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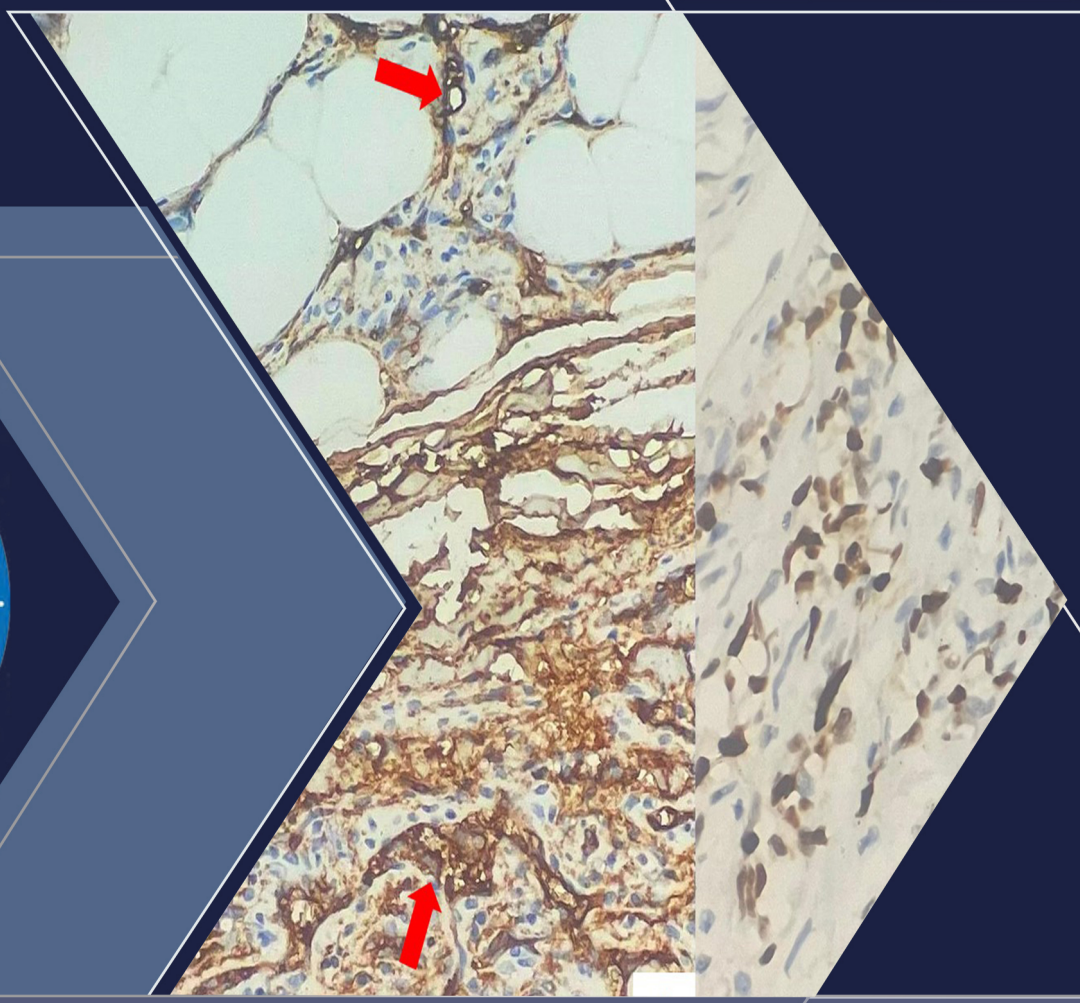

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Research Article

Antimicrobial Susceptibility Patterns and Extended-Spectrum β-Lactamase Production by *Enterobacterales* in a Tertiary Hospital

Bir Üçüncü Basamak Hastanesinde *Enterobacterales*'ler Tarafından Üretilen Geniş Spektrumlu Beta Laktamazlar ve Antimikrobiyal Duyarlılık Paternleri

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Abstract

Puspose: In this research, we seek to define the extended-spectrum -lactamases (ESBL) producers and patterns of antimicrobial susceptibility of *Enterobacterales* from clinical care patients in the Aksaray province Türkiye, throughout the term from January 2017 to December 2021.

Materıal And Methods: Clinical strains will be isolated and identified for microbiologically. Then *Enterobacterales* isolates antibiotic resistance profiles will be determined, in addition the presence of blaCTX-M gene in these isolates will be investigated by molecular methods.

Results: A total of 1752 clinical strains were initially microbiologically isolated and subsequently identified using VITEK® 2 incoupled with an automated ID and susceptibility system. Following that, the identified and suspected isolates were subjected to PCR application for the presence of blaCTX-M gene. The results showed that more common *Klebsiella pneumoniae (K. pneumoniae*) (43.95%) than other species with low percentages were following *Escherichia coli (E.coli)* (45.89%). The antimicrobial susceptibility pattern was determined to be 86.62% resistant to ampicillin, 76.33% to amoxicillin/clavulanic acid, 64.52% to cefuroxime, 59.14% to trimethoprim/sulfmetaxazol, 59.99% to ceftriaxone, 58.35% to ceftazidime, and 54.39% to ciprofloxacin. 45.49% of the isolates from urine samples showed sensitivity to fosfomycin, nitrofurantoin, imipenem, and amikacin. Based on the suspected species, the frequencies of *E. coli* isolates were detected to be 47.63% positive for ESBL, and of *K. pneumoniae* isolates 61.16%.

Conclusions: Overall, we detected that the bacteri of ESBL-producing *E. coli* was relatively high. Antimicrobial resistance clearly to be a mixed issue because of the superior consumption of antibiotics in the society and the knowledge from the trend research could be considered as helpfully for a more wide assesment of the antibiotic resistance profiles in the Turkiye provinces.

Keywords: *Enterobacterales*, Antimicrobial resistance, ESBL, bla CTX-M

Öz

Amaç: Bu çalışmada, Ocak 2017-Aralık 2021 döneminde, Aksaray ilinde çeşitli kliniklerden gelen hastalardan elde edilen *Enterobacterales* izolatlarının ürettiği geniş spektrumlu β-laktamaz (GSBL) oranlarının ve antimikrobiyal duyarlılık paternlerinin belirlenmesi amaçlanmıştır.

Gereç ve Yöntem: Laboratuvarda, klinik numunelerden suşlar izole edilecek ve mikrobiyolojik olarak tanımlanacaktır. Daha sonra *Enterobacterales* izolatlarının antibiyotik direnç profilleri belirlenerek, bu izolatlarda blaCTX-M geninin varlığı moleküler yöntemlerle araştırılacaktır.

Bulgular: Çalışma süresince toplam 1752 klinik suş mikrobiyolojik olarak izole edildi ve ardından otomatik bir ID ve duyarlılık sistemi ile birleştirilmiş VITEK® 2 sistemi kullanılarak suşlar tanımlandı. Ardından tespit edilen ve şüphelenilen izolatlara blaCTX-M geninin varlığı için PCR uygulaması yapıldı. Bulgular, *Escherichia coli*'nin (*E.coli*) (%45,89) en yaygın tür olduğunu, bunu *Klebsiella pneumoniae* (*K.pneumoniae*) (%43,95) ve düşük yüzde ile diğer türlerin izlediği görüldü. Antimikrobiyal duyarlılık paterni ampisiline %86,62, amoksisilin/klavulanik aside %76,33, sefuroksime %64,52, trimetoprim/sülfmetaksazole %59,14, seftriaksona %59,99, seftazidime %58,35 ve siprofloksasine %54,39 olarak belirlendi. İdrar örneklerinden elde edilen izolatların %45,49'u fosfomisin, nitrofurantoin, imipenem ve amikasine duyarlılık gösterdi. Şüphelenilen türe göre GSBL sıklığı *E. coli* için %47,63, *K. pneumoniae* için %61,16 olarak bulundu.

Sonuç: Genel olarak, GSBL üreten *E. coli* oranının nispeten yüksek olduğunu bulduk. Antimikrobiyal direnç, toplumdaki yüksek antibiyotik tüketimi nedeniyle karmaşık bir sorun olarak görünmektedir ve mevcut çalışmadan elde edilen bu veriler, Türkiye'de illerdeki antibiyotik direnç profillerinin daha kapsamlı bir şekilde değerlendirilmesi için yardımcı olarak kabul edilebilir.

Anahtar Kelimeler: *Enterobacterales*, Antimicrobial direnç, GSBL, bla CTX-M

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INTRODUCTION

One of the biggest global dangers to public health is antimicrobial resistance. It has asubstantial negative influence on health care systems, as well as, global serious social implications (1). The family of Enterobacterales includes the well-known pathogens which cause nosocomial infections, gastrointestinal infections, septicemia, pneumonia, meningitis, peritonitis and urinary tract infections (2,3). Some members of the family Enterobacterales have acquired resistance against antibiotic agents by a specific resistance mechanism, producing extended spectrum β-lactamase (ESBL) enzymes to hydrolyze oxyimino-cephalosporins and aztreonam(4). Due to this characteristic, extended spectrum β-lactamase (ESBL) enzymes exert a significant impact on antimicrobial therapy. These enzymes have emerged with point mutations in the TEM-1, TEM-2 and SHV-1 genes, which show beta-lactamase activity. While ESBL enzymes originating from TEM and SHV genes were common in the 1980s, they were replaced by CTX-M type enzymes in the 2000s (5). The early CTX-M variants hydrolysed cefotaxime and ceftriaxone efficiently, thus the name cefotaximase. In contrast to the TEM- and SHV-type ESBLs reported to date, the early CTX-M enzymes had limited activity against ceftazidime. However, CTX-M variants with enhanced ceftazidime hydrolytic activity were later described (6). This makes infections caused by pandrug resistant or almost pandrug resistant Gram-negative germs particularly challenging to cure and a growing problem in many healthcare facilities. (7,8). Moreover, *E. coli* and *Klebsiella pneumoniae* (*K. pneumoniae*) have get to resistant to newer third generation cephalosporins, indicating that they are hard-to-treat ESBL producers. Recent worldwide surveys reported increasing proportions of ESBL-producers among *E. coli* (from 9% in 2003 to 18% within 2005–2007) and *K. pneumoniae* (from 14% to 26.2%); there was decreasing susceptibility to third-generation cephalosporins (from 85–90% to 77–82%) (9).

As variations do exist among different countries and regions, the local epidemiological data along with local resistance patterns is essential for the effective management of infections (11).

In Turkey, there have been many clinical studies on ESBL-producing strains of Enterobacterales. However, data from Aksaray province in Central Anatolia are still missing. Therefore, this research was planned to define the antimicrobial susceptibility patterns and to detect the occurrence of ESBL-producers among members of the family Enterobacterales isolated from various clinical care patients admitted to the Aksaray University Training and Research Hospital, Aksaray province, Turkiye.

MATERIALS AND METHODS

The research was carried out between January 2017 to December 2021 in the department of Clinical Microbiology of the Training and Research hospital of the University School of Medicine. The University Training and Research hospital located in middle Anatolian province, Turkey comprises a 500-bed tertiary care facility with approximately 50.000 admissions each year.

Ethics Committee Approval

The territorial ethics committee gave its admission to the study protocol, Faculty of Medicine, Aksaray University. (Committee approval date: 23.06.2022; number 2022/12-13).

Isolation and identification of Enterobacterales species

A total of 1752 clinical samples included urine (n=1002), blood (n=226), catheter (n=92), tracheal secretion (n=315), wound (n=54), sputum (n=30), stool (n=8), tissue (n=19) and sterile body fluids (n=6) were cultured directly onto MacConkey agar and 5% sheep blood agar (Merck, Darmstadt, Germany). Under aerobic situations, all plates were incubated at 37 °C for 24-48 hours.

For each morphologically distinct type of colony per specimen belonging to Enterobacterales, one isolate was selected and tested for gram stain and oxidase reaction using Bactident oxidase test strips (Merck, Darmstadt, Germany), and the oxidase-negative colonies were subcultured onto 5% sheep blood agar for further identification.

All isolates were thereafter identified handling the VITEK®2 compact automated system (bioMérieux), for this purpose, two or three colonies from 5% sheep blood agar were suspended in aqueous 0.45% (wt/vol) NaCl to achieve a turbidity equivalent to 0.5 Mc Farland. The turbidity meter (DensiChek, bioMerieux, Franch) was used for turbidity reading. After that, the isolates were identified using VITEK®2 ID-GNC card according to the manufacturer's instructions.

Determination of antimicrobial susceptibility (AMS)

The AMS was performed using AST-N325 and AST-N327 VITEK® 2 cards comprised of various antibiotics including ampicillin (AM), amoxicillin/clavulanic acid (AMC), amikacin (AN), ceftazidime (CAZ), cefixime (CFM), ciprofloxacin (CIP), ceftriaxone (CRO), cefuroxime (CXM), ertapenem (ETP), fosfomycin (FOS), nitrofurantoin (FT), gentamicin (GM), imipenem (IPM), meropenem (MEM), trimethoprim/sulfmetaxazol (STX), piperacillin/tazobactam (TZP), colistin (CS), cefepime (FEP) and tigecycline (TGC).

Finally, the production of ESBLs was confirmed by disc diffusion method using ceftazidime (30 µg) and cefotaxime (30 µg) discs alone and in combination with clavulanic acid discs according to the Guidelines of EUCAST (13), followed by an in the night incubation at 37°C. The zone of inhibition was evaluated by the criteria described by the Guidelines of EUCAST (13). *E. coli* ATCC 25922 and *K. pneumoniae* ATCC 700603 and were used for ESBL positive and ESBL negative control testing.

Molecular detection of ESBL

A randomly selected number of ESBL-producing *E. coli* (n=30) and *K. pneumonia* (n=15) isolates were further examined for the presence of bla-genes by a specific PCR assay using universal CTX-M primers and the amplification conditions as previously described (14). Total DNA of ESBL-producing isolates was extracted using DNeasy Blood & Tissue Kit (Qiagen, Hilden, Germany) accordingly the manufacturer's instructions. Gel electrophoresis of the PCR products was performed in a 2% agarose gel (Biozym, Hessisch-Oldendorf, Germany). The amplicons were photographed by GelDoc 2000 imaging system (BioRad-USA). Finally, the analysis was carried-out using Image Lab™ Software, Version 5.0 (BioRad). For quality control, *E. coli* strain DSM 22665 harboring a blaCTX-M gene was used as standard ESBL-positive strain for all PCR amplification tests.

Statistical analysis

SPSS for Windows version 26 was used for the statistical analysis of the study subjects' demographic, clinical, and laboratory data. (IBM, USA).

RESULTS

In one year study period, Enterobacterales isolates were recovered from 1752 clinical samples. Different Enterobacterales isolates from clinical samples are displayed in Table 1.

Clinical samples included urine (n=1002), blood (n=226), catheter (n=92), tracheal secretion (n=315), wound (n=54), sputum (n=30), stool (n=8), tissue (n=19) and sterile body fluids (n=6) . The results showed that 898 (51.26%) isolates were beta lactamase positive. The presence ratio per genus was; *E. coli* (n=804; 45.89%), *K. pneumoniae* (n=770; 43.95%), *K. oxytoca* (n=10; 0.58%) *Proteus spp*. (n=43; 2.45%), *Enterobacter spp*. (n=64; 3.65%), *Serratia spp*. (n=28; 1.61%), *Citrobacter spp*. (11; 0.63%), P*rovidencia spp.* (9; 0.50%) and *Morganella morganii* (11; 0.63%) and *Raoultella ornithinolytica* was (2; 0.11%) (Table 2).

Table 1: Percent prevalence of antimicrobial resistance phenotypes in Enterobacterales isolates from different specimens.

Bacterial Species		*E. coli*	*K. pneumoniae*	Other Isolates
Isolate	No.	804	770	178
	(%)	45,89	43,95	10,16
Antibiotics and % of Resistance	AM	73,34	100	88,75
	AMC	58,73	93,79	80,29
	AN	64,35	68,8	10,38
	CAZ	39,23	81,33	45,32
	CIP	28,8	84,49	39,78
	CRO	34,92	90,34	41,91
	CXM	28,94	96,8	85,62
	ETP	4,54	81,5	27,89
	GN	17,43	67,2	31,13
	MEM	2,64	77,68	17,66
	SXT	44,69	79,52	36,28
	TZP	23.45	89,76	29,23
	CFM	52,36	87,48	77,25
	FOS1	24,23	54,42	37,12
	FT1	27,35	74,33	71,26
	IPM	1,25	61,35	22,92
	CO2	1,57	44,9	55,48
	FEP	35,3	83,12	18,8
	TGC2	2,56	31,24	37,44

Abbreviation: AM, ampicillin; AMC, amoxicillin/clavulanic acid; AN, amikacin; CAZ, ceftazidime; CFM, cefixime; CIP, ciprofloxacin; CRO, ceftriaxone; CXM, cefuroxime; ETP, ertapenem; FOS, fosfomycin; FT, nitrofurantoin; GM, gentamicin; IPM, imipenem; MEM, meropenem; STX, trimetoprim/sulfmetaxazol; TZP, piperacillin/tazobactam; CS, colistin; FEP, cefepime; TGC, tigecycline. Antibiotic resistance phenotypes determined based on EUCAST guidelines (EUCAST Clinical Breakpoint Tables 2020)

Table 2: Distribution and percent of the esbl isolates in investigated specimens

Bacterial species	Total no.[1]	ESBL producing isolates	
		No. of isolates (%)	Specimen (*n*)[2]
E. coli	804	383 (47,63)	urine (280), blood (48), catheter (12), tracheal (19), wound (16), sputum (6), sterile body fluids (1), tissue (1)
K. pneumonia	770	471(61,16)	urine (134), blood (144), catheter (12), tracheal (161), wound (9), sputum (9), sterile body fluids (2)
Other isolates	158	44 (27,85)	urine (27), tracheal (12), wound (2), sputum (1), stool (1), catheter (1)
Other isolates (ESBL (-))	24	0	
Total	1752	898 (51,26)	

1. Total number of isolates; - = none
2. Number in parenthesis indicates the number of isolates; ESBL, extended spectrum β-lactamase.

The majority of ESBL-producing isolates were recovered from urine specimens (n=442; 49.11%) followed by blood (n=192; 21.38%), tracheal secretion (n=192; 21.38%), with decreasing isolation rates from wound (n=27; 3.01%), catheter (n=25; 2.79%), sputum (n=16; 1,78%), steril fluid body (n=3; 0.33%), stool (n=1; 0.11%) and tissue(n=1; 0.11%) (Table 3).

Table 3: Clinical samples from which enterobacterales isolates were obtained and ESBL (+) ratios.

Clinical samples	Total samples		ESBL (+) samples	
	n	%	n	%
Urine	1002	57.19	442	49.11
Tracheal secretion	315	17.98	192	21.38
Blood	226	12.90	192	21.38
Catheter	92	5.25	25	2.79
Wound	54	3.08	27	3.01
Sputum	30	1.71	16	1.78
Tissue	19	1.09	1	0.11
Stool	8	0.46	1	0.11
Sterile body fluids	6	0.34	3	0.33
Total	1752	100	898	100

Finally, all selected *E. coli* (n=30) and *K. pneumoniae* (n=15) isolates phenotypically ESBL positive were confirmed with PCR amplification of blaCTX-M gene. The results revealed that 45 ESBL positive isolates were positive with an amplicon size of 585 bp (Figure).

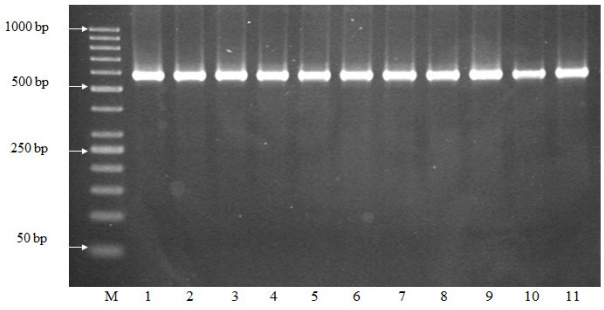

Figure: Typical amplicon of blaCTX-M (585 bp).

M = Marker, Gene Ruler® 50 bp DNA Ladder; 1-10, isolates obtained in this study; 11 = positive control *E. coli* strain DSM 22665 harboring a blaCTX-M gene.

CONCLUSION

A meta-analysis represents the first attempt to assess the prevalence of co-existing ESBL producing *E. coli* and *K. pneumoniae* in animals, humans, and the environment worldwide. Additionally, it was observed that blaCTX−M and blaSHV were the most frequently detected genes in ESBL producing *E. coli* and *K. pneumoniae* infecting animals, humans, and the environment (12).

The CTX-M or cefotaximase known as serine-β-lactamases family pose a substantial clinical challenge because of their capacity to impart resistance to a wide range of β-lactam antibiotics and inhibitors. This characteristic qualifies CTX-M-ases for classification as ESBL (13). In recent years, there have been studies on the epidemiology of CTX-M β-lactamases in the world (14).

Since no data related to the ESBL prevalence in the middle Anatolian region in Turkıye were available, in our hospital, a study was done to determine the prevalence of ESBL among Enterobacterales isolates and their antibiotic susceptibility profile. To the best of our knowledge, this study was the first to documented the prevalence of Enterobacterales that produce ESBLs. and the distribution of antibiotic susceptibly patterns from the specimens of patients in province Aksaray of middle Anatolia region.

In investigation yielded, a total of 1752 Enterobacterales isolates from different specimens were analyzed. The majority were *E. coli* (45.89%) followed by *K. pneumoniae* (43.95%), and other species (10,16%) (Table 1).

Our study emerged that the *E. coli* isolates were resistance to ampicilin (73,34%), amikacin (64,35%), amoxicillin clavulanic acid (58,73%), cefixime (52,36%), sulfometaxazol/trimethoprim (44,69%), ceftazidime (39,23%) respectively. There is a dramatic difference between the study by Gündüz et al and our *E. coli* resistance patterns in terms of amikacin. They found 6% resistance to amikacin (15). A decrease in amikacin resistance in ESBL-producing *E. coli* was observed after 2019 in the study by Beata et al (16). In our study, *K. pneumoniae* isolates showed resistance to ampicilin (100,00%), cefuroxime (96,80%), amoxicillin clavulanic acid (93,79%), ceftriaxone (90,34%), piperacillin/tazobactam (89,76%), cefixime (87,48%) and ceftazidime (81,33%). *K. pneumoniae* strains show a more resistant profile compared to *E. coli* and other Enterobacterales. These results are consistent with the studies of Beata et al. Although *E. coli* is responsible for the majority of infections, *K. pneumoniae* is frequently seen in multidrug-resistant strains (16).

Around the world, ESBL-producing Enterobacterales are becoming more common in urinary tract infections.

In this investigation, the prevalence of ESBL-producing organisms was detected to be 36.3%, with the bulk of ESBL isolates coming from urine samples. (Table 2 and Table 3). Our results indicate that the frequency of ESBL-producing bacteria was remarkably high rate the E. coli isolates (n=280; 73.10%) than the *K. pneumoniae* isolates (n=471, 28.45%) and ESBL-producing *K. pneumoniae* and *E. coli* were isolated most commonly from urine samples (n=280) and (n=134), respectively. Similar to our study, in a study by Şenol et al. 86.55% of the 1041 ESBL-positive samples were urine samples and 70.3% were reported as E. coli (17).

The epidemiological research for ESBL-producing bacteria conducted locally, regionally, nationally, and internationally bacteria in the clinical specimens provide different data (7). In Turkiye, ESBLs has been investigated in different studies performed in various regions, quite different antimicrobial resistance/susceptibility rates have been reported. For example Bülüç et al. (19) reported that ESBL detection rate in various clinical samples including urine samples (37% in all) in Istanbul faculty of medicine; 48% of *K. pneumoniae*, 40% of *K. oxytoca* and 14% of *E. coli* were ESBL positive. Also Karagöz et al. (20) determined the drug resistance of 28 ESBL-

producing *E. coli* isolates acquir from 144 patients hospitalized at the Yüzüncü Yil University Hospital in Van province, Turkey. They reported that all *E. coli* isolated developed resistance by producing ESBLs against oxyimino and non-oxyimino cephalosporins, and penicillin-type antibiotics. Delialioglu et al. (21) proclaimed that ESBL frequencies of *E. coli*, *K. pneumoniae* and *K. oxytoca* and isolates were 18.3, 29.7 and 4.2%, respectively. In addition, Bali et al. (22) verified 94 clinical isolates collected from Gazi University Hospital in Ankara and showed that 69.1% of the Enterobacterales isolates were ESBL-producer. They came to the conclusion that the most prevalent species in the hospitalized patients were ESBL-positive strains of *A. baumannii, E. coli*, , *K. pneumoniae* and *P. aeruginosa*, and that it is crucial to quickly identify these drug-resistant strains in order to treat serious infections. Celik et al. (23) examined the presence of ESBL-producing *E. coli* isolated from patients admitted to the hospital of the Trakya University in the province of Edirne with a community-acquired urinary tract infection.

The interpretation of the study by Doğanay et al. is that although different studies had different resistance rates, there was a change in resistance rates between centres over the years. The effect of the samples from which the isolates were obtained, the clinics and the conditions of patient use on resistance can be attributed to this situation (23).

Eleven isolates of *E. coli* harboring ESBL were identified among 30 *E. coli* isolated from patients admitted with symptoms corresponding to upper urinary tract infection. Furthermore, the selected ESBL-positive isolates were analyzed for blaCTX-M gene by PCR assay. The results showed that all investigated ESBL-producing isolates were observed to carry blaCTX-M, the gene that mediates CTX-M enzyme production. The ESBL mediated by blaCTX-M type β-lactamase genes are undoubtedly the most widespread type produced among species of Enterobacterales worldwide. Several studies in Turkiye have shown that CTX-M-type extended-spectrum -lactamases have appeared in Enterobacterales, together with the genes coding for their production (22).

Over the last two decades, there has been an eightfold surge in the intestinal carriage rate of ESBL *E. coli* within the community. Mitigating its dissemination may necessitate the development of novel therapeutic and public health strategies (24). Kızmaz et al. found that faecal colonisation of ESBL *E. coli* persisted in 15 (23%) of 64 patients after treatment of UTI and that faecal and urine isolates of three (20%) of these patients were in the same phylogenetic class. Faecal colonisation was found to be significantly higher in patients with invasive procedures in the last year (25). These results reveal the spread of ESBL from another point.

An inherent limitation of this study is the relatively small sample size for the CTX-M gene, which may affect the generalisability of the findings to a wider population. Furthermore, the study faced challenges due to the unavailability or unreliability of certain data, imposing restrictions on grouping and analysing for hospital- or community-acquired ESBL strains.

The current study reveals an increasing resistance to third generation cephalosporins in the middle region of Turkıye. The ESBL-producing bacteria disseminates easily through communities where antimicrobial drug consumption is uncontrolled. An adequate and reasonable antibiotic use may lead to reduction due to the selective pressure, and it's possiblity that the resistance bacteria will no longer have a survival benefit. The information from the present study may be useful for a more thorough analysis of the patterns of antibiotic resistance across Turkıye.

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Research Article

Comparison of 2019 and 2020 Outpatient Data of a Mental Health Hospital: The Impact of the COVID-19 Outbreak

Bir Ruh Sağlığı Hastanesinin 2019 ve 2020 Yılı Ayaktan Hasta Verilerinin Karşılaştırması: COVID-19 Pandemisinin Etkisi

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Abstract

Puspose: In this study, it was aimed to examine and compare the sociodemographic and clinical variables of the subjects admitted to the outpatient psychiatry clinic of a mental health and diseases hospital (MHDH).

Material and Method: All subjects who were admitted to the outpatient psychiatric outpatient clinics of Elazığ MHDH between 01.01.2019-31.12.2019 and 01.01.2020-31.12.2020 were included in the study. Sociodemographic and clinical data of the subjects, such as age, gender, and diagnosis, were recorded.

Results: The number of subjects admitted between 01.01.2019-31.12.2020 was 108,367 (71,280 in 2019; 37,087 in 2020). The total (n=108,367) mean age was 44.79±17.62 years (45.18±17.78 years in 2019, 44.03±17.28 years in 2020). In total (n=108,367), there was a significant difference between the ages of male and female subjects (p<0.001) and 75.1% of the subjects resided in Elazığ. In total (n=108,367), 85.9% of the subjects were admitted due to examination, 4.6% due to a single physician report, 5.1% due to medical board report, and 4.4% due to probation. Overall, there were differences between genders in terms of admission reason, diagnosis, hospitalization after outpatient examination, and health insurance (p<0.001). In total (n=108,367), the most common diagnoses were anxiety disorders spectrum (21.6%), schizophrenia spectrum disorders (19.4%), depression spectrum disorders (15.6%), and bipolar spectrum disorders (12.5%). Forensic health insurance, residence, and diagnosis in hospitalized subjects were significantly different from those who were not hospitalized (p<0.001). In total (n=108,367), the rates of bipolar spectrum disorder and schizophrenia spectrum disorder were higher in those residing outside Elazığ, while anxiety disorder spectrum and depression spectrum disorder were higher in those residing in Elazığ (p<0.001

Conclusion: The COVID-19 outbreak was associated with a significant decrease in the number of subjects admitted to the outpatient psychiatric clinic of an MHDH. In addition, there were various differences associated with COVID-19 in terms of health insurance, admission reason, diagnosis, and hospitalization between the subjects admitted in 2019 and 2020.

Keywords: Outpatient; forensic case; hospitalization; probation; COVID-19; pandemic

Öz

Amaç: Bu çalışmada bir ruh sağlığı ve hastalıkları hastanesinin (RSHH) psikiyatri polikliniğine başvuran olguların sosyodemografik ve klinik değişkenlerinin incelenmesi ve karşılaştırılması amaçlanmıştır..

Gereç ve Yöntem: Elazığ RSHH'nin ayaktan psikiyatri polikliniklerine 01.01.2019-31.12.2019 ve 01.01.2020-31.12.2020 tarihleri arasında başvurmuş bütün olgular çalışmaya dâhil edilmiştir. Olgulara ait yaş, cinsiyet ve tanı gibi sosyodemografik ve klinik veriler kaydedilmiştir.

Bulgular: 01.01.2019-31.12.2020 arasında başvuran olgu sayısı 108.367 (2019'da 71.280, 2020'de 37.087) idi. Totalde (n=108.367) ortalama yaş 44.79±17.62 yıldı (2019'da 45.18±17.78 yıl, 2020'de 44.03±17.28 yıl). Totalde (n=108.367) kadın ve erkek olguların yaşları arasında anlamlı farklılık vardı (p<0.001) ve olguların %75.1'i Elazığ'da ikamet ediyordu. Totalde (n=108.367) olguların %85.9'u muayene, %4.6'sı tek hekim raporu, %5.1'i sağlık kurulu raporu ve %4.4'ü denetimli serbestlik nedeniyle başvurmuştu. Totalde (n=108.367) cinsiyetler arasında başvuru nedeni, tanı, ayaktan muayene sonrası yatış ve sağlık güvencesi açısından farklılık saptandı (p<0.001). Totalde (n=108.367), en sık başvuru tanıları sırasıyla anksiyete bozuklukları spektrumu (%21.6), şizofreni spektrum bozuklukları (%19.4), depresyon spektrum bozuklukları (%15.6) ve bipolar spektrum bozukluklarıydı (%12.5). Yatırılan olgularda adli giriş oranı, ikamet ve tanı yatırılmayanlardan anlamlı olarak farklıydı (p<0.001). Totalde, Elazığ dışında ikamet edenlerde bipolar spektrum bozukluğu ve şizofreni spektrum bozukluğu oranı daha yüksek iken Elazığ'da ikamet edenlerde anksiyete bozukluğu spektrumu ve depresyon spektrum bozukluğu daha yüksekti (p<0.001).

Sonuç: COVID-19 salgını bir RSHH'nin ayaktan psikiyatri kliniğine başvuran olguların sayısının belirgin olarak azalması ile ilgili bulunmuştur. Ayrıca 2019 ve 2020 yıllarında başvuran olgular arasında sağlık güvencesi, başvuru nedeni, tanı ve hastaneye yatış açısından da COVID-19 ile ilişkilendirilen çeşitli farklılıklar görülmüştür

Anahtar Kelimeler: Ayaktan hasta; adli olgu; yatış; denetim; COVID-19; pandemi

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INTRODUCTION

Coronavirus disease (COVID-19) outbreak is an infectious disease that was first learned about on December 31, 2019, after a series of cases called viral pneumonia were reported in Wuhan, China (1). The first case in Turkey was reported on March, 2020, and the number of daily cases has gradually increased. After the second half of 2020, the effects of the COVID-19 outbreak were experienced severely (2). The COVID-19 outbreak emerged as a health problem, but subsequently deeply affected social and economic life and still continues to do so (1).

Societal functions have come to a halt worldwide, due to the airborne transmission of respiratory illnesses. One strategy to curb the spread of COVID-19 has been to minimize contamination. Consequently, policies aimed at this goal have profoundly impacted various facets of social and economic life. Many professions, along with educational and training activities, have transitioned to remote formats. This arrangement has persisted in many occupations outside the healthcare system in spite of a number of drawbacks. Conversely, as healthcare facilities, particularly hospitals, have become more densely populated worldwide, there are instances where this has led to systemic congestion. It is important to continue monitoring and treating illnesses other than COVID-19, but prevention is also a goal (3, 4).

Numerous studies have examined the impact of COVID-19 outbreak on the mental health of the general public (5-7). However, its impact on mental health and diseases hospitals' (MHDH) psychiatric outpatient data, has not been sufficiently studied. The purpose of this study was to assess and compare the subjects who were admitted to a MHDH's psychiatry outpatient clinic in 2019 and 2020. According to our hypothesis, there were fewer outpatients overall in the Elazığ MHDH psychiatry outpatient clinic in 2020.

MATERIALS AND METHODS

Study Design

This study includes all subjects who applied to Elazığ MHDH outpatient psychiatric clinics between 01.01.2019-31.12.2019 and 01.01.2020-31.12.2020. Elazığ MHDH is one of the largest psychiatric branch hospitals in Türkiye, with outpatient and inpatient clinics, providing mental health services to 18 different provinces in the Eastern Anatolia, Black Sea and South-Eastern Anatolia regions. Elazığ MHDH has outpatient and inpatient adult psychiatric clinics, outpatient and inpatient adult alcohol and substance addiction clinic, outpatient leprosy clinic, outpatient probation clinic related to substance use, outpatient child and adolescent psychiatry clinic, inpatient child and adolescent psychiatry alcohol and substance addiction clinic, internal medicine outpatient clinic, neurology outpatient clinic.

All information presented in the study was obtained retrospectively from the hospital registry system. Ethics committee approval was received from Fırat University (Date: 22/04/2021; No: 2021/06-17).

Inclusion and Exclusion Criteria

In this study, subjects admitted to outpatient clinics of adult psychiatrists were examined. Psychiatric outpatient clinic and probation outpatient clinic were the clinics examined for this purpose. Data from all inpatients, outpatient and inpatient alcohol and substance addiction clinics, leprosy clinic, child and adolescent psychiatry outpatient and inpatient clinics, internal medicine outpatient clinic and neurology outpatient clinic were not included in the study. There was no age and gender limit in the study.

Psychiatric Diagnosis Procedure

The medical diagnoses included in the study were written according to the International Classification of Diseases 10th Revision (8). Subject diagnoses were grouped under some headings. The diagnosis groups determined in this study were as follows: Anxiety disorders spectrum, schizophrenia spectrum disorders, depression spectrum disorders, bipolar spectrum disorders, general psychiatric examination. Alcohol and substance use disorders, general medical conditions, personality disorders, obsessive-compulsive disorder spectrum, post-traumatic stress disorder spectrum, conversion disorder spectrum, somatization disorder spectrum, eating disorder spectrum, sleep disorder spectrum, sexual function disorder spectrum, intellectual disability, neurodevelopmental disorders, attention-deficit/hyperactivity disorder, extrapyramidal system related disorders, epilepsy spectrum, dementia spectrum, organic psychiatric disorders, impulse control disorders, alcohol and illegal substance screening, phobic disorders, registered but not examined.

Statistical Analysis

Descriptive statistics and continuous variables are presented as mean±standard deviation, and categorical variables are presented as frequency and percentage. Chi-Square test was used to compare categorical data, and independent samples t-test was used to compare numerical data. The statistical significance level was determined as 0.05 and below.

RESULTS

The total number of subjects who were admitted to Elazığ MHDH psychiatric outpatient clinics in 2019-2020 was

108,367. The number of subjects admitted in 2019 was 71,280 (42,780 males (60.0%), 28,500 females (40.0%)), the number of subjects admitted in 2020 was 37,087 (21,916 males (59.1%), 15,171 females (%) 40.9)).

In total (n=108,367), the forensic health insurance was 10.6% in subjects hospitalized after the examination, while this was 3.1% in those who were not hospitalized (p<0.001). In total (n=108,367), the residing outside Elazığ was 51.6% in the subjects hospitalized after the examination, while this was 23.9% in those who were not hospitalized (p<0.001). In total (n=108,367), bipolar spectrum disorders were found to be 15.6%, schizophrenia spectrum disorders 25.4%, anxiety disorder spectrum 11.0%, alcohol and substance use disorders 20.4%, and depression spectrum disorders 9.8% in the hospitalized subjects after examination, while bipolar spectrum disorders were found to be 12.4%, schizophrenia spectrum disorders 19.1%, anxiety disorder spectrum 22.0%, alcohol and substance use disorders 7.5%, depression spectrum disorders 15.8% (p<0.001) in those who were not hospitalized.
The 3,414 (94.0%) of the forensic admissions were male. Of the forensic admissions (n=3,631), 22.7% came to the medical board and 55.9% came to the probation unit. The 43% of the prisoner/convict subjects (n=7,661) came for a single physician report, medical board report, or probation unit. Almost all (95.8%) of the subjects (n=5,694) who paid an admission fee came for a single physician report or medical board report. In total (n=108,367), 42% of the forensic admissions, 22.8% of the SSI admissions, 51.9% of the prisoner/convict subjects, and 13.0% of the subjects who paid the admission fee resided outside ELAZIĞ. In total (n=108,367), 30.3% of the diagnoses in forensic subjects were general psychiatric examination and 58.5% were alcohol and substance use disorders. In total (n=108,367), 3.0% of the subjects with SSI admission were examined for general psychiatric examination, 14.6% for bipolar spectrum disorders, 22.6% for schizophrenia spectrum disorders, 24.4% for anxiety disorders, 6.8% for alcohol and substance use disorders, and 18.2% were depression spectrum disorders. In total (n=108,367), 19.9% of the prisoner/convict subjects were admitted without a psychiatric diagnosis therefore classified as general psychiatric examination, 15.6% as anxiety disorders, 19.7% as post-traumatic stress disorder, 8.3% as sleep disorders, and 17.8% as personality disorders. In total (n=108,367), 88.3% of the subjects who paid an admission fee were for general psychiatric examination.

Table 1. Comparison of Elazığ MHDH Psychiatry Outpatient Clinic Data of 2019 and 2020

Parameters		2019 mean±SD & n (%)	2020 mean±SD & n (%)	p
Age (years)		45.18±17.78	44.03±17.28	<0.001**
Gender	***Male***	42780 (60.0%)	21916 (59.1%)	0.003*
	Female	28500 (40.0%)	15171 (40.9%)	
Nationality	***TC***	71100 (99.7%)	36953 (99.6%)	0.003*
	Syria	117 (0.2%)	96 (0.3%)	
	Others	63 (0.1%)	38 (0.1%)	
Health insurance	***SSI/SGK***	59462 (84.1%)	30491 (83.1%)	<0.001**
	Forensic	2164 (3.1%)	1467 (4.0%)	
	YUPASS	123 (0.2%)	48 (0.1%)	
	Refugees	104 (0.1%)	77 (0.2%)	
	Prisoners-convicts	5225(7.4%)	2436 (6.6%)	
	Patient paid	3543 (5.0%)	2151 (5.9%)	
	TOBB	68 (0.1%)	39 (0.1%)	
Residence	***Elazığ***	53436 (75.0%)	27973 (75.4%)	0.097
	Outside Elazığ	17844 (25.0%)	9114 (24.6%)	
Admission month	***January***	2786 (3.9%)	4978 (13.4%)	<0.001**
	February	1003 (1.4%)	6629 (17.9%)	
	March	6175 (8.7%)	4470 (12.1%)	
	April	6462 (9.1%)	2719 (7.3%)	
	May	5909 (8.3%)	2203 (5.9%)	
	June	4454 (6.2%)	4037 (10.9%)	
	July	7426 (10.4%)	3670 (9.9%)	
	August	8298 (11.6%)	314 (0.8%)	
	September	9322 (13.1%)	71 (0.2%)	
	October	9918 (13.9%)	104 (0.3%)	
	November	6370 (8.9%)	2826 (7.6%)	
	December	3157 (4.4%)	5066 (13.7%)	
Admission reason	***Examination***	60999 (85.6%)	32089 (86.5%)	<0.001**
	Single physician report	3842 (5.4%)	1171 (3.2%)	
	Medical board report	3445 (4.8%)	2062 (5.6%)	
	Probation	2994 (4.2%)	1765 (4.8%)	
Hospitalization after examination		2967 (4.16%)	1001 (2.69%)	<0.001**

**p<0.001, *p<0.05; Independent-Samples T-Test and Chi-square test were used in statistical analysis; Abbreviations: MHDH=Mental Health and Diseases Hospital, SD=Standard Deviation, COVID-19=Coronavirus Disease 2019, TC=Turkish Citizen, SSI/SGK=Social Security Institution/Sosyal Güvenlik Kurumu (in Turkish), YUPASS=Foreign Provision Activation Health System/Yurt dışı Provizyon Aktivasyon Sağlık Sistemi (in Turkish), TOBB=Turkish Chambers, Stock Exchanges And Union Personnel Insurance And Pension Fund Foundation/Türkiye Odalar, Borsalar ve Birlik Personeli Sigorta ve Emekli Sandığı (in Turkish)

Table 2. Comparison of Elazığ MHDH Psychiatry Outpatient Data According to Gender

Parameters		Male (n=64,696) mean±SD & n (%)	Female (n=43,670) mean±SD & n (%)	p
Age (years)		42.75±16.90	47.82±18.21	<0.001**
Nationality	*TC*	64457 (99.7%)	43596 (99.7%)	<0.001**
	Syria	157 (0.2%)	56 (0.2%)	
	Others	82 (0.1%)	19 (0.1%)	
Health insurance	*SSI/SGK*	49425 (77.1%)	40528 (93.6%)	<0.001**
	Forensic	3414 (5.4%)	217 (0.5%)	
	YUPASS	96 (0.1%)	75 (0.2%)	
	Refugees	147 (0.2%)	34 (0.1%)	
	Prisoners-convicts	7068 (11.0%)	593 (1.4%)	
	Patient paid	3906 (6.1%)	1788 (4.1%)	
	TOBB	28 (0.1%)	79 (0.1%)	
Residence	*ELAZIĞ*	46028 (71.1%)	35381 (81.0%)	<0.001**
	Outside ELAZIĞ	18668 (28.9%)	8290 (19.0%)	
Admission month	*January*	4636 (7.2%)	3128 (7.2%)	0.002*
	February	4484 (6.9%)	3148 (7.2%)	
	March	6381 (9.9%)	4264 (9.8%)	
	April	5616 (8.7%)	3565 (8.2%)	
	May	4917 (7.6%)	3195 (7.3%)	
	June	4968 (7.7%)	3523 (8.1%)	
	July	6635 (10.3%)	4461 (10.2%)	
	August	5229 (8.1%)	3383 (7.7%)	
	September	5625 (8.7%)	3768 (8.6%)	
	October	5874 (9.1%)	4148 (9.5%)	
	November	5473 (8.4%)	3723 (8.4%)	
	December	4858 (7.4%)	3365 (7.6%)	
Admission reason	*Examination*	51816 (80.1%)	41272 (94.5%)	<0.001**
	Single physician report	4467 (6.9%)	546 (1.3%)	
	Medical board report	3726 (5.8%)	1781 (4.1%)	
	Probation	4687 (7.2%)	72 (0.2%)	
Hospitalization after examination		2946 (4.6%)	1022 (2.3%)	<0.001**

**p<0.001, *p<0.05; Independent-Samples T-Test and Chi-square test were used in statistical analysis; Abbreviations: MHDH=Mental Health and Diseases Hospital, SD=Standard Deviation, TC=Turkish Citizen, SSI/SGK=Social Security Institution/Sosyal Güvenlik Kurumu (in Turkish), YUPASS=Foreign Provision Activation Health System/Yurt dışı Provizyon Aktivasyon Sağlık Sistemi (in Turkish), TOBB=Turkish Chambers, Stock Exchanges And Union Personnel Insurance And Pension Fund Foundation/Türkiye Odalar, Borsalar ve Birlik Personeli Sigorta ve Emekli Sandığı (in Turkish)

Table 3. Comparison of Male Elazığ MHDH Psychiatry Outpatient Clinic Data of 2019 and 2020

Parameters		2019 mean±SD & n (%)	2020 mean±SD & n (%)	p
Age (years)		43.19±17.03	41.87±16.62	<0.001**
Nationality	*TC*	42649 (99.7%)	21808 (99.5%)	<0.001**
	Syria	78 (0.2%)	79 (0.4%)	
	Others	53 (0.1%)	29 (0.1%)	
Health insurance	*SSI/SGK*	32950 (77.7%)	16475 (76.0%)	<0.001**
	Forensic	2067 (4.9%)	1347 (6.2%)	
	YUPASS	72 (0.2%)	24 (0.1%)	
	Refugees	78 (0.2%)	69 (0.3%)	
	Prisoners-convicts	4823 (11.4%)	2245 (10.4%)	
	Patient paid	2406 (5.7%)	1500 (6.9%)	
	TOBB	21 (0.0%)	7 (0.0%)	
Residence	*ELAZIĞ*	30483 (71.3%)	15545 (70.9%)	0.097
	Outside ELAZIĞ	12297 (28.7%)	6371 (29.1%)	
Admission reason	*Examination*	34067 (79.6%)	17749 (81.0%)	<0.001**
	Single physician report	3443 (8.0%)	1024 (4.7%)	
	Medical board report	2322 (5.4%)	1404 (6.4%)	
	Probation	2948 (6.9%)	1739 (7.9%)	
Hospitalization after examination		2180 (73.99%)	766 (26.01%)	<0.001**

**p<0.001, *p<0.05; Independent-Samples T-Test and Chi-square test were used in statistical analysis; Abbreviations: MHDH=Mental Health and Diseases Hospital, SD=Standard Deviation, TC=Turkish Citizen, SSI/SGK=Social Security Institution/Sosyal Güvenlik Kurumu (in Turkish), YUPASS=Foreign Provision Activation Health System/Yurt dışı Provizyon Aktivasyon Sağlık Sistemi (in Turkish), TOBB=Turkish Chambers, Stock Exchanges And Union Personnel Insurance And Pension Fund Foundation/Türkiye Odalar, Borsalar ve Birlik Personeli Sigorta ve Emekli Sandığı (in Turkish)

General psychiatric examination diagnosis (n=10,393) was 3.1% in those who applied for examination, 52.8% in a single physician report, and 87.7% in a medical board report. The diagnosis of all those (100.0%) who applied for probation (n=4,759) was alcohol and substance use disorder. The 89.1% of those who applied for a single physician report (n=5,013), 67.7% of those who applied for a medical board report, 98.5% of those who applied for probation, and 55.7% of those who applied for examination were males.

In total (n=108,367), among those residing outside Elazığ, the rate of bipolar spectrum disorder was 15.1%, schizophrenia spectrum disorder was 22.9%, anxiety disorder spectrum was 11.9%, depression spectrum disorder was 9.7%, and alcohol and substance use disorder was 14.6%. In total (n=108,367), among those residing in Elazığ, the rate of bipolar spectrum disorder was 11.6%, schizophrenia spectrum disorder was 18.2%, anxiety spectrum disorder was 24.8%, depression spectrum disorder was 17.6%, and alcohol and substance use disorder was 5.8%. There was a significant difference in terms of diagnoses according to place of residence (p<0.001). In total (n=108,367), the male rate was 69.2% among those residing outside Elazığ, while it was 56.5% among those residing in Elazığ (p<0.001).

Table 4. Comparison of Elazığ MHDH Diagnosis Data of 2019 and 2020 (n=108367)

Parameters	2019 n (%)	2020 n (%)	p
Anxiety disorder spectrum	14897 (20.9%)	8499 (22.9%)	<0.001**
Schizophrenia spectrum disorders	14748 (20.7%)	6230 (16.8%)	
Depression spectrum disorders	11765 (16.5%)	5170 (13.9%)	
Bipolar spectrum disorders	9020 (12.7%)	4539 (12.2%)	
General psychiatric examination	6317 (8.9%)	4076 (11.0%)	
Alcohol and substance use disorders	5382 (7.6%)	3235 (8.7%)	
General medical conditions	1391 (2.0%)	924 (2.5%)	
Personality disorders	1282 (%)	767 (%)	
Obsessive-compulsive disorder spectrum	1199 (1.7%)	716 (1.9%)	
Post-traumatic stress disorder spectrum	1644 (2.3%)	1087 (2.9%)	
Conversion disorder spectrum	196 (0.3%)	90 (0.2%)	
Somatization disorder spectrum	161 (0.2%)	64 (0.2%)	
Eating disorder spectrum	5 (0.0%)	0 (0.0%)	
Sleep disorder spectrum	529 (0.7%)	403 (1.1%)	
Sexual function disorder spectrum	5 (0.0%)	3 (0.0%)	
Intellectual disability	585 (1.8%)	305 (2.1%)	
Neurodevelopmental disorders	22 (0.0%)	14 (0.0%)	
Attention-deficit/hyperactivity disorder	420 (0.6%)	266 (0.7%)	
Extrapyramidal system related disorders	30 (0.0%)	19 (0.1%)	
Epilepsy spectrum	113 (0.2%)	51 (0.1%)	
Dementia spectrum	569 (0.8%)	206 (0.6%)	
Organic psychiatric disorders	38 (0.1%)	39 (0.1%)	
Impulse control disorders	10 (0.0%)	7 (0.0%)	
Alcohol and illegal substance screening	465 (0.7%)	10 (0.0%)	
Phobic disorders	70 (0.1%)	46 (0.1%)	
Registered but not examined	417 (0.6%)	321 (0.9%)	

**p<0.001; Chi-square test was used in statistical analysis; Abbreviations: MHDH=Mental Health and Diseases Hospital

Table 5. Comparison of Elazığ MHDH Diagnosis Data by Gender (n=108367)

Parameters	Male n (%)	Female n (%)	p
Anxiety disorder spectrum	10211 (15.8%)	13185 (30.2%)	<0.001**
Schizophrenia spectrum disorders	14419 (22.3%)	6559 (15.0%)	
Depression spectrum disorders	6863 (10.6%)	10072 (23.1%)	
Bipolar spectrum disorders	7878 (12.2%)	5681 (13.0%)	
General psychiatric examination	7497 (11.6%)	2896 (6.6%)	
Alcohol and substance use disorders	460 (0.7%)	15 (0.0%)	
General medical conditions	1280 (2.0%)	1035 (2.4%)	
Personality disorders	1928 (3.0%)	121 (0.3%)	
Obsessive-compulsive disorder spectrum	748 (1.2%)	1167 (2.7%)	
Post-traumatic stress disorder spectrum	1934 (3.0%)	797 (1.8%)	
Conversion disorder spectrum	68 (0.1%)	218 (0.5%)	
Somatization disorder spectrum	79 (0.1%)	146 (0.3%)	
Eating disorder spectrum	0 (0.0%)	5 (0.0%)	
Sleep disorder spectrum	772 (1.2%)	160 (0.4%)	
Sexual function disorder spectrum	6 (0.0%)	2 (0.0%)	
Intellectual disability	583 (0.9%)	307 (0.7%)	
Neurodevelopmental disorders	27 (0.0%)	9 (0.0%)	
Attention-deficit/hyperactivity disorder	408 (0.6%)	278 (0.6%)	
Extrapyramidal system related disorders	26 (0.0)	23 (0.1%)	
Epilepsy spectrum	108 (0.2%)	56 (0.1%)	
Dementia spectrum	373 (0.6%)	402 (0.9%)	
Organic psychiatric disorders	56 (0.1%)	21 (0.0%)	
Impulse control disorders	12 (0.0%)	5 (0.0%)	
Alcohol and illegal substance screening	8472 (13.1%)	145 (0.3%)	
Phobic disorders	72 (0.1%)	44 (0.1%)	
Registered but not examined	416 (0.6%)	322 (0.7%)	

**p<0.001; Chi-square test was used in statistical analysis; Abbreviations: MHDH=Mental Health and Diseases Hospital

In total (n=108,367), among those residing outside Elazığ, the rate of bipolar spectrum disorder was 15.1%, schizophrenia spectrum disorder was 22.9%, anxiety disorder spectrum was 11.9%, depression spectrum disorder was 9.7%, and alcohol and substance use disorder was 14.6%. In total (n=108,367), among those residing in Elazığ, the rate of bipolar spectrum disorder was 11.6%, schizophrenia spectrum disorder was 18.2%, anxiety spectrum disorder was 24.8%, depression spectrum disorder was 17.6%, and alcohol and substance use disorder was 5.8%. There was a significant difference in terms of diagnoses according to place of residence (p<0.001). In total (n=108,367), the male rate was 69.2% among those residing outside Elazığ, while it was 56.5% among those residing in Elazığ (p<0.001).

DISCUSSION

The COVID-19 outbreak has severely affected both the general population and individuals with or at risk for psychiatric disorders who are more vulnerable to anxiety. In the general population, anxiety disorder, panic disorder, disease phobia, obsessive-compulsive disorder and post-traumatic stress disorder are the psychiatric conditions most commonly associated with COVID-19 outbreak. COVID-19 outbreak may also trigger the emergence of more serious psychiatric disorders such as schizophrenia and bipolar disorder in the general population. On the other hand, COVID-19 outbreak may trigger attacks in individuals who already have one or more psychiatric disorders and may lead to exacerbation of existing symptoms. However, this information that psychiatric disorders will increase during the COVID-19 outbreak period may lead to staying away from healthcare institutions due to fear of COVID-19 contamination. People may choose to remain untreated, torn between psychiatric symptoms and fear of contracting COVID-19. Regardless, admissions to hospitals continued during the

COVID-19 period. Psychiatry branch hospitals continued to serve both outpatients and inpatients during this period. The fact that the outpatient data of these hospitals before and after COVID-19 outbreak was not sufficiently examined enabled this study to be carried out.

One of the first and most important findings of present study is that the number of subjects applying to Elazığ MHDH decreased by half in the 2020. Many studies have shown that psychiatric admissions decreased after COVID-19 outbreak. Seo et al. (9) examined psychiatric subjects admitted to a tertiary hospital in Korea between 01.10.2019-31.12.2019 and 01.03.2020-31.05.2020 and showed that the number of subjects decreased by 13.76% after COVID-19 outbreak. Savilahti et al. (10) reported that the total number of adolescent psychiatric admissions decreased in the spring of 2020. Many studies have shown that admissions to healthcare institutions around the world have decreased significantly after the second half of 2020 (7). In this present study, it was reported that the number of admissions in August, September and October 2020 decreased significantly. One of the most important reasons for this decrease is that curfews were strictly implemented during this period (11).

The fact that Elazığ MHDH has a medical board is also reflected in the findings of the study. This is the main reason why the rate of forensic health insurance admissions, prisoner/convict admissions and paid admissions is high in the study. The rates of probation, single physician report, medical board report and prisoner/convict admissions were higher in male subjects. Single physician reports are known to include shotgun and driver's license examinations. Since Elazığ MHDH is a psychiatric branch hospital serving 18 different provinces, the number of subjects whose place of residence is outside Elazığ is relatively high. The reason why the proportion of males living outside Elazığ is higher is that males are in the majority in forensic admissions, probation and prisoner/convict admissions. Proportion of males has found higher in prisoner/convicts and forensic subjects which is in line with the literature (12).

When our study findings were examined in terms of diagnoses, it was seen that the anxiety disorder spectrum was the most common reason for admission to the psychiatric outpatient clinic. In the study conducted by Tümkaya et al. (13) by examining 2002 data at the psychiatry outpatient clinic of Pamukkale University Faculty of Medicine, it was reported that the most common diagnosis was mood disorders with a rate of 40.9% and anxiety disorders with a rate of 38.5%. However, in this study, bipolar spectrum disorders and depression spectrum disorders were examined together according to the DSM-IV-TR. When these two disorder spectrums are separated, it is seen that the most common reason for admission is the anxiety disorder spectrum. In the study conducted by Güleç-Öyekçin et al. (14) by examining 2006 data at the psychiatry outpatient clinic of Erzincan State Hospital, it was reported that the most common diagnosis was mood disorders with 28.1% and anxiety disorders with 26.9%. Since DSM-IV-TR diagnostic criteria were taken into account in this study, bipolar and depression spectrum disorders were evaluated together. In other words, it can be seen that the anxiety disorder spectrum is the most common reason for admission in this study. In this study, the second most common presenting diagnosis was determined to be schizophrenia spectrum disorder. Since the studies conducted by Tümkaya et al. (13), Güleç-Öyekçin et al. (14), Yağcı et al. (15) and Hacımusalar et al. (16) were conducted in general hospital psychiatric outpatient clinics, schizophrenia and psychotic disorders were detected less frequently.

When the data of this study were evaluated in terms of gender, it was seen that there were aspects that differed from the literature. While the rate of females was found to be higher in studies conducted in psychiatric outpatient clinics of general hospitals (13-16), the rate of males was found to be higher in this study. In this study, the higher number of forensic subjects, prisoner/convicts, schizophrenia and bipolar spectrum disorder caused the high proportion of males in our study. In this study, the hospitalization rate was reported to be higher in forensic subjects. When the literature is examined, it is thought that the possible reason for this is involuntary hospitalization decisions (17). The post-examination hospitalization rate was higher in patients with schizophrenia spectrum disorder, bipolar spectrum disorder, and alcohol and substance use disorders. The greater need for hospitalization in MHDH for patients with severe mental disorders is reflected in their hospitalization decisions. On the other hand, involuntary hospitalization decisions are most often made in subjects of alcohol and substance use disorders and psychotic disorders (17).

After the COVID-19 outbreak, strict rules have been implemented all over the world. The health system was one of the systems most seriously affected by these rules. In order to prevent or reduce the spread of COVID-19, the inpatient capacities of hospitals have been reduced (18). In Elazığ MHDH, inpatient capacity was halved during the COVID-19 period. Due to the reduced capacity, hospitalization criteria were also changed and the profit and loss ratio was taken into account (17). This situation is also reflected in the data of this presented study. While the hospitalization rate after outpatient clinic examination in 2019 was 4.16%, it decreased to 2.69% in 2020. The rate of forensic admissions has increased after COVID-19 outbreak due to the lack of restrictions in the evaluation of forensic cases.

The diagnostic distributions of this study also provide important findings regarding the COVID-19 outbreak. While admissions for anxiety disorder spectrum increased after COVID-19 outbreak/the year 2020, admissions for schizophrenia and depression spectrum disorders decreased. Considering the psychological processes caused by COVID-19 outbreak, the interpretation of the findings has become easier. The fact that the

COVID-19 outbreak caused great loss of life all over the world in a short time, and that scientists and health authorities do not yet have sufficient information about the modes of transmission and treatment of the disease, has strengthened people's sense of uncertainty about the disease. With the increase in the number of COVID-19 cases, the fear of death and disease has emerged and anxiety levels have increased in all people. This psychological pattern is reflected in hospital admission statistics. Finally, when the diagnosis distributions are examined, it is seen that although the data of an adult psychiatry outpatient clinic is examined, non-psychiatric diagnoses and admissions under the age of 18 are also included. One reason for this is that forensic subjects under the age of 18 are also evaluated at the Elazığ MHDH medical board. In addition, since psychiatrists are also general practitioners, it can be thought that they also address patients' general medical problems.

Study Limitations and Strengths

Its retrospective nature is one of the most important limitations of this study. Detailed characteristics of the subjects' diagnoses could not be obtained. There is no information about additional psychiatric disorders and additional medical diseases. The strongest aspect of the current study is that it addresses an important issue regarding the COVID-19 process.

CONCLSION

This study is important in that it addresses all psychiatric outpatient clinic admissions from a very large group of subjects (n=108,367) who admitted to a psychiatric branch hospital in 2019 and 2020. Accordingly, the COVID-19 outbreak is primarily related to the decrease in hospital admissions. In addition, various changes have emerged in the admission diagnoses and the distribution of diagnoses according to sociodemographic and clinical variables. Differences were found between genders in terms of reason for admission, diagnosis, hospitalization after outpatient examination, and health insurance. The rate of forensic admission, residence and diagnosis in hospitalized subjects were significantly different from those in non-hospitalized subjects. Investigating the findings of the study in future studies will facilitate discussion of the findings.

Declarations

Ethics Committee Approval: Ethics committee approval was obtained from the Non-Invasive Ethics Committee of Fırat niversity (Date: 22/04/2021; No: 2021/06-17). This study was conducted according to the principles of the Declaration of Helsinki.

Authorship Contributions: Concept: M.H.O., Design: M.H.O., N.K., Data Collection or Processing: M.H.O., O.K., D.O., Analysis or Interpretation: M.H.O., N.K., O.K., D.O., And Literature Search: M.H.O., N.K., O.K., D.O., Writing: M.H.O., N.K., O.K., and D.O. All authors approved the final version of the manuscript.

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Research Article

Rotavirus Vaccination Status in Rotavirus Infection Presenting to Pediatric Emergency Department

Rotavirüs enfeksiyonu nedeniyle çocuk acil servisine başvuran hastalarda rotavirüs aşı durumu

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Abstract

Puspose: The aim of this study was to determine the frequency of rotavirus enteritis (RV-e) and rotavirus vaccination (RV-V) status in patients with acute gastroenteritis (AGE) admitted to the pediatric emergency department and to evaluate the demographic characteristics, seasonal distribution and risk factors of the disease.
Material and Method: The study was conducted in the Pediatric Emergency Department of Aksaray University Training and Research Hospital between January 1, 2023 and December 31, 2023. The study population included a total of 609 patients (229 patients with rotavirus (RV) antigen detected in stool smear and 380 patients with normal stool findings) out of 2156 patients aged 0-16 years admitted due to AGE. Patients were evaluated according to demographic characteristics, vaccination status, seasonal distrubition and hospitalization status.
Results: The mean age of the patients included in the study was 54.01 ± 45.24 months and 45.3% were girls. RV-e positivity rate was 37.6% (229 patients). Of the patients, 90% (n=548) were not vaccinated and 10% (n=61) were vaccinated. RV-e was most common in the spring (38.3%) and fall (24.3%) seasons. RV was detected in 78.9% of 133 patients hospitalized with AGE and this rate was statistically significant compared to those without RV-e (p<0.001). 93.9% of children with RV-e had not received RV-V.
Conclusion: Our study shows that RV-e in our region continues to be an important public health problem. Especially the detection of RV-e in the majority of severe cases requiring hospitalization emphasizes the seriousness of the disease. The low vaccination rates and the significantly lower incidence of infection in vaccinated children reveal the importance of expanding vaccination programs. Knowing the seasonal distribution of rotavirus infections will guide the planning of health services. In future studies, it is recommended to determine rotavirus genotypes and to examine the factors affecting vaccine efficacy in more detail.

Keywords: Rotavirus, gastroenteritis, pediatric emergency, seasonal distribution, vaccination

Öz

Amaç: Bu çalışmanın amacı, akut gastroenterit (AGE) nedeniyle çocuk acil servisine başvuran hastalarda rotavirüs enteriti (RV-e) ve rotavirüs aşısı (RV-V) durumunun sıklığını belirlemek ve hastalığın demografik özelliklerini, mevsimsel dağılımını ve risk faktörlerini değerlendirmektir.

Gereç ve Yöntem: Çalışma, 1 Ocak 2023 ile 31 Aralık 2023 tarihleri arasında Aksaray Üniversitesi Eğitim ve Araştırma Hastanesi Çocuk Acil Servisi'nde yürütülmüştür. Çalışma popülasyonu, AGE nedeniyle başvuran 0-16 yaş arası 2156 hastadan toplam 609 hastayı (dışkı yaymasında rotavirüs (RV) antijeni tespit edilen 229 hasta ve dışkı bulguları normal olan 380 hasta) içermektedir. Hastalar demografik özelliklerine, aşılanma durumlarına, mevsimsel dağılımlarına ve hastanede yatış durumlarına göre değerlendirilmiştir.
Bulgular: Çalışmaya dahil edilen hastaların yaş ortalaması 54,01 ± 45,24 ay olup %45,3'ü kızdı. RV-e pozitiflik oranı %37,6 (229 hasta) idi. Hastaların %90'ı (n=548) aşılanmamış ve %10'u (n=61) aşılanmıştı. RV-e en sık ilkbahar (%38,3) ve sonbahar (%24,3) mevsimlerinde görüldü. AGE nedeniyle hastaneye yatırılan 133 hastanın %78,9'unda RV tespit edildi ve bu oran RV-e olmayanlara göre istatistiksel olarak anlamlıydı (p<0,001). RV-e'li çocukların %93,9'u RV-V almamıştı.

Sonuç: Çalışmamız bölgemizde RV-e'nin önemli bir halk sağlığı sorunu olmaya devam ettiğini göstermektedir. Özellikle hastaneye yatış gerektiren ciddi vakaların çoğunda RV-e tespit edilmesi hastalığın ciddiyetini vurgulamaktadır. Düşük aşılama oranları ve aşılanmış çocuklarda enfeksiyon sıklığının önemli ölçüde düşük olması, aşılama programlarının genişletilmesinin önemini ortaya koymaktadır. Rotavirüs enfeksiyonlarının mevsimsel dağılımının bilinmesi sağlık hizmetlerinin planlanmasına rehberlik edecektir. Gelecekteki çalışmalarda rotavirüs genotiplerinin belirlenmesi ve aşı etkinliğini etkileyen faktörlerin daha ayrıntılı olarak incelenmesi önerilmektedi

Anahtar Kelimeler: Rotavirüs, gastroenterit, pediatrik acil, mevsimsel dağılım, aşılama

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INTRODUCTION

Rotavirus is one of the most important viral agents of AGE in childhood and are an important cause of morbidity and mortality especially in children under 5 years of age (1,2). More than 200,000 deaths due to RV-e occur worldwide every year and the majority of these deaths are observed in low-income countries (3,4). RV-e is typically characterized by vomiting and watery diarrhea and may be accompanied by fever and abdominal pain. Rapid dehydration may develop especially in young children (5). The disease is usually self-limiting within 3-8 days, but hospitalization may be required in severe cases. RV-e peak in temperate climates especially in winter and early spring (6,7). In the pre-vaccination period, rotavirus infections constituted a significant economic burden even in developed countries. For example, they caused approximately 400,000 outpatient visits, 200,000 emergency department visits and 55,000 hospitalizations annually in the USA (8). With the introduction of rotavirus vaccine (RV-V) into the routine vaccination program in 2006, a significant decrease in the disease burden was observed (9,10). The most effective method in the prevention of RV-e is vaccination. The World Health Organization recommended the addition of RV-V to all national vaccination programs in 2009 (11). Today, RV-V is used in more than 100 countries. While the efficacy of the vaccine is 80-90% in developed countries, it is around 50-60% in low-income countries (12).
In this study, we aimed to evaluate the frequency of RV-e in patients to our pediatric emergency department and the effect of RV-V status on the disease course.

MATERIALS AND METHODS

Study Design

This study was conducted in the Pediatric Emergency Department of Aksaray University Training and Research Hospital, which serves an average of 15000 cases per month between January 1, 2023 and December 31, 2023. Ethics committee approval was obtained from the Aksaray Health Sciences ethics committee before the study (ethics committee no: 2024/027-SAGETİK25). Clinical data were obtained from the hospital's electronic medical database and patient files. The study population consisted of patients aged 0-16 years who presented to the Pediatric Emergency Department with diarrhea. Patients with RV antigen detected by stool immunochromatography or normal stool smear results were included in the study. Patients over 16 years of age or patients with pathogens other than RV antigen in stool analysis and patients with missing data were excluded from the study. The patients whose parents could not be contacted by telephone to inquire about vaccination status were excluded. The patients included in the study will be classified according to demographic characteristics such as age, gender, nationality, season of the year and whether they are hospitalized or not. Patients will be divided into two groups as with and without RV-V and the relationship with subgroups will be examined.

Statistical Analysis

Analyses were performed by transferring to SPSS 24.0 (IBM, USA) programme.

Participants were divided into two groups: those with RV-e and normal stool test group.

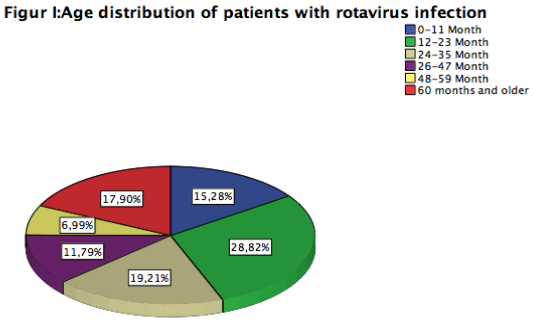
The normal distribution of the data was evaluated by Shapiro-Wilk test. Categorical variables were expressed as n (%) and continuous variables showing normal distribution were expressed as mean ± standard deviation. Chi-square test was used to compare the percentage distribution of categorical data between groups and Fisher's exact test was used non-normal distrubition of qualitative variables

RESULTS

A total of 609 patients (229 with RV-e and 380 with normal stool findings) out of 2156 patients admitted to the pediatric emergency department with AGE were included in the study. The mean age of the patients was 54.01 ± 45.24 months and 45.3% (n=276) were female. Of the patients, 90% (n=548) were unvaccinated and 10% (n=61) were vaccinated. Among patients with RV-e, the most common age group was between 12 and 23 months. (Figure I) Demographic characteristics of patients with AGE are given in Table 1and flowchart.

When hospitalization rates were evaluated, 21.8% (n=133) of the patients received inpatient treatment, while 78.2% (n=476) were treated as outpatients. Of 133 patients hospitalized with the diagnosis of AGE, 92.5% did not have RV-V, and there was no difference compared to the normal group (p=0.079). We found that only 6 (2.6%) children with RV-e had RV-V. Of the total of 229 children with RV-e, 215 (93.9%) did not have RV-V and we found a significant difference between the two groups (p<0.001). RV was detected in 78.9% of 133 patients hospitalized with the diagnosis of AGE and was statistically significant compared to those without RV-e (p<0.001). RV-e did not differ by gender, season and refugee status (p=0.895, p=0.296, p=0.598). Evaluation of RV-V is given in Table-2.

Table 1. Demographic characteristics of patients with gastroenteritis



Features	Subgroup	Number	%
Age (month)		54,01 ±45,2	
Gender	Female	276	45.3
	Male	333	54.7
Nationality	Turkish	507	83.3
	Refugee	102	16.7
Season	Winter	129	21.2
	Spring	233	38.3
	Summer	99	16.3
	Autumn	148	24.3
Infection status	Rotavirus	229	37.6
	Normal	380	62.4
Vaccination	Yes, 2 doses	51	8.4
	Yes, 1 dose	10	1.6
	No	548	90
Hospitalisation	Yes	133	21.8
	No	476	78.2

Flowchart

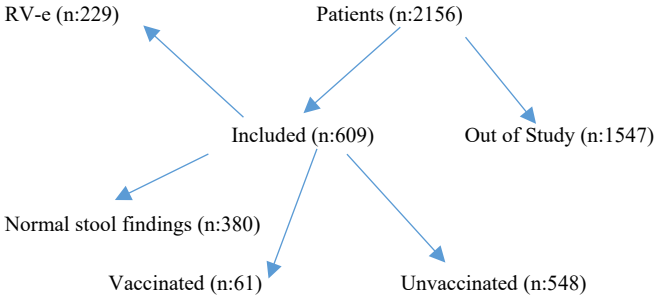


Table 2. Evaluation of Rotavirus Vaccination

		Rotavirus Vaccination Status				Stool Test		
Features	**Subgroups**	**Yes, 2 Dose n (%)**	**Yes 1 dose n (%)**	**No n (%)**	p	**Rotavirus**	**Normal n (%)**	p
Gender	Female Male	25 (9.1) 26 (7.8)	6 (2.2) 4 (1.2)	245 (88.8) 303 (91.0)	0.540**	103 (37.3) 126 (37.8)	173 (62.7) 207 (62.2)	0.895**
Nationality	Turkish Refugee	47 (9.3) 4 (3.9)	9 (1.8) 1 (1.0)	451 (89.0) 97 (95.1)	0.167**	193 (38.1) 36 (35.3)	314 (61.9) 66 (64.7)	0.598**
Season	Winter Spring Summer Autumn	15 (11.6) 21 (9.0) 6 (6.1) 9 (6.1)	2 (1.6) 5 (2.1) 2 (2.0) 1 (0.7)	112 (86.8) 207 (88.8) 91 (91.9) 138 (93.2)	0.550*	41 (31.8) 97 (41.6) 38 (38.4) 53 (35.8)	88 (68.2) 136 (58.4) 61 (61.6) 95 (64.2)	0.296**
Hospitalisation	Yes No	6 (4.5) 45 (9.5)	4 (3.0) 6 (1.3)	123 (92.5) 425 (89.3)	0.079**	105 (78.9) 124 (26.1)	28 (21.1) 352 (73.9)	**<0.001****
Infection status	Rotavirus Normal	6 (2.6) 45 (11.8)	8 (3.5) 2 (0.5)	215 (93.9) 333 (87.6)	**<0.001****			

*Fisher's exact test was used, **Chi-square test was used

DISCUSSION

In our study, 37.6% (229 cases) of 609 patients admitted to the pediatric emergency department were found to be RV-e positive. This rate is in the range of 9.8-39.8% reported in previous studies conducted in our country (1,2). The variability in RV-e prevalence in studies conducted in different regions of Turkey may be related to regional differences and vaccination rates during the periods when the studies were conducted. RV-e did not differ significantly according to gender (p=0.540). This finding is consistent with the literature and supports that RV-e affects both genders equally (13). When evaluated according to age groups, RV-e was found most frequently in the 0-12 months (12.9%) and 13-24 months (11.1%) groups. This distribution is in parallel with studies showing that rotavirus infections are observed more frequently in children under 2 years of age (14, 15).

Patel et al. analyzed 99 studies including 6 geographical regions of the world and Cook et al. reported that RV-e was most frequently observed in winter and spring months in studies conducted in 23 countries. Similarly, RV-e was observed most frequently in winter and spring months in our study (7). The fact that RV-e peak in winter months in countries located in the temperate climate zone is explained by the fact that the virus can remain more stable under low temperature and humidity conditions (5). In tropical regions, RV-e can be observed throughout the year. This difference is associated with socioeconomic characteristics and hygiene conditions of societies as well as climatic conditions (6).

RV-e was detected in 78.9% of 133 patients hospitalized with a diagnosis of AGE. This high rate indicates that RV-e have a more severe course and require more frequent hospitalization compared to other viral AGE agents (7). As a matter of fact, RV was responsible for approximately 40% of gastroenteritis requiring hospitalization in children in the pre-vaccine period, and a significant decrease in both hospitalization and mortality rates was found after the vaccine became widespread (8). In our study, it was found that only 2.6% of the patients with RV-e had RV-V. Of those with RV-e, 93.9% did not have RV-V (p<0.001). This result shows the effectiveness of the vaccine in preventing RV-e. It has also been reported in the literature that RV-V has high efficacy in preventing RV-e, especially with severe course (11,12). In developed countries, the efficacy of the vaccine varies between 85-98%. However, vaccine efficacy remains at the level of 50-60% in low-income countries (13).

Our study has some limitations. First, the study was conducted with data from a single center and the results may not be generalizable to the whole population. Secondly, RV was diagnosed only by stool RV antigen test and genotyping by molecular methods was not performed. Finally, recurrent infections and long-term complications could not be evaluated because long-term follow-up data were not available.

CONCLUSION

In conclusion, RV-e remains an important cause of childhood AGE. Vaccination is the most effective method of disease prevention and is particularly successful in reducing severe cases. However, vaccine coverage needs to be increased and factors affecting vaccine efficacy need to be better understood. Future studies will contribute to the development of new vaccine strategies and improve the efficacy of existing vaccines

Declarations

Conflict of interest: The authors of the article declare that they have no conflict of interests.

Competing interests: None to declare. The authors reported no competing interests.

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Research Article

Comparison of Conjunctival Flora of Turkish and Syrian Individuals

Türk ve Suriyeli Bireylerin Konjonktival Floralarının Karşılaştırılması

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ABSTRACT

Puspose: The objective of this study is to explore the refugee problem and its global implications. The refugee problem has been a global concern for many years, with the scale of the issue increasing over time. Turkey is one of the leading countries hosting Syrian refugees. The present study aims to evaluate the conjunctival flora of Syrian refugees and Turkish individuals who presented at our clinic, and to compare the results.

Material and Method: The study population comprised a total of 96 patients, with 55 Turkish and 41 Syrian individuals. Swabs were taken from the conjunctiva of the lower eyelid of the patients with a sterile swab. The samples were then cultured on various agar media, including Eosin Methylene Blue (EMB), Sabouraud dextrose, chocolate, and 5% sheep blood agar, within the microbiology laboratory.

Results: The results showed that 53.7% of Syrian refugee samples and 52.7% of Turkish samples were culture positive (p=0.92). Coagulase negative staphylococcus (CNS) was the most frequently isolated microorganism in Turkish individuals (32.7%) and Syrian refugees (46.3%) (p=0.19). The most prevalent microorganism isolated in 32.7% of Turkish individuals was CNS, followed by *Streptococcus spp*. (18.2%), *Staphylococcus aureus* (12.7%), *Corynebacterium spp.* (10.9%), *Bacillus spp*. (12.7%), *Micrococcus spp*. (1.8%), and *Neisseria spp*. (1.8%). In conjunctival cultures of Syrian refugees, CNS was isolated in 19 (46.3%), *Corynebacterium spp*. in 7 (17.1%), *Streptococcus spp*. in 3 (7.3%), *Staphylococcus aureus* in 2 (4.9%), *Bacillus spp*. in 5 (12.2%), *Micrococcus spp*.

Conclusion: Conjunctival growth was found to be similar in both the Turkish and Syrian refugee groups, with CNS being the most frequently isolated bacterium. The bacterial species isolated were comparable in both groups, and there was no statistically significant difference in the incidence of these bacteria

Keywords: Conjunctival flora; Syrian refugee; Turkey

Öz

Amaç Mülteci sorunu uzun yıllardır tüm dünyada devam eden ve giderek daha da büyük boyutlara ulaşan bir sorundur. Türkiye'ye gelen Suriyeli mültecileri misafir eden ülkelerin başında gelmektedir. Bu çalışmamızda kliniğimize başvuran Türk bireyler ile Suriyeli mültecilerin konjonktival floralarının değerlendirilmesi ve sonuçların karşılaştırması amaçlandı.

Gereç ve Yöntem Çalışmaya 55 'i Türk, 41'i Suriyeli toplam 96 hasta dahil edildi. Hastaların alt göz kapağı konjonktivasından steril eküvyon ile sürüntü örneği alındı. Alınan örneklerin mikrobiyoloji laboratuvarında Eosin Metilen Blue (EMB) agar, Sabouraud dekstroz agar, çukulatamsı agar ve %5 koyun kanlı agar besiyerlerine ekimleri yapıldı.

Bulgular: Suriyeli mültecilerde konjonktival kültür pozitifliği %53.7 iken Türk bireylerde %.52.7 oranında pozitif kültür saptandı (*p*=0.92). *Coagulase negative staphylococcus (CNS)* Türklerde (%32.7) ve Suriyeli mültecilerde (%46.3) en sık izole edilen mikroorganizma olarak bulundu (*p*=0.19). Türklerde *CNS* 18'inde (%32.7), ikinci en sık izole edilen *Streptococcus spp*. 10'unda (%18.2) , *Staphylococcus aureus* 7'sinde (%12.7), *Corynebacterium spp.* 6'sında (%10.9), *Bacillus spp.* 7'sinde (%12.7), *Micrococcus spp* 1'inde.(%1.8), *Neisseria spp.* 1'inde (%1.8) izole edilmiştir. Suriyeli mültecilerin konjonktival kültürlerinde ise *CNS* 19'unda (%46.3), *Corynebacterium spp.* 7'sinde (%17.1), *Streptococcus spp*. 3'ünde(%7.3), *Staphylococcus aureus* 2'sinde (%4.9), *Bacillus spp*. 5'inde (%12.2), *Micrococcus spp* 1'inde (%1) izole edilmiştir.

Sonuç: Türklerde ve Suriyeli mültecilerde konjonktival üreme benzer ve en sık izole edilen bakteri *CNS* bulunmuştur. İzole edilen bakteri türleri iki grupta benzerdir ve bu bakterilerin görülme sıklıkları açısından da istatiksel olarak anlamlı fark görülmemiştir.

Anahtar Kelimeler: Konjonktival flora; Suriyeli mülteci; Türkiye

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INTRODUCTION

The microbiota present on the eyelids and conjunctiva are classified as saprophytic; however, under certain conditions, these microorganisms possess the capacity to assume a pathogenic role. This transition occurs when the body's innate defence mechanisms are compromised (1). These microorganisms may become pathogenic and lead to infections in cases such as surgical interventions performed on the eye, malnutrition and impaired body resistance (2-4).

The most prevalent organisms identified within the normal conjunctiva are *Staphylococcus epidermidis, Corynebacterium spp., Staphylococcus aureus, Micrococcus spp., Streptococcus spp., Morexella catarrhalis, Haemophilus influenza, Klebsiella spp., E. coli* and *Pseudomonas aeruginosa* (5). This conjunctival flora, which is established from birth, persists throughout life and may be subject to variation depending on environmental factors, season, age, body resistance and general hygienic conditions (6).

Following the Second World War, the number of refugees has exceeded 70 million, and there is concern that this figure will increase. The increasing number of refugees also gives rise to significant humanitarian problems. In recent times, millions of individuals have been compelled to flee their countries due to armed conflicts and systematic killings in the Middle East, becoming refugees or seeking asylum in neighbouring countries. These individuals predominantly seek refuge in neighbouring countries and developing nations (7).

The ongoing armed conflict in Syria, which commenced in 2011, has been a significant driver of displacement, with millions of Syrians compelled to seek refuge elsewhere. The war has resulted in the death of hundreds of thousands of Syrians and the displacement of millions more (8). In numerous cities across our nation, camps have been established for Syrian refugees by the Prime Ministry Disaster and Emergency Management Presidency (AFAD). The city under consideration in this study is one of those hosting such camps, with a significant population of Syrians residing in these camps for an extended period.

Syrian refugees in Turkey, who constitute the most significant refugee problem in recent years, are compelled to reside in substandard conditions, akin to those experienced by refugees in numerous other countries worldwide. This situation is accompanied by a prevalence of physical and psychological health complications (9,10).

A multitude of studies have demonstrated that the migration of war victims from their countries of origin to live as refugees in other countries engenders various problems, particularly economic, social and health-related challenges. In the domain of ophthalmology, it is also important to ascertain the conjunctival flora of Syrian refugees, as this information is pivotal for the timely initiation of treatment or the implementation of precautionary measures in potential cases of postoperative infection and endophthalmitis.

The objective of this study was to investigate the conjunctival flora of individuals who have fled the Syrian war and have taken refuge in Malatya province of Turkey, and to compare these samples with the flora of the local population residing in this province. This approach was informed by the understanding that the conjunctival flora is susceptible to alterations in response to environmental factors, body resistance, and hygienic conditions. The presence of recurrent conjunctivitis cases among Syrian refugees seeking medical attention at our clinic further underscores the need for comprehensive investigation into this aspect of health in refugee populations.

MATERIALS AND METHODS

Study Design

The present study was conducted in accordance with the following material and methodological framework. Two groups, consisting of 41 Syrian refugees and 55 Turkish individuals, were admitted to the Ophthalmology Clinic. Prior to participation, all subjects were thoroughly informed about the study's objectives and procedures, and their consent was obtained in the form of a signed consent form. The principles of the Declaration of Helsinki were followed at all stages of the study. Ethical approval was obtained from the Malatya Clinical Research Ethics Committee (Decision No: 2020/130).

The demographic data of the participants, including their age, gender, the presence of systemic diseases, and the clinical information at the time of hospital admission, were thoroughly documented. Patients meeting the following criteria were included in the study: no symptoms or signs of ocular infection in the last three months; no systemic diseases such as diabetes mellitus; no history of eye surgery; and no eye disease other than refractive error, as determined by a complete ophthalmological examination. Following a thorough visual examination, biomicroscopic examination and fundus examination of the patients, the lower eyelid of the eligible patients was retracted and a sample was taken from the lower fornix by gently rubbing a sterile cotton swab. In order to avoid contamination from the eyelids and eyelashes, the swab was taken with the utmost care. The use of topical anaesthetic drops was avoided both before and during swab collection, owing to their inhibitory effect on

certain microorganisms. Immediately, cotton swabs were immersed in Stuart Transport Medium (BTR Stuart Transport Swab, Gülka sağlik, Ankara/Turkey) and transferred to the microbiology laboratory. The samples were then subjected to a process of culturing in Thioglycolate broth, a procedure that was initiated with alacrity to mitigate the risk of contamination. Subsequent transfer cultures were then performed on EMB (Eosin Methylene Blue) agar, Sabouraud dextrose agar, chocolate agar and 5% sheep blood agar media in the microbiology laboratory. These were then left to incubate at 37°C for a period of between 24 and 48 hours. Following this, Gram staining, catalase, oxidase, PYR and coagulase tests were performed on the pure colonies obtained, and preliminary nomenclature was made. These microorganisms were then identified at species level using a fully automated bacterial-yeast identification device (VITEK 2-compact, Biomerieux, USA).

Statistical Analysis

The statistical analysis was conducted using SSPS Windows (ver. 22.0; IBM Corp., Armonk, NY, USA), a statistical software package. The results obtained were expressed as either the mean standard deviation (SD) or the number (%). The Shapiro-Wilk test was employed to ascertain the conformity of continuous variables to a normal distribution. The Mann-Whitney U test was employed for the analysis of quantitative data, while the Chi-Square test was utilised for the examination of qualitative data, with the objective of investigating the disparities between two groups. A value of $P<0.05$ was considered statistically significant**.**

RESULTS

The mean age of Syrian refugees was 32.3 years (± 8.1 years), while the mean age of the Turkish group was 25.6 years (± 7.6 years). While 51.2% of Syrians were female and 48.8% were male, 60% of Turks were female and 40% were male. The age and gender distribution of the two groups is outlined in Table I.

Table-1. Distribution of Syrian Refugees and Turkish People by Age and Gender

	Turkish Individual (n:55)	Syrian Refugees (n:41)
Female	33(60%)	21(51.2%)
Male	22(40%)	20(48.8%)
Average Age	25.6±7.6	32.3±8.1

Growth in conjunctival cultures: 53.7% of Syrian patients exhibited growth in conjunctival cultures, with CNS being isolated most frequently (46.3%). In the Turkish patient group, 52.7% had positive cultures, and CNS was isolated most frequently (32.7%), although this difference was not statistically significant (p=0.17). A subsequent analysis revealed no statistically significant difference between the two groups in terms of growth rates (p=0.92).

The most prevalent bacterial isolate in Turkish patients was *Streptococcus spp*. (18.2%), followed by *Corynebacterium spp*. (17.1%). *Stapylococcus aureus* was isolated at a rate of 12.7% in the Turkish population and 4.9% in the Syrian refugee population (p=0.19); *Bacillus spp*. was isolated at a rate of 12.7% in the Turkish population and 12.2% in the Syrian refugee population (p=1.00); and *Micrococcus spp*. was isolated at a rate of 1.8% in the Turkish population and 2.4% in the Syrian refugee population (p=1.00). *Neisseria spp*. was isolated at a rate of 1.8% in the Turkish population but not among Syrian refugees in conjunctival cultures. Growth in conjunctival cultures is demonstrated in Table II.

Table-2: Growth in Conjunctival Cultures

Types of Bacteria	Turkish Individuals	Syrian refugees	*p* value
Staphylococcus aureus	7(12.7%)	2(4.9%)	0.19
Coagulase negative staphylococcus (CNS)	18(32.7%)	19(46.3%)	0.17
Streptococcus spp.	10(18.2%)	3(7.3%)	0.12
Corynebacterium spp.	6(10.9%)	7(17.1%)	0.38
Neisseria spp.	1(1.8%)	0	1.00
Bacillus spp.	7(12.7%)	5(12.2%)	1.00
Micrococcus spp.	1(1.8%)	1(2.4%)	1.00

DISCUSSION

The normal flora of the conjunctiva is the primary source of contamination following intraocular surgery (11,12). *Coagulase-negative staphylococci* (CNS), *Staphylococcus aureus* and *Corynebacterium species*, which are most frequently isolated from conjunctival and eyelash flora, are the most common agents of postoperative infections (13). These microorganisms have the potential to become pathogenic, leading to infections in conditions such as surgical interventions performed on the eye, malnutrition and impaired body resistance (2-4).

The ongoing Syrian conflict has resulted in a significant exodus, with more than two million individuals compelled to flee their

homeland. Access to healthcare has emerged as a pressing concern for these refugees, underscoring the need for effective health systems. The predominant health challenges experienced by refugees pertain to infections and acute diseases associated with malnutrition (14). In the initial stages of their arrival, Syrian refugees residing in camps have received complimentary health education, along with essential amenities such as shelter, nutrition, and education, with the aim of mitigating the risk of infections and diseases. The most prevalent health concerns experienced by Syrian refugees who sought care at our ophthalmological clinic pertain to spectacle requirements due to refractive errors, conjunctivitis, pterygium requiring surgical intervention, cataract, and glaucoma.The present study aims to evaluate the conjunctival flora of Syrian refugees in Malatya who presented at our clinic and to compare the results with those of Turkish individuals.

It is important for healthcare professionals to possess a comprehensive understanding of the normal conjunctival flora, as this knowledge is crucial for the effective evaluation of culture results in pathological conditions (15). In the context of Syrian refugees, it is of particular significance to be acquainted with their conjunctival flora, as this information is pivotal for the timely initiation of treatment or the implementation of precautionary measures in cases of potential postoperative infection and endophthalmitis. This is especially salient in cases of diseases such as pterygium and cataract, which have increased surgical requirements. It is important for healthcare professionals to recognise that migration can lead to increased intensity in operating theatre activities and personnel workload (16). Healthcare personnel must be cognisant of the needs of migrant groups and possess the ability to interact with them effectively (17). As ophthalmologists, we have been and continue to perform essential examinations and treatments for Syrian refugees, both in outpatient clinics and in surgical settings. This study was conducted to investigate how we should approach eye infections in Syrian refugees, given the knowledge of the normal conjunctival flora.

The bacterial isolation rate in normal conjunctiva varies between 15% and 100% (18-21). Coagulase-negative *staphylococci* and diphtheroids are found in the normal flora of the conjunctiva commensally and are the most frequently isolated species. Potentially pathogenic bacteria, including *Staphylococcus aureus*, *Stretococcus pneumoniae, Haemophilus influenza, Pseudomonas spp*. and *Escherichia coli*, are isolated less frequently (22-25). In the present study, the isolation rates of bacteria from conjunctival cultures of Turkish and Syrian refugees were found to be comparable, with 52.7% of Turks and 53.7% of Syrians exhibiting bacterial growth. A statistical analysis revealed no significant difference between the two groups with respect to growth rates (p=0.92).

Coagulase-negative staphylococci were the most frequently isolated bacteria in both the Turkish population (32.7%) and the Syrian refugee population (46.3%). The remaining *staphylococci*, excluding *S. aureus*, were designated as CNS. Among these, *S. epidermidis* was the most frequently isolated. *S. epidermidis* has been observed to be prevalent in terms of its localisation and has frequently been identified as an opportunistic pathogen (26). It is typically present in the ocular flora but can become pathogenic in the appropriate environment, leading to chronic blepharoconjunctivitis. Strains that are infective can produce *S. aureus*-like toxins (27-31).

In the present study, *Streptococcus spp*. (18.2%) was identified as the most prevalent bacterium isolated from CNS in the Turkish population, while *Corynebacterium spp*. (17.1%) was the second most common isolate in the Syrian refugee population. *Neisseria spp.* was isolated from the conjunctival cultures of Turks (1.8%) but not from the conjunctival flora of Syrian refugees. However, this difference was not statistically significant. The frequencies of the other isolated bacteria were comparable between the two groups, with no statistically significant differences observed.

The resident flora of the conjunctiva may resemble the transient flora as a result of any environmental change (32). Given that the conjunctival flora may be influenced by environmental and hygienic factors, it was observed that the conjunctival flora of Syrian refugees who had been residing in Malatya for an extended period during the adaptation process was similar to that observed in the conjunctiva of Turks.

Disturbances in the balance between transient and resident flora within the conjunctiva have been shown to facilitate the process of microbial proliferation and disease development (32). Chronic diseases, including diabetes, hypertension, and chronic obstructive pulmonary disease, emerge as a significant concern due to the absence of comprehensive long-term plans and programmes in sectors such as health and education (7). In cases where there is a decrease in body resistance due to these diseases, microorganisms in the conjunctival flora may become pathogenic, leading to infections.

With regard to ophthalmic diseases, the facilitation of access to healthcare services for the purpose of averting potential ocular complications arising from chronic conditions can serve to diminish the prevalence of severe pathologies. However, a significant proportion of refugees are unaware of how to access healthcare services (33). A significant proportion of refugees, 77.4%, are unaware of the procedures to be performed prior to surgery, while 51.4% lack knowledge on how to use prescribed medication. The majority of refugees reportedly consult with their neighbours for guidance on how to use their medication. The correlation between linguistic barriers, educational levels, and these outcomes is noteworthy (34). Consequently, the role of physicians is rendered more arduous, and this scenario

underscores the necessity for the implementation of preventive measures.

CONCLSION

In conclusion, the most frequently isolated bacterium from conjunctival cultures in Turks and Syrian refugees was CNS. The bacterial species isolated were found to be similar in both groups, with no statistically significant difference in the frequency of these bacteria. The hypothesis that this phenomenon may be attributable to the geographical and climatic similarities between the province where the study was conducted and Syria is substantiated by the proximity of the two regions. This phenomenon may also be attributed to the shared cultural characteristics and genetic similarities between the two populations. However, it is acknowledged that an epidemiological evaluation based solely on patients admitted to our clinic may not be sufficient to reflect the situation of all refugees. Conducting studies that include Syrian refugees who do not seek healthcare in health centres is also recommended. Achieving solutions to challenges related to health and education in our country, where there is a gradual increase in the number of refugees, necessitates both national and international cooperation.

Declarations

Ethics Committee Approval: The study was approved by the Malatya Clinical Research Ethics Committee (Decision No: 2020/130) and conducted in accordance with the Declaration of Helsinki.
Informed Consent: The consents were obtained from all of the authors for this article.
Author Contributions: All authors contributed to every stage of the study.
Conflict of Interest: None.
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Review Article

What is Eating Awareness? A Review

Yeme Farkındalığı Nedir? Bir Derleme

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Abstract

In order to ensure that eating behaviors are healthy, more studies are carried out in order to increase eating awareness. Eating awareness can be used together with other known healthy eating behavior techniques. It is thought that eating awareness may be important in the treatment or prevention of obesity and eating disorders. In this review, literature information about the concept of eating awareness and its effect on obesity and eating disorders will be presented.

Keywords: Eating awareness, mindful eating, obesity, eating disorders

Öz

Yeme davranışlarının sağlıklı olmasını sağlamak için yeme farkındalığının arttırılmasının önemi ile ilgili günümüzde daha fazla çalışma yapılmaktadır. Yeme farkındalığı bilinen diğer sağlıklı yeme davranışı oluşturma teknikleri ile birlikte kullanılabilmektedir. Yeme farkındalığının, obezitede ve yeme bozukluklarının tedavisinde ya da önlenmesinde önemli olabileceği düşünülmektedir. Bu derlemede, yeme farkındalığı kavramı ve bu kavramın obezite ve yeme bozuklukları üzerindeki etkisi hakkında literatür bilgileri sunulacaktır

Anahtar Kelimeler: Yeme farkındalığı, dikkatli yeme, obezite, yeme bozuklukları

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INTRODUCTION

Eating behavior and eating function, which are necessary for survival, not only provide pleasure but can also cause some health problems such as undernutrition, overnutrition or eating disorders (1). The psychological characteristics of the person, including emotional and cognitive elements, may affect the eating habits and weight controls. This can be seen in individuals who are overweight and obese, as well as individuals with ideal body weight (2). Eating awareness is a personal approach to improving eating behaviors by directing attention to eating (3). It is stated that high eating awareness skills have a crucial role in improving the effectiveness of treatment for weight control and eating disorders. Eating awareness is important in gaining healthy eating attitudes and behaviors (4). In this review, literature information about the concept of eating awareness and its impact on body weight and eating disorders will be presented.

Definition and History

Mindfulness is a psychological thing that can help reduce stress and unhealthy eating behaviors that come with stressful experiences for some people (5). Mindfulness is the experience of paying attention without judgment in the present moment. Mindfulness-based interventions teach recognizing and experiencing tough emotions instead of exhibiting impulsive behaviors like eating as a way to decrease the intensity of emotions (6). Mindfulness-based strategies have been used successfully in weight loss and weight management interventions (5, 7, 8). The concept of eating awareness is defined as eating behavior accompanied by different principles. These principles consist of 5 main headings according to Matheui. This title is; Recognizing the signals of hunger toughness, realizing the difference between emotional and physical hunger, preventing the elements that distract attention while eating, slowing down the speed of eating, thinking about how the food helps to feed the body and benefiting from all the senses (9). Alberts et al. has also discussed similar principles. These principles; Discovering emotional triggers about food, enjoying the food, being aware of physical signals while eating, not making nutritional restrictions, not categorizing nutrients as good or bad (10). Eating awareness does not focus on the content of the food eaten. It is a style of eating that being aware of why and how eating behaviors occur, noticing physical hunger and fullness cues, and being focused on the food being consumed at that moment, understanding the impact of emotions and thoughts. In eating awareness, there is full awareness, including the taste and texture of the food (11, 12). Eating mindfulness involves making conscious choices about eating (13) being aware of hunger and fullness, eliminating distractions, knowing the consequences of mindless eating, choosing attractive and nutritious foods, and deciding how much to eat (14). This awareness can play a role in providing body weight control by helping to slow down the rate of eating and reduce food cravings (15). Lawlor and colleagues have stated that mindfulness and acceptance-based interventions are effective not only changing eating behaviors but also in benefiting mental health outcomes such as anxiety or depression (16). Although eating awareness can be used with the proposed dietary behavioral changes in behavioral change programs, this ability is different from the most widely taught skills for weight control such as portion control and food planning (17). Eating awareness advocates encourage people to take away distractions, such as television while eating and to avoid multitasking, such as working while eating (9).

Diagnostic Evaluation

The Mindful Eating Questionnare (MEQ) was created by Framson et al. to evaluate the level of eating awareness. This scale is a 4-point Likert type and consists of 28 items. The scale measures the main constructs of eating awareness (awareness, distraction, disinhibition, emotional response and external cues) and is used in clinical research. Individuals with high points are considered as people who are aware of the physiological indicators of hunger and satiety. Scale developers argue that these subscales evaluate their basic awareness skills in the context of eating. They also pay attention to taste and texture of foods, excessive eating triggers and external stimuli (18). The scale was adapted into Turkish by Köse et al., after conducting a validity and reliability study of the scale (11).

The Relationship Between Eating Awareness and Obesity

Obesity and overweight have significantly increased over the past thirty years. One in every three adults globally is overweight or obese, and this is associated with over 3 million deaths each year (19). People can eat with awareness, which is an innate skill. Abundance of food, triggers such as increased stress and multitasking cause unconscious food selection and overeating. Increased portion sizes of consumed foods, exposure to emotional and environmental factors while eating, less observation of the act of eating at the time of food consumption (automatic pilot) cause lack of monitoring of how much food is consumed, excessive food consumption and increased calorie intake. These are resulting in increased body weight. Although there is no genetic predisposition to obesity, excessive food consumption without awareness can cause obesity. The main goal of mindfulness is to reduce the autopilot state, or the times when people are not conscious of individual moments during the day (14). Some claim that, despite mindfulness-based programs teaching emotion regulation skills that can influence behaviors and psychological state to promote healthier eating behaviors (20), they do not directly lead to weight loss (21). On the other hand, some argue that eating awareness helps reduce overconsumption of food by ensuring awareness of current

events through non-judgmental and focused attention, and helps in healthy body weight loss by encouraging adequate and balanced nutrition with less energy intake (22). Numerous studies have also shown that mindful eating may be related to weight loss and could be a practical approach to weight loss (13, 20, 23-26). In a study in which a 6-week application was made to give awareness training called Mindful Eating and Living (MEAL) to obese individuals, changes in BMI, eating behavior and psychological distress were examined. Participants showed significant increases in eating awareness, while demonstrating significant decreases in weight, eating disinhibition, binge eating, depression, and perceived stress (15). When mindful eating techniques are used as part of an intervention for obese or overweight individuals, it is important that these interventions also include techniques that reduce negative affect and emotional dysregulation (27). The fact that emotional regulation skills are weak and depression is common in people with emotional eating suggests that emotional regulation skills should also be focused on in the treatment of obese people with emotional eating problems (28). Higher mindfulness has been found to be associated with lower emotional eating, anger, and anxiety. The potential need for mindfulness intervention programs in the treatment of different types of emotional eating in overweight or obese adults has been demonstrated (29). In one study, the intervention group was allowed to listen to music for 15 minutes to relax the individuals, while correct breathing, sensations and focusing on the body were practiced, and body awareness was tried to be created. The control group was only allowed to listen to music. After this intervention, each participant was asked to taste crackers, raw almonds and colored chocolate beads in 3 bowls with the same amount of content in a separate bowl, eat as much as they wanted and rate how delicious they were. As a result of the study, it was found that the intervention group consumed 24% less energy than the control group and that there was a causal link between eating awareness and food consumption (30). Due to these features, it is stated that eating awareness is a useful strategy in reducing impulsive food choice in adolescents and adults, and thus can temporarily prevent weight gain (31). Eating awareness can effectively manage emotional eating (15, 24). It also effective in food intake (20, 26, 32) and food choice (20). Traditional body weight reduction strategies and eating awareness based interventions offer a long-term, holistic approach to healthy living (7). In a study conducted by Mantzios and Wilson, they asked undergraduate students to answer a series of questions either while eating or immediately after eating for 5 weeks. The questions were about the smell, color, texture and taste of the food. They asked the control group questions that encouraged them to think about their food, unrelated to their current experiences. In this study, they aimed to learn the effects of increasing present moment awareness regarding the sensory properties of food. The results showed that those in the mindfulness group lost significantly more weight than those in the control group (33). One study compared the effectiveness of a family-based mindful eating intervention in obese adolescents with standard dietary counseling for losing weight and improving cardiometabolic risk markers. Adolescents who received a family-based mindful eating intervention showed reduced distraction while eating at 12 weeks and increased mindfulness at 24 weeks compared with the standard dietary counseling group (34). Alberts et al. in their study, all participants attended 10-week meetings that included information about healthy food choices and a 1-hour physical activity session. The study examined the effects of present moment awareness and acceptance among overweight and obese adults. And it primarily aimed to reduce the desire to eat. And along with this, weight loss was also evaluated. Participants were given an instruction manual that included exercises that developed present-moment awareness of bodily sensations and thoughts related to eating behaviors and aimed at acceptance of bodily sensations and thoughts related to food cravings. As a result, those in the awareness group lost more weight than those in the control group. However, this study, with a total of 19 participants, was underpowered and this difference was not significant (10). In another study, an eating awareness-based intervention in stress management was applied to 48 adult males for 4 months. Sessions were held at regular intervals and during the sessions, participants were trained in mindfulness meditation practice. When the data obtained before, after and four months after the intervention were evaluated with the eating awareness scale, it was determined that eating awareness increased significantly, but the initial BMI values of the participants increased as a result of the study and during follow-up (35). Mindfulness-based interventions to treat obesity have generally yielded positive results, but weight loss remains a challenge (3, 36). The aim of mindful eating is not losing weight. It's aim is help individuals enjoy the moment and the meal and encourage their full presence for the eating experience. However, those who adopt this eating style are likely to lose weight. Diets have the potential for success or failure depending on weight results. People can know that their results will depend on caloric intake and expenditure, and they can understand that this is related to their behavior. However, when individuals are exposed to daily stress and external pressures, it will be difficult to maintain behavioral changes. Awareness provides a process-oriented behavior rather than a result-oriented behavior. It is based on the individual's current experience. The individual focuses on appreciating the food experience and is not concerned with restricting intake. The eater chooses what and how much to consume. It is no coincidence that with a mindful approach, one enjoys eating and chooses foods consistent with desired health benefits (17).

The Relationship Between Eating Awareness and Eating Disorders

Eating disorders are characterized by abnormal eating or weight control behaviors. Disturbing attitudes towards weight, body shape and food have a significant role in their origin and maintenance (37). During stressful times, not only does it

become harder to resist eating delicious foods, but those foods also become more rewarding. It is possible for mindfulness to reduce the relationship between eating in response to stress during stressful experiences. It is reported that there is a weaker relationship between stressors and stress-related eating due to the higher ability of individuals with high levels of mindfulness to cope with stress effectively (38). It has been found that eating awareness reduces the relationship between disordered eating behaviors and disordered eating cognitions, and is also effective in weight loss, obesity and eating disorders (39, 40). The relationship between eating awareness and eating behaviors was examined in an 8-week eating mindfulness-based intervention study involving 26 women aged 18-65 with eating behavior disorders (emotional eating, stress-related eating, mindless eating, and/or binge eating). This intervention is composed of five basic components: 1-awareness of food, 2-awareness of physical sensations, 3-awareness of emotions and thoughts related to eating, 4-non-judgmental acceptance, 5-step by step change of awareness, daily patterns, eating and physical activity habits. In light of these components, exercises related to body scanning meditation, sitting and walking meditation, eating awareness skills, self-acceptance and control paradox were performed for 45-60 minutes a day. The results suggest that the intervention may be an effective way to reduce factors associated with eating behavior disorders (15). There is a study showing that a weight management intervention based on acceptance and commitment therapy helps participants with emotional eating by enhancing self-awareness and teaching alternative coping strategies (41). In a meta-analysis, mindfulness was found to be negatively associated with the psychopathology of eating disorders (42). Mindfulness-based eating awareness training (MB-EAT) is a group intervention developed for the treatment of binge eating disorder and related problems, including mindfulness meditation and guided mindfulness practices training. This intervention includes controlling reactions to changing emotional states, making conscious food choices, developing awareness of hunger and fullness cues, and improving self-acceptance. Evidence supports the importance of intervention in developing a person's sense of self-control around eating, reducing overeating, and reducing depressive symptoms (43). As a result of a review, it was concluded that mindfulness-based interventions using meditation techniques have positive effects on people with problematic eating behaviors such as overeating and emotional eating (44). It has been observed that after the training given to individuals with binge eating disorder about the awareness of internal and external stimuli regarding nutrition, guilt and restriction behavior after binge eating behavior decrease and healthy eating habits are regained (45). In a study of adolescents with eating disorders, students who learned mindfulness showed significant reductions in weight and shape anxiety and eating disorder symptoms relative to controls at a 6-month follow-up (46). In a recent randomized controlled trial, a 'mindful eating' program was added to treatment as usual. Emotional eating was found to be reduced in adults with overweight or obesity at both post-treatment and follow-up, compared to those who only received treatment as usual. It was stated that the severity of bulimic behaviors and the frequency of binge eating attacks decreased, and some secondary outcomes related to awareness and self-compassion also showed significant improvements in the follow-up. However, weight and other physiological parameters were not significantly affected (47). In a study of young adult women with body image concerns, mindfulness participants showed statistically significant improvements over the control group in weight and shape concern, dietary restriction, and eating disorder symptoms. However, these gains were largely lost in follow-up (48). Eating awareness seems to be beneficial in many cases. However, there are very few studies on this topic in patients diagnosed with anorexia nervosa. While multimodal eating awareness-based therapies are effective in this disease, it is thought that shorter interventions may be beneficial but can result in greater anxiety. In patients diagnosed with anorexia nervosa, it may be more beneficial to implement eating awareness as a part of treatment (49). In addition, a recent systematic review found that there is still weak evidence for the effectiveness of 'mindful eating' programs and future research using high-quality study designs is needed (50).

CONCLSION

In recent years, there has been a focus on increasing eating awareness for individuals to recognize and cope with their emotions. Eating awareness is seen to be effective on obesity and various eating disorders both alone and in combination with other methods. It is stated that high eating awareness skills in acquiring and controlling healthy eating attitudes and behaviors have an important role in body weight control and increasing the effectiveness of treatment in eating disorders. Although the number of studies on eating awareness has increased recently, it has been observed that these studies are mostly related to obesity and binge eating. It is thought that more studies are needed examining the relationship between eating awareness and eating disorders (anorexia nervosa, bulimia nervosa).

Declarations

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Case Report

Graves' Thyrotoxicosis Case Presenting with COVID-19

COVİD-19 ile Prezente Graves Tirotoksikoz Olgusu

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Abstract

Graves' disease is an autoimmune multifactorial thyroid disease caused by environmental factors in genetically susceptible patients. Viral infections are thought to play a role in the pathophysiology of this disease. Several potential mechanisms have been proposed for the pathophysiology of Graves' disease, including antigen exposure, cytokine release and inflammatory response. A review of the literature shows that subacute thyroiditis developing after viral infection has been reported as Graves' disease. It is a potential risk factor for Graves' disease and should be considered in the differential diagnosis in the etiology. For this purpose, we present a case compatible with Graves' disease that developed after COVID-19 viral infection, which will contribute to the literature.

Keywords: Graves' disease, angiotensin-converting enzyme 2, COVID-19

Öz

Graves hastalığı, genetik olarak duyarlı hastalarda çevresel faktörlerin neden olduğu otoimmün multifaktöriyel bir tiroid hastalığıdır. Viral enfeksiyonların bu hastalığın patofizyolojisinde rol oynadığı düşünülmektedir. Graves hastalığının patofizyolojisi için antijene maruz kalma, sitokin salınımı ve enflamatuar yanıt gibi çeşitli potansiyel mekanizmalar önerilmiştir. Literatür incelendiğinde viral enfeksiyon sonrası gelişen subakut tiroiditini Graves hastalığı olarak bildirilen yayınlar bulunmaktadır. COVID-19 viral enfeksiyonu Graves hastalığı açısından potansiyel bir tetikleyici faktör olduğu, etiyolojide ayırıcı tanılarda düşünülmesi gerekmekedir. Bu amaçla literatüre katkı sağlayacağı COVID-19 viral enfeksiyon sonrası gelişen Graves hastalığı ile uyumlu olguyu sunuyoruz.

Anahtar Kelimeler: Graves hastalığı, angiotensin dönüştürücü enzim-2, covid-19

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INTRODUCTION

It is a new coronavirus that first emerged in the Chinese city of Wuhan, creating a pandemic impact. Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2), known as the seventh virus in the viral classification, is known to infect humans. It has often been associated with cross-species infections and occasional cases of worldwide spread. According to available evidence, transmission via droplet and contact routes is known to occur. It starts to be seen between 4-6 days after clinical exposure, which occurs with symptoms such as coughing and sneezing. However, studies have shown that the incubation period can last up to 14 days. The most common symptoms reported in the literature are fever, sputum, fatigue, malaise, cough, etc., which are seen in other viral infections such as seasonal flu (1). Graves' disease (GD) is an autoimmune disease characterized by diffuse goiter and hyperthyroidism. It is generally seen in female patients between the ages of 20-40. When clinical findings are examined, symptoms such as irritability, palpitations, inability to tolerate heat, sweating, etc. are observed due to excess thyroid hormone within the scope of physical and psychological symptoms. Involvements such as ophthalmopathy, dermopathy and acropathy are specific to the disease. Increased serum tetraiodothyronine and/or triiodothyronine levels, immeasurably suppressed serum Thyroid Stimulating Hormone (TSH) levels, antibodies against TSH receptors (TRAB), and increased blood flow along with a heterogeneous appearance in the parenchyma on ultrasonography are the main diagnostic criteria. Traditional options such as Anti-thyroid Drugs (ATDs), Radioiodine (RAI) or surgery are used in the treatment method. It has remained largely unchanged for many years, although many young people relapse after a course of ATDs or require lifelong thyroid hormone replacement after definitive treatment (2).

Generally, the clinical severity of SARS-CoV-2 is broad-spectrum, and as a result of studies, current evidence suggests that Coronavirus Disease 2019 (COVID-19) can affect organs and systems. Angiotensin Converting Enzyme 2 (ACE2) plays an important role in the pathogenesis of COVID-19 and plays a role in the internalization of SARS-CoV-2 into human cells. ACE2 is expressed in thyroid follicular and parafollicular cells and allows SARS-CoV-2 to enter the thyroid gland. The mechanism has not been clearly elucidated, and this has led to interest in determining whether a history of thyroid dysfunction is associated with a worse clinical course of COVID-19 or an increased risk of SARS-CoV-2 infection. When the literature is reviewed, several studies have been conducted on the subject, and it seems that neither a history of hyperthyroidism nor a history of hypothyroidism is associated with worse clinical outcomes (3).

It is obvious that viral factors in the etiology of GD play a role. In this case, the clinical findings of thyrotoxicosis that occurred after viral infection were important. We think that SARS-CoV-2 infection, which we consider as a potential viral trigger, may have this effect through the ACE2 mechanism. In this context, we present it as a contribution to the literature in order to direct studies aimed at elucidating the relationship between thyroid diseases that may arise from subacute thyroiditis and that it should be considered in differential diagnoses

CASE REPORT

A 25-year-old male patient was admitted to the emergency clinic with excessive sweating, palpitations, weight loss and diarrhea. The patient stated that his symptoms were present for the last two weeks and they were progressively worsening, and he has lost 15 kilograms of his body weight in the last month. After the initial assessment, the patient was consulted to the endocrinology department. The patient did not have a significant prior medical history other than COVID-19, which was confirmed with positive Polymerase Chain Reaction (PCR) test. His COVID-19 symptoms included myalgia, fever, and cough. He was diagnosed with mild viral pneumonia and did not require hospitalization. He had a complete resolution from COVID-19 one month before the emergency service visit. His family history included hypothyroidism in his mother. On physical examination, his body temperature was 36.8 ^{0}C, heart rate was 130 beats per minute, blood pressure was 120/80 mmHg and respiratory rate was 22 per minute. His skin was warm and sweaty. He had punctate hyperpigmented lesions on the skin. Comprehensive metabolic panel revealed that glucose 95 g/dL, sodium 137 (135-142) mmol/L, potassium 4.2 (3.5-5.5) mmol/L and creatinine 0.97 (<1.10) mg/dL levels were in the normal range and TSH, Thyroxine (T4) and Triiodothyronine (T3) levels were 0.015 (0.30-5.00) U/L, 4.78 (0.6-1.6) ng/dL and 24.78 (2.10-4.50) ng/dL respectively. These results prompted consideration for a thyroid abnormality. Thyroid ultrasound imaging revealed heterogeneous and increased vascularization of the thyroid gland parenchyma. The patient was diagnosed with GD and was prescribed propranolol 40 mg twice daily, and methimazole 40 mg once daily. Thyroid function tests one month later were repeated and TSH, T4 and T3 levels were 0.015 (0.30-5.00) U/L, (1.31 (0.6-1.6) ng/dL, 6.17 (2.10-4.50) ng/dL respectively. The patient was followed up with medical treatment.

DISCUSSION

In this study, we present a case of Graves' disease after COVID-19 infection. The patient had no history of thyroid disease and no history of drug use, and had no symptoms of thyrotoxicosis. Whether COVID-19 had contributed to the development of GD, or the occurrence of GD was coincidental, requires further

studies (4,5). The relationship between Graves' disease and other viral infectious diseases has not been clarified despite studies. Various potential mechanisms for the pathophysiology of GD have been proposed, such as antigen exposure, cytokine release, and inflammatory response. There are reports showing that thyrotoxicosis clinic usually occurs after subacute thyroiditis following viral infectious diseases (6).

The first step in COVID-19 pathophysiology is viral entry via binding of the viral trimeric spike protein to the human receptor ACE-2, which is considered the main factor in transmission. Previous studies have linked SARS-CoV-2 infection with subacute thyroiditis and other autoimmune diseases such as systemic lupus erythematosus and cold agglutinin disease (7-8). It is clear that COVID-19 infection causes multiple clinical manifestations that can affect all body systems compared to a simple viral infection (9). At the same time, the importance of stress in the development of thyrotoxicosis in GD patients is still under debate. Cross-sectional studies have shown that stressful life events are more common in the months before the development of GD. Other studies have also found that the time between possible exposure and onset of disease symptoms in cases of subacute thyroiditis associated with COVID-19 infection is shorter than in pre-pandemic cases (10).

In our case, clinical findings of thyrotoxicosis following SARS-CoV-2 infection were significant. This is a rare case report of which we suggest SARS-CoV-2 as a potential viral trigger for the development of GD.

CONCLSION

In conclusion, SARS-CoV-2 infection is a potential risk factor for GD and should be considered in the differential diagnosis in the etiology. Further studies are needed to clarify the relationship between thyroid diseases that may arise from subacute thyroiditis after viral infection such as COVID-19.

Declarations

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Patient’ Consent: Written informed consent was obtained from the patient who participated in this case.
Competing Interest: The authors declared no competing interest.

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Case Report

Unexpected Outcome in a Patient Presenting with Syncope: Splenic Laceration

Senkop ile Başvuran Hastada Beklenmedik Son: Dalak Laserasyonu

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Abstract

The spleen is one of the most commonly injured organs in blunt trauma. Typical symptoms of splenic injury include left-sided abdominal pain, peritonitis and hypovolemic shock. Kehr's sign can be seen in approximately 20% of cases. It is rare to have a splenic injury with a comfortable abdominal examination and no complaint of abdominal pain.

A 68-year-old male patient was admitted to the emergency department with the complaint of fainting after feeling dizzy at the exit of a mosque. At the time of presentation, blood pressure was 126/68 mmHg, pulse rate 86/min, SpO2 97%, temperature 36.4 °C, fingertip blood glucose 98 mg/dL and he had no active complaints. On physical examination, GCS was 15, oriented and cooperative and neurologic examination was normal. There was no defense, rebound and tenderness on abdominal examination. Rectal examination was characterized by colicky fecal smearing. There were no acute pathologic findings on brain CT. The patient whose vitals were stable during follow-up examination stated that he felt dizzy again when he was lifted from the stretcher during the control examination. Vital signs were checked and blood pressure was 70/40 mmHg. The patient stated that he had a new onset of abdominal pain. When the anamnesis was deepened, he stated that he hit his left side on the pavement while falling, but he did not mention it at the time of the first anamnesis because he was not in pain. Splenectomy was performed after abdominal imaging revealed splenic injury and the patient was consulted with general surgery.

With this case report, we aimed to remind once again the importance of a thorough anamnesis and detailed questioning of trauma history in addition to non-traumatic causes and the importance of control examinations in a patient presenting with syncope.

Keywords: Spleen Laseration; Syncope; Trauma

Öz

Künt travmalarda en sık yaralanan organlardan biri dalaktır. Dalak yaralanmasının tipik semptomları, sol taraflı karın ağrısı, peritonit ve hipovolemik şoktur. Olguların yaklaşık %20'inde Kehr bulgusu görülebilir. Dalak yaralanması olup hem batın muayenesi rahat olup hem de hastanın karın ağrısı şikayetinin olmaması nadir bir durumdur.

68 yaşındaki erkek hasta acil servise cami çıkışında başı döndükten sonra bayılma şikâyeti ile başvurdu. Başvuru anında kan basıncı 126/68 mmHg, nabız 86/dk, SpO2 %97, ateş 36,4 °C, parmak ucu kan şekeri 98 mg/dL olarak ölçüldü ve aktif herhangi bir şikayeti yoktu.. Hastanın fizik muayenesinde; GKS 15, oryante koopere olup nörolojik muayenesi normaldi. Batın muayenesinde defans, rebaund ve hassasiyet yoktu. Rektal muayenesini kolik gayta bulaşı idi. Hastanın beyin BT'sinde akut patolojik bulgu yoktu. Takiplerinde vitalleri stabil seyreden hasta kontrol muayenesi esnasında sedyeden kaldırıldığında tekrar baş dönmesi olduğunu beyan etti. Vitalleri kontrol edilen hastanın kan basıncı 70/40 mmHg olarak ölçüldü. Hasta yeni başlayan bir karın ağrısı olduğunu ifade etti. Anamnez derinleştirildiğinde düşerken sol yan tarafını kaldırıma çarptığını ancak ağrısı olmadığı için ilk anamnez anında belirtmediğini ifade etti. Batın görüntülemelerinde dalak yaralanması tespit edilen ve genel cerrahi ile konsülte edilen hastaya splenektomi yapıldı.

Bu olgu sunumu ile senkop ile başvuran hastada non-travmatik sebeplerin yanı sıra anemnez derin tutulup travma öyküsünün de ayrıntılı sorgulanması gerektiği ile kontrol muayenelerin önemini bir kez daha hatırlatmayı amaçladık.

Anahtar Kelimeler: Dalak Laserasyonu, Travma, Senkop

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INTRODUCTION

The spleen is one of the most commonly injured organs in blunt trauma. Typical symptoms of splenic injury include pain in the left upper abdomen, peritoneal inflammation and shock due to blood loss. Kehr's sign is observed in approximately 1 out of every 5 cases (1,2). The Kehrsign is a classic example of radiating pain, where problems with the diaphragm or spleen cause pain in the left shoulder. Irritation or damage to the diaphragm stimulates the phrenic nerve, causing pain above the clavicle, in the left shoulder or clavicle region (2). USG is the imaging method of first choice in the emergency department because it is portable, rapid, reproducible, noninvasive and low-cost (3,4). In addition to surgery, conservative treatment is also used in selected patients.

CASE REPORT

A 68-year-old man was admitted to the emergency department with the complaint of fainting after feeling dizzy at the exit of a mosque. He did not remember how he fell and had no chest pain or shortness of breath before the incident, only dizziness. The patient described complete syncope and had head trauma in the occipital region. There was no open wound or hematoma and only soft tissue tenderness. The patient had a history of hypertension, chronic renal failure and chronic obstructive pulmonary disease. At the time of admission, blood pressure was 126/68 mmHg, pulse rate 86/min, SpO2 97%, temperature 36.4 °C, fingertip blood glucose 98 mg/dL and he had no active complaints at the time of admission. On physical examination, GCS was 15, oriented and cooperative, and neurologic and other system examinations were normal. Bilateral pulses were equal and palpated clearly. Abdominal examination revealed no defense, rebound and tenderness. Rectal examination was characterized by colic fecal smearing.

ECG was ordered in addition to laboratory tests. There was no acute ischemic change on ECG. Laboratory tests revealed pH:7.38 lactate:1.8 hemoglobin:12. Other laboratory values including cardiac markers were within normal limits. Bedside USG of the aorta showed no evidence of dissection.

There was no acute pathologic finding on brain CT. The patient, whose vitals were stable during follow-up, stated that he felt dizzy again when he was lifted from the stretcher during the control examination. His vitals were checked and blood pressure was 70/40 mmHg. Crystalloid fluid replacement was started. The patient reported a new onset of abdominal pain. When the anamnesis was deepened, he stated that he hit his left side on the pavement while falling, but he did not mention it at the time of the first anamnesis because he was not in pain. Control hemogram biochemistry tests and abdominal USG were ordered from the patient who had tenderness in the left upper quadrant of the abdomen. Abdominal USG showed a heterogeneous hyperechogenous area in the splenic parenchyma. Contrast-enhanced abdominal CT showed perihepatic perisplenic and abdominal free fluid. The spleen was heterogeneously contrast enhanced. Perisplenic hemorrhage area was observed (Figure).

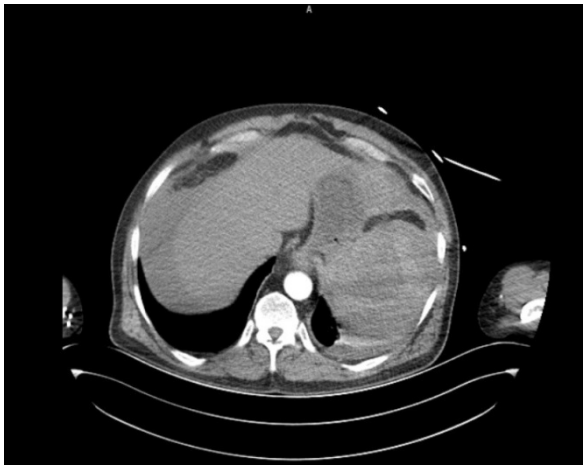

Figure: Contrast-enhanced abdominal CT

The patient was consulted to general surgery with a diagnosis of splenic laceration. Vasopressor therapy was initiated because of persistent hypotension despite appropriate fluid replacement. Erythrocyte suspension replacement was planned. The patient was taken into emergency operation by general surgery and splenectomy was performed. The patient developed signs of multiorgan failure during intensive care unit follow-up and died on the 5th post-op day.

DISCUSSION

A spleen injury is a potentially fatal injury if left undetected or untreated. Injuries are divided into traumatic and non-traumatic injuries. Traumatic injuries are more common and their etiology mostly involves motor vehicle accidents or direct blows to the abdomen, which commonly occur in sports. Non-traumatic causes include neoplasm, infectious, inflammatory disease, drug and medical treatment, mechanical causes and idiopathic condition (2,3). Patients may be asymptomatic or present with abdominal pain, nausea, shoulder pain and shock. Our patient was initially asymptomatic, but during follow-up in the emergency department, first abdominal pain and then hypovolemic shock developed. Ultrasonography and CT are commonly used imaging modalities for diagnosis. Although ultrasound is a highly reliable method in diagnosing the presence of intra-abdominal free fluid, its sensitivity in demonstrating acute injury to the spleen may decrease to 72-89% (4). CT is a

highly reliable method in the diagnosis of splenic injuries and has an accuracy rate of 93%. In addition, CT has the ability to differentiate patients without any damage to the spleen with 100% accuracy (5). Ultrasound may help the diagnosis of splenic diseases by showing findings such as decreased echogenicity, enlargement, fluid accumulation under and around the capsule and free fluid in the abdominal cavity (6). In our patient, USG of the whole abdomen and then abdominal CT with iv contrast were ordered. The treatment plan is determined depending on the hemodynamic stability of the patient. Since our patient was hemodynamically unstable, splenectomy was performed. If the patient's blood pressure and circulation are unstable, intravenous fluid therapy should be administered by opening two wide vascular accesses in the emergency room until the patient is taken to surgery and blood transfusion should be performed if possible.

CONCLUSION

In conclusion, in this case report, we wanted to emphasize that in a patient presenting with syncope, in addition to non-traumatic causes, the anamnesis should be kept deep and the history of trauma should be questioned in detail. We also wanted to draw attention to the fact that it is very important to follow the patient in the emergency department for a sufficient period of time and to perform consecutive control examinations during follow-up.

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Letter to the Editor

The Synergy of 3D Printing and Artificial Intelligence in Cardiology: A Glimpse into the Future

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To the Editor,

The intersection of three dimensional (3D) printing and artificial intelligence (AI) has paved the way for revolutionary advancements in the field of cardiology (1, 2). This brief communication offers an overview of the current and potential future applications of this powerful synergy, showcasing its transformative impact on cardiovascular care (1, 3).

In the present, 3D printing in cardiology is primarily employed for the creation of patient-specific anatomical models (1, 2). These models serve as invaluable tools for preoperative planning, education, and enhanced communication with patients and their families (2, 3). AI, on the other hand, is playing a pivotal role in data analysis, aiding in the interpretation of medical images, and assisting in early diagnosis (3).

The fusion of these technologies holds immense promise for the future of cardiology. Through machine learning algorithms, AI can be used to automate and expedite the segmentation of cardiac structures from medical images, enabling the rapid generation of patient-specific 3D-printed models (3, 4). These models, while currently employed for surgical planning, are poised to become instrumental in the development of personalized cardiac devices, such as stents and prosthetics, offering an unparalleled level of customization for improved patient outcomes (4, 5).

Moreover, AI-driven predictive modeling can assist in forecasting patient-specific cardiovascular risks, helping physicians tailor treatment plans and interventions. The integration of AI with 3D printing technology is set to enable real-time adjustments to devices during procedures, based on the patient's immediate needs (5, 6).

Educational institutions and medical training programs are already benefiting from this synergy, as it provides a lifelike platform for medical students and practitioners to hone their skills. The 3D printing of heart models, incorporating AI-generated scenarios, offers a dynamic training ground, enhancing understanding and procedural expertise (6, 7).
While the marriage of 3D printing and AI in cardiology shows great promise, it is not without challenges. Issues of data security, standardization, and regulatory frameworks must be addressed. However, the potential benefits, including more precise surgical planning, reduced procedure times, and improved patient outcomes, make these challenges worth tackling (7, 8).

Here are a few examples of how AI is being used together with 3D printing in cardiology:

1. Automated Segmentation of Cardiac Structures

AI algorithms are used to automatically segment cardiac structures from medical imaging data, such as MRI or CT scans. This data is then converted into a 3D model of the heart, which is printed using 3D printing technology (3, 4). The printed model provides a detailed representation of the patient's heart, helping cardiologists plan surgeries and interventions with greater precision. This integration speeds up the creation of patient-specific models, reduces the time needed for manual segmentation, and enhances the accuracy of the models, leading to better surgical outcomes (1, 3).

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2. Personalized Cardiac Device Development

AI is employed to analyze a patient's unique cardiac anatomy and determine the optimal shape and size for a personalized cardiac device, such as a stent, valve, or prosthetic. The customized design is then 3D printed, ensuring a perfect fit for the patient's heart structure (4, 5). This approach ensures that the implanted devices are tailored specifically to the patient's needs, improving their functionality and reducing the risk of complications, such as device migration or improper fitting (1-8).

3. Real-Time Intraoperative Adjustments

During cardiac surgeries, AI algorithms analyze real-time data from imaging devices and sensors to assess the patient's heart condition. This information can be used to make real-time adjustments to 3D-printed surgical guides or implants.[5, 6] For example, if a patient's anatomy changes during surgery, a new guide or implant can be rapidly printed to adapt to the new measurements. This capability allows surgeons to make precise, real-time decisions during operations, enhancing surgical accuracy and patient outcomes (1-8).

CONCLUSION

In conclusion, the convergence of 3D printing and AI represents a dynamic and transformative force in the field of cardiology. By amalgamating the precision of patient-specific anatomical models with the analytical power of AI, the future of cardiovascular care promises to be highly personalized, efficient, and effective. As technology continues to evolve, we anticipate that this synergy will further redefine the landscape of cardiovascular medicine, ultimately leading to improved patient outcomes and enhanced quality of care. [1-8]

Declarations

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