sadness helplessness and anger, the restriction of their freedom in social life were the problem that was frequently shared in the sessions with the relatives of the patients. The economic burden caused by treatment during the disease process was another problem that strongly occupies the families. In a similar study, Özhan et al. revealed that 56.7% of cancer patients' relatives experience depression.[14] Karakartal, in his study with the relatives who care for the cancer patients, stated the psychological problems experienced by the participants were helplessness, anxiety and hopelessness. Again, in the same study, the themes of restriction of the social life of the participants and deterioration of their economic status were emphasized.[15] In a similar study in which the loss of social roles and economic problems were emphasized, it was stated that the participants needed moral and companion support.[16]

There are limited studies in the literature on the methods of coping with the problems of the relatives of patients who experience many psychological, social and economic problems. In a study conducted with the relatives of palliative care patients, it was shown that 91% of the participants tried to cope with the problems in the disease process through religious methods and 65.5% through social support.[17] Similarly, in our study, the participants stated religious rituals and belief in God in coping.

CONCLUSION

While there are many applications beneficial psychologically and physically to the patients who are at terminal stage and need care, the problems of the relatives of the patients who are in this process are ignored. Meeting with the relatives of patients who have similar problems and enabling them to express their problems in the presence of professionals will be beneficial in terms of awareness, insight and education. In addition, informing caregivers about the methods of coping with these problems will contribute positively to the quality of life of both themselves and the patients they care for. We would like to emphasize that these meetings, which are held together with professionals, can lead to positive results for patients' relatives and subsequently for patients

ETHICAL DECLARATIONS

Ethics Committee Approval: The study was carried out with the permission of Tokat Gaziosmanpaşa University School of Medicine Ethical Committe (Date: 09.01.2020, Decision No: 19-KAEK-264).

Informed Consent: All patients signed the free and informed consent form.

Referee Evaluation Process: Externally peer-reviewed.

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REFERENCES

1. Şahin H, Kocamaz D, Yıldırım M. Kanser sürecinde psikolojik sorunlar ve psiko-onkoloji. Zeugma Health Res. 2020;2(3):136-141.
2. Özkan, S. (1993). Psikiyatrik tıp: Konsültasyon-liyezon psikiyatrisi. Roche.
3. World Health Organization.WHO definition of palliative care. 2011; Available at: http://www.who.int/cancer/palliative/definition/en/ (Erişim Tarihi:05.07.2021)
4. Atagün, M. İ., Balaban, Ö. D., Atagün, Z., Elagöz, M., & Özpolat, A. Y. (2011). Kronik hastalıklarda bakım veren yükü. Psikiyatride Güncel Yaklaşımlar, 3(3), 513-552.
5. Cubukcu M. Evaluation of quality of life in caregivers who are providing home care to cancer patients. Support Care Cancer. 2018;26(5):1457-1463.
6. Silver JH, Wellman N. Family caregiver training is needed to improve outcomes for older adults using home care technologies. J Am Diet Assoc 2002; 102:831-836.
7. DePalma J.A. Caregiver Burden: Resources and Research. Home Health Care Management Practice. 2002; 14(2): 151-152.
8. Lund M. Caregiver, take care. Geriatr Nurs. 2005; 26: 152-3.
9. İnci F.H. ve Kartal A. Yaşlıya Bakım verici Bireylerin Birlikte Yaşama Güçlüklerinin Belirlenmesi, IV. Ulusal Yaşlılık Kongresi, Antalya, 2007; s: 196-204.
10. McElroy H. Male caregivers of spouses with alzheimer's disease: risk factors and health status. American Journal of Alzheimer's Disease and Other Dementias, 2001;16(3).
11. Donker T, Griffiths KM, Cuijpers P et al. (2009). Psychoeducation for depression, anxiety and psychological distress: a meta-analysis. BMC Medicine, 7 (79): 1-9.
12. Karabuğa-Yakar H, Pinar R. Kanserli hastalara bakım veren aile uyelerinin yaşam kalitesi ve yaşam kalitesini etkileyen faktorlerin değerlendirilmesi. Hemşirelikte Araştırma Geliştirme Dergisi 2013; 15: 1-16.
13. Aktaş E, Barış N, Hıdıroğlu S, Save D. Kemoterapi Alan Hastalarin Yakınlarının Deneyimleri: Niteliksel Bir Çalışma. Ege Üniversitesi Hemşirelik Fakültesi Dergisi 2012; 28 (2) : 63-78
14. Özhan, E. (2019). Kanser Hastalarının Yakınlarının Psiko-Sosyal Durumlarının Değerlendirilmesi: Eyüpsultan Devlet Hastanesi Palyatif Bakım Merkezi Örneği. Yayınlanmamış yüksek lisans tezi, Sakarya Üniversitesi.
15. Karakartal, D.(2017). Tedavi Sürecindeki Kanserli Hastaya Bakım Veren Hasta Yakınlarının Yaşadıkları Sorunların İncelenmesi. Uluslararası Beşeri Bilimler ve Eğitim Dergisi,3(2),96-109.
16. Turgut AŞ, Soylu G. Palyatif bakım hasta yakınları ile nitel bir çalışma. Toplum ve Sosyal Hizmet 2020; 31(2): 460-476.
17. İlhan, H. (2018). Palyatif Bakım Hastalarının Bakıcılarında Tükenmişlik Düzeylerinin Sosyal Yaşamları Üzerindeki Etkisi. Yayınlanmamış Yüksek Lisans Tezi, Tokat Gaziosmanpaşa Üniversitesi.

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CONTEMPORARY MEDICINE

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Original Article / Orijinal Araştırma

Evaluation of Knowledge Levels of Individuals In Tokat City About Dental Implant Treatments: A Survey Study

Tokat Şehrindeki Bireylerin Dental İmplant Tedavileri Hakkındaki Bilgi Düzeylerinin Değerlendirilmesi: Anket Çalışması

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Abstract

Aim: Dental implant treatment is considered the gold standard today for the elimination of tooth loss. In this study; it was aimed to evaluate the knowledge levels of patients about dental implant treatments which ones referred to the Tokat Gaziosmanpaşa University Faculty of Dentistry, Clinic of Prosthetic Dentistry.

Material and Method: A total of 296 patients, 166 women and 130 men, participated in the study. A multiple-choice standardized questionnaire containing questions about demographic information and implant treatment was applied to the patients. People who had implants before, had no tooth deficiency and had no knowledge of implant treatment were not included in the study.

Results: 42.2% of the patients obtained information about implants from doctors or dentists. 74.7% of the participants preferred to have the implant surgery phase done by a maxillofacial surgeon, and 66.2% preferred to have prosthesis over the implant done by a prosthesis specialist. When the questionnaire responses of the patients were evaluated with the age variable, it was observed that the awareness level of the individuals under the age of 35 about dental implants was statistically significantly higher ($p<0.05$).

Conclusion: When the results of this study were evaluated, it was seen that individuals who needed prosthetic dental treatment due to tooth deficiency did not have sufficient knowledge about dental implants. In order to provide patients with more accurate information about dental implants, it is necessary to reach the resources that patients use to obtain information.

Keywords: Dental implants, implant-supported dental prosthesis, knowledge, awareness, patients

Öz

Amaç: Diş implant tedavisi günümüzde diş kayıplarının giderilmesinde altın standart olarak kabul edilmektedir. Bu çalışmada Tokat Gaziosmanpaşa Üniversitesi Diş Hekimliği Fakültesi Protetik Diş Tedavisi kliniğine sevk edilen hastaların dental implant tedavileri hakkında bilgi düzeylerinin değerlendirilmesi amaçlanmıştır.

Gereç ve Yöntem: Çalışmaya 166'sı kadın, 130'u erkek olmak üzere toplam 296 hasta katıldı. Hastalara demografik bilgileri hakkında ve implant tedavisi hakkında soruları içeren çoktan seçmeli standardize anket uygulandı. Daha önce implant yaptırmış, diş eksikliği olmayan ve implant tedavisi hakkında hiçbir bilgisi olmayan kişiler çalışmaya dahil edilmedi.

Bulgular: Hastaların %42,2'si implantlar hakkındaki bilgileri doktor veya diş hekimlerinden edinmişlerdir. Katılımcıların %74,7'si implant cerrahi aşamasını çene cerrahına yaptırmayı, %66,2'si ise implant üstü protezleri protez uzmanına yaptırmayı tercih etmiştir. Hastaların anket cevapları yaş değişkeni ile değerlendirildiğinde, 35 yaş altı bireylerin diş implantları konusunda farkındalık düzeylerinin istatistiksel olarak anlamlı derecede daha yüksek olduğu görülmüştür ($p<0,05$).

Sonuç: Bu çalışmanın sonuçları değerlendirildiğinde, diş eksikliği nedeniyle protetik diş tedavisine ihtiyaç duyan bireylerin diş implantları hakkında yeterli bilgiye sahip olmadıkları görülmüştür. Hastalara diş implantları hakkında daha doğru bilgi verebilmek için hastaların bilgi almak için kullandıkları kaynaklara ulaşılması gerekmektedir.

Anahtar Kelimeler: Diş implantları, implant destekli diş protezi, bilgi, farkındalık, hastalar

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INTRODUCTION

Tooth losses occur due to many reasons such as dental caries, traumas, genetic disorders. The loss of natural teeth has been a health problem associated with functional, cosmetic and psychological diseases since ancient times.[1]

Various attempts have been made to complete missing teeth with artificial teeth (prostheses) that mimic the function and appearance of natural teeth.[2] There are several alternative prosthetic options for replacing missing teeth. Among these options, the patient's choice of prosthesis type; it was stated that it depends on the education level, economic level, cultural background and age factors of the patients.[3] Dental implant treatment; it has taken its place in the literature as a treatment method that is mostly welcomed by patients and the results are better than other prosthetic methods.[4-8]

In over implant prostheses; thanks to the adequate retention and stability of the prosthesis, functional prostheses can be made and thus the quality of life of the patient can be improved.[9] In short, dental implant treatment is accepted as the gold standard today for the elimination of tooth losses.[2]

With the advances in dental implant treatment in recent years, this treatment, which has been applied in many indications, helps patients suffering from tooth deficiency and dentists who treat these problems. Among these indications, there are many applications in prosthodontics such as single dental implants applied in single tooth deficiencies, all-on-four implant systems used in total tooth deficiencies[10], implant supported overdenture prosthesis[11], zygoma implants.[12]

In different studies conducted in various countries, the awareness and knowledge levels of the patients about dental implant treatments were evaluated.[4,13-23] When we examine the literature made in Turkey in the Tokat province, there is no such a study.

The purpose of the study is to evaluate the knowledge and awareness levels of patients who are referred to the Department of Prosthetic Dentistry, Tokat Gaziosmanpaşa University Faculty of Dentistry, about dental implant treatment.

MATERIAL AND METHOD

Ethics committee approval was obtained from Tokat Gaziosmanpaşa University Faculty of Medicine Clinical Research Ethics Committee with project number 18-KAEK-200 for our study. Our work; it has been made in accordance with the principles of the World Medical Association (WMA) Declaration of Helsinki; informed consent forms were obtained from all patients included in the study.

A standardized questionnaire was conducted to evaluate the knowledge level of patients about the implant. The survey includes information on dental implants as well as demographics. The questionnaire was administered by the researcher to the patients in the form of questions and answers. The survey was conducted by the same researcher to all participants. 296 patients aged 18-75 years participated in this study. Individuals who had implants before, if there is no tooth loss and had no knowledge about implant treatment were not included in the study.

Statistical Analysis

Descriptive analyzes were made to give information about the general characteristics of the study groups. IBM SPSS Statistics 25 (IBM Corp., Somers, NY) software was used in statistical analysis. The data of continuous variables are as mean±standard deviation. Data on categorical variables are given as n (%). When comparing the means of quantitative variables between groups, the significance test of the difference between the two means and one-way analysis of variance are used. Cross tables and chi-square tests are used to evaluate whether there is a relationship between qualitative variables.

If $p<0.05$ was considered statistically significant.

RESULTS

A total of 296 patients (mean age 45.24±15.59) participated in the study, with 166 women (mean age 43.25±14.85), 130 men (mean age 47.78±16.2 years). The demographic characteristics of the patients are summarized in **Table 1**.

Table 1. Demographic characteristics of the patients participating in the study

	n	%
Age		
18-25	42	14.2
26-35	55	18.6
36-45	50	16.9
46-55	61	20.6
56-65	61	20.6
66 and over	27	9.1
Gender		
Woman	166	56.1
Man	130	43.9
Education level		
Didn't go to school	4	1.4
Primary school	113	38.2
Middle school	30	10.1
High school	51	17.2
University	87	29.4
Postgraduate	11	3.7
Income level (in Turkish Liras)		
0-2000	171	57.8
2001- 4000	86	29.1
4001- 8000	30	10.1
8001 and over	9	3

Participants in the study stated that they obtained their knowledge about dental implants mostly from doctors and dentists (125 people) and secondly from their friends (90 people). The rate of individuals who thought that dental

implants could be applied in any indication was 73.6%. Regarding the applicability of dental implant treatment to which age groups, 38.5% of the individuals think that it can be applied in patients over 18 years old, and 46.3% in patients between the ages of 30-65. 57.1% of individuals think that dental implants can remain in the mouth for a lifetime. When the preferences of the patients in the question "Which group of dentists or physicians do you have the dental implant placement procedure done?" It is seen that 221 people prefer the "Oral and Maxillofacial Surgeon" group. When the dentist preferences of the individuals in our study at the stage of making prosthetics on implants were examined, the "Prosthodontist" group was among the preference or preferences of 196 patients. Dental implant information of the individuals participating in the study is shown in **Table 2**.

In the chi-square analysis in which the questionnaire answers were evaluated with the age variable, it was observed that the awareness level of the individuals under the age of 35 about dental implants was statistically higher ($p<0.05$).

Table 2. Responses of the individuals to the questionnaire about dental implants

	n	%
Where did you get the most information about dental implants?		
Friend	90	30.4
Doctor and dentist	125	42.2
Internet/TV	67	22.6
Newspaper and magazine	3	1
Health employee	11	3.7
Can implant treatment be applied to everyone?		
Yes	78	26.4
No	218	73.6
What is your opinion about the age range of implant treatment?		
12-18 years old	5	1.7
Above 18 years old	114	38.5
30-65 years old	137	46.3
Over 50 years old	40	13.5
Is implant treatment a life-long treatment?		
Yes	169	57.1
No	127	42.9
***Which is or which ones are related the duration of the implants in the mouth ?**		
Oral hygiene of the patient	135	45.6
General health status	164	55.4
Preferred implant type	94	31.8
The competence of the physician or physicians in this field whose performing the application	128	43.2
***Which material or materials are dental implants made of ?**		
Porcelain	75	25.3
Stainless steel	93	31.4
Titanium	83	28
Titanium/Zirconium Alloy	61	20.6
***If you do not want to have a dental implant, which or which ones of the following will cause you to make this decision?**		
To be expensive	140	47.3
Fear of surgical operation	77	26
Foreign body entering the body	21	7.1
I think it's harmful to health	29	9.8
It is a long-lasting form of treatment	75	25.3
***Which group of dentist/specialist dentist would you prefer to have the dental implant placed in the jawbone?**		
Oral and Maxillofacial Surgeon	221	74.7
Periodontist	32	10.8
Prosthodontist	54	18.2
General Dental Practitioner	10	3.4
***Which group of dentists or specialist dentists you prefer for being done the dental implant superstructure ?**		
Oral and Maxillofacial Surgeon	65	22
Periodontist	23	7.8
Prosthodontist	196	66.2
General Dental Practitioner	18	6.1

* More than one option can be selected.

DISCUSSION

With the definition and development of the concept of osseointegration in dentistry, dental implants have begun to be used with great acceleration in the treatment of missing teeth.[24] The popularity of this treatment, which gives more satisfactory results compared to traditional prostheses, is increasing day by day. With this increasing popularity, patients seek information about dental implants and obtain information from various sources. Although this information is not always correct, it also causes the patient's biased approach to dental implant treatment. Having the patient's knowledge about the procedure to be performed reduces the anxiety that will occur before and after the treatment. When the relevant literature is examined, there are not many studies about the knowledge and awareness of patients about dental implants. In this study conducted in the city of Tokat, the awareness, level of knowledge and preferences of individuals with tooth deficiency about implant treatments were evaluated.

In our study, when the preferences of the patients at the stage of placing dental implants in the bone were examined, among the preference or preferences of 74.7% of the patients were oral and maxillofacial surgeons. In the preferences of the physician who will make the upper structure of the dental implant; prostodontist was among the preference or preferences of 66.2% of the patients. In the study conducted by Güngör and Dikeç[13], who evaluated the awareness of patients in the Eastern Anatolia Region about dental implant treatments, the participants were asked "where they prefer to have the implant done" and 60.5% of the participants chose to have it done by a specialist dentist. The findings of both studies are similar in terms of the physician preference of the participants in implant treatment.

In the study conducted by Siddique et al.[15] in India, the rate of patients who thought that dental implants were expensive

was 60.4%. In this study, 11.6% of the patients think that the obstacle in front of dental implant treatment is that the surgical procedure is a difficult procedure. In another study investigating the awareness of patients about implant treatments; 35.2% of the patients stated that their costs were high when asked about the factors that prevent implant treatment.[19] Murkute et al.[25] in their study; stated that cost is the main barrier to choosing implant treatment for patients (49%). In our study, 47.3% of the participants stated that implant treatment is an expensive treatment, and 26% stated that they feared surgical procedure. Looking at the results of our study, it is seen that they are similar to the results of other researchers.

In our study, 57.1% of the participants think that the usage period of the dental implant is lifetime. In the study of Menziletoğlu et al.[26], 69.2% of the participants stated that the implant treatment was long-term. In another study, 55.1% of individuals stated that the implants remained in the mouth for more than 20 years or for a lifetime.[27] The results of the authors support our study.

Patients have obtained their knowledge about dental implants from various sources. In our study, 42.2% of the individuals stated that they had information about dental implants from doctors/dentists, 30.4% from their friends, 22.6% from the internet/TV and 4.7% from other sources. Mukatash et al.[8], Erzurumlu et al.[17], Pommer et al.[28], Kohli et al.[29], Özcan Küçük et al.[30] reported that participants mostly learned the information about dental implants from their dentists. These results show similarities with our study. Differently; Peker Ozturk et al.[31] 57.7% of individuals stated that they obtained information from media organs (TV, radio, internet, magazine, newspaper, etc.).

In the group consisting of patients who applied to the clinic for dental implants in the study of Memiş[20] in 2020; 54.1% of the participants said "I don't know", 22.9% said "titanium", and 12.8% said "stainless steel", to the question about which material dental implants are made of. In the study conducted by Deeb et al.[18], 70% of the participants in the patient group who were thinking of having an implant for the same question chose "titanium". When the answers given by the patients to the question about the materials used for dental implants were examined in our inpatient study; it is seen that in total, 48.6% of the choice is titanium and/or titanium-zirconium alloy. According to these results, individuals participating in our study; it can be interpreted that they have more knowledge about the basic materials used in the production of dental implants at a lower rate than the study group made by Memiş[20] and less than the working group of Deeb et al.[18]

CONCLUSIONS

When the results of the present study were evaluated, it was seen that individuals suffering from tooth deficiency did not have sufficient knowledge about dental implants. In order to provide more accurate information about dental implants to patients, the resources that patients use to obtain information should be accessed. As a professional, dentists have a great responsibility in this regard. To ensure that patients have more and more accurate information about dental implant treatments; organizing patient education programs and establishing counseling centers about the indications, advantages and possible complications of dental implants will be beneficial.

ETHICAL DECLARATIONS

Ethics Committee Approval: Ethics committee approval with project number 18-KAEK-200 was obtained from Tokat Gaziosmanpaşa University Faculty of Medicine Clinical Research Ethics Committee on 2018-09-25.

Informed Consent: All patients signed the free and informed consent form.

Referee Evaluation Process: Externally peer-reviewed.

Conflict of Interest Statement: The authors have no conflicts of interest to declare.

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

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

REFERENCES

1. Mgbeokwere U, Okoye L, Ekwueme O. A survey of the knowledge of dental implants as a choice in treatment of edentulous jaws among health workers in government dental clinics in Enugu. Ann Med Health Sci Res 2011;1(1):91-5.
2. Sivaraman K, Chopra A, Narayan AI, Balakrishnan D. Is zirconia a viable alternative to titanium for oral implant? A critical review. J Prosthodont Res 2018;62(2):121-33.
3. Jayasinghe RM, Perera J, Jayasinghe V, et al. Awareness, attitudes, need and demand on replacement of missing teeth among a group of partially dentate patients attending a university dental hospital. BMC Res Notes 2017;10:334.
4. Al-Johany S, Al Zoman HA, Al Juhaini M, Al Refeai M. Dental patients' awareness and knowledge in using dental implants as an option in replacing missing teeth: A survey in Riyadh, Saudi Arabia. Saudi Dent J 2010;22(4):183-8.
5. Wang Y, Bäumer D, Ozga AK, Körner G, Bäumer A. Patient satisfaction and oral health-related quality of life 10 years after implant placement. BMC Oral Health 2021;21:30.
6. Awadalkreem F, Khalifa N, Satti A, Suleiman AM. The influence of immediately loaded basal implant treatment on patient satisfaction. Int J Dent. 2020;2020:6590202.
7. Bakker MH, Vissink A, Meijer HJ, Raghoebar GM, Visser A. Mandibular implant-supported overdentures in (frail) elderly: A prospective study with 20-year follow-up. Clin Implant Dent Relat Res 2019;21(4):586-92.
8. Mukatash GN, Al-Rousan M, Al-Sakarna B. Needs and demands of prosthetic treatment among two groups of individuals. Indian J Dent Res 2010;21(4):564-7.
9. Gbadebo OS, Lawal FB, Sulaiman AO, Ajayi DM. Dental implant as an option for tooth replacement: The awareness of patients at a tertiary hospital in a developing country. Contemp Clin Dent 2014;5(3):302-6.
10. Durkan R, Oyar P, Deste G. Maxillary and mandibular all-on-four implant designs: A review. Niger J Clin Pract 2019;22(8):1033-40.

11. Matthys C, De Vijlder W, Besseler J, Glibert M, De Bruyn H. Cost-effectiveness analysis of two attachment systems for mandibular overdenture. Clin Oral Implants Res 2020;31(7):615-24.
12. Trevisiol L, Procacci P, D'Agostino A, Ferrari F, De Santis D, Nocini PF. Rehabilitation of a complex midfacial defect by means of a zygoma-implant-supported prosthesis and nasal epithesis: a novel technique. Int J Implant Dent 2016;2(1):7.
13. Güngör H, Dikeç E. Doğu Anadolu Bölgesinde implant tedavisi hakkında hastaların bilgi düzeyinin araştırılması. Atatürk Üniv Diş Hek Fak Derg 2015;25(2):205-12.
14. Özçakır Tomruk C, Özkurt-Kayahan Z, Şençift K. Patients' knowledge and awareness of dental implants in a Turkish subpopulation. J Adv Prosthodont 2014;6(2):133-7.
15. Siddique EA, Bhat PR, Kulkarni SS, Trasad VA, Thakur SL. Public awareness, knowledge, attitude and acceptance of dental implants as a treatment modality among patients visiting SDM College of Dental Sciences and Hospital, Dharwad. J Indian Soc Periodontol 2019;23(1):58-63.
16. Chowdhary R, Mankani N, Chandraker NK. Awareness of dental implants as a treatment choice in urban Indian populations. Int J Oral Maxillofac Implants 2010;25(2):305-8.
17. Ünal Erzurumlu Z, Kara ZS. Diş Hekimliği Fakültesi'ne başvuran hastaların dental implant farkındalıklarının değerlendirilmesi. Selcuk Dent J 2018;5:212-7.
18. Deeb G, Wheeler B, Jones M, Carrico C, Laskin D, Deeb JG. Public and patient knowledge about dental implants. Oral Maxillofac Surg 2017;75:1387-91.
19. Saha A, Dutta S, Vijaya V, Rajnikant N. Awareness among patients regarding implants as a treatment option for replacement of missing teeth in Chattisgarh. J Int Oral Health 2013;5(5):48-52.
20. Memiş S. Türkiye'nin Batı Karadeniz Bölgesinde dental implantlar hakkında hastaların bilgi ve farkındalığı. Turkiye Klinikleri J Dental Sci 2020;26(3):323-30.
21. Kranjcic J, Mikus A, Mehulic K, Vojvodic D. Knowledge and awareness of dental implants among elderly people in Croatia. J Prosthodont 2015;24:37-42.
22. Tanvir M, Izhar F, Yazdannie N, Kamal MM. General awareness and acceptance of dental implants in patients attending a tertiary care hospital. J Rehman Coll Dent 2021;2(1):2-6.
23. Salim NA, Meyad FH, Al-Abdallah MM, Motasum Abu-Awwad M, Satterthwaite JD. Knowledge and awareness of dental implants among Syrian refugees: a cross sectional study in Zaatari camp. BMC Oral Health 2021;21:442.
24. Henry PJ. Oral implant restoration for enhanced oral function. Clin Exp Pharmacol Physiol 2005;32(1-2):123-7.
25. Murkute S, Beldar A, Thakkar P, Thamke M. A cross-sectional epidemiological study to evaluate the awareness of patients and private dental practitioners regarding dental implant therapy in Nashik. IOSR J Dent Med Sci 2017;16(1):22-6.
26. Menziletoğlu D, Kılınç A, Işık BK, Akın C. Assesment of dental implant awareness and knowledge levels of patients. Yeditepe J Dent. 2020;16(3):209-12.
27. Al-Rafee M, Adam HI, Alharbi TS, Almojel AA. Public awareness and knowledge of dental implants in Riyadh, Saudi Arabia. Saudi J Oral Sci 2018;5(2):110-4.
28. Pommer B, Zechner W, Watzak G, Ulm C, Watzek G, Tepper G. Progress and trends in patients' mindset on dental implants. I: level of information, sources of information and need for patient information. Clin Oral Implants Res 2011;22(2):223-9.
29. Kohli S, Bhatia S, Kaur A, Rathakrishnan T. Patients awareness and attitude towards dental implants. Indian J Dent 2015;6:167-71.
30. Özcan Küçük A, Keskinrüzgar A, Şimşek HO. Hastaların dental implantlara bakış açısının değerlendirilmesi. Mersin Univ Saglık Bilim Derg 2021;14(2):232-41.
31. Peker Öztürk H, Özgedik HS, Avsever H, et al. Awareness, attitude, and knowledge of dental patients regarding dental implant treatment in an urban population: a cross-sectional study in Turkey. J Stoma 2019;72(3):112-7.

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Original Article / Orijinal Araştırma

Vaccine Opposal in People Over 60 Years of Age in Mardin/ Turkey-A Territory with Low Rate of Vaccination

COVID-19'a Karşı Aşılanmanın Düşük Olduğu Mardin/Türkiye İlinde 60 Yaş Üzeri Kişilerde Aşı Tutumu

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Abstract

Objective: One of the most important public health practices in the prevention of communicable diseases is vaccination. In this study, it was desired to evaluate the vaccination attitude of individuals over the age of 60 years in cities where the rate of vaccination against COVID-19 was low rate.

Material and Method: Our research was carried out by reaching 396 people over the age of 60 in MardinTurkey. A questionnaire including the positive and negative attitudes of the participants towards the vaccine was filled in by face to face interviews.

Results: We found that 110 (45.8%) of the participants who have not beeninnoculated in the provinces where the study was conducted did not trust the vaccine. Again, it was seen that 128 (53.3%) of those who did not get inoculated were illiterate and 68 (28.3%) were primary school graduates. There were no university graduates in the group that did not receive the vaccine. When positive and negative attitudes were evaluated, it was seen that 64 (16.2%) people strongly disagree with the positive attitude, I would like to be vaccinated at the first opportunity, and 48 (12.1%) strongly disagree with the positive attitude, I think everyone should be vaccinated. When the positive attitude of I trust the studies about the vaccine was examined, it was seen that 108 (27.3%) people gave the answer of strongly disagree. Again, it was seen that 53.3% of the participants who did not get vaccinated were illiterate and 28.3% were primary school graduates.

Conclusion: The high level of concern about vaccine safety needs to be addressed. Future introduction of the vaccine should address these concerns, and a properly and thoroughly tested vaccine will help win the public's trust. In addition, campaigns should be organized to target low-educational groups, and they should be informed, due to the increase in the fear of vaccination as the level of education decreases.

Keywords: COVID-19 vaccine, low vaccination, vaccine hesitancy

Öz

Amaç: Bulaşıcı hastalıkların önlenmesinde en önemli halk sağlığı uygulamalarından biri aşılamadır. Bu çalışmada COVID-19' a karşı aşılanmadın düşük olduğu şehirlerde 60 yaş üstü bireylerde aşı tutumu değerlendirilmek istendi.

Gereç ve Yöntem: Araştırmamız Mardin/Türkiye ilinde 60 yaş üstü 396 kişiye ulaşılarak yapıldı. Katılımcılara aşıya karşı olumlu ve olumsuz tutumlarını içeren bir anket yüzyüze sorularak dolduruldu.

Bulgular: Çalışmanın yapıldığı ilde aşı yaptırmayan katılımcıların 110 (%45,8)' unun aşıya güvenmediğini gördük. Yine aşı yaptırmayanların 128 (%53,3) 'inin okur yazar olmadığı, 68 (%28,3) 'ininse ilkokul mezunu olduğu görüldü. Aşı yaptırmayan grupta üniversite mezunu yoktu. Olumlu ve olumsuz tutumlar değerlendirildiğinde ilk fırsatta aşı olmak isterim olumlu tutumuna 64 (%16,2) kişinin kesinlikle katılmıyorum, bence herkes aşı olmalı olumlu tutumuna 48 (%12,1) kişinin kesinlikle katılmıyorum cevabını verdiği görüldü. Aşı hakkında yapılan çalışmalara güveniyorum olumlu tutumu incelendiğinde 108 (%27,3) kişinin kesinlikle katılmıyorum cevabını verdiği görüldü.

Sonuç: Aşı güvenliği konusundaki yüksek düzeyde endişenin giderilmesi gerekmektedir. Aşının gelecekteki tanıtımı bu endişeleri gidermeli ve düzgün ve kapsamlı bir şekilde test edilmiş bir aşı, halkın güvenini kazanmaya yardımcı olacaktır. Ek olarak eğitim seviyesi düştükçe aşı treddütünün artması nedeniyle düşük eğitim seviyeli kitleleri hedef alacak kampanyalar düzenlenmeli, bilgilendirilmeleri sağlanmalıdır.

Anahtar Kelimeler: COVID-19 aşısı, aşılanma düşüklüğü, aşı tereddütü

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INTRODUCTION

Coronavirus-19 (COVID-19) first appeared in Wuhan, China. [1] The clinical features of the disease range from simple flu-like symptoms to severe acute respiratory syndrome. It has been reported that mild symptoms in 81% of patients due to COVID-19 infection, severe respiratory failure symptoms in 14%, and septic shock and multi-organ dysfunction in addition to respiratory failure in 5% has been observed.[2]

Therefore, the development and administration of COVID-19 vaccines becomes crucial for the prevention and eradication of the disease.[3] Vaccines are one of the most effective methods used in the prevention of infectious diseases from past to present. Since the use of vaccines, there have been anti-vaccine activistism events. The reasons for this have been shown to be religious perspectives, differences in political views, and insufficient information about the safety of the vaccine.[4] Despite the great advances in vaccination in the past century, the re-emergence of vaccine-preventable diseases has also created distrust in the society against newly discovered vaccines.[5]

In this study, it was aimed to evaluate positive and negative attitudes towards vaccination in a province with a low vaccination rate.

MATERIALS AND METHOD

This study was conducted in 01.06.2021- 30.06.2021 June 2021 by contacting 396 patients over 60 years of age in a face to face interview. The study questionnaire was administered face-to-face with patients by a nurse in a family practice. Signed informed consent forms were obtained from all participants, and our study, which complies with the Principles of the Declaration of Helsinki, was approved by the ethics committee. (Dicle Universitiy Ethics committe Number: 309)

An internationally validated questionnaire was used in the study to assess participants' attitudes towards the COVID-19 vaccine.[6] The volunteers included in the face-to-face survey study were first asked their demographic information; age, gender, educational background, occupation and COVID-19 experience; whether they had COVID-19 infection, whether they believed in the protection of the CoronaVac vaccine, orhave been inoculated with the I. and II. dose of CoronaVac vaccine. If their answer was no, then they were asked about the reason. In addition, the Attitudes Towards COVID-19 Vaccine Scale was applied. The Attitudes Towards COVID-19 Vaccine Scale has 9 items and has two sub-dimensions (positive and negative attitudes). This scale consists of 9 items in total, including 4 items for positive attitudes and 5 items for negative attitudes, and its validity and reliability have been established.[6]

As a positive attitude, the participants were presented with options such as 'I would like my family to have the vaccine to be developed/developed for this disease', 'I would like to have the vaccine to be developed/developed for this disease at the first opportunity', 'I think everyone should have the vaccine to be developed/developed for this disease', 'I trust the explanations made about the vaccine to be developed/developed'.

As a negative attitude; 'the vaccine to be developed/developed may cause transmission of the disease'. (I), 'I think that the vaccine to be developed/developed will/will not have a protective effect'. (I), 'The vaccine to be developed/developed is dangerous.'(I), 'I think the efficacy of the vaccine to be developed/developed will not/have not been adequately tested.'(I)'I think I can survive the epidemic without a vaccine.'(I) options were presentation. I= Inverse substances.

The statements in the scale were evaluated as "Strongly disagree (1)", "Disagree (2)", "Undecided (3)", "Agree (4)", "Strongly agree (5)".Items in the negative attitude sub-dimensions were scored inversely. A value between 1-5 was obtained by dividing the total score obtained by summing the item scores in the scale sub-dimension by the number of items in that sub-dimension.

High scores obtained from the positive attitude sub-dimension indicate that the attitude towards the vaccine was positive. It was calculated after the items in the negative attitude sub-dimension have been reversed, and the high scores in this sub-dimension indicated that the negative attitude towards the vaccine was less.

Inverse items 1→5; 2→4; 3→3; 4→2; It was encoded as 5→1.

In order to increase the reliability of this study, the survey was conducted in areas of different socioeconomic levels.

Inclusion criteria:Individiuals over 60 years old, who did not have mental health, auditory or speech problems, and who voluntarily accepted to participate in the study.

Exclusion criteria: Being too old to answer the questions, having mental disorder, speech or hearing impairment, and refusing to participate in the study.

Statistical Analysis

Statistical Package for the Social Sciences (SPSS) program was utilized for data evaluation and statistical analysis. Chi-square test was used when comparing percentage data in descriptive statistics, data expressed as mean, standard deviation and count. In comparisons, values with $p<0.05$ were considered statistically significant.

RESULTS

A total of 396 volunteers were enrolled in this research. Of the people who agreed to participate in the study, 44.4% (n=176) were female and 55.6% (n=220) were male. As of the date of the survey, 60.6% (n=240) of the participants have not been vaccinated against COVID-19, and 39.4% (n=156) have been vaccinated. As of the date of the survey, 74.7% (n=296) of the people who participated in our research did not have COVID-19 infection, while 25.3% (n=100) had

COVID-19 infection. Of the participants, 44.4% (n=176) were illiterate, 34.3% (n=136) were primary school graduates, 7.1%(n=28)were secondary school graduates, 12.1%(n=48) were high school graduates, and 2% (n=8) of them were university graduates (**Table 1**).

Table 1. Descriptive demographic characteristics of the study population

	N	%
Gender		
Female	176	44.4%
Male	220	55.6%
Age (years)		
60-64	212	53.5%
65-69	140	35.4%
70-75	32	8%
75<	12	3%
Educational Status		
İlliterate	176	44.4%
Primary School	136	34.3%
Secondary School	28	7.1%
High School	48	12.1%
University Graduates	8	2%
Had COVID-19 Infection		
Yes	100	25.3%
No	296	74.7%
İnoculated with COVID-19 vaccine		
Not inoculated	240	60.6%
Inoculated	156	39.4%
Total	396	100%

When we tried to analyze the reasons for not getting vaccinated, 75% (n=180) of the participants did not trust the vaccine, 2% (n=5)of the participants stated that they had relatives who had COVID-19 after vaccination (**Table 2**).

Table 2. Reasons for not being inoculated

	N	%
Reasons for not being inoculated		
Does not trust vaccine	180	75 %
Presence of relatives who had COVID-19 after inoculation	5	2%
Has been infected with COVID-19 previously	11	4.5%
Believing that vaccine could cause other diseases	11	4.5%
Other	33	13.7%
Toplam	240	100%

It was shown that 53.3% of the participants who did not get vaccinated were illiterate, 28.3% were primary school graduates, 5% were secondary school graduates, and 13.3% were high school graduates. On the other hand 5.1% of the participants who had the vaccine were university graduates and 30.8% were illiterate. There was no university graduate who has not been vaccinated (**Table 3**).

Table 3. The educational status of the participants who refused to get vaccinated

Educational Status	Vaccination Status		Total
	Not vaccinated N(%)	Vaccinated N(%)	
Illiterate	128 (53.3%)	48(30.8%)	176
Primary School	68(28.3%)	68(43.6%)	136
Secondary School	12(5.0%)	16(10.3%)	28
High School	32(13.3%)	16(10.3%)	48
University	0(0%)	8(5.1%)	8
Total	240	156	396

When the responses of the participants to the positive attitudes were examined; it was seen that 64 (16.2%) people strongly disagree, 40 (10.1%) disagree, and 44 (11.1%) undecided. The phrase: 'I think everyone should be vaccinated', 48 (12.1%) people strongly disagree, 44 (11.1%) disagree, 68 (17.2%) people were undecided. When the positive attitude of 'I trust the studies about the vaccine'was examined, it was seen that 108 (27.3%) people strongly disagree, 68 (17.2%) disagree, 68 (17.2%) people were undecided.

When the responses of the participants to the negative attitudes were examined; 'I do not believe that the vaccine is protective', 148 (37.7%)'people strongly agree', 64 (16.16%)'agree', 104 (26.26%) people answered 'undecided'. I strongly agree, 64 (16.16%) people agree, 100 (25.25%) said'I am undecided', 'I think I overcome the disease without vaccination', 64 (16.16%) strongly agree, 20 (5.05%)and it was observed that 136 (34.34%) respondents gave the answer "I agree" and "I am undecided" (**Table 4**).

DISCUSSION

The current study has important implications. We found that 110 (45.8%) of the participants who were not inoculated did not trust the vaccine. It was also determined that 128 (53.3%) of those who did not get vaccinated were illiterate and 68 (28.3%) were primary school graduates. There were no university graduates in the group that did not receive the vaccine.

When positive and negative attitudes were evaluated, 'I would like to be inoculated in the first possible opportunity' phrase has been interpreted as: 64 (16.2%) people strongly disagree, 40 (10.1%) disagree, and 44 (11.1%) undecided. 'I think everyone should be vaccinated', 48 (12.1%) people strongly disagree, 44 (11.1%) disagree, 68 (17.2%) people are undecided. When the positive attitude of 'I trust the studies about the vaccine'was examined, it was seen that 108 (27.3%) people strongly disagree, 68 (17.2%) disagree, 68 (17.2%)were undecided.

When the responses of the participants to the negative attitudes were examined; It was seen that 'I do not believe in the protective effects of vaccine'148 (37.7%) people strongly agree, 64 (16.16) agree, and 104 (26.26%) undecided. It was observed that 172 (43.43%) people strongly agree, 64 (16.16%) agree, and 100 (25.25%)were undecided about the

Table 4. The opinions and attributes of participants on COVID-19 vaccine

POSITIVE ATTRIBUTE	Gender		Total	INVERSE ATTRIBUTE	Gender		Total
	Female	Male			Female	Male	
I want my family members to be inoculated.				I do not believe in the protective effects of vaccine			
Strongly disagree	16 (9.1%)	32 (14.5%)	48 (12.1%)	Strongly Agree	80 (20.2%)	68(17.17%)	148 (37.37%)
Disagree	28 (15.9%)	12 (5.5%)	40 (10.1%)	Agree	32 (8.08%)	32 (8.08%)	64(16.16%)
Undecided	28 (15.9%)	32 (14.5%)	60 (15.2%)	Undecided	32 (8.08%)	72 (18.18%)	104 (26.26%)
Agree	32 (18.2%)	44 (20.0%)	76 (19.2%)	Disagree	8 (2.02%)	24 (6.06%)	32 (8.08%)
Strongly Agree	72 (40.9%)	100 (45.5%)	172 (43.4%)	Strongly Disagree	24 (6.06%)	24 (6.06%)	48 (12.12%)
I would like to be inoculated in the first possible opportunity.				Vaccination may cause the spreading of the virus			
Strongly disagree	24 (13.6%)	40 (18.2%)	64 (16.2%)	Strongly Agree	84 (21.21%)	72 (18.18%)	156 (39.39%)
Disagree	24 (13.6%)	16 (7.3%)	40 (10.1%)	Agree	20 (5.05%)	32 (8.08%)	52 (13.13%)
Undecided	24 (13.6%)	20 (9.1%)	44 (11.1%)	Undecided	52 (13.13%)	80 (20,20%)	132 (33.33%)
Agree	20 (11.4%)	44 (20.0%)	64 (16.2%)	Disagree	12 (3.03%)	16 (4.04%)	28 (7.07%)
Strongly Agree	84 (47.7%)	100 (45.5%)	184 (46.5%)	Strongly Disagree	8 (2.02%)	20 (5.05%)	28 (7.07%)
Everynone should be inoculated				Strongly Agree	72 (18.18%)	100 (25.25%)	172 (43.43%)
Strongly disagree	16 (9.1%)	32 (14.5%)	48 (12.1%)	Agree	28 (7.07%)	36 (9.09%)	64 (16.16%)
Disagree	24 (13.6%)	20 (9.1%)	44 (11.1%)	Undecided	48(12.12%)	52 (13.13%)	100 (25.25%)
Undecided	36(20.5%)	32 (14.5%)	68 (17.2%)	Disagree	8 (2.02%)	12 (3.03%)	20 (5.05%)
Agree	16 (9.1%)	32 (14.5%)	48 (12.1%)	Strongly Disagree	20 (5.05%)	20 (5.05%)	40 (10.10%)
Strongly Agree	84 (47.7%)	104 (47.3%)	188 (47.5%)	Thinks that the vaccine has not been tested sufficiently			
I trust the explanations & briefings on vaccination				Strongly Agree	32 (8.08%)	36 (9.09%)	68 (17.17%)
Strongly disagree	48 (27.3%)	60 (27.3%)	108 (27.3%)	Agree	32 (8.08%)	28 (7.07%)	60 (15.15%)
Disagree	40 (22.7%)	28 (12.7%)	68 (17.2%)	Undecided	64 (16.16%)	96 (24.24%)	160 (40.40%)
Undecided	24(13.6%)	44 (20.0%)	68 (17.2%)	Disagree	28 (7.07%)	28 (7.07%)	56 (14.14%)
Agree	4 (2.3%)	24 (10.9%)	28 (7.1%)	Strongly Disagree	20(5.05%)	32 (8.08%)	52 (13.13%)
Strongly Agree	60(34.1%)	64 (29.1%)	124 (31.3%)	I can overcome COVID-19 disease without getting vaccinated			
				Strongly Agree	44 (11.11%)	20 (5.05%)	64 (16.16%)
				Agree	4 (1.01%)	16 (4.04%)	20 (5.05%)
				Undecided	56 (14.14%)	80 (20.20%)	136 (34.34%)
				Disagree	28 (7.07%)	68 (17.17%)	96 (24.24%)
				Strongly Disagree	44 (11.11%)	36 (9.09%)	80 (20.20%)

negative attitude that'the vaccine is dangerous'. It was seen that 64 (16.16%) people strongly agree, 20 (5.05%) agree, and 136 (34.34%)were undecided with the negative attitude of "I think I can overcome the disease without vaccination."

It has been reported that vaccine rejection and hesitations have increased in recent years.[7] This increased vaccine rejection and hesitation can eventually lead to a reduction in vaccine coverage and affect its efficacy.[8-10] Vaccine hesitancy is also listed among the top ten global health threats by the World Health Organization (WHO).[7] Therefore, there is a need to determine the willingness of communities to accept the COVID-19 vaccine.

As technology develops, misinformation through the internet and media has led to an increase in anti-vaccine opinions. Clear and concise evidence-based communication to a broad audience will be crucial in the fight against anti-vaccination opposals.[4] In the light of the COVID-19 outbreak, anti-vaccine sentiments are rising and anti-vaccine activists are increasing on social media.[5]

Research in China found that although more than 90% of respondents indicated they would accept the COVID-19 vaccine when available, almost 50% of these people would like to delay vaccination until the vaccine is confirmed to be safe.[11] In a study conducted in Canada, the acceptance rate of the COVID-19 vaccine was found to be low. In this study, as the main factors in not accepting the vaccinehas been stated that vaccination has risks, safety and side effect concerns.[12] Most of the survey studies among the general population classified by country showed a level of ≥70% acceptance about the COVID-19 vaccine. Low COVID-19 vaccine acceptance rates have been reported in the Middle East, Russia, Africa and several European countries.[13]

In an Italian study, uncertainty about the rapid development of COVID-19 vaccines was found to be the second most common reason for "No" or "Not sure" responses to vaccine intent, given the high rate of hesitation attributed to low trust in pharmaceutical companies. These concerns appear to be specific to new COVID-19 vaccines, and lower levels of anti-influenza vaccine opposition have been reported for 2020-2021.[14] In our study, the rate of women who strongly agree with the item "I absolutely do not believe in the protection of the vaccine" was 13.6%, while the rate of men was found to be 10.9% less. In our study, the rate of absolutely not believing in the protection of the vaccine was much higher (37.7%).

In a study conducted within the scope of Istanbul Medeniyet University Social Structure Research Program (TYAP) in Turkey, information was obtained about the society's approaches to vaccines. According to this study, the rate of those who want to be vaccinated immediately was 16.5%, the rate of those who want to be vaccinated after the effectiveness of the vaccine has been proven, 26%, the rate of those who will make their decision according to the type of vaccine to be made, 8.4%, the rate of those who have never thought of being vaccinated was 24.6% and they are undecided about getting vaccinated. The rate of those who did was determined as 24.6%.[15] In our study, the rate of those who answered "I strongly disagree" with the item "I want to be vaccinated at the first opportunity" was 16.2%, while the rate of those who answered "I strongly agree" with this item was found to be 46.5%.

According to results from surveys of COVID-19 vaccine acceptance rates from 33 different countries, the highest COVID-19 vaccine acceptance rates among adults were Ecuador (97.0%), Malaysia (94.3%), Indonesia (93.3%) and China (91.3%). However, the lowest COVID-19 vaccine acceptance rates were Kuwait (23.6%), Jordan (28.4%), Italy (53.7%), Russia (54.9%), Poland (56.3%), USA (56.9%) and France (58.9%) (14).In our study, the rate of being vaccinated was 39.4%. The data we have obtained lags behind most countries in the world.

As there are studies indicating that the level of education increases, the anti-vaccination increases.[16] There are also studies stating that the level of anti-vaccination increases as the level of education decreases.[17] In our study, it was seen that 128 (53.3%) of those who did not get vaccinated were illiterate and 68 (28.3%) were primary school graduates. There were no university graduates in the group that did not receive the vaccine.

Although the sample was selected in accordance with the exclusion criteria, some difficulties in communication can be counted among the limitations of the study due to the fact that the participating individuals were over the age of 60 years.

The high level of concern about vaccine safety needs to be addressed. Future introduction of the vaccine should address these concerns, and a properly and thoroughly tested vaccine will help to win the public's trust. In addition, campaigns should be organized to target low-educational groups, and they should be informed, due to the increase in the fear of vaccination as the level of education decreases. We believe it is important and more effective to begin promotion, begin policy making, and establish priority guidelines for vaccination before vaccines are approved. More quantitative and qualitative studies can be conducted to track individuals' vaccination acceptance and reasons at different time points.

Healthcare professionals will always play an important role in this struggle, as they will continue to be both a high-risk population and the first resource for patients. We hope our data can help governments, public health professionals and legislators achieve their goals in the COVID-19 vaccine campaign.

ETHICAL DECLARATIONS

Ethics Committee Approval: This study was approved by the ethics committee. (Dicle Universitiy Ethics committe Number: 309)

Informed Consent: All patients signed the free and informed consent form.

Referee Evaluation Process: Externally peer-reviewed.

Conflict of Interest Statement: The authors have no conflicts of interest to declare.

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

REFERENCES

1. Kabak M, Çil B, Hocanlı I. Relationship between leukocyte, neutrophil, lymphocyte, platelet counts, and neutrophil to lymphocyte ratio and polymerase chain reaction positivity. Int Immunopharmacol. 2021;93:107390.
2. B Çil, M Kabak.The Possible Factors That Affect The Clinical Severity And Mortality Of Covid Pneumonia. Acta Medica Mediterranea 2020;36:3655.
3. Qiang Gao, Linlin Bao, Haiyan Mao, Lin Wang et al. Development of an inactivated vaccine candidate for SARS-CoV-2. Science 2020;369:77-81.
4. Rafael Prieto Curiel, Humberto González Ramírez. Vaccination Strategies Against Covıd 19 And The Difusion Of Anti Vaccination Views. Sci Rep. 2021;11:6626.
5. Puri N, Coomes EA, Haghbayan H, Gunaratne K. Social media and vaccine hesitancy: new updates for the era of COVID-19 and globalized infectious diseases. Hum Vaccin Immunother 2020;16(11):2586-93.
6. Geniş B, Gürhan N, Koç M, et al. Development of Perception and Attitude Scales Associated with the COVID-19 Pandemic (2020).
7. Brit Trogen, David Oshinsky, Arthur Caplan. Adverse Consequences of Rushing a SARS-CoV-2 Vaccine:Implications for Public Trust. JAMA 2020;323:2460-1.
8. Jarrett C, Wilson R, O'Leary M, Eckersberger E, Larson HJ. The SAGE Working Group on Vaccine Hesitancy. Strategies for addressing vaccine hesitancy—A systematic review. Vaccine 2015;33:4180-90.
9. Sadaf A, Richards J.L, Glanz J, Salmon D.A, Omer SB. A systematic review of interventions for reducing parental vaccine refusal and vaccine hesitancy. Vaccine 2013;31:4293-304.
10. Larson H.J, Jarrett C, Eckersberger E, Smith D.M, Paterson P. Understanding vaccine hesitancy around vaccines and vaccination from a global perspective:A systematic review of published literature, 2007-2012. Vaccine 2014;32:2150-9.
11. Wang J, Jing R, Lai X, et al. Acceptance of COVID-19 Vaccination during the COVID-19 Pandemic in China. Vaccines (Basel). 2020;8(3):482.
12. Frank, K.;Arim, R. Canadians' Willingness to Get a COVID-19 Vaccine:Group Differences and Reasons for Vaccine Hesitancy 2020. Available online:https://www150.statcan.gc.ca/n1/pub/45-28-0001/2020001/article/00073-eng.htm(accessed on 12 November 2020).
13. Sallam M. COVID-19 Vaccine Hesitancy Worldwide:A Concise Systematic Review of Vaccine Acceptance Rates. Vaccines (Basel). 2021;9(2):160.
14. Francesco Di Gennaro, Rita Murri, Francesco Vladimiro Segala et al., Attitudes towards Anti-SARS-CoV2 Vaccination among Healthcare Workers:Results from a National Survey in Italy. Viruses. 2021;13(3):371.
15. Karadeniz Teknik Üniversitesi-Stratejik Araştırma MerkeziProtokol Dergisi |Yıl 2 | Sayı 1 www.ktu.edu.tr/sam 2021.
16. Paulina Pisaniak, Aleksander Tarczon, Milena Konarskaet al.,Parents' Opinions and Knowledge About Vaccination in Poland-A Cross-Sectional Observational StudyInt J Gen Med. 2021;14:3235-42.
17. Cadeddu C, Daugbjerg S, Ricciardi W, et al. Beliefs towards vaccination and trust in the scientific community in Italy. Vaccine 2020;38(42):6609-17.

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Original Article / Orijinal Araştırma

The Risk Factors for Delirium in Patients with Stroke in Palliative Care

Palyatif Bakımda İnmeli Hastalarda Deliryum İçin Risk Faktörleri

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Abstract

Aim: Post-stroke delirium is an acute neuropsychiatric syndrome that increases the distress of patients and family members and leads to long-term results, especially in older age. In this study, we aimed to investigate the risk factors for delirium in patients followed-up in palliative care with the diagnosis of stroke.

Material and Method: This retrospective study included 161 patients followed-up in the palliative care ward with the diagnosis of stroke. Patients diagnosed with stroke were grouped as ischemic stroke (IS), hemorrhagic stroke (HS) and subarachnoid hemorrhage (SAH). The age, gender, Glasgow coma scale (GCS), percutaneous endoscopic gastrostomy (PEG) status, presence of infection, electrolyte values, length of hospitalization, discharge conditions and comorbid diseases of the patients included in the study were evaluated.

Results: The average age of the patients was 70.49±15.269 years, the length of hospitalization was 46.6±16.11 days, and 35 (21.1%) patients had been diagnosed with delirium. In patients who developed delirium, the ages were significantly lower, the infection rates were significantly higher, and the length of hospitalization was significantly longer (p=0.046, p<0.001, p=0.003). While the proportion of patients with a PEG was significantly lower, the rate use of anticholinergics, narcotic analgesics, antiepileptics and antipsychotics was significantly higher in patients who had developed delirium.

Conclusion: We think that determining and managing the risk factors for delirium development in stroke patients followed-up in palliative care will decrease the morbidity and improve the quality of life of the patients and that further studies on this topic are needed.

Keyword: Palliative care, stroke, delirium, length of hospitalization

Öz

Amaç: İnme sonrası deliryum, hastaların ve aile üyelerinin sıkıntısını arttıran ve özellikle ileri yaşlarda uzun süreli sonuçlara yol açan akut nöropsikiyatrik bir sendromdur. Biz bu çalışmada palyatif bakımda stroke tanısı ile izlenen hastalarda deliryum için risk faktörlerini araştırmayı amaçladık.

Gereç ve Yöntem: Bu retrospektif çalışmaya palyatif bakım servisinde stroke tanısı ile izlenen 161 hasta dahil edildi. İnme tanılı hastalar iskemik inme (IS), hemorajik inme (HS) ve subaraknoid kanama (SAK) olarak gruplandırıldı. Çalışmaya alınan hastaların yaşları, cinsiyetleri, glaskow koma skalaları (GKS), perkütan endoskopik gastrostomi (PEG), enfeksiyon varlığı, elektrolit değerleri, ilaç kullanımı, yatış süreleri, çıkış durumları ve komorbid hastalıkları değerlendirildi.

Bulgular: Hastaların yaş ortalamaları 70,49±15,269 yıl, yatış süreleri 46.6±16.11 gündü ve 35 (%21.1) hasta deliryum tanısı aldı. Deliryum gelişen hastaların yaşları anlamlı derecede daha düşük, enfeksiyon oranları anlamlı derecede fazla ve yatış süreleri anlamlı derecede uzundu (p=0.046, p<0.001, p=0.003). Deliryum gelişen hastalarda PEG olanların oranı anlamlı derecede azken, antikolinerjik, narkotik analjezik, antiepileptik ve antipiskotik kullananların oranı anlamlı derecede daha fazlaydı.

Sonuçlar: Palyatif bakımda izlenen inmeli hastalarda deliryum gelişimindeki risk faktörlerinin belirlenip iyi yönetilmesinin, hastaların morbiditelerini azaltıp, yaşam kalitelerini iyileştireceğini ve bu konuda daha fazla çalışmaya ihtiyaç olduğunu düşünüyoruz.

Anahtar Kelime: Palyatif bakım, stroke, deliryum, hastanede yatış süresi

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INTRODUCTION

Delirium is defined as a disorder of awareness and cognition (mostly attention and memory); it develops within hours or days, cannot be explained by other cognitive disorders such as dementia, and is a direct result of a physical condition or medication.[1] Unlike many serious diseases, stroke is a sudden and unexpected condition, and it is a leading cause of severe long-term disability.[2] Post-stroke delirium is an acute neuropsychiatric syndrome that increases the distress of patients and family members and leads to long-term results, especially in older age.[3,4]

The palliative care needs of patients after stroke are extensive and evident.[5] Patients are directed to palliative care after stroke for end-of-life decisions rather than symptom management.[6,7] Stroke patients seen by palliative care specialists are more functionally impaired, less likely to possess decision-making capacity and more likely to die in the hospital.[6] Stroke itself is a known predisposing factor for delirium.[3] Studies have reported that the frequency of delirium varies between 12% and 43% in patients with ischemic stroke (IS) and hemorrhagic stroke (HS).[8,9] It has been reported that the prevalence of delirium is 13-42% in patients receiving inpatient palliative care, and that it increases to 88% at the end of life (weeks to hours before death). However, we found no literature on the delirium rates of stroke patients in palliative care.[10]

The pathophysiology of delirium is multifactorial and not fully understood. There are some risk factors for delirium such as advanced age, male gender, an underlying cognitive disorder, medication use, electrolyte disorders, infection, fever, orthopedic and cardiovascular surgeries.[11] In this study, we aimed to investigate the risk factors for delirium in patients diagnosed with stroke followed-up in palliative care.

MATERIAL AND METHOD

The retrospective study was approved by Dr. Abdurrahman Yurtaslan Ankara Oncology Training and Research Hospital Ethics Committee (Date: 08.07.2020, Decision No:2020-07/682). All procedures were applied per the principles of the Declaration of Helsinki. The files of 161 patients who had been followed-up with the diagnosis of stroke in the palliative care center (PCC) of our hospital between 2015-2020 were reviewed retrospectively. Patients diagnosed with stroke were classified as ischemic stroke (IS), hemorrhagic stroke (HS) and subarachnoid hemorrhage (SAH). The age, gender, Glasgow coma scale (GCS), percutaneous endoscopic gastrostomy (PEG) status, presence of infection, electrolyte values, length of hospitalization, discharge conditions, and comorbid diseases of the patients included in the study were evaluated. Comorbid diseases were classified as dementia, heart disease (HD), hypertension (HT) and diabetes mellitus (DM).

The study collected the data from the medical records written by psychiatrists who had evaluated the patients. The delirium diagnosis was determined using the "Confusion Assessment Method" (CAM) survey.[12] The presence of infection was defined by laboratory tests, identification of pathogens in a bacterial culture or empirical use of antibiotics. The kidney function was evaluated by calculating the blood urea nitrogen (BUN) and plasma creatinine levels and the liver functions by blood aspartate transaminase (AST) and alanine transaminase (ALT) levels, as well as plasma albumin levels. Electrolyte imbalance was assessed by determining the levels of sodium and potassium. The medications used by patients were classified as antipsychotics, anticholinergics, antiepileptics and narcotic analgesics.

Statistical Analyses

The study data comprised 161 individuals. The analyses were performed using the IBM SPSS statistics 23 software bundle. While evaluating the study data, number were given for the categorical variables and descriptive statistics (mean, standard deviation, median, minimum, maximum) were given for the numerical variables. The normality assumptions of the numerical variables were examined using the Kolmogorov Smirnov normality test and it was observed that the variables were not normally distributed. Therefore, non-parametric statistical methods were used in the study. The differences between the two independent groups were examined using the Mann Whitney U Analysis. The relationship between two independent categorical variables was interpreted using the Chi-Square analysis. The statistical significance level in the analysis was accepted as 0.05.

RESULTS

A total of 161 stroke patients, 74 of which (46%) were female and 87 (54%) were male, were included in the study. The mean age of the patients was 70.49±15.269 years, and 97 (60.2%) patients had been diagnosed as IS, 32 (19.9%) patients had been diagnosed as HS and 32 (19.9%) patients had been diagnosed as SAH. The average length of hospitalization of the patients was 46.6±16.11 days and the GCS was 10.6±2.17. Among these patients, 92.5% had HT, 50.3% had HD, 27.3% had DM and 14.9% had dementia as comorbidity. Thirty-five (21.1%) patients had been diagnosed with delirium (**Table 1**).

There were significant differences between the patients with and without delirium in terms of age, infection status, and the length of hospitalization. Accordingly, the ages of the patients who had developed delirium were significantly lower than those who had not ($p=0.046$). The length of hospitalization of patients who had developed delirium was significantly longer and the rate of infection was significantly higher than patients who had not developed delirium ($p=0.003$, $p<0.001$) (**Table 2**).

Table 1. Demographic characteristics of stroke patients

(n=161)	Mean	Standard Deviation
Age	70.49	15.269
Length of hospitalization	46.62	16.119
GCS	10.68	2.172
	n	**%**
Gender		
Female	74	46.0
Male	87	54.0
Diagnosis		
IS	97	60.2
HS	32	19.9
SAH	32	19.9
Dementia		
Present	24	14.9
Absent	137	85.1
DM		
Present	44	27.3
Absent	117	72.7
HT		
Present	149	92.5
Absent	12	7.5
HD		
Present	81	50.3
Absent	80	49.7
Delirium		
Present	35	21.7
Absent	126	78.3
Discharge Condition		
Exitus	29	18.0
Alive	132	82.0

GCS: Glasgow coma scale, IS: Ischemic stroke, HS: hemorrhagic stroke, SAH: Subarachnoid hemorrhage, DM: Diabetes Mellitus, HT: Hypertension, HD: Heart Disease

Table 2. Evaluation of the relationship between the delirium status and the variables

	Delirium				Chi-square	p
	Present		Absent			
	n	%	n	%		
Gender						
Female	16	45.7	58	46.0	0.001	0.973
Male	19	54.3	68	54.0		
Diagnosis						
IS	17	48.6	80	63.5	5.852	0.054
HS	6	17.1	26	20.6		
SAH	12	34.3	20	15.9		
Dementia						
Present	8	22.9	16	12.7	2.228	0.135
Absent	27	77.1	110	87.3		
DM						
Present	9	25.7	35	27.8	0.059	0.809
Absent	26	74.3	91	72.2		
HT						
Present	33	94.3	116	92.1	0.006	1.000
Absent	2	5.7	10	7.9		
HD						
Present	13	37.1	68	54.0	3.102	0.078
Absent	22	62.9	58	46.0		
Infection						
Present	22	62.9	29	23.0	20.089	0.000
Absent	13	37.1	97	77.0		
Discharge Condition						
Exitus	7	20.0	22	17.5	0.120	0.729
Alive	28	80.0	104	82.5		
	Median	**Min.-Max.**	**Median**	**Min-Max.**	**Z**	**p**
Age	68.0	44-90	76.0	20-94	-1.995	0.046
GCS	10.0	7-15	10.0	7-15	-0.462	0.644
Length of hospitalization	47.0	9-257	31.0	7-257	-2.953	0.003

GCS: Glasgow coma scale, IS: Ischemic stroke, HS: Hemorrhagic stroke, SAH: Subarachnoid hemorrhage, DM: Diabetes Mellitus, HT: Hypertension, HD: Heart disease

There were significant differences between the patients with and without delirium in levels of glucose, creatinine, sodium, ALT, and albumin. There was a statistically significant relationship between the development of delirium and the PEG status. (p=0.015) While the glucose, creatinine and ALT levels of patients who had developed delirium were significantly higher than those without delirium, their Na and albumin levels were significantly lower. The proportion of patients with PEG was significantly lower among patients with delirium (p=0.0015) (**Table 3**).

There were significant differences between the patients with and without delirium the use of anticholinergics, narcotic analgesics, antiepileptics, and antipsychotics. Accordingly, the rate of anticholinergic, narcotic analgesic, antiepileptic and antipsychotic users among patients with delirium was significantly higher than those without delirium (p=0.003, p< 0.001, p=0.004, p<0.001) (**Table 4**).

Table 3. Evaluation of the relationship between the delirium status and laboratory parameters and PEG

	Delirium				Z	p
	Present		Absent			
	Median	Min.-Max.	Median	Min.-Max.		
Glucose	119.0	79-189	98.5	74-200	-2.989	0.003
Urea	23.0	0.6-64	18.0	0.2-62	-1.929	0.054
Creatinine	0.6	0.2-4.1	0.5	0.1-3.5	-2.869	0.004
K	3.9	2.9-4.9	3.9	2.3-5.4	-1.064	0.287
Na	134.0	128-143	138.0	130-147	-3.777	0.000
AST	21.0	9-66	18.0	5-44	-1.001	0.317
ALT	20.0	6-71	15.0	2-73	-2.751	0.006
Albumin	2.5	1.6-3.9	2.8	1.6-4.1	-3.561	0.000
	n	**%**	**n**	**%**	**Chi-square**	**p**
PEG						
Present	20	57.1	98	77.8	5.958	0.015
Absent	15	42.9	28	22.2		

PEG Percutaneous Endoscopic Gastrostomy, K: Potassium, Na: Sodium, ALT: Alanine aminotransferase, AST: Aspartate aminotransferase

Table 4. Evaluation of the relationship between the delirium status and medication use

	Delirium				Chi-square	p
	Present		Absent			
	n	%	n	%		
Anticholinergic						
Present	11	31.4	14	11.1	8.620	0.003
Absent	24	68.6	112	88.9		
Narcotic Analgesic						
Present	17	48.6	5	4.0	46.191	0.000
Absent	18	51.4	121	96.0		
Antiepileptic						
Present	21	60.0	42	33.3	8.178	0.004
Absent	14	40.0	84	66.7		
Antipsychotic						
Present	13	37.1	13	10.3	14.556	0.000
Absent	22	62.9	113	89.7		

DISCUSSION

Delirium is a temporary neurocognitive disorder characterized by cognitive, psychomotor and behavioral symptoms, and it is a common complication after stroke.[13] In our study, we detected delirium in 35 (21.1%) of stroke patients followed in palliative care. In their study, Farhaan S. Vahidy and colleagues found that the rate of delirium was higher in HS patients (ICH: 10.0%, SAH: 9.8%) than in IS patients (7.0%).[14] In our study, the delirium rates in palliative care were higher in HS patients (HS: 18.5%, SAH: 37.5%) than in IS patients (17.5%), but this did not create a statistically significant difference. (p=0.054)

Previous studies have shown that advanced age, infection and dementia pose a high risk of developing delirium after a stroke.[15] In the patients we followed in palliative care who developed delirium after a stroke, the infection rate was significantly high, and their average age was significantly low. Advanced age (≥65) has been shown as a risk for delirium in many studies.[14] Caeiro et al.[16] identified the average age as 63.6 in stroke patients who developed delirium. In our study, although the mean age of patients with delirium was 66.6, it was considered to be low when compared with patients without delirium. We have thought that admission of some poststroke patients to the palliative care in the advance stage of the disease might be a factor acting on the difference in the mean age.

It was previously shown that the duration of hospitalization and mortality increased in patients who developed delirium after a stroke and that delirium negatively affected the prognosis.[17] In our study, the length of hospitalization was significantly longer in patients with stroke under our follow-up in palliative care, but there was no significant difference in the exitus rates. Similarly, Nydahl et al.[18] showed that complication rates increased, but mortality did not increase in patients with delirium that they followed in the primary stroke unit.

In their hospital-based study, Khurana and colleagues[19] showed that the second major risk factor for delirium after sepsis and infection was metabolic abnormalities. The glucose, creatinine and ALT levels were significantly higher, and the Na and albumin levels were significantly lower in patients with stroke who developed delirium, whom we followed in palliative care. In their study, Kotfis et al.[20] found that acute renal failure and impaired glucose tolerance posed a high risk of delirium development after a stroke, and that AST and creatinine values were significantly higher in patients with delirium. We identified that the PEG rate was significantly low in patients who developed delirium. We thought that this result might have been be due to the decrease in delirium development through use of a PEG, which provides a partial reduction of nutritional problems in patients with stroke followed-up in palliative care.

Medications are an increasingly common precipitant of delirium as well as other neuropsychiatric adverse effects, especially in the elderly and other patients with altered pharmacokinetics and pharmacodynamics.[21] Opioids, anticholinergics, anxiolytics, antipsychotics, antiepileptics and steroids are among the medications that most frequently cause delirium.[22] Anticholinergic agents are commonly used for the treatment of several poststroke disorders including urinary bladder problems, spasticity, depression, and pain. The effects of medications on the development of delirium in stroke patients have previously been studied in a limited number of studies, and anticholinergics have been shown to increase the risk of delirium.[16,23] In our study, we identified that the use of anticholinergics, narcotic analgesics, antiepileptics and antipsychotics was significantly high among patients with stroke who developed delirium, who had been under follow-up in our palliative care.

This study had several limitations: First, the patients included in the study had not been routinely screened for delirium; they had been accepted as delirium after evaluation by the psychiatry department. We think that some patients, particularly those who could have been diagnosed as hypoactive delirium during their clinical follow-up may have been omitted. Secondly, the etiology of delirium is multifactorial and has not been fully clarified. Location and size of the stroke lesion can be related to the risk of delirium; therefore, the lack of analysis of such a relationship is included in the limitations of this study.

CONCLUSION

Delirium is a complication that we commonly encounter, both in the acute period and during palliative care follow-up, in patients with stroke. In our study, we showed that age, infection, metabolic disorders and medications affected the development of delirium and the length of stay in palliative care in patients with stroke. We think that determining and managing the risk factors for delirium development in stroke patients followed-up in palliative care will decrease the morbidity of the patients and improve their quality of life, and that further studies on this topic are needed.

ETHICAL DECLARATIONS

Ethics Committee Approval: The study was carried out with the permission of Dr. Abdurrahman Yurtaslan Ankara Oncology Training and Research Hospital Ethics Committee (Date: 08.07.2020, Decision No:2020-07/682).

Informed Consent: Because the study was designed retrospectively, no written informed consent form was obtained from patients.

Referee Evaluation Process: Externally peer-reviewed.

Conflict of Interest Statement: The authors have no conflicts of interest to declare.

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REFERENCES

1. American Psychiatric Association. Diagnostic and statistical manual of mental disorders, (Fifth Edition ed). Arlington:American Psychiatric Association, 2013.
2. Creutzfeldt CJ, Longstreth WT, Holloway RG. Predicting decline and survival in severe acute brain injury:the fourth trajectory. BMJ. 2015;351:h3904.
3. McManus J, Pathansali R, Stewart R, Macdonald A, Jackson S. Delirium Post-Stroke. Age Ageing. 2007;36(6):613-8.
4. Inouye SK, Westendorp RGJ, Saczynski JS. Delirium in Elderly People. Lancet. 2014;383(9920):911-22.
5. Holloway RG, Arnold RM, Creutzfeldt CJ, et al. Palliative and end-of-life care in stroke:a statement for healthcare professionals from the American Heart Association/American Stroke Association. Stroke. 2014;45:1887-916.
6. Holloway RG, Ladwig S, Robb J, Kelly A, Nielsen E, Quill TE. Palliative Care Consultations in Hospitalized Stroke Patients. J Palliat Med. 2010;13(4):407-412.
7. Eastman P, McCarthy G, Brand CA, Weir L, Gorelik A, Le B. Who, Why and When:Stroke Care Unit Patients Seen by a Palliative Care Service Within a Large Metropolitan Teaching Hospital. BMJ Support Palliat Care. 2013;3(1):77-83.
8. Patel MB, Bednarik J, Lee P, et al. Delirium Monitoring in Neurocritically Ill Patients:A Systematic Review. Critical care medicine. 2018;46(11):1832-41.
9. Naidech AM, Beaumont JL, Rosenberg NF, et al. Intracerebral hemorrhage and delirium symptoms. Length of stay, function, and quality of life in a 114-patient cohort. American journal of respiratory and critical care medicine. 2013;188(11):1331-7.
10. Hosie A, Davidson PM, Agar M, Sanderson CR, Phillips J. Delirium prevalence, incidence, and implications for screening in specialist palliative care inpatient settings:a systematic review. Palliat Med. 2013;27(6):486-98.
11. 11.Kim H, Chung S, Ho Joo Y, Lee JS. The major risk factors for delirium in a clinical setting. Neuropsychiatr Dis Treat. 2016;12:1787-93.
12. Shi Q, Warren L, Saposnik G, MacDermid JC. Confusion assessment method:a systematic review and meta-analysis of diagnostic accuracy. Neuropsychiatr Dis Treat. 2013;9:1359-70.
13. Langhorne P, Stott DJ, Robertson L, et al. Medical complications after stroke:A multicenter study. Stroke. 2000;31(6):1223-29.
14. Vahidy FS, Bambhroliya AB, Meeks JR, et al. In-hospital outcomes and 30-day readmission rates among ischemic and hemorrhagic stroke patients with delirium. PLoS One. 2019;14(11):e0225204.
15. Simone MJ, Tan ZS. The Role of Inflammation in the Pathogenesis of Delirium and Dementia in Older Adults:A Review. CNS Neurosci Ther. 2011;17(5):506-13.
16. Caeiro L, Ferro JM, Claro MI. Delirium in acute stroke:a preliminary study of the role of anticholinergic medications. Eur J Neurol. 2004;11:699-704.
17. McManus J, Pathansali R, Hassan H, et al. The course of delirium in acute stroke. Age and Aging. 2009;38:385-9
18. Nydahl P, Bartoszek G, Binder A, et al. Prevalence for delirium in stroke patients:A prospective controlled study. Brain Behav. 2017;7(8):e00748.
19. Khurana V, Gambhir IS, Kishore D. Evaluation of delirium in elderly:a hospital-based study. Geriatr Gerontol Int. 2011;11:467-73.
20. Kotfis K, Bott-Olejnik M, Szylińska A, Listewnik M, Rotter I. Characteristics, Risk Factors And Outcome Of Early-Onset Delirium In Elderly Patients With First Ever Acute Ischemic Stroke-A Prospective Observational Cohort Study. Clin Interv Aging. 2019;14:1771-82.
21. Bush SH, Tierney S, Lawlor PG. Clinical Assessment and Management of Delirium in the Palliative Care Setting. Drugs. 2017;77(15):1623-43.
22. Jackson N, Doherty J, Coulter S. Neuropsychiatric Complications of Commonly Used Palliative Care Drugs. Postgrad Med J. 2008;84(989):121-6
23. Gustafson Y, Olsson T, Eriksson S, Asplund K, Bucht G. Acute confusional states (delirium) in stroke patients. Cerebrovasc Dis. 1991;1:257-64.

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Factors Affecting Blood Pressure Control in Hypertension Patients and Their Social Adaptation

Hipertansiyon Hastalarında Tansiyon Kontrolüne Etki Eden Faktörler ve Sosyal Uyum

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Abstract

Aim: In this research, we aimed to analyze the factors affecting the control of blood pressure and social adaptation in hypertensive patients.

Material and Method: Our study was conducted with 100 hypertensive patients in Ankara Training and Research Hospital Family Medicine Polyclinics between December 2015 and March 2016. Five-day blood pressure follow-up, socio-demographic characteristics and "Fatih Social Tendencies Scale" questionnaire data of the patients were recorded. 5-day blood pressure follow-up of the patients was performed.

Results: A total of 100 individuals including 48 (48%) male and 52 (52%) female patients were included in the study. In our research, physical activity, regular exercise, being on diet, smoking, regular doctor check, medication compliance, marital status, years of education, regular book reading, working status and monthly income were found to be effective in blood pressure control. "Social Adaptation", "Avoidance of Substance", "Avoidance of Violence", "Family Status" and "Economic Status" among social tendency factors were found to be better in patients with blood pressure under control.

Conclusion: In blood pressure follow-up, the lifestyle characteristics of the patient should be questioned and taken into consideration. Questioning psychological factors such as social adaptation and providing support through the provision of necessary information and education to the patient will make a great contribution to the patients in terms of blood pressure control.

Keywords: Hypertension, social adjustment, follow-up studies

Öz

Amaç: Çalışmamızda, hipertansiyon hastalarının tansiyonlarının kontrolüne etki eden faktörleri ve sosyal uyumu değerlendirmeyi amaçladık.

Gereç ve Yöntem: Çalışmamız Aralık 2015-Mart 2016 tarihleri arasında Ankara Eğitim ve Araştırma Hastanesi Aile Hekimliği Polikliniklerinde 100 hipertansif hasta ile yapıldı. Hastaların beş günlük tansiyon takibi, sosyodemografik özellikleri ve "Fatih Sosyal Eğilimler Ölçeği" anket verileri kaydedildi. Hastaların 5 günlük tansiyon takipleri yapıldı.

Bulgular: Katılımcıların 48 (%48) tanesi erkek; 52 (%52) tanesi kadın olup toplamda 100 kişi çalışmamıza dahil edildi. Çalışmamızda fiziksel aktiflik, düzenli egzersiz, diyetine dikkat etme, sigara kullanımı, doktora düzenli gitme, ilaçlarını düzenli kullanma, evli olma, eğitim yılı, düzenli kitap okuma, çalışma durumu ve aylık gelir düzeyi tansiyon kontrolünde etkili olduğu bulundu. Sosyal eğilim faktörlerinden "Sosyal Uyum", "Maddeden Kaçınma", "Şiddetten Kaçınma", "Aile Statüsü" ve "Ekonomik Durum" faktörlerinin tansiyonları kontrol altında olan hastalarda daha iyi olduğu gözlendi.

Sonuç: Tansiyon takibinde hastanın yaşam tarzı özelliklerinin sorgulanması ve göz önüne alınması, sosyal uyum gibi psikolojik faktörlerin sorgulanması ve bu konuda gerekli bilgi ve eğitimin hastaya verilmesi ile destek sağlanması tansiyon kontrolü açısından hastalara büyük katkı sağlayacaktır.

Anahtar Kelimeler: Hipertansiyon, sosyal uyum, takip çalışmaları

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INTRODUCTION

As one of the preventable global death causes, hypertension constitutes a prevailing and treatable risk factor. Among chronic diseases, it is a leading cause of the referrals to Family Medicine polyclinics. Differences are present between the hypertension guidelines before and after 2017 and the current classification defined a decrease from 25% to 18% in hypertension prevalence in patients without cardiovascular disease.[1] There is an estimated number of 15-16 million hypertension patients in our country.[2] Epidemiological studies reported a HT prevalence of 31.8-41.7% in our country.[3,4]

Blood pressure follow-up and decreased referral for doctor control in hypertension patients using medication are generally caused by their trust on medication use and considering this, the importance of blood pressure measurements should be explained satisfactorily to the patients.[1-4]

Our aim in this study was to evaluate the effects of the sociocultural and economic condition of patients and the effect of detailed clinical evaluation by primary care physicians in HT patients based on social adaptation condition in HT control.

MATERIAL AND METHOD

Our study is a cross-sectional study with an analytic pattern. Consent no 5166 was taken from Ankara Training and Research Hospital Ethics Board in the meeting no 0617 dated 11.11.2015 before starting our study. The examining doctor applied face-to-face survey on 100 consenting patients who referred to Ankara Training and Research Hospital Family Medicine polyclinics between 01 December 2015 and 31 March 2016. No sampling calculation was performed and all patients meeting the study criteria and giving consent between the mentioned dates were included in the study.

Sociodemographic characteristics and Fatih Social Tendencies scale was applied to the participating patients. Stress condition, presence of any chronic diseases, blood pressure checking interval, control interval and the referred health institutions were asked in addition to the smoking, exercising and diet application conditions. Five-day blood pressure follow-ups (systolic and diastolic blood pressure measurements at the same hours in the morning and evening) were demanded from the patients. Mean blood pressure was calculated through taking the arithmetic mean of the data acquired during five-day follow-up. Patients who had blood pressure measuring device at home and had blood pressure measuring device for less than two years were included in the study. A year limit was determined for blood pressure device for the safety of blood pressure measurements.

The condition of blood pressure being under control was regulated based on JNC 8; target systolic BP should be below 150 mmHg and diastolic BP should be below 90 mmHg in individuals aged ≥ 60 while the systolic BP level should be below 140 mmHg and diastolic BP level should be below 90 mmHg in individuals under 60 years of age based on JNC 8.[5]

Fatih Social Tendencies Scale

We conducted Fatih Social Tendencies Scale developed by Tekin et al to evaluate the social tendencies of the participants (6 factors 22 questions, with five point Likert scale (I.Totally disagree, II.Disagree, III.Neutral, IV.Somewhat agree, V.Certainly agree). Scoring of the sentences negatively related to the factor was performed through subtracting from 6. Cronbach's Alpha value for the general reliability of the scale is 0.794 (Corrected 0.811) and the scale is highly reliable based on its corrected value. The Factors of the scale are Social Adaptation (SA), Tendency of Avoiding Substance (AS), Tendency of Avoiding Violence (AV), Economic Status (ES), Family Status (FS) and Targets and Ideals (TI). The scores of the sub-groups are evaluated separately and the scaling of the related factor is evaluated as "higher" as the score increases. Fatih Social Tendencies Scale can be used to research the effects of descriptive characteristics on social tendencies.[6]

Statistical Analysis

Data were evaluated through entering in SPSS statistics package program version 16.0. After determining the factors affecting the blood pressure control through Logistic Regression Analysis, the effect direction of the factors was calculated through Chi-Square Test and Comparison Analysis for the Mean Values in Independent Groups (Student T test). The relationship between the variables was examined with Spearman correlation analysis. Data without normal distribution were given as median (minimum-maximum). Significance level was taken as $p<0.05$.

RESULTS

A total of 100 individuals including 48 (48%) male and 52 (52%) female patients were included in the study. Demographic characteristics of the patients were shown on **Table 1**.

All participants knew their normal blood pressure values and had blood pressure device at home. The book reading rate was 50% (n=50) in our study group. Women read significantly more book compared to men (p=0.045). 94 (94%) of the patients in our study group were followed-up in state or training and research hospital. General characteristics of the patients were shown on **Table 2**.

We applied "Logistic Regression" analysis to see the possible collective effects of the factors we considered to be effective on systolic and diastolic blood pressures which constitute the main subject of our study. The effective factors on mean systolic blood pressure were shown and while "Physical Activity" and "Regular Book Reading" were significant in systolic blood pressure control ($p<0.05$), "Being Married" was

Table 1. General Demographic Characteristics of Hypertensive Patients

Parameter	Male		Female		General	
	n	Mn±SD	n	Mn±SD	n	Mn±SD
Age	48	61.75±6.34	52	45.98±4.73	100	53.86± 5.53
Number of individuals in the family	48	4.63±1.19	52	3.92±1.15	100	4.27± 1.17
Number of children	48	2.81±0.93	52	1.88±1.32	100	2.34± 1.12
BMI	48	28.38 ±1.97	52	27.63±2.24	100	28.0± 2.10
Education year	48	8.88±1.95	52	7.79±2.89	100	8.33± 2.42
Monthly income	48	2779±1.04	52	2015±914	100	2397± 977
HT duration	48	8.31±2.82	52	4.38±2.96	100	6.34± 2.89
Number of medications taken	48	2±0.61	52	1.10±0.29	100	1.55± 0.45

* Mn: Mean, SD: Standard Deviation

again significant in systolic blood pressure control (p<0.05). The relationship between "Being Married" and mean systolic blood pressure showed that the mean systolic blood pressure was under control in 59.5% and not under control in 40.5% of "Married" individuals while it was 100% (n=9) under control and 0% (n=0) not under control in "Single individuals". The rate of individuals with mean systolic blood pressures under control was 29.4% and not under control in 70.6% in "Widows" (p<0.001). Blood pressure control was better in single individuals. Statistical comparison of the characteristics and blood pressures of hypertension patients was shown on **Table 3**.

A significant effect of "Working Status" was detected (p<0.05). "Years of Education" and "Monthly Income" were also detected as effective factors on mean systolic blood pressure (p<0.05). While mean systolic blood pressure control was significant in individuals "Medication Compliance" (p<0.05), "Being on Diet" was also found to be effective on mean systolic blood pressure control (p<0.05). "Smoking Condition" and "Stress in the Working Environment" were found to be effective on mean systolic blood pressure control (p<0.05). "Social Adaptation", "Avoidance of Substance", "Avoidance of Violence", "Family Status" and "Economic Condition" among social tendency factors effective on mean systolic blood pressure (p<0.05), "Targets and Ideals" were not found to be effective.

Social adaptation, avoidance of substance, avoidance of violence, family status and economic condition among social tendencies factors were more significant in individuals with mean systolic blood pressures under control (p<0.001). Targets and ideals among social tendencies factors were not found to be significant in individuals with mean systolic blood pressures under control (p=0.084) (**Table 4**).

While factors effective on systolic blood pressure were effective on diastolic blood pressure, age, gender, number of individuals in the family, number of children, body mass index (BMI), hypertension duration and lack of regular measurement were also found to be effective (p<0.05). Targets and ideals in addition to social adaptation, avoidance of substance, avoidance of violence, family status and economic condition among social tendency factors were also found to be effective on diastolic blood pressure (p<0.05).

Based on the analysis of the relationship between "Age condition" and mean diastolic blood pressure, the average age of the patients with diastolic blood pressure under control was 52.95±10.029 while it was 57.54±5.45 in those with uncontrolled diastolic blood pressure and p was found as 0.020 in their comparison.

Based on the analysis of the relationship between "Gender" and mean diastolic blood pressure, diastolic blood pressure was under control in 40 males (83.3%) and in 47 (90.4%) females. Diastolic blood pressure was not under control in 8 males (16.7%) and in 5 (9.6%) females (p=0.073).

DISCUSSION

"Social Adaptation", "Avoidance of Substance Use", "Avoidance of Violence", "Family Status" and "Economic Status" among social tendency factors were observed to be better in patients with blood pressure under control.

Many studies on the subject made us consider that aerobic physical activity may be useful in preventing hypertension, its treatment and decreasing cardiovascular risk and mortality.[7] A meta-analysis of randomized control studies showed that aerobic endurance training decreased resting systolic and diastolic blood pressure 3.0/2.4 mmHg in general and 6.9/4.9 mmHg in hypertensive patients.[8] Similarly, we observed a positive effect of "physical activity" and "regular exercise" on arterial blood pressure control in our study.

Blood pressure control was also better in individuals "Reading Books Regularly" in our study. A Chinese study showed that literacy and having information on hypertension had a significant effect on treatment and organization of training programs for literacy is suggested for rural areas.[9] The direct relationship between hypertension follow-up and treatment and health-literacy was also clearly presented in a Turkish study.[10] As the education level and income conditions may be better in individuals who regularly read books, we may consider that they have a more stabile psychological condition and this condition has a positive effect on blood pressure control. It is also possible that this group controls their diseases more regularly.

Table 2. General characteristics of hypertension patients and their comparison

Parameter	Male		Female		General		p
	n	n (%)	n	n (%)	n	n (%)	
Physically Active	48	40 (83.3)	52	49 (94.2)	100	89 (89)	0.841
Regular Book Reading							
Yes	48	2 (4.2)	52	18 (34.6)	100	20 (20)	0.045
No	48	46 (95.8)	52	34 (65.4)	100	80 (80)	
Marital Status							
Married	48	40 (83.3)	52	34 (65.4)	100	74 (74)	
Single	48	0 (0)	52	9 (17.3)	100	9 (9)	0.436
Widow	48	8 (16.7)	52	9 (17.3)	100	17 (17)	
Profession							
Housewife	48	0 (0)	52	18 (34.6)	100	18 (18)	
Healthcare professional	48	1 (2.1)	52	0 (0)	100	1 (1)	
Police	48	9 (18.8)	52	0 (0)	100	9 (9)	0.653
Trainer	48	6 (12.5)	52	15 (28.8)	100	21 (21)	
Technical	48	11 (22.9)	52	0 (0)	100	11 (11)	
Other	48	21 (43.7)	52	19 (36.5)	100	40 (40)	
Working Status							
Employed	48	33 (68.8)	52	23 (44.2)	100	56 (56)	
Retired	48	14 (29.2)	52	1 (1.9)	100	15 (15)	0.085
Unemployed	48	1 (2.1)	52	28 (53.8)	100	29 (29)	
Regular Measurement							
None	48	0 (0)	52	1 (1.9)	100	1 (1)	
Once or twice a month	48	29 (60.4)	52	37 (71.2)	100	66 (66)	0.706
Once or twice a week	48	18 (37.5)	52	12 (23.1)	100	30 (30)	
Every day	48	1 (2.1)	52	2 (3.8)	100	3 (3)	
Medication Name Known							
No	48	1 (2.1)	52	21 (40.4)	100	22 (22)	
Some	48	31 (64.6)	52	1 (1.9)	100	32 (32)	0.063
Yes	48	16 (33.3)	52	30 (57.7)	100	46 (46)	
Follow-up Location							
University	48	3 (6.3)	52	2 (3.8)	100	5 (5)	
Training Hospital	48	26 (54.2)	52	19 (36.5)	100	45 (45)	0.358
State Hospital	48	19 (39.6)	52	30 (57.7)	100	49 (49)	
Family Health Center	48	0 (0)	52	1 (1.9)	100	1 (1)	
Being On Diet							
No	48	3 (6.3)	52	18 (34.6)	100	21 (21)	
Sometimes	48	40 (83.3)	52	21 (40.4)	100	61 (61)	0.674
Yes	48	5 (10,4)	52	13 (25)	100	18 (18)	
Regular Exercise							
None	48	8 (16.7)	52	22 (42.3)	100	30 (30)	
Once or twice a week	48	35 (72.9)	52	15 (28.8)	100	50 (50)	0.083
More than three times a week	48	5 (10.4)	52	15 (28.8)	100	20 (20)	
Smoking							
No	48	31 (64.6)	52	29 (55.8)	100	60 (60)	0.095
Yes	48	17 (35.4)	52	23 (44.2)	100	40 (40)	
Is the Environment Stressful							
No	48	32 (66.7)	52	24 (46.2)	100	56 (56)	0.064
Yes	48	16 (33.3)	52	28 (58.3)	100	44 (44)	
Chronic Disease							
No	48	44 (91.7)	52	49 (94.2)	100	93 (93)	0.643
Yes	48	4 (8.3)	52	3 (5.8)	100	7 (7)	
Systolic BP under Control							
Yes	48	28 (58.3)	52	30 (57.7)	100	58 (58)	0.653
No	48	20 (41.7)	52	22 (42.3)	100	42 (42)	
Diastolic BP under Control							
Yes	48	40 (83.3)	52	47 (90.4)	100	87 (87)	0.527
No	48	8 (16.7)	52	5 (9.6)	100	13 (13)	
Regular Doctor Control							
Never	48	1 (2.1)	52	3 (5.8)	100	4 (4)	
Sometimes	48	24 (50)	52	39 (75)	100	63 (63)	0.073
Regular	48	23 (47.9)	52	10 (19.2)	100	33 (33)	

*Chi-square test

Table 3. Comparing characteristics and BP of hypertension patients

Parameter	n (%)	Systolic BP		Diastolic BP	
		OR	p	OR	p
Physically Active	89 (89)	4.955	0.026	56.640	<0.001
Regular Book Reading					
Yes	20 (20)	20.000	<0,001	20.000	<0.001
No	80 (80)				
Marital Status					
Married	74 (74)	11.649	0.003	64.351	<0,001
Single	9 (9)				
Widow	17 (17)				
Profession					
Housewife	18 (18)				
Healthcare professional	1 (1)				
Police	9 (9)	0.179	0.728	21.258	<0.001
Trainer	21 (21)				
Technical	11 (11)				
Other	40 (40)				
Working Status					
Employed	56 (56)	14.067	0.001	37.838	<0.001
Retired	15 (15)				
Unemployed	29 (29)				
Regular Measurement					
Never	1 (1)				
Once or twice a month	66 (66)	3.376	0.337	52.261	<0.001
Once or twice a week	30 (30)				
Every day	3 (3)				
Medication Name Known					
No	22 (22)	9.846	0.002	18.615	<0.001
Some	32 (32)				
Yes	46 (46)				
Follow-up Location					
University	5 (5)				
Training Hospital	45 (45)	2.599	0.118	49.539	<0.001
State Hospital	49 (49)				
Family Health Center	1 (1)				
Being On Diet					
No	21 (21)	14.403	0.001	45.934	<0.001
Sometimes	61 (61)				
Yes	18 (18)				
Regular Exercise					
Never	30 (30)	13.370	0.001	39.253	<0.001
Once or twice a week	50 (50)				
More than three times a week	20 (20)				
Smoking					
No	60 (60)	13.067	<0,001	26.667	<0.001
Yes	40 (40)				
Is the Environment Stressful					
No	56 (56)	12.071	0.001	37.786	<0.001
Yes	44 (44)				
Chronic Disease					
No	93 (93)	1.333	0.248	21.333	<0.001
Yes	7 (7)				
Systolic BP under Control					
Yes	58 (58)	2.492	0.127	18.468	<0.001
No	42 (42)				
Diastolic BP under Control					
Yes	87 (87)	3.245	0.284	16.397	<0.001
No	13 (13)				
Regular Doctor Control					
Never	4 (4)	7.571	0.023	25.730	<0.001
Sometimes	63 (63)				
Regular	33 (33)				

*Student T test, OR: Odds Ratio

Table 4. The Relationship between Fatih Social Tendencies Scale factors and mean systolic blood pressure

	Mean Systolic Blood Pressure Values	n	Mean	SD	p
Social Adaptation	Controlled	58	4.2011	.29905	<0.001
	Uncontrolled	42	3.4127	.43436	
Avoiding Substance Use	Controlled	58	3.8506	.72325	<0.001
	Uncontrolled	42	2.5714	.59939	
Avoiding Violence	Controlled	58	4.1782	.89881	<0.001
	Uncontrolled	42	1.8968	.55332	
Familial Status	Controlled	58	4.1149	.51224	<0.001
	Uncontrolled	42	2.4643	.46640	
Economic Condition	Controlled	58	2.7931	.73303	<0.001
	Uncontrolled	42	2.1111	.42717	
Targets and Ideals	Controlled	58	4.8060	.37182	0.084
	Uncontrolled	42	4.7560	.44341	

*Student T test, SD: Standard Deviation

A Swedish study on hypertension and health-related life quality covering 8000 participants showed that the blood pressure control was better in single and married individuals compared to widows.[11] We observed in our study that the blood pressure was in control in "Most of the Married Individuals", "All Singles" but only 29.4% of the widows. Formation of unexpected condition such as death of a spouse or divorce in widows may cause some psychiatric changes and anxiety in the individuals.

A study made in North Carolina showed that the group over 65 years of age and the individuals with a lower education level had less information (information acquired through curiosity, not without any obligation).[12] Information level of individuals over the age of 60 and the individuals with a low education level was found lower in another study made in USA. Low information level is a factor negatively affecting blood pressure control.[13] Although we could not find any study directly on years of education in literature, we observed in our study that blood pressure control was positively affected as "Years of Education" increased.

A study made in China detected low socioeconomic level as a factor negatively affecting blood pressure control.[14] Our study detected better blood pressure control in individuals with "Highly Monthly Income". Socioeconomic level is among the most important factors determining the life style and thus the psychological condition of the patient.

The blood pressure controls were better in "Employed" and "Retired" individuals compared to "Unemployed" individuals in our study. No similar studies were found in literature but retirement salary and less or no financial concerns of retired individuals compared to unemployed individuals may explain why their controls are better than unemployed individuals. Again, less or no financial concern of employed individuals may explain why they have better blood pressure controls financial concerns constitute an anxiety-causing factor. Primary and secondary HT risk increases with increasing age.[15]

Medication compliance had a positive effect on blood pressure control as expected. This data supported by many other previous studies is not shocking.[14]

Blood pressure control was better in individuals having "Regular Doctor Control" and "Occasional Doctor Control" compared to those having "No Doctor Control" in our study. Previous studies also showed regular doctor control as an important factor affecting blood pressure control.[16]

Factors such as being on diet, smoking, regular exercise and stress condition in the environment were detected as significant factors in blood pressure control in a study made in Ankara.[17] Our study showed that the blood pressures of "Individuals on Diet" were under more control and the blood pressures of individuals making exercise at least once or twice a week were under control and no smoking and unstressed environment positively affected blood pressure control. Previous studies had also detected that these factors had a significant role in blood pressure control.[18,19]

There was a positive relationship between blood pressure control and the positive nature of "Social Adaptation", "Avoidance of Substance", "Economic Condition", "Family Status" and "Avoidance of Violence" of Social Tendencies scale we used in our study. We found no studies on this subject in literature. Psychological factors are known to be effective on blood pressure. The mentioned factors can be considered to have a significant effect on psychology. These factors may be a demonstrator of the stabile psychology of an individual. It may also be considered that the psychologies of the individuals with good blood pressure control are positively affected in this regard. Thus, this finding will make an important contribution to the literature as it concretely presents the importance of psychology and point of view in blood pressure control. This finding also shows the necessity of providing psychological support to the patients.

CONCLUSION

Factors such as physical activity, regular exercise, regular book reading, marital status, years of education, working status, medication compliance, regular doctor visits, being on diet and smoking were found to be effective on blood pressure control in our study. Social adaptation, avoidance of substance, avoidance of violence, family status and economic condition factors of Fatih Social Tendencies scale we used are also effective on blood pressure control in psychological terms. Supporting the patient through considering the factors mentioned above in blood pressure follow-up and giving the required information and training on this subject would make a great contribution to the patients in terms of blood pressure control. This can only be achieved by providing the opportunity for doctors to examine patients in sufficient time.

ETHICAL DECLARATIONS

Ethics Committee Approval: Consent no 5166 was taken from Ankara Training and Research Hospital Ethics Board in the meeting no 0617 dated 11.11.2015 before starting our study.

Informed Consent: All patients signed the free and informed consent form.

Referee Evaluation Process: Externally peer-reviewed.

Conflict of Interest Statement: The authors have no conflicts of interest to declare.

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

REFERENCES

1. Chowdhury EK, ASPREE Investigator Group. Impact of the 2017 American Heart Association and American College of Cardiology hypertension guideline in aged individuals. J Hypertens. 2020;38(12):2527-36.
2. Altun B, Arici M, Nergizoglu G, et al. Prevalence, awareness, treatment and control of Hypertension, in Turkey (the PatenT study) in 2003. J Hypertens 2005;23:1817-23.
3. Soydan İ. Hipertansiyon ile ilgili TEKHARF çalışması verileri ve yorumu. In: Onat A (ed). Türk Erişkinlerde Kalp Sağlığı (TEKHARF). İstanbul: Argos iletişim, 2003; 60-71.
4. Ulusal Hastalık Yükü ve Maliyet-Etkililik Projesi Final Raporu, Ankara: T.C. Sağlık Bakanlığı, Refik Saydam Hıfzıssıhha Mektebi Müdürlüğü ve Başkent Üniversitesi Yayını; 2004. Pages 33-34.
5. T.C. Sağlık Bakanlığı, Türkiye Sağlık Okuryazarlığı Ölçekleri Güvenilirlik ve Geçerlilik Çalışması. https://sbu.saglik.gov.tr/Ekutuphane/Home/GetDocument/166 Erişim tarihi: 22.09.2020.
6. James P, Oparil S, Carter B, et al. 2014 Evidence-based guideline for the management of high blood pressure in adults report from the panel members appointed to the Eighth Joint National Committee (JNC 8). JAMA 2014;311:507-20.
7. Tekin O, Özkara A, Cebeci S ve ark. 11-20 Yaş Öğrencilerde Sosyal Eğilimler Anketi. Yeni Tıp Derg 2007;24:198-204.
8. Fagard RH. Physical activity, fitness and mortality. Journal of Hypertension 2012;30:1310-12.
9. Cornelissen VA, Fagard RH. Effects of endurance training on blood pressure, blood pressure-regulating mechanisms, and cardiovascular risk factors. Hypertension 2005;46: 667-75.
10. Li X, Ning N, Hao Y, et al. Health Literacy in Rural Areas of China: Hypertension Knowledge Survey. International J Environment Res Public Health 2013;10(3):1125-38.
11. Bardage C, Isacson GL. Hypertension and health-related quality of life: an epidemiological study in Sweden. J Clin Epidemiol 2001;54:172-81.
12. Viera AJ, Cohen LW, Mitchell CM, et al. High blood pressure knowledge among primary care patients with known hypertension: a North Carolina Family Medicine Research Network (NC-FM-RN) study. J Am Board Fam Med 2008;21:300-8.
13. Sanne S, Muntner P, Kawasaki L, et al. Hypertension knowledge among patients from an urban clinic. Ethnicity Dis 2008;18:42.
14. Li W, Jiang X, Ma H, et al. Awareness, treatment and control of hypertension in patients attending hospital clinics in China. J Hypertens 2003;21:1191-97.
15. Cohen L, Curhan GC, Forman JP. Influence of age on the association between lifestyle factors and risk of hypertension. J Am Soc Hypertens. 2012;6:284-90.

16. Clark LT, Afflu E. Antihypertensive therapy: factors affecting medication compliance and blood pressure control. Am J Manager Care 1995;1:289-94.
17. Çöl M, Özdemir O, Ocaktan ME. Park Sağlık Ocağı bölgesindeki 35 yaş üstü hipertansiflerde tedavi kontrol durumları ve davranışsal faktörler. Ankara Üniversitesi Tıp Fakültesi Mecmuası 2006;59:144-50.
18. Oliveria Susan A,Chen RS, McCarthy BD, et al. Hypertension knowledge, awareness, and attitudes in a hypertensive population. J Gen Intern Med 2005;20:219-25.
19. Watson K, Jamerson K. Therapeutic lifestyle changes for hypertension and cardiovascular risk reduction. J Clin Hypertens 2003;5:32-7.

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Original Article / Orijinal Araştırma

Clinical and Laboratory Findings in Children with Influenza Infections

İnfluenza Enfeksiyonu Olan Çocuklarda Klinik ve Laboratuvar Bulguları

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Abstract

Objective: We aimed to show the clinical characteristics of children with influenza infection and the relationship between influenza infections and hemogram parameters, neutrophil/lymphocyte ratio, platelet/lymphocyte ratio, neutrophil/monocyte ratio, and mean platelet volume.

Material and Method: The data of patients who applied to Necmettin Erbakan University Meram Medical Faculty Department of Pediatrics outpatient clinics and had positive rapid influenza test were scanned through the hospital information system.

Results: The median age and neutrophil value in the influenza A group were significantly lower than in the influenza B group (p=0.002, p=0.008). The median MPV and monocyte value in the influenza A group were significantly higher than in influenza B (p<0.00, p=0.005). The mean WBC count was found to be significantly higher in hospitalized patients compared to outpatients (p=0.039). There were no significant difference between the groups in terms of NLR, PLR, NMR. Bacteremia was detected significantly more in hospitalized patients compared to outpatients. Underlying chronic diseases were significantly lower in outpatients than in inpatients (p<0.001).

Conclusion: There were no difference in the severity of clinical severity between infleunza A and B subgroups and no significant difference was found in terms of hemogram parameters.

Keywords: Influenza A, Influenza B, hemogram parameters, Neutrophil/lymphocyte ratio, hospitalization, children

Öz

Amaç: Bu çalışmada influenza enfeksiyonu olan çocukların klinik özelliklerini ve nötrofil/lenfosit oranı, trombosit/lenfosit oranı, nötrofil/monosit, ortalama trombosit hacmi gibi laboratuvar bulgularını göstermeyi amaçladık.

Gereç ve Yöntem: Necmettin Erbakan Üniversitesi Meram Tıp Fakültesi Çocuk Sağlığı ve Hastalıkları Anabilim Dalı polikliniklerine başvuran ve hızlı influenza testi pozitif çıkan hastaların verileri hastane bilgi sistemi üzerinden tarandı.

Bulgular: İnfluenza A grubunda ortanca yaş ve nötrofil değeri influenza B grubuna göre anlamlı derecede düşüktü (p=0,002, p=0,008). İnfluenza A grubunda ortanca MPV ve monosit değeri influenza B'ye göre anlamlı derecede yüksekti (p<0,00, p=0,005). Hastanede yatan hastalarda ortalama WBC sayısı ayaktan hastalara göre anlamlı derecede yüksek bulundu. (p=0,039). NLR, PLR, NMR açısından gruplar arasında anlamlı fark yoktu. Hastanede yatan hastalarda ayaktan hastalara göre anlamlı derecede daha fazla bakteriyemi saptandı. Altta yatan kronik hastalıklar ayaktan hastalarda yatan hastalara göre anlamlı derecede düşüktü (p<0,001).

Sonuç: İnfluenza A ve B alt grupları arasında klinik şiddet şiddeti açısından fark bulunmadı ve hemogram parametreleri açısından anlamlı fark bulunmadı.

Anahtar Kelimeler: İnfluenza A, İnfluenza B, kan sayımı parametreleri, Nötrofil/lenfosit oranı, hastaneye yatış, çocuklar

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INTRODUCTION

Influenza virus infections cause high rates of morbidity and mortality all over the world. It causes infections in more than 1,000,000,000 people, serious illness in five million people, deaths of 250 to 500 thousand people each year.[1] It has been reported that influenza viruses infect 20-50% of children during the periods of pandemic.[2] It is estimated that the number of hospitalizations due to influenza in children under five years of age worldwide is more than 870,000 per year.[3]

Most influenza infections are self-limiting. However, the disease may lead to clinical manifestations including upper and lower respiratory tract infection, acute respiratory distress syndrome (ARDS) myocarditis, myositis, febrile convulsion, central nervous system infections and death.[2-6] The disease can cause fatal complications even in healthy children without any underlying disease. It has been reported that mortality and morbidity rates are higher in children under two years of age.[7] It is important to diagnose the disease early to prevent complications and to decrease mortality.[8]

Children are considered to be the most important carriers for the spread of influenza infection in the community.[9] In addition, the lack of parents to continue their daily routines for the care of their children because of influenza infection leads to job losses.[9] So, early diagnosis of influenza infections in children can contribute to both control the spread of the disease and reduce the negative socio-economic effects.

It has been reported that the parameters in the complete blood count can be used to predict the course and prognosis of many diseases in children and adults.[8,10-14] Routine blood analyses are frequently performed in patients admitted to the hospital with complaints suggesting influenza infection. The parameters measured on the complete blood count can provide important clues about the severity of inflammation in patients. In this study, our aim is to compare the clinical status and inflammation findings of patients hospitalized for influenza infection by using findings of complete blood count parameters.

MATERIAL AND METHOD

This is retrospective case-control study, which included patients aged under 18 years old who applied to Necmettin Erbakan University Meram Medical Faculty Department of Pediatrics between October 2019 and March 2020 and had a positive rapid influenza test. The data of patients were obtained through the hospital medical record database. Patients with any chronic disease such as hematological diseases (leukemia, lymphoma, hemoglobinopathy, conditions causing bone marrow failure), chronic renal and liver disorders were not included in the study. Sociodemographic-clinical characteristics and complete blood count parameters of the patients were noted. The stages of forming the working group are shown in **Figure 1.**

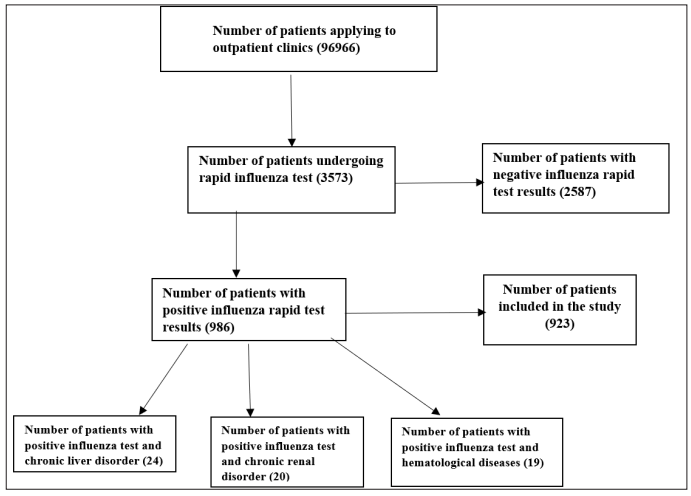

Figure 1. The creation of the study group

Nasal and nasopharyngeal swab samples from the patients were taken to Copan 606CS01PSwabs™ and Copan Universal Transport Medium™ viral transport medium (Copan, Italy). Samples that could not be delivered to the laboratory on the same day were stored at 4-8°C and delivered to the laboratory within 48 hours at the latest.

Patients were hospitalized if they met the criteria reported in the study of Jain et al.[15] which were: body temperature above 39°C, signs of severe lower respiratory tract infection (tachypnea, retraction, need for oxygen therapy), ill appearance and severe extrapulmonary complications. It was found that patients without these findings were followed up as outpatients.

This study was conducted with the approval of Necmettin Erbakan University Ethics Committee (Decision number: 2021/3136). In addition, all procedures were carried out in accordance with the Declaration of Helsinki and local laws and regulations.

Statistical Analysis

All statistical analysis was performed using SPSS for Windows 22.0. Shapiro-Wilk normality test and Q-Q plots were used to check the normality of the data. Mean platelet volume (MPV)/platelet (PLT), PLT/lymphocyte, MPV/platecrit (PCT), PLT/PCT, neutrophil/lymphocyte ratios were analyzed by taking their logarithmic transformations since they showed a right-skewed distribution. Numerical variables were presented as mean±standard deviation if normally distributed, and as median (interquartile range: 25th percentile-75th percentile) if not normally distributed. Other numerical variables such as age and hematological parameters were compared with independent samples t-test, Welch t-test or Mann-Whitney U test. On the other side, categorical variables were described as counts (n) and percentages (%), and were evaluated using Pearson chi-square, Yates continuity correction and also Fisher's exact test according to the expected frequency in each cell in the crosstabs. A p-value less than .05 was considered as statistically significant.

RESULTS

A total of 923 children who were diagnosed with Influenza infection were included. 498 (54.0%) of the patients were male and 425 (46.0%) were female (**Table 1**). The median age was 45 months, with an age range of 19-72 months. The clinical and laboratory findings of patients with influenza A and B positive groups are given in **Table 1**. The median age (month) in the influenza B-positive group was significantly higher than in the influenza A-positive group. The gender distributions of the groups were similar.

The median MPV value in the influenza A-positive group was significantly higher than in influenza B-positive (p<0.001). The median neutrophil value of the influenza A-positive group was significantly lower than in influenza B-positive (p=0.008). The median monocyte value of the influenza A-positive group was significantly higher than influenza B-positive (p=0.005). The median AST and ALT value of the influenza A-positive group was significantly higher than influenza B-positive (p=0.013, p=0.021 respectively). There were no statistically significant differences for the other parameters between groups (**Table 2**).

The clinical symptoms of the patients with influenza A-positive and influenza B-positive are given in **Table 3**. While vomiting rate was significantly higher in the influenza A-positive group runny nose and sore throat rates were significantly lower in the influenza A-positive than in the influenza B-positive group. However, the other clinical symptoms showed no significantly difference between groups (**Table 3-4**).

Table 1. Demographic parameters of patients with influenza infection

Parameters	Influenza A-positive (n=557)	Influenza B-positive (n=366)	p-value
Age (month)	45 (19-72)	48 (24-79)	0.002
Age Groups			0.462
0-24 age (month)	176 (31.6)	109 (29.7)	
25-60 age (month)	217 (38.9)	131 (35.7)	
61-144 age (month)	144 (25.8)	111 (30.3)	
>144 age (month)	20 (3.5)	15 (4.1)	
Gender male	300 (53.8)	198 (54.1)	0.943

Table 3. Clinical symptoms of the patients according to groups

Parameters	Influenza A-positive (n=557)	Influenza B-positive (n=366)	Total (n=923)	p-value
Fever	496 (88.4)	323 (87.8)	819 (88.7)	0.708
Vomiting	136 (23.6)	60 (16.4)	196 (21.2)	0.004
Cough	320 (57.9)	207 (57.1)	527 (57.1)	0.765
Respiratory distress	17 (3)	14 (3.7)	31 (3.3)	0.524
Restlessness	28 (5)	24 (6.9)	52 (5.6)	0.327
Myalgia	37 (6.4)	36 (9.5)	73 (7.9)	0.080
Nasal flow	202 (37.5)	174 (48.7)	376 (40.7)	<0.001
Diarrhea	42 (7.5)	21 (5.8)	63 (6.8)	0.288
Anorexia	98 (17)	61 (16.7)	159 (17.2)	0.715
Sore throat	67 (11.8)	73 (20.6)	140 (15.1)	<0.001
Skin rash	4 (0.7)	5 (1.1)	9 (0.9)	0.327
Somnolence	28 (4.7)	15 (3.4)	43 (4.6)	0.513
Seizure	22 (3.6)	19 (4.5)	41 (4.4)	0.370

Table 2. Comprasion of laboratory parameters between groups of Influenza A and Influenza B

Parameters	InfluenzaA-positive (n=557)	Influenza B-positive (n=366)	p-value
White blood cell (/mm³)	6680 (4670-9300)	6950 (4825-9482)	0.318
Monocyte (/mm³)	540 (360-840)	490 (340-820)	0.005
Mean platelet volume (MPV)	9.5±1.1	9.3±1.1	<0.001
Platecrit (PCT)	0.22 (0.18-0.28)	0.21 (0.18-0.27)	0.434
Neutrophil (/mm³)	3490 (1930-5700)	3650 (2137-6160)	0.008
Lymphocyte (/mm³)	1910 (1310-3170)	1925 (1317-3382)	0.783
Hemoglobin (g/dL)	12.07±1.4	12.2±1.5	0.364
Platelet (×10³) (/mm³)	239 (188-298)	249 (191-297)	0.331
MPV/platelet(×10⁵) #	0.61 (0.49-0.73)	0.57 (0.47-0.69)	0.050
Lymphocyte/Platelet(×10⁵) #	2.91±0.39	2.91±0.29	0.854
Platelet/PCT#	5.97±0.49	6.04±0.92	0.067
Neutrophil/lymphocyte#	0.19 (-0.17-0.52)	0.20 (-0.03-0.49)	0.359
Platelet/lymphocyte#	2.06±0.31	2.07±0.29	0.637
Monocyte/lymphocyte#	-0.56±0.32	-0.58±0.31	0.109
Monocyte/lymphocyte	0.29 (0.16-0.51)	0.23 (0.17-0.42)	0.097
Erythrocyte sedimentation rate (mg/h)	15 (9-26)	17 (10-27)	0.204
C-reactive protein (mg/L)	4.90 (1.50-12.8)	3.6 (1.4-12.8)	0.312
Aspartate aminotransferase (U/L)	34 (27-46.7)	32 (25.6-44.5)	0.013
Alanine aminotransferase (U/L)	13 (9.8-20.7)	12 (8.2-19)	0.021
Urea (mg/dL)	20 (15-25)	20 (15-24)	0.423
Creatinine (mg/dL)	0.38 (0.31-0.49)	0.42 (0.33-0.48)	0.204
Fibrinojen (mg/dL)	322.8±74.2	305±69	0.172
Creatinine phosphokinase (U/L)	242.5 (97.2-819.5)	150 (87-1342)	0.882
pH	7.37±0.07	7.37±0.881	0.080
PCO_2	36.6±6.9	36.1±6.4	0.558
HCO_3	20.9±4.1	20.9±4.8	0.868
Lactate	1.9 (1.3-2.5)	1.9 (1.5-2.4)	0.335

Table 4. Demographic and clinical parameters of the hospitalized groups

Parameters	Outpatient (n=731)	Hospitalized (n=192)	p-value
Age (month)	48 (24-74)	36 (15-60)	0.001
Age Groups			0.003
0-24 age (month)	205 (28)	80 (33)	
25-60 age (month)	282 (38.5)	66 (37.7)	
61-144 age (month)	214 (29.2)	41 (26)	
>144 age (month)	30 (4.1)	5 (3.3)	
Gender male	394 (53.9)	104 (53.5)	0.947
Use of oseltamivir	726 (99.3)	192 (100)	0.517
Bacteraemia	11 (1.5)	62 (32)	<0.001
Chronic disease			<0.001
None	664 (90.8)	122 (63.5)	
Familial Mediterranean Fever	4 (0.5)	1 (0.5)	
Cystic fibrosis	5 (0.7)	5 (2.6)	
Immune deficiency	10 (1.4)	24 (12.5)	
Neurological disease	14 (1.9)	23 (12.0)	
Cardiological disease	12 (1.6)	6 (3.1)	
Asthma	7 (1.0)	5 (2.6)	
Atopy	9 (1.2)	2 (1.0)	
Endocrine Disease	4 (0.5)	2 (1.0)	
Chronic lung disease	2 (0.3)	2 (1.0)	
Pediatric Intensive Care Support	0 (0)	8 (4.2)	<0.001

Clinical and laboratory findings of outpatient and hospitalized patient groups are shown in **Table 5**. While the mean ages, mean hemoglobin concentrations (HGB) and mean creatinine values of the hospitalized patients were found to be significantly lower than the outpatients, the mean WBC count and the mean platecrit percentage (PCT) were found to be significantly higher in hospitalized patients. The other laboratory parameters showed no significantly difference between groups (**Table 5**).

DISCUSSION

Influenza has caused global and local epidemics many times since its first definition. Although mortality rates are not high in children, morbidity rates are high. Findings of influenza infection are similar to other viral diseases.[8] For this reason, the differential diagnosis of the disease is made with laboratory tests including rapid antigen tests, polymerase chain reaction (PCR), viral culture, antibody determination, in addition to a detailed anamnesis and complete physical examination.[8] But these laboratory studies are often expensive and time-consuming. Hemogram test is performed in most of the children admitted to the hospital with symptoms of influenza infection.

Table 5. Laboratory parameters of Outpatients and Hospitalized Patients

Parameters	Outpatient(n=731)	Hospitalized(n=192)	p-value
White blood cell (/mm³)	6475 (4617-8730)	7090 (4785-10200)	0.039
Monocyte (/mm³)	560 (375-810)	530 (345-950)	0.602
Mean platelet volume(MPV)	9.5±1.05	9.65±1.25	0.134
Platecrit (PCT)	0.21 (0.18-0.26)	0.22 (0.18-0.32)	0.011
Neutrophil (/mm³)	3360 (1957-5232)	3480 (1795-6690)	0.106
Lymphocyte (/mm³)	1830 (1307-2972)	2190 (1325-3845)	0.072
Hemoglobin (g/dL)	12.3±1.3	11.6±1.5	<0.001
Platelet ($\times 10^3$) (/mm³)	238 (187-281.5)	244 (195-327)	0.057
MPV/platelet($\times 10^5$) #	0.60 (0.49-0.72)	0.58 (0.46-0.70)	0.169
Lymphocyte/Platelet($\times 10^5$) #	2.9±0.37	2.94±0.33	0.310
Lymphocyte/monocyte#	0.53 (0.31-0.76)	0.62 (0.33-0.82)	0.061
MPV/PCT#	1.64±0.21	1.61±0.19	0.154
Platelet/PCT#	5.9±0.48	6.01±0.12	0.666
Neutrophil/lymphocyte#	0.21 (-0.11-0.52)	0.17 (-0.13-0.52)	0.919
Platelet/lymphocyte#	2.07±0.30	2.05±0.33	0.603
Monocyte/lymphocyte#	0.53±0.31	-0.59±0.33	0.048
Monocyte/lymphocyte	0.29 (0.17-0.48)	0.23 (0.15-0.46)	0.087
Erythrocyte sedimentation rate (mg/h)	15 (10-25)	15 (8-26)	0.931
C-reactive protein (mg/L)	4.7 (1.4-12.4)	3.9 (1.6-13.7)	0.864
Aspartate aminotransferase (U/L)	33 (27.3-42)	35 (26.5-51)	0.173
Alanine aminotransferase (U/L)	12 (9.6-18.2)	14 (10-22)	0.080
Urea (mg/dL)	20 (16-25)	20 (14-25.2)	0.433
Creatinine (mg/dL)	0.42 (0.33-0.50)	0.36 (0.30-0.46)	<0.001
Fibrinojen (mg/dL)	316±80.4	337.4±64.1	0.615
Creatinine phosphokinase (U/L)	135 (80-470)	285 (172.5-1705.0)	0.099
pH	7.36±0.07	7.37±0.07	0.723
PCO_2	40.2±9.3	35.8±6.07	0.039
HCO_3	22.2±3.2	20.6±4.2	0.205
Lactate	1.85 (1.32-3.65)	1.9 (1.3-2.3)	0.756

In our study, the mean age of the influenza B positive group was found to be significantly higher than the influenza A. Studies have reported that influenza B infection is more common in older children.[16-18] The association between age and influenza B infection may be related to the fact that the surface receptors necessary for the virus to infect host cells change with age.

In our study, 70.3% of the patients who were hospitalized due to influenza infection were found to be younger than five years old. Principi et al.[2] reported that influenza infections had a more severe course in children under the age of two. In a study which conducted by Kondrich et al.[3] it was reported that more than 800,000 children under the age of five are hospitalized every year due to influenza infection. In the study conducted by Moy et al.[9] which children with influenza infection were investigated, it was reported that hospitalization rates under the age of five were 48-65/100000, and this rate was higher in children under the age of six months.

In our study, it was found that 63% of the children hospitalized due to influenza infection did not have a chronic disease. Kondrich et al.[3] reported that children with influenza infection may face severe clinical pictures even if they were previously healthy. Various studies have reported that influenza virus infection can cause respiratory, circulatory and neurological complications in healthy children.[2-4] This may be due to the capacity of the microorganism to spread rapidly among children.

In our study, it was found that 45.2% of the children who had influenza infection had gastrointestinal system findings and showed significantly more vomiting symptoms in the influenza B positive group compared to the influenza A positive group. In a study, it was reported that 10-30% of children with influenza infection had gastrointestinal system findings.[3] Paules et al.[19] reported in their study that influenza B infection showed more gastrointestinal symptoms than influenza A infection.

In our study, no significant difference was found between the influenza A and B positive groups in terms of hospitalization and intensive care unit admission. Similar to clinical findings, no significant difference was found between influenza A and B groups in terms of neutrophil/lymphocyte, platelet/lymphocyte, monocyte/lymphocyte ratios. However, wbc and platecrit rate were significantly higher in the hospitalized group compared to the outpatients. In the study conducted by Fei et al.[7] lymphocyte x platelet multiplier and MPV (Mean platelet volume)/platelet ratios were found to be higher in children with influenza A infection compared to children with influenza symptoms but not influenza A. In the study of Zhu et al.[1] lymphocyte, platelet count, lymphocyte/monocyte ratio (LMR) and lymphocyte x platelet multiplier were lower, neutrophil/lymphocyte ratio (NLR) and MPV/platelet ratio were higher in children with influenza infection compared to the control group. These results show that there is no difference in terms of inflammation between influenza A and B infections. Esposito et al.[8] reported that influenza A infection had a more severe clinical manifestation compared to influenza B infection. The fact that these parameters indicating inflammation are higher in hospitalized patients may be related to the correlation between the degree of clinical severity and inflammation.

Transaminase levels were found to be significantly higher in the influenza A group compared to the influenza B group in our study. However, when the mean values were taken into account, it was found that the transaminase values in both groups were within the normal reference ranges. In a review study conducted in the USA, it was reported that increased transaminases could be observed in children with influenza A infection.[20]

In our study, it was determined that the frequency of an underlying diseases in the hospitalized group was 36.5% for all inpatients and 93.3% of the outpatients received oseltamivir treatment, and the frequency of hospitalization in the intensive care unit was 4.2%. In a study conducted in Australia, the frequency of an underlying disease in children hospitalized due to influenza infection was reported as 43%, antiviral treatment use as 20.5%, and the frequency of hospitalization in the intensive care unit as 8.5%.[9] In various studies, it has been reported that oseltemivir treatment provides the highest efficiency and decreases the contagiousness and morbidity of the disease when it is started in the first 24-48 hours of the disease.[7,20] Making the diagnosis of influenza infection within minutes with the rapid antigen test and starting oseltamivir treatment early may have caused the frequency of hospitalizations to the intensive care unit to be low.

In our study, there was no significant difference between influenza A and B groups in terms of bacterial growth in blood culture. However, a significant increase in bacterial growth in blood culture was found in the hospitalized group compared to the outpatient group. No significant difference was found in the number of neutrophil and lymphocytes in inpatient and outpatient groups. Choe et al.[21] reported that the frequency of bacteremia increased in patients hospitalized due to influenza virus infection. In addition, it has been reported that the decrease in the number of cells such as neutrophils and lymphocytes in the immune system during influenza virus infection may cause secondary bacterial infections.[7] Tavares et al. reported that cytokines caused by influenza virus infection may lead to susceptibility to secondary bacterial infections by weakening their abilities such as chemotaxis, aggregation and activation without affecting the number of neutrophil and lymphocytes.[22] Significantly higher rates of bacteremia in the group with influenza virus infection and requiring hospitalization may be associated with deterioration in the function of neutrophil and lymphocytes.

Our study had some limitations. The retrospective case control nature of the study, the absence of healthy children in the study group, and the rapid antigen test to diagnose influenza infection were the limitations of our study.

CONCLUSION

There were no difference in the level of clinical severity between infleunza A and B subgroups and no significant difference was found in terms of hemogram parameters. Influenza virus infection is a disease that causes high morbidity in children. Rapid diagnosis and rapid initiation of treatment reduce morbidity and mortality rates. More randomized controlled studies are needed to investigate the effects of influenza infections in children.

ETHICAL DECLARATIONS

Ethics Committee Approval: This study was conducted with the approval of Necmettin Erbakan University Ethics Committee (Decision number: 2021/3136).

Informed Consent: All patients signed the free and informed consent form.

Referee Evaluation Process: Externally peer-reviewed.

Conflict of Interest Statement: The authors have no conflicts of interest to declare.

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

REFERENCES

1. Zhu R, Chen C, Wang Q, et al. Routine blood parameters are helpful for early identification of influenza infection in children. BMC Infect Dis. 2020;20(1):864.
2. Principi N, Esposito S. Severe influenza in children: incidence and risk factors. Expert Rev Anti Infect Ther 2016;14(10):961-8.
3. Kondrich J, Rosenthal M. Influenza in children. Curr Opin Pediatr. 2017;29(3):297-302.
4. Paksu MS, Aslan K, Kendirli T, et al. Neuroinfluenza: evaluation of seasonal influenza associated severe neurological complications in children (a multicenter study). Child's Nerv. Syst. ChNS Off. J. Int. Soc. Pediatr. Neurosurg. 2018;34(2):335-47.
5. Uyeki TM, Bernstein HH, Bradley JS, et al. Clinical Practice Guidelines by the Infectious Diseases Society of America: 2018 Update on Diagnosis, Treatment, Chemoprophylaxis, and Institutional Outbreak Management of Seasonal Influenzaa. Clin. Infect. Dis. an Off. Publ. Infect. Dis. Soc. Am. 2019;68(6):895-902.
6. Yorulmaz A, Ağır MA, Arslan Ş. Benign Acute Childhood Myositis Associated with Influenza A (H1N1) Virus Infection: Evaluation of 22 Cases. J. Pediatr Infect Dis 2019;14(03):127-32.
7. Fei Y, Zhang H, Zhang C. The application of lymphocyte*platelet and mean platelet volume/platelet ratio in influenza A infection in children. J. Clin Lab Anal 2019;33(9):e22995.
8. Esposito S, Molteni CG, Daleno C et al. Clinical and socioeconomic impact of different types and subtypes of seasonal influenza viruses in children during influenza seasons 2007/2008 and 2008/2009. BMC Infect Dis 2011;11:271.
9. Li-Kim-Moy J, Yin JK, Blyth CC, et al. Influenza hospitalizations in Australian children. Epidemiol Infect 2017;145(7):1451-60.
10. Chu SG, Becker RC, Berger PB, et al. Mean platelet volume as a predictor of cardiovascular risk: a systematic review and meta-analysis. J Thromb Haemost 2010;8(1):148-56.
11. Korniluk A, Koper-Lenkiewicz OM, Kamińska J, Kemona H, Dymicka-Piekarska V. Mean Platelet Volume (MPV): New Perspectives for an Old Marker in the Course and Prognosis of Inflammatory Conditions. Mediators Inflamm. 2019;2019:9213074.
12. Uzun N, Akıncı MA. Hemogram parameters in childhood anxiety disorders: Could anxiety disorders be related with inflammation? Med Hypotheses 2021;146:110440.
13. Akinci MA, Uzun N. Evaluation of hematological inflammatory markers in children and adolescents with attention deficit/hyperactivity disorder. Bratisl Lek Listy 2021;122(4):256-62.
14. Varman, Alkan, Alper S. Evaluation of neutrophil/lymphocyte ratio, platelet/lymphocyte ratio, mean platelet volume, and neutrophil/monocyte ratio in patients with benign breast lesions. Bratisl Lek Listy 2021;122(7):489-92.
15. Jain VK, Rivera L, Zaman K, et al. Vaccine for prevention of mild and moderate-to-severe influenza in children. N Engl J Med 2013;369(26):2481-91.
16. Wada T, Morishima T, Okumura A et al. Differences in clinical manifestations of influenza-associated encephalopathy by age. Microbiol Immunol 2009;53(2):83-8.
17. Teutsch SM, Zurynski YA, Nunez C, et al. Ten Years of National Seasonal Surveillance for Severe Complications of Influenza in Australian Children. Pediatr. Infect Dis J 2021;40(3):191-8.
18. Han SB, Rhim J-W, Kang JH, Lee K-Y. Clinical features and outcomes of influenza by virus type/subtype/lineage in pediatric patients. Transl Pediatr 2021;10(1):54-63.
19. Paules C, Subbarao K. Influenza. Lancet (London, England) 2017;390(10095):697-708.
20. Livingston RA, Bernstein HH. Prevention of Influenza in Children. Infect. Dis Clin North Am 2015;29(4):597-615.
21. Choe YJ, Park S, Michelow IC. Co-seasonality and co-detection of respiratory viruses and bacteraemia in children: a retrospective analysis. Clin Microbiol Infect Off Publ Eur Soc Clin Microbiol Infect Dis 2020;26(12):1690.e5-1690.e8.
22. Tavares LP, Garcia CC, Machado MG, et al. CXCR1/2 Antagonism Is Protective during Influenza and Post-Influenza Pneumococcal Infection. Front Immunol 2017;8:1799.

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Original Article / Orijinal Araştırma

Investigation of Seasonal Influenza and Pneumococcal Vaccination Status in Chronic Kidney Failure Patients Undergoing Hemodialysis: A Survey Study

Hemodiyalize Giren Kronik Böbrek Yetmezliği Hastalarında Mevsimsel İnfluenza ve Pnömokok Aşılanma Durumunun Değerlendirilmesi: Bir Anket Çalışması

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Abstract

Aim: Respiratory tract infections due to influenza virus are more mortal in hemodialysis patients than in the healthy population. These patients should be provided with influenza vaccination every year. In this study; the frequency of influenza vaccination in hemodialysis patients in our region and the factors affecting it were investigated.

Material and Method: A total of 239 patients who had undergone hemodialysis for at least one year were asked the prepared questionnaires. The obtained data were analyzed in SPSS 20 program.

Results: The rate of seasonal influenza vaccination of the patients was 87%. Vaccination rates were found to be significantly higher in patients with a duration of hemodialysis longer than five years and those who were vaccinated in the last year (respectively p=0.02, p=0.016). The rate of pneumococcal vaccination in those vaccinated against influenza and the rate of vaccination in the families of these patients were also found to be significantly higher (p<0.01).

Conclusion: In this study, it was found that influenza vaccination rates were high in patients undergoing hemodialysis in our region. The reason for this is that the influenza vaccine is provided free of charge to those with chronic diseases every year by the Ministry of Health in our country.

Keywords: Influenza vaccination, chronic kidney disease, hemodialysis

Öz

Amaç: İnfluenza virüsüne bağlı solunum yolu infeksiyonları hemodiyaliz hastalarında sağlıklı popülasyona göre daha mortal seyretmektedir. Bu hastaların her yıl influenza aşısı olmaları sağlanmalıdır. Bu çalışmada; hastanemizde hemodiyalize giren KBY hastalarında influenza aşısı yaptırma sıklığı ve buna etki eden faktörler araştırılmıştır.

Gereç ve Yöntem: En az bir yıldır hemodiyalize giren toplam 239 hastaya hazırlanan anket soruları soruldu. Elde edilen veriler SPSS 20 programında analiz edildi.

Bulgular: Hastaların mevsimsel influenza aşısı olma oranı %87 idi. Hemodiyalize girme süresi beş yıldan uzun olanlarda ve geçen yıl da aşı olanlarda aşılanma oranları anlamlı derece yüksek bulundu (sırasıyla p=0,02, p=0,016). İnfluenza aşısı olanlarda pnömokok aşısı olma oranı ve bu hastaların ailelerinde aşı olma oranı da anlamlı oranda yüksek bulundu (p<0,01).

Sonuç: Bu çalışmada bölgemizde hemodiyalize giren hastalarda influenza aşılama oranlarının yüksek olduğu bulunmuştur. Bunun sebebi olarak ülkemizde sağlık bakanlığı tarafınca influenza aşısının kronik hastalığı olanlara her yıl ücretsiz sağlanmasının büyük payı vardır.

Anahtar Kelimeler: Grip aşısı, kronik böbrek hastalığı, hemodiyaliz

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INTRODUCTION

Influenza virus is one of the common agents of viral respiratory tract infections. Hemodialysis patients have a higher risk for influenza-related illness and death compared to the healthy population. Hospitalization for pneumonia and sepsis is higher in this patient group than in the general population.[1,2] In particular, a 10-fold increased annual risk of mortality has been reported for pneumonia and 100-fold for sepsis.[3] Vaccination is the most effective and inexpensive way to prevent the flu.[4] For this reason, it is recommended that patients with CKD and the households living with them to be vaccinated each year before the start of the flu season.[5] The influenza vaccine is safe and effective in all age groups over 6 months. Vaccination is important especially in all people over 50 years of age, in all groups where influenza may cause serious complications such as chronic pulmonary (including asthma) or cardiovascular (except isolated hypertension), renal, hepatic or metabolic disorders (includin diabetes mellitus).[6]

Influenza vaccine is also safe in CRF patients. The Advisory Committee on Immunization Practices (ACIP) has recommended trivalent inactivated influenza vaccine to patients with end-stage renal disease for more than 40 years.[7] It was first shown in 1982 that influenza vaccine is safe in patients with chronic renal failure and that the vaccine does not cause deterioration in renal functions.[8] However, exacerbations of autoimmune diseases may occur after influenza vaccination.

Vaccination rates were found to be higher in those with chronic lung, heart and kidney disease than in the healthy population.[9] In this study; In this study, it was aimed to investigate the frequency of influenza vaccination in CRF patients undergoing hemodialysis in our region and the factors affecting it, and to reveal the situation in our country.

MATERIAL AND METHOD

In this prospective study, questionnaire questions were asked to patients undergoing hemodialysis in Samsun Training and Research Hospital in 2015. Patients undergoing hemodialysis for more than a year were included in the study, newly diagnosed cases were excluded. All patients signed the informed consent form. During the face-to-face interviews with the patients, demographic characteristics including age, gender, how many years they had undergone hemodialysis, their status of getting influenza and pneumococcal vaccines and the reasons for not having them were asked. Vaccination experiences and perspectives on vaccination were evaluated by asking questions about the subjective experiences affecting vaccination behavior as well as complication experiences. There was no flu epidemic during the study. The obtained data were recorded in the SPSS 20 program and statistical analysis was performed. Descriptive analysis was used to calculate frequencies and ratios, and the chi-square test was used to investigate the level of correlation between variables. A p value less than 0.05 was considered statistically significant.

This study was approved by the Non-interventional Clinical Research Ethics Committee of Samsun Training and Research Hospital (Date: 09.06.2021, Decision No: 2021/11/12) and our study was carried out in accordance with Principles of the Helsinki Declaration.

RESULTS

Of the 239 patients participating in the study, 120 (50%) were female and the mean age was 56+13 years (minimum 25-maximum 85 years). Of the patients, 207 (87%) had received seasonal influenza vaccination. It was determined that there was no difference between the genders of being vaccinated against influenza (85% in women, 88% in men) (p>0.05).

When the patients were divided into two groups as under 65 years old and 65 years old and over; there was no significant difference between the two groups in terms of vaccination rate (86% in the young group, 92% in the elderly group) (p>0.05). The mean duration of hemodialysis was 4 years (minimum 1-maximum 18 years). When those who have been on hemodialysis for four years or less and those who have been on hemodialysis for five years or more are compared; vaccination rates were found to increase proportionally with the duration of hemodialysis entry (p=0.02). None of the patients reported any side effects related to the vaccine.

The rate of seasonal flu vaccination in the families of the patients was found to be 48%. While this rate was 52% in the families of those who had the flu vaccine, it was 23% in the families of those who didn't have the flu vaccine (p<0.01).

Pneumococcal vaccination rate was 40% (n=96). 45% of the patients who had flu vaccine and 6.5% of those who didn't stated that they had pneumococcal vaccine (p<0.01).

It was determined that the patients were largely aware (92.5%) of the H1N1 epidemic in 2009. There was no difference in the rates of influenza vaccination between those who heard of this epidemic and those who did not (87% and 89%, respectively, p=0.81). The data obtained when comparing those with and without the flu vaccine are shown in **Table 1.**

When the reasons for not being vaccinated were examined; The most common reason was the disbelief in the efficacy of the vaccine. Other reasons are given in **Table 2**.

Table 2. Reasons for not getting vaccinated for flu vaccine

Answers	Number (n)	(%)
I do not believe the vaccine is effective	19	60
I don't trust the vaccine	7	22
I didn't know I had to get vaccinated	4	12
I couldn't get the vaccine	1	3
I already had the flu	1	3
Total	32	100

Table 1. Comparison of patients with and without flu vaccine

	Who have the flu vaccine (n=207)		Who don't have the flu vaccine (n=32)		p
	Number	(%)	Number	(%)	
Age					>0.05
<65	153	85.5	26	14.5	
≥ 65	55	92	5	8	
Hemodialysis time					0.01
≤ 4 years	122	83	25	17	
≥ 5 years	86	93.5	6	6.5	
Get the flu vaccine last year					<0.01
Yes	186	96	8	4	
No	22	49	23	51	
Have you ever had the flu vaccine?					<0.01
Yes	175	96	7	4	
No	33	58	24	42	
Have you had the pneumonia vaccine?					<0.01
Yes	94	98	2	2	
No	114	80	29	20	
Do your family members get the flu vaccine?					<0.01
Yes	108	94	7	6	
No	100	81	24	19	

DISCUSSION

This study is the first questionnaire study to measure the approach to influenza vaccine in hemodialysis patients in Turkey. In our country, influenza vaccination rate was 22% and pneumococcal vaccination rate was 6% in patients over 65 years of age.[10] In our study, it was found that the annual seasonal influenza and pneumococcal vaccination rates were higher in hemodialysis patients compared to the general population.

The risk of pulmonary infection-related mortality in patients with end-stage renal disease undergoing hemodialysis is 14-16 times higher than in the general population.[3] It has been shown that morbidities such as total hospitalization time, ICU stay, pneumonia/flu, septicemia/bacteremia/viremia, respiratory failure and heart disease are seen at a lower rate with influenza vaccination in this patient group, and that all-cause mortality is reduced by 50% with vaccination.[11]

In our study, the rate of influenza vaccination was found to be high. This rate is above the rates specified in the world. In a study in which cases diagnosed with CRF for the first time were included, the influenza vaccination rate was 1% in 1998, and it was found to be 38% in 2009.[11] Again, in a study conducted between 1998 and 2001, the influenza vaccination rate for each year was found to be below 50%.[12] In a survey study of 133 patients, the rate of getting the flu vaccine was 67%, while the rate of updating the vaccine regularly for the last two years was 50%.[13] In a study conducted in Austria, the influenza vaccination rate of hemodialysis patients was found to be 22%.[14] The reason for our high rate may be that we included patients who had been on hemodialysis for more than a year. These results show that the awareness of hemodialysis patients in our country is good.

Since 2011, seasonal influenza vaccines are provided free of charge to all people over the age of 65, those with chronic lung diseases such as asthma and chronic obstructive pulmonary disease, cardiovascular diseases such as hypertension, chronic metabolic diseases such as diabetes (Type 1 and 2), and chronic kidney diseases. We think that the free access to the vaccine has an important contribution to our high vaccination rates.

The efficacy of inactivated influenza vaccine in healthy elderly is 70-90%. It has been shown that the risk of serious complications decreased by 60% and the mortality rate by 80% with influenza vaccination in healthy elderly people[4] In a 4-year prospective observational study conducted in the elderly population from 1998 to 2002, it was shown that the influenza vaccination rate was 48%, and the hospitalization rates were significantly lower in the unvaccinated group compared to the vaccinated group (59% vs. 40%, respectively).[15] In this study, although there was no relationship between age and influenza vaccination, the rate of vaccination was found to be higher in elderly patients.

In this study, it was observed that the rate of influenza vaccination increased by years. it can be concluded that the first vaccine is important in terms of raising awareness. The training given in the first vaccination is an important step in gaining the awareness that the vaccination should be repeated every year. Also, as the duration of hemodialysis increases, the increase in vaccination also shows that awareness has increased over the years.

Pneumococcal infections are more common in patients with CRF than in healthy individuals. The Advisory Committee on Immunization Practices (ACIP) recommends the polysaccharide pneumococcal vaccine to all dialysis patients aged 2 years and older.[16] In this study a positive correlation was found between being vaccinated against pneumococcus and being vaccinated against influenza. Being vaccinated against the flu also affects susceptibility to pneumococcal vaccine. When patients start hemodialysis, they should be informed that they should get annual influenza vaccine. With the annual influenza vaccine, the awareness of the patients to receive the polysaccharide pneumococcal vaccine every five years is also increased.

The rate of having the flu vaccine in the families of those who had the flu vaccine was found to be higher. It is possible to evaluate this in two ways. Persons caring for patients may be vaccinated to protect themselves and therefore their patients. Or we can say that the presence of someone in the family who has received training in vaccination also increases social awareness and sensitivity.

There was no relationship between being aware of the H1N1 flu epidemic and getting the flu vaccine. In our study, flu vaccination rates of hemodialysis patients were found to be quite high. The reason why vaccination rates are similar between those who are aware of the H1N1 epidemic and those who aren't can be attributed to the fact that these patients are already trained in flu vaccination.

Influenza vaccine is generally well tolerated. The most common side effects are local reactions with erythema and induration at the injection site. Systemic reactions, including acute febrile disease, hypersensitivity reactions, and Guillian Barre syndrome are rare.[17] There were no serious side effects related to the vaccine in the patients participating in this study.

However, patients with renal failure may show a decreased immune response to the vaccine compared to the general population due to their immunosuppressed state. It has been shown that transplanted, CAPD and hemodialysis patients do not reach high levels of protective antibody titers as healthy individuals.[18] While the 4-fold antibody response after vaccination is 64% in healthy individuals, this response can be seen only in 50% of hemodialysis patients.[19,20] Despite this, it is known that the vaccine can induce immunity in a significant proportion of patients.[4] With the influenza vaccine, hospitalization and mortality are significantly reduced in hemodialysis patients.[11,21]

This study was carried out in Samsun is an important health center for both its own population and patients coming from the surrounding provinces in the Central Black Sea region. For this reason, we think that our data gives a good idea about the general population. It can also be considered as a limiting aspect of the study.

CONCLUSION

As a result; In this study, influenza vaccination rates were found to be high in patients undergoing hemodialysis in our region. The most important reason for this is that access to the vaccine is free in our country. It is important to raise awareness of the patients about the efficacy, safety and necessity of influenza vaccine and to have them vaccinated annually.

ETHICAL DECLARATIONS

Ethics Committee Approval: This study was approved by the Non-interventional Clinical Research Ethics Committee of Samsun Training and Research Hospital (Date: 09.06.2021, Decision No: 2021/11/12).

Informed Consent: All patients signed the free and informed consent form.

Referee Evaluation Process: Externally peer-reviewed.

Conflict of Interest Statement: The authors have no conflicts of interest to declare.

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

REFERENCES

1. Allon M, Depner TA, Radeva M, et al. Impact of dialysis dose and membrane on infection-related hospitalization and death: results of the HEMO Study. J Am Soc Nephrol 2003;14(7):1863-70.
2. Guo H, Liu J, Collins AJ, Foley RN. Pneumonia in incident dialysis patients--the United States Renal Data System. Nephrol Dial Transplant 2008;23(2):680-6.
3. Sarnak MJ, Jaber BL. Mortality caused by sepsis in patients with end-stage renal disease compared with the general population. Kidney Int 2000;58(4):1758-64.
4. Mastalerz-Migas A, Gwiazda E, Brydak LB. Effectiveness of influenza vaccine in patients on hemodialysis--a review. Med Sci Monit 2013;19:1013-8.
5. Control CfD, Prevention: Prevention and control of influenza; recommendations of the Advisory Committee on Immunization Practices (ACIP). Prevention and control of influenza: recommendations of the Advisory 2003;52:16-24.
6. Fiore AE, Uyeki TM, Broder K, et al. Prevention and control of influenza with vaccines: recommendations of the Advisory Committee on Immunization Practices (ACIP), 2010.
7. Eickhoff TC. Immunization against Influenza: Rationale and Recommendations. J Infect Dis 1971;123(4):446-54.
8. Nikoskelainen J, Vaananen P, Forsstrom J, Kasanen A. Influenza vaccination in patients with chronic renal failure. Scand J Infect Dis 1982;14(4):245-51.
9. Mutlu H, Coskun F, Sargin M. The incidence and awareness of vaccination among people aged 65 and over applied to a family medicine outpatient clinic. Ankara Med J 2018; 1:1-13.
10. Yılmaz T, Şencan İ, Yılmaz TE, et al. The Assessment of Knowledge Levels and Practices of Family Physicians Practicing in Family Health Centers in Ankara with Regard to Well Child Follow-up. Ankara Med J 2018; 18(3):312-21.
11. Wang IK, Lin CL, Lin PC, et al. Effectiveness of influenza vaccination in patients with end-stage renal disease receiving hemodialysis: a population-based study. PLoS One 2013;8(3):e58317.
12. McGrath LJ, Kshirsagar AV, Cole SR, et al. Influenza vaccine effectiveness in patients on hemodialysis: an analysis of a natural experiment. Arch Intern Med 2012;172(7):548-54.
13. Wilmore SM, Philip KE, Cambiano V, et al. Influenza and pneumococcal vaccinations in dialysis patients in a London district general hospital. Clin Kidney J 2014;7(1):27-32.
14. Eder M, Omic H, Gorges J, et al. Influenza vaccination uptake and factors influencing vaccination decision among patients with chronic kidney or liver disease. PloS one 2021;16(4):e0249785.
15. Landi F, Onder G, Cesari M, et al. In a prospective observational study, influenza vaccination prevented hospitalization among older home care patients. J Clin Epidemiol 2006; 59(10):1072-7.
16. Grohskopf LA, Bresee JS, Cox N, Shimabukuro TT Prevention and control of influenza with vaccines: recommendations of the Advisory Committee on Immunization Practices (ACIP)--United States, 2012-13 influenza season. 2012.
17. Duggal T, Segal P, Shah M, Carter-Monroe N, Manoharan P, Geetha D. Antineutrophil cytoplasmic antibody vasculitis associated with influenza vaccination. Am J Nephrol 2013;38(2):174-8.
18. Cavdar C, Sayan M, Sifil A, et al. The comparison of antibody response to influenza vaccination in continuous ambulatory peritoneal dialysis, hemodialysis and renal transplantation patients. Scand J Urol Nephrol 2003;37(1):71-6.
19. Koşan C. Aşilarin Kronik Diyaliz Hastalarında Kullanımı. MJAU 2002;34:25-9.
20. Jordan MC, Rousseau WE, Tegtmeier GE, Noble GR, Muth RG, Chin TD. Immunogenicity of inactivated influenza virus vaccine in chronic renal failure. Ann Intern Med 1973;79(6):790-4.
21. Kunisaki KM, Janoff EN: Influenza in immunosuppressed populations: a review of infection frequency, morbidity, mortality, and vaccine responses. Lancet Infect Dis 2009;9(8):493-504.

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Original Article / Orijinal Araştırma

Investigation of the Effect of Gastroesophageal Reflux Disease on Dental Erosion and Oral Tissue Alterations

Gastroözofageal Reflü Hastalığının Dental Erozyona ve Ağız Dokularındaki Değişikliklere Etkisinin Araştırılması

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Abstract

Aim: This study aimed to investigate the relationship between gastroesophageal reflux disease (GERD) and dental erosion and the alterations in oral tissues.

Material and Method: In this study, the GERD group consisted of 50 individuals with gastroesophageal reflux symptoms, and the control group consisted of 50 healthy individuals. The prevalence of teeth wears and caries was evaluated using the Smith and Knight tooth wear index (TWI) and the decayed, missing, and filled teeth index (DMFT), respectively. Oral complaints were also evaluated. Stimulated saliva samples were collected, and the salivary buffering capacity, pH and flow rate values were measured.

Results: In the GERD group, wear was observed in the palatal surface of the maxillary teeth, whereas no wear was observed in the control group ($p<0.05$). Although the incisal surfaces of the maxillary anterior teeth and the occlusal surfaces of the maxillary/mandibular posterior teeth were observed as eroded in both groups, the values in the patient group were significantly higher compared with those of controls ($p<0.05$). In the GERD group, complaints of inflammatory mouth sensitivity, tongue sensitivity, nonspecific itching and burning, halitosis, dry mouth, tooth sensitivity, erythema in the soft/hard palatinal mucosa/uvula were significantly more frequent than the control group ($p<0.05$, for each). The groups were similar with respect to DMFT ($p=0.480$). The salivary flow rate, pH and buffering capacity values were found to be significantly lower in the GERD group ($p<0.05$, for each).

Conclusion: The results showed that patients with GERD had wear in palatal surfaces of maxillary teeth. Moreover, these patients also complained more commonly from oral tissue alterations and had lower salivary flow rate, pH, and buffering capacity. Hence dentists should consider GERD as a potential risk factor for oral health.

Keywords: Dental erosion, gastroesophageal reflux disease, saliva

Öz

Amaç: Bu çalışmanın amacı, gastroözofageal reflü hastalığı (GÖRH) ile dental erozyon ve ağız dokularındaki değişiklikler arasındaki ilişkinin araştırılmasıdır.

Gereç ve Yöntem: Çalışmada GÖRH grubu gastroözofageal reflü semptomları olan 50 kişiden, kontrol grubu ise 50 sağlıklı bireyden oluşturuldu. Diş aşınması ve çürük prevalansı sırasıyla Smith ve Knight diş aşınma indeksi (TWI) ve çürük, eksik ve dolgulu dişler indeksi (DMFT) kullanılarak değerlendirildi. Ayrıca ağız içerisindeki şikayetler de değerlendirildi. Uyarılmış tükürük örnekleri toplandı ve tükürük tamponlama kapasitesi, pH ve akış hızı değerleri ölçüldü.

Bulgular: GÖRH grubunda üst dişlerin palatinal yüzeyinde aşınma görülürken, kontrol grubunda aşınma gözlenmedi ($p<0,05$). Her iki grupta da üst ön dişlerin insizal yüzeyleri ve üst/alt arka dişlerin oklüzal yüzeylerinin aşınmış olduğu görülmesine rağmen, hasta grubundaki değerler kontrollere göre anlamlı olarak yüksek bulundu ($p<0,05$). GÖRH grubunda yangılı ağız duyarlılığı, dil hassasiyeti, nonspesifik kaşıntı ve yanma, ağız kokusu, ağız kuruluğu, dişlerde hassasiyet, yumuşak/sert palatinal mukoza/uvulada eritema şikayetlerine kontrol grubundan anlamlı olarak daha sık rastlandı (her biri için $p<0,05$). Gruplar DMFT'ye göre benzer bulundu ($p=0,480$). GÖRH grubunda tükrük akış hızı, pH ve tamponlama kapasitesi değerleri anlamlı olarak düşük bulundu (her biri için $p<0,05$).

Sonuç: Çalışmanın sonuçları GÖRH grubundaki katılımcıların üst dişlerinin palatinal yüzeylerinde aşınma olduğunu gösterdi. Ayrıca bu hastaların daha yaygın olarak ağız içi doku değişikliklerinden şikayet ettiklerine ve daha düşük tükürük akış hızı, pH ve tamponlama kapasitesine sahip oldukları da tespit edildi. Bu nedenle diş hekimleri GÖRH'nı ağız sağlığı için potansiyel bir risk faktörü olarak düşünmelidir.

Anahtar Kelimeler: Dental erozyon, gastroözofageal reflü hastalığı, tükürük

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INTRODUCTION

In the mouth, different forms of chronic degenerative events other than caries affect the teeth. This degeneration appears as wear in the clinic. Based on the etiology and wear rate, dental tissue loss is considered normal or pathological. Functional microwear or attrition usually causes normal wear and this wear progresses to lifelong physiological values. Normal rate of tooth hard tissue loss is approximately 65m/yr. When wear occurs in a larger size than expected, it is considered pathological. Pathological loss of dental hard tissue may be due to one or more factors, such as abnormal attrition, abrasion, domestication, attrition, abfraction, resorption, erosion, developmental disorder, etc.[1]

Dental erosion, which is a chemical dissolution, occurs as a result of the contact of acidic solutions with the teeth. Any solution below the critical pH value (approximately 5.5) for the solubility of the enamel layer can cause erosion, especially if the acidic attack is prolonged and repeated. Although saliva and dental pellicle prevent attacks, the destruction of dental tissues is inevitable if the attack is severe and protracted. If erosive lesions progress rapidly, sensitivity increases, but if the progress is slow, the patient may not have any symptoms. However, the entire dentition can be severely damaged.[2]

External or internal factors play a role in the etiology of dental erosion. Externally-induced dental erosion may occur as a result of diet, medication use, environmental factors, and lifestyle.[3] The most common cause of internal erosion is "regurgitation," which means that stomach acid enters the mouth and comes into contact with the teeth. This is particularly seen in conditions such as gastroesophageal reflux, anorexia and bulimia nervosa, alcoholism and chronic nausea.[4]

The involuntary passage of gastric contents into the esophagus is defined as reflux. Normally, the anatomical position of the gastroesophageal junction, the lower esophageal sphincter and the crural diaphragm prevent the passage of fluid or solids from the stomach to the esophagus. But, when the lower esophageal sphincter relaxes, the pressure gradient between the stomach and the esophagus disappears, and reflux takes place. The reflux material might reach cervical esophagus, pharynx, and oral cavity.[5] Gastroesophageal reflux is a physiological phenomenon that occurs as a result of short-term acid reflux during the day, and it is eliminated by the buffering effect of saliva and the normal swallowing function before any harm occurs. If acid reflux begins to occur chronically, then pathological gastroesophageal reflux disease (GERD) presents.[6] As a result of gastroesophageal reflux, the gastric fluid's pH (~1-2) decreases the pH in the mouth below the enamel's critical pH.[7] The contact of gastric contents with teeth and other oral structures should be considered a potential risk factor for the formation of dental erosion and oral lesions. In previous studies, oral cavity lesions and tooth damage caused by reflux material were reported at different frequencies.[8,9]

The present study aimed to investigate the relationship between gastroesophageal reflux and dental erosion and the alterations in oral tissues as a result of reflux.

MATERIAL AND METHOD

Study Setting and Participants

This case-control study was conducted in Ankara University Faculty of Dentistry, Department of Restorative Dentistry Polyclinics and Ankara University Faculty of Medicine, Department of Gastroenterology Polyclinics with a total of 100 participants (49 females and 51 males between the ages of 16-65) of whom 50 were in the GERD group, and 50 were in the control group. Participants diagnosed with GERD were included in the GERD group, and those without the disease were included in the control group. Ethical approval of the study protocol was granted by the Ankara University Faculty of Dentistry Research Ethics Committee (2008/131-2). The study was performed following the principles and the guidelines of the Declaration of Helsinki Ethical Principles. Each human subject signed an informed consent before participating to the study.

The GERD group included 25 females and 25 males with at least one year of reflux symptoms, endoscopic esophagitis, no systemic disease other than reflux, no medication use except anti-reflux drugs, no habit of ruminating and vomiting, and no habit of bruxism. Those who were vegetarian, consumed citrus and vinegar frequently, and consumed more than ½ liter of acidic beverages per day were not included in the study. Those who never brush their teeth and were using battery/rechargeable and scrub brush and abrasive toothpaste were not included in the study, either.

The reflux diagnosis was made by a gastroenterologist using detailed patient history and examination and endoscopy, when needed. The patients were questioned according to the burning sensation behind the breastbone and the history of regurgitation. In the endoscopy, esophagitis was sought and graded from A to D with the Los Angeles classification (10). The control group included 24 females and 26 males without any systemic disorder, no habit of ruminant and vomiting, no habit of bruxism, and no drug use. The control group was determined by gender matching with the GERD group.

Data Collection

The study participants' sociodemographic characteristics, nutrition habits, oral hygiene habits, and oral complaints were assessed to determine the presence of risk factors for dental erosion.

Oral complaints of the participants were evaluated according to the answers given to the questions regarding oral burning sensation, tongue sensitivity, nonspecific itching and burning in the mucosa, halitosis, dry mouth, and increased tooth sensitivity. The presence of erythema in the soft/hard palatal mucosa/uvula was determined by oral examination. In the GERD group, the duration of reflux symptoms and whether regurgitation was

present and, if so, how often did it occur were recorded. The grade of esophagitis was recorded from the endoscopy reports of the patients, and the duration of anti-reflux treatment and specific medications were collected from the patient charts.

Oral and dental examinations of the study groups were performed by the researcher (F.A.B.) insufficient daylight using a mirror and sond. The intraoral examinations were performed according to the decayed, missing, and filled teeth (DMFT) index and Smith and Knight tooth wear index (TWI) classification. DMFT index is the sum of the number of decayed, missing, and filled teeth. TWI was performed on the cervical, buccal/labial, lingual/palatinal and occlusal/incisal surfaces of the teeth at 0-4 scores.[11] The scoring of TWI was shown in the **Table 1**. Besides, the soft/hard palatal mucosa/uvula was evaluated regarding presence of erythema. All participants were examined once and dental data were collected. After the oral examination, stimulated saliva samples were collected. Then, salivary buffering capacity, pH and flow rate were determined from the collected samples.

Statistical Analysis

All analyses of the present study were performed using IBM SPSS Statistics 25 program. Descriptive statistics of the data were given as number, frequency (percentage), mean, standard deviation, median, minimum and maximum. For the normalty check, the Shapiro-Wilk test was used. Normally distributed variables were analyzed with the Independent Samples t Test or one way ANOVA test. Non-normally distributed variables were analyzed with the Mann Whitney U test or Kruskall Wallis test. Categorical variables were analyzed with the Pearson's chi-square test and Fisher exact test. The statistical significance level was set as $p<0.05$.

Table 2. DMFT, salivary flow rate, pH and buffering capacity values for GERD and control groups.

Parameter	Groups	Mean±SD	Median	Min.-Max.	p
DMFT	GERD	10.9±6.58	10	1-27	0.480
	Control	10.06±5.18	10	2-22	
Flow rate	GERD	1.490±0.589	1.27	0.40-3.08	0.042*
	Control	1.726±0.552	1.63	0.80-3.40	
pH**	GERD	7.262±0.263	7.2	6.60-7.90	0.020*
	Control	7.392±0.297	7.35	6.70-8.10	
Buffering capacity**	GERD	3.99±1.14	3.9	1.40-6.30	0.000*
	Control	4.95±0.81	5	3.37-6.49	

* p<0.05 , **Mann Whitney U, DMTF: decayed, missing, and filled teeth index, SD: standard deviation

RESULTS

In this study a total of 100 participants were evaluated. 50% (n=25) of the participants in the GERD group are women and 50% (n=25) are men and, 49% (n=24) of the participants in the control group were female and 51% (n=26) were male (p=0.841). The mean age of the GERD group was 42.92±11.5, and the mean age of the control group was 33.16±9.63. Compared to the control group, the age of the GERD group was significantly higher (p=0.000).

Dental Caries and Salivary Protection

The mean values of the DMFT, salivary buffering capacity, pH and flow rate parameters for the GERD and control groups are shown in **Table 2.** No difference was found between the groups in terms of the DMFT parameter (p=0.480), whereas the mean salivary buffering capacity, pH and flow rate values were significantly lower in the GERD group compared to the control group (p=0.042, p=0.020, p=0.000, respectively).

Oral Complaints

The distribution of oral complaints in the groups are shown in **Table 3.** It was found that oral complaints were significantly more common in the GERD group than in the control group (p<0.05).

Table 3. Distribution of oral complaints parameters of GERD and control groups.

Oral complaints		Groups				p
		GERD		Control		
		n	%	n	%	
Oral burning sensation	Not have	34	40.5	50	59.5	0.000*
	Have	16	100.0	0	0.0	
Tongue sensitivity	Not have	39	43.8	50	56.2	0.000*
	Have	11	100.0	0	0.0	
Nonspecific itching/ burning	Not have	37	43.0	49	57.0	0.001*
	Have	13	92.9	1	7.1	
Halitosis	Not have	18	36.0	32	64.0	0.005*
	Have	32	64.0	18	36.0	
Dry mouth	Not have	12	25.5	35	74.5	0.000*
	Have	38	71.7	15	28.3	
Sensitivity of teeth	Not have	25	38.5	40	61.5	0.002*
	Have	25	71.4	10	28.6	
Erythema of soft/hard palatinal mucosa/uvula	Not have	30	37.5	50	62.5	0.000*
	Have	20	100.0	0	0.0	

*Pearson ki-kare test, *p<0.05, n= Number, %= Percent

Table 1. Smith and Knight tooth wear index[11]

Score	Surface	Criteria
0	B/L/O/I C	No loss of enamel surface characteristics. No loss of contour.
1	B/L/O/I C	Loss of enamel surface characteristics. Minimal loss of contour.
2	B/L/O I C	Loss of enamel exposing dentine for less than one third of surface. Loss of enamel just exposing dentine. Defect less than 1 mm deep.
3	B/L/O I C	Loss of enamel exposing dentine for more than one third of surface. Loss of enamel and substantial loss of dentine. Defect less than 1-2 mm deep.
4	B/L/O I C	Complete enamel loss-pulp exposure-secondary dentin exposure. Pulp exposure or exposure of secondary dentine. Defect more than 2mm deep-pulp exposure-secondary dentine exposure.

B: buccal; L: lingual; O: occlusal; I: incisal; C: cervical.

Dental Wear

The distribution of TWI values of individuals in GERD and control groups are shown in **Table 4.** As a result of the evaluation of all teeth between 7-7 in the maxillary and mandibular arch using the TWI in the GERD and control groups, the difference between the groups in the cervical and buccal/labial surfaces of the maxillary teeth, the cervical, buccal/labial surfaces of the mandibular posterior teeth, and cervical ve occlusal/incisal surfaces of the mandibular anterior teeth was not significant. Wear was not observed on the buccal/labial surfaces of the mandibular anterior teeth and the lingual surfaces of the mandibular anterior/posterior teeth in both groups (p>0.05). However, for the incisal and palatal surfaces of the maxillary anterior teeth, the occlusal and palatal surfaces of the maxillary posterior teeth, and the occlusal surfaces of the mandibular posterior teeth, the difference between the groups was statistically significant (p<0.05).

Wear was observed in the palatal surfaces of the maxillary teeth in the GERD group, while no wear was observed in the control group. Although some wears were observed in both groups, in the occlusal surfaces of maxillary/mandibular posterior teeth and the incisal surfaces of the maxillary anterior teeth, the values in the GERD group were higher than control group (**Table 4**).

Relationship of GERD with Oral Compaints, Dental Caries and Salivary Protection

There was no statistically significant difference between the two groups in terms of nutrition and oral hygiene habits (p> 0.05, for each).

It was determined that 14% (n=7) of the participants in the GERD group had reflux complaints for 12 months, 30% (n=15) of the participants in the GERD group had reflux complaints between 13 and 36 months, and 56% (n=28) of the participants in the GERD group had reflux complaints for more than 36 months. Of these participants, 30% (n=15) had regurgitation every day, 34% (n=17) frequently, 28% (n=14) occasionally and 8% (n=4) had no regurgitation. The distribution of the participants in the GERD group in terms of esophagitis grading was determined as 50% (n=25) Grade A, 46% (n=23) Grade B and 4% (n=2) Grade C stage.

There was no statistically significant relationship between oral complaints and GERD duration (p>0.05, for each) (**Table 5**). Also, there was no statistically significant relationship between the DMFT, salivary flow rate, ph, buffering capacity and GERD duration (p>0.05, for each) (**Table 6**).

The relationship between the oral complaints and levels of regurgitation frequency (every day, frequently, occasionally, none) were evaluated and no statistically significant relationship was found (p>0.05, for each) (**Table 7**). The relationship of the DMFT, salivary flow rate and pH with regurgitation frequency was not statistically significant (p>0.05, for each) (**Table 8**).

Table 4. Distribution of cervical, buccal/labial, incisal/occlusal and palatinal/lingual surface TWI values of the maxillary and mandibular teeth of GERD and control groups.

Surface	Teeth		TWI Score	Groups				p
				GERD		Control		
				n	%	n	%	
CERVICAL	Maxillary	Anterior	0	226	46.2	263	53.8	0.683
			1	7	50.0	7	50.0	
			2	1	100.0	0	0.0	
			Total	234	46.4	270	53.6	
		Posterior	0	225	43.9	288	56.1	0.928
			1	11	44.0	14	56.0	
			2	5	50.0	5	50.0	
			Total	241	44.0	307	56.0	
	Mandibular	Anterior	0	261	48.7	275	51.3	1.000
			1	14	50.0	14	50.0	
			2	1	50.0	1	50.0	
			Total	276	48.8	290	51.2	
		Posterior	0	246	46.6	282	53.4	0.941
			1	15	45.5	18	54.5	
			2	4	57.1	3	42.9	
			3	1	50.0	1	50.0	
			Total	266	46.6	304	53.4	
BUCCAL/LABIAL	Maxillary	Anterior	0	240	47.5	265	52.5	0.476
			2	1	100.0	0	0	
			Total	241	47.6	265	52.4	
		Posterior	0	246	44.9	302	55.1	0.450
			1	1	100.0	0	0.0	
			Total	247	45.0	302	55.0	
	Mandibular	Anterior	0	283	49.5	289	50.5	-
		Posterior	0	272	47.2	304	52.8	0.107
			1	3	100.0	0	0.0	
			Total	275	47.5	304	52.5	
INCISAL/OCCLUSAL	Maxillary	Anterior	0	27	15.3	150	84.7	0.000*
			1	105	52.8	94	47.2	
			2	102	85.0	18	15.0	
			3	6	85.7	1	14.3	
			Total	240	47.7	263	52.3	
		Posterior	0	83	34.4	158	65.6	0.000*
			1	73	68.2	34	31.8	
			2	45	100.0	0	0.0	
			3	2	100.0	0	0.0	
			Total	203	51.4	192	48.6	
	Mandibular	Anterior	0	113	48.1	122	51.9	0.908
			1	139	49.6	141	50.4	
			2	29	53.7	25	46.3	
			3	2	50.0	2	50.0	
			Total	283	49.4	290	50.6	
		Posterior	0	73	30.9	163	69.1	0.000*
			1	109	71.1	46	28.3	
			2	59	100.0	0	0.0	
			3	2	100.0	0	0.0	
			Total	243	54.1	206	45.9	
PALATAL/LINGUAL	Maxillary	Anterior	0	50	16.7	249	83.3	0.000*
			1	59	100.0	0	0.0	
			2	118	100.0	0	0.0	
			3	13	100.0	0	0.0	
			Total	240	49.1	249	50.9	
		Posterior	0	144	32.7	297	67.3	0.000*
			1	84	100.0	0	0.0	
			2	15	100.0	0	0.0	
			3	1	100.0	0	0.0	
			Total	244	45.1	297	54.9	
	Mandibular	Anterior	0	281	49.3	289	50.7	-
		Posterior	0	276	47.2	309	52.8	-

*p<0.05 and **Fisher's Exact test, n= Number, %= Percent, TWI=Tooth wear index (**Table 1**), Anterior=central, lateral, canine, Posterior=1st premolar, 2nd premolar, 1st molar, 2nd molar

Table 5. The relationship between duration of GERD and oral complaints.

		GERD duration						p
		12 months		13-36 months		More than 36 months		
		n	%	n	%	n	%	
Oral burning sensation	Not have	5	14.7	8	23.5	21	61.8	0.362
	Have	2	12.5	7	43.8	7	43.8	
Tongue sensitivity	Not have	6	15.4	11	28.2	22	56.4	0.899
	Have	1	9.1	4	36.4	6	54.4	
Nonspecific itching/burning	Not have	7	18.9	10	27.0	20	54.1	0.210
	Have	0	0.0	5	38.5	8	61.5	
Halitosis	Not have	2	11.1	3	16.7	13	72.2	0.245
	Have	5	15.6	12	37.5	15	46.9	
Dry mouth	Not have	2	16.7	2	16.7	8	66.7	0.578
	Have	5	13.2	13	34.2	20	52.6	
Sensitivity of teeth	Not have	5	20.0	7	28.0	13	52.0	0.536
	Have	2	8.0	8	32.0	15	60.0	
Erythema of soft/hard palatinal mucosa/uvula	Not have	4	13.3	8	26.7	18	60.0	0.784
	Have	3	15.0	7	35.0	10	50.0	

*p<0.05, n= Number, %= Percent

Table 6. Comparison of the means of DMFT, salivary flow rate, pH and buffering capacity according to GERD duration.

Parameter	GERD duration	Mean±SD	Median (Min.-Max.)	p
DMFT**	12 months	9.8571±7.35818	8 (1-20)	0.453
	13-36 months	10.4±8.57571	7 (2-27)	
	More than 36 months	11.4286±5.25941	11 (4-24)	
Flow rate	12 months	1.5786±0.65198	1.25 (1.04-2.64)	0.915
	13-36 months	1.4693±0.55969	1.28 (0.8-2.56)	
	More than 36 months	1.4796±0.60914	1.32 (0.4-3.08)	
pH	12 months	7.3143±0.34365	7.2 (6.9-7.9)	0.765
	13-36 months	7.28±0.23361	7.3 (6.9-7.6)	
	More than 36 months	7.2393±0.26435	7.2 (6.6-7.8)	
Buffering capacity	12 months	4.4429±1.25812	3.9 (3-5.9)	0.362
	13-36 months	4.12±1.20071	4.1 (1.4-6.3)	
	More than 36 months	3.8±1.07909	3.6 (1.5-6.2)	

*p<0.05 and **Kruskal Wallis test, SD: standard deviation

Table 7. The relationship between regurgitation frequency and oral complaints.

		Regurgitation Frequency								p
		Every day		Frequently		Occasionally		None		
		n	%	n	%	n	%	n	%	
Oral burning sensation	Not have	10	29.4	11	32.4	9	26.5	4	11.8	0.674
	Have	5	31.3	6	37.5	5	31.3	0	0.0	
Tongue sensitivity	Not have	11	28.2	11	28.2	13	33.3	4	10.3	0.218
	Have	4	36.4	6	54.5	1	9.1	0	0.0	
Nonspecific itching/burning	Not have	12	32.4	11	29.7	10	27.0	4	10.8	0.585
	Have	3	23.1	6	46.2	4	30.8	0	0.0	
Halitosis	Not have	4	22.2	7	38.9	5	27.8	2	11.1	0.776
	Have	11	34.4	10	31.3	9	28.1	2	6.3	
Dry mouth	Not have	3	25.0	5	41.7	3	25.0	1	8.3	0.925
	Have	12	31.6	12	31.6	11	28.6	3	7.9	
Sensitivity of teeth	Not have	6	24.0	9	36.0	6	24.0	4	15.0	0.204
	Have	9	36.0	8	32.0	8	32.0	0	0.0	
Erythema of soft/hard palatinal mucosa/uvula	Not have	6	20.0	10	33.3	10	33.3	4	13.3	0.28
	Have	9	45.0	7	35.0	4	20.0	0	0.0	

*p<0.05, n= Number, %= Percent

Table 8. Comparison of the means of DMFT, salivary flow rate, pH and buffering capacity according to regurgitation frequency.

Parameter	Regurgitation Frequency	Mean±SD	Median (Min.-Max.)	p
DMFT**	Every day	10.9333±7.95044	7 (2-27)	0.422
	Frequently	9.4118±6.16501	7 (2-22)	
	Occasionally	12.2143±4.45798	11 (4-19)	
	None	12.5±9.94987	12 (1-25)	
Flow rate**	Every day	1.5747±0.49538	1.58 (0.84-2.56)	0.283
	Frequently	1.3359±0.50724	1.24 (0.4-2.38)	
	Occasionally	1.4607±0.70826	1.225 (0.68-3.08)	
	None	1.935±0.73709	1.93 (1.24-2.64)	
pH	Every day	7.3267±0.21202	7.3 (7.1-7.8)	0.556
	Frequently	7.2765±0.24375	7.3 (6.9-7.6)	
	Occasionally	7.1929±0.34298	7.1 (6.6-7.9)	
	None	7.2±0.21602	7.15 (7-7.5)	
Buffering capacity	Every day	4.76±1.15499	4.7 (2.8-6.3)	0.014*
	Frequently	3.6588±0.80782	3.9 (1.5-5)	
	Occasionally	3.5929±1.24311	3.45 (1.4-5.9)	
	None	3.85±0.72342	3.75 (3.2-4.7)	

*p<0.05 and **Kruskal Wallis test, SD: standard deviation

The relationship of the salivary buffering capacity with regurgitation frequency was statistically significant (p=0.014). Accordingly, statistically significant differences were obtained between those who had regurgitation every day and those who had regurgitation frequently and occasionally (p=0.029, p=0.027, respectively).

It was noticed that the medications using for treatment did not effect the salivary buffering capacity, pH and flow rate values (p>0.05, for each) (**Table 9**).

Table 9. Comparison of the means of salivary flow rate, pH and buffering capacity according to medication use for GERD treatment.

Parameter	Medication use	Mean±SD	Median (Min.-Max.)	p
Flow rate**	Not use	10.9±6.57841	1.28 (1-27)	0.841
	Use	1.4389±0.47495	1.26 (0.8-2.56)	
pH	Not use	1.5219±0.65517	7.2 (0.4-3.08)	0.894
	Use	1.4904±0.58934	7.2 (0.4-3.08)	
Buffering capacity**	Not use	7.2684±0.23107	3.9 (7-7.6)	0.589
	Use	7.2581±0.28493	3.6 (6.6-7.9)	

*p<0.05 and ** Mann Whitney U test, SD: standard deviation

DISCUSSION

In the present study, it was aimed to investigate the relationship between GERD and the loss of tooth tissues, and TWI was used to evaluate the erosion in teeth. Also, the saliva samples, which were considered a very important biological factor for the occurrence of dental erosion, were collected from all individuals to compare the buffering capacity, pH and flow rate of saliva in the GERD and control groups.

The salient findings of the present study were as follows: the wear values on the palatal surfaces of the maxillary teeth, on the incisal surfaces of the maxillary anterior teeth, and on the occlusal surfaces of the maxillary/mandibular posterior teeth were higher in the GERD group. The wear scores on the other surfaces were similar in the groups. Further, the salivary buffering capacity, pH and flow rate values were lower in the GERD group than in the control group.

The acids usually involved in dental erosion are of intrinsic or extrinsic origin. Usually intrinsic factors are from regurgitated gastric juices and extrinsic factors are from dietary, medicinal, occupational, and recreational sources. Bartlett and Coward reported that gastric fluid obtained from GERD patients during endoscopy had much more erosive potential than acidic dietary products.[8] Wang et al.[9] reported that the reflux material in liquid or solid-liquid form can easily reach the oral cavity and then cause erosive damage to the teeth. They also added that the reflux in gas or vapor form may play same role.

Dentition is protected from erosion by various mechanisms of saliva and its components. First, saliva dilutes the erosive material and helps it flow away from the environment by allowing it to flow into the stomach. Saliva protects dental hard tissues against acid attacks by creating saturation on the enamel's outer surface thanks to the presence of calcium and phosphorus, providing pellicle formation on the tooth surface, and also providing the remineralizing ions (Fluor, Calcium, Phosphorus) necessary to convert demineralization to remineralization after erosive attacks.[2,4,12]

Moazzez et al.[13] showed that in GERD, wear occured due to the contact of regurgitated gastric acid with the palatal surfaces of the upper incisors, and saliva played an important role in tooth erosion due to its low buffering capacity. Holbrook et al.[14] also emphasized that a low salivary buffering capacity was associated with erosion. Bartlett et al.[15] and Richter[16] stated that acid reflux primarily affects the palatal surfaces of the upper incisors. This was explained by the fact that gastric juice first hit the palatal surface of the upper teeth and continued contact with acid for a longer period of time,

that the palatal surfaces were relatively farther away from the major salivary glands, and that the tongue's protection of the lower teeth was greater than in the palatal region. They added that if the acidic effect persists, other surfaces of the maxillary posterior and mandibular teeth may also be affected. The results of this study support the view that the most affected area is the palatal surface of the maxillary anterior teeth. The ability of saliva to clear acid is important for the development of dental erosion. The speed of the saliva's movement can vary greatly in different parts of the mouth. Teeth near the areas where saliva flows into the mouth, such as the lower anterior and upper posterior teeth, benefit from a higher salivary clearance. In the middle interproximal and anterior maxillary areas where saliva has more difficulty to reaching, clearance is slower and pH returns to normal late.[17,18]

In the present study, the prevalence of GERD patients (82%) with dental erosions was higher than that reported by Meurman et al.[19] (24%), Schroeder et al.[20] (55%), Munoz et al.[21] and Benages et al.[22] (47.5%). but similar to that of Bartlett et al.[23] (64%) and Tugut et al.[24] (80%). This variance regarding dental erosions among the studies might be due to many factors, including, but not limited to, the diagnostic criteria used, dietary habits, frequency and content of regurgitation, saliva characteristics, frictional force caused by the tongue during swallowing and phonation, and the presence of restorations.

Some factors influencing the formation of dental erosions are dependent on the individual, whereas some other are completely independent. The buffering capacity of saliva and the solubility of the teeth against acids are factors that are independent of the individual, while general health status and dietary habits depend on the individual. It has been frequently mentioned that dietary acids, especially in fruit juices and carbonated beverages, cause erosion.[25-28] In the present study, no significant difference was observed between the groups in terms of dietary habits. This result also lends support that GERD was the primary cause of dental erosions observed in the patients.

According to some studies, clinical signs of dental erosions occur when acid contacts the teeth several times a week for at least 1-2 years.[4] In the current study, all patients had at least 12 months of regurgitation, while 26 (62%) patients had this symptom more than 36 months. Regurgitation was observed daily or frequently in 67% and occasionally in 33% of the patients. Moreover, the ability of saliva to neutralize acid affects the formation of erosion by protecting the teeth and oral cavity with dilution and its salivary buffering capacity. It is thought that individuals with low flow rates are five times more at risk for erosion than those with normal flow rates.[29] When the buffering capacity is deteriorated, acid is also more dangerous for oral tissues.[30] In general, dental erosion appears when the protective buffering capacity of the oral cavity is overcome by either reduced salivary secretion or increased volume of injurious gastric refluxate.[31]

In the present study, the findings related to dry mouth, oral acid/burning sensation, halitosis, and erythema of the soft/hard palatal mucosa/uvula were in line with previous studies, and this was thought to be caused by direct contact of acid reflux with oral tissues.[30,32,34] In terms of dental sensitivity parameters, Di Fede et al.[34] showed discrepant results. This can be explained by the fact that the duration, amount, and frequency of gastric acid contact with the tissues, the saliva characteristics, or the erosion value between the studies were different.

Some limitations of the present study deserve mention; first, the case and control groups were not matched according to age. Since the age of the case group was significantly higher, age-related problems might have affected the patient group more than the control group. This may have caused a selection bias. Second, since the study examined 50 cases and 50 healthy participants who applied between certain dates, its generalizability should be evaluated in this respect. Finally, recall bias may have affected the results in the questions asked to the patients.

In this study, the results showed that the loss of dental hard tissues was higher in patients with GERD than in healthy individuals. Dry mouth, halitosis, oral burning sensation, nonspecific itching, teeth sensitivity, tongue sensitivity, and erythema of the soft/hard palatal mucosa/uvula were also associated with GERD. No difference was found between the groups for caries prevalence. Patients with GERD should be considered as a risk group for dental and oral health, and all the necessary prophylactic and therapeutic applications should be performed.

CONCLUSIONS

In the present study, erosion-related wear was observed in the GERD group, but not in the control group. The wear values observed in the patient group were found to be different concerning the jaws, teeth, and surfaces. It was found that the palatal and incisal/occlusal surfaces of the maxillary teeth had higher scores than the other surfaces. These scores were higher in the anterior region than in the posterior region, whereas the mandibular teeth had high scores in the occlusal surfaces of the posterior teeth. Oral complaints were more frequent in the GERD group, and the salivary buffering capacity, pH and flow rate values were also lower than in the control group. However, there was no difference between the groups in terms of DMFT.

ETHICAL DECLARATIONS

Ethics Committee Approval: The study was carried out with the permission of Ankara University Faculty of Dentistry Research Ethics Committee (permission granted: 10.06.2008, decision no: 131/2).

Informed Consent: All patients signed the free and informed consent form.

Referee Evaluation Process: Externally peer-reviewed.

Conflict of Interest Statement: The authors have no conflicts of interest to declare.

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

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REFERENCES

1. Gregory-Head B, Curtis DA. Erosion caused by gastroesophageal reflux: diagnostic considerations. J Prosthodont 1997;6(4):278-85.
2. Meurman JH, ten Cate JM. Pathogenesis and modifying factors of dental erosion. Eur J Oral Sci 1996;104(2):199-206.
3. Zero DT. Etiology of dental erosion: extrinsic factors. Eur J Oral Sci 1996;104(2):162-77.
4. Scheutzel P. Etiology of dental erosion-intrinsic factors. Eur J Oral Sci 1996;104(2):178-90.
5. Van Roekel NB. Gastroesophageal reflux disease, tooth erosion, and prosthodontic rehabilitation: a clinical report. J Prosthodont 2003;12(4):255-9.
6. Mousa H, Hassan M. Gastroesophageal reflux disease. Pediatr Clin North Am 2017;64(3):487-505.
7. Bartlett DW, Evans DF, Anggiansah A, Smith BG. The role of the esophagus in dental erosion. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2000;89(3):312-5.
8. Bartlett DW, Coward PY. Comparison of the erosive potential of gastric juice and a carbonated drink in vitro. J Oral Rehabil 2001;28(11):1045-7.
9. Wang GR, Zhang H, Wang ZG, Jiang GS, Guo CH. Relationship between dental erosion and respiratory symptoms in patients with gastro-oesophageal reflux disease. J Dent 2010;38(11):892-8.
10. Lundell LR, Dent J, Bennett JR, et al. Endoscopic assessment of oesophagitis: clinical and functional correlates and further validation of the Los Angeles classification. Gut 1999;45(2):172-80.
11. Smith BG, Knight JK. An index for measuring the wear of teeth. Br Dent J 1984;156(12):435-8.
12. Gudmundsson K, Kristleifsson G, Theodors A, Holbrook WP. Tooth erosion, gastroesophageal reflux, and salivary buffer capacity. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 1995;79(2):185-9.
13. Moazzez R, Bartlett D, Anggiansah A. Dental erosion, gastro-oesophageal reflux disease and saliva: how are they related? J Dent 2004;32(6):489-94.
14. Holbrook WP, Furuholm J, Gudmundsson K, Theodórs A, Meurman JH. Gastric reflux is a significant causative factor of tooth erosion. J Dent Res 2009;88(5):422-6.
15. Bartlett DW, Evans DF, Smith BG. The relationship between gastroesophageal reflux disease and dental erosion. J Oral Rehabil 1996;23(5):289-97.
16. Richter JE. Extraesophageal presantations of gastroesophageal reflux disease. Semin Gastrointest Dis 1997;8(2):75-89.
17. Millward A, Shaw L, Smith A. Dental erosion in four year old children from differing socio-economic backgrounds. ASDC J Dent Child 1994;61(4):263-6.
18. Milosevic A, Young PJ, Lennon MA. The prevalence of tooth wear in 14-year-old school children in Liverpool. Community Dent Health 1994;11(2):83-6.
19. Meurman JH, Toskala J, Nuutinen P, Klemetti E. Oral and dental manifestations in gastroesophageal reflux disease. Oral Surg Oral Med Oral Pathol 1994;78(5):583-9.
20. Schroeder PL, Filler SJ, Ramirez B, Lazarchik DA, Vaezi MF, Richter JE. Dental erosion and acid reflux disease. Ann Intern Med 1995;122(11):809-15.
21. Muñoz JV, Herreros B, Sanchiz V, et al. Dental and periodontal lesions in patients with gastro-oesophageal reflux disease. Dig Liver Dis 2003;35(7):461-7.
22. Benages A, Muñoz JV, Sanchiz V, Mora F, Mínguez M. Dental erosion as extraoesophageal manifestation of gastro-oesophageal reflux. Gut 2006;55(7):1050-1.
23. Bartlett DW, Evans DF, Anggiansah A, Smith BG. A study of the association between gastro-oesophageal reflux and palatal dental erosion. Br Dent J 1996;181(4):125-31.
24. Tugut F, Ozdemir Dogan D, Polat T, Yılmaz K, Ozdemir AK. Prevalence of dental erosion in patients with gastroesophageal reflux disease. CDJ 2009;12(1):29-32.
25. Grobler SR, Senekal PJ, Laubscher JA. In vitro demineralization of enamel by orange juice, apple juice, pepsi cola and diet pepsi cola. Clin Prev Dent 1990;12(5):5-9.
26. Larsen MJ, Nyvad B. Enamel erosion by some soft drinks and orange juices relative to their pH, buffering effect and contents of calcium phosphate. Caries Res 1999;33(1):81-7.
27. Milosevic A, Bardsley PF, Taylor S. Epidemiological studies of tooth wear and dental erosion in 14-year old children in North West England. Part 2: The association of diet and habits. Br Dent J 2004;197(8):479-83.
28. Jensdottir T, Holbrook P, Nauntofte B, Buchwald C, Bardow A. Immediate erosive potential of cola drinks and orange juices. J Dent Res 2006;85(3):226-30.
29. Järvinen VK, Rytömaa II, Heinonen OP. Risk factors in dental erosion. J Dent Res 1991;70(6):942-7.
30. Lazarchik DA, Filler SJ. Effects of gastroesophageal reflux on the oral cavity. Am J Med 1997;103(5):107-3.
31. Farrokhi F, Vaezi MF. Extra esophageal manifestations of gastroesophageal reflux. Oral Dis 2007;13(4):349-59.
32. Järvinen V, Meurman JH, Hyvärinen H, Rytömaa I, Murtomaa H. Dental erosion and upper gastrointestinal disorders. Oral Surg Oral Med Oral Pathol 1988;65(3):298-303.
33. DeVault KR. Should upper gastrointestinal endoscopy be part of the evaluation for supraesophageal symptoms of GERD? Am J Gastroenterol 2004;99(8):1427-9.
34. Di Fede O, Di Liberto C, Occhipinti G, et al. Oral manifestations in patients with gastro oesophageal reflux disease: a single-center case-control study. J Oral Pathol Med 2008;37(6):336-40.

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Original Article / Orijinal Araştırma

A comparative study of VITEK-2, Double Disc Synergy and Combined Disc Methods for detection of ESBL (Extended Spectrum Beta-Lactamase) production in *Escherichia coli* and *Klebsiella pneumoniae* strains

Escherichia coli ve *Klebsiella pneumoniae* suşlarında ESBL (Genişletilmiş Spektrum Beta-Laktamaz) üretiminin saptanması için VITEK-2, Çift Disk Sinerjisi ve Kombine Disk Yöntemlerinin karşılaştırmalı bir çalışması

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Abstract

Aim: In this prospective study we aimed to compare the effectiveness of VITEK-2 (bioMérieux, France) automated system, double disc synergy test (DDST) versus combined disc test (CDT) in detecting the Extended Spectrum Beta-Lactamase (ESBL) positivity in *Escherichia coli* and *Klebsiella pneumoniae* strains isolated from various clinical samples.

Material and Method: *E. coli* and *K. pneumoniae* strains inoculated on Mueller Hinton Agar plate. Susceptibility tests were performed with the VITEK 2 (BioMérieux, France) system before. Afterward, EBSL positivity was investigated manually DDST and CDT. Minimal inhibitor concentration (MIC) results of three tests were compared with each other according to the European Committee on Antimicrobial Susceptibility Testing (EUCAST) criteria.

Results: 184 *E. coli* and *K. pneumoniae* strains, elevuated. 92.9% of 98 patients with VITEK 2 positive results were positive with combined disc and DDS method, 100% of the 86 patients with negative results of VITEK 2 were negative with combined disc and DDST.

Conclusion: VITEK 2 was found to have a sensitivity of 100%, a specificity of 92.4%, a positive predictive value of 92.8% and a negative predictive value of 100%. VITEK 2 was found to be compatible with validation tests for ESBL positivity.

Keywords: *Escherichia coli*, *Klebsiella pneumoniae*, VITEK-2, Double Disk Synergy (DDS) Test, Combined disc test, Extended-Spectrum Beta-Lactamase (ESBL)

Öz

Amaç: Bu prospektif çalışmada, çeşitli klinik örneklerden izole edilen *Klebsiella pneumoniae* ve *Escherichia coli* suşlarında Genişletilmiş Spektrum Beta-Laktamaz (ESBL) pozitifliğini saptamada VITEK-2 (bioMérieux, Fransa) otomatize sistem, çift disk sinerji testi (ÇDST) ve kombine disk testinin (KDT) etkinliğini karşılaştırmayı amaçladık.

Gereç ve Yöntem: *E. coli* ve *K. pneumoniae* suşları Mueller Hinton Agar plağına inokule edildi. Duyarlılık testleri önce VITEK 2 (BioMérieux, Fransa) sistemi ile değerlendirildi. Sonrasında EBSL pozitifliği manuel olarak ÇDST ve KDT ile araştırıldı. Üç testin minimum inhibitör konsantrasyonu (MIC) sonuçları, Avrupa Antimikrobiyal Duyarlılık Testi (EUCAST) kriterlerine göre birbirleriyle karşılaştırıldı.

Bulgular: 184 *E. coli* ve *K. pneumoniae* suşu değerlendirildi. VITEK 2 pozitif sonucu olan 98 hastanın %92,9'u kombine disk ve DDS yöntemi ile pozitifti, VITEK 2 negatif sonucu olan 86 hastanın %100'ü kombine disk ve DDST ile negatifti.

Sonuç: VITEK 2'nin %100 duyarlılık, %92,4 özgüllük, %92,8 pozitif öngörü değeri ve %100 negatif öngörü değerine sahip olduğu bulundu. VITEK 2'nin ESBL pozitifliği için doğrulama testleri ile uyumlu olduğu bulundu.

Anahtar Kelimeler: *Escherichia coli*, *Klebsiella pneumoniae*, VITEK-2, Çift Disk Sinerjisi (DDS) Testi, Kombine disk testi, Genişletilmiş Spektrumlu Beta-Laktamaz (ESBL)

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INTRODUCTION

Extended Spectrum Beta-Lactamases (ESBL) were first reported in Germany in 1983, just after the introduction of broad-spectrum beta-lactam antibiotics against *Klebsiella pneumoniae* species.[1] The most crucial mechanism for developing resistance to beta-lactam antibiotics in gram-negative bacteria is beta-lactamase synthesis. Today, approximately 600 beta-lactamase enzymes have been identified. The most important beta-lactamase enzyme groups are cephalosporinase which is genetically encoded by plasmids, metallo-beta-lactamase and ESBL. ESBLs are enzymes that can cause resistance to penicillin, all cephalosporins except cephamycins (cefoxitin, moxalactam) and aztreonam, be inactivated with beta-lactamase inhibitors such as clavulanic acid, sulbactam or tazobactam, and generate different enzymes as a result of different amino acid changes in TEM and SHV enzymes.[2,3] Plasmids that encode ESBL, also contain genetic material against many antibiotics other than beta-lactams in their genetic structure. As a result, the bacteria that can synthesize ESBL can be simultaneously resistant to fluoroquinolone, tetracycline, chloramphenicol, trimethoprim-sulfamethoxazole, and especially aminoglycosides.[4-6]

Today, ESBL screening is recommended for research purposes in infection control and epidemiological studies. Screening and verification tests are used to determine the presence of ESBL. Inhibition diameter is determined by disk diffusion test performed with cefotaxime, ceftriaxone, ceftazidime, cefpodoxime as screening test or the minimum inhibitory concentration (MIC) is determined by the liquid dilution method. If the zone diameters from the test are lower than the limit values specified in international sources for the tested antibiotics, or the MIC values are greater than the limit values, a verification test should be performed. Verification tests consist of phenotypic tests such as combination disk test, double disk synergy test and microdilution test, and genotypic tests such as PCR (polymerase chain reaction). ESBL can be found in various commercial kits and automated systems.[7-9]

The aim of this study was to investigate whether there is a difference between the VITEK 2 (BioMérieux, France) fully automated system and double disc synergy (DDST) versus combined disc test (CDT) in detecting the presence of ESBL.

MATERIAL AND METHOD

In this prospective study, 131 *E. coli* and 53 *K. pneumoniae* strains isolated from various clinical samples as an infectious agent between November 2016 and January 2017, were included. Susceptibility tests were performed with the VITEK 2 (BioMérieux, France) system before, and after DDSTs and CDTs were applied to ESBL positive or negative *E. coli* or *K. pneumoniae* strains. For this test bacterial suspension which prepared in 0.5 McFarland turbidity was inoculated to Mueller Hinton Agar (MHA) plate. *E. coli* ATCC 25922 used as a positive and negative control group. *E. coli* and *K. pneumoniae* strains inoculated on Mueller Hinton Agar plate. Susceptibility tests were performed with the VITEK 2 (BioMérieux, France) system before, and after Minimal inhibitor concentration (MIC) results of three tests were compared with each other according to the European Committee on Antimicrobial Susceptibility Testing (EUCAST) criteria.

a.Double Disc Sinergy Test: After placing an amoxicillin-clavulanic acid (AMC) (20/10 µg) disc in the centre of the petri dish and placing ceftazidime (CAZ) (30 µg), ceftriaxone (CRO) (30 µg), cefoxitin (FOX) (30 µg), cefotaxime (CTX) (30 µg) radially at a distance of 25 mm from AMC's disc circumference, an expansion towards the AMC disk in the inhibition zones around the CAZ, CRO, FOX or CTX discs or the presence of a non-bacterial synergy area in between was evaluated as ESBL production.

b.Combine Disc Test: In this method ceftazidime (CAZ) (30 µg), ceftazidime-clavulanic acid (CCA) (30/10 µg), cefotaxime (CTX) (30 µg), cefotaxime-clavulanic acid (CCT) (30/10 µg) was used. Bacterial suspension which prepared in 0.5 McFarland turbidity was spread with sterile swab to Mueller-Hinton Agar medium. CAZ and CCA discs were placed in the petri dish with 30 mm between them and same procedure was applied to CTX and CCT disks. Petri dishes was incubated at 35°C for 18 hour and results was evaluated according to EUCAST criteria. 5mm or difference more than that between cephalosporin disc and cephalosporin -clavulanate disc was evaluated as ESBL production.

Ethical approval: In order to conduct the study, Ethical approval was taken from Clinical Researches Ethics Committee of Dr. Lütfi Kırdar Training and Research Hospital (Date: 29.11.2016, Decision No: 2016/514/96/2). All procedures were carried out in accordance with the ethical rules and the principles of the Declaration of Helsinki.

Statistical analysis: Statistical Packages for the Social Sciences (SPSS) for Windows 22.0 package program was used for statistical analysis.

RESULTS

In our study, 131 *E. coli* and 53 *K. pneumoniae* strains isolated from various clinical samples were evaluated. Of the patients from whom the isolates were obtained, 126 (68.5%) were female, 58 (31.5%) were male and the age range was 6 months-92 years, the average age was 42. The most common comorbidities were hypertension (21.2%), Diabetes Mellitus (DM) (16.3%) and malignancy (13.6%)(**Table 1**). The antibiotics used by the patients in the last three months were questioned in terms of ESBL positivity (**Table 2**). The distribution of the samples included in the study is as follows; 162 (88.0%) were urine, 9 (4.9%) were wound, 5 (2.7%) were trachea and sputum and 3 (1.6%) were tissue culture. The antibiotic susceptibility results of *E. coli* and *K. pneumoniae* strains with VITEK-2 are shown in **Table 3**.

In this study, ESBL positivity was detected by VITEK 2, the confirmation tests were performed on these strains with the DDSTs and CDTs to 63 (48.1%) 131 of *E. coli* strains and 35 (66%) 53 of *K. pneumoniae* strains. The verification tests gave positive results methods in 91 (92.9%) of 98 strains that VITEK 2 gave positive results, 86 (100%) of 86 strains that VITEK 2 gave negative results were found negative by CDTs and DDS method. DDST and CDTs results were consistent with each other in terms of positivity and negativity. Evaluated only for *E. coli*; the confirmation tests gave positive results in 57 (90.5%) out of 63 strains that VITEK 2 gave positive results, 68 (100%) of 68 strains that gave negative results with VITEK 2 were also found negative by combined disc and double disc synergy method. Evaluated only for *K. pneumoniae*; the confirmation tests gave positive results in 34 (97.1%) out of 35 strains that VITEK 2 gave positive results, 18 (100%) of 18 strains that gave negative results with VITEK 2 were also found negative by DDSTs and CDTs method.

Thus, when the VITEK 2 results were compared with the validation tests that studied, the sensitivity was 100%, specificity 92.4%, PPD 92.8%, NPD 100% for all strains. For *E. coli*, sensitivity 100%, specificity 91.9%, PPD 90.5%, NPD 100%; For *K. pneumoniae*, the sensitivity 100%, specificity 94.7%, PPD 97.1% and NPD 100% was found (**Table 4**).

DISCUSSION

The most important mechanics in gram negative bacteria for developing resistance against beta-lactam antibiotics is beta-lactamase synthesis, and approximately 600 beta-lactamase enzymes have been identified since today. Because enteric bacteria that can synthesize this enzyme can easily transfer these enzymes to other bacteria via plasmids, the number of bacteria that can synthesize this enzyme is increasing day by day.[1-3] Microorganisms that synthesize ESBL, can transfer these enzymes between species and could cause epidemic in hospitals. In bacterial infection that can synthesize ESBL, should be investigated whether the factor causes ESBL due to the insufficiency of many antibiotics in the treatment, prolonged hospitalization stay, increased morbidity and mortality rates, and serious economic losses.[5,6]

Various studies have been conducted in the literature on methods that detect ESBL production.[10-22] In a comparative study which done with various automatize systems, DDS test and E-test on 150 enteric bacteria, VITEK 2 (BioMérieux, Fransa), Phoenix Automated Microbiology System (BD Diagnostic Systems, Sparks, MD, ABD), MicroScan WalkAway-96 System (Dade Behring, Inc., West Sacramento, CA, ABD), DDS test and E-test methods for the ESBL detection sensitivity for *E. coli* (n=61) respectively 81.4%, 100%, 100%, 97.7%, 97.7%, specificity 100%, 72.2%, 72.2%, 100%, 94.4%, PPD 100%, 89.6%, 89.6%, 100%, 94.4%, NPD 69.2%, 100%, 100%, 94.7%, 97.7%, The ESBL detection sensitivity for *K. pneumoniae* (n=29) 95.7%, 100%, 95.7%, 91.3%, 100%, and the specificity 83.3%, 66.7%, 50%, 100%,83.3%, PPD 95.7%,

Table 1. Demographic information, factors and underlying diseases

	n	%
Gender (Female)	126/58	68.5
Isolated bacteria		
E. coli	131	71.2
K. pneumoniae	53	28.8
Underlying diseases		
Hypertension	39	21.2
Diabetes mellitus	30	16.3
Malignancy	25	13.6
Coronary artery disease	15	8.2
Chronic kidney failure	13	7.1
Chronic obstructive pulmonary disease	9	4.9
Cerebrovascular Disease	2	1.1

Table 2. Antibiotics Used by Patients in the Last Three Months

Antibiotic	Exist	(%)	Non-exist	(%)
Aminopenicillin	24	13	160	87
Phosphomycine	20	10.9	164	89.1
2nd generation cephalosporin	19	10.3	165	89.7
Fluoroquinolone	16	8.7	168	91.3
3rd generation cephalosporin	11	6.0	173	94.0
Trimethoprim-sulfamethoxazole	7	3.8	177	96.2
Nitrofurantoin	3	1.6	181	98.4
1st generation cephalosporin	3	1.6	181	98.4
Aminoglycoside	3	1.6	181	98.4
Other antibiotics	3	1.5	181	98.5

*Other antibiotics: (tetracycline, clindamycin, fusidic acid)

Table 3. VITEK-2 antibiotic susceptibility results.

Antibiotic	Susceptible	(%)	Resistant	(%)
Ampicilline	45	24.5	139	75.5
Amoxicilline-clavulanic acid	90	48.9	94	51.1
Cefuroxime	81	44.0	103	56.0
Cefuroxime axetil	81	44.0	103	56.0
Ceftazidime	86	46.7	98	53.3
Ceftriaxone	86	46.7	98	53.3
Cefixime	83	45.1	101	54.9
Piperacillin-tazobactam	114	62.0	70	38.0
Imipeneme	176	95.7	8	4.3
Meropeneme	180	97.8	4	2.2
Ertapenem	178	96.7	6	3.3
Amikacin	139	75.5	45	24.5
Gentamicin	139	75.5	45	24.5
Ciprofloxacin	118	64.1	66	35.9
Trimethoprim-sulfamethoxazole	116	63.0	68	37.0
Tigecycline[1]	13	7.1	1	0.5
Nitrofurantoin[2]	146	79.3	18	9.8
Phosphomycine[2]	150	81.5	14	7.6

[1]Non-urinary samples have been studied, [2]Only studied in urine samples.

Table 4. Comparison of VITEK 2 and verification tests for *E. coli* ve *K. pneumoniae* strains

Test VITEK 2	n	Susceptibility %	Specificity %	PPD %	NPD %
All strains	184	100	92.4	92.8	100
E. coli	131	100	91.9	90.5	100
K. pneumoniae	53	100	94.7	97.1	100

PPD: positive predictive value, NPD: negative predictive value

92%, 88%, 100%, 95.8%, NPD 83.3%, 100%, 75%, 75%, 100%, The ESBL detection sensitivity for *E. coli*, K. oxytoca ve *K. pneumoniae* (n=104) 84.5%, 100%, 98.6%, 94.4%, 98.6%, and the specificity 93.9%, 51.5%, 51.5%, 97%, 72.7%, PPD 96.8%, 81.6%, 81.4%, 98.5%, 88.6%, NPD 73.8%, 100%, 94.4%, 88.9%, 96.0 was found when when molecular methods were taken as a reference.[10] Fincancı et al.[11] was found screen test that based on zone diameter measurements is significantly sensitive compared to DDS and E-test methods for the ESBL detection sensitivity, similarly Oztürk et al.[12] was found screen test that based on zone diameter measurements is concordant as E-test and more efficient than DDS. There are also studies reporting that there is no difference between DDST test and E-test methods in detecting the presence of ESBL. For example, Yavuz et al.[13] compared the ESBL production in Enterobacteriaceae strains with the DDS test and E-test methods and reported that there was no significant difference between the methods. Yurtman et al.[14] and Akçam et al.[15] did not detect a difference between the DDST test and E-test methods. Genç et al.16 in a study that compared VITEK-2 and DDS which investigated the presence of ESBL for 95 *E. coli* and 61 *K. pneumoniae* strains and reported that VITEK 2 sensitivity was 93.3%, specificity 81.8%, false-positivity ratio 18.1%, false-negativity ratio 6.6% and positivity ratio 86.4%.

In a study which conducted with 117 enteric bacteria that ESBL positivity was determined by combination disk diffusion test, 91% of the strains with VITEK-2 and 97% of the strains were found to be ESBL positive with the DDS test, although VITEK 2 could give false negative results It is stated that it can be used routinely in laboratories.[17]

Another study which conducted with 94 ESBL positive and 71 ESBL negative enteric bacteria that were studied with molecular methods, VITEK 2 sensitivity 91.5%, specificity 100%, DDS test sensitivity 97.9%, specificity 97.2%, combined disc test sensitivity 93.6%, specificity 100% was detected on all strains.[17] Focusing only *E. coli* (n=79), VITEK 2 sensitivity 89.8%, specificity 100%, DDS test sensitivity 98%, specificity 100%, combined disc test sensitivity 89.8%, specificity 100% was detected. Focusing only *K. pneumoniae* (n=23), VITEK 2 sensitivity 95.7%, specificity 100%, DDS test sensitivity 95.5%, specificity 100%, combined disc test sensitivity 95.5%, specificity 100% was detected.[18]

Mehli et al.[10] was found in their study conducted with 321 enteric bacteria, when DDS test and VITEK 2 was compared in ESBL detection sensitivity and specificity was respectively detected as 100%, 94.1%. In another study which conducted with 1123 enteric bacteria with molecular methods as a reference, VITEK-2'nin sensitivity 98.1%, specificity 99.7%, PPD 99.3%, NPD 99.3% was detected, for *E. coli* (n=534) sensitivity 98.1%, specificity 99.5%, PPD 98.1%, NPD 99.5%, for *K. pneumoniae* (n=193) sensitivity 97.7%, specificity 100%, PPD 100%, NPD 98.1% was detected and VITEK 2 automatize system can be used rountinely in laboratories for ESBL detection.[19] Kacmaz et al.[20] reported that in some cases where the reliability of the DSS test is decreased (for example, accompanied by different resistance mechanisms such as the production of carbapenemases such as high-level Amp C beta lactamase, metallo beta lactamase and *K. pneumoniae* beta lactamase, excretion mechanisms and decreased permeability with ESBL) It may mask the presence of ESBL and also that the bacteria which resistant to clavulanic acid cannot be evaluated with the DDS test.

Singh et al.[21] compared the 57 ESBL positive strains with six methods. Between these methods, concordance was found with combined disk test and 100% MIC value. VITEK 2 sensitivity 91.8% specificity 97.24%, PPD 93.3% was found in all strains. The highest sensitivity and specificity have been demonstrated with combined disc (93.44%) and double disc synergy (100%) techniques, respectively. They reported that VITEK-2 has an acceptable capacity to detect ESBL strains compared to traditional phenotypic methods.[21] ChromID ESBL agar (BioMerieux, France) that developed in recent years, is a chromogenic selective broth that developed to identify ESBL positive Enterobacteriaceae strains earlier than other methods used. The sensitivity and specificity of this broth in detecting ESBL-producing microorganisms were reported as 97% and 92.9% respectively, by Alıskan et al.[22] from our country.

In our study when we compared VITEK 2 Automatize System's results with DDS and Combined Disc Methods which are ESBL verification tests, sensitivity 100%, specificity 92.4%, PPD 92.8%, NPD 100% was found in all strains.

CONCLUSION

ESBL-positivity is an important problem of resistance in Gram-negative bacteria, one of the most important risk factors is antibiotic use. Therefore, attention should be paid to the use of appropriate antibiotics in the appropriate indication. In addition, it was found that the VITEK 2 automated system in laboratories was compatible with confirmation tests in detecting ESBL positivity during the decision-making process in the selection of antibiotics that play a role in the treatment of these infections.

ETHICAL DECLARATIONS

Ethics Committee Approval: Ethical approval was taken from Clinical Researches Ethics Committee of Dr. Lütfi Kırdar Training and Research Hospital (Date: 29.11.2016, Decision No: 2016/514/96/2).

Informed Consent: All patients signed the free and informed consent form.

Referee Evaluation Process: Externally peer-reviewed.

Conflict of Interest Statement: The authors have no conflicts of interest to declare.

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Author Contributions: MY, ÖA, DH: design, execution, and analysis; SA: editing, writing, execution. All authors: Approved the final version. This study is corresponding author's thesis study.

REFERENCES

1. Forbes A, Sahm F, Weissfeld S. Principles of antimicrobial action and resistance, In:Fabiano K, Lester S, Wurm E(eds), Bailey & Scott's Diagnostic Microbiology. 2003,11thed. St. Louis. CV Mosby Co, Missouri. p:214-220.
2. Livermore DM.Defining an extended-spectrum beta-lactamase. Clin Microbiol Infect. 2008;14(1):3-10.
3. Livermore DM. Beta-lactamases in laboratory and clinical resistance. Clin Microbiol Rev. 1995;8(4):557-84.
4. Albertini M, Benoit C, Berardi L. Surveillance of methicillin-resistant Staphylococcus aureus (MRSA) and Enterobacteriaceae producing extended spectrum beta-lactamase (ESBL) in Northern France:a five-year multicentre incidence study. J Hosp Infect. 2002;52(2):107-13.
5. Kang C, Kim SH, Park WB, et al. Bloodstream infections due to extended spectrum beta-lactamases producing *E. coli* and *K. pneumoniae*:Risk factors for treatment outcome with special emphasis on antimicrobial. Antimicrobial Agents Chemother. 2004;48(12):4574-81.
6. Ramphal R, Ambrose PG. Extended spectrum beta-lactamases and clinical outcomes:Current data. Clin Inf Dis. 2006;42 Suppl 4:164-72.
7. Jorgensen JH, Ferraro MJ. Antimicrobial susceptibility testing:special needs for fastidious organisms and difficult-to-detect resistance mechanisms. Clin Infect Dis. 2000;30(5):799-808.
8. Clinical and Laboratory Standards Institute. Performance Standarts for Antimicrobial Susceptibility Testing. 24th Informational Supplement. CLSI Document M100-S24, CLSI, Wayne, PA, 2014.
9. Mehli M, Zer Y, Gayyurhan E. Çeşitli klinik örneklerden izole edilen Enterobacteriaceae suşlarında GSBL oluşturmanın ÇDST ve VITEK 2 yöntemleri ile araştırılması. ANKEM Derg. 2007;21(3):71-5.
10. Fincancı M, Ulutürk R, Eren G, et al. *Klebsiella pneumoniae*, Klebsiella oxytoca ve *Escherichia coli* kökenlerinde genişletilmiş spektrumlu beta laktamazların araştırılmasında kullanılan çeşitli yöntemlerin karşılaştırılması. İnfeksiyon Derg. 2003;17(1):55-60.
11. Öztürk CE, Kaya DA, Yücel M, et al. Genişlemiş Spektrumlu Beta-Laktamaz Tespitinde Kullanılan Bazı Fenotipik Testlerin Karşılaştırılması. ANKEM Derg. 2010;24(3):111-6.
12. Yavuz MT, Ersan G, Süvarierel M. Enterobacteriaceae kökenlerinde genişlemiş spektrumlu beta-laktamaz üretiminin iki farklı yöntemle araştırılması, Düzce Tıp Fak Derg. 2005;2:10-3.
13. Yurtman AN, Hoşgör-Limoncu M, Ermertcan Ş, et al. Genişlemiş spektrumlu beta-laktamazların saptanmasında fenotipik yöntemlerin karşılaştırılması. İnfeksiyon Derg. 2009;23(1):5-8.
14. Akçam FZ, Gönen İ, Kaya O, et al. Hastane infeksiyonu etkeni çeşitli Gram-negatif bakterilerde genişlemiş spektrumlu beta-laktamaz yapımının iki yöntemle araştırılması. Klimik Derg. 2004;17(1):47-9.
15. Genç S, Dündar D. *Escherichia coli* ve *Klebsiella pneumoniae* Suşlarında GSBL Üretiminin Saptanmasında VITEK- 2 Otomatize Sistemi ile Çift Disk Sinerji Testinin Karşılaştırılması. Türk Mikrobiyol Cem Derg. 2015;45(1):36-40.
16. Ece G. Comparison of conventional method and automatized vitek system in the detection of extended spectrum beta-lactamase in *Escherichia coli* and *Klebsiella pneumoniae* isolates. Afr J Microbiol Res. 2013;7(32):4091-95.
17. Robin F, Delmas J, Schweitzer C, et al. Evaluation of the Vitek-2 extended-spectrum β-lactamase test against non-duplicate strains of Enterobacteriaceae producing a broad diversity of well-characte-rised β-lactamases . Clin Microbiol Infect. 2008;14(2):148-54.
18. Spanu T, Sanguinetti M, Tumbarello M, et al. Evaluation of the new VITEK 2 extended-spectrum beta-lactamase (ESBL) test for rapid detection of ESBL production in Enterobacteriaceae isolates. J Clin Microbiol. 2006;44(9):3257-62.
19. Kaçmaz B, Ece G. Genişlemiş spektrumlu betalaktamaz saptanmasında ikinci, üçüncü ve dördüncü kuşak sefalosporinlerin çift disk sinerji testinde kullanılması ve sefoksitin duyarlılığı. ANKEM Derg. 2010;24(2):61-4.
20. Singh RM, Singh HL. Comparative evaluation of six phenotypic methods for detecting extended-spectrum beta-lactamase-producing Enterobacteriaceae. J Infect Dev .Ctries 2014;8(4):408-15.
21. Alışkan HE, Çolakoğlu Ş, Turunç T, Demiroğlu YZ. GSBL Pozitif Enterobacteriaceae ve Vankomisine Dirençli Enterokokların İdrar Kültürlerinden Erken Tespitinde ChromID ESBL Agarın Değerlendirilmesi. Mikrobiyol Bul. 2012;46(1):17-25.

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Original Article / Orijinal Araştırma

Our Experience in Perioperative Medicine in Patients with Colorectal Surgery

Kolorektal Cerrahi Geçiren Hastalarda Perioperatif Bakım Deneyimlerimiz

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Abstract

Aim: ERAS (Enhanced Recovery After Surgery) programmes have been becoming more important day by day. Researchers should compose these type of programmes according to the conditions of their surgical centers. In this study we aimed to demonstrate our experience on enhanced recovery after surgery protocol.

Material and Method: To optimize the patients mental and physical status; informative meetings about operation were arrenged with patients and relatives, and walking and respiratory exercises were given to patients. Patients were received either spinal or epidural analgesia for postoperative pain management. After operation patients were followed up at surgical intensive care unit and surgery ward. Pain scores and clinical status of the patients were evaluated.

Results: A total of 65 patients were included in this retrospective study. Numerical Rating Scale (NRS) scores found significantly lower in thoracal epidural analgesia group than spinal analgesia group at 6., 12., 24., 48. hours (p=0.036; p=0.002; p=0.002; p=0.003 respectively). Early mobilizated patients oral intake and first flatus time were much earlier.

Conclusions: Positive qualitative clinical impacts were determined on patients. Controlling pain at postoperative period is an important part of enhanced recovery programmes. Our protocol was about colorectal surgeries in our hospital but we believe that enhanced recovery protocols should be used for different type of surgeries widespread

Keywords: Colorectal surgeries, enhanced recovery, pain, spinal, thoracal epidural

Öz

Amaç: ERAS (Enhanced Recovery After Surgery) programları gün geçtikçe daha da önem kazanmaktadır. Araştırmacılar bu tür programları cerrahi merkezlerinin şartlarına uygun olarak oluşturmalıdır. Bu çalışmada ameliyat sonrası hızlandırılmış iyileşme protokolü üzerine kendi deneyimlerimizi sunmayı amaçladık.

Gereç ve Yöntem: Hastaların mental ve fiziksel durumlarını optimize etme amaçlı ameliyattan önce hasta ve yakınlarıyla operasyon hakkında bilgilendirici görüşmeler ayarlandı ve hastalara yürüme ve nefes egzersizleri yaptırıldı. Operasyondan sonra hastalar cerrahi yoğun bakım ünitesinde ve cerrahi servisinde takip edildi. Hastaların ağrı skorları ve klinik durumları kayıt edildi.

Sonuç: Bu retrospektif çalışmaya 65 hasta dahil edildi. Numerical Rating Scale (NRS) skorları epidural analjezi alan grupta spinal analjezi alan gruba göre 6., 12., 24., 48. saatlerde anlamlı derecede düşük bulundu (sırasıyla p=0,036; p=0,002; p=0,002; p=0,003). Erken mobilize edilen hastalarda oral alım ve gaz çıkarmanın daha erken başladığı görüldü.

Tartışma: Hastalar üzerinde pozitif kalitatif klinik etkiler gözlemlendi. Postoperatif periyotta ağrı kontrolü hızlandırılmış iyileşme programlarının önemli bir bileşendir. Bizim uyguladığımız protokol hastanemizdeki kolorektal cerrahiler hakkındaydı fakat biz hızlandırılmış iyileşme protokollerinin farklı cerrahilerde de yaygın bir biçimde kullanılması gerektiğine inanmaktayız.

Anahtar Kelimeler: Kolorektal cerrahiler, hızlandırılmış iyileşme, ağrı, spinal analjezi, torakal epidural analjezi

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INTRODUCTION

Colorectal cancers are one of the leading causes of cancer-related mortality and morbidity with an incidence of 23.1 in 100.000 male and 14.4 100.000 female population in Turkey.[1] Colorectal cancer predominately affects the older population in whom the geriatric comorbidities and physiological changes might complicate the surgical outcome. Elective colorectal surgeries are also the reason of perioperative morbidity.[2] Perioperative management is an important denominator to indicate the high-quality health care by decreasing the postoperative morbidity in these patients.[3]

Perioperative medicine is a developing field where a multidisciplinary approach to perioperative period is ensued by surgeons, anesthesists and internists. The main purpose of the discipline is to optimize the physiological condition of the high-risk patients for the operation. By this way, patients get better and turn to normal life faster, complication rates decrease nearly by 50% and the length of hospital stay is significantly shorter.[4,5]

Many studies have been conducted in developed countries on perioperative medicine and various evidence-based protocols have been developed recently. Enhanced Recovery After Surgery (ERAS) protocol, a modification of the perioperative medicine concept of Henrik Kehlet, a Danish surgeon,[6] and CHEERS DREAM (Carbohydrate loaded, Hydrated, Euvolemic, Eunatremic, Ready to Start, DRinking, EAting, Mobilising) are among others.[7]

The ERAS protocol consists of common items such as providing minimal fasting time, postoperative analgesia, no routine bowel clearance, early mobilization and early feeding.[8] They are independent of each other, but are directed at the same target, reducing surgical stress and optimizing the patient physically and mentally.[9] Since the end point is the result of the cumulative effect of each theme, it is difficult to assign the impact of any single of the themes. We have been utilizing a perioperative care protocol, mainly based on the ERAS protocol in patients who underwent colorectal surgery in Tokat Gaziosmanpaşa University Hospital since 2014. In this study, we aimed to compare the effect of spinal and thoracic epidural analgesia on postoperative pain in patients who underwent ERAS protocol after colorectal surgery.

MATERIAL AND METHOD

This study was performed in Gaziosmanpaşa University Medical Faculty Hospital. Before the study commenced, the study was carried out with the permission of Gaziosmanpaşa University Medical Faculty Clinical Researches Ethics Committee (Date: 26.12.2017, Decision No: 15-KAEK-093). A perioperative team was established since 2014 with the participation of a surgical oncologist (IO), internist (SU) and anesthesiologist (MS) to pursue the aim of providing a standart care for surgical oncology patients. A perioperative checklist protocol for colorectal surgery was introduced in general surgery ward. The protocol covered the preoperative preparation of the patient and postoperative follow-up instructions on daily basis adapted from ERAS protocol. Only the patients with colorectal cancer aged between 18 and 81 years, with ASA score I-IV according to the American Society of Anesthesiologists (ASA) classification who were scheduled for curative surgery were included to the study. The ones who had mental problems (like Alzheimer's diseases), disoriented (i.e. with delirium), were operated under emergency conditions and with non-curative surgery and unwilling to enroll to the study were excluded. The study period comprised the time between 2014 and 2017. The data were collected prospectively and evaluated retrospectively.

The patients with colorectal cancer was discussed in multidisciplinary tumor meeting. After the decision of surgery, the patients were evaluated preoperatively by a periopearative team comprising a surgical oncologist, an internist and anesthesiologist. The patients planned to undergo colorectal surgery were evaluated by the same anesthesiologist and the internal medicine specialist in the perioperative period to minimize the bias. The time between the first diagnosis and operation was practiced to educate and train the patients about perioperative management. The educations were performed in a face to face manner. For example, the use of incentive spirometer (6 times the daily for 5 minutes) was taught and then encouraged for spirometer study until the operation day. Walking (at least 3 km/day on a horizontal level) exercises were suggested and the patients were encouraged to quit smoking if they smoke. All patients were informed about the pain management postoperatively and taught Numerical Rating Scale (NRS) for the evaluation of the postoperative pain severity.

On the morning of surgery, patients were taken to the operating table where electrocardiography (ECG), non-invasive arterial blood pressure and venipuncture were performed. The choice of regional anesthesia either spinal or thoracal epidural catheterization was left to the discretion of the anesthesist. For spinal anesthesia, Morphine 0.3 mg intrathecal and bupivacaine 5 mg were administered in patients with spinal analgesia. Five minutes after an intervention, a pinprick test was performed on the lower extremities to identify whether the drug reached the subarachnoid space or not. In another group of patients, thoracal epidural catheters were placed at T7-T12 level. Before the patient was anesthetized, 10 ml of 0.125% bupivacaine was administered through the thoracic epidural catheter, and then a pinprick test was performed on the lower extremities to assess whether the drug was in epidural space or not. After the pinprick test, the mixture we prepared for postoperative analgesia was given from the thoracic epidural catheter at an infusion rate of 0.1 ml/kg/h (a total of 100 ml including the mixture of bupivacaine 0.125% and morphine and saline 50 mcg/ml). fentanyl 2 mcg/kg, thiopental 5 mg/kg, rocuronium 0.6 mg/kg intravenous (IV) was administered to all patients during anesthesia induction. Anesthesia was maintained with 50% of O_2, air, and sevoflurane. Patients were heated with a heater blanket. Tramadol 100 mg IV and paracetamol 1 gr IV were administered half an hour before the end of the operation. After

extubation, the patients were monitored in surgical intensive care for 24 hours. The first mobilization time after the operation was recorded for all patients. Analgesic drugs were administered according to our postoperative pain protocol. The pain protocol included paracetamol 1 gr IV three times a day and tramadol 100 mg IV three times a day, for the first day or until an oral intake. Pain severity was assessed with the Numerical Rating Scale (NRS) (1=mildest pain, 10=the most severe pain). If NRS is four or above, additional tramadol 100 mg was administered, and if NRS did not decrease under four, additional paracetamol 1 gr IV was administered. After the first day, paracetamol 1 gr oral three times a day and dexketoprofen 25 mg orally twice a day were administered to patients if oral intake was possible.

Patients' respiratory rate, heart rate, pain severity (NRS), blood pressure, first flatus time, first defecation time, first oral solid food intake time, headache (if there was or not), and other complications (wound infection, anastomosis leak) and time of discharge toward were recorded by examining patient files.

The distributions of the data were analyzed by one sample Kolmogorov-Smirnov test. Numerical data were shown as mean and standard deviation; categorical data were shown as frequency and percentage. The Mann Whitney-U test was used to compare the mean values of the numerical data while the Chi-square test was used for the categorical data. Linear regression analysis was used to investigate the effect of other possible markers on a variable. The relationship between two variables were analyzed by Pearson correlation analysis (r). We analyzed all the data by the Statistical Package for Social Sciences 20.0 (SPSS Inc. Chicago, IL) program. Statistical significance for all analysis was set to $p<0.05$.

RESULTS

Demographic and Clinical Features of the Patients

Of the 65 patients enrolled in this study, 34 were male (52.3%) and 31 were female (47.7%). 44 patients (67.7%) were operated for colon cancer while 21 patients (32.3%) for rectum cancer. 28 patients (43.1%) underwent open surgery while 37 patients (56.9%) were operated by laparoscopic surgery. Four patients (6.2%) had the ASA physical status of I, 25 (38.5%) as II, 35 (53.8%) as III and one patient (1.5%) as IV.

Five patients (7.7%) were the smoker, while 60 patients (92.3%) were the non- smoker. Demographic characteristics of the patients and the type of cancers were presented in **Table 1** and **Table 2**, respectively. Body Mass Index (BMI) was 27.41±5.17 in the females and 25.33±4.34 in the males.

Table 1. Patient demographics

	Female	Min-Max	Male	Min-Max
Number of patients	31 (47.7%)	-	34 (52.3%)	-
Mean age	60.74	(23-83)	62.18	(37-91)
Mean height (cm)	157.81	(149-167)	170.59	(150-182)
Mean weight (kg)	67.97	(48-95)	74.21	(43-104)
Mean BMI (kg/m²)	27.41	(17.93-36.98)	25.33	(16.80-34.75)

Table 2. Cancer types in female and male gender

Type of cancer	Female		Male		Total
	number	%	number	%	Number
Colon cancer	22	71	22	64.7	44
Rectum cancer	9	29	12	35.3	21
Total	31	100	34	100	65

Perioperative Features of the Patients

Only 15 patients (13.8%) had nausea at the 6th hour of postoperative period. In the postoperative 48th hour, bowel sounds were found to be normoactive in 32 patients (49.2%), hypoactive in 22 patients (33.8%), hyperactive in three patients (4.6%) and 8 patients (12.3%) had no bowel sounds.

The mean postoperative mobilization time of the patients was 22.53±11.52. Between early mobilization time, and first flatus time there was a positive weak correlation ($\rho=0.321$, $p=0.015$). Additionally, mobilization time and first oral solid intake time had a positive weak correlation ($\rho=0.304$, $p=0.024$)

Three patients had postoperative wound infection and three had a postoperative headache. Mean discharge time was 198.19±103.1 hours. Respiration rate, mean artery pressure, pulse per minute and NRS scores (1st, 2nd, 6th, 12th, 24th, 36th, 48th hours) recorded in the postoperative follow-ups are shown at **Figure 1. Table 3** demonstrates the oral solid food intake, float and defecation time, mobilization time (the first time of observation at the postoperative period) and discharge time.

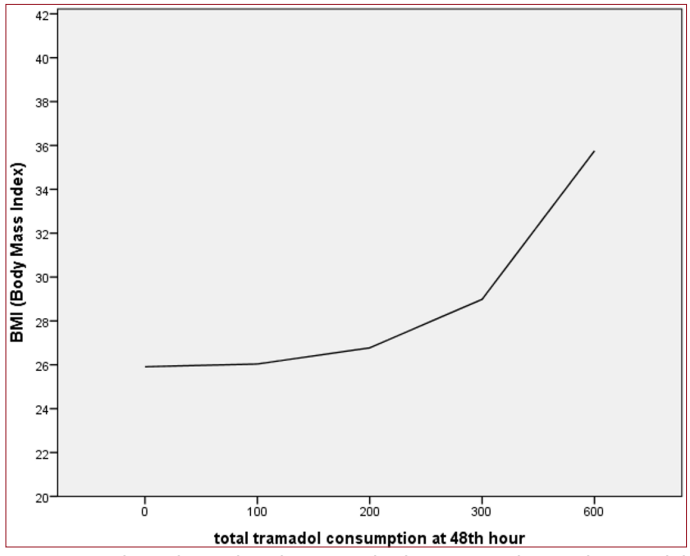

Figure 1. The relationship between body mass index and tramadol consumption

Tablo 3. Postoperative follow-ups

	Number of patients (n)	Mean±SD (hour)	Min-Max (hour)
Postoperative oral solid intake time	56	75.77 (±35.186)	25-192
Postoperative flatus time	65	36.89 (±18.958)	8-96
Postoperative stooling time	63	57.25 (±27.283)	12-120
Postoperative mobilization time	57	22.53 (±11.523)	8-72
Discharge time	62	198.1 (±103.188)	66-552

Postoperative Pain and Associated Factors

The type of surgery (Laparoscopic or open surgery) had no effect on postoperative pain severity. (β=-.235, p=0,059). Furthermore, the total consumption of paracetamol and tramadol during 48 hours after the surgery didn't differ significantly between laparoscopic and open surgery (p=0.894; p=0.113, respectively).

Pain severity measured at 1st, 2nd, 6th, 12th, 24th, 36th, 48th hours postoperatively between males and females revealed no significant difference (p=0.240; p=0.472; p=0.530; p=0.880; p=0.317; p=0.275; p=0.428, respectively). Total paracetamol and tramadol use at 48th hours were also not significantly different between males and females (p=0.114; p=0.925, respectively). There was a positive weak significant correlation between BMI and total tramadol consumption (ρ=0.247, p=0.047; **Figure 2**).

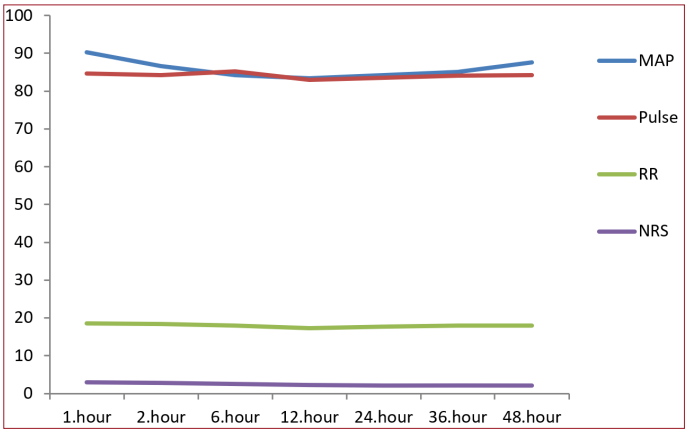

Figure 2. Postoperative follow-ups.
MAP: Mean Artery Pressure, RR: Respiration Rate, NRS: Numerical Rating Scale

Thoracal Epidural vs. Spinal Analgesia

47 patients (66.2%) were administered spinal morphine while in 18 patients (33.8%) thoracal epidural catheter was inserted. Comparisons of age, gender, tumor type, operation type and discharge time in these groups are shown in **Table 4**. Patients with thoracal epidural analgesia were found to have significantly lower NRS scores at postoperative 6th, 12th, 24th, 48th hours compared to those with spinal analgesia (p=0.036; p=0.002; p=0.002; p=0.003, respectively). Comparison of NRS scores in thoracal epidural analgesia and spinal analgesia is shown in **Table 5**. Postoperative nausea was not significantly different between thoracal and spinal analgesia group in the postoperative first hour (p=0.376).

Table 4. Comparison of age, gender, tumor type, operation type and discharge time in thoracal epidural and spinal analgesia

Parameters	Spinal analgesia	Epidural analgesia	p value
Age	60.60±13.180	63.83±10.662	p=0.329
Gender	Female: 25 Male: 22	Female: 6 Male: 12	p=0.151
Tumor type	Colon tumor: 32 Rectum tumor: 15	Colon tumor: 12 Rectum tumor: 6	P=0.913
Operation type	Open surgery: 22 Laparoscopy: 25	Open surgery: 6 Laparoscopy: 12	p=0.326
Discharge time	204.84±110.77	180.59±79.97	P=0.624

Table 5. Difference of NRS scores in thoracal epidural analgesia and spinal analgesia

Time (hour)	Thoracal Epidural Analgesia		Spinal Analgesia		p value
	Mean NRS	Standart Deviation	Mean NRS	Standart Deviation	
1. hour	2.44	1.381	3.17	1.434	0.079
2. hour	2.22	1.263	2.96	1.285	0.058
6. hour	2.11	1.079	2.62	0.945	0.036
12. hour	1.61	0.850	2.53	1.080	0.002
24. hour	1.56	0.616	2.34	1.147	0.002
36. hour	1.78	0.808	2.24	0.786	0.068
48. hour	1.61	0.778	2.36	0.919	0.003
Total number of patients (n)	18		47		

DISCUSSION

This study, which we aimed to present our experience about colorectal cancers, found that thoracal epidural analgesia is better than spinal analgesia. However, both techniques were successfully to control pain at the postoperative period (in all patients the NRS scores were under four). Furthermore, there was no statistical difference in discharge times between these techniques. The study also revealed that first flatus time and first oral solid food intake seemed to be early in patients with early mobilization.

The protocol we use in colorectal surgeries in our hospital is influenced by the ERAS protocol and one of the first steps of our protocol is informing the patients and their relatives preoperatively. The indication of surgery by Cancer Surgery Clinic and their relatives are consulted to Anesthesiology and Internal Medicine doctors a week before the operation to optimize their conditions and receive information about the treatment of their comorbidities.

Pain, one of the most important components of the symptom cluster in cancer patients,[10] is known to have an impact on patients both physiologically and emotionally. One of the main targets of ERAS is postoperative analgesia.[11] Postoperative pain is an important problem that increases the morbidity of a patient in major abdominal surgeries. Fortunately, there are various analgesia methods that can be used in postoperative analgesia. For example; spinal, thoracal epidural and intravenous methods can be used either alone or combined in lower abdominal surgeries. In a study evaluating postoperative analgesia methods in colorectal cancer operations, it has been shown that spinal and thoracal epidural morphine provide better results in pain palliation than IV morphine.[12] In another study patients undergoing thoracal epidural morphine had lower pain scores than the other analgesia methods.[13] Spinal morphine is simple in practice, significantly reduces the intravenous opioid consumption and found to be cost-effective than epidural analgesia or peripheral nerve blocks.[14] Effective analgesic treatment in the postoperative period provides rapid healing as well as helping to reduce complications such as sleeping disorders or increased stress response.[4,12] Besides, effective postoperative

pain management may lead to early patient mobilization, early oral intake and reduced weight loss.[15] Another crucial goal in the management of postoperative analgesia is the ability to control pain with oral analgesics, which is important for the discharge of the patient.[5,6]

One of the well-known complications of spinal morphine is a postspinal headache and the frequency is about 0.1% and 36%.[16] A headache occurs due to cerebrospinal fluid (CSF) leak at the injection site and typically begins within the first 48 hours after intervention.[17] Two of our patients had a postspinal headache (4.16%). A postspinal headache can seriously impair the quality of life of the patient. This is an important point that anesthesia doctors should take into account for postoperative pain management.

Furthermore, postoperative nausea rates at 24th and 48th hours were 13.9% (n=58) and 8.6% (n=58), respectively. In a study by Barclay et al. 12% of the patients had nausea on the first postoperative day and 20-25% on the 1st-4th postoperative days.[18] There are several studies evaluating postoperative nausea and vomiting, however factors such as surgical procedure, comorbidities, surgery type etc. may lead to difficulties making comparison among the outcomes of these studies.[18]

Prolonged immobilization period leads to loss of muscle strength and muscle mass.[6] Another component of our protocol was the early mobilization of patients, and the physical capacities of the patients were tried to be optimized by preoperative walking. Likewise, the patients were tried to be mobilized at the earliest possible time after the operations. Early mobilization, which reduces the incidence of deep vein thrombosis (DVT), plays an important role in enabling the patients to return to their daily routine.[19] The earlier the mobilization starts, the less constipation develops. Early mobilization also decreases pulmonary complications like atelectasis in the postoperative period.[4,20,21] For these reasons, its role is significant in patients' returning to daily life. In our study, we've seen that early mobilization results in earlier flatus and lower constipation rates.

The stimulation of intestinal motility in the postoperative period is important for early enteral intake. A study by Yamada et al. on gastric surgery indicated that the ERAS group had earlier flatus and stooling and earlier oral intake than the control group.[9] Bowel sounds of nearly half of our patients were either hypoactive or absent. At the 48th hour postoperatively, 22 patients' (12 for spinal analgesia and 10 for thoracal epidural analgesia) bowel sounds were hypoactive and in 8 patients (5 for spinal analgesia and 3 for thoracal epidural analgesia) there were no bowel sounds, and analgesic use of morphine might be related to these results.

The ERAS protocol, prepared for colorectal cancers, has begun to gain more supporters over time. Nowadays, there are different protocols developed for various surgical branches, not only for colorectal surgeries.[22-24] Morbidity and mortality rates decreased in colorectal surgeries, which are one of the major abdominal surgical procedures on account of the application of the ERAS protocol.[7,25] The purpose of the ERAS protocol is to prepare the preoperative patients physically and psychologically for the operation; to prevent complications that may occur during and after the operation; to manage the complications in the best way, if developed any; and to follow patients with common protocols in the guideline of evidence-based medicine so as to make them return to everyday life in the postoperative period as soon as possible.

One of the most important points of this protocol is to follow up patients with the principles of multidisciplinary and interprofessional approach.[24,25]

Unlike the classical approach, anesthesists task starts preoperatively as soon as the patient has an indication for surgery. They manage the patients anesthesia in the operating room, follow up them to prevent complications until they are discharged postoperatively. At home after discharge, they continue to maintain perioperative care, especially pain treatment if necessary.

The term "perioperative medicine" is a specialty at some universities in developed countries such as Canada, Australia, United Kingdom, and the United States in the world. As a result of the major studies done in this new area, clinical improvements are observed in patients and hospital costs are seriously reduced.

Our study has some limitations. As well as being a monocentric study and the number of patients included in the study was relatively small. We followed up our patients for pain palliation and clinical recovery rather than cost-effectiveness. If our study involved the cost-effectiveness of the patients, it could have been described as being more comprehensive.

CONCLUSIONS

In this study performed in a university hospital, the effects of our perioperative medicine protocol modified from the ERAS protocol on the patients who underwent colorectal surgery were investigated. The fact that the anesthetic methods have no effect on the discharge time and the VAS scores are below 4 in both methods suggests that both spinal and thoracal epidural methods can be used in terms of postoperative analgesia. The positive contribution of this protocol is seen qualitatively on patients in our clinic, however, we suggest that multicentred, prospective, and more comprehensive studies involving the larger amount of patients are needed in order to objectively evaluate the outcomes of the ERAS protocol.

ETHICAL DECLARATIONS

Ethics Committee Approval: The study was carried out with the permission of Gaziosmanpaşa University Medical Faculty Clinical Researches Ethics Committee (Date: 26.12.2017, Decision No: 15-KAEK-093).

Informed Consent: Because the study was designed retrospectively, no written informed consent form was obtained from patients.

Referee Evaluation Process: Externally peer-reviewed.

Conflict of Interest Statement: The authors have no conflicts of interest to declare.

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

REFERENCES

1. İlter H. Keskinkılıç B. 2015 Yılı İlk 10 Kanser. Türkiye Kanser İstatistikleri 2015, Halk Sağlığı Genel Müdürlüğü, Sağlık Bakanlığı, Ankara:2018.
2. Mamidanna R, Burns EM, Bottle A, et al. Reduced risk of medical morbidity and mortality in patients selected for laparoscopic colorectal resection in England:a population-based study. Arch Surg 2012;147(3):219-27.
3. Casanova MPR. Time to change the objectives hemodynamic to guide the perioperative fluid management? Glob J Perioperative Med 2017;1(1):1-3.
4. Fawcett WJ, Mythen MG, Scott MJP. Enhanced recovery:more than just reducing length of stay? Br J Anaesth 2012;109(5):671-4.
5. Bozkırlı BO, Gündoğdu RH, Ersoy PE, Akbaba S, Temel H, Sayın T. Did the ERAS protocol affect our results in colorectal surgery? Ulus Cerrahi Derg 2012;28(3):149-52.
6. Ersoy E, Gündoğdu H. Enhanced recovery after surgery. Ulus Cerrahi Derg 2007;23(1):35-40.
7. Levy N, Mills P, Mythen M. Is the pursuit of dreaming (drinking, eating and mobilising) the ultimate goal of anaesthesia? Anaesthesia 2016;71:1008-12.
8. Wind J, Hofland J, Benedikt P, et al. Perioperative strategy in colonic surgery:LAparoscopy and/or FAst track multimodal management versus standart care (LAFA trial). BMC Surg 2006;6:16.
9. Yamada T, Hayashi T, Haruhiko C, et al. Usefullness of enhanced recovery after surgery protocol as compared with conventional perioperative care in gastric surgery. Gastric Cancer 2012;15:34-41.
10. Süren M, Doğru S, Önder Y, et al. The evaluation of symptom clusters in patients with the diagnosis of terminal stage cancer. Agri 2015;27(1):12-7.
11. Levy BF, Scott MJP, Fawcett WJ, Day A, Rockall TA. Optimizing patient outcomes in laparoscopic surgery. Colorectal Dis 2011;13:8-11.
12. Ayvaz H, Düger C, Bulut F, et al. Effects of pre-emptive intravenous, spinal and epidural morphine on early postoperative analgesia and stress response. Cumhuriyet Med J 2013;35:363-72.
13. Levy BF, Scott MJ, Fawcett W, Fry C, Rockall TA. Randomized clinical trial of epidural, spinal or patient-controlled analgesia for patients undergoing laparoscopic colorectal surgery. Br J Surg 2011;98(8):1068-78.
14. Fares KM, Mohamed SA, Abdel-Ghaffar HS. High dose intratecal morphine for major abdominal cancer surgery:a prospective double-blind, dose-finding clinical study. Pain Physician 2014;17(3):255-64.
15. Carli F, Baldini G. Perioperative Pain Management & Enhanced Outcomes. In:Butterworth JF, David MC, Wasnick JD (editors). Morgan&Mikhail's Clinical Anesthesiology. 5th ed. McGraw-Hill;2013. pp.1087-105
16. Jabbari A, Alijanpour E, Mir M, Hashem NB, Rabiea SM, Rupani MA. Postspinal puncture headache, and old problem and new concepts:review of articles about predisposing factors. Caspian J Intern Med 2013;4(1):595-602
17. Turnbull DK, Shepherd DB. Post-dural puncture headache:pathogenesis, prevention and treatment. Br J Anaesth 2003;91(5):718-29.
18. Barclay KL, Zhu YY, Tacey MA. Nausea, vomiting and return of bowel function after colorectal surgery. ANZ J Surg 2015;85:823-8.
19. Pearse EO, Caldwell BF, Lockwood RJ, Hollard J. Early mobilisation after conventional knee replacement may reduce the risk of postoperative venous thromboembolism. J Bone Joint Surg Br 2007;89:316-22
20. Muehling BM, Halter GL, Schelzig H et al. Reduction of postoperative pulmonary complications after lung surgery using a fast track clinical pathway. Eur J Cardiothorac Surg 2008;34:174-80.
21. Huang J. Enhanced recovery after surgery (ERAS) protocols and perioperative lung protection. J Anesth Perioper Med 2014;1:50-6.
22. Bugada, D, Bellini V, Fanelli A et al. Future perspectives of ERAS:a narrative review on the new applications of an established approach. Surg Res Pract 2016;Article ID:3561249.
23. Kelliher L, Jones C, Day A. Optimising perioperative patient care:'enhanced recovery' following colorectal surgery. J Perioper Prac 2011;21(7):239-43.
24. Kelliher LJS, Jones CN, Fawcett WJ. Enhanced recovery for gastrointestinal surgery. BJA Educ 2015;15 (6):305-10.
25. Bayar ÖÖ, Bademci R, Sözener U, Tüzüner A, Karayalçın K. Major karaciğer rezeksiyonunda ERAS protokolü. Okmeydanı Tıp Dergisi 2013;29(3):135-42.

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Original Article / Orijinal Araştırma

Effect of Telestroke Practices on Short-Term Mortality in Ischemic Stroke Patients

Telestroke Uygulamalarının İskemik İnme Hastalarında Kısa Süreli Mortalite Üzerine Etkisi

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Abstract

Aim: It was aimed to compare the year we started using telestroke application in ischemic stroke patients with the previous year in which we did not use telestroke application in terms of patient prognosis.

Material and Method: Stroke patients presenting for whom WhatsApp was used for telestroke purposes, were evaluated as the telestroke group. The previous year it was a pre-telestroke group. In this prospectively planned study, the pre-telestroke and telestroke groups were compared in terms of age, gender, chronic disease characteristics, onset of symptoms, aspirin, warfarinuse, door-to-CT, door-to-consultation and door-to-treatment times, prognosis, and 30-day mortality.

Results: A total of 727 patients clinically and radiologically confirmed to have ischemic stroke were included in the study. There were 252(34.6%) patients in the pre-telestroke group and 475 (65,4%) patients in the telestroke group. Both rtPA and thrombectomy treatment were significantly higher in the telestroke group (p<0.001). In the first 24-hour evaluation, the rate of discharge increased and hospital admission and mortality decreased in the telestroke group (p<0.001). There was no statistically significant difference between the groups in terms of poor prognosis and 30-day mortality (p=0.470 and p=0.625, respectively).

Conclusion: Telestroke practices not only provide access to there levant clinical branch for early consultation but also facilitate time lytreatment thus leading to improvement in prognosis.

Keywords: Telestroke, ischemicstroke, rtPA, thrombectomy, WhatsApp application

Öz

Amaç: Bu çalışmada, telestroke uygulamalarının, bu uygulamanın kullanıldığı bir dönem öncesi ve kullanım sırasında başvuran hastaların verilerini karşılaştırarak hasta prognozu ve mortalite üzerindeki etkisini değerlendirmeyi amaçladık.

Gereç ve Yöntem: WhatsApp uygulaması kullanılmayan dönem pre-telestroke olarak adlandırıldı ve WhatsApp uygulaması kullanılan grup telestroke grubu olarak adlandırıldı. Prospektif olarak planlanan bu çalışmada, telestroke öncesi ve telestroke grupları yaş, cinsiyet, kronik hastalık özellikleri, semptomların başlangıcı, aspirin, varfarin kullanımı, kapı-CT, kapı-konsültasyon ve kapı-tedavi süreleri, prognoz ve 30 günlük mortalite açısından karşılaştırıldı.

Bulgular: Klinik ve radyolojik olarak doğrulanan 727 iskemik stroke hastası çalışmaya dahil edildi. Pre-telestroke grubuna ait hasta sayısı 252 (34,6%) olup, telestroke grubuna ait hasta sayısı ise 475 (65,4%) idi. Telestroke uygulaması kullanılan grupta, kullanılmayan gruba göre hem r-tPA hem de trombektomi tedavisi anlamlı olarak daha yüksek oranda idi (p<0,001). İlk 24 saatlik değerlendirmede telestroke grubunda taburculuk oranı artmış ve hastane servis yatışı ve mortalite azalmıştır (p<0,001). Kötü prognoz ve 30 günlük mortalite açısından gruplar arasında istatistiksel olarak anlamlı fark yoktu (sırasıyla p=0.470; p=0,625).

Sonuç: Tele-stroke uygulamaları, erken konsültasyonla ilgili branşa veya görüntüleme sistemlerine ulaşımı sağlamakla kalmaz; çoğunlukla tedavinin zamanında ve efektif yapılmasına, erken taburculuğa dolayısı ile de prognozda iyileşmeye neden olur.

Anahtar kelimeler: Telestroke, iskemikstroke, r-tPA, trombektomi, WhatsApp uygulaması

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INTRODUCTION

Stroke is a clinical condition that occurs due to the sudden onset of focal or general neurological dysfunction accompanied by circulatory disturbance lasting more than 24 hours.[1] After the stroke diagnosis is made using anamnesis, physical examination, and advanced imaging, the primary goal in the treatment process is an anti-ischemic protocol after providing vital functions via airway, respiration, and circulation routes.

As the main thrombolytic agent of anti-ischemic therapy, tissue plasminogen activator (rtPA) acts by inhibiting the conversion of plasminogen to plasmin. The rtPA should be given within the first 4.5 hours, which is the effective time from the onset of stroke.[2,3] Thrombectomy is the main treatment option within the first 24 hours in patients that do not present to hospital during the first 4.5 hours or in those with contraindications to rtPA.[4]

The early application of rtPA treatment is necessary in terms of effectiveness, and telestroke practices have been introduced to both prevent delaying treatment due to environmental and/or social reasons and to shorten the door-needle time(DTN) which is considered important in terms of not delaying targeted treatment due to patient transport.[2,5] For this purpose, the WhatsApp application is being used in developing countries or those that cannot access developed communication tools due to economic reasons. Telestroke is considered an ideal system for sharing data, pictures, and videos, and provides easy access in a short amount of time.[6,7]

Aim

This study aimed to evaluate the effect of telestroke practices on patient prognosis and mortality by comparing the data of patients that presented before and during a period when this application was in use.

MATERIAL AND METHOD

Study design

This comprehensive observational study was conducted in the Emergency Medicine Clinic of Ümraniye Education and Research Hospital, which accepts an average of 438,000 patients per year. An emergency medicine specialist evaluates the patients presenting to our hospital with stroke symptoms, and those that are considered to have a clinical stroke are transferred to the radiology unit for imaging. During this transfer, the emergency medicine specialist shares the demographic data, clinical state, and symptom onset time in a WhatsApp group, in which the stroke team members of the hospital—emergency medicine specialists, neuroradiologists, and neurologists—are registered. The stroke team evaluates the patient's radiological images through the PACS system. After radiological imaging, patients for whom the stroke team has made rtPA treatment decisions are hospitalized in the stoke intensive care unit (ICU) or other departments, and thrombolytic therapy is started. Patients planning to undergo a thrombectomy are transferred to the thrombectomy center located 12 km from the hospital and admitted back to the stroke ICU of our hospital after this procedure.

In our hospital, the telestroke protocol was implemented on October 1, 2018. In this study, using the hospital computer-based data system, patients with an ischemic stroke admitted between October 1, 2017, and October 1, 2018, were retrospectively evaluated as the pre-telestroke group. After the implementation of the telestroke protocol, patients presenting with an ischemic stroke between October 1, 2018, and October 1, 2019, were prospectively followed-up on by the researchers and evaluated as the telestroke group. The data of these two groups were compared in terms of short-term mortality and outcome.

Study Population and Data Collection

All patients presenting to our clinic with a manifestation of stroke were evaluated. Of the patients with a pre-diagnosis of ischemic stroke, those diagnosed via brain CT with a hemorrhagic stroke or other central pathologies (masses and spontaneous subarachnoid hemorrhage), those with metabolic diseases (diabetic ketoacidosis, hyperosmolar nonketotic coma, hypernatremia, etc.), and trauma patients were excluded. Patients who were referred to the ICUs of other hospitals due to bed occupancy were also excluded from the study since their mortality and outcome information could not be obtained. Finally, the study included patients over the age of 18 years that were diagnosed with ischemic stroke based on CT, CT-angiography, and MR diffusion where necessary, after receiving their consent or that of their first-degree relatives.

This prospectively planned study compared the pre-telestroke and telestroke groups in terms of age, gender, chronic disease characteristics, onset of symptoms, aspirin use, warfarin use, door-to-CT, door-to-consultation and door-to-treatment times, prognosis, and 30-day mortality. In relation to prognosis, the patients with good/poor clinical outcome were identified and those discharged after admission to the emergency department (ED) or another hospital service were considered to have a 'good clinical outcome,' while the cases that still required intensive care at the time the study was terminated were evaluated as having a 'poor clinical outcome.'

The primary outcome was 30-day all-cause mortality after ED admission. The secondary outcomes were hospitalization or admission to ICU from ED, discharge from ED, and mortality in ED.

Statistical Analysis

All statistical analyses were performed using SPSS version 16.0 for Windows (SPSS Inc, Chicago, IL, USA). The normality analysis of continuous data was undertaken

using the Kolmogorov-Smirnov test. Categorical data were presented as n (%) and compared using the chi-squared test. Quantitative variables were presented as median and interquartile range (IQR, 25th-75th percentile) and compared between the two groups using the Mann-Whitney test and Student's t-test according to the normality of data distribution. A p-value of less than 0.05 was considered statistically significant.

Ethics

For the study, ethical approval was obtained from the local clinical research ethics committee of our hospital (date: March 18, 2020, number: B.10.1.TKH.4.34.H.GP.0.01/62). Patients with a sufficient level of consciousness, or the relatives of patients who did not have sufficient consciousness, were invited to participate in the study. The patients or their relatives who decided to participate in the study signed an informed consent form.

RESULTS

Of the 871 patients that presented to our clinic with a stroke, 144 were excluded due to cranial or metabolic pathologies other than ischemia, incomplete data, or lack of consent. A total of 727 ischemic stroke patients with clinical and radiological confirmation were included in the study (**Figure 1**).

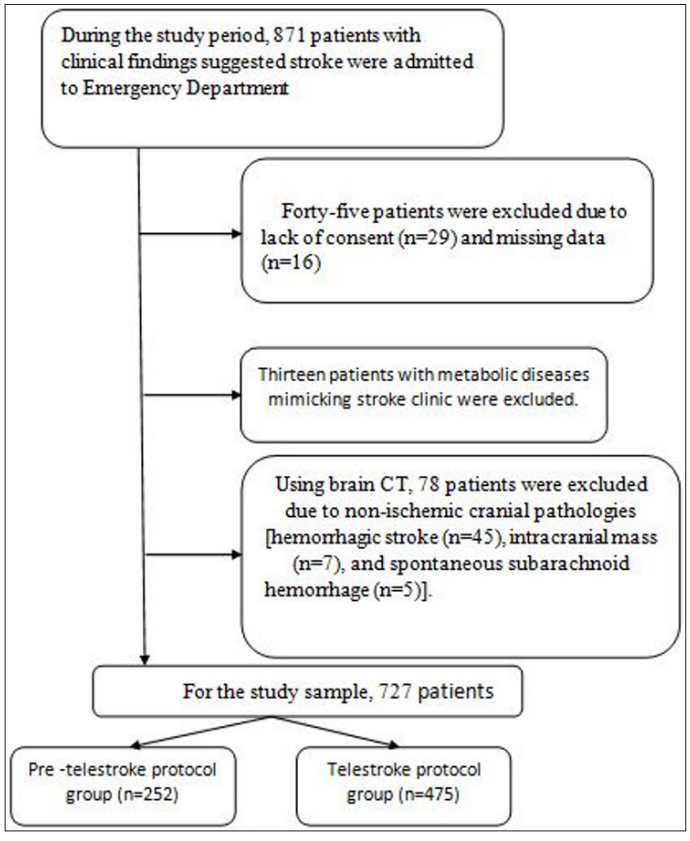

Figure 1. Numerical distribution of the patients included in and excluded from the study

The mean age of the patients was 66±12.51 years, and 377 (51.8%) were male. While 599 (82.4%) of the patients had a good clinical outcome, 128 (17.6%) had a poor clinical outcome. A CT scan was performed in 98.9% of the patients and diffusion MRI in 86.9%. In 66.9% of the patients, a CT angiography was undertaken to evaluate vascular occlusion.

Table 1 displays the basic characteristics, comorbidities, medication, and clinical characteristics of the patients belonging to both groups, as well as the time to access treatment, prognosis, and mortality. There were 252 (34.6%) patients in the pre-telestroke group and 475 (65.4%) in the telestroke group. While 37.3% of the patients in the pre-telestroke group presented within the first 4.5 hours of their onset of symptoms, 64.4% in the telestroke group visited the hospital within the first 4.5 hours. Meanwhile, 15.4% of the patients in the telestroke group were discharged within 24 hours. The discharge rate in the pre-telestroke group was 1.2% (p<0.001) The median door-to-CT time was similar in both groups with no statistically significant difference [15 (10) and 15 (8), respectively, p=0.409]. The mean door-to-rtPA times of the patients in both groups were similar, and there was no significant difference between them in terms of the time to access treatment (95.83±46.52 and 88.75±32.43, respectively, p=0.627). The mean door-to-thrombectomy time was 107.86±9.94 minutes in the pre-telestroke group and 145.83±50.5 minutes in the telestroke group (p<0.001).

Table 2 portrays the relationship between the prognosis and mortality of the patients who received rtPA or thrombectomy treatment. Door-to-consultation time in patients who received rtPA was 20 (10-97), and 36 (10-1647) (p<0.001) in patients who did not receive rtPA. Door-to-consultation time in patients who received a thrombectomy was 26 (10-180), and 35 (10-1647) (p=0.002) in patients who did not receive thrombectomy. There was a statistically significant difference in the door-to-consultation time between the patients that received initial treatment and those that did not (rtPA/thrombectomy) (p<0.001).

We evaluated the prognosis and mortality of the telestroke group according to treatment modality in **Table 3**. While 72.6% of patients who received thrombectomy treatment had a poor prognosis, the rate of poor prognosis was 85.4% in patients who did not receive thrombectomy treatment (p=0.004). Conversely, mortality was 20.2% in patients who received thrombectomy treatment, and 8.4% in patients who did not (p=0.001). While there was no statistically significant difference in clinical outcome or mortality between the rtPA and non-rtPA groups, there was a statistically significant difference in these parameters when comparing the patients that underwent thrombectomy as their initial treatment to the non-thrombectomy group (p=0.004). The telestroke group was separately evaluated to determine whether there was a difference in terms of the treatment protocol, and the same results were obtained with the difference table in terms of the treatment protocol of the whole sample; thus, the use of WhatsApp for telestroke was not found superior in relation to the implemented treatment protocol (**Table 3**).

Table 1. Analysis of demographic data according to the study groups and 30-day mortality

	Total	Pre-telestroke	Telestroke	p value	survivor	mortality	p value
Age/years	66±12.51	68.92±14.18	69.70±14.34	0.485	68.93±14.32	73.52±13.33	0.007
Gender				0.466			0.639
Female	350 (48.14%)	126 (50%)	224 (47.2%)		310 (88.6%)	40 (11.4%)	
Male	377 (51.8%)	126 (50%)	251 (52.8%)		338 (89.7)	39 (10.3%)	
Comorbidities							
DM	218 (29.9%)	97 (38.5%)	121 (25.5%)	<0.001	191 (87.6%)	27 (12.4%)	0.390
HT	422 (58%)	161 (63.9%)	261 (54.9%)	0.020	373 (88.4%)	49 (11.6%)	0.448
CAD	233 (32%)	48 (19%)	185 (38.9%)	<0.001	214 (91.8%)	19 (8.2%)	0.107
CKD	42 (5.7%)	17 (6.7%)	25 (5.3%)	0.415	38 (90.5%)	4 (9.5%)	0.773
CVD	174 (23.9%)	51 (20.2%)	123 (25.9%)	0.089	155 (89.1%)	19 (10.9%)	0.979
Drug use history							
Aspirin	235 (32.3%)	71 (28.2%)	164 (34.5%)	0.082	219 (93.2%)	16 (6.8%)	0.015
Warfarin	50 (6.8%)	14 (5.6%)	36 (7.6%)	0.305	45 (90%)	5 (10%)	0.838
Onset of event				<0.001			0.888
first 4.5 hours	400 (55.02%)	94 (37.3%)	306 (64.4%)		356 (89%)	44 (11%)	
>4.5 hours	220 (30.26%)	154 (61.1%)	66 (13.9%)		199 (90.5%)	21 (9.5%)	
Unknown	107 (14.72%)	4 (1.6%)	103 (21.7%)		93 (86.9%)	14 (13.1%)	
Door-to-CT time(min)	14 (10)	15 (10)	15 (8)	0.409	15 (8)	15 (9)	0.368
Door-to-consultation time (min)	55 (79)	97.5 (79)	34 (55)	<0.001	55 (77)	56 (94)	0.846
Door-to-r-tPA time (min)	90.70±36.73	95.83±46.52	88.75±32.43	0.627	89.79±34.8	85.20±11.6	0.520
Door-to-thrombectomy time (min)	149.15±69.65	107.86±9.94	145.83±50.53	<0.001	139.23±50.34	157.89±45.16	0.144
First 24-hour evaluation				<0.001			<0.001
Discharged	76 (10.5%)	3 (1.2%)	73 (15.4%)		76 (100%)		
Admitted to hospital services	549 (75.5%)	218 (86.5)	331 (69.7)		523 (67.1%)	26 (32.9%)	
Admitted to ICU	100 (13.8%)	30 (11.9%)	70 (14.7%)		49 (33.7%)	51 (66.4%)	
Died	2 (0.2)	1 (0.4%)	1 (0.2%)			2 (2.5%)	
Treatment							
RtPA	63 (8.6%)	6 (2.4%)	57 (12%)	<0.001	58 (92.1%)	5 (7.9%)	0.435
Thrombectomy	92 (12.65%)	8 (3.2%)	84 (17.7%)	<0.001	74 (80.4%)	18 (19.6%)	0.004
Poor prognosis	128 (17.6%)	48 (19%)	80 (16.8%)	0.470			
Mortality	79 (10.9%)	29 (11.5%)	50 (10.5%)	0.625			
Total	727	252 (34.6%)	475 (65.4%)		79 (10.86)	648 (89.14)	

(DM: Diabetes mellitus, HT: hypertension, CAD: coronary artery disease, CKD: chronic kidney disease, CVD: cerebrovascular disease)

Table 2. Prognosis and mortality evaluation according to treatment modalities

	rtPA	non-rtPA	p value	thrombectomy	non-thrombectomy	p value
Door-to-CT time (min)	15 (5-132)	15 (2-233)	0.272	15 (5-123)	15 (2-233)	0.469
Door-to-consultation time (min)	20 (10-129)	60 (10-1647)	<0.001	28 (10-180)	60 (10-1647)	<0.001
Prognosis			0.509			0.004
Good prognosis	50 (79.4%)	549 (82.7%)		66 (71.1%)	533 (83.9%)	
Poor prognosis	13 (20.6%)	115 (17.3%)		26 (28.3%)	102 (16.1%)	
30-daymortality			0.434			0.004
Survivor	58 (92.1%)	590 (88.9%)		74 (80.4%)	574 (90.4%)	
Mortality	5 (7.9%)	74 (11.1%)		18 (19.6%)	61 (9.6%)	

Table 3. Prognosis and mortality evaluation of the telestroke group according to treatment modality

	tPA	non-tPA	p value	thrombectomy	non-thrombectomy	p value
Door-to-CT time (min)	15 (5-75)	15 (5-134)	0.428	15 (5-123)	15 (5-134)	0.542
Door-to-consultation time (min)	20 (10-97)	36 (10-1647)	<0.001	26 (10-180)	35 (10-1647)	0.002
Prognosis			0.327			0.004
Good prognosis	50 (87.7%)	345 (82.5%)		23 (27.4%)	57 (14.6%)	
Poor prognosis	7 (12.3%)	73 (17.5%)		61 (72.6%)	334 (85.4%)	
30-day mortality			0.357			0.001
Survivor	53 (93%)	372 (89%)		67 (79.8%)	358 (91.6%)	
Mortality	4 (7%)	46 (11%)		17 (20.2%)	33 (8.4%)	

Table 4. Evaluation of time parameters and treatment modalities according to mortality and prognosis in the pre-telestroke and telestroke groups

mortality				prognosis		
	pre-telestrokegroup (n=29, 11.5%)	telestroke group (n=50, 10.5%)	p value	pre-telestroke group (n=48)	telestroke group (n=80)	p value
Door-to-CT time (min)	14 (10-132)	17 (10-123)	0.141	13.5 (5-233)	17 (10-123)	0.138
Door-to-consultation time (min)	115 (15-300)	23 (11-180)	<0.001	108.5 (15-300)	32.5 (11-180)	<0.001
tPAapplied first treatment	1	4	0.647	6	7	0.552
Thrombectomy applied as first treatment	1	17	0.002	3	23	0.002
Door-to-rtPA time (min)	100	81.5±9.47	0.179	95.83±46.52	93.71±36.11	0.928
Door-to-thrombectomy time (min)	120	160±45.5	0.404	110±14.14	164.17±44.52	0.105

When consultation, imaging, and treatments used were compared in relation to mortality using the Spearman correlation analysis, there was no correlation between the door-to-consultation time and mortality (r=0.007, p=0.846). Similarly, mortality had no correlation with the door-to-CT, door-to-rtPA, and door-to-thrombectomy times (r=-0.033, p=0.368; r=-0.006, p=0.960; and r=-0.165, p=0.112, respectively).

Table 4 presents the results of the examining the time-related parameters between the pre-telestroke and telestroke groups undertaken by isolating the patients with a mortality course and poor clinical outcome. In the mortal group's door-to-consultation time was 115 (15-300) in pre-telestroke groups and 23 (11-180) in telestroke groups (p=0.141). In the poor clinical outcome groups, the door-to-consultation time was 108.5 (15-300) in pre-telestroke groups and 32.5 (11-180) in telestroke groups (p<0.001). There was a statistically significant difference in the door-to-consultation time in patients with mortality and poor clinical outcomes when compared to the other outcome group (p<0.001), despite the absence of clinical significance and similar death rates. The door-to-consultation time was shorter in the telestroke group. The door-to-CT time (min), rtPA applied as first treatment, thrombectomy applied as first treatment, door-to-rtPA time, and door-to-thrombectomy time data did not create a statistically significant difference in the pre-telestroke and telestroke groups, both in the mortality group and in the group with a poor prognosis (**Table 4**).

Telestroke did not have any superiority considering the effects of rtPA and thrombectomy treatment protocols, door-to-rtPA time, and door-to-thrombectomy time on mortality and prognosis.

DISCUSSION

WhatsApp can be used in clinical practices in managing emergency cases as an inexpensive and easily accessible method to achieve fast decisions on treatment protocols. This study aimed to compare the period in which the telestroke WhatsApp group was used and the period when it was not used to investigate its effect on patient prognosis and mortality. When comparing the pre-telestroke and telestroke groups, there was no statistical difference in terms of poor clinical outcome and mortality rates; however, a statistically significant difference was observed in relation to the rates of discharge and hospitalized treatment. The rate of discharge from the hospital within the first 24 hours of presentation was significantly higher and the rate of receiving hospitalized treatment was significantly lower in the telestroke group.

In the literature, WhatsApp is found to be used as an in-hospital communication tool for consultation, sharing radiological images, and tele-neurological purposes.[8] In Northern Ireland, the first use of this application for tele-neurological purposes was described in 2003, and entered into routine use in certain centers in 2016.[9] In a study in which neuroradiological images were shared by e-mail, Saadi et al. reported reduced cost and increased efficiency.[6] Médecins Sans Frontières, an international humanitarian medical non-governmental organization, provided access to its web-based messaging system to facilitate the access of doctors to all consultants.[10]

In a study comparing the consultation times of patients with intracerebral hemorrhage according to whether they underwent the normal procedure or a telemedicine protocol, Ford et al. found that blood pressure and anticoagulant reversibility were taken under control in a shorter time in the telemedicine group, to an extent that it significantly affected patient outcome.[11] Similarly, in our study, the door-to-consultation time was significantly shorter in the telestroke group. Reducing the door-to-consultation time (min) seems to be very important in terms of both alerting the hospital system and making treatment decisions quickly in order to provide neuroplasticity, which refers to regaining neurological functions of the brain.

In a meta-analysis undertaken by Baratloo et al., the time from the onset of the event to arriving at the emergency door was lower in the telestroke group than the control group.[12] In a 10-year telestroke study that used teleconsultation and video conferencing, Barna et al. reported that the time from the onset of the event to the emergency door decreased in the telestroke group.[13] However, Mazighi et al. found no significant difference in the time from the onset of the event to arrival at the emergency door according to whether telestroke was used.[14] Similarly, in our study, the rate of patients presenting within the first 4.5 hours of the onset of their symptoms was significantly higher and their onset of event to the emergency door time was significantly lower in the telestroke group.

Lee et al., conducting a study with 259 patients over two periods of time—before and after the introduction of the telestroke system into their hospital—found that the time from the beginning of telestroke consultation to rtPA application

(door-to-rtPA/min) decreased.[15] Fonarow et al. and a meta-analysis by Baratloo et al. also reported that the door-to-rtPA/min time was significantly decreased in the telestroke group.[2,12] In another study in which 959 stroke patients—of whom 523 were teleneurology patients—were retrospectively examined, the door-to-rtPA time was significantly shorter in the telestroke group, but there was no statistically significant difference between the groups in terms of the door-to-thrombectomy time.[16] In another study, the effectiveness of the pre-hospital telestroke system was investigated with 650 patients that were transferred to the hospital without telestroke and 289 transferred to the hospital using telestroke, and no statistically significant difference was found between the two groups in relation to thrombolytic treatment.[17] In our study, we observed that the door-to-thrombectomy/min time was longer in the telestroke group compared to the pre-telestroke group ($p<0.001$), and the door-to-rtPA time was 7 lower in the telestroke group, but without statistical significance ($p=0.627$).

Gutowitz et al. compared teleneurology and non-teleneurology groups in terms of rtPA and thrombectomy treatments and determined no significant difference.[16] In a multicenter, cross-sectional study, including 29 hospitals, that examined a two-year telestroke period, the rate of rtPA treatment was higher in the hospital where telestroke was used than in other hospitals.[18] The results of our study revealed that the rates of both rtPA and thrombectomy treatments were significantly higher in the group in which the telestroke system was used compared to the pre-telestroke group ($p<0.001$).

In telestroke studies, the rate of hospital discharge was higher and the in-hospital mortality rate was lower in the telestroke group compared to the pre-telestroke group.[2,12-14] In a study conducted by Sanchez et al., who examined the relationship between mortality and use of telestroke, the authors did not find a statistically significant difference between the hospitals that did and did not use this system.[18] In the current study, although no statistically significant difference was detected in terms of poor prognosis and 30-day mortality in the comparison of the pre-telestroke and telestroke discharge within the first 24 hours however a significant decrease in the hospitalization rate in the telestroke group. We consider that this is due to the decrease in door-to-consultation/min and door-to-CT/min in the telestroke group.

Limitations

We consider that the reason the number of patients in the pre-telestroke group was approximately twice the number of those in the telestroke group was that our hospital has been promoted as a stroke hospital since the day it started to apply the telestroke protocol. Conducting further studies in more similar groups will provide clearer results on mortality and outcome. Furthermore, since a number of our patients were still hospitalized in the ICU at the time of data analysis, we were not able to evaluate the final clinical outcome in all patients; thus, we had to add these patients to the poor clinical outcome group which also included the mortality cases.

CONCLUSION

Telestroke practices not only provide access to the relevant clinical branch for early consultation or imaging studies, but also facilitate timely and effective treatment as well as early discharge, thus leading to improvement in prognosis.

ETHICAL DECLARATIONS

Ethics Committee Approval: For the study, ethical approval was obtained from the local clinical research ethics committee of our hospital (date: March 18, 2020, number: B.10.1.TKH.4.34.H.GP.0.01/62).

Informed Consent: Because the study was designed retrospectively, no written informed consent form was obtained from patients.

Referee Evaluation Process: Externally peer-reviewed.

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REFERENCES

1. Szelenberger R, Kostka J, Saluk-Bijak J, Miller E. Pharmacological Interventions and Rehabilitation Approach for Enhancing Brain Self-repair and Stroke Recovery, Home/Current. Neuropharmacology 2020(18);1:51-64.
2. Fonarow GC, Zhao X, Smith EE, et al. Door-to-needle times for tissue plasminogen activator administration and clinical outcomes in acute ischemic stroke before and after a quality improvement initiative. JAMA. 2014;311(16):1632-40.
3. Powers WJ, Rabinstein AA, Ackerson T et al. 2018 Guidelines for the Early Management of Patients With Acute Ischemic Stroke. Stroke 2018;49(3):e46-e99.
4. Schimpf B, Deanda K, Severenuk DA et al. Integration of Real-Time Electronic HealthRecordsand Wireless Technology in a Mobile Stroke Unit. J StrokeCerebrovascDis 2019(28);9:2530-6.
5. Maingard J, Phan K, Lamanna A, et al. Rescue Intracranial Stenting After Failed Mechanical Thrombectomy for Acute Ischemic Stroke:A Systematic Review and Meta-Analysis. World Neurosurg. 2019;132:e235-e245.
6. Saadi A, Mateen FJ. International issues: tele neurology in humanitarian crises. Neurology 2017;89(3):16-9.
7. Sarfo FS, Adamu S, Awuah D, Ovbiagele B. Tele-neurology in sub-Saharan Africa:a systematicreview of theliterature. J NeurolSci 2017;380:196-9.
8. Inan I, Algin A, Sirik M. WhatsApp as an EmergencyTeleradiology Application forCranial CT Assessment in Emergency Services. J Coll Physicians Surg Pak 2020;30(7):730-4.
9. Patel UK, Malik P, DeMasi M, Lunagariya A, Jani VB. Multidisciplinary Approach and Outcomes of Tele-neurology:A Review. Cureus 2019;11(4):4410.
10. Calleja-Castillo JM, Gonzalez-Calderon G. Whatsapp in strokesystems: current use and regulatory concerns. Front Neurol2018;9:388.
11. Ford S, Ajani Z, Chen Q et al. Comparison of Standard Emergency Room Carewith Tele-Stroke Evaluation in Acute Intra cerebral Hemorrhage Management. Stroke 2016;47(1):AWP367.
12. Baratloo A, Rahimpour L, Abushouk AI, Safari S, Lee CW, Abdalvand A. Effects of Telestroke on Thrombolysis Times and Outcomes: A Meta-analysis. Prehospital Emergency Care 2018;22(4):472-84.

13. Barna PM, Hubert GJ, Boy S et al. Telestroke Units Serving as a Model of Care in RuralAreas 10-Year Experience of the Tele Medical Project for Integrative Stroke Care. Stroke2014;45(9):2739-44.
14. Mazighi M, Meseguer E, Labreuche J, et al. TRUST-tPA trial:Telemedicine for remote collaboration with urgentists for stroke-tPA treatment. J Telemed Telecare. 2017;23(1):174-80.
15. Lee VH, Cutting S, Song SY et al. Participation in a TeleStroke Program ImprovesTimeliness of IntravenousThrombolysis Delivery. Telemedicineand e-Health2017;23(1):60-2.
16. Gutowitz S, Legget J, Hart L, Leaman SM, James H, Stillinger T. Theimpact of teleneurologists on acutestrokecare at an advanced primary stroke centre. J Telemed Telecare2020.
17. Bergrath S, Reich A, Rossaint R et al. Feasibility of Prehospital Teleconsultation in AcuteStroke-A Pilot Study in Clinical Routine. PLoSONE. 2012;7(5):36796.
18. Sanchez S, Campos Y,Cadena A et al. Intravenous thrombolysis in theelderly is facilitated by a tele-stroke network:A cross-sectionalstudy. Clin Neurol Nourosurg 2020:197:106177.

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Original Article / Orijinal Araştırma

Evaluation of Treatment with a Single (400 mg) versus Double Dose (800 mg) of Tocilizumab in Acute Respiratory Distress Syndrome Associated with COVID-19 Pneumonia

COVID-19 Pnömonisi ile İlişkili Akut Solunum Sıkıntısı Sendromunda tek doz (400 mg) ve çift doz (800 mg) Tocilizumab ile Tedavinin Değerlendirilmesi

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Abstract

Background: COVID-19 is a viral infectious caused by novel coronavirus called as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). Recent studies have shown that the level of IL-6 in the severe infection group was higher than that in the moderate group, suggesting that IL-6 can be used as a biomarker for severity assessment. However, the correlation of IL-6 levels in critically ill patients is still unknown. Tocilizumab is a monoclonal antibody against the IL-6 receptor and commonly used for cytokine storm or macrophage activation syndrome (MAS) in COVID-19 patients.

Objective: In this study, we wanted to compare the clinical outcomes of single dose tocilizumab (400 mg) and double dose tocilizumab (800 mg) as treatment.

Material and Method: In this retrospective analysis we have included 120 patients with mild Acute Respiratory Distress Syndrome (ARDS) associated with COVID-19 pneumonia who received tocilizumab 400 mg once or twice daily. The two treatment groups were compared in terms of age, gender, comorbid diseases, arterial oxygen pressure (PaO_2), oxygen saturation (SaO_2) on room air, admission to the intensive care, length of stay in the intensive care unit, status of intubation, mortality, C reactive protein, white blood cell count, platelets, neutrophil, lymphocyte, ferritin, D-dimer, procalcitonin levels.

Results: There were no statistically significant difference between the two dosing regimens in gender, arterial oxygen pressure (PaO_2), oxygen saturation (SaO_2) on room air, comorbidities, need for intubation, mortality, requirement for intensive care, total length of hospital stay, length of stay in intensive care, CRP, WBC, platelets, neutrophils, lymphocytes, ferritin, D-dimer and procalcitonin levels.

Conclusion : Currently the short and long term adverse effects of tocilizumab have not been clearly reported in the literature. The clinical outcomes of once or twice daily tocilizumab did not differ significantly in terms of efficacy. Therefore a single dose of 400 mg once daily tocilizumab could be a rational treatment option.

Keywords: Tocilizumab, coronavirus, acute respiratory distress syndrome

Öz

Arka plan: COVID-19, şiddetli akut solunum sendromu koronavirüs 2 (SARS-CoV-2) olarak adlandırılan yeni koronavirüsün neden olduğu viral bir enfeksiyondur. Son çalışmalar, şiddetli enfeksiyon grubundaki IL-6 seviyesinin orta gruptan daha yüksek olduğunu göstermiştir, bu da IL-6'nın şiddet değerlendirmesi için bir biyobelirteç olarak kullanılabileceğini düşündürmektedir. Bununla birlikte, kritik hastalardaki IL-6 düzeylerinin korelasyonu hala bilinmemektedir. Tocilizumab, IL-6 reseptörüne karşı monoklonal bir antikordur ve COVID-19 hastalarında sitokin fırtınası veya makrofaj aktivasyon sendromu (MAS) için yaygın olarak kullanılır.

Amaç: Bu çalışmada tedavi olarak tek doz tosilizumab (400 mg) ve iki doz tosilizumab (800 mg) uygulamasının klinik sonuçlarını karşılaştırmak istedik.

Gereç ve Yöntem: Bu retrospektif analize, günde bir veya iki kez 400 mg tocilizumab alan COVID-19 pnömonisi ile ilişkili hafif Akut Solunum Sıkıntısı Sendromu (ARDS) olan 120 hastayı dahil ettik. İki tedavi grubu yaş, cinsiyet, eşlik eden hastalıklar, arteriyel oksijen basıncı (PaO_2), oda havasında oksijen satürasyonu (SaO_2), yoğun bakıma yatış, yoğun bakımda kalış süresi, entübasyon durumu açısından karşılaştırıldı. , mortalite, C reaktif protein, beyaz kan hücresi sayısı, trombositler, nötrofil, lenfosit, ferritin, D-dimer, prokalsitonin seviyeleri.

Bulgular: Cinsiyet, arteriyel oksijen basıncı (PaO_2), oda havasında oksijen satürasyonu (SaO_2), komorbiditeler, entübasyon ihtiyacı, mortalite, yoğun bakım gereksinimi, toplam hastanede kalış süresi açısından iki doz rejimi arasında istatistiksel olarak anlamlı bir fark yoktu. , yoğun bakımda kalış süresi, CRP, WBC, trombosit, nötrofil, lenfosit, ferritin, D-dimer ve prokalsitonin düzeyleri.

Sonuç: Halihazırda tocilizumabın kısa ve uzun dönem yan etkileri literatürde net olarak bildirilmemiştir. Günde bir veya iki kez tocilizumabın klinik sonuçları, etkinlik açısından önemli ölçüde farklılık göstermedi. Bu nedenle günde bir kez 400 mg'lık tek doz tocilizumab rasyonel bir tedavi seçeneği olabilir.

Anahtar Kelimeler: Tocilizumab, koronavirüs, akut solunum sıkıntısı sendromu

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INTRODUCTION

Coronavirus disease 2019 (COVID-19) was first detected in Wuhan City, China. COVID-19 was caused by novel coronavirus called severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and has caused a worldwide pandemic.[1] Although the majority of patients survive the disease with mild to moderate symptoms, almost one third of the individuals are at risk of developing acute respiratory distress syndrome (ARDS) due to COVID-19. This group of severe patients may require mechanical ventilation (MV), intensive care, and their diseases may result in death.[2] A systemic inflammatory response develops in the body due to COVID-19 and in severe cases this inflammatory response induces damage to the lungs and other body organs.[2,3]

Cytokin storm plays an important role in critical patient groups with SARS-CoV-2 infection[4,5] which is mainly characterized by elevated plasma interleukin 6 (IL-6). According to recent COVID-19 studies it was elaborated that the level of IL-6 in the severe group was higher than that in the moderate group,[6,7] accordingly, it suggests that IL-6 can be used as a biomarker for severity assessment in COVID-19-related cytokin storm. However, the correlation of IL-6 levels in critically ill patients is still unknown. Tocilizumab, a monoclonal antibody against IL-6 receptor, has been previously used in the treatment of rheumatological diseases but with the outbreak of the COVID-19 pandemic it has been widely used in hospitals to treat COVID-19.[8]

In the context of ongoing pandemic, Xu et al. were the first to claim that tocilizumab could possibly leverage clinical outcomes on cytokine release syndrome (CRS) triggered by SARS-CoV-2. As of February 2020, they treated 21 severe or critical COVID-19 patients with tocilizumab and published that oxygen support decreased by 75% and CT images improved at a rate of 90.5%.[9]

Cytokine storm is a reaction state of the immune system that causes an uncontrolled release of proinflammatory cytokines. Indeed, under normal physiological conditions, cytokines are part of the body's immune response to infection, but their uncontrolled excess release can cause multisystem organ damage and death.[10] Cytokine storms can be caused by a range of infectious and non-infectious etiologies, including viral respiratory infections such as SARS-CoV-1 and SARS-CoV-2.[11-13]

In this retrospective study, we have analyzed patients with mild ARDS associated with COVID-19 pneumonia who were treated with a double dose of tocilizumab versus single dose and compared clinical outcomes.

MATERIAL AND METHOD

In this retrospective analysis we have included 120 patients with mild Acute Respiratory Distress Syndrome associated with COVID-19 pneumonia who received tocilizumab 400 mg once or twice daily between 01.06.2020 and 01.12.2020. The study protocol was approved by the Scientific Research Commission of the Turkish Ministry of Health. The study was approved by the Ethics Committee of the Harran University (protocole number:HRU/21.02.27). All procedures were carried out in accordance with the ethical rules and the principles of the Declaration of Helsinki.

During the pandemic, the firstline treatment approach of our instution can be elaborated as: favipiravir, heparin, protein pump inhibitor and antibiotherapy. Tocilizumab 400mg/800 mg and other anti-inflammatory drugs were administered as secondline therapy in patients who developed cytokine storm due to COVID-19 and did not benefit from first-line treatment. We included patients with acute respiratory distress syndrome who did not benefit from first-line therapy and who received tocilizumab as second-line therapy.

The patients were divided into two groups according to the dosage of tocilizumab (800 mg versus 400 mg). The two groups were compared in terms of age, gender, comorbid diseases, arterial oxygen pressure (PaO_2), oxygen saturation (SaO_2) on room air, admission to the intensive care, length of stay in the intensive care, status of intubation, mortality, C reactive protein (CRP), white blood cell (WBC) count, platelet, neutrophil, lymphocyte, ferritin, D-dimer, procalcitonin levels. Age, gender, comorbid diseases, status of intubation, mortality, admission to the intensive care unit, length of stay in the intensive care, arterial oxygen pressure (PaO_2), oxygen saturation (SaO_2) on room air, C reactive protein (CRP), white blood cell (WBC) count have been analyzed in all patients. The mean calculation for platelets, neutrophils, lymphocyte, ferritin, D-dimer, procalcitonin levels have been conducted. In addition to this, regression analysis was performed on the factors affecting mortality.

The inclusion criteria were as follows:

1. PCR positivity or thorax CT consistent with COVID-19 pnemonia (14).
2. Age above 18 years
3. Mild ARDS manifestations related to COVID-19 pneumonia (200 mmHg<PaO_2/FiO_2<300mmHG+ PEEP or CPAP 200 mmHg<PaO_2/FiO_2<300mmHG+ PEEP or CPAP ≥5cm H_2O)

The exclusion criteria were as follows:

1. Patients who have received other anti-inflammatory drugs (steroid, anakinra)
2. Patients who receive treatment other than favipiravir, heparin, protein pump inhibitor and antibiotics in initial treatment.
3. Age under 18 years

Statistical Analysis

Statistical analysis was performed using the SPSS 15.0 for Windows (SPSS Inc., Chicago, IL, USA). The assumption of normal distribution of data was tested by kolmogorov-smirnov test. The patients were divided into two groups as those receiving tocilizumab 400 mg treatment and tocilizumab 800

mg treatment. Mann Whithney-U test was applied to numerical data and chi-square test was applied to nominal data. In addition, chi-square and student t tests were performed on the exitus and surviving groups to determine the factors affecting mortality.The hypotheses are two-sided and p≤0.05 was considered statistically significant at 95% confidence interval.

RESULTS

A total of 120 patients were retrospectively investigated between 01.06.2020 and 01.12.2020. The distribution of the individuals according to dosing regimen were as follows: 54 patients were treated with a single dose of tocilizumab 400 (400 mg), and 66 patients with a double dose of tocilizumab 400 (800 mg). The characteristics and parameters of two groups are provided in **Table 1** and **Table 2**.

There were no statistically significant differences between the groups receiving tocilizumab 400 or tocilizumab 800 in terms of gender, comorbidities, requirement for intubation, mortality, and need for intensive care (p>0.05) (**Table 1**).

No statistically significant differences were found between the groups receiving tocilizumab 400 or tocilizumab 800 in terms of age, oxygen saturation (SaO_2) on room air, PaO_2, total length of hospital stay, length of stay in intensive care, CRP, WBC, platelet, neutrophil, lymphocyte, ferritin, D-dimer and procalcitonin values (p>0.05) (**Table 2**).

Comparisons were made between discharged and deceased groups to identify factors affecting their mortality (**Table 3**).

When discharged and deceased patients were compared, it was found that the presence of additional disease, requirement for intensive care, requirement for intubation, length of stay, age, length of stay in the intensive care unit, increase in WBC, increase in neutrophils, increase in procalcitonin were found to be statistically higher in exitus patients. Oxygen saturation (SaO_2) was significantly lower in the group with on room air exitus (p≤ 0.05) (**Table 3**). Receiving tocilizumab 400 mg or 800 mg treatment had no effect on mortality.

Table 1. Comparison of the demographic parameters between the two groups

	Tocilizumab single dose (1x400 mg) n=54	Tocilizumab double dose (2x400 mg) n=66	All Patients n:120	P value
Gender				0.1
Female	26 (48.1%)	20 (30.3%)	46 (38.3%)	
Male	28 (51.9%)	46 (69.7%)	74 (61.6%)	
Hypertension				0.5
Yes	22 (40.7%)	32 (48.4%)	54 (45%)	
No	32 (59.3%)	34 (51.6%)	66 (55%)	
Diabetes mellitus				0.7
Yes	8 (14.8%)	12 (22.2%)	20 (16.6%)	
No	46 (85.2%)	54 (77.8%)	100 (83.3%)	
Chronic Renal Failure				0.6
Yes	2 (3.7%)	4 (6.06%)	6 (5%)	
No	52 (96.3%)	62 (93.94%)	114 (95%)	
Heart failure				0.8
Yes	4 (7.4%)	4 (6.06%)	8 (6.6%)	
No	50 (92.6%)	62 (93.94%)	112 (93.3%)	
Chronic obstructive pulmonary disease				0.7
Yes	6 (11.1%)	6 (9.09%)	12 (10%)	
No	48 (88.9%)	60 (90.91%)	108 (90%)	
Other chronic disorders				0.8
Yes	4 (7.4%)	6 (9.09%)	10 (8.3%)	
No	50 (92.6%)	60 (90.91%)	110 (91.6%)	
Comorbid disease				0.8
Yes	32 (59.25%)	38 (57.57%)	70 (58.3%)	
No	22 (40.75%)	28 (42.43%)	50 (41.6%)	
Need for intubation				0.2
Yes	4 (7.4%)	12 (18.18%)	16 (13.3%)	
No	50 (92.6%)	54 (81.82%)	114 (86.6%)	
Mortality				0.5
Yes	4 (7.4%)	8 (12.12%)	12 (10%)	
No	50 (92.6%)	58 (87.88%)	108 (90%)	
Need for intensive care				0.4
Yes	10 (18.51%)	18 (27.27%)	18 (23.3%)	
No	44 (81.49%)	48 (72.73%)	102 (76.6%)	

p≤ 0.05 was considered statistically significant

Table 2. Comparison of laboratory and other parameters between the two groups

	Tocilizumab single dose (1x400 mg) n=54 median (range min-max)	Tocilizumab double dose (2x400 mg) n=66 median (range min-max)	All patients n:120 median (range min-max)	P value
Age	67 (31 to 81)	64 (28 to 88)	65.50 (28 to 88)	0.5
Oxygen saturation (SaO_2) on room air (mean+/-sd)	83.92±2.26	83.84±2.25	83.88±2.24	0.8
PaO_2(mean+/-sd)	51.14±3.20	51.54±3.38	51.36±3.28	0.6
Total length of hospital stay	12 (6 to 25)	14 (7 to 41)	13 (6 to 41)	0.1
Length of stay in intensive care	0 (0 to 20)	0 (0 to 24)	0 (0 to 24)	0.3
C Reactive Protein (CRP)	66 (3 to 306)	79 (4 to 227.60)	68.95 (3 to 306)	0.1
White Blood Cell (WBC)	8.76 (2.77 to 20.42)	8.79 (1.50 to 22.80)	8.77 (1.50 to 22.80)	0.9
Platelets	186 (88 to 623)	208 (116 to 363)	208 (88 to 623)	0.5
Neutrophils	7.85 (0.27 to 19.22)	7.15 (0.54 to 20.99)	7.54 (0.27 to 20.99)	0.7
Lymphocytes	0.79 (0.27 to 3.33)	0.86 (0.23 to 5.90)	0.8 (0.23 to 5.90)	0.6
Ferritin	728 (71.10 to 3699)	807 (99.8 to 3625.50)	788.65 (71.1 to 3699	0.8
D-dimer	727 (188 to 4300)	666 (216 to 4420)	719.5 (188 to 4420)	0.8
Procalcitonin	0.22 (0.01 to 3.26)	0.12 (0.01 to 31.44)	0.2 (0.01 to 31.44)	0.4

p≤ 0.05 was considered statistically significant

Table 3. Factors affecting mortality

	Exitus n: 12	Discharged n: 108	p
Gender			0.7
Female	4 (33.3%)	42 (38.8%)	
Male	8 (66.6%)	66 (61.2%)	
Concomittant Disease			0.02
Yes	12 (100%)	50 (46.2%)	
No	0 (0%)	58 (53.8%)	
Requirement for intensive care			0.01
Yes	12 (100%)	16 (14.8%)	
No	0 (0%)	92 (85.2%)	
Requirement for intubation			0.01
Yes	12 (100%)	4 (3.7%)	
No	0 (0%)	104 (96.3%)	
Medication			0.5
Tocilizuman 400	4 (33.3%)	50 (46.2%)	
Tocilizumab 800	8 (66.6%)	58 (53.8%)	
	Exitus mean±sd	**Discharged mean±sd**	**p**
Hospital stay	20.33±8.82	14.29±6.59	0.04
Age	76.66±7.89	59.85±15.65	0.01
Intensive Care Unit Stay	11.16±8.77	1.50±4.58	0.01
Oxygen saturation (SaO_2) on room air	82±2.60	84.09±2.12	0.02
PaO_2	50.5±4.50	51.46±3.16	0.5
CRP	103.51±53.62	75.89±54.46	0.2
WBC	12.95±6.87	9.05±4.36	0.05
Platelets	194.66±89.22	217.5±86.12	0.5
Neutrophil	10.82±7.87	7.25±4.03	0.07
Lymphocyte	0.68±0.34	1.05±0.90	0.3
Ferritin	1123.51±904.99	917.97±743.82	0.5
D-dimer	936.5±388.38	1023.18±914.08	0.8
Procalsitonin	5.83±12.59	0.41±0.67	0.01

p≤ 0.05 was considered statistically significant

DISCUSSION

The present study showed that there was no difference between the double dose of tocilizumab (800 mg) compared to single dose therapy (tocilizumab 400 mg) in terms of their clinical outcomes. When discharged and deceased patients were compared, it was found that then presence of the presence of additional disease, the need for intensive care, the need for intubation, the length of stay, the age, the length of stay in the intensive care unit, the increase in WBC, the increase in neutrophils, the increase in procalcitonin were found to be statistically higher in exitus patients. Oxygen saturation (SaO_2) on room air was significantly lower in the exitus patients. Treatment with tocilizumab 400 mg or 800 mg had no effect on mortality. Undoubtedly, there are numerous controversial treatment options for COVID-19 which is a novel disease. Tocilizumab therapy has become prominent in COVID-19 pneumonia in patients who were unresponsive to treatment. Eimer J. et al. compared 29 patients receiving tocilizumab with 58 patients receiving only routine care and not only the ventilator-free days of the patients treated with tocilizumab were significantly more but also extubation was achieved at an earlier stage and in a higher number of patients. Both the length of stay in the ICU and the length of hospital stay were significantly shorter in patients treated with tocilizumab.[15] Similarly, in another study, mortality was 12% lower in COVID-19 patients treated with tocilizumab.[16] Although research on tocilizumab has increased with the pandemic, there is still no clear information about the dose of tocilizumab in COVID-19 pneumonia. According to Tonyati et al. and Colaneri et al. administered tocilizumab from 8 mg/kg to a maximum of 800 mg in most of the patients.[17,18] Alattar et al. used a median dose of 5.7 mg/kg/dose,[19] Luo et al. administeredlower doses of tocilizumab (80-600 mg per dose),[20] and Xu et al. targeted a dose of 4-8 mg/kg per dose. These varying dosing regimens make it complicated to perform a comparison between these studies and to evaluate the impact of this treatment.[21]

Farzaneh Dastan et al. have investigated the efficacy of asingle dose of tocilizumab 400 and reported that it was a promising agent for patients with severe or critical SARS-CoV-2 infection, if initiated immediately at the severe stage. In their study of 42 cases, 35 patients had clinical improvement while 7 patients died.[22] In our study, there were no statistically significant differences in the length of stay in the hospital and intensive care unit, intubation, need for intensive care and mortality among the patients receiving 400 mg and 800 mg tocilizumab therapy.

On the other hand, there are also studies that do not recommend the use of tocilizumab. Salvarani et al. published a randomized study of adults with a PaO_2/FiO_2 ratio of 200-300 mm Hg who were treated with tocilizumab showed no difference in progression compared to standard care.[23] In another systematic review, it was stated that there is insufficient evidence regarding the clinical efficacy and safety of tocilizumab in patients with COVID-19. Its use should be considered experimental, requiring ethical approval and clinical trial surveillance.[24]

Adverse effects of tocilizumab on COVID-19 patients are still uncertain. In a recently performed double-blind, randomized controlled study of patients with rheumatoid arthritis (RA), the principal adverse effects associated with tocilizumab were a transient decrease in leukocytes, elevated liver enzymes, dyslipidemia, and negativity associated with infection.[25] In our study, there were no groups of patients with moderate or severe ARDS, thus had no data on whether 400 mg or 800 mg tocilizumab use would have different effectsin these two groups. In addition, in our study, mortality was observed to be higher in the group treated with tocilizumab 800 mg, but it was not statistically significant. Although there is no difference between the clinical classifications of the groups, doctors may tend to give 800 mg tocilizumab treatment to more severe cases.

CONCLUSION

We do not have clear and adequate data about the short- and long-term adverse effects of tocilizumab. In this case, a single dose use of 400 mg would be more rational as the clinical outcomes between tocilizumab 400 mg and 800 mg are not different, Since it is difficult to accessevery drug during this pandemic conditions, we think that tocilizumab 400 mg treatment can serve a good alternative to tocilizumab 800 mg treatment. There is no doubt that comprehensive studies with large groups of patients are necessary.

Abbreviations: **ARDS**: Acute Respiratory Distress Syndrome, **CRP**: C reactive protein, **CRS**: cytokine release syndrome, **CT**: computerized tomography, **ICU**: intensive care unit, **IL**: interleukins, **MV**: mechanical ventilation, **PaO_2**: arterial oxygen pressure, **RA**: rheumatoid arthritis, **SARS-CoV-2**: severe acute respiratory syndrome coronavirus 2, **WBC**: White blood cell

ETHICAL DECLARATIONS

Ethics Committee Approval: Ethical approval was obtained from the ethics committee of the Harran University. Ethics committee number: HRU/21.02.27.

Informed Consent: Because the study was designed retrospectively, no written informed consent form was obtained from patients.

Referee Evaluation Process: Externally peer-reviewed.

Conflict of Interest Statement: The authors have no conflicts of interest to declare.

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REFERENCES

4. Li Q, Guan X, Wu P, et al. Early Transmission Dynamics in Wuhan, China, of Novel Coronavirus-Infected Pneumonia. N Engl J Med. 2020;382(13):1199-207.
5. Wu C, Chen X, Cai Y, et al. Risk Factors Associated with Acute Respiratory Distress Syndrome and Death in Patients with Coronavirus Disease 2019 Pneumonia in Wuhan, China. JAMA Intern Med. 2020;180 (7):934-43.
6. Vardhana SA, Wolchok JD. The many faces of the anti-COVID immune response. J Exp Med. 2020;217(6): e20200678.
7. Chen L, Liu HG, Liu W, et al. Analysis of clinical features of 29 patients with 2019 novel coronavirus pneumonia. Zhonghua Jie He He Hu Xi Za Zhi. 2020;43(3):203-8.
8. Zumla A, Hui DS, Azhar EI, Memish ZA, Maeurer M. Reducing mortality from 2019-nCoV: host-directed therapies should be an option. Lancet. 2020;395(10224): e35-e36.
9. Chen L, Liu HG, Liu W, et al. [Analysis of clinical features of 29 patients with 2019 novel coronavirus pneumonia]. Zhonghua Jie He He Hu Xi Za Zhi. 2020;43(3):203-8. Chinese.
10. Wang F, Nie J, Wang H, et al. Characteristics of Peripheral Lymphocyte Subset Alteration in COVID-19 Pneumonia. J Infect Dis. 2020;221(11):1762-9.
11. Potere N, Di Nisio M, Cibelli D, et al. Interleukin-6 receptor blockade with subcutaneous tocilizumab in severe COVID-19 pneumonia and hyperinflammation: a case-control study. Ann Rheum Dis. 2021;80(2):1-2.
12. Xu X, Han M, Li T, et al. Effective treatment of severe COVID-19 patients with tocilizumab. Proc Natl Acad Sci USA. 2020;117(20):10970-5.
13. Konstantinos F, Anastasia B, Raymond N. Systematic review of the prevalence of current smoking among hospitalized COVID-19 patients in China: Could nicotine be a therapeutic option?". Intern Emerg Med. 2020;15(5):845-52.
14. Wong JP, Viswanathan S, Wang M, et al. "Current and future developments in the treatment of virus-induced hypercytokinemia". Future Med Chem. 2017;9(2):169-78.
15. Liu Q, Zhou YH, Yang ZQ. "The cytokine storm of severe influenza and development of immunomodulatory therapy". Cell Mol Immunol. 2016;13(1):3-10.
16. Bhaskar S, Sinha A, Banach M, et al. The cytokine storm of severe influenza and development of immunomodulatory therapy. Cell Mol Immunol. 2016;13(1):3-10.
17. Byrne D, O'Neill SB, Müller NL, et al. RSNA Expert Consensus Statement on Reporting Chest CT Findings Related to COVID-19: Interobserver Agreement Between Chest Radiologists. Can Assoc Radiol J. 2021;72(1):159-66.
18. Eimer J, Vesterbacka J, Svensson AK, et al. Tocilizumab shortens time on mechanical ventilation and length of hospital stay in patients with severe COVID-19: a retrospective cohort study. J Intern Med. 2021;289(3):434-6.
19. Malgie J, Schoones JW, Pijls BG. Decreased Mortality in Coronavirus Disease 2019 Patients Treated with Tocilizumab: A Rapid Systematic Review and Meta-analysis of Observational Studies. Clin Infect Dis. 2021;72(11):742-9.
20. Toniati P, Piva S, Cattalini M, et al. Tocilizumab for the treatment of severe COVID-19 pneumonia with hyperinflammatory syndrome and acute respiratory failure: A single center study of 100 patients in Brescia, Italy. Autoimmun Rev. 2020;19(7):102568.
21. Colaneri M, Bogliolo L, Valsecchi P, et al. Tocilizumab for Treatment of Severe COVID-19 Patients: Preliminary Results from SMAtteo COvid19 REgistry (SMACORE). Microorganisms. 2020;8(5):695.
22. Alattar R, Ibrahim TBH, Shaar SH, et al. Tocilizumab for the treatment of severe coronavirus disease 2019. J Med Virol. 2020;92(10):2042-9.
23. Luo P, Liu Y, Qiu L, Liu X, Liu D, Li J. Tocilizumab treatment in COVID-19: A single center experience. J Med Virol. 2020;92(7):814-8.
24. Xu Z, Shi L, Wang Y, et al. Pathological findings of COVID-19 associated with acute respiratory distress syndrome. Lancet Respir Med. 2020;8(4):420-2.
25. Dastan F, Saffaei A, Haseli S, et al. Promising effects of tocilizumab in COVID-19: A non-controlled, prospective clinical trial. Int Immunopharmacol. 2020;88:106869.
26. Salvarani C, Dolci G, Massari M, et al. Effect of Tocilizumab vs Standard Care on Clinical Worsening in Patients Hospitalized with COVID-19 Pneumonia: A Randomized Clinical Trial. JAMA Intern Med. 2021;181(1):24-31.
27. Cortegiani A, IppolitoM, Greco M, et al. Rationale and evidence on the use of tocilizumab in COVID-19: a systematic review. Pulmonology. Jan-Feb 2021;27(1):52-66.
28. Baek HJ, Lim MJ, Park W, et al. Efficacy and safety of tocilizumab in Korean patients with active rheumatoid arthritis. Korean J Intern Med. 2019;34(4):917-31.

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Original Article / Orijinal Araştırma

Retrospective Assesment of Spleen Injuries in Children: Ten Years of Experience in A Single Centre

Çocuklarda Dalak Yaralanmalarının Geriye Dönük Değerlendirilmesi: Tek Bir Merkezde On Yıllık Deneyim

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Abstract

Objective: We aimed to assess the causes of trauma that result in spleen and accompanying organ injuries, management types, and results of management in children referred to our clinic for spleen injuries in the last ten years.

Material and Method: The reports of 76 (56 boys, 20 girls) patients managed for spleen injuries owing to blunt abdominal trauma between June 2011 and May 2021 were reviewed retrospectively.

Results: The patients were aged between 2-17 (8.7±5.4) years old; 56 (73.7%) were boys and 20 (26.3%) were girls. Causes of injuries included accidents involving a motorized vehicle (37, 48.7%), falls from height (21, 27.6%), sports/bumping into obstacles (14, 18.3%), a crash object in the abdomen (3,3,9%), kick from a horse 1 (1.3%). Isolated spleen injury was present in 42 patients (55.3%), while 34 patients (44.7%) had other organ injuries. Spleen injuries were grade I in 9 patients (11.8%), grade II in 18 (23.7.%), grade III in 27 (35.6%), grade IV in 19 (25%), and grade V in 3 (3.9%). Splenectomy was performed in three patients (3.9%) owing to hemodynamic instability and small intestine repair owing to a small intestine injury in two patients (2.6%). None of these patients died from splenic injuries, but one of our patients died from brain injury while in nonoperative treatment.

Conclusion: Conservative treatment methods should be chosen in patients with a spleen injury who are hemodynamically stable. The shorter duration of hospital stay, less blood transfusion requirement, and lower morbidity, mortality percentages are indispensable reasons for this method to be preferred. The probability of other organ injuries should be thought of besides splenic trauma.

Keywords: Trauma, children, spleen, treatment

Öz

Amaç: Son on yılda dalak yaralanmaları nedeniyle kliniğimize başvuran çocuklarda dalak ve beraberindeki organ yaralanmalarına neden olan travma nedenlerini, tedavi tiplerini ve tedavi sonuçlarını değerlendirmeyi amaçladık.

Gereç ve Yöntem: Haziran 2011-Mayıs 2021 tarihleri arasında künt karın travmasına bağlı dalak yaralanması nedeniyle tedavi edilen 76 (56 erkek, 20 kız) hastanın raporları retrospektif olarak incelendi.

Bulgular: Hastaların yaşları 2-17 (8,7±5,4) arasında; 56'sı (%73,7) erkek, 20'si (%26,3) kız idi. Yaralanmaların nedenleri arasında motorlu taşıtla ilgili kazalar (%37, 48,7), yüksekten düşme (%21, 27,6), spor/engellere çarpma (%14, 18,3), karın duvarına bir nesnenin çarpması (%3, 3,9), atın tekme atması 1 (%1,3) yer aldı. 42 hastada (%55,3) izole dalak yaralanması mevcutken, 34 hastada (%44,7) başka organ yaralanmaları vardı. Dalak yaralanmaları 9' unda grade I (%11,8), 18' inde grade II (%23,7), 272'sinde grade III (%35,6), 19' unda grade IV (%25) ve 3'ünde grade V (%3,9) idi. Hemodinamik instabilite nedeniyle üç hastada (%3,9) splenektomi ve iki hastada (2,6%) incebarsak yaralanması nedeniyle incebarsak onarımı yapıldı. Bu hastaların hiçbiri dalak yaralanmasından ölmedi, ancak hastalarımızdan biri ameliyatsız tedavi sırasında beyin hasarından öldü.

Sonuç: Dalak yaralanması olan ve hemodinamik olarak stabil olan hastalarda konservatif tedavi yöntemleri seçilmelidir. Hastanede kalış süresinin kısalması, kan transfüzyonu gereksiniminin azalması ve morbidite, mortalite yüzdelerinin düşmesi bu yöntemin tercih edilmesinin vazgeçilmez nedenleridir. Dalak travmasının yanısıra diğer organ yaralanmalarının olasılığı düşünülmedir.

Anahtar Kelimeler: Travma, çocuklar, dalak, tedavi

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INTRODUCTION

The trauma is inducing death and disability in children. More than 90% of the pediatric age group entries worldwide are the outcome of a blunt mechanism, with 10% of these including the abdomen and pelvis. The spleen is the most widely affected intra-abdominal organ in children due to blunt abdominal traumas. Liver and kidney traumas are frequently contused organs with the spleen.[1,2] The abdominal organs in children are at an unreasonable risk of organ injuries owing to a higher transmission rate of forces through the slight abdominal wall, bigger relative surfaces of the solid abdominal organs; for example spleen and liver, more elastic ribs, and more horizontal positioning of the diaphragm in children contrasted to adults.[3]

Blunt abdominal traumas are most widely seen in traffic accidents, falls from height, and bicycle accidents. The treatment alternatives for splenic injuries are conservative treatment, splenoraphy, ligation of the splenic artery, partial or total splenectomy. Splenectomy or splenoraphy were the most considerable methods especially in the quarter of the last century.

However, the spleen includes a critical role in immune function, and because of the risk of sepsis due to gram-positive bacteria in asplenic patients, conservative treatment is currently more popular.[4]

The right and exact diagnosis for splenic injury decline morbidity and mortality. Abdominal x-ray graphy, ultrasonography (US), and computed tomography (CT) are the most widely used monitoring methods for diagnosis and follow-up in case of splenic trauma. Surgical methods are used less in solid organ injuries because of developments in radiology.[5]

We aimed to assess the causes of trauma that result in spleen and accompanying organ injuries, management types, and results of management in children referred to our clinic for spleen injuries in the last ten years

MATERIAL AND METHOD

This study was conducted by ethics committee approval obtained from Karamanoğlu Mehmetbey University Faculty of Medicine (06-12/10.09.2021). All procedures were carried out in accordance with the ethical rules and the principles of the Declaration of Helsinki. The records of 76 patients managed for splenic injuries owing to blunt abdominal trauma between June 2011 and May 2021 were examined.

In addition to demographic features of the patients such as age and gender, duration of stay in the hospital, causes of trauma, additional organ injuries, and treatment methods were examined. Hemodynamic status was determined with blood pressure at referral, hemoglobin levels, and essential for blood transfusion. All splenic trauma patients were accepted to the intensive care unit and their vital parameters (heart rate, number of breaths, blood pressure, urine output, and density) were assessed hourly and hemoglobin levels were measured at the 6th and 24th hours. Injuries were diagnosed by history, physical examination, US, and/or contrast CT. US and CT examinations were performed by a radiologist. Splenic injuries were graded according to the classification of the American Association for the Surgery of Trauma (AAST).

The need for blood transfusion and treatment modalities were examined. Patients with hemodynamic stability were managed conservatively. Patients with evidence of perforation of the bowels or low hemoglobin levels in spite of blood transfusions underwent surgery. Patients were classified according to a retrospective analysis of their records. Hemodynamic stability was determined by blood pressure hemoglobin levels and by performing blood transfusions.

RESULTS

The patients were aged between 2-17 (8.7±5.4) years; 56 (73.7%) were boys, 20(26.3%) were girls involved in this study. Patients were categorized according to treatment methods, into the non-operative treatment (NOT) (group I) or operative treatment (OT) (group II). Their blood pressures, hemoglobin levels, blood transfusion, stay in intensive care and hospitalization times were examined (**Table 2**).

Causes of injuries included accidents involving a motorized vehicle (37, 48.7%), falls from height (21, 27.6%), sports/bumping into obstacles (14, 18.3%), a crash object in the abdomen (3.3, 9%), kick from a horse 1 (1.3%).

Table 1. Adjustment of AAST Organ Injury Scale for Spleen

Grade	Injury type	Description of injury	*n	**%
I	Hematoma	Subcapsular <10% surface area	9	11.8
	Laceration	Capsular tear, <1cm parenchymal depth		
II	Hematoma	Subcapsular, 10% to 50% surface area Intraparenchymal, <5 cm in diameter	18	23.7
	Laceration	Capsular tear,1 cm to 3 cm parenchymal depth that doesn't involve a trabecular vessel		
III	Hematoma	Subcapsular, >50% surface area or expanding: ruptured subcapsular or parenchymal hematoma: intraparenchymal hematoma_>5 cm or expanding.	27	35.6
	Laceration	3 cm parenchymal depth or involving trabecular vessels		
IV	Laceration	Laceration involving segmental or hilar vessels producing major devascularization (>25% of the spleen)	19	25
V	Laceration	Completely shattered spleen	3	3.9
	Vascular	Hilar vascular injury with devascularizes spleen		

*Number of cases **Percentage

Systolic and diastolic blood pressures were lower in group II than in group I. Hb levels were considerably lower in group II than in group I. All of the patients in group II needed blood transfusions, whereas only 45.2% of patients treated in group I needed transfusions. Length of stay in intensive care and hospitalization time was significantly longer in group II than in group I (**Table 2**). X-ray graphy, US, and CT were used as diagnostic methods. CT was used for grading and other organ injuries in patients in whom splenic lacerations were detected in the US. Intra-abdominal free fluid was seen in the US in 65 (71.1%) patients. The splenic laceration was diagnosed directly in US in the 64 (71.1%) patients. In CT assessments splenic injuries were classed as grade I in 9 (11.8%) patients, grade II in 18 (23.7.1%), grade III in 27 (35.6%), grade IV in 19 (25%), and grade V 3 (3.9%) patients.

Table 2. The relationship between hemodynamic stability and hospitalization time in conservative and surgical treatment groups

	Group I (n. 70)	Group II (n. 6)
Systolic blood pressure	105 mmHg (95-120)*	95 mmHg (70-110)*
Diastolic blood pressure	70 mmHg (55-80)*	65 mmHg (50-75)*
Average Hb value	10.4 gr/dL (10-12)*	8.2 gr/dL (7-10.5)*
Transfusion (number of patients)	38 (%45)	6 (%100)
Stay in intensive care unit (day)	2 (1-3)*	3 (2-4)*
Lenght of stay (LOS) (day)	4 (3-6)*	7.5 (5-9)*

[*: mean (range)].

Patients with grade I and II injuries were treated conservatively whereas patients who had grade III (one patient), grade IV (one patient), grade V(one patient) injuries were treated surgically (**Table 2**). Two patients with subdiaphragmatic air were disclosed small bowel injury in X-ray.

Splenic injury alone was observed in 42 (55.3%) patients and in conjunction with other organ injuries in 34 (44.7%) patients. Other organ injuries included brain injuries in 11 (14.5%) patients, the liver in 9 (11.8%), lung in 7 (9.2%), kidney in 5 (6.6%), and bowel in 2 (2.6%) patients.

Seventy-one patients (93.4%) were treated conservatively, whereas 5 (6.6%) required surgery. Splenectomy was performed in three patients. Also, small bowel repair was done in two (2.6%) patients who had intestinal perforation. One of our patients died from brain injury while NOT.

DISCUSSION

The present first reason for death in children is trauma. Even in highly developed countries, traffic accidents account for the majority of deaths[6] which is verified by this study. After the year 2000, there was a remarkable change towards NOT of splenic injury, with a total success rate of 97%. NOT is thought the gold standart for the treatment of patients with blunt splenic trauma (BST) who are hemodynamically stable after a conservative approach, in the absence of peritonitis and associated injuries needing laparotomy.[7]

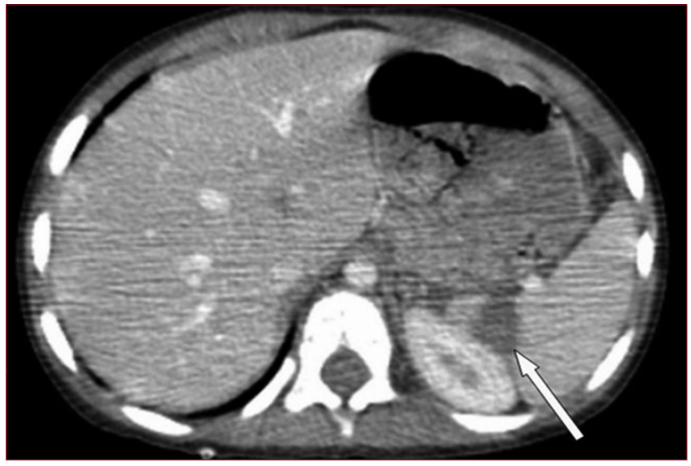

Figure 1. Axial enhanced CT image showing grade 2 splenic lacerations

A study disclosed that 36 (52%) of 69 patients had trauma due to domestic violence, 11 (16%) patients had trauma due to falls from height, 8 (11.5%) from traffic accidents, and 14 (20%) patients from fights, sporting activities and other reasons. Fights and sports accidents are the most common causes of solid organ injuries in adults while falls from height, traffic and bicycle accidents and falling objects are the most frequent causes of injury in children.[8] Our study included patients who had traumas because of accidents involving a motorized vehicle (37, 48.7%), falls from height (21, 27.6%), sports/bumping into obstacles (14, 18.3%), a crash object in the abdomen (3.3, 9%), kick from a horse 1 (1.3%).

Multi-trauma organ injuries occur after abdominal traumas in children because the dimensions of children are big, the surface area of children is limited and the intraabdominal organs are closer to each other. The liver is the most commonly injured organ with the spleen.[9,10] Liver injuries came after brain injuries in our study. This finding is different from those in the literature.

NOT including frequent physical examination, monitoring, bed rest, and hemoglobin measurements is the preferred mode of treatment in children because splenic traumas in children are well defined. Infection risk after splenectomy is higher in children than in adults, so conservation of the spleen is very important. A considerable number of grade 1-4 and 40% of grade 5 lacerations pull through well with NOT. In general, studies have shown that progress with NOT has a success level of 90-98% in children.[11] While all grade 1 and 2 lacerations were treated NOT in this study, one patient who underwent splenectomy had grade 3 laceration and one had grade 4 laceration, one had grade 5 laceration. The number of patients treated with NOT was 71 (93.4%). This result is well-matched with the literature. We can there infer that the need for surgery in cases of high-grade injury is lower in children than in adults.

We take notice that accompanying abdominal trauma can be an indication for surgery, and therefore lead to some form of spleen preserving treatment. In this study, there were

two patients who underwent laparotomy for indications other than splenic injuries. In both patients, the spleen was protected.

Even on the initial CT scan, contrast extravasation can be succeeded at NOT when using an identified treatment protocol. The APSA protocol declares that treatment should be rested on physiological answers rather than radiologic properties of the injury. Fluid supplementation alone is often enough to balance up a pediatric patient hemodynamically (as opposed to adults). These proposals further prove that NOT is safe in the pediatric population, even in the presence of seemingly considerable injuries. Literature shows that the success rate for NOT in high-grade splenic injuries (IV and V) is very high if patient is hemodynamically stable.

The only difference with lower grade injuries is that the LOS increases considerably.[12,13] In the NOT group LOS means 4, and the other OT group 7.5 days. This result is well-matched with the literature.

Abdominal CT findings such as intra-abdominal free fluid and enhancement of this fluid and contrast medium are used for adults in need of surgery; however, this is not true for children.[11] US and CT are the most used diagnostic imaging methods recently.[12] Insufficient recovery of vital signs in spite of adequate fluid replacement, another pathology requiring laparotomy, and the need for blood over the level of 40 ml/kg/day in pediatric patients are important criteria in determining surgical indications.[13]

Grading at CT was not indispensable parameter in deciding when surgery was necessary for this study; however, one patient with worsened hemodynamic and whose hemoglobin level did not rise in spite of blood transfusion underwent surgery.[14] Forty-three of 46 patients (93.5%) who had grade 3- 4 laceration on CT were managed NOT.

In this study Arikan et al.[4] reported incidences of abscess in two patients, dermopancreatic fistula in one patient and aspiration pneumonia in one patient. There are increased risks of infection and sepsis who had a splenectomy, so NOT is indispensable for children particularly.

Kuzma et al.[8] reported mean systolic blood pressure in a NOT group as 98 mmHg and in a surgically treated group as 84 mmHg. We detected the same parameter at the level of 105 mmHg in group I and 95 mmHg in group II; mean diastolic blood pressures were 70 mmHg in group I and 65 mmHg in group II. Hypotension is an indispensable parameter when considering surgery. There was signified hypotension in group II in our study.

In Thompson et al. study the level of hemoglobin in the nonoperative group was 12.1 g/dl and in the operative group was 11 g/dl.[4] This parameter was 10.4 g/dl in group I and 8.2 g/dl in group II in our study. Blood transfusions were performed in four patients (12%) in the nonoperative group and in five patients (83%) in the operative group in Thompson et al. study. Jerzy et al.[8] indicated that patients in the NOT group needed 0.81 unit of blood and the OT group they needed 2.91 units of blood ($p<0.001$). In this study the rate of blood transfusion in group I was 45% and in group II it was 100%. If hemodynamic stability cannot be obtained in spite of enough blood transfusions, so OT must be performed. Blood transfusions must be conducted and hemodynamic stability must be determined in patients with splenic traumas before deciding on surgery.

CONCLUSION

This research article gives insight to us that most splenic traumas can be treated conservatively in pediatric patients who are hemodynamically stable. There are some advantages to conservative management like short hospitalization time, less blood transfusion requirement, and a lower morbidity and mortality rate in splenic injuries. Patients must be examined strictly before deciding on surgery. Falls from height and traffic accidents are important causes of splenic injuries. The probability of other organ injuries should be thought of besides splenic trauma. Because mortality might be occurred due to the concomitant injuries.

ETHICAL DECLARATIONS

Ethics Committee Approval: This study was conducted by ethics committee approval obtained from Karamanoğlu Mehmetbey University Faculty of Medicine (06-12/10.09.2021).

Informed Consent: Because the study was designed retrospectively, no written informed consent form was obtained from patients.

Referee Evaluation Process: Externally peer-reviewed.

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REFERENCES

1. Clemente N, Di Saverio S, et al. Management and outcome of 308 cases of liver trauma in Bologna Trauma Center in 10 years, Ann Ital Chir, 2011;82:351-60.
2. Dodgion CM, Gosain A, Rogers A, St Peter SD, Nichol PF, Ostlie DJ. National trends in pediatric blunt spleen and liver injury management and potential benefits of an abbreviated bed rest protocol. J Pediatr Surg. 2014;49(6):1004-8.
3. Klimek PM, Lutz T, Stranzinger E, Zachariou Z, Kessler U, Berger S. Handlebar injuries in children. Pediatr Surg Int. 2013;29(3):269-73.
4. Arslan S, Guzel M, Turan C, Doğanay S, Kopru M. Management and treatment of splenic trauma in children. Ann Ital Chir,2015;86:30-34.
5. Visrutaratna P, Na-Chiangmai W. Computed tomography of blunt abdominal trauma in children. Singapore Med J 2008;49 (4):352.
6. McVay MR, Kokoska ER, Jackson RJ, et al. Throwing out the "grade" book:management of isolated spleen and liver injury based on hemodynamic status. J Pediatr Surg 2008;43:1072-6.
7. Juyia RF, Kerr HA. Return to play after liver and spleen trauma. Sports Health 2014;6:239-45.

8. Kuzma J, Atua V:Conservative management of splenic injury in the tropics. Tropical doctor, 2008;38:210-21.
9. Wegner S, Colletti JE, Van Wie D. Pediatric blunt abdominal trauma. Pediatry Clin North Am, 2006;53:243-56.
10. Sekmenli T, Gündüz M, Çiftçi İ. Travmatik Dalak Yaralanması ve Akut Apandisit Birlikteliği:Olgu Sunumu, Zeynep Kamil Tıp Bülteni 2013;44:48-50.
11. Ardley R, Carone L, Smith S, Spreadborough S, Davies P, Brooks A. Blunt splenic injury in children:the hemodynamic status key to guiding management, a 5-year review of practice in a UK major trauma centre. Eur J Trauma Emerg Surg. 2019;45(5):791-9
12. Leschied JR, Mazza MB, Davenport MS, et al. Inter-radiologist agreement for CT scoring of pediatric splenic injuries and effect on an established clinical practice guideline. Pediatr Radiol 2016; 46(2):229-36.
13. Yang K, Li Y, Wang C, Xiang B, Chen S, Ji Y. Clinical features and outcomes of blunt splenic injury in children:a retrospective study in a single institution in China. Medicine 2017;96(51):e9419.
14. Davies DA, Pearl RH, Ein SH. Management of blunt splenic injury in children:Evolution of the nonoperative approach. Journal of Pediatric Surgery, 2009;44:1005-8.

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Original Article / Orijinal Araştırma

Evaluation of Acute Appendicitis Findings in Children During the COVID-19 Pandemic Containment Process

COVID-19 Pandemisi Kısıtlama Sürecinde Çocuk Akut Apandisit Bulgularının Değerlendirilmesi

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Abstract

Aim: To evaluate the effect of the COVID-19 pandemic on patients admitted to the pediatric emergency department and operated with the diagnosis of acute appendicitis in the pediatric surgery clinic.

Material and Method: Files of patients who underwent appendectomy in the pediatric surgery clinic of Health Sciences University Adana City Training and Research Hospital between 16 March-16May 2019 and 16 March-16 May 2020 were retrospectively analyzed and divided into two groups respectively.

Results: In the study, 95 patients in Group-1 (5.1% 95/1851) and 83 patients in Group-2 (11.5% 83/724) was operated for acute appendicitis. There was a significant difference between the two groups in terms of the number of patients who underwent appendectomy (p=0.001). A statistically significant difference was not found between the two groups when age, gender, duration of admission to hospital, preoperative laboratory values and duration of hospitalizasyon were compared. Perforated appendicitis was detected in 9 (9.5%) of the patients who underwent appendectomy in Group-1 and in 13 (15.7%) of the patients in Group-2 and it was not statistically significant (p=0.007). The mean size of appendix of the surgical pathology specimens was found to be 8.98±3.12 mm in Group-1 and 10.3±3.43 mm in Group-2 (p=0.007).

Conclusion: Although the number of applications to pediatric emergency services decreased during the pandemic period, there was no decrease in the number of patients operated on due to appendicitis. In addition, it was found that the rate of perforated appendicitis increased. For this reason, it should be considered that the situations requiring emergency surgery do not decrease with the epidemic.

Keywords: Appendicitis, COVID-19, Child

Öz

Amaç: COVİD-19 pandemisinin çocuk acil servise başvuran ve çocuk cerrahi kliniğinde akut apandisit tanısı ile ameliyat edilen hastalar üzerindeki etkisinin değerlendirilmesi.

Gereç ve Yöntem: Sağlık Bilimleri Üniversitesi Adana Şehir Eğitim ve Araştırma Hastanesi çocuk acil servisine 16Mart-16Mayıs 2019 ile 16Mart-16Mayıs 2020 tarihleri arasında başvuran ve çocuk cerrahi kliniğinde apendektomi yapılan hastaların dosyaları retrospektif olarak incelenmiştir. Hastalar iki gruba ayrılmıştır, Grup1: 16Mart-16Mayıs 2019, Grup2: 16Mart-16 Mayıs 2020 tarihleri arasında ameliyat edilen hastalar olarak belirlenmiştir. Hastaların demografik verileri, hastaneye başvuru süresi, hastanede yatış süresi, patoloji raporlarında kayıtlı olan apendiks çapı, perforasyon olup olmaması ve laboratuvar bulguları değerlendirilmiştir.

Bulgular: Çalışmada Grup1'de 95 hastaya (%5,1 95/1851) Grup2'de 83 hastaya (%11,5 83/724) akut apandisit nedeni ile apendektomi yapıldığı saptanmıştır. Her iki grup arasında apendektomi yapılan hasta sayısı açısından anlamlı fark saptanmıştır (p=0,001). İki grup arasında yaş, cinsiyet, hastaneye başvuru süresi, ameliyat öncesi laboratuar değerleri ve hastanede yatış süresi karşılaştırıldığında istatistiksel olarak anlamlı fark saptanmamıştır. Grup1'de apendektomi yapılan hastaların 9'unda (%9,5), grup 2'deki hastaların 13'ünde (%15,7) perfore apandisit saptanmışve istatisktiksel olarak anlamlı fark bulunmamıştır (p=0,07). Patoloji raporlarında ölçülen apendiks çapı ortalama değerleri Grup1 'de 8,98±3,12mm, Grup2'de 10,31±3,43mm hesaplanmış ve istatistiksel olarak anlamlı bulunmuştur (p=0,007).

Sonuç: Pandemi döneminde çocuk acil servislerine başvuru sayısı azalmış olmasına rağmen apandisit nedeni ile ameliyat edilen hasta sayılarında azalma görülmemiştir. Ayrıca perfore apandisit oranının artmış olduğu saptanmıştır. Bu nedenle acil cerrahi gerektiren durumların salgın ile azalmadığı konusunda uyanık olunması gerektiği hatırlanmalıdır.

Anahtar Kelimeler: COVID-19, Çocuk, Apandisit

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INTRODUCTION

The new coronavirus disease (COVID-19) has spread rapidly all over the world since December 2019, when it was first detected in the People's Republic of China. COVID-19 has affected more than 10 million people worldwide and was declared as a pandemic by the World Health Organization (WHO) on March 11, 2020.[1,2] Due to the seriousness of the disease, strategies aimed at reducing the spread of the virus have been preferred worldwide, and each country has developed different strategies in their own conditions. Various restrictions such as interrupting face-to-face education in schools, applying restriction hours specific to age groups, and encouraging practices to stay at home voluntarily have imposed in different countries.[3-7] The first COVID-19 cases were detected in Turkey on March 11, 2020 and similar restrictions has also begun with the increase in the number of COVID-19 cases.[8] Although the target of the restrictions aims to manage the burden of the health system in a planned manner by reducing social movement, medical emergencies besides COVID-19 infection remained. Problems are encountered in solving emergency health problems other than COVID-19 infection due to the intensity caused by the pandemic and related conditions in the health systemand the lack of information on how individuals in the society will manage other emergency health problems during the pandemic process. Due to the difficulties brought by the pandemic, delay in the diagnosis and treatment of emergency health problems may lead to a more severe course of these diseases and increase in morbidity and mortality.[4,5,9-11]

One of the most common reason for admission to pediatric emergency service is acute abdominal pain.[12] At a rate of 1-8% of the children are diagnosed with acute appendicitis who applied to the emergency department with the complaint of acute abdominal pain.[13] Early diagnosis of acute appendicitis is important in starting surgical and antibiotic treatment at the appropriate time, preventing perforation, abscess formation and other postoperative complications.[13-15]

According to the results of the study examining the applications to the pediatric emergency department, the number of emergency surgery patients applied to the pediatric emergency department has decreased in the COVID-19 pandemic restriction period between March-May 2020.[3,7,16] In the studies, it has been determined that families are reluctant to take their children to the hospital due to the fear of catching COVID-19 and the restriction of the use of public transportation, and the difficulties in transportation to hospitals.[4,7,10,17,18] In the present study, it was aimed to evaluate the effect of the COVID-19 pandemic on patients who were admitted to the pediatric emergency department and operated with the diagnosis of acute appendicitis on days restricted due to the COVID-19 pandemic.

MATERIAL AND METHOD

The study was designed as a retrospective cohort study. Applications to the pediatric emergency department during the restriction period due to the pandemic and the applications in the same months last year before the pandemic was examined. Files of patients who applied to the pediatric emergency department of University of Health Sciences Adana City Training and Research Hospital between 16 March-16 May 2019 and 16 March-16 May 2020 with the complaint of abdominal pain and were hospitalized in the pediatric surgery clinic and underwent appendectomy were retrospectively analyzed. Patients hospitalized for other reasons rather than abdominal pain, patients operated due to ovarian pathology, patients operated due to acute abdomen but not diagnosed with appendicitis were excluded from the study. Patients were divided into two groups. Group 1: Patients operated before pandemic (between March 16 and May 16, 2019), Group 2: Patients operated in the pandemic (between March 16 and May 16, 2020). A total of 1851 patients in Group 1 and 724 patients in Group 2 were consulted to the pediatric surgery department due to abdominal pain. The demographic data of the patients, the duration of admission to the hospital, the length of hospital stay, the diameter value of the appendix recorded in the pathology reports, the presence or absence of perforation and laboratory findings were evaluated. Ethical approval was obtained from University of Health Sciences Adana City Training and Research Hospital Clinical Research Ethics Committee (18.11.2020 / 70/133) for the study. All procedures were carried out in accordance with the ethical rules and the principles of the Declaration of Helsinki.

Statistical analysis in the study was conducted using the SPSS (Statistical Package for the Social Sciences) 23.0 package program. Categorical measurements were calculated as numbers and percentages, and continuous measurements were calculated as mean and standard deviation (median and minimum-maximum where necessary). Pearson Chi-square test statistics were used to compare categorical variables. The Shapiro-Wilk test was used to determine whether the parameters in the study show normal distribution. In the comparison of continuous measurements between the groups, by controlling the distributions, Independent Student t-test was used for binary variables with normal distribution, and Mann Whitney u tests were used for more than two variables that did not show normal distribution. The statistical significance level was taken as 0.05 in all tests.

RESULTS

Demographic and clinical characteristics of the patients are shown in **Table 1**. Statistically significant difference was not found between the two groups when age, gender, duration of admission to hospital, preoperative laboratory values and length of hospital stay were compared (**Table 1**).

Comparison of postoperative diagnosis and pathological findings are shown in **Table 2**. In group 1, uncomplicated appendicitis was detected in 76 (80%), lymphoid hyperplasia in 10 (10.5%) and perforated appendicitis in 9 (9.5%) of the patients who underwent appendectomy. Uncomplicated appendicitis was detected in 8 (74.7%), lymphoid hyperplasia in 8 (9.6%), and perforated appendicitis in 13 (15.7%) of the

patients. Although the rate of perforated appendicitis was higher in Group 2, this difference was not statistically significant (p=0.07). Mean values of appendix diameter measured in pathology reports were higher in Group 2 (p=0.007).

Table 1. Demographic and clinical characteristics of the patients.

Variables	Group 1	Group 2	P Value
Number of patients	1851	724	
Operation Status			0.001
Unoperated patients	1756 (94.4%)	641 (88.5%)	
Operated patients	95 (5.1%)	83 (11.5%)	
Age, mean (Year±sd)	11.31± 4.3	12.1±3.9	0.19
Gender*			0.877
Female, n(%)	61 (64.2%)	52 (62.7%)	
Male, n(%)	34 (35.8%)	31 (37.3%)	
Application period to the hospital* (days)			0.139
mean± sd	1.8±1.3	2.2±1.5	
median (min-max)	2 (1-10)	2 (1-10)	
Length of stay at the hospital (days)*			0.707
(mean± sd)	3.3±2.3	3.5±2.4	
median (min-max)	3 (1-11)	2 (1-15)	
WBC 10^3/µl (mean±sd)*	13.9±5.6	15.3±4.9	0.073
Neutrophils % (mean±sd)*	74.4±14.2	75.3±14.4	0.700
Lymphocytes % (mean±sd)*	16.4±10.8	15.4±10.6	0.536
Thrombocytes 10^3/µl (mean±sd)*	311.2±93.7	303.3±81.8	0.553
C-reactive protein mg/L(mean±sd)*	37.7±53.8	39.9±68.8	0.829
Radiological evaluation*			0.575
PA erect abdominal, n (%)	59 (62.1)	53 (63.9)	
Ultrasound, n (%)	29 (30.5)	24 (28.9)	
Tomography, n (%)	6 (6.3)	3 (3.6)	
Ultrasound + Tomography, n (%)	1 (1.1)	3 (3.6)	

* Operated patients

Table 2. Comparison of post-operative diagnosis and pathological findings

	Group 1 n (%)	Group2 n (%)	P Value
Uncomplicated appendicitis	76 (80)	62 (74.7)	0.07
Lymphoid Hyperplasia	10 (10.5)	8 (9.6)	
Perforated appendicitis	9 (9.5)	13 (15.7)	
Total	95 (100)	83 (100)	
The mean size of appendix of the surgical pathology specimens (mm) (mean±sd)	8.9±3.1	10.3±3.4	0.007

DISCUSSION

The COVID-19 pandemic has caused some changes in the service provision of hospitals in our country as well as the rest of the world. During the pandemic period, there were even times when elective surgeries were stopped and only emergency operations were allowed in operating rooms. In this process, most of the inpatient services in hospitals in many centers were transformed into COVID-19 services, the number of patients admitted to polyclinics was reduced and only patients with appointments were allowed to the polyclinics. While operating room personnel and doctors were assigned to work in COVID-19 intensive care, service and emergency polyclinics, emergency services were rearranged in accordance with the pandemic.

According to the results of this study, a significant difference was found between the number of patients in group 1 and group 2. This finding indicates that the number of patients admitted to pediatric emergency clinics has decreased in the COVID-19 pandemic.[3,7,19,20] The reasons for the decrease in pediatric emergency clinic admission are, the thought that health problems are solved with local health services, suggestions to stay at home, people do not want to enter crowded environments such as emergency services and risk of infection.[4,7,18] In our study, although the number of patients admitted to the pediatric emergency department during the pandemic period decreased, the number of patients operated for acute appendicitis in the pediatric surgery clinic did not decrease when compared to the last year, and even an increase was observed in the operation rates. In the study of Kvasnovsky et al., when the pandemic period was compared with the patients who underwent appendectomy in the last year, results were similar.[21] There are also different studies reporting that there is no decrease in pediatric appendectomies during the pandemic period.[4,18,22]

According to the literature, appendicitis in children is more common at the ages of 10-19 and there is a peak at 11-12 years of age. Appendicitis is more common in girls.[12,15,23] In this study, although there was no significant difference between the groups, the age and gender distribution of the patients in the groups were compatible with the age and gender of appendicitis in the literature. In studies conducted in the pandemic, appendicitis was more common in males.[4,17,18] However, in our study, females were more common in both groups. There was no significant difference between the groups in terms of admission time. There are studies reporting higher complication rate in patients with acute appendicitis with delayed admission to hospital. It has been reported that the incidence of complicated appendicitis increases especially in patients whose symptoms last than 24 hour and who undergo appendectomy.[4,11,17,18,24] In our study, the admission time to hospital was more than 24 hours in both groups and Group 2's admission time was longer. Although there was no statistically significant difference between the two groups in terms of perforation, the higher rate of perforation during the pandemic period suggests complications due to delayed admissions.[11,18] Our results was similar with the studies in the literature.

Studies have reported that patients who underwent appendectomy during the pandemic period had a longer length of hospital stay.[13,21] In these studies, they reported reasons such as the patients presenting later than 24 hours, higher perforation rates, and the preoperative follow-up of patients with COVID-19 with antibiotic treatment.[4,7,10,11,21]

In our study, the similarity of patient hospitalization period between the groups may be related to the fact that physicians kept their hospitalization periods short to reduce the risk of COVID-19 infection during the pandemic period.

Since it is difficult to diagnose acute appendicitis in pediatric patients, clinical evaluation, laboratory evaluation and radiological examinations are used. In this study, since most of the patients were brought to the hospital under emergency conditions at night, the patients were evaluated according to physical examination and laboratory values (white blood cell, neutrophil, lymphocyte, platelet count and C-reactive protein). Adequate radiological examination could not be performed due to the difficulty of performing ultrasonography at night. However, abdominal tomography was performed deemed necessary according to the surgeon's preference. Ultrasound and abdominal tomography could be performed on very few patients in both groups. The decision for surgery was made according to physical examination and laboratory findings

In the literature, there are studies in which the diameter of the appendix is measured with radiological imaging methods.[25-29] Romero et al. conducted a study calculating the tomographic measurement of the appendix diameter in adult patients with acute appendicitis during the pandemic period. They reported that appendix diameter was found to be higher in patients diagnosed with acute appendicitis during the pandemic period and it was statistically significant.[26] In our study, we evaluated the appendix diameter according to the pathological measurements after the surgery, since tomography was not peformed in all of the patients and the appendix diameter was not measured in the tomography. Since there isn't study based on phatological measurements, we can't make a comparison, but the appendix diameter was found to be higher in pathological measurements in patients who underwent appendectomy during the pandemic period. It was found statistically significant.

CONCLUSION

In this study, which was carried out with the aim of evaluating the findings of appendicitis in children during the period of restriction by the COVID-19 Pandemic, it was found that the number of surgical emergencies did not decrease despite the decrease in the number of patients applied to the pediatric emergency department. It was found that the rate of operated patients increased during the pandemic period, the mean values of the measured appendix diameter were higher, and the incidence of perforated appendicitis increased.

Despite the decrease in the number of referrals to pediatric emergency services during the pandemic period, the number of patients operated on is similar and the rate of perforated appendicitis among them has increased, reminding pediatric emergency physicians and surgeons that the situations requiring emergency surgery do not decrease with the pandemic.

ETHICAL DECLARATIONS

Ethics Committee Approval: The study approved by the Ethical Committee of Adana City Training and Research Hospital, with the ethical number of 1133.

Informed Consent: Informed consent was obtained from the parents of all patients preoperatively.

Referee Evaluation Process: Externally peer-reviewed.

Conflict of Interest Statement: The authors have no conflicts of interest to declare.

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REFERENCES

1. Data as received by WHO from national authorities by 10:00 CEST, Coranavirus disease 2019 (COVID-19) Situation report -158 [June 26th, 2020];Available from:https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200626-covid-19-sitrep-158.pdf?sfvrsn=1d1aae8a_2
2. Sohrabi C, Alsafi Z, O'Neill N, et al. World health organization declares global emergency:a review of the 2019 novel coronavirus (COVID-19). Int J Surg. 2020;76:71-6.
3. Dong Y, Mo X, Hu Y, et al. Epidemiology of COVID-19 Among Children in China. PEDIATRICS 2020;145;(6):1-10.
4. Orthopoulos G, Santone E, Izzo F, et. al. Increasing incidence of complicated appendicitis during COVID-19 pandemic. Am J Surg 2021;221;(5):1056-60.
5. Valderrama OC, Morales X, Ferrigni CJ, et al. Acute Care Surgery during the COVID-19 pandemic in Spain: Changes in volume, causes and complications. A multicentre retrospective cohort study. Int J Surg 2020;80:157-61.
6. Wei Y, Yu C, Zhao TX, et al. The impact of Covid-19 pandemic on pediatric operations:a retrospective study of Chinese children. Italian Journal of Pediatrics 2020;46(155):1-5.
7. Dopfer C, Wetzke M, Scharff AZ, et al. COVID-19 related reduction in pediatric emergency healthcare utilization-a concerning trend. BMC Pediatrics 2020;20:(427):1-10.
8. Demirbilek Y, Pehlivantürk G, Özgüler ZÖ, Alp Meşe E. COVID-19 outbreak control, example of ministry of health of Turkey. Turk J Med Sci. 2020;50(1):489-94.
9. Zhou Y, Cen LS. Managing acute appendicitis during the COVID-19 pandemic in Jiaxing, China. World J Clin Cases 2020;8(19):4349-59.
10. Place R, Lee J, Howell J. Rate of pediatric appendiceal perforation at a children's hospital during the Covid-19 pandemic compared with the previous year. JAMA Network Open 2020;3(12):1-3:e2027948
11. Sinapiri O, Danziger CR, Krause I, et al. Delayed diagnosis of pediatric appendicitis during the COVID-19 pandemic. Acta Paediatrica 2020;109;(8):1672-6.
12. Kaharbanda AB, Stevenson MD, Macias CG, et al. Interrater reliability of clinical findings in children with possible appendicitis. Pediatrics 2012;129;(4):695-700.
13. Rentea RM, St. Peter SD, Snyder CL. Pediatric appendicitis:state of the art review. Pediatr Surg Int 2017;33;(3):269-83.
14. Sucu A, Tolunay O, Cesur İB, et al. Relationship Between Acute Appendicitis and Platelet Indices in Childhood. J Pediatr Emerg Intensive Care Med 2018;5:98-102.

15. Kaharbanda AB, Benitez GV, Ballard DW, et al. Development and Validation of a Novel Pediatric Appendicitis Risk Calculator (pARC). PEDIATRICS 2018;141(4):1-9.

16. Ludvigsson JF. Systematic review of COVID-19 in children shows milder cases and a better prognosis than adults. Acta Paediatrica. 2020;109;(6):1088-95.

17. Velayos M, Munoz-Serrano AJ, Estefanía-Fernández KJ, et al. Influence of the coronavirus 2 (SARS-Cov-2) pandemic on acute appendicitis. Anales Pediatria (Barc) 2020;93;(2):118-22.

18. Gerall CD, DeFazio JR, Kahan AM, et al. Delayed presentation and sub-optimal outcomes of pediatric patients with acute appendicitis during the COVID-19 pandemic. J Pediatr Surg 2021;56;(5)905-10.

19. Zvizdic Z, Vranic S. Decreased number of acute appendicitis cases in pediatric population during the COVID-19 pandemi:Any link? Journal of Pediatric Surgery 2021;56;(1):199-200.

20. Isba R, Edge R, Broughton E, Francis N, Butler J. Where have all the children gone? Decreases in paediatric emergency department attendances at the start of the COVID-19 pandemic of 2020. Arch Dis Child 2020;105(7):704.

21. Kvasnovsky CL, Shi Y, Rich BS, et al. Limiting hospital resources for acute appendicitis in children:Lessons learnd from the U.S epicenter of the COVID-19 pandemic. J Pediatr Surg 2021;56(5):900-4.

22. Archer LP, Blackll S, Campbell H, Boyd D, McBride C. Increased incidence of complicated appendicitis during the COVID-19 pandemic. J Pediatr Child Health 2020;56(8):1313-4.

23. Körner H, Söndenaa K, Söreide JA, et al. Incidence of acute nonperforated and perforated appendicitis:age-specific and sex-specific analysis. World J Surg 1997;21(3):313-7

24. Pham XB, Sullins V, Kim D, et al. Factors predictive of complicated appendicitis in children. J Surg Res. 2016;206(1):62-6.

25. Katipoglu B, Aygun A, Cinar H. The effect of appendix diameter on perforation in acute appendicitis cases. Cumhuriyet Med J2019;41(2):392-7.

26. Romero J, Valencia S, Guerrero A. Acute appendicitis during coronavirus disease 2019 (COVID-19):changes in clinical presentation and CT findings. J Am Coll Radiol 2020;17(8):1011-3.

27. Gezer HÖ, Temiz A, Ezer S, İnce E Demir Ş, Hasbay B. Acute Appendicitis in Children;Assessment of Diagnostic Reliability of Ultrasonography. Turkish J Pediatr Dis 2021;15:123-8.

28. Pedram A, Asadian F, Roshan N. Diagnostic Accuracy of Abdominal Ultrasonography in pediatric Acute Appendicitis. Bull Emerg Trauma 2019;7(3):278-83.

29. Nielsen JW, Boomer L, Kurtovic K, et al. Reducing computed tomography scans for appendicitis by introduction of a standardized and validated ultrasonography report template. J Pediatric Surg 2015;50(1):144-8.

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Original Article / Orijinal Araştırma

Evaluating The Knowledge Level, Perception and Attitude Towards COVID-19 Among Otolaryngologists

Kulak Burun Boğaz Uzmanlarının COVID-19'a Karşı Bilgi Düzeyi, Algı ve Tutumlarının Değerlendirilmesi

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Abstract

Aim: Otolaryngologists cope with the COVID-19 pandemic at first lines. Inadequate knowledge level among healthcare workers may cause inadequate controlling efforts to maintain required treatments, facilitate the rapid spread of infections and an impenetrable process start.The aim of the study was to determine the attitude, knowledge level and perception of the risk of infection with COVID-19 among otolaryngologists.

Material and Method: A questionnaire consist of a total of 36 questions was prepared in order to evaluate the knowledge and attitude about COVID-19 among Otolaryngologists.

Results: The average true answer rate of knowledge questions was% 86 (range 63-100 %) showing that a great of participants had good knowledge level about the COVID-19 in our study. The majority of the otolaryngologists showed a positive behaviour towards COVID-19.

Conclusion: According to our knowledge this present study was the first study that focused on the knowledge level and attitude towards COVID-19 among otolaryngologists.

Keywords: COVID-19, knowledge, attitude, perception, otolaryngologists

Öz

Amaç: Kulak Burun Boğaz Uzmanları , COVID-19 salgını ile ön saflarda savaşmaktadır. Sağlık çalışanları arasında yetersiz bilgi seviyesi, gerekli tedavileri sürdürmek için yetersiz kontrol çabalarına, enfeksiyonların hızlı yayılmasını kolaylaştırmaya ve aşılmaz bir sürecin başlamasına neden olabilir. Çalışmanın amacı kulak burun boğaz uzmanlarının COVID-19 enfeksiyonu riskine ilişkin tutum, bilgi düzeyi ve algısını belirlemekti.

Gereç ve Yöntem: Kulak Burun Boğaz Uzmanlarının COVID-19 hakkındaki bilgi ve tutumlarını değerlendirmek için toplam 36 sorudan oluşan bir anket hazırlandı.

Bulgular: Bilgi sorularının ortalama gerçek cevap oranı% 86 (63-100 aralığında) olup, çalışmamızda katılımcıların büyük bir kısmının COVID-19 hakkında iyi bilgi düzeyine sahip olduğunu göstermektedir. Kulak burun boğaz uzmanlarının çoğu, COVID-19'a karşı olumlu bir davranış gösterdi.

Sonuç: Bildiğimiz kadarıyla bu çalışma, Kulak Burun Boğaz Uzmanları arasında COVID-19'a yönelik bilgi düzeyi, davranış ve tutumunu inceleyen ilk çalışmadır.

Anahtar Kelimeler: COVID-19, bilgi, davranış, algı, KBB uzmanı

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INTRODUCTION

On December 31st, 2019, The World Health Organization (WHO), was declared of pneumonia cases of an uncertain genesis in Wuhan, Hubei province, China. The new microorganism was defined on January 7th, 2020 as '2019 n-CoV'. The illness caused by the virus was named given the name coronavirus disease 2019 (COVID-19) on February 11th, 2020 and on March 11th, 2020 WHO defined the outbreak as a pandemic.[1] The WHO declared many online training sessions about COVID-19 in many languages to enforce precautions, informing healthcare workers for preparedness procedures. Inadequate knowledge level among healthcare workers may cause inadequate controlling efforts to maintain required treatments, facilitate the rapid spread of infections in hospitals.[2] Healthcare workers have an essential role in terms of combating the pandemic and have to be aware of updated testing guidelines and novel treatment modalities. There is a great deal of misinformation is spread during a pandemic, particularly due to social media. This misinformation exists even among health care professionals.[3] It is very important for an otolaryngologist to keep himself from the disease and to fight with the disease at frontlines.[4] The aim of the study was to determine the attitude, knowledge level and perception of COVID-19 among otolaryngologists.

MATERIAL AND METHOD

We performed this present study after approval of the Ministry of Health in Turkey and Malatya Clinical Research Ethics Committee (number 2020/176). A questionnaire consisting of a total of 36 questions that included six demographic questions, 17 COVID-19 specific knowledge questions, eight questions regarding attitude and behaviour in terms of the disease, three questions about the current literature, conference follow up, and participation, and two questions about personal care was prepared in order to analyze the knowledge of and attitude regarding COVID-19 among otolaryngologists. The general information questions were prepared using international guidelines from the World Health Organization (WHO), the Turkish Centre for Disease Control and Prevention and the Turkish Ministry of Health, among others. The demographic data consisted of; age, sex, occupational group (ENT specialist, assistant and academician), institution (state hospital, training and research hospital, university, private hospital, and other), marital status, total working years. A group of otolaryngologists analyzed the scope , feasibility and consistency of the survey which was developed in Turkish. The knowledge portion included questions regarding the transmission methods, incubation period, mortality rate, diagnosis, radiological images, and treatment modalities of COVID-19. All questions were in multiple choice format and the survey was maintained available online (through Google documents) and sent to the participants (via What's App or email) . General information questions were formed as multiple choice questions and calculated as 'True= 1 point, False=0 point'. Behavioural questions were also formed as multiple choice questions and calculated like 'Always equals to 5 points, Often as 4 points, Sometimes 3 points, Rarely 2 points and Never refers to 1 points'. We included the participants who accept to participitate voluntarily. A total of 102 otolaryngologists participated the questionnaire.

The data was analyzed by the SPSS "Statistical Package for Social Sciences (SPSS17.0)" program. Percentages, average, standard deviation, minimum, maximum values were calculated. In terms of the variables, Kolmogorov-Smirnov test statistics ($p>0.05$) were suitable for normal distribution and parametric test statistics were used. The differentiation between the two groups was evaluated using the Independent Samples Test. The difference between more than two groups was evaluated by ANOVA test. Chi-square test was utilized to evaluate the data and compare qualitative variables. The Kolmogorov-Smirnov test statistics ($p<0.05$), non-parametric test statistics, the Kruskal Wallis test, and Mann-Whitney U were utilized for data not suitable for normal distribution. The relationship between two variables was analyzed by Pearson Correlation test. An alpha error level of $p<0.05$ was accepted as considerable in statistical comparisons.

RESULTS

Demographic Features of Participants

We obtained 102 valid responses from participants. **Table 1** summarizes the characteristics of the population. The mean age was 41.4±7.05 years. 69.6% of participants were ENT specialist, 3.9% were assistant and 26.5% were academician.

Table 1. Demographic characteristics of participants

	n	%
Gender		
Female	67	65.7
Male	35	34.3
Profession		
Specialist	71	69.6
Assistant	4	3.9
Academician	27	26.5
Institution		
State Hospital	21	20.6
University	20	19.6
Training and Research Hospital	41	40.2
Private	20	19.6
Marital Status		
Married	89	87.3
Single	13	12.7

Results of Knowledge Questions

The rates of true and false answers to the knowledge questions were given in **Table 2**. The results showed that the participants had satisfactory overall knowledge of COVID-19. The average true answer rate of knowledge questions was 86% (63-100%). 82% of the participants knew

where the name of the new type of corona virus came from. 97% knew that SARS and MERS were included in the corona virus family and 100% the formal name of COVID-19. 64.7% of ENT doctors knew that SARS- CoV-2 is an envelope single stranded RNA virus and 63.7% remembered the date of 11 th March 2020 that was announced as pandemic by WHO. 87.3% of the participants knew the typical symptoms and 65.7% of them aware of the COVID-19 potential intensive care requirement ratio. A large number of participants, 91.2 %, knew the mechanism by which the virus attaches to the human cell. 77.5% of the participants replied correct answer to the question regarding the definition of 'reproduction ratio'(RR). Questions about transmission routes, disease incubation period, accurate diagnosis, and the typical thorax tomography findings were answered correctly by nearly all of the participants with percentages of 99%, 100%, and 100%, respectively. 94.1% knew that COVID-19 can also be contagious during the fever-free period. 94.1% of the participants knew the drugs used in COVID-19 treatment. 89.2% of the ENT doctors knew that the surgical mask has three layers and 68.6% of otolaryngologists agreed that the most sensitive sample for COVID-19 can be obtained from bronchoalveolar lavage. There was also no statistically significance among the correct answers given to the questions and age, gender, total working years, place of employment, or profession (**Table 3**).

Seminar/Conference/Course Participation Results

37.3% of female and 17.1% of male ENT doctors reported that they had attended a conference, seminar or course on COVID-19 (**Table 4**). A statistically significance was determined among the genders in terms of conference, course, or seminar participation. It was statistically measured that women had a higher rate of participation than men ($p<0.05$). No numerically significance was detected regarding conference, seminar, or course attendance between the occupational groups and the institutions. The average age of otolaryngologists attending the conference was 43.6 (± 6.9) and the average age of those who did not attend was 40.4 (± 6.9). The attendance rate was higher in older physicians ($p<0.05$). Conference participation was not differed between occupational groups and not affected from total working years, or place of employment statistically ($p>0.05$) (**Table 5, 6**). 61.8% of the ENT doctors (63 participants) heard about COVID-19 from a bulletin and 26 of those (25.5%) heard from social media (**Table 4**).

Results of Attitude Questions

41.1% otolaryngologists answered 'often' and 6.8% answered 'always' to the question 'how often do you follow up with current articles about COVID-19?'. 46% of doctors replied 'always' and 29% replied 'often' to the statement 'I wash my hands before patient examination' while 71.5% answered 'always' and 23.5% answered 'often' to the statement 'I wash my hands after patient examination'. 51.9% of participants confirmed that they always wash their hands both before and after patient examination while 29.4% indicated that they do this often. Most of the otolaryngologists, 83%, stated that they used to wear a surgical mask during patient examination during pandemic. Conversely, 54.9% doctors stated that they always and 24.5% of often wear N95 or derived masks while in contact with patients. 41.1% of doctors stated that they had always tried to teach the population and remind them of COVID-19 protection methods since the pandemic began; 36% of them indicated that they tried to do this often. A large portion of doctors, 86%, confirmed that they had never removed their masks when they needed to speak with the patient in the policlinic.

Table 2. The rate of True and False Answers of Knowledge Questions between 7-23.

Questions	True Answers		False Answers	
	n	%	n	%
COVID-19 name of origin	82	80.4	20	19.6
Which agents belong to the corona family?	97	95.1	5	4.9
The special name of the viral agent of COVID-19	102	100.0**	---	---
Single- stranded RNA virus	66	64.7	36	35.3
Announcement date of the pandemic	65	63.7	37	36.3
ICU requirement	67	65.7	35	34.3
Not the typical COVID-19 symptom	89	87.3	13	12.7
The way of viral cell attachment of COVID-19	93	91.2	9	8.8
reproduction ratio	79	77.5	23	22.5
Main transmission way of COVID-19	101	99.0	1	1.0
Whether the virus is contagious in fever-free period	96	94.1	6	5.9
Incubation period	102	100.0**		
Definitive diagnosis	99	97.1	3	2.9
Typical thorax BT sign	102	100.0**		
The most sensitive sample	70	68.6	32	31.4
Treatment protocol	96	94.1	6	5.9
Surgical mask layers	91	89.2	11	10.8

All of the participants gave true answers to the questions about the special name of the viral agent of COVID-19, incubation period, typical thorax BT sign.

About 44% of the participants stated that they always wore all the required protective equipment in accordance with the rules while examining patients; 40% of them stated that they did this often. 13% of the participants stated that they did not eat out in order to avoid COVID-19 while 38% of them reported that they often avoided it. 15% of otolaryngologists noted that, since the pandemic began, they always paid attention to their nutrition while and 38% indicated that they often paid attention to it (**Table 7**). Average behavioural and attitude scores were 43.1 (±

Table 4. Seminar/conference/course participation rate and the source the otolaryngologists first heard about COVID-19.

Seminar/conference/course	n	%
Yes	31	30.4
No	71	69.6
The source they heard first about COVID-19.		
Bulletin	63	61.8
Social media	26	25.5
Newspaper	2	2.0
Instution	11	10.8
Total	102	100.0

Table 3. True and False Answers rate of Knowledge Questions 7th -23th between ENT specialist, assistants and academicians.

QUESTIONS		PROFESSION			p	chi-square
		ENT specialist	assistant	academician		
COVID-19 name of origin	False True	15 (21.6%) 56 (79.6%)	0 (0%) 4 (100%)	5 (18.5%) 22 (81.5%)	0.906	0.541
Which agents belong to the corona family?	False True	5 (4.2%) 68 (95.8%)	0 (0%) 4 (100%)	2 (7.4%) 25 (95.1%)	0.685	0.983
The special name of the viral agent of COVID-19	False True	0 71 (100%)	0 4 (100%)	0 27 (100%)		
Single- stranded RNA virus	False True	26 (36.6%) 45(63.4%)	0 4 (100%)	10 (37%) 17 (73%)	0.431	1.889
Announcementdate of the pandemic	False True	30 (42.3%) 41 (57.7%)	2 (50%) 2 (50%)	5 (18.5 22 (81.5%)	0.62	5.346
Not the typical COVID-19 symptom	False True	10 (14.1%) 61 (85.9%)	0 4 (100%)	3 (11.1%) 24 (88.9%)	0.95	0.267
ICU requirement	False True	20 (28.2%) 51 (71.8%)	2 (50%) 2 (50%)	13 (48.1%) 14 (51.9%)	0.11	4.072
The way of viral cell attachment of COVID-19	False True	6 (8.5%) 65 (91.5%)	1 (25%) 3 (75%)	2 (7.4%) 25 (92.6%)	0.38	1.910
Definition of reproduction ratio	False True	16 (22.5%) 55 (77.5%)	2 (50%) 2 (50	5 (18.5%) 22 (81.5%)	0.356	2.072
Main transmission way of COVID-19	False True	0 71 (100%)	0 4 (100%)	1 (3.7%) 26 (96.3%)	0.304	3.93
Whether the virus is contagious in fever-free period	False True	6 (8.5%) 65 (91.5%)	0 4 (100%)	6 (5.9%) 21 (94.1%)	0.362	2.272
Incubation period	False True	0 71 (100%)	0 4 (100%)	0 27 (100%)		
Definitive diagnosis	False True	2 (2.8%) 69 (97.2%)	0 4 (100%)	1 (3.7%) 26 (96.3%)	0.98	0.996
Typical thorax BT sign	False True	0 71 (100%)	0 4 (100%)	0 27 (100%)		
The most sensitive sample	False True	18 (25.4%) 53 (74.6%)	1 (25%) 3 (75	13 (48.1%) 14 (51.9	0.08	4.690
The most sensitive sample	False True	2 (2.8%) 69 (97.2%)	0 4 (100%)	4 (14.8%) 23 (85.5%)	0.07	4.652
Surgical mask layers	False True	7 (9.9%) 64(90.1%)	0 4 (100%)	4 (14.8%) 23 (85.5%)	0.67	0.72

Table 5. Seminar/conference/course participation rate between ENT specialist, assistants and academicians and comparison in terms of gender and profession

		Seminar/Conference/Course Participation Rate			
		Yes	No	p	Chi-Square
Gender	Female Male	25 (37.3%) 6 (17.1%)	42 (62.7%) 29 (82.9%)	0.035**	4.42
Profession	specialist assistant academician	18 (25.4%) 1 (25%) 12 (44.4%)	53 (74.6%) 3 (75%) 15 (55.6%)	0.174	3.417
Institution	State hospital University hospital Training and Research Private	3 (14.3%) 7 (35%) 13 (31.7%) 8 (40%)	18 (85.7%) 13 (65%) 28(68.3%) 12 (60%)	0.282	3.818

** A statistically significant difference was determined between the male and female otolaryngologists in terms of the conference, course or seminar participation. It was statistically measured that women had a higher rate of the conference, course or seminar participation than men (p =0.035).

4) for women and 39.3 (±5.2) for men. COVID-19 behaviour and attitude scores were higher among female ENT doctors than male ones. A statistically significance was detected regarding behavioural attitude score between genders (p=0.01) (**Table 8**). A positive correlation between working year and behavioural attitude score (r=0.269, p=0.006) as well as between age and behavioural attitude score was detected (r=0.268, p=0.006). No statistically significant difference in COVID-19 behaviour and attitude scores existed in terms of profession or institution.

Table 6. Seminar/conference/course participation rate according to age and experience

Seminar/conference/ course participation rate		n	Mean ±Std. Deviation	p	t
Age	Yes	31	43.6129±6.93627	0.038**	2.098
	No	71	40.4789±6.94233		
Total working year	Yes	31	18.1613±7.28970	0.07	1.830
	No	71	15.3380±7.11125		

** The average age of otolaryngologists attending the conference was 43.6 (± 6.9), and the average age of those who did not attend was calculated as 40.4 (± 6.9). The attendance rate was higher in older physicians than those who did not attend the conference. The difference was statistically significant (p =0.038).

DISCUSSION

The COVID-19 microorganism was defined on January 7th, 2020 as '2019 n-CoV', a new coronavirus. The novel disease was named coronavirus disease 2019 (COVID-19) on February 11th, 2020 and WHO deemed the current state to be a pandemic on March 11th, 2020.[1] 2019-nCoV is an enveloped single-stranded RNA virus and belongs to Coronaviridae family. S proteins help the virus to attach to the Angiotensin Converting Enzyme 2 (ACE-2) receptors of the human epithelial cells located in the respiratory mucosa.[5,6] 82% of the participants knew that the name of the new type of coronavirus came from the year it was defined and 97% of them had learned that SARS and MERS were included in the coronavirus family. 100% knew the formal name of COVID-19. 64.7% of ENT doctors knew that SARS- CoV-2 was a kind of envelope single stranded RNA virus and 63.7% recalled the date that the pandemic was declared by WHO. Most the of participants, 91.2 %, knew the method by which the virus connects to a human cell.

The diagnostic tests for coronavirus are reverse-transcription polymerase chain reactions (RT-PCR), real time RT-PCRs (rRT-PCT), and reverse transcription loop-mediated isothermal amplifications. Bilateral pulmonary parenchymal ground-glass and consolidative pulmonary opacities, peripheral lung

Table 7. Answers of Attitude Questions between 26-36.

Questions	Always (n/%)		Often (n/%)		Sometimes (n/%)		Rarely (n/%)		Never (n/%)	
	n	%	n	%	n	%	n	%	n	%
Hand washing before patient examination	47	46	30	29.4	14	13.7	6	5	5	3.9
Follow up current articles	7	6.8	42	41.1	39	38.2	11	10.7	3	2.9
Hand washing after patient examination	73	71.5	24	23.5	3	2.9	2	1.9	0	0
Hand washing before and after patient examination	53	51.9	30	29.4	9	8.8	9	8.8	1	0.9
Wearing surgical mask	85	83.3	4	3.9	4	3.9	5	4.9	4	3.9
Wearing N95 mask	56	54.9	25	24.5	15	14.7	6	5.8	0	0
Effort to teach around	42	41.1	37	36.2	19	18.6	3	2.9	1	0.9
Removing mask while speaking requirement	0	0	0	0	2	1.9	12	11.7	88	86.2
Wearing total protective equipments	45	44.1	41	40.1	8	7.8	5	4.9	2	1.9
Not eat out	14	13.7	39	38.2	27	26.4	15	14.7	7	6.8
Taking attention to own nutrition	16	15.6	39	38.2	26	25.4	17	16.6	4	3.9

Table 8. Attitude scores between groups

Attitude scores		n	Mean±Std. Deviation	p	test statistics
Gender	Female	67	43.1194±4.03966	0.001**	t=4.032
	Male	35	39.3429±5.25773		
Profession	specialist	71	41.3239±5.29359	0.076	Chi-Square 5.149
	assistant	4	39.7500±2.75379		
	academician	27	43.4444±3.12968		
Institution	State h.	21	42.2381±3.61808	0.647	F=0.553
	University h.	20	42.8500±4.06882		
	Training and research h.	41	41.2927±5.78897		
	Private h.	20	41.4500±4.52449		
Marital Status	Married	89	41.9775±4.32219	0.964	z=-0.45
	Single	13	40.7692±7.55153		

** COVID-19 behaviour and attitude scores were higher among ENT female doctors than male doctors (p =0,001).

distribution form typical CT findings of the disease. [7] Questions about transmission ways, incubation period of the disease, definitive diagnosis, and the specific thorax tomography images of COVID-19 were answered correctly by nearly total of the participants. Fever, cough, and dispnea are the main early COVID-19 symptoms that have been clearly declared by CDC.[8]

A vast majority of the doctors, 94.1%, were aware that COVID-19 can also be contagious during the fever-free period. It has been reported in many studies that intensive care reqirement in COVID- 19 cases varies between 5-8%.[9-14] 65.7% of the otolaryngologists knew the average COVID-19 potential intensive care requirement ratio. The question about the definition of the term 'reproduction ratio' of the disease (RR) was relatively requiring detailed information and 77.5% of the participants gave the correct answer to this question. The reproduction ratio (RR) can be determined as the estimated number of patients infected through only one infected case in the whole population.[15] Lopinavir inhibits the protease activity of the coronavirus LPV/Ritonavir combination in SARS patients, was effective as initial treatment, and is belived to reduce the death rate. Remdesivir is another antiviral agent used for COVID-19 and is considered to improve pulmonary mechanism, reduce viral loads, and cure serious pulmonary involvement. Chloroquine is an antimalarial and autoimmune disease drug. It is considered as to prevent virus reproduction through rising endosomal PH and has been used in the prevention and treatment of COVID-19 pneumonia. Hydroxychloroquine is a more potent chloroquine analogue in COVID-19 treatment[7] Azitromycin is a macrolid antibiotic used in COVID-19 treatment for its features such as in-vitro decreased viral replication, blocking entrance into host cells, and immunomodulating.[16] It is a part of COVID 19 treatment protocol of children in Turkey. Favipravir is an RNA-dependent RNA polymerase inhibitor used in COVID-19 treatment.[17] 94.1% of the participants correctly selected the drug not included in the treatment of COVID-19.

Face masks have a preserver layer to prevent the transmission of the virus.It is important to know how to wear a face mask and how to dispose of it. A surgical mask has three layers.[18] 89.2% of the ENT doctors knew this. Wenling Wang et al. detected SARS-CoV-2 in different types of clinical specimens and they indicated that bronchoalveolar lavage samples presented the highest positivity (93%).[19] 68.6% of otolaryngologists agreed that the most sensitive sample in terms of positive COVID-19 results can be gained from bronchoalveolar lavage. We could not detect a numerically significance between the otolaryngologists, residents, or assistants in terms of rates of correct answers to the questions. The average true answer rate of knowledge questions was 86% (63-100%), showing that a great of otolaryngologists had a good knowledge level regarding COVID-19; this result was similar to those of the studies carried out by Maheshwari and Giao among medical students and healthcare workers, respectively.[20,21] Studies about knowledge and attitude regarding COVID-19 among otolaryngologists are limited.

Sameer Mehrotra and et al. showed that 65% healthcare professionals had a moderate and another 33% of healthcare professionals had a low level of COVID-19 knowledge in their study. Maheshwari et al. found that 86% of medical students had a good level of knowledge on COVID-19 while Giao et al. found that 81% of healthcare workers had sufficient knowledge. This difference may be due to the format of the questions, yes/no or multiple choice. It is very important for doctors to have adequate knowledge about COVID-19 so that they can treat it at all phases including symptomatology, diagnosis, treatment and disease protection. Modi et al. found that their participants had an inadequate level of knowledge regarding the potential consequences of close contact.[3,21,22]

Wahed et al. detected that direct contact to COVID-19 positive cases increased knowledge level exponentially, as dealing directly with patients allows for healthcare workers to learn more about the disease and force to read more about current literature and guidelines.[6] Haridi et al. showed that the dental healthcare workers did not have satisfactory information regarding mandatory precautions against the infectious diseases or their transmission. Quadri et al. found that the knowledge of COVID-19 among the dental interns, dental auxiliaries, and dental specialists in Saudi Arabia is adequate.[8]

Naseer Ahmed et al. found the current knowledge level and awareness of healthcare professionals to adequate in their study. They found that healthcare professionals (HCPs) learned information about COVID-19 from multiple media sources; Sun et al. concurred. The major information source in this study was bulletins, with social media acting as a secondary resource. Naseer Ahmed et al. underlined the importance of the reliability and authenticity of the readily available COVID-19 information. Continuing education programmes such as seminars, webinars, and courses as well as constant updating of prevention methods, transmission methods, and treatment modalities should be mandatory for HCPs.[23]

ENT specialists face a high risk of infection due to their compulsory close contact to patients' upper respiratory system and the type of the procedures they carry out; this is particularly important for aerosol-generating procedures. On April 19th, 2020, The Guardian headlined the death of an otolaryngology consultant from COVID-19. This was one of the first frontline hospital workers to pass away from COVID-19 in the UK.[1]

Zhang et al.found that 89% of healthcare workers had good knowledge about COVID-19.[24] Bhagavathula et al. found that health care workers have insufficient knowledge about COVID-19 transmission prevention in their study.[2] Public health administrators all around the world, take precautions against the pandemic and disseminated informative videos, instructive brochures, educational newsletters to increase knowledge level of the health care practitioners and general population. It is very important to wash hands appropriately and to use personal protective equipments including surgical

masks, gloves, eye shields, etc. A well-informed health care professional is very important not only for community but also for work colleagues and patients.[8]

COVID-19 behaviour and attitude scores were higher among female ENT doctors than male ones (p=0.01). a positive correlation was detected between working year and behavioural attitude score (r=0.269 p=0.006) and also between age and behavioural attitude score (r=0.268, p= 0.006) in our study. Otolaryngologists are not included in the Scientific Board Established by Ministry of Health in Turkey yet. However, the opinions of otolaryngologists will be needed for the duration of the COVID-19 pandemic. It is critical for them to be able to give correct information to their communities, colleagues, and patients. Many otolaryngologists in our country have had to treat COVID-19 patients as well as their own ENT patients. They have had to educate themselves on this issue as much as infection specialists or lung and chest disease specialists directly associated with COVID-19 have; otolaryngologists should be familiar with the most recent information about COVID-19.

Limitations

However, there are some limitations in this study. Our study group was small and may be supported by large groups in future studies. Having two separate groups in the study would have made it more valuable in terms of comparing the study data, being a single-group study is a disadvantage. The questionnaire we used is self-reported and depends on the participant's honesty and recall ability in part; in this respect this may recall bias.

CONCLUSION

The knowledge and attitude scores were high among otolaryngologists in this study. To our knowledge, it was the first to focuse on the knowledge level and attitude towards COVID-19 among otolaryngologists.

ETHICAL DECLARATIONS

Ethics Committee Approval: We performed this present study after approval of the Ministry of Health in Turkey and Malatya Clinical Research Ethics Committee (number 2020/176).

Informed Consent: The first question at the beginning of the survey was asked to the participants whether they participated in our study and online survey or not. Candidates who answered the questionnaire after reading the preliminary explanation of the study and choosing the statement as I agree to participate the study and fill in the questionnaire were included in the study. Informed consent was obtained from all participants.

Referee Evaluation Process: Externally peer-reviewed.

Conflict of Interest Statement: The authors have no conflicts of interest to declare.

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

REFERENCES

1. Banerjee S, Sarkar S, Bandyopadhyay SN. Survey and analysis of knowledge, attitude and practice among otolaryngologists in a state in eastern India in relation to the coronavirus disease 2019 pandemic. J Laryngol Otol 2020;134(8):696-702.
2. Bhagavathula AS, Aldhaleei WA, Rahmani J, Mahabadi MA, Bandari DK. Knowledge and Perceptions of COVID-19 Among Health Care Workers:Cross-Sectional Study. JMIR Public Health Surveill 2020;30(2):19160.
3. Mehrotra S, Jambunathan P, Jindal M, Gupta A, Kapoor K. A cross-sectional survey to assess the knowledge regarding coronavirus disease (COVID-19) among health care professionals. Med J Armed Forces India 2020;15.
4. Kanaparthi A, Dukkireddy D, Gopalaiah H, Kesary SPR, Katne T, Gantala R. Awareness of COVID 19 pandemic among dental practioners of Telangana state, India:A cross sectional survey. J Oral Biol Craniofac Res 2020;10(4):484-9.
5. Ikhlaq A, Bint-E-Riaz H, Bashir I, Ijaz F. Awareness and Attitude of Undergraduate Medical Students towards 2019-novel Corona virus Pak J Med Sci 2020;36 (COVID19-S4):32-36.
6. Abdel Wahed WY, Hefzy EM, Ahmed MI, Hamed NS. Assessment of Knowledge, Attitudes, and Perception of Health Care Workers Regarding COVID-19, A Cross-Sectional Study from Egypt J Community Health 2020;7:1-10.
7. Zhai P, Ding Y, Wu X, Long J, Zhong Y, Li Y. The epidemiology, diagnosis and treatment of COVID-19. Int J Antimicrob Agents 2020;55(5):105955.
8. Quadri MFA, Jafer MA, Alqahtani AS, et al. Novel corona virus disease (COVID-19) awareness among the dental interns, dental auxiliaries and dental specialists in Saudi Arabia:A nationwide study. J Infect Public Health 2020;13(6):856-64.
9. Yang X, Yu Y, Xu J, et al. Clinical course and outcomes of critically ill patients with SARS-CoV-2 pneumonia in Wuhan, China:a single-centered, retrospective, observational study. Lancet Respir Med. 2020;8(5):475-81.
10. Wang D, Hu B, Hu C, et al. Clinical Characteristics of 138 Hospitalized Patients With 2019 Novel Coronavirus-Infected Pneumonia in Wuhan, China. JAMA 2020;323:1061.
11. Wu Z, McGoogan JM. Characteristics of and Important Lessons From the Coronavirus Disease 2019 (COVID-19) Outbreak in China:Summary of a Report of 72 314 Cases From the Chinese Center for Disease Control and Prevention. JAMA 2020;323:1239.
12. Guan WJ, Ni ZY, Hu Y, et al. Clinical Characteristics of Coronavirus Disease 2019 in China. N Engl J Med 2020;382:1708.
13. Grasselli G, Pesenti A, Cecconi M. Critical Care Utilization for the COVID-19 Outbreak in Lombardy, Italy:Early Experience and Forecast During an Emergency Response. JAMA 2020;323:1545.
14. Livingston E, Bucher K. Coronavirus Disease 2019 (COVID-19) in Italy. JAMA 2020;323:1335.
15. Hamza MS, Badary OA, Elmazar MM. Cross-Sectional Study on Awareness and Knowledge of COVID-19 Among Senior pharmacy Students. J Community Health 2020;15:1-8.
16. Arshad S, Kilgore P, Chaudhry ZS et al. Treatment with hydroxychloroquine, azithromycin, and combination in patients hospitalized with COVID-19. Int J Infect Dis 2020;97:396-403.
17. Irie K, Nakagawa A, Fujita H, et al. Pharmacokinetics of Favipiravir in Critically Ill Patients With COVID-19. Clin Transl Sci 2020;13(5):880-5.
18. Kumar J, Katto MS, Siddiqui AA, et al. Knowledge, Attitude, and Practices of Healthcare Workers Regarding the Use of Face Mask to Limit the Spread of the New Coronavirus Disease (COVID-19).Cureus 2020;20,12(4):7737.

19. Wang W, Xu Y, Gao R, et al. Detection of SARS-CoV-2 in Different Types of Clinical Specimens. JAMA 2020;12,323(18):1843-4.
20. Maheshwari S, Gupta P.K, Sinha R, Rawat P. Knowledge, attitude, and practice towards coronavirus disease 2019 (COVID-19) among medical students:a cross-sectional study. J Acute Dis 2020;9(3):100.
21. Giao H, Han NT, Van Khanh T, Ngan V.K, Van Tam V, Le An P. Knowledge and attitude toward COVID-19 among healthcare workers at district 2 Hospital, Ho Chi Minh city. Asian Pac J Trop Med 2020;13.
22. Modi PD, Nair G, Uppe A, Modi J, et al. Cureus. COVID-19 Awareness Among Healthcare Students and Professionals in Mumbai Metropolitan Region:A Questionnaire-Based Survey. 2020;2;12(4):e7514.
23. Ahmed N, Shakoor M, Vohra F, Abduljabbar T, Mariam Q, Rehman MA. Knowledge, Awareness and Practice of Health care Professionals amid SARS-CoV-2, Corona Virus Disease Outbreak. Pak J Med Sci 2020;36(COVID19-S4):49-56.
24. Zhang M, Zhou M, Tang F, et al. Knowledge, attitude and practice regarding COVID-19 among healthcare workers in Henan, China. J Hosp Infect 2020;105:183-7.

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Case Report / Olgu sunumu

Chemical Burn Caused by Garlic

Sarımsak Kullanımına Bağlı Kimyasal Yanık

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Abstract

In traditional medicine garlic is used intensely for it's antimicrobial, antihypertensive and antihyperlipidemic etc. effects. For this reasons, use of garlic is common among the public health. In this case we aimed to present a patient with a second degree skin burn because of self-applying garlic on his superficial eruptions.

Keywords: Burn, chemical burn, garlic (*Allium sativum*), traditional treatment, contact dermatitis

Öz

Sarımsağın geleneksel tıpta antimikrobiyal, antihipertansif, antihiperlidemik vb. nedenlerle kullanımı mevcuttur. Bu nedenle halk arasında yanlış kullanımına sık rastlanmaktadır. Bu olgu sunumunda yüzeyel döküntülerini iyileştirmek için cildine sarımsak süren ve 2.derece yanık yakınması ile acil servise başvuran hastayı bildirdik.

Anahtar Kelimeler: Yanık, kimyasal yanık, sarımsak (*Allium sativum*), geleneksel tedavi, kontakt dermatit

INTRODUCTION

Garlic (*Allium sativum*), which is orginated from Asia, has a long history. It is primarily used as a spice in meals, later in the treatment of traditional medicine.[1] It was also tested in cholera and plague epidemic in the treatment of amoebic dysentery in Africa.[2] Even a world congress which was named '*The Health Importance of Garlic and Garlic Ingredients*' washeld in Washington in 1990.[3] There are many publications emphasized that garlic has not used only for it's antibacterial, antiparasitic and antiviral purpose but also antihypertensive, antihyperlipidemic, fibrinolytic and antitumor effects.[4-9]

In this case we aimed to represent a patient with a second degree skin burn because of garlic usage.

CASE REPORT

A 62-year-old diabetic male patient admitted to our emergency department (ED) with eczema-like skin lesions on his bilateral hands and feets. He applied crushed garlic on his both feets and distal tibial regions with wrapped bandage. His vital parameters were stable (TA: 121/71 mmHg, pulse: 72 beat/min, respiratory rate: 12/min, temperature: 36.8°C). In his physical examination there was a 10% total second degree burn where was surrounding of the both distal tibial/feet region and its approximately 5% of the one leg and 5% of the other (**Figure 1**). Other systemic examinations was normal. Patient's laboratuvary findings were found within normal range except complete blood count (WBC 9520 mm³) and blood glucose level (146 mg/dL). After the patient's burned areas was washed with pressurized sterilwater, he was consulted with the burn specialist.

The patient was hospitalized because of the diabetes mellitus comorbidity and the total 10% percentage of burns in both feet. Due to rule out possible vascular pathologies, arterial/venous doppler ultrasonography was performed in burn service and pathological condition was not detected, microorganism growth was not observed in patient's wound cultures either. He was followed up with daily wound care and dressing. On the 5th day of hospitalization he was discharged without any complication with a good clinical improvement. Blood glucose level was in normal level during the hospital stay.

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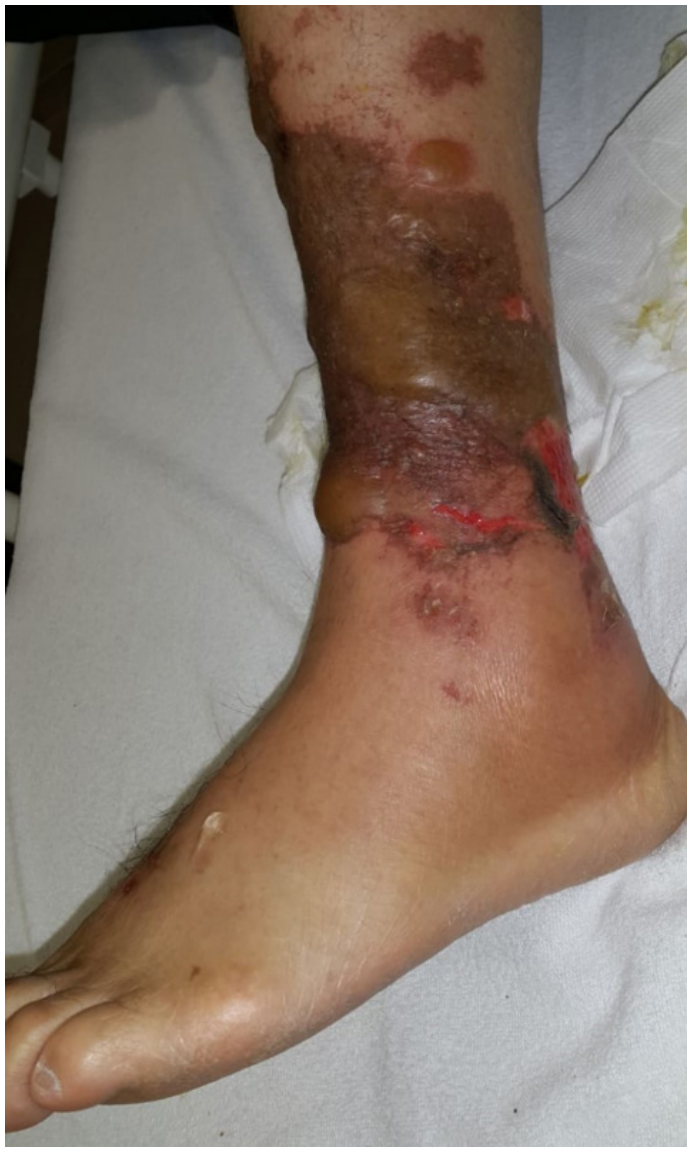

Figure 1. Chemical burns due to garlic use

DISCUSSION

Garlic (*Allium sativum*) has been used in traditional medicine for a long time and is still using for the therapeutic purpose in many cultures.

During World War II, the Soviet army used garlic to prevent infections so it was called "Russian Penicilin". The antifungal, antiparasitic, antiviral, antimicrobial, antihypertensive, blood glucose lowering, antithrombotic, antimutagenic and antiplatelet properties of this herb have been confirmed.[3]

'It is the dose that separates the drug from the posion' said Paracelsus however this situation may not be the case for some herbal treatments likewise garlic.

The first contact dermatitis and chemical burn case by using topical garlic was reported in 1987 in a 17 month-old child.[10] Likewise this case, there is still skin chemical burn ED admissions caused by topical application of garlic. Monosulfides, disulfides, trisulfides, and allicin are the primary allergens in garlic believed to cause a contact dermatitis. Although not entirely figured out, singular reactivity to garlic is hooked to genetic differences, concentration and freshness of the garlic, duration of exposure, preexisting skin diseases, individual reactivity and occupational exposure.[4] Therefore, while taking anamnesis in case of burn patients, garlic usage should always be in mind for differential diagnosis.

We believe that not only the herbalists must be kept under control but also patients should be more frequently educated such of these traditional treatment complications.

This case report underline the importance of clinicians' ability to recognize unforeseeable presentations of injury due to culturally abusive etiology of herbal treatments.

Application of raw garlic (skin or mucosal) must be discouraged.

ETHICAL CONSIDERATIONS

Informed Consent: Written informed consent was obtained from all participants who participated in this study.

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REFERENCES

1. Bhattarai A, Atreya A, Karki B. Garlic-induced face burn. Med Leg J. 2021;25817220981818.
2. Ayaz E, Alpsoy HC. Sarımsak (*Allium sativum*) ve Geleneksel Tedavide Kullanımı. Türkiye Parazitoloji Derg 2007;31:145-9.
3. Hitl M, Kladar N, Gavarić N, Srđenović Čonić B, Božin B. Garlic burn injuries-a systematic review of reported cases. Am J Emerg Med. 2021;44:5-10.
4. Kaçar CK, Kiliç ET, Akelma H, Uzundere O, Kaydu A, Gökçek E. Medical Folk Remedy: Two Cases of Garlic Burns. J Burn Care Res. 2019;40(1):133-5.
5. Harris JC, Plummer S, Turner MP, Lloyd D. The microaerophilic flagellate Giardia intestinalis: *Allium sativum* (garlic) is an effective antigiardial. Microbiology (Reading). 2000;146:3119-27.
6. Sharp O, Waseem S, Wong KY. A garlic burn. BMJ Case Rep. 2018;2018:bcr2018226027.
7. Barr R, Chin KY. Iatrogenic burns from garlic. J Burn Care Res. 2013;34(3):e214.
8. Yilmaz HH, Gormez O, Hastar E, Yildirim D, Aksoy MC. Garlic burn in a patient with trigeminal neuralgia: a case report. Eur J Dent. 2010;4(1):88-90.
9. Karasaki Y, Tsukamoto S, Mizusaki K, Sugiura T, Gotoh S. A garlic lectin exerted an antitumor activity and induced apoptosis in human tumor cells. Food Res Int 2001;34:7-13.
10. Bagga S, Thomas BS, Bhat M. Garlic burn as self-inflicted mucosal injury-a case report and review of the literature. Quintessence Int. 2008;39:491-4.

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Case Report / Olgu sunumu

Spontaneous Pneumomediastinum in COVID-19 Patient: A Case Report

COVID-19 Bağlı Gelişen Spontan Pnömomediastinum: Olgu Sunumu

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Abstract

Spontaneous pneumomediastinum has been reported as a rare complication in COVID-19 pneumonia. Symptoms in pneumomediastinum are usually nonspecific. A 36-year-old male patient was admitted to our clinic with shortness of breath, cough, and left flank pain. His computed tomographic (CT) examination of the thorax showed pneumomediastinum. The patient was accepted as COVID-19 pneumonia and related pneumomediastinum. This case was presented to emphasize that patients with severe Covid-19 pneumonia on computed tomography may develop pneumomediastinum during treatment.

Keywords: SARS-COV-2, pneumomediastinum, COVID-19

Öz

COVID-19 pnömonisinde, spontan pnömomediastinum nadir gelişen bir komplikasyon olarak bildirilmiştir. Pnömomediastinumda semptomlar genellikle nonspesifiktir. Otuz altı yaşında erkek hasta nefes darlığı, öksürük, sol yan ağrısı ile kliniğimize kabul edildi. Takiplerinde çekilen Bilgisayarlı toraks tomografisinde mediastende hava dansiteleri izlendi. Hasta COVID-19 pnömonisi ve buna bağlı gelişen pnömomediastinum olarak kabul edildi. Bu olgu bilgisayarlı tomografide ağır Covid-19 pnömonisi olan hastalarda tedavi sırasında pnömomediastinum gelişebileceğini vurgulamak amacıyla sunulmuştur.

Anahtar Kelimeler: SARS-COV-2, Pnömomediastinum, COVID-19

INTRODUCTION

The new severe acute respiratory syndrome virus (SARS CoV-2) identified in the end of 2019 subsequently resulted in a global pandemic, as declared by the World Health Organization (WHO) in March 2020.[1] SARS CoV-2 may not only lead to pneumonia and severe acute respiratory failure requiring ventilation, but it may also be associated with a number of other pulmonary and systemic complications. [2] Pneumonia is the most common lung manifestation of coronavirus disease 2019 (COVID-19). Pneumomediastinum (PM) is defined as the presence of free air between the mediastinal tissues due to intrathoracic and extrathoracic conditions.[3] To our knowledge, there have been only limited case reports of SARS CoV-2 associated pneumomediastinum in the published literature.

CASE

A 36-year-old male patient, who admitted to the emergency department with the complaints of cough, shortness of breath, and left flank pain for a week, was admitted to the chest diseases clinic with the diagnosis of pneumonia. His medical history was remarkable for chronic renal failure, hypertension and familial mediterranean fever (FMF), although he had no known pulmonary conditions. He was currently receiving colchicine for FMF, bisoprolol for hypertension. He was on hemodialysis 3 days of week. He had a 10 pack-year smoking history and was an ex smoker for 5 years. On admission, the patient was in moderate general condition, conscious, cooperative, oriented, blood pressure was 120/75 mmHg, heart rate 74 beats per minute, respiratory rate 18 breaths/minute, and pulse oxygen

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saturation in room air was 99%, body temperature was 37.6°C. Respiratory system and other system examinations were normal. Laboratory data showed a CRP 24 mg/L, procalcitonin 0.80 µg/L, D-Dimer 75 ng/mL, LDH 343 mg/dL (**Table 1**). Computed tomography of the thorax revealed ground glass and crazy paving accompanying peripheral consolidation areas containing air bronchograms in the left upper lobe of the lung (**Figure 1**). Since this appearance is not typical for COVID-19 pneumonia and the Polymerase Chain Reaction test was negative, the patient was started on nonspecific antibiotherapy (Moxifloxacin 400 mg 1×1, piperacillin-tazobactam 3×2.25 gr). On the 7th day of treatment, the patient developed dyspnea. Oxygen saturation measured by pulse oximetry while breathing room air was 88%. In biochemical parameters significant progression was detected (D-Dimer 992 ng/mL, ferritin 1482 ng/mL, LDH 504 mg/dL, IL-6 10 pg/mL, Troponin 300 ng/L). Polymerase Chain Reaction test was negative. There was no growth in blood, urine, sputum, and catheter cultures. Galactomannan antigen and collagen tissue markers were negative (**Table 1**). In the control thorax tomography, widespread patchy-nodular multifocal ground glass opacities in both lungs, and interlobular septal thickening (crazy paving pattern) were observed. In addition, air densities were observed in the at the planes cervical level soft tissue and mediastinum. Findings were consistent with COVID-19 pneumonia and pneumomediastinum (**Figure 2**).

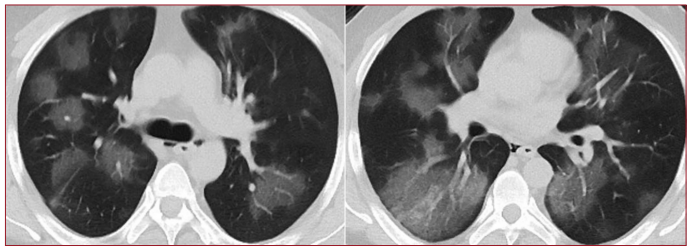

Figure 1. Thorax computerized tomography sections of the patient; ground glass and crazy paving accompanying peripheral consolidation areas containing air bronchograms in the left upper lobe of the lung.

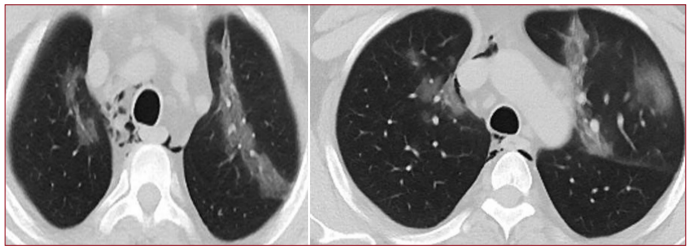

Figure 2. In the control thorax computerized tomography sections of the patient: widespread patchy-nodular multifocal ground glass opacities in both lungs, interlobular septal thickening , air densities in cervical level soft tissue and mediastinum.

The patient was considered to have COVID pneumonia and spontaneous pneumomedastinum due to increased dyspnea, hypoxemia, increase in inflammatory markers, progressive bilateral consolidation-ground glass opacities on CT, and the presence of pneumomediastinum during follow-up.

The patient, whose saturation was 88 in the absence of oxygen support, was followed up in the pulmonological intensive care unit. Treatments included immune plasma, antiviral treatment, pulsed steroid (250 mg/day, 3 days, prednisolon) and nasal oxygen.

On the 20th day of hospitalization, the symptoms completely resolved and the patient no longer needed oxygen. Significant improvement in laboratory parameters (**Table 1**), and radiological regression in bilateral ground glass infiltration and pneumomediastinum were observed. The patient was discharged with recommendations.

We present our case because spontaneous pneumomediastinum cases due to COVID-19 are rare in the literature.

Table 1. Laboratory data of the patient

Variable	Admission	7th Day	Discharge	Reference Range
D-Dimer	675	992	916	0-500 ng/ml
Fibrinogen	700	700	253	200-400 mg/dl
Ferritin	260	1482	747	11-306 ng/ml
LDH	343	504	260	126-222 mg/dl
IL-6		10.6		0.5-6.4 pg/ml
CRP	24	28	1.6	0-8 mg/l
Procalcitonin	0.83	6	0.15	0-0.5 ug/l
Troponin	10.6	300	17.5	0-17.5 ng/l
PCR	Negative	Negative	Negative	Negative
Galactomannan antigen		Negative		Negative
Lactate	1.2	4.9	2.2	0.3-2 mmol/l

LDH: Lactic Dehydrogenase; IL-6: Interleukin 6; PCR: Polymerase Chain Reaction

DISCUSSION

Pneumomediastinum ıs a rare condition characterized by the presence of air in the mediastinum.[4] Pneumomediastinum may occur in patients with COVID-19 pneumonia, either occurring spontaneously, or in association with invasive mechanical ventilation.[5,6] Its pathophysiology involves the development of air dissection in the bronchovascular sheath due to a pressure gradient between the alveoli and interstitium, and was originally described by Maclin.[7] Although the positive pressure in patients receiving non-invasive mechanical ventilation is of lesser degree as compared to invasive mechanical ventilation, pathophysiological mechanisms are probably similar.[8]

Symptoms and signs are generally non-specific, and include chest pain, dyspnea, dysphagia, cough, palpitations, agitation, sore throat, odynophagia, dysphonia, and hemoptysis. It may co-exist with subcutaneous emphysema and pneumothorax. Venous distention, hypotension, and reduced cardiac output may be observed in patients who also develop tension pneumomediastinum.[9] Chest x-ray is the initial examination of choice and allows a diagnosis to be established in most cases. Air collections around the esophagus, main bronchi, and mediastinum are highly suggestive of spontaneous Pneumomediastinum (SPM).[10]

PM is generally a self-limited condition that resorbs with prophylactic antibiotics and conservative treatment without prolonged hospitalization. However, evacuation of air with mediastinotomy may be required in tension pneumomediastinum.[9]

Since COVID-19 related pulmonary infection infects both type I and type II pneumocytes, the integrity of the alveolar membrane is disrupted.[11] Therefore, injury to alveolar membrane may represent a possible mechanism leading to alveolar rupture and subsequent spontaneous pneumomediastinum.

Pneumothorax, pneumomediastinum, or subcutaneous emphysema have as been reported to occur due to mechanical ventilator-related barotrauma or ARDS in patients admitted to intensive care units. However, as a result of the lung-protective ventilation strategies adopted in the past two decades, a significant decline in the incidence of pneumomediastinum or subcutaneous emphysema due to barotrauma has been observed. On the other hand, a noticeable increase has been observed in the incidence of PM/subcutaneous emphysema during the COVID-19 pandemic, despite continued use of such lung protective approaches.[12] The patient reported herein developed SPM. A decrease in lung compliance, advanced age, and underlying lung disease (such as interstitial lung disease, chronic obstructive pulmonary disease cystic fibrosis, and certain lung infections like Pneumocystis jirovecii pneumonia) are known risk factors for non- trauma related pneumomediastinum.[13] However, our patient had no such underlying conditions.

Pneumomediastinum has not been associated with increased mortality in COVID- I9 patients.[9]

Previously, a link between elevated LDH and increased risk of spontaneous pneumomediastinum has been proposed in patients infected with SARS.[14] In this patient, the LDH level at presentation was 343 U/L, rising dramatically to 504 U/L following admission to the intensive care unit. A possible link between elevated LDH due to cellular injury and development of PM, similar to that observed in SARS, cannot be excluded.

CONCLUSION

In this case report, a rare complication due to SARS CoV-2 pneumonia has been described. In patients with severe CT signs of SARS CoV-2 pneumonia, it should be borne in mind that development of pneumomediastinum may be associated with poor prognosis. Further studies or case series are warranted to better elucidate the pathophysiological mechanisms.

ETHICAL CONSIDERATIONS

Informed Consent: Written informed consent was obtained from all participants who participated in this study.

Status of Peer-review: Externally peer-reviewed.

Conflict of Interest Statement: The authors have no conflicts of interest to declare.

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

REFERENCES

1. Coronaviridae Study Group of the International Committee on Taxonomy of Viruses. The species Severe acute respiratory syndrome-related coronavirus: classifying 2019-nCoV and naming it SARS-CoV-2. Nat Microbiol. 2020;5(4):536-44.
2. Jain A, Talwar D, Kumar S. Spectrum of Respiratory Involvement in COVID 19 Era; An Overview. IJMTFM. 2020;14(4):6593-99.
3. Caceres M, Ali SZ, Braud R, Weiman D, Garrett HE Jr. Spontaneous pneumomediastinum: a comparative study and review of the literature. Ann Thorac Surg. 2008;86(3):962-6.
4. Goldman N, Ketheeswaran B, Wilson H. COVID-19-associated pneumomediastinum. Clin Med (Lond). 2020;20(4):91-2
5. Zhou C, Gao C, Xie Y, Xu M. COVID-19 with spontaneous pneumomediastinum. The Lancet Infectious Diseases. 2020;20(4):510.
6. Wali A, Rizzo V, Bille A, Routledge T, Chambers AJ. Pneumomediastinum following intubation in COVID-19 patients: a case series. Anaesthesia. 2020;75(8):1076-81.
7. Murayama S, Gibo S. Spontaneous pneumomediastinum and Macklin effect: Overview and appearance on computed tomography. World J Radiol. 2014;6(11):850-4.
8. Fukushima K, Marut K, Kiyofuji C, Sugimoto M. Evaluation of the incidence of pneumothorax and background of patients with pneumothorax during noninvasive positive pressure ventilation. Nihon Kokyuki Gakkai Zasshi. 2008;46(11):870-4.
9. Shennib HF, Barkun AN, Matouk E, Blundell PE. Surgical decompression of a tension pneumomediastinum. A ventilatory complication of status asthmaticus. Chest. 1988;93(6):1301-2.
10. Durukan P, Tekin İ, Yakar S, Salt O, Baykan N, Ozkan S. Spontaneous pneumomediastinum: Case report. Gazi Med J 2017;28(4):275-7.
11. Gralinski LE, Baric RS. Molecular pathology of emerging coronavirus infections. J Pathol. 2015;235(2):185-95.
12. Lemmers DHL, Abu Hilal M, Bnà C, et all. Pneumomediastinum and subcutaneous emphysema in COVID-19: barotrauma or lung frailty? ERJ Open Res. 2020;6(4):00385-2020.
13. Kouritas VK, Papagiannopoulos K, Lazaridis G, et all. Pneumomediastinum. J Thorac Dis. 2015;7(Suppl 1):S44-9.
14. Chu CM, Leung YY, Hui JY, et all. Spontaneous pneumomediastinum in patients with severe acute respiratory syndrome. Eur Respir J. 2004;23(6):802-4.