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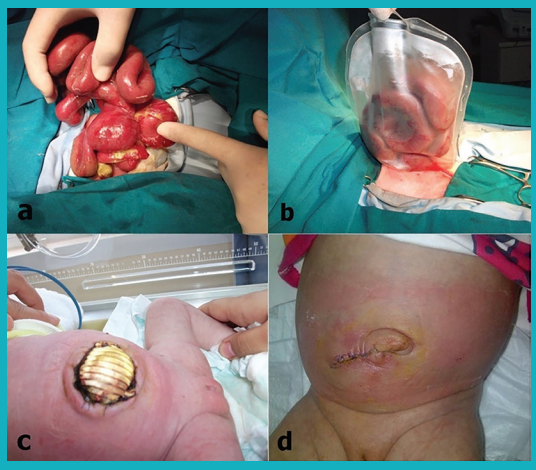

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Statistical analyses must be conducted in accordance with the international statistical reporting standards (Altman DG, Gore SM, Gardner MJ, Pocock SJ. Statistical guidelines for contributors to medical journals.Br Med J 1983: 7; 1489-93). Statistical analyses should be written as a subheading under the Methods section and statistical software must certainly be specified. Data must be expressed as mean±standard deviation when parametric tests are used to compare continuous variables. Data must be expressed as median (minimum-maximum) and percentiles (25th and 75th percentiles) when nonparametric tests are used. In advanced and complicated statistical analyses, relative risk (RR), odds ratio (OR) and hazard ratio (HR) must be supported by confidence intervals (CI) and p values.

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Conference Proceedings: Bengisson S. Sothemin BG. Enforcement of data protection, privacy and security in medical informatics. In: Lun KC, Degoulet P, Piemme TE, Rienhoff O, editors. MEDINFO 92. Proceedings of the 7th World Congress on Medical Informatics; 1992 Sept 6-10; Geneva, Switzerland. Amsterdam: North-Holland; 1992.p.1561-5.

Scientific or Technical Report: Smith P. Golladay K. Payment for durable medical equipment billed during skilled nursing facility stays. Final report. Dallas (TX) Dept. of Health and Human Services (US). Office of Evaluation and Inspections: 1994 Oct. Report No: HHSIGOE 169200860.

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EDITORIAL

Dear Readers;

We are happy to be with you in the fourth issue of the year 2020. SARS-CoV-2 makes us live the second peak period in our country and in European countries. Daily life continues to involve many challenges, especially for health workers. Despite our "new normal" efforts, we have difficulty implementing them. However, together with our esteemed readers, we strive to improve everything for the better, and we also get good results during this difficult period. I said in our last issue that we would publish a special issue about COVID-19, and I noted that we received around 40 valuable articles. After all, articles about this topic still continue to arrive. From now on, we will accept these articles in our normal issues. Due to the abundance of articles, we will publish our special issue in possible 3 chapters. Despite the difficulties, we solved many problems with the excellent efforts of our editorial board and decided to publish the first two chapters consecutively with this issue.

Our issue continues to make breakthrough. We are happy to share valuable works with you, our precious readers, in the last issue of the year 2020. As a result of the studies carried out in order to achieve better positions and increase accessibility of our journal, I would like to inform you, our precious readers, that our journal has entered index databases called **CABI** (our content from our publications in 2019 will be seen in the **CABI** database), **Gale** and **Index Copernicus**.

I would like to mention our cover art and selected articles in this issue;

We are very happy to be together once again with beautiful topics in this issue. "A Radiographic Comparison of the Root Length and Area After Class II Treatment with Two Different Functional Appliances" by Şeker et al., "Evaluation of Nosocomial Infections and Antimicrobial Resistance Profiles in the Intensive Care Units: Nine Years Experience'' by Keskin Seremet et al., ''Gastroschisis Treatment: Evaluation of Surgical Techniques and Results'' by İnce et al., and "The Impact of Moral Sensitivities and Professional Values of Nursing Students on Care Perception" by Lafcı et al. are the articles on the forefront in this issue.

We will be with you with innovations in the year 2021. From this year on, we will develop our editorial section and create a separate section from selected topics. The selected guest and his/her article will be published with the editor's comment. We will accept your original articles in Turkish and English. We only want reviews to be sent in English. Original articles to be submitted in English will be published in a shorter time than others since they will not have a translation process.

I would like to thank all of our healthcare professionals who work devotedly at the expense of their lives during these difficult days due to the COVID-19 pandemic. I wish God's mercy to the healthcare professionals who lost their lives in this struggle, my condolences to their families and patience.

I would like to thank our publishing house, our editorial board and our reviewers for taking their time and preventing interruptions despite the increasing workload.

I wish you all the best and hope to see you in our next issue in the new year...

Yours truly

Prof. Dr. Adem AKÇAKAYA
Editor-In-Chief

Original Article

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Bezmialem Science 2020;8(4):321-329

A Radiographic Comparison of the Root Length and Area After Class II Treatment with Two Different Functional Appliances

Sınıf II Malokluzyonun Tedavisinde Kullanılan İki Farklı Fonksiyonel Aygıtın Kök Uzunluğu ve Alanına Etkisinin Radyografik Olarak Karşılaştırılması

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ABSTRACT

Objective: The purpose of this study was to compare the changes in root lengths and root surface areas that occur after treatment with two functional appliances the Twin Block (TWB) and Crown Herbst appliances.

Methods: Forty patients (12 boys, 28 girls) were included in this study. Half of them were treated with the stainless steel Crown Herbst appliance (with crowns placed on the first molars and the first and second premolars), and the other half were treated with the TWB appliance. Panoramic and cephalometric films were obtained before treatment (T1) and after the functional treatment (T2). All upper and lower teeth except second and third molars were analysed with the ImageJ software (version 1.37, National Institutes of Health, Bethesda) on panoramic films. Root length and area values were compared using t-tests.

Results: The intragroup comparison showed that root length values were significantly decreased in right and left mandibular incisors and canines in the Crown Herbst group (12 years 7 months ± 9 months). However, significantly increased root length was observed in right and left maxillary second premolars and right maxillary first premolar in the TWB group (11 years 1 month ± 4 months). The intergroup comparison indicated that root length values were

ÖZ

Amaç: Bu çalışmanın amacı, Twin Block (TWB) ve Kron Herbst apareyleri ile yapılan fonksiyonel tedavilerin dişlerin kök uzunlukları ve kök yüzey alanlarına etkisini karşılaştırmaktır.

Yöntemler: Bu çalışmaya kırk hasta (12 erkek, 28 kız) dahil edilmiş olup, bunların yarısı paslanmaz çelik Kron Herbst apareyi ile (birinci molar, birinci ve ikinci premolarlara yerleştirilen kronlar ile) ve diğer yarısı ise TWB apareyi ile tedavi edilmiştir. Çalışmaya dahil edilen hastalardan panoramik ve sefalometrik filmler tedaviden önce (T1) ve fonksiyonel tedaviden sonra (T2) elde edilmiştir. İkinci ve üçüncü molar dişler dışındaki tüm üst ve alt dişler, panoramik filmler üzerinde ImageJ yazılımı (version 1,37, National Institutes of Health, Bethesda) kullanılarak analiz edilmiştir. Kök uzunluğu ve alan değerleri t-testi kullanılarak karşılaştırılmıştır.

Bulgular: Grup içi karşılaştırmada, Kron Herbst grubundaki (12 yaş 7 ay ± 9 ay) sağ ve sol mandibular kesici dişler ve kaninlerde kök uzunluk değerlerinin anlamlı derecede azaldığı gözlendi. Bununla birlikte, TWB grubunda (11 yaş 1 ay ± 4 ay) sağ ve sol maksiller ikinci premolar ve sağ maksiller birinci premolarda kök uzunluğunda anlamlı bir artış gözlendi. Gruplar arası karşılaştırma, Kron Herbst grubunda TWB grubuna göre sağ maksiller premolar,

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significantly decreased in right maxillary premolars, right and left mandibular laterals and left mandibular canine in the Crown Herbst group when compared with those in the TWB group.

Conclusion: It was concluded that the Crown Herbst group showed a greater tendency for decreased root length than the TWB group. In orthopaedic correction of Class II malocclusions, in the absence of any contraindications, TWB appliance may be preferred for the promotion of root development.

Keywords: Orthodontics, malocclusion, root resorption, radiography

sağ sol mandibular lateraller ve sol mandibular kaninlerde kök uzunluk değerlerinin anlamlı olarak azaldığını göstermiştir.

Sonuç: Kron Herbst grubunda bulunan dişlerin kök rezorpsiyonu riski TWB grubundan daha fazlaydı. Sınıf II maloklüzyonlarının ortopedik düzeltmesinde, kontrendikasyon yoksa, kök gelişiminin desteklenmesi bakımından TWB cihazı tercih edilebilir.

Anahtar Sözcükler: Ortodonti, maloklüzyon, kök rezorpsiyonu, radyografi

Introduction

A large variety of functional appliances are utilised for the correction of Class II skeletal malocclusions (1). Two of the most frequently used functional appliances for treating Class II dento-skeletal malocclusion are the Herbst and the Twin-block (TWB) appliance, developed by Emil Herbst (2) and William Clark (3), respectively. It has been shown that both the appliances can result in considerable favourable effects in growing patients with Class II malocclusions (4). Numerous studies have compared the treatment efficacy of Herbst and TWB appliances (4-7) and shown that both appliances are equally effective at the dento-skeletal level in the correction of Class II malocclusion (4,5). Although, these appliances are commonly used for functional treatment; literature regarding the effects of their use is limited (4,8).

Few studies in literature have assessed the apical root resorption caused by Herbst appliance (8). To our knowledge, root resorption induced by TWB has not been evaluated thus far. Further we did not find any analysis comparing the effects of Herbst versus TWB treatment on root resorption.

The muscle forces used in the functional treatment tend to retract the lower jaw, and these are especially transmitted to the anchorage teeth (the upper first molars and the lower first premolars) (9). Heavy forces or prolonged treatment can induce resorption in the apical area or negatively affect the root development in teeth that have incompletely formed roots (10,11). Although, root resorption seen with functional appliances is mild (12), it is pertinent to question if the inhibition of root growth or the development of apical root resorption in the anchorage teeth results specifically from the treatment (13). Since, the biologic factors are specific to a patient and cannot be altered (14), it is necessary to define how the functional treatment affects root resorption or root development to reduce their risks and harms.

Radiography can be used for the evaluation of root resorption or development (8,9). Panoramic radiography is used extensively in orthodontics. Panoramic films have some advantages such as less radiation exposure, visualisation of the entire lower half of the face and simplicity (15).

The purpose of this study was to compare the root lengths and root surface area of teeth after functional treatment with Herbst and TWB appliances. We also aimed to assess whether root development in the premolars and canines is substantially restrained by functional treatment.

Method

This retrospective study was designed to evaluate the effect of Class II treatment on the root dimensions with two different functional appliances. The experimental protocol of the study was approved by the Erciyes University Local Ethics Committee (2018/602).

Forty patients were included in this study; half of them were treated with the stainless steel Crown Herbst appliance (with bands placed on the first molars and the first and second premolars), and the other half was treated with the TWB appliance. The appliance designs are demonstrated in Figure 1. The pre- (T1) and post-treatment (T2) records were collected. All patients were treated at the Erciyes University, Faculty of Dentistry, Department of Orthodontics.

Among the patients treated with the Crown Herbst appliance and TWB appliance there were 15 girls and 5 boys (12 years 7 months ± 9 months) and 13 girls and 7 boys (11 years 1 month ± 4 months) with an average treatment time of 9.2±2 months and 11.1±4 months, respectively. Demographic characteristics of the patients are shown in Table 1.

All patients had the following properties: (1) Class II malocclusion (2) treated with standardised Crown Herbst or TWB appliances,

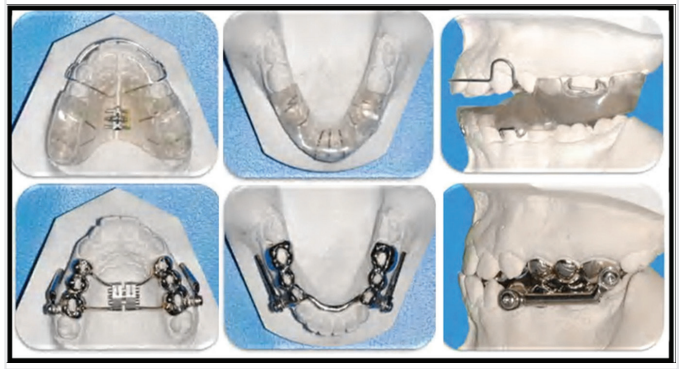

Figure 1. Crown Herbst and TWB appliance design used in this study

Table 1. Demographic characteristics of patients

	TWB	Crown herbst	Total
Boys (n %)	7 (35%)	5 (25%)	12
Girls (n %)	13 (65%)	15 (75%)	28
Mean age ± SD	11.08±0.3	12.58±0.5	

SD: Standard deviation

(3) non-extraction patients (before or during treatment) and (4) pre- and post-treatment radiographic records present.

Radiographic Analysis

Proclined or retroclined anterior teeth may change magnification and influence the root dimensions measured on radiographs (16). Therefore, in the present study, pre- and post-treatment lateral cephalometric films that were taken with the same method and the same radiography device were evaluated by the same investigator. On the digitised cephalometric images, using Dolphin Imaging Software (Version 8.0, Dolphin Imaging Cephalometric and Tracing Software, Chatsworth, Calif), sagittal variances in upper and lower incisors inclination that are seen with TWB and Crown Herbst treatment, were measured. To determine the inclination of the maxillary and mandibular incisors, U1-PP (inclination of the upper central incisor relative to the palatal plane) and IMPA (inclination of the lower central incisor relative to the mandibular plane) were measured, respectively. These measurements were obtained from Steiner and Rickets Analysis.

To determine the root length and area values, digitised panoramic films that they are routinely taken during orthodontic treatment were used.

The analysis of the digitised panoramic films was conducted by using the ImageJ software (version 1.37, National Institutes of Health, Bethesda) to detect root length changes from T1 to T2 (Figure 2). A total of 960 teeth (all upper and lower teeth, except second and third molars) were analysed before and after the functional treatment. The disto-buccal and palatal roots of the maxillary teeth were not measured as tracing these from the panoramic radiograph is difficult. Also distal roots of lower molar teeth were used for the length and area measurement.

Borders of root surfaces were drawn from cemento-enamel junction up to root apex with this programme on the radiograph and the root area was measured. For the linear root length measurement, reference points were the centre of the incisal edges or cusp tips and the root apices of the teeth (Figure 2) (17). To detect the changes in root length and area, the difference between the radiographic tooth lengths at T1 and T2 were calculated.

Since, the difference of magnification between pre- and post-treatment radiographs may affect the measurements, the differences of the root length and area values were calculated on panoramic films as follows (18);

Change of Root Length Value (T2-T1):

= C1 ÷ C2 x R2-R1

Change of Root Area Value (T2-T1):

= C1 ÷ C2 x A2-A1

(C1, radiographic incisor crown length at T1; C2, radiographic incisor crown length at T2; R1, radiographic root length at T1; R2, radiographic root length at T2; A1, radiographic root area at T1; A2, radiographic root area at T2).

Positive and negative values indicated an increase or decrease in the root length and area, respectively (19). All measurements were performed at the Erciyes University, Faculty of Dentistry, Department of Orthodontics.

Statistical Analysis

Fifteen cephalometric and panoramic radiographs were randomly selected for the assessment of measurement reliability. Each radiograph was re-assessed after 1 month to determine the method errors. Dahlberg's formula was used for method error (ME) analysis ($ME = \sqrt{\Sigma (x_1 - x_2)^2/2n}$; n = number of sample). ME was found to be clinically insignificant ($p<0.05$). Statistical analysis was performed with SPSS (version 15.0; SPSS, Chicago, III). The normality of data distribution was assessed using the Shapiro-Wilk normality test. For the intergroup differences, Student's t-Test and Wilcoxon t-test were performed to compare data following normal and non-normal distributions,

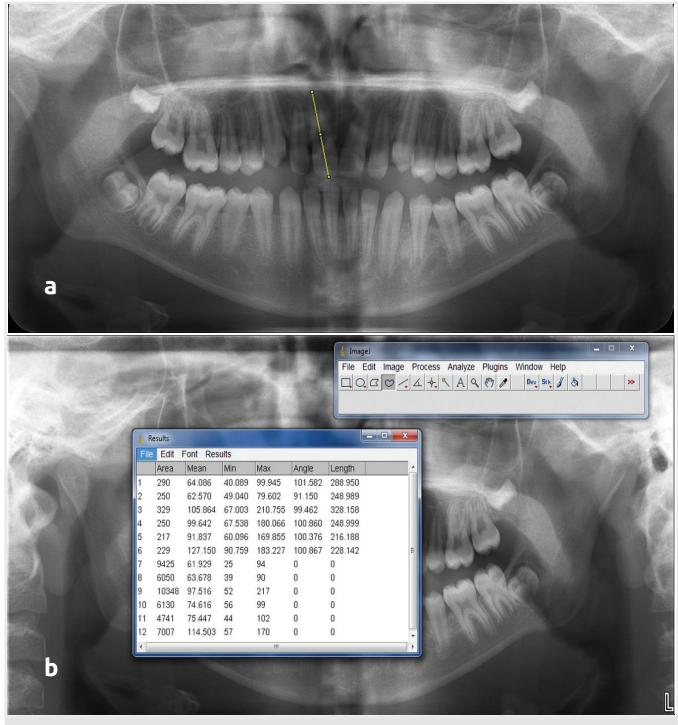

Figure 2. a. Measurement of the maxillary central incisor root length (the perpendicular distance from the centre of the incisal edge to the root apex). **b.** Analysis of the root dimensions on the digitised panoramic film with ImageJ software

respectively. For the intragroup comparison, Paired t-test and Wilcoxon t-Test were performed for normally and non-normally distributed data, respectively. The level of statistical significance was set at $p<0.05$.

Results

Comparison of cephalometric values associated with maxillary and mandibular incisor inclination was performed, since inclination changes of anterior teeth may affect the root lengths measured on panoramic films. Table 2 shows the results of the cephalometric analysis associated with maxillary and mandibular incisor inclination. We observed a significant increase in mandibular incisors proclination in both TWB and Crown Herbst group as was expected. However, no statistical difference was observed for T2-T1 values ($p>0.05$) between the groups. From the 40 patients in the TWB and Crown Herbst groups, a total of 960 root lengths and areas were evaluated on pre-treatment (T1) and post-treatment (T2) panoramic films. During the orthodontic treatment (T1-T2), differences in root length and area were detected for each of the maxillary and mandibular teeth. Table 3 demonstrates the comparison of the

Table 2. Mean U1-PP and IMPA (°) values of the patients studied at T1 and T2 and differences between T2 and T1

	TWB			HERBST			TWB-HERBST		
	T1	**T2**	**p**	**T1**	**T2**	**p**	**T2–T1**	**T2–T1**	**p**
U1-PP	116.9±3.7	116.3±7.3	0.85	106.2±9.1	108.2±6.8	0.34	-0.56±8.1	2.05±7.5	0.46
IMPA	95.4±6.3	102.4±7	0.008**	93.9±7.5	102.4±7.7	0.001***	7.02±6.8	8.44±5.1	0.29

**p<0.001, ***p=0.001
U1-PP: Maxillary incisor and palatal plane angle, IMPA: Lower incisor mandibular plane angle

Table 3. Comparison of root length and root area values between TWB and Crown Herbst groups at T1

	TWB	Herbst		TWB	Herbst	
	Root length			Root area		
	Mean SD	**Mean SD**	**p**	**Mean SD**	**Mean SD**	**p**
16	224.8±53.7	221.3±54.2	0.55	9122±1768.6	8907.8±2837.4	0.72
15	242±60	230.9±57.3	0.18	7457.5±1874.5	7269±1824.7	0.73
14	244.5±63.4	236.4±58.9	0.26	8595.7±2478.5	8602.4±2376.2	0.99
13	313.1±78.3	313.2±80	0.98	10517.5±3856.1	10150.4±2834.1	0.65
12	257.7±62.8	264.7±68.9	0.45	7074.3±3856.1	6752.5±1806.4	0.61
11	281±68.2	276±70.7	0.55	8512.6±2246.2	8089.2±2373.7	0.58
21	282.7±66.6	281±69.8	0.84	8607.4±2033.9	8128.7±2285	0.52
22	266.9±60.7	267.6±68.3	0.92	7132.3±1678.7	6724.5±1468.2	0.42
23	315.2±76.9	317.3±79.9	0.81	11079.3±3725.9	10449.8±3060.8	0.42
24	252.1±60.1	244.2±59.4	0.22	8867.8±2723.4	8960.6±2546.1	0.89
25	250.3±57.6	234.9±58.4	0.09	8130.4±2630.8	8033.4±2644.4	0.88
26	229.8±52.6	219.9±50.5	0.07	9112.7±2152	8464.5±1886.8	0.27
36	258.4±54	261.5±60.2	0.64	14289.9±1976.2	14459.5±3362.6	0.82
35	252.3±54.1	251.2±61.5	0.86	8409.6±1410.7	8563.6±2356	0.8
34	246.3±53.4	254.8±59.5	0.25	7955.1±1274.7	7822.7±2150.8	0.78
33	264.5±59.8	283.2±70.1	0.06	9520.3±2212.7	10284.1±3529.1	0.22
32	228±51.4	228.5±54.9	0.94	5774.3±1311.3	5531±1431.9	0.51
31	211.6±47.1	208.9±55.5	0.74	4598.9±862.9	4707.4±1308.8	0.74
41	217.7±45.5	207.8±52.8	0.214	4857.5±1044.5	4842.8±1248.9	0.97
42	229.3±49.3	226.5±58.6	0.75	5629.2±1347.1	5910.7±2098.8	0.52
43	263.8±58.1	277.2±70.6	0.11	10553.8±2549.3	11379.9±3983.4	0.38
44	248.6±53.3	249.4±56.9	0.89	8296.9±1314.2	7984.2±1859.2	0.55
45	252±49.9	252.7±60.8	0.93	9357.4±1693.9	8826.2±2011.4	0.4
46	256.6±52.8	263.6±59.6	0.26	13985.9±2369.1	14443.5±3125.8	0.47

SD: Standard deviation, T1:Pre-treatment

mean root length and area values between groups at T1. There were no significant differences in the root lengths and areas at T1 between the TWB and Crown Herbst groups (p>0.05).

Table 4 shows the comparison of the mean root length and area values between T1 and T2 in the Crown Herbst group. The results showed that root length values were significantly decreased for the right and left mandibular incisors and canines in the Crown Herbst group (p<0.05).

Significantly increased root lengths were observed in the right and left maxillary second premolars and right maxillary first premolar in the TWB group (Table 5, p<0.05). However, no statistical difference in the root area values between T1 and T2 was observed in both groups (p>0.05).

The statistical comparison of the differences in the root values between T1 and T2 between the TWB and Crown Herbst groups is shown in Table 6. The results indicated that root length values were significantly decreased in right maxillary premolars, right and left mandibular laterals and left mandibular canine in the Crown Herbst group (p<0.05). However, no statistical difference in the root area values was observed in the teeth studied (p>0.05).

Discussion

Numerous studies have indicated that TWB and Herbst appliances can induce major positive modifications in growing patients with Class II malocclusions (4,20,21). However, a similar effect in their functional treatment of Class II malocclusion has been reported (4,5). For this reason, the potential side effects of these appliances that are used frequently in orthodontic practice should be examined in detail.

The present retrospective study assessed the effects of the Crown Herbst and TWB appliances on root resorption and root formation. To the best of our knowledge, this is the first study that compared the root length changes of the maxillary and mandibular teeth associated with the Crown Herbst and TWB treatments.

Table 4. Comparison of root lengthand are a values between T1 and T2 in the Crown Herbst group

	Root length			Root area		
	T1	T2		T1	T2	
	Mean SD	**Mean SD**	**p**	**Mean SD**	**Mean SD**	**p**
16	221.3±54.3	221.8±61.9	0.98	8907.9±2837.5	8340.7±2278.4	0.49
15	230.9±57.4	234.1±62.8	0.87	7269.1±1824.7	7103±2226.1	0.8
14	236.4±58.9	240.8±62.8	0.82	8602.5±2376.3	8546.6±3686.6	0.96
13	313.3±80.1	308.2±79.9	0.84	10150.5±2834.1	9806.9±3130.8	0.72
12	264.8±69	264±68.8	0.97	6752.5±1806.4	7066.3±2000.1	0.61
11	276±70.7	272.8±70.4	0.89	8089.2±2373.8	8590.6±2431.1	0.51
21	281±69.8	279.8±70.2	0.96	8128.7±2285	8577.2±2011.5	0.51
22	267.6±68.4	263.4±66.6	0.84	6724.5±1468.3	6846.1±1829.4	0.82
23	317.4±79.9	318.6±81.8	0.96	10449.9±3060.9	9948.8±2497.6	0.57
24	244.3±59.5	247.6±63.4	0.86	8960.7±2546.1	8676.1±3319.4	0.76
25	234.9±58.4	241.2±63.8	0.74	8033.5±2644.5	7994.1±2592.2	0.96
26	220±50.6	216.4±55	0.83	8464.6±1886.8	8163.4±1923.4	0.62
36	261.6±60.2	260.6±62.8	0.96	14459.6±3362.6	14626.3±3776.6	0.88
35	251.2±61.6	253.9±65.5	0.89	8563.6±2356	8504.9±2387.9	0.94
34	254.9±59.5	247.7±58.9	0.7	7822.7±2150.8	7889±2033.8	0.92
33	283.2±70.2	264.9±74.7	0.01**	10284.1±3529.1	9668±3369.6	0.18
32	228.5±54.9	213.4±57.6	0.02*	5531±1432	5616.1±1909.9	0.87
31	209±55.5	192.1±55.6	0.01**	4707.4±1308.9	4466.5±1657.8	0.37
41	207.9±52.8	192.1±55.3	0.01**	4842.9±1248.9	4478.1±1247.7	0.22
42	226.5±58.6	212.2±56.7	0.01**	5910.8±2098.8	5700.9±2014.8	0.49
43	277.3±70.6	264.4±75.3	0.03*	11379.9±3983.5	11055.8±4459.1	0.62
44	249.5±57	242±59.1	0.22	7984.3±1859.2	8623.8±3319.7	0.26
45	252.8±60.8	252.9±61.2	0.98	8826.3±2011.4	8948.6±2595.9	0.8
46	263.7±59.7	261.4±64	0.76	14443.6±3125.9	14056.5±3892.4	0.56

SD: Standard deviation, *p<0.05,**p=0.01, T1: Pre-treatment, T2: Post-treatment

Table 5. Comparison of root lengthand are a values between T1 and T2 in the TWB group

	Root length			Root area		
	T1	T2		T1	T2	
	Mean SD	**Mean SD**	**p**	**Mean SD**	**Mean SD**	**p**
16	224.8±53.7	229.8±54.8	0.77	9122±1768.6	9393±1993.8	0.65
15	242.1±60.1	253.4±61.6	0.01**	7457.6±1874.5	7747.9±1550	0.25
14	244.5±63.5	258.6±60.3	0.01**	8595.7±2478.5	9307.9±2030.9	0.12
13	313.2±78.4	324.5±78.1	0.07	10517.6±3856.1	10866±2124	0.61
12	257.8±62.9	260.2±64.2	0.69	7074.4±2065.1	7382.7±1562.5	0.41
11	281±68.3	281.9±74.1	0.92	8412.7±2246.3	8481.7±2328.1	0.97
21	282.8±66.6	285.4±64.5	0.69	8607.5±2033.9	9278.8±1887.8	0.18
22	266.9±60.7	269±60.1	0.68	7132.4±1678.7	7945.6±1954.4	0.17
23	315.2±77	321.1±74.7	0.39	11079.4±3725.9	10744.5±2862.3	0.63
24	252.2±60.2	257.1±59.5	0.4	8867.9±2723.4	9996.6±2840.5	0.21
25	250.3±57.7	258.7±59.1	0.02*	8130.5±2630.9	8033.5±2644.5	0.91
26	229.9±52.6	234.4±52.9	0.21	9112.7±2152	14422.8±21492.8	0.29
36	258.4±54.1	261.6±60.2	0.36	14289.9±1976.2	14459.6±3362.6	0.85
35	252.3±54.1	253.9±54.2	0.64	8409.6±1410.7	8563.6±2356	0.8
34	246.4±53.5	250.6±56.4	0.2	7955.1±1274.7	7822.7±2150.8	0.81
33	264.5±59.8	266.6±61.1	0.69	9520.3±2212.7	10284.1±3529.1	0.42
32	228±51.4	229.1±48.6	0.77	5684.7±1282.7	6062.5±1486	0.31
31	211.7±47.1	207.6±46.2	0.41	4598.9±862.9	5078.2±1185.3	0.12
41	217.7±45.5	212±46.6	0.22	4857.6±1044.6	4898.1±907.5	0.87
42	229.4±49.3	231.2±48.9	0.71	5629.3±1347.2	6142±818.4	0.1
43	263.8±58.2	268.1±58.9	0.45	10553.8±2549.3	10741.7±2110.4	0.75
44	248.7±53.3	253.1±53	0.32	8297±1314.3	8333.5±1248.6	0.91
45	252±50	253.5±49.5	0.62	9357.5±1693.9	9479.7±1267.6	0.71
46	256.6±52.9	259±52.3	0.55	13985.9±2369.2	14356.5±2714.4	0.55

SD: Standard deviation, *p<0.05, **p=0.01, T1: Pre-treatment, T2: Post-treatment

Herbst and TWB appliances may influence the inclinations of the upper and lower incisors during the treatment (4,22). Overly proclined or retroclined anterior teeth can remain outside the focal trough of the X-ray machine. Magnification of roots that are outside the focal trough may change and this can influence the root dimensions measured on radiographs (16). In this study, we evaluated the inclinations of the upper and lower incisors on cephalometric radiographs. The differences in the inclination changes between T1 and T2 of the upper and lower incisors in the TWB and Crown Herbst groups were reported to be non-significant in a previous study (4). Therefore, it is reasonable to accept that the incisor inclination has no effect on the root length changes in TWB and Crown Herbst groups.

Root length may be measured by various methods. Measurements with any software program on a digitised radiographic image generally practical (23). We used panoramic films that are routine recorded for orthodontic treatment and ImageJ software to assess the root length and area. The results of root resorption related to orthodontic treatment on panoramic films may be exaggerated by 20% or more when compared with that on periapical films (15). This difference is mostly observed in the lower incisors, unlike the uppers (24). In this study, we did not aim to determine the root resorption quantitatively. We compared the effects of two different functional appliances on the root length. Stramatos et al. (25) reported that when the occlusal plane is retained in an equal position at different times at which the panoramic radiographs are taken, and not inclined more than 10°, the linear root length measurements are reliable on these radiographs.

A previous study reported that while the length measurements of the upper first molar's buccal roots were reproducible, those of the palatal root of the maxillary first molar were unreliable (9).

However, the disto-buccal roots of the maxillary molars were not measured as their tracing on the panoramic film was difficult and unreproducible. A retrospective study to assess the risk of apical root resorption in orthodontic treatment reported that the distal

root of the mandibular first molar showed significantly decreased length compared to the right root (26). Hence, we also included the measurements of the distal roots of the mandibular molars. In total we analysed 960 teeth roots including the maxillary incisors, canines, buccal roots of first premolars, second premolars, mesiobuccal roots of first molars and mandibular incisors, canines, premolars and the distal roots of first molars in the present study.

In the Crown Herbst group the root length values from T1 to T2 were significantly decreased in right and left mandibular incisors and canines (Table 4).

Right and left maxillary second premolars and right maxillary first premolar had significantly increased root length in the TWB group (Table 5). However, despite incomplete root development, no significantly increase in root length of premolars was observed between T1 and T2 in the Crown Herbst group, unlike the TWB group.

Nasiopoulos et al. (27) reported that the root lengths of the mandibular first premolars significantly decreased following the Herbst appliance treatment. Our results showed a tendency for root length reduction in mandibular first premolars in the Crown Herbst group similar to the findings of Kinzinger et al. (13). As mentioned before, we did not find any reports that evaluated the root resorption induced by TWB appliance on panoramic films.

The interesting result in intergroup comparison was significantly decreased root length of right maxillary premolars, mandibular laterals and left mandibular canine in Crown Herbst group compared with that in the TWB group (Table 6). It can be deduced that the Crown Herbst inhibits root development in upper premolars and induces root resorption in the lower laterals and canines greater than that by the TWB. In this study, similar to a previous report, lesser root resorption was observed for the removable appliance TWB when compared with the fixed appliance Crown Herbst (28). It can be expected that the anchor teeth may be more susceptible to the side effects of the force applied by these appliances. However, in this study, not only the anchor teeth but also the mandibular teeth (incisors and canines), to which the force was indirectly delivered with occlusal and proximal contacts, were affected by the Crown Herbst appliance. However, no significant differences in the root area values between T1 and T2 were observed in inter and intragroup comparisons.

Results of the root area measurement did not reflect the root length values. It can be explained that the resorption changed the morphology and shape of the apical region and the margins of the apex were ragged and irregular, as previously defined in literature (29). Hence, it is considered that the actual root area measurements were limited and dependent on the increased surface area in the apical region.

Study Limitations

The present study had some limitations such as the absence of an untreated control group. Another limitation of our study design was the use of two-dimensional panoramic radiographs to quantify root resorption. Recent studies have revealed that periapical radiographs or CBCT offer many advantages to detect the amount of apical root resorption induced by orthodontic forces. Conversely, high costs, high ionising radiation doses and ethical issues restrict the usage of CBCT imaging (30-32). Epidemiological studies have showed that higher radiation doses during adolescence are associated with cancer development (33). Risk of future malignancy may increase in preadolescents and adolescents who are exposed to cumulative ionising radiation. Adolescents have higher breast and thyroid gland radiosensitivity than adults. ALARA principles (the concept of 'as low as reasonably achievable') should be applied in clinical dentistry. Since, the exact relationship between radiation dose and its biological harm is poorly understood, and even very low doses may cause the development of cancer in children and adolescents (34); therefore, diagnostic imaging using ionising radiation such as CBCT should not be performed routinely to examine the effects of orthodontic treatment in adolescent patients.

Conclusion

According to the present study, radiographic assessment indicated a tendency for decrease in root lengths with the Crown Herbst appliance in both the anchoring teeth and mandibular teeth which were indirectly exposed to force. However, the TWB appliance promoted the root development of teeth during the functional treatment.

Therefore, the unfavourable effects on root development when using the Crown Herbst appliance for functional treatment should be taken into consideration. In orthopaedic correction of Class II malocclusions, if there is no contraindication, the TWB appliance can be preferred.

Further studies with larger sample sizes (involving control groups) are needed to approve our results.

Ethics

Ethics Committee Approval: The experimental protocol of the study was approved by the Erciyes University Local Ethics Committee (2018/602).

Peer-review: Externally peer reviewed.

Authorship Contributions

Concept: E.D.Ş., A.Y., K.K.D., Design: E.D.Ş., A.Y., K.K.D., E.N.Y., Data Collection or Processing: E.D.Ş., Analysis or Interpretation: E.D.Ş., A.Y., K.K.D., E.N.Y., Literature Search: E.D.Ş., A.Y., K.K.D., E.N.Y., Writing: E.D.Ş.

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Original Article

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Evaluation of Nosocomial Infections and Antimicrobial Resistance Profiles in the Intensive Care Units: Nine Years Experience

Yoğun Bakım Ünitesinde Nozokomiyal Enfeksiyonlar ve Antimikrobiyal Direnç Profillerinin Değerlendirilmesi: Dokuz Yıllık Deneyim

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ABSTRACT

Objective: The aim of this study is to identify nosocomial infections and causative mikroorganisms in adult intensive care units of hospital and also to investigate the changes in antimicrobial resistance profiles over a nine-year period.

Methods: The infection control committee surveillance data of 29318 patients hospitalized in adult intensive care units between 01 January 2010 and 31 December 2018 were evaluated retrospectively.

Results: A total of 29318 patients were followed up in adult intensive care units of hospital in nine-year period and nosocomial infection was detected in 2593 patients (8.8%). The most common infections were; ventilator-associated pneumonia (34.1%), catheter-related urinary tract infection (21.8%), primary bacteremia (17.1%), central venous catheter-related bloodstream infection (14.7%) and pneumonia (8.5%). The most common causative agents were Gram-negative bacteria (72.9%; 2056/2822). Carbapenem resistance in gram negative bacteria responsible for nosocomial infections was 33% in 2010 and reached 75% in 2018. Colistin resistance of *Klebsiella* spp. strains reached up to 34% in 2018.

Conclusion: In Turkey, nosocomial infections in intensive care units are an important problem as well as in the world. With increasing antibiotic resistance, treatment of infections is becoming difficult. Therefore; each center should follow its own infectious

ÖZ

Amaç: Bu çalışmanın amacı, hastanemiz erişkin yoğun bakım ünitelerinde gelişen hastane enfeksiyonlarını ve etken mikroorganizmaları tanımlamak, ve ayrıca dokuz yıllık süreçte antimikrobiyal direnç profillerindeki değişimi araştırmaktır.

Yöntemler: 01 Ocak 2010-31 Aralık 2018 tarihleri arasında erişkin yoğun bakım ünitelerinde yatan 29318 hastanın enfeksiyon kontrol komitesi sürveyans verileri retrospektif olarak değerlendirildi.

Bulgular: Hastanemiz erişkin yoğun bakım ünitelerinde toplam 29318 hasta takip edildi, bunların 2593'ünde (%8,8) nozokomiyal enfeksiyon gelişti. En sık görülen hastane enfeksiyonları sırası ile ventilatör ilişkili pnömoni (%34,1), kateter ilişkili üriner sistem enfeksiyonu (%21,8), primer bakteremi (%17,1), santral venöz kateter ilişkili kan dolaşımı enfeksiyonu (%14,7) ve pnömoni (%8,5) idi. Nozokomiyal enfeksiyon etkeni olarak en sık gram negatif bakteriler (%72,9; 2056/2822) izole edildi. Nozokomiyal enfeksiyonlardan sorumlu olan gram negatif bakterilerde karbapenem direncinin 2010 yılında %33 iken 2018 yılında %75'e ulaştığı saptandı. Kolistin direncinin ise 2018 yılında *Klebsiella* spp. suşlarında %34'e kadar ulaştığı tespit edildi.

Sonuç: Yoğun bakım ünitelerinde gelişen nozokomiyal enfeksiyonlar tüm dünyada olduğu gibi Türkiye'de de önemli bir sorundur. Artan antibiyotik direnci ile enfeksiyonların tedavisi giderek

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agent distribution and antibiotic susceptibility, empirical treatment should be selected appropriate to the flora of the intensive care unit and the broad use of broad spectrum antibiotics should be limited.

Keywords: Antibiotic resistance, nosocomial infections, intensive care unit

zorlaşmaktadır. Bu nedenle; her merkezin kendi etken dağılımı ve antibiyotik duyarlılıklarını takip etmesi, empirik tedavide yoğun bakım ünitesinin florasına uygun antibiyotik seçilmesi ve geniş spektrumlu antibiyotiklerin yaygın kullanımının kısıtlanması gereklidir.

Anahtar Sözcükler: Antibiyotik direnci, hastane enfeksiyonları, yoğun bakım

Introduction

Patients who are followed up and treated in intensive care units (ICUs) in hospitals are at risk for the development of nosocomial infections due to the long hospitalization period and invasive procedures such as intubation, mechanical ventilation, tracheostomy and urinary catheterization (1).

Nosocomial infection (NI) is defined as the infection that develops 48-72 hours after the patient's hospitalization (2). While pneumonia is the most common NI in ICUs, urinary infections are in the first order in hospital units other than ICU (3). At least one antibiotic is given to an average of 80% of the patients in the ICU (4,5). Therefore, ICUs are hospital units with the highest antibiotic resistance. The distribution of microorganisms that cause NI varies between units of the hospital as well as between different centers.

Increasing resistance against antibiotics creates a problem in the selection of empirical treatment of critically ill patients, especially those in the ICU. Infections caused by multi-antibiotic resistant microorganisms cause an increase in morbidity and mortality, prolongation of hospital stay, an increase in costs and the emergence of serious complications (6).

It is only possible to determine the frequency of NI and the distribution of agents, to detect developing epidemics, to evaluate whether infection control measures are applied effectively, and to monitor the infection rates of our hospital, with continuous and effective infection surveillance. Surveillance studies are guiding in identifying real problems and evaluating the effectiveness of infection control policies (7).

In this study, we aimed to examine the developing nosocomial infections, causative microorganisms and antimicrobial resistance profiles in the ICUs of our hospital between January 2010 and December 2018.

Method

Our hospital is a tertiary training and research hospital serving an average of 71767 inpatients and an average of 5278 ICU patients in a year. Until 2016, adult ICU had consisted of 4 separate units and 49 beds in total; after 2016, it started to serve with 9 units and a total of 83 beds. Active, patient and laboratory-based surveillance is carried out by the Infection Control Committee (ICC) in ICUs in our hospital. Surveillance data are evaluated by the infection control physician and the infection control nurse.

In our study, the ICC surveillance data of 29318 patients hospitalized in the ICU between January 2010 and December 2018 were retrospectively evaluated. The diagnosis of NI was made based on the definitions of the Ministry of Health National Nosocomial Infections Surveillance Network (UHESA). Typing of the causative microorganisms and their antibiotic susceptibilities were done with the Phoenix automatized system (BD Diagnostic Systems, USA). Infection rate was calculated with the formula (NI number/patient number)X100 and NI Density was calculated with the formula (NI number/patient day)X1000. In the calculation of invasive device-related infection rates, the invasive device-associated NI number/invasive device use day × 1000 formula was used.

The study was approved by the Antalya Training and Research Hospital Ethics Committee (Date: 30-03-2017, number: 6/03).

Results

In the course of nine years, a total of 29318 patients were followed up in all ICUs, and NE developed in 2593 (8.8%) of them. The distribution of NI by years is given in Table 1. When the distribution of NI according to systems was examined; ventilator-associated pneumonia (VAP) was found the most (34.1%) in ICUs. The second most common was catheter-associated urinary tract infection (CAUTI) (21.8%), followed by primary bacteremia (17.1%), central venous catheter-related bloodstream infection (CRBSI) (14.7%), and pneumonia (8.5%).

The most common NE agents were gram negative bacteria (2056/2822) with a rate of 72.9%. The distribution of causative microorganisms is given in Table 3.

Carbapenem resistance in gram-negative bacteria responsible for NI between 2010 and 2018, were found as 33%, 48%, 57%, 46%, 52%, 68%, 60%, 72% and 75%, respectively. The increase in carbapenem resistance among especially in strains of Klebsiella spp. was remarkable.While there was no carbapenem resistance in 2010, this rate reached 83% in 2018 (Table 4).

The rate of detection of extended spectrum beta-lactamase (ESBL) in gram-negative bacteria, which were nosocomial infectious agents, was 20%, 55%, 41%, 27%, 40%, 38%, 38%, 21% and 27%, respectively between 2010 and 2018 (Table 5).

It was noteworthy that colistin resistance in strains of Acinetobacter spp., Pseudomonas spp. and Klebsiella spp. which were included in the study increased over the years. Colistin resistance reached up to 34% in strains of Klebsiella spp. It was

determined that piperacillin-tazobactam resistance increased in strains of Klebsiella spp. over the years. These high resistance rates cause serious problems in treatment planning and treatment success, especially in infections caused by gram-negative bacteria (Table 6).

Coagulase negative staphylococci constituted the majority of gram positive bacteria which were NI agents. Methicillin resistance was quite high in coagulase-negative staphylococci (100%, 92%, 85%, 95%, 84%, 87%, 88%, 100%, 100%, respectively by years).

Vancomycin resistance was detected in 20 (11.3%) of a total of 177 Enterococcus strains isolated as NI agents between 2010-2018 in ICUs. Although vancomycin resistance seemed to increase in recent years, it should be kept in mind that there might be strains naturally resistant to vancomycin such as E. gallinarum in this group (Table 7).

Discussion

NI increases the length of hospital stay, leading to labor loss and increased treatment costs. Morbidity and mortality rates are higher than other infections. While the incidence of NI is between 3.6% and 12% in high-income countries, this rate varies between 5.7% and 12% in low and middle-income countries (8).

Prematures and newborns whose immune system is not sufficient, elderlies, those with underlying chronic diseases, those who have undergone an operation, those diagnosed with cancer, traumatic patients, and patients with metabolic disorders constitute the risk group for the development of NI. In addition, long-term follow-up and treatment of patients in the ICU increase the risk of colonization of these patients with microorganisms and subsequent infection development. Multiple antibiotic treatments used because of the high infection rate in the ICU lead to the emergence of resistant microorganisms. As a result, problems arise in empirical antibiotherapy response.

Microorganisms and antibiotic susceptibilities that develop in ICUs differ between countries, regions, hospitals, and even ICUs in the same hospital (9,10). In order to achieve success in NI treatment and to determine the infection control measures that should be applied, it is necessary to continuously monitor the specialized units of the hospital and crowded ICUs for the infections that occur, the microorganisms that cause infections and the antibiotic susceptibility of microorganisms (11). For this

Table 1. Nosocomial infections developing in ICUs between 2010-2018

	Number of hospitalized patients	Patient day	Nosocomial infection n (%)	Nosocomial infection density
2010	2,295	11,051	179 (7.84)	16.29
2011	2,952	12,456	144 (4.95)	11.72
2012	3,124	12,463	183 (5.86)	14.78
2013	3,178	12,561	189 (5.95)	15.05
2014	3,517	13,847	393 (11.1)	28.3
2015	2,573	12,664	425 (16.5)	33.5
2016	2,911	14,216	436 (14.9)	30.6
2017	4,123	20,827	360 (8.7)	17.2
2018	4,645	24,721	411(8.8)	16.8
Total	29,318	134,806	2,593 (8.8)	19.2

Table 2. Distribution of nosocomial ınfections in ICUs between 2010-2018 by systems

	CAUTI n (%)	Respiratory system ınfections n (%)		Bloodstream infection n (%)		Other n (%)	Total
		Pneumonia	VAP	CRBSI	Primary bacteremia		
2010	42 (4.82)	12 (1.44)	37 (3.57)	42 (5.21)	46 (4.89)	-	179
2011	16 (2.30)	4 (0.50)	18 (2.54)	27 (3.71)	73 (10.01)	6 (0.50)	144
2012	41 (5.57)	12 (1.62)	51 (6.88)	20 (2.50)	54 (7.34)	5 (0.66)	183
2013	47 (3.74)	11 (0.88)	41 (3.26)	26 (2.07)	53 (4.22)	11 (0.9)	189
2014	104 (26.4)	37 (9.4)	118 (30.0)	66 (16.8)	57 (14.5)	11 (2.9)	393
2015	106 (25.0)	38 (9.0)	169 (39.7)	50 (11.7)	44 (10.3)	18 (4.3)	425
2016	108 (24.8)	42 (9.6)	173 (39.6)	52 (11.9)	44 (10.1)	17 (4.0)	436
2017	74 (20.6)	41 (11.4)	147 (40.8)	41 (11.4)	47 (13.0)	10 (2.8)	360
2018	54 (13.1)	36 (8.8)	174 (42.3)	74 (18.0)	49 (12.0)	24 (5.8)	411

VAP: Ventilator-associated pneumonia, CAUTI: Catheter-associated urinary tract infection, CRBSI: Central venous catheter-related bloodstream infection

Table 3. Microorganisms causing nosocomial infections in ICUs between 2010-2018

	Microorganism n (%)	2010	2011	2012	2013	2014	2015	2016	2017	2018
Gram-negative	***A .baumannii***	21 (11.9)	31 (20.9)	38 (20.4)	41 (20.0)	108 (24.0)	133 (31.9)	111 (34.2)	122 (32.9)	174 (32.1)
	***Acinetobacter* spp.**	21 (11.9)	10 (6.7)	21 (11.3)	1 (0.5)	2 (0.6)	2 (0.4)	7 (2.2)	-	3 (0.6)
	P. aeruginosa	23 (13.1)	14 (9.4)	22 (11.8)	28 (13.6)	64 (14.2)	55 (13.2)	41 (12.6)	50 (13.5)	93 (17.2)
	***Pseudomonas* spp.**	5 (2.8)	-	1 (0.5)	2 (1.0)	5 (1.1)	-	3 (0.9)	3 (0.8)	-
	K. pneumoniae	5 (2.8)	11 (7.4)	14 (7.5)	34 (16.5)	50 (11.1)	66 (15.9)	60 (18.5)	67 (18.1)	95 (17.5)
	***Klebsiella* spp.**	9 (5.1)	7 (4.8)	1 (0.5)	-	3 (0.6)	1 (0.2)	2 (0.6)	1 (0.3)	4 (0.7)
	E. coli	11 (6.3)	6 (4.0)	12 (6.5)	14 (6.8)	15 (3.3)	11 (2.7)	14 (14.3)	13 (3.5)	25 (4.6)
	***Enterobacter* spp.**	4 (2.2)	3 (2.0)	4 (2.1)	7 (3.3)	18 (4.0)	11 (2.7)	5 (1.5)	9 (2.4)	11 (2.0)
	Others	2 (1.1)	4 (2.8)	5 (2.7)	3 (1.4)	26 (5.8)	28 (6.8)	16 (4.9)	29 (7.8)	65 (12.0)
	Total	**101 (57.2)**	**86 (58.0)**	**118 (63.3)**	**130 (63.1)**	**291 (64.7)**	**307 (73.8)**	**259 (79.7)**	**294 (79.3)**	**470 (86.7)**
Gram-positive	***S. aureus***	5 (2.8)	5 (3.4)	5 (2.7)	6 (2.9)	12 (2.6)	7 (1.7)	2 (0.6)	10 (2.7)	10 (1.8)
	CNS	28 (15.9)	12 (8.1)	15 (8.1)	24 (11.7)	37 (8.2)	15 (3.5)	10 (3.1)	1 (0.2)	8 (1.4)
	***Enterococcus* spp.**	13 (7.5)	18 (12.1)	13 (7.0)	13 (6.3)	35 (7.8)	25 (5.9)	16 (4.9)	19 (5.1)	25 (4.6)
	***Streptococcus* spp.**	1 0.6)	-	-	1 (0.5)	-	1 (0.2)	-	-	-
	Others	-	2 (1.3)	-	1 (0.5)	1 (0.2)	1 (0.2)	-	-	-
	Total	**47 (26.8)**	**37 (24.9)**	**33 (17.8)**	**45 (21.9)**	**85 (18.8)**	**49 (11.5)**	**28 (8.6)**	**30(8.0)**	**43 (7.8)**
Fungus	***C. albicans***	9 (5.1)	8 (5.5)	6 (3.3)	11 (5.3)	24 (5.3)	22 (5.3)	25 (7.8)	21 (5.7)	11 (2.0)
	C. tropicalis	5 (2.8)	1 (0.7)	3 (1.7)	7 (3.3)	33 (7.3)	22 (5.3)	4 (1.2)	10 (2.7)	4 (0.7)
	C. parapsilosis	1 (0.6)	4 (2.8)	4 (2.1)	5 (2.4)	7 (1.5)	4 (0.9)	3 (0.9)	6 (1.6)	7 (1.3)
	***Candida* spp.**	13 (7.5)	12 (8.1)	22 (11.8)	4 (2.0)	2 (0.6)	7 (1.7)	1 (0.3)	-	-
	Others	-	-	-	4 (2.0)	8 (1.8)	6 (1.5)	5 (1.5)	10 (2.7)	8 (1.5)
	Total	**28 (16.0)**	**25 (17.1)**	**35 (18.9)**	**31(15.0)**	**74 (16.5)**	**61 (14.7)**	**38 (11.7)**	**47 (12.7)**	**30 (5.5)**
	Grand total	**176 (100)**	**148 (100)**	**186 (100)**	**206 (100)**	**450 (100)**	**417 (100)**	**325 (100)**	**371 (100)**	**543 (100)**

CNS: Coagulase negative staphylococci

reason, active and patient and laboratory-based surveillance is carried out by ICC in ICUs and specialized units of our hospital, and agent microorganisms and antibiotic susceptibilities are regularly reported to the relevant departments. Defining NIs in ICUs is necessary for determining local epidemiological features and empirical treatment approach (12).

In studies conducted in our country, the NI rate has been reported between 5.3% and 56.1% (13). Karahocagil et al. reported the NI rate as 3.5% throughout the hospital and 18.3% in the ICU (14). On the other hand, Öncül et al. reported the NE rate as 9.1% in ICU (15). In our study, we found the rate of NI in the ICU as 8.8%.

Table 4. Carbapenem resistance in agent microorganisms in ICUs between 2010-2018

		Total number of agents	Number of agents resistant to carbapenem (%)
2010	***A. baumannii***	21	19 (90)
	P. aeruginosa	23	3 (13)
	***Klebsiella* spp.**	9	-
	E. coli	11	-
2011	***A.baumannii***	31	29 (94)
	P. aeruginosa	14	3 (21)
	***Klebsiella* spp.**	18	1 (6)
	E. coli	6	-
2012	***A.baumannii***	38	38 (100)
	P. aeruginosa	22	11 (50)
	***Klebsiella* spp.**	15	1 (7)
	E. coli	12	-
2013	***A.baumannii***	41	37 (90)
	P. aeruginosa	28	11 (39)
	***Klebsiella* spp.**	34	6 (18)
	E. coli	14	-
2014	***A.baumannii***	108	96 (89)
	P. aeruginosa	64	23 (36)
	***Klebsiella* spp.**	53	5 (9)
	E. coli	15	-
2015	***A.baumannii***	132	121 (92)
	P. aeruginosa	101	51 (50)
	***Klebsiella* spp.**	67	36 (54)
	E. coli	11	3 (27)
2016	***A.baumannii***	111	92 (83)
	P. aeruginosa	43	13 (67)
	***Klebsiella* spp.**	62	31 (50)
	E. coli	14	1 (7)
2017	***A.baumannii***	122	113 (93)
	P. aeruginosa	50	18 (36)
	***Klebsiella* spp.**	68	48 (71)
	E. coli	13	4 (31)
2018	***A.baumannii***	122	113 (93)
	P. aeruginosa	50	18 (36)
	***Klebsiella* spp.**	58	48 (83)
	E. coli	13	4 (31)

ICUs: Intensive care units

The most common NI in ICUs is pneumonia (16,17). The most important risk factor for the development of nosocomial pneumonia is intubation and mechanical ventilation. Therefore, VAP constitutes the majority of pneumonia in ICUs. Akın et al. reported the rate of pneumonia as 41% (18). In our study, the VAP rate was found to be 34.1%.

Table 5. Positivity Rate of Extended Spectrum Beta-Lactamase (ESBL) in gram-negative microorganisms in ICUs between 2010-2018

		Total number of agents	Number of agents with GSBL (%)
2010	***E. coli***	11	2 (18)
	K. pneumoniae	5	3 (60)
	***Klebsiella* spp.**	9	-
2011	***E. coli***	6	3 (50)
	K. pneumoniae	11	7 (64)
	***Klebsiella* spp.**	7	2 (29)
2012	***E. coli***	12	4 (33)
	K. pneumoniae	14	7 (50)
	***Klebsiella* spp.**	1	-
2013	***E. coli***	14	9 (64)
	K. pneumoniae	33	3 (9)
	***Klebsiella* spp.**	1	1 (100)
2014	***E. coli***	15	7 (47)
	K. pneumoniae	50	20 (40)
	***Klebsiella* spp.**	3	0
2015	***E. coli***	11	7 (64)
	K. pneumoniae	66	23 (35)
	***Klebsiella* spp.**	1	-
2016	***E. coli***	11	4 (36)
	K. pneumoniae	48	17 (35)
	***Klebsiella* spp.**	2	2 (100)
2017	***E. coli***	13	3 (23)
	K. pneumoniae	66	14 (21)
	***Klebsiella* spp.**	2	-
2018	***E. coli***	25	9 (36)
	K. pneumoniae	95	24 (25)
	***Klebsiella* spp.**	4	-

ICUs: Intensive care units

The first three NI types vary in studies from different regions of Turkey (14,19,20,21,22). In our study, in order of frequency, the most common NI was VAP (34.1%), followed by CAUTI (21.8%), primary bacteremia (17.1%), CRBSI (14.7%) and pneumonia (8.5%).

The causative microorganisms in NI may differ between hospitals and in-hospital units, as well as vary according to the systems in which they are infectious. Gram negative bacteria are the most common agents in VAP and urinary tract infections. Gram-positive bacteria are more frequent agents in bloodstream and surgical site infections (9,23). In our study, the most common agents in VAP and urinary tract infections were gram negative bacteria, primarily Acinetobacter spp. While gram-negative bacteria were detected as the causative agent in 57.2% of all NIs in 2010, this rate increased over the years and reached 86.7%

Table 6. Antimicrobial resistance of gram-negative bacteria causing nosocomial ınfection between 2010-2018 in ICUs

		Resistance (%)								
		2010	2011	2012	2013	2014	2015	2016	2017	2018
Acinetobacter spp.	Piperacillin-tazobactam	81	100	100	98	98	78	100	100	100
	Amikacin	95	79	97	96	97	92	98	75	99
	Ceftriaxone	100	100	100	100	100	100	100	100	100
	Ciprofloxacin	95	97	98	99	100	100	100	100	100
	Colistin	-	-	-		-	2	1	1	2
Pseudomonas spp.	Piperacillin-tazobactam	24	20	67	57	21	9	44	38	70
	Amikacin	41	10	47	38	15	3	23	24	64
	Ceftriaxone	100	100	100	100	100	100	100	100	100
	Ciprofloxacin	48	20	74	56	25	3	28	28	74
	Colistin	-	-	-	-	-	1	-	2	-
Klebsiella spp.	Piperacillin-tazobactam	30	60	43	52	55	76	81	82	87
	Amikacin	50	41	57	48	7	6	76	48	36
	Ceftriaxone	100	82	86	75	34	50	85	57	74
	Ciprofloxacin	60	65	79	78	47	55	98	71	96
	Colistin	-	-	-	-	-	1	3	10	34

ICUs: Intensive care units

Table 7. Vancomycin resistance in causative enterococci in ICUs between 2010-2018

	Number of agents	Number of agents resistant to vancomycin (%)
2010	13	0
2011	18	2 (11)
2012	13	3 (23)
2013	13	3 (23)
2014	35	3 (9)
2015	25	3 (12)
2016	16	5 (31)
2017	19	-
2018	25	1 (4)

ICUs: Intensive care units

in 2018. In the "European Prevalence of Infection in Intensive Care (EPIC II)" study, which examined data from 1265 ICUs from 75 countries, 62% of the causative microorganisms were gram negative bacteria, 47% gram-positive bacteria and 19% candida (24). In a study conducted in Brazil, it was found that gram negative bacteria were causative agents in 28.1% of NIs, gram positive bacteria in 7.8%, and fungi in 1.6% (25).7

In two separate studies conducted by Küçükbayrak et al. (26) and Tanrıverdi Çaycı et al. (27), the most frequently isolated NI agents were *P. aeruginosa* and *Acinetobacter* spp. In the study of Kiremitçi et al. (11) the most frequently isolated microorganisms in the ICU were *Acinetobacter* spp. (28.4%), *S. aureus* (19.8%), *Candida* spp. (13.4%) and *P. aeruginosa* (8.1%). The most common gram negative bacteria isolated in our study were *Acinetobacter* spp. (30%), followed by *Klebsiella* spp. (15.2%), *Pseudomonas* spp. (14.4%), and *E.coli* (4.2%). Of Gram-positive bacteria, 5.3% were coagulase negative staphylococcus (CNS), 2.1% S.aureus, and 6.2% *Enterococcus* spp. Candida was observed at a rate of 13%. For this reason, empirical antibiotic should be chosen to cover gram-negative bacteria first in infections occurring in the ICU.

Studies have shown that methicillin resistance rate in staphylococci detected as infectious agents in ICUs, vancomycin resistance rate in enterococci and carbapenem resistance rate in gram negative bacteria are higher than those found in other parts of the hospital (9,22,28,29,30). In our study, carbapenem resistance in ICU was detected as 33% in 2010, but it gradually increased over the years and reached 75% in 2018. Especially, very high (90-100%) carbapenem resistance in A. baumannii strains has been interpreted as a result of intensive use of carbapenem against resistant gram-negative bacteria in ICUs in recent years. Similarly, the high rate of resistance to methicillin in coagulase-negative staphylococci and the use of glycopeptides in the treatment of infections caused by these bacteria cause the

risk of vancomycin resistance in gram positive bacteria. When the enterococcus strains included in our study were evaluated; vancomycin resistance was found in 11.2%.

Colistin resistance rates have increased in recent years as Acinetobacter-induced infection rates and colistin use have increased in ICUs. In our study, it was found that colistin resistance reached 2% in Acinetobacter and Pseudomonas and up to 34% in Klebsiella spp.

It has been reported that antibiotic resistance in microorganisms can be minimized with the proper and appropriate use of antibiotics in ICUs (31). In their study, Gruson et al. reported that providing the correct use of antibiotics in the ICU reduced the rate of VAP and resistant microorganisms (32).

With the use of antibiotics in combinations and sequentially, developmet of new resistance can be reduced. The choice of drugs to be used can be made depending on the microbiological flora detected in the ICU. To prevent microorganisms to develop resistance; unnecessary antibiotic use should be avoided, antibiotics should be used in appropriate dose and time according to the detected microorganism and the focus of infection, appropriate antibiotic combinations in empirical treatment should be selected for the microorganisms previously detected in the ICU, and appropriate isolation methods should be applied to patients who have developed NI caused by multi-drug resistant microorganisms. After empirical treatment, the treatment should be rearranged according to the agent reproducing.

Conclusion

As a result, NIs developing in ICUs are an important problem in our country as in the whole world. Many factors play a role in controlling NI. It is very important knowing the situations where hand washing is necessary, avoiding unnecessary antibiotic use, obeying the isolation rules, paying attention to the hospital cleaning rules, performing disinfection and sterilization processes properly and regularly, and performing surveillance studies properly. Surveillance studies help to reduce hospital infection rates, identify hospital outbreaks, and compare hospital infection rates. For this reason, all hospitals should know the factors causing NI and their sensitivity profiles; thus will contribute to the selection of appropriate antibiotics in empirical treatment, to decrease the unnecessary use of antibiotics, to decrease the cost and to prevent the emergence of resistant agents.

Ethics

Ethics Committee Approval: The study was approved by the Antalya Training and Research Hospital Ethics Committee (Date: 30-03-2017, number: 6/03).

Peer-review: Internally peer reviewed.

Authorship Contributions

Concept: A.K.S., F.K., K.D.Ö., N.Ö., Design: A.K.S., F.K., K.D.Ö., N.Ö., Data Collection or Processing: A.K.S., F.K., K.D.Ö., N.Ö., Analysis or Interpretation: A.K.S., F.K., K.D.Ö., N.Ö., Literature Search: A.K.S., F.K., K.D.Ö., N.Ö., Writing: A.K.S., F.K., K.D.Ö., N.Ö.

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Original Article

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Gastroschisis Treatment: Evaluation of Surgical Techniques and Results

Gastroşizis Tedavisi; Cerrahi Teknikler ve Sonuçların Değerlendirilmesi

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ABSTRACT

Objective: Recently, achieving good cosmetic results for patients with gastroschisis has gained popularity, as since the visceral organs can be safely positioned into the abdominal cavity. We aimed to evaluate patient outcomes while focusing on the cosmetic results to contribute to the limited amount of data on this subject in the literature.

Methods: From January 2005 to May 2018, patients operated on for gastroschisis in a single institution were evaluated retrospectively.

Results: Twenty-two patients with gastroschisis were treated (10 females/12 males). The mean gestational age was 38.2±2.1 weeks. The mean birth weight was 2256.9±418.2 g. Eleven patients were diagnosed prenatally. Five patients had complex gastroschisis. Others presented with necrosis (n=3), perforation (n=3), volvulus (n=1) and jejunal atresia (n=1). Primary closure (n=16) and staged closure (n=6) were performed. Patients needed mechanical ventilation and total parenteral nutrition for 3.7±1.0 days and 24.3±9.7 days, respectively. Enteral feeding was started at 15.9±10.5 days. The duration of hospitalisation was 36.7±13.3 days. Three patients died from sepsis and multi-organ failure.

Conclusion: We believe that performing appropriate gastroschisis surgery at the same hospital without transferring to another centre is the main factor in achieving a successful outcome. Good cosmetic results and visceral function were achieved in this study in 86.3% patients.

Keywords: Abdominal wall defects, gastroschisis, neonatal surgery

ÖZ

Amaç: Son zamanlarda, gastroşizisli hastalar için iyi bir kozmetik sonuç elde etmek, visceral organları karın boşluğuna güvenle yerleştirmek kadar popülerlik kazanmaktadır. Çalışmanın amacı, kozmetik sonuçlara odaklanarak hastaların sonuçlarını değerlendirmek ve literatürde kozmetik sonuçlara odaklanan sınırlı sayıdaki verilere katkıda bulunmaktır.

Yöntemler: Ocak 2005'ten Mayıs 2018'e kadar gastroşizis nedeniyle opere edilen tüm hastaların tıbbi kayıtları geriye dönük olarak değerlendirildi.

Bulgular: Gastroşizisi olan 22 hasta tedavi edildi (10 kız/12 erkek). Ortalama gebelik yaşı 38,2±2,1 hafta idi. Ortalama doğum ağırlığı 2256,9±418,2 g idi. Onbir hastaya doğum öncesi tanı kondu. Beş hastada komplike gastroşizis vardı; nekroz (n=3), perforasyon (n=4), volvulus (n=1) ve jejunal atrezi (n=1). Primer kapama (n=16) veya aşamalı kapama (n=6) yapıldı. Mekanik ventilasyon süresi ve total parenteral beslenme sırasıyla 3,7±1 gün ve 24,3±9,7 gündü. Enteral beslenmeye 15,9±10,5 günde başlandı. Hastanede kalış süresi 36,7±13,3 gündü. Üç hasta sepsis ve multiorgan yetmezliği nedeniyle öldü.

Sonuç: Hastaların doğduğu hastanede opere olmasının ve uygun cerrahi prosedür seçilmesinin başarı şansının ana faktörleri olduğunu düşünüyoruz. Bu çalışmada hastaların %86,3'ünde iyi kozmetik sonuçlar ve visseral fonksiyonlar elde edildi.

Anahtar Sözcükler: Abdominal duvar defekti, gastroşizis, yenidoğan cerrahisi

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Introduction

Gastroschisis, a congenital abdominal wall defect, causes the abdominal organs to be exposed to the amniotic fluid. The stomach, the small and the large bowels, the liver, the spleen and the bladder may protrude through the defect (1). Gastroschisis occurs in 3:10,000 live births and has a very poor prognosis (2). Gastroschisis can be either a complex abnormality involving other gastrointestinal anomalies, such as intestinal atresia, perforation, necrosis, volvulus, or a simple abnormality without other anomalies (1,2).

Placement of the visceral organs back into the abdominal cavity safely for good functional maintenance and to ensure an acceptable cosmetic appearance is the main treatment principles of gastroschisis. Simultaneously, associated anomalies or complications should be identified and managed promptly and provided the appropriate nutrition support (3,4).

The aim of this study is to describe the characteristics and outcomes of cases of gastroschisis and evaluate the repair methods and cosmetic results.

Method

This study was conducted at our institution after the approval of the ethical committee (05-February-2019: KA19/42). The study was conducted in compliance with the principles of the ethics committee and the Declaration of Helsinki. Twenty-one neonates diagnosed with gastroschisis in our hospital between January 2005 and May 2018 and were evaluated retrospectively. The patient data were collected and recorded for each patient, including the preoperative preparation of the neonate, maternal age, prenatal diagnosis, gestational age and gender, birth weight, co-existing malformations, surgical technique used, mechanical ventilation, complications, time of parenteral nutrition, time to begin oral feeding, postoperative cosmetic results and length of hospitalisation.

Resuscitation by covering the bowel with warm saline-soaked sterile gauzes and by infusing fluids and prophylactic antibiotics, such as ampicillin, aminoglycosides and metronidazole, was performed for all neonates initially. A nasogastric tube was inserted into all patients and allowed to drain freely. If the new-born was born at our centre, we covered the herniated organs with moist, warm gauze and transferred the baby to the operating room directly that is adjacent to the delivery room. Neonates who were born in another centre were transferred to the operating room after clinical stabilisation.

In our study, the decision to repair gastroschisis by primary closure or staged closure depended on the surgeon's personal experience, without the criterion as reported in the literature. After evaluation of the baby and ascertaining whether the abdominal contents cannot be reduced or reduction is not safe, a staged closure was performed. While this decision was being made, we observed that it was physically impossible due to viscera-abdominal disproportion, or the risk for abdominal compartment syndrome. If a complete reduction was deemed safe, then a primary closure was performed.

All patients, who were intubated previously during the operation, were transferred to our neonatal intensive care unit postoperatively. A central catheter was placed on the postoperative first day, and all patients were given total parenteral nutrition (TPN) support until bowel function returned.

Surgical Technique

Primary Skin Closure

Under general anaesthesia, we washed the bowel gently with warm saline. The bowel was carefully inspected for complex gastroschisis, including intestinal atresia, volvulus and other gastrointestinal anomalies. Then, the assistant tents the abdomen by upward traction on the umbilical cord, which has been kept deliberately long. Reduction of the bowel was continued, loop by loop, until the entire bowel was reduced to the abdominal cavity. The fascia, at least 5 mm from the junction of skin and without any dissection, was sutured with non-absorbable purse-string and tied firmly. Subsequently, another absorbable suture was placed using single sutures with the skin and cord side-by-side (Figure 1).

Staged Procedure

A silastic silo material was used for larger defects that could not be closed primarily. The umbilical ligament was ligated and removed. Then, the silastic silo was properly cut and prepared. The layers of the abdominal wall, including skin, subcutaneous tissue and fascia, were separated from each other. Then, the silastic silo mesh was sutured with non-absorbable suture material to the peritoneum and fascia of the defect by at least 5 mm intervals to prevent sutured edge tears. After 3 days when the bowel gas and

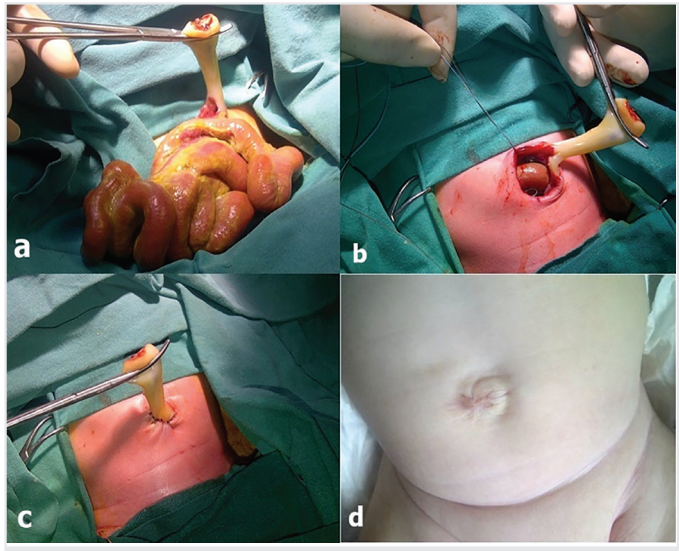

Figure 1. Primary closure for gastroschisis. **(a)** Reduction of the gut then until the entire bowel was within the abdominal cavity. **(b)** A non-absorbable purse-string suture was placed in the fascia. The purse-string suture in the fascia was tied firmly. **(c)** Another absorbable suture was placed using single sutures with the skin and cord side-by-side. **(d)** At six weeks, full healing of the abdominal defect is shown and is a good cosmetic result for the patient.

oedema lessens, the silastic silo was replaced, and a patch was employed (Dual Mesh®, Gore-Tex®). Complete skin closure was successfully achieved after the patch was removed three weeks later (Figure 2).

Statistical analysis: This is a single-centre, retrospective, cross-sectional and descriptive study. Patients were not randomly selected, and all patients had undergone surgery. Data were analysed using descriptive statistical tests based on data distribution.

Results

During the study interval, 22 patients with gastroschisis were admitted to our clinic (10 females and 12 males). Of these, seven patients were born at other hospitals. In our study, 11 patients were diagnosed as antenatal gastroschisis by ultrasonography, whereas the rest were without a prenatal diagnosis. The mean gestational age at the time of referral was 38.2±2.1 weeks, and the mean birth weight was 2256.9±418.2 g. Fourteen neonates were born via caesarean section; the other neonates were born via normal vaginal delivery (Table 1). The average age of mothers was 22.8±2 years. All cases underwent abdominal ultrasonography and echocardiogram. Co-existing congenital anomalies including atrial septal defect (n=5), patent ductus arteriosus (n=2), meningocele (n=1), cleft palate and micrognathia (n=1) were detected. Seventeen neonates (77.2%) had simple gastroschisis, whereas five infants (22.7%) had complex gastroschisis; necrosis

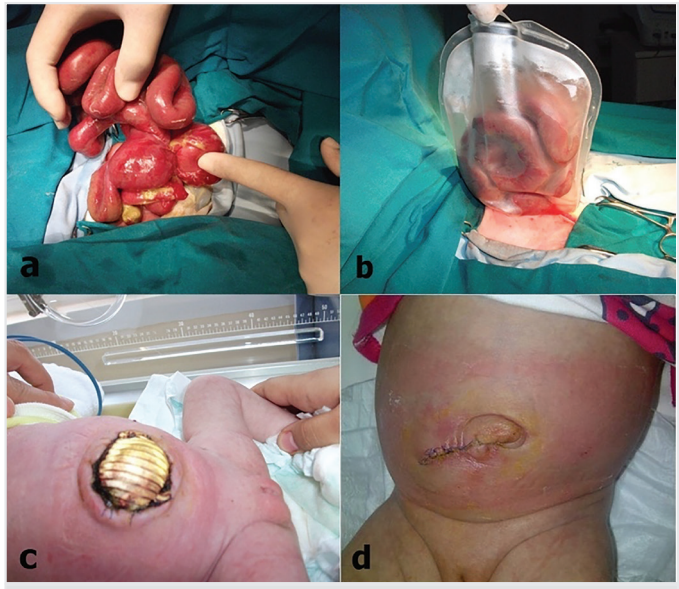

Figure 2. Staged closure for gastroschisis. **(a)** On day 1, the patient's exposed bowel is covered with a sterile silastic bag. When the bowel cannot be completely reduced (as shown here), the bag is tied off, forming a silo. **(b)** When the silastic silo had progressively lessened the bowel gas and oedema three days later, the bowel was reduced, and a patch was employed. **(c)** Complete skin closure was successfully achieved after the patch was removed three weeks later. **(d)** After two weeks, full healing of the abdominal defect is shown and is a good cosmetic result for the patient.

Table 1. Demographic and clinical data

	Primary closure (n=16)	Staged closure (n=6)	Total (n=22)
M/F ratio	9/7	3/3	12/10
Maternal age (years)	21.5±2.4	22.6±2.4	22.8±2
out born (n)	4	3	7 (31.8%)
Prenatal diagnosis (n)	9	2	11 (50%)
Delivery			
Vaginal (n)	4	3	7 (31.8%)
Caesarean (n)	12	3	15 (68.1%)
Gestational age (weeks)	37.2±2.4	36.6±2.4	38.2±2.1
Birth weight (g)	2259.1±341.5	2300±444.9	2256.9±418.2
Co-existing congenital anomalies			
Atrial septal defect	3	2	5
Patent ductus arteriosus	1	1	2
Meningocele	1		1
Cleft palate and micrognathia		1	1
Simple gastroschisis (n)	14	3	17 (77.2%)
Complex gastroschisis (n)	3	2	5 (22.7%)
TPN (days)	16.1±10.9	18.6±10.1	24.9±9.7
Enteral feeding (days)	14.5±10.6	23.5±10.5	15.9±10.5
Length of hospital stay (days)	30.5±6.7	55.3±20.1	36.7±13.3
Survival (%)	**16 (100%)**	**3 (50%)**	**19 (86.3%)**

Abbreviations: TPN: Total parenteral nutrition, F: Female, M: Male. Data are presented as mean ± standard deviation and %

(n=3), perforation (n=4), mesenteric venous thrombosis and volvulus (n=1) and jejunal atresia (n=1) (Figure 3).

Of the three cases of complex gastroschisis with bowel necrosis and perforation, one infant had jejunal atresia only, and the other infant had bowel necrosis and volvulus. Prematurity and low birth weight, weight less than 2000 g (range, 1,700-2,000 g), were more associated with neonates with complex gastroschisis. The diameters of the defects ranged from 2.5 to 6 cm (median, 3 cm) in 22 of the gastroschisis cases. Sixteen patients were subjected to primary closure, and six underwent staged closure. None of the neonates in this study had abdominal compartment syndrome. The duration of mechanical ventilation and TPN were 3.7±1.0 days and 24.3±9.7 days, respectively. Enteral feeding was started at 15.9±10.5 days (Table 2).

One patient with complex gastroschisis (bowel necrosis and perforation) was subjected to primary closure and ileostomy. Three months later, this patient had contrast-enhanced tests and intestinal passage radiograms performed, which demonstrated the malrotation. This patient underwent the Ladd procedure and ostomy closure. Gastroschisis with jejunal atresia, rarely seen, was diagnosed 24 days later from primary closure of the abdominal wall. Of the six neonates who had undergone staged closure, two died in the early 48-hour postoperative period. The first patient died of septicaemia, and the second patient died of bowel infarction caused by presumed mesenteric venous thrombosis and volvulus. Another patient who underwent primary closure died due to multi-organ failure from sepsis and ileus two months later. The duration of hospitalisation was 36.7±13.3 days. All patients had an acceptable cosmetic appearance after the closure of the abdominal wall defect when they came for follow-up after discharge (Figures 1, 2).

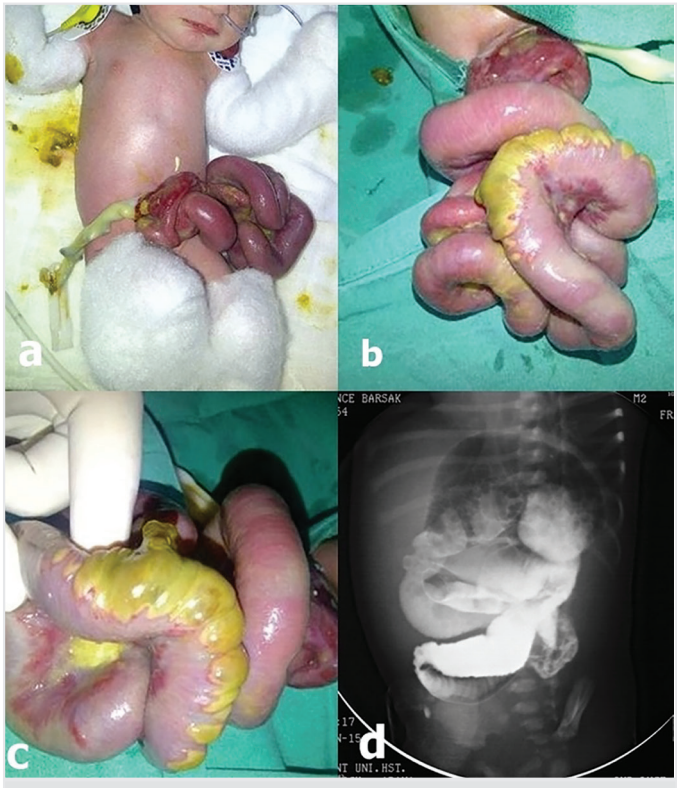

Figure 3. (a, b, c) One patient with complex gastroschisis (bowel necrosis and perforation) was subjected to primary closure and ileostomy. **(d)** Three months later, this patient had performed contrast-enhanced tests performed. Intestinal passage radiograms demonstrated the malrotation. The Ladd procedure and ostomy closure were performed on this patient.

Discussion

The treatment strategies of gastroschisis vary over a broad spectrum ranging from operative treatment, such as primary closure, staged closure, with or without general anaesthesia, to nonoperative treatment (3-8). Operative primary reduction, mostly depended on individual or selective cases, has become the standard initial surgical approach for more than 20 years. In contrast, operative staged reduction is typically associated with poorer cosmetic outcomes and is frequently used as a protective strategy when reduction is deemed unsafe or is physically impossible (3,4,7,8). Recently, obtaining a good cosmetic result for patients with gastroschisis has gained popularity to put visceral organs safely into the abdominal cavity during the treatment. In our study, we obtain a good cosmetic result with putting visceral organs safely into the abdominal cavity in 86.3% of patients, most of whom had primary closure performed.

Gastroschisis, a rare congenital abdominal wall defect through which intra-abdominal organs herniate, requires surgical management soon after birth. Although antenatal diagnosis and care have improved during the last 30 years; some patients were not diagnosed during the antenatal period in our study (4). The mothers were not followed regularly during the prenatal period and usually give birth at regional maternity hospitals where paediatric surgeons do not work. On the other hand, infections during transfer caused sepsis in externally born infants (9). Therefore, if the conditions are suitable, neonates with antenatally diagnosed gastroschisis should be born in a paediatric surgical centre, since they will require surgery after delivery (4,9). In our study, 11 patients were diagnosed as antenatal gastroschisis by ultrasonography, while the rest were without a prenatal diagnosis. Two of the transferred patients died early in the postoperative period. The first died of septicaemia and the second died from mesenteric venous thrombosis and intestinal infarction caused by volvulus. We believe that transferring patients from another centre increases the risk of mortality and morbidity due to improper physical conditions (insufficient fluid intake, hypovolemia and insufficient protection of the intestines). If the patient is diagnosed during the antenatal period, we recommend that the mother should be referred to a suitable centre for treatment of gastroschisis.

Young mothers have a high risk of having a child with gastroschisis (10,11). In our study, the mean age of the mothers was 22.8±2 years, and four of them were under 20 years of age.

The most common intestinal anomalies associated with gastroschisis are malrotation, midgut volvulus and atresia

(12,13). The diagnosis of intestinal atresia in gastroschisis can be difficult due to a thick inflammatory layer covering the intestines (10,14,15). In our study, the diagnosis of jejunal atresia, which was not initially available to our patient, was made 24 days after closure of the abdominal wall. This patient had feeding intolerance for a long time and nasogastric tube drainage with marked abdominal distention. The contrast-enhanced test performed before the ostomy closure surgery revealed that the patient had intestinal malrotation.

Because of less parenteral nutrition and shorter hospital stay, primary closure of the gastroschisis is still considered an ideal correction (2-4). However, a tight closure during primary fascial repair may increase intra-abdominal pressure and the need for mechanical respiratory support. Therefore, it is necessary to consider the morbidity associated with mechanical ventilation (4, 14, 16). In this procedure, the fascia was sutured with a non-absorbable purse-string without any dissection and tied firmly. Thereafter, another absorbable suture was placed using single sutures with the skin and cord placed side-by-side. We consider that purse-string suture without dissection of the fascia has a role in the good cosmetic results. Abdominal compartment syndrome was not seen in any patients postoperatively. The mean duration of mechanical ventilation and TPN support was 3.7±1.0 days and 24.3±9.7 days, respectively. The mean time of starting enteral feeding was 35.9±4.6 days. In our series, there was no difference in the time to full enteral feeds and those reported in the literature.

On the other hand, when reduction is deemed unsafe or physically impossible, operative staged reduction is frequently used as a rescue strategy. Suturing a synthetic material to the enlarged defect in operative staged reduction was the safest approach, but was associated with worse cosmetic outcomes (12,16). Sepsis, enteric fistula, prolonged ileus and the need for more surgeries is the causes of morbidity in silo use (11,12,16). Another method is the suture-less method, which is applied to uncomplicated gastroschisis (7,8). This method uses the umbilical cord as a biological dressing with non-adherent synthetic materials to reinforce it. In this method, a high incidence of umbilical hernia has been reported, but only a small percentage of patients require subsequent umbilical hernioplasty (7,8).

We were presented with five patients who underwent staged closure. Silo and patch techniques are combined in our staged repair method. The main goal of the silastic silo management is to achieve sequential reduction. So, after a mean of 3 days, l when the bowel gas and oedema lessen, the bowel was reduced by replacing the silo with a patch. If the patch had been used in the first stage, the inspection of the vitality of the viscera and the sequential reduction of the intestines would not be possible. In addition, the sequentially reduced organs enable us to use a smaller sized patch. Three weeks later, the patch was removed, and complete skin closure was performed. Two patients with complex gastroschisis died within the first 48 postoperative hours due to sepsis and multi-organ failure. One of these patients had mesenteric thrombus and volvulus during the first admission, followed by intestinal necrosis. The second patient had sepsis because he was not transported under appropriate conditions.

None of our patients developed an umbilical hernia. Our 19 patients were reported to have good cosmetic appearance during outpatient follow-up**.**

The limitation of our study is that its relatively small sample size may not reflect global gastroschisis. The demographic data of our study patients are largely in line with those in the literature, and the therapeutic approach in our clinic complies with the international trend.

Conclusion

We believe that performing appropriate gastroschisis surgery at the same hospital without transferring to another centre is the main factor in achieving a successful outcome. Good visceral function and acceptable cosmetic results were achieved by our surgical techniques in 86% of our patients. Although many modifications have been tried in recent years to obtain good cosmetic results, we believe that good cosmetic results can be achieved with primary closure using the newest methods when experienced surgeons perform the procedure.

Ethics

Ethics Committee Approval: This study was conducted at our institution after the approval of the ethical committee (05-February-2019:KA19/42).

Informed Consent: The study was conducted in compliance with the principles of the ethics committee and the Declaration of Helsinki.

Peer-review: Internally peer reviewed.

Authorship Contributions

Concept: E.İ., S.S.E., A.T., H.Ö.G., A.H., Design: E.İ., S.S.E., A.T., H.Ö.G., A.H., Data Collection or Processing: E.İ., S.S.E., A.T., H.Ö.G., A.H., Analysis or Interpretation: E.İ., S.S.E., A.T., H.Ö.G., A.H., Literature Search: E.İ., S.S.E., A.T., H.Ö.G., A.H., Writing: E.İ., S.S.E., A.T., H.Ö.G., A.H.

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

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Original Article

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The Impact of Moral Sensitivities and Professional Values of Nursing Students on Care Perception

Hemşirelik Öğrencilerinin Ahlaki Duyarlılıklarının ve Profesyonel Değerlerinin Bakım Algısına Etkisi

Diğdem LAFÇI, Ebru YILDIZ, Kübra AKKAYA, Gamze ÇOLAK

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ABSTRACT

Objective: This study was conducted to investigate the effect of nursing students' perceptions of moral sensitivities and the care given by professional values towards the nursing profession.

Methods: Research was approved by Mersin University Clinical Research Ethics Committee and planned as a descriptive study. It was conducted between 1 May and 30 June 2017 with 195 students graduating in the third and fourth grades of the School of Health Nursing Department of a public university. Data were collected with "Individual Identification Form", "Moral Sensitivity Questionnaire (MSQ)', "Nurses' Professional Values Scale (NPVS)" and "Individualized Care Scale-A-Nurse Version (ICSA-Nurse)'.

Results: It was found that 55.4% of the students did not voluntarily choose the profession, 31.8% met ethical problems during clinical practice and 38.7% thought that the problems faced should be solved with the help of the clinical guide. The mean scores of the students from the MSQ, NPVS and ICSA-Nurse forms were as follows; (84.32±28.32), (125.17±34.07), (60.74±16.35). There was a significant positive correlation between the Professional values and the individualized care abilities mean scores ($p<0.05$). The mean scores of benevolence and orientation subscales of MSQ were found to be higher in males, and the mean scores of conflict and autonomy subscales of MSQ were found to be higher in 4th grade. "Clinical situation", "personal life situation" and "decisional control over care" mean scores were found to be higher in female students. The mean score of professional values was found to be higher in those who

ÖZ

Amaç: Çalışma, hemşirelik öğrencilerinin ahlaki duyarlılıklarının ve hemşirelik mesleğine yönellik profesyonel değerlerinin, verdikleri bakımı algılamalarına etkisini incelemek amacıyla yapıldı.

Yöntemler: "Mersin Üniversitesi Klinik Araştırmalar Etik Kurulu" tarafından onaylanan ve tanımlayıcı olarak planlanan araştırma, 1 Mayıs-30 Haziran 2017 tarihleri arasında bir devlet üniversitesinin sağlık yüksekokulu hemşirelik bölümü 3. ve 4. sınıflarında öğrenim gören, etik dersini almış gönüllü 195 öğrenci ile yürütüldü. Veriler, "Birey Tanıtım Formu", "Ahlaki Duyarlılık Anketi (ADA)", "Hemşirelerin Profesyonel Değerler Ölçeği (HPDÖ)" ve "Bireyselleştirilmiş Bakım Skalası-A-Hemşire Versiyonu (BBSA-Hemşire)" ile toplandı.

Bulgular: Öğrencilerin %55,4'ünün mesleği isteyerek seçmediği, %31,8'inin klinik uygulama sırasında etik problem ile karşılaştığı ve %38,7'sinin karşılaştığı problemleri klinik rehberden yardım alarak çözülmesi gerektiğini düşündüğü belirlendi. Öğrencilerin, ADA, HPDÖ ve BBSA-Hemşire formlarından aldıkları puan ortalamaları sırasıyla; 84,32±28,32, 125,17±34,07; 60,74±16,35'tir. Profesyonel değerler ile bireyselleştirilmiş bakım becerisi puan ortalamaları arasında pozitif yönde anlamlı bir ilişki saptandı ($p<0,05$). Ahlaki duyarlılık için yarar sağlama ve oryantasyon alt puan ortalaması erkeklerde, çatışma ve otonomi ise 4. sınıflardan yüksekti. Bireyselleştirilmiş bakım, klinik durum ve karar verme puan ortalaması kızlarda yüksekti. Profesyonel değerler puan ortalaması mesleği isteyerek seçenlerde, harekete geçme ve güvenlik ise mesleği severek yapanlarda yüksekti.

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wanted to choose the profession, and the means scores of action and safety were found to be higher in those did the profession willingly.

Conclusion: It was concluded that the development of professional value was important for the individualized care skill of the student.

Keywords: Moral sensitivity, nursing students, professional values

Sonuç: Öğrencinin bireyselleştirilmiş bakım becerisi için profesyonel değer gelişiminin önemli olduğu söylenebilir.

Anahtar Sözcükler: Ahlaki duyarlılık, hemşirelik öğrencileri, profesyonel değerler

Introduction

Care, which is a multidimensional concept, consists of the results of individuals' cultures, values, experiences and their relationships with others (1). It is important for nurses to be aware of the values that guide their personal and professional behaviors in order to provide qualified service to the individuals they care for (2,3). The nurse needs professional values that find verbal expression in ethical codes by creating the philosophy of nursing while explaining/defending the reasons for the individual's behavior and attitudes during care and making decisions when faced with ethical dilemmas (2). The values of nurses guide their interactions with colleagues, other team members and the society, guide them to make decisions about practices and form the basis (4,5).

Professional values help to perceive and evaluate what is right/wrong, important or less important in professional attitudes and behaviors (6). Professional values and moral sensitivity that predict problem solving and critical thinking skills, which play a primary role in determining the needs of the individual and their family, directly affect the quality of care (7). Quality nursing care is shaped by moral development, which is the process of creating a system of values that the individual can use effectively in society. This development is essential for professional nurses to develop their ability to make decisions in line with moral behavior and ethical codes (8). At the same time, in cases where there is an ethical dilemma that needs to be decided, the moral sensitivity required to recognize and resolve the dilemma is influenced by the personal values of the nurse giving care (9,10).

With the expansion of personal values system in nursing education, which has an important role in the development and shaping of professional values, it is aimed to pattern new professional values into this system. Students can use their skills to reflect these values in professional behaviors through professional work and socialization, including after graduation (10,2). It is observed that nursing students are faced with ethical dilemmas and problems as well as health professionals during clinical practices. Although the ethics course is an integral part of the nursing undergraduate curriculum, students are incapable of resolving and managing ethical dilemmas and problems. Students may experience problems in perceiving ethical problems and dilemmas, in solution-oriented approaches to the problem, and in coping with the problems due to the poor self-confidence, and limited clinical practice experience and ethics education.

In the literature, there are separate studies to determine nursing students' professional values and influencing factors (11-13), ethical sensibilities (14-16), and individualized care perception (17). However, no study has been found in which students' moral sensibilities and professional values towards nursing profession and individualized care perception are discussed together. For this reason, this study was conducted to examine the effects of nursing students' moral sensibilities and professional values towards nursing profession on their perception of care.

Method

The Universe and Sample of the Research

The universe of the descriptive and cross-sectional study consisted of 453 3rd and 4th grade students graduating in Nursing Department of a state university where the research was conducted during 2016-2017 academic year spring semester, and the sample of the study consisted of 195 students who agreed to participate in the study, attended the course on 08-19 May 2017 and met the inclusion criteria.

Research Variables

Moral sensitivity, perception of care and nursing values were dependent variables. Students' age, gender, school grade, and the high school they graduated from were independent variables.

Collection of Data

"Personal Information Form", "Moral Sensitivity Questionnaire", "Nurses Professional Values Scale" and "Individualized Care Scale-Nurse Version" were used for data collection. The data were collected using face-to-face interview technique. The application of the questionnaire took approximately 15 minutes.

Personal Information Form

In the Personal Information Form developed by researchers in line with the literature (18,19), there were 18 questions in total about students' descriptive characteristics (age, gender, marital status, high school they graduated from, etc.) and their opinions on ethics (the course they took on ethics, the publication they followed, the situation of encountering ethical dilemma in the practice lessons, ethical problem solving, etc.).

Moral Sensitivity Questionnaire (MSQ)

The Turkish validity and reliability study of the scale, which was developed by Kim Lützen in 2000 to measure the ethical sensibilities of nurses, was conducted by Tosun in 2005 (20,21). The scale consists of 30 items arranged under six subscales: Autonomy (items 10,12,15,16,21,24 and 27), benevolence (items 2,5,8 and 25), holistic approach (items 1,6,18,29 and 30), conflict (items 9,11 and 14), practice (items 4,17,20 and 28),

and orientation (items 7,13,19 and 22). It is a seven-point Likert scale. Responses to items in the questionnaire range between 1 (strongly agree) and 7 (strongly disagree). A total of 30-210 points can be obtained from the scale. High score indicates low sensitivity in terms of ethics, low score indicates high sensitivity in terms of ethics. In the adaptation study of the scale in Turkey, Cronbach's alpha value was reported as 0.84 and 0.87 was found in this study.

Nurses Professional Values Scale (NPVS)

The Turkish validity and reliability study of the scale, which was developed in 2000 by Darlene Weis and Mary Jane Schank, based on the ethical codes of the American Nurses Association, was conducted by Orak in 2005. The scale consists of five subscales and a total of 36 items: Human dignity (11 items), responsibility (9 items), action (8 items), safety (4 items) and autonomy (4 items). The total score obtained from the scale is calculated by summing the scores obtained from 36 items such as human dignity (17-18- 19-28-29-31-32-33-34-35-36), responsibility (6-7-8-9-10-11-13-14-16), action (4-12-15-20 21-22-27-30), safety (1-2-3-5), and autonomy (23-24-25-26). Five-point likert is used as; not important (1), slightly important (2), important (3), very important (4), extremely important (5). A total of 36-180 points can be obtained from the scale. High scores indicate that nurses attach more importance to their professional values (17). In this study, Cronbach's alpha value was found to be 0.93.

Individualized Care Scale-Nurse Version (ICS-Nurse)

The Individualized Care Scale-Nurse Version was developed by Suhonen et al. in 2007 to evaluate nurses' views about individualized care in the healthcare setting. Adaptation to Turkish population was made by Şendir et al. (23) in 2010. In the first part of the scale, nurses' perceptions of supporting the individuality of patients in their care practices (ICSA-Nurse), and in the second part, perceptions of individualizing patients' care (ICSB-Nurse) are evaluated. The scale consisting of 17 items in 5-point Likert type is scored as "1 = strongly disagree", "2 = partially disagree", "3 = undecided", "4 = partially agree", "5 = completely agree". In this study, the first part that evaluates nurses! perceptions of supporting the individuality of patients in care practices (ICSA-Nurse) was used. The ICSA-Nurse is consisted of 3 subscales: "Clinical situation" (care behaviors aimed at supporting the individuality of sick individuals in issues that include responses to the disease, feelings, feelings, and what the disease means to them), "personal life situation" (care behaviors aimed at supporting the individuality of sick individuals in issues that reflect the beliefs and values of sick individuals, such as habits, activities, preferences, family ties, as well as work and hospital experience) and "decisional control over care" (caring behaviors aimed at supporting the individuality of the sick individuals in issues that reflect the feelings, thoughts, desires of sick individuals and allowing them to have a say in their care and participate in decisions related to their care) (18,24-26). The items included in the subscales are: Clinical situation (A01-A07), personal life situation (A08-A011) and decisional control over care (A12-A17). Item score averages that can be obtained from each part and subscales of the ICSA-Nurse version are at least 1 and at most 5. The high score indicates that nurses generally support the individuality of the patients during their nursing actions. When applying part A of the scale, nurses are asked to consider their general attitudes about how they support the individuality of the patients in their general care practices (19). In the presented study, Cronbach's alpha value was found to be 0.90.

Ethical Aspect of the Research

The study was approved by the "Mersin University Clinical Research Ethics Committee" (2017/142) and the "Mersin University Directorate of İçel Health High School ". The purpose of the study, its duration and what was expected from them were explained to the students in the sample and their written consent was obtained in line with the willingness and voluntary principle.

Statistical Analysis

Statistical analysis of the data was carried out using the SPSS 20.0 (Statistical Package for Social Science for Windows) package program. In continuous measurements; arithmetic mean, standard deviation, in categorical measurements; numbers and percentages were used. For comparison of 2 independent groups, and 3 or more groups; "Student's t-test" and "One-Way Anova" were used when the parametric distribution prerequisite was met, and "Kruskal-Wallis" and "Mann-Whitney U Test" were used when the parametric distribution prerequisite was not met. Relationships between variables were examined with the "Pearson Correlation Coefficient" and the reliability of the scales with the "Cronbach's Alpha" coefficient. The results were evaluated at a significance level of $p<0.05$ at a 95% confidence interval.

Results

The average age of the students was 21.95±1.44 years. It was determined that 56.9% of them were girl, 42.6% were 4th grade students and 55.4% were graduates of science and anatolian high schools, and 62.1% lived in the Mediterranean region. It was determined that 48.7% of the students had clinical practice on average 1.84±0.98 days per week during the 14-week education period, including in the pediatric service. It was found that 44.6% chose the profession willingly, 65.6% liked to go/willingly went to clinical and field practice, 100% took ethics lessons, 86.2% did not follow any publications related to ethics, 52.3% did not have information about the ethics committee of the hospital where they went for clinical and field practice, 31.8% encountered ethical problems during the practice and 38.7% solved the problems they encountered with help (Table 1).

When the mean scores of the students from the scales were examined; the mean score of MSQ was 84.32±28.32, the mean NPVS score was 125.17±34.07, and the mean ICSA-Nurse score was 3.57±0.96 (Table 1).

Findings regarding the comparison of MSQ score averages of students according to their introductory characteristics are shown in Table 2.

Table 1. Findings regarding students' demographic features, their information on ethics and total scores of MSQ, NPVS, ICSA-Nurse

Demographic features	Mean ± SD	
Age	**21.95±1.44**	
	N	**%**
Gender		
Female	111	56.9
Male	84	43.1
Grade		
3rd grade	112	57.4
4th grade	83	42.6
High school from where you graduated		
Health vocational high school	7	3.6
High school	62	31.8
Private high school	6	3.1
Science/Anatolian high school	108	55.4
Other	12	6.2
Geographical region where you grew up		
East	51	26.2
West	8	4.1
South	121	62.1
Central Anatolia	15	7.7
Status of choosing the profession willingly		
Yes	87	44.6
No	108	55.4
Knowledge on ethics		
Service of clinical practice		
Gynecology/maternity service	26	13.3
Pediatrics service	95	48.7
Psychiatry service	43	22.1
Public health	31	15.9
Clinical practice time/day	1.84±0.98	
Participating in clinical practice with love/willingness		
Yes	128	65.6
No	67	34.4
Status of following publications related to ethics		
Yes	27	13.8
No	168	86.2
The state of being aware of the existence of an ethics committee in the institution where you practiced		
Yes	48	24.6
No	45	23.1
I do not know	102	52.3
The situation of encountering an ethical problem during practice		
Yes	62	31.8
No	133	68.2
The situation of solving the ethical problem encountered during practice*		
I thought it should be resolved	22	35.5
I thought I should get help	24	38.7
I thought it couldn't be solved	16	25.8
Means of scale sums	**Mean ± SD**	
Moral sensitivity questionnaire (MSQ)	84.32±28.32	
Nurses professional values scale (NPVS)	125.17±34.07	
Individualized care scale-a-nurse version (ICSA-Nurse)	3.57±0.96	

* The distribution of those who encountered ethical problems
MSQ: Moral sensitivity questionnaire, NPVS: Nurses professional values scale, ICSA-Nurse: Individualized care scale-a-nurse version, SD: Standart deviation

Table 2. Students' moral sensitivity according to their demographic characteristics and their knowledge on ethics

Demographic features	Moral Sensitivity Questionnaire (MSQ)						
	Autonomy Mean ± SD	Benevolence Mean ± SD	Holistic approach Mean ± SD	Conflict Mean ± SD	Practice Mean ± SD	Orientation Mean ± SD	MSQ total Mean ± SD
Gender							
Female	21.47±8.16	11.83±4.77	3.70±1.04	10.23±4.16	13.00±8.03	10.82±5.40	81.45±28.60
Male	22.74±7.58	13.26±5.15	3.39±0.80	10.81±3.54	13.58±4.49	12.48±5.06	88.09±26.94
p	0.275	0.048	0.029	0.304	0.557	0.030	0.106
Grade							
3rd grade	21.01±7.53	11.99±4.89	3.59±0.94	9.92±3.63	12.96±7.92	11.57±5.08	81.43±27.03
4th grade	23.38±8.28	13.07±5.05	3.54±0.99	11.22±4.15	13.65±4.68	11.50±5.64	88.0±29.00
p	0.041	0135	0.697	0.022	0.483	0.933	0.099
High School from where you graduated							
Health vocational high school	21.42±4.79	13.71±3.72	3.57±0.66	11.42±4.07	22.28±26.12	9.57±3.82	89.57±26.29
High school							
Private high school	22.77±7.54	12.58±4.59	3.49±1.01	10.98±4.17	13.17±4.64	12.29±4.78	87.81±25.85
Science/Anatolian high school	21.83±12.60	14.16±8.68	4.21±0.78	10.50±5.90	11.66±7.11	12.33±7.55	84.33±51.19
Other	22.11±7.58	12.16±4.91	3.58±0.91	10.22±3.57	12.91±4.36	11.44±5.34	83.04±26.35
p	18.41±11.26	12.75±6.34	3.58±1.30	9.66±3.77	12.25±6.64	9.33±6.93	74.50±39.59
Geographical region where you grew up	0.565	0.932	0.395	0.802	0.933	0.157	0.601
East	23.32±8.0120.	13.39±5.20	3.33±0.80	3.57±0.96	13.31±4.67	13.19±5.38	89.46±29.22
West	87±10.13	15.12±5.43	3.36±1.32	10.32±3.54	13.25±5.62	12.00±6.74	84.50±34.66
South	21.77±7.69	12.02±4.72	3.62±0.99	10.62±4.13	13.35±7.64	10.99±5.11	82.97±26.68
Central Anatolia	20.20±8.40	11.26±5.54	4.08±0.77	10.13±4.98	12.26±5.67	10.13±5.04	77.60±30.84
p	0.588	0.15	0.052	0.921	0.909	0.072	0.507
Choosing the profession willingly							
Yes	20.75±7.80	11.97±4.25	3.60±1.07	10.31±3.62	13.17±8.70	10.58±5.13	80.56±26.36
No	23.03±7.91	12.84±5.49	3.55±0.86	10.62±4.14	13.32±4.61	12.31±5.35	87.36±29.06
p	0.047	0.230	0725	0.577	0.876	0.024	0.097
Knowledge on ethics							
Status of following publications related to ethics							
Yes	25.03±10.16	13.18±5.69	3.29±11.17	11.00±4.92	13.96±5.52	14.03±5.88	93.73±36.11
No	21.54±7.43	12.33±4.86	3.61±0.91	10.40±3.74	13.14±6.91	11.14±5.12	82.82±26.34
p	0.049	0433	0.131	0.591	0.227	0.013	0.056
Participating in clinical practice with love/ willingness							
Yes	22.00±7.85	12.52±4.73	0.21±0.05	10.69±3.83	13.48±7.50	11.25±5.10	84.24±26.82
No	22.05±8.12	12.31±5.47	0.20±0.05	10.08±4.04	12.82±4.97	12.08±5.68	84.46±30.34
p	0.961	0.787	0.953	0.308	0.515	0.300	0.958

Table 2. contiuned

Service of clinical practice							
Gynecology/maternity service	23.50±5.83	13.15±4.13	3.51±0.97	10.34±3.66	14.03±3.61	13.88±4.99	90.26±22.59
Pediatrics service	21.00±7.66	11.84±4.87	3.65±0.92	10.10±3.65	13.00±8.38	11.17±5.01	80.94±26.95
Psychiatry service	24.83±9.18	13.81±5.68	3.63±1.00	11.79±4.29	14.20±4.68	12.189±6.02	92.54±32.61
Public health	19.96±7.43	11.83±4.67	3.29±0.98	9.93±4.09	12.06±5.27	9.80±4.84	78.00±26.20
p	0.048	0.161	0.174	0.228	0.060	0.021	0.113
The state of being aware of the existence of an ethics committee in the institution where you practiced							
Yes	20.95±8.36	11.00±4.43	3.77±1.073	10.43±4.24	13.64±11.00	10.06±4.82	80.06±27.64
No	24.71±7.96	14.08±5.13	3.10±0.84	10.77±3.91	13.97±4.91	14.13±5.30	94.68±30.67
I do not know	21.30±7.48	12.41±4.98	3.68±0.89	10.37±3.78	12.75±4.43	11.09±5.18	81.60±25.97
p	0.032	0.011	0.008	0.846	0.540	0.000	0.016
T**he situation of encountering an ethical problem during practice**							
Yes	22.68±7.52	12.41±5.29	3.60±0.85	11.00±4.16	13.30±4.15	11.87±5.34	85.95±27.17
No	21.70±8.11	12.46±4.84	3.55±1.01	10.24±3.78	13.23±7.66	11.39±5.31	83.55±28.48
p	0.427	0.948	0.752	0.215	0.944	0.558	0.583
The situation of solving the ethical problem encountered during practice*							
I solved it on my own	22.95±9.09	12.18±5.55	3.49±0.95	10.00±4.89	13.31±4.94	11.72±5.33	85.95±32.80
I solved by getting help	22.37±7.24	11.45±4.36	3.79±0.73	11.91±3.68	12.70±3.67	10.87±5.14	83.00±23.40
I could not solve	22.80±5.69	14.18±6.06	3.47±0.88	11.00±3.60	14.18±3.74	13.56±5.58	90.66±24.72
p	0.998	0.293	0.392	0.183	0.635	0.333	0.651

"Autonomy" subscale average score was found to be higher in grade 4 students who chose their profession involuntarily, followed ethical publications, and practiced in an institution that did not have an ethics committee ($p<0.05$).

It was found that the mean score of the "Benevolence" subscale was higher in male students who had a practice in an institution without an ethics committee and the mean score of the "Holistic approach" subscale was higher in female students ($p<0.05$).

It was found that the mean score of the "Conflict" subscale was higher in 4th grade students and the mean score of the "Orientation" subscale was found to be higher in male students who chose their profession involuntarily, followed up ethics-related publications, and did not have an ethical institution in the service where they went for practice ($p<0.05$).

It was observed that there was no statistically significant difference between the students' high school where they graduated from, the geographical region where they grew up, the area where they went for practice, the state of going to practice with love/willingness, the situation of experiencing ethical problems and the situation of solving ethical problem encountered, and mean scores of MSQ and its subscales ($p>0.05$).

Findings regarding the comparison of the introductory characteristics of the students and the mean scores of NPVS are shown in Table 3.

It was determined that "Human dignity" subscale mean score was higher in students who chose their profession willingly, followed publications on ethics, went to an institution with an ethics committee for practice, and solved the ethical problem they encountered during the practice with help ($p<0.05$).

It was found that "Responsibility" subscale mean score was higher in the students who chose their profession willingly and went to an institution with an ethics committee for practice ($p<0.05$).

It was observed that "Action" and "Safety" subscales mean scores were higher in the students who chose their profession voluntarily, went to practice lovingly/willingly, followed ethical publications, and practiced in an institution with an ethics committee ($p<0.05$).

Table 3. Students' demographic characteristics and professional values according to their knowledge on ethics

	Nurses Professional Values Scale (NPVS)					
Demographic features	Human Dignity Mean ± SD	Responsibility Mean ± SD	Action Mean ± SD	Safety Mean ± SD	Autonomy Mean ± SD	NPVS Total Mean ± SD
Gender						
Female	39.11±12.27	32.14±9.41	27.99±8.46	14.26±4.89	14.04±4.59	127.55±37.67
Male	37.33±9.59	30.52±7.28	27.20±6.27	13.50±4.16	13.46±3.65	122.02±28.54
p	0.272	0.192	0.474	0.253	0.342	0.262
Grade						
3rd grade	38.99±10.47	32.03±7.99	28.24±7.23	14.08±4.35	14.16±4.09	127.50±31.67
4th grade	37.48±12.13	30.65±9.30	26.85±8.03	13.73±4.92	13.30±4.34	122.02±37.03
p	0.354	0.266	0.209	0.605	0.160	0.268
High School from where you graduated						
Health vocational high school	40.42±5.68	32.57±1.98	28.14±4.14	14.14±2.41	14.57±3.45	129.85±14.40
High school	36.11±10.88	31.20±9.05	26.04±7.28	13.33±4.62	13.00±4.02	119.70±33.09
Private high school	39.66±14.36	35.33±8.16	30.83±7.70	17.16±3.25	14.83±4.57	137.83±36.60
Science/Anatolian high school	38.72±11.19	30.98±8.32	28.06±7.47	13.83±4.62	13.99±4.26	125.59±34.21
Other	44.66±12.33	34.25±10.83	30.33±10.66	16.16±4.93	15.16±4.82	140.58±41.99
p	0.114	0.545	0.211	0.071	0.339	0.293
Geographical region where you grew up						
East	36.74±9.81	31.11±7.21	26.49±6.82	13.47±4.08	13.21±3.57	121.03±29.09
West	33.25±13.95	31.62±13.58	23.50±7.80	11.87±4.61	11.75±5.06	112.00±38.76
South	38.95±11.34	31.25±8.65	28.07±7.67	14.05±4.73	13.99±4.30	126.33±34.95
Central Anatolia	41.66±12.53	34.00±9.56	30.40±8.57	15.60±4.91	15.26±4.71	136.93±39.02
p	0.219	0.571	0.127	0.211	0.268	0.237
Choosing the profession willingly						
Yes	40.60±11.29	32.97±8.28	29.18±7.31	14.65±4.70	14.54±4.22	131.96±34.24
No	36.52±10.85	30.21±8.65	26.41±7.62	13.35±4.44	13.19±4.12	119.70±33.09
p	0.011	0.025	0.011	0.049	0.026	0.012
Knowledge on Ethics						
Status of following publications related to ethics						
Yes	32.77±11.75	29.25±10.87	24.11±8.22	11.55±4.77	11.85±4.32	109.55±37.30
No	39.24±10.89	31.79±8.13	28.22±7.35	14.31±4.46	14.10±4.12	127.68±32.96
p	0.014	0.160	0.020	0.012	0.016	0.025
Participating in clinical practice with love/willingness						
Yes	39.05±11.51	30.14±8.45	26.05±7.29	12.88±4.11	12.98±3.99	119.07±31.39
No	32.12±8.59	28.48±7.64	14.48±4.75	14.21±4.27	128.36±35.09	1.48±0.43
p	0.225	0.127	0.034	0.020	0.052	0.070
Service of clinical practice						
Gynecology/maternity service	36.07±11.10	31.38±8.69	25.92±7.12	13.00±3.86	12.57±3.76	118.96±30.79
Pediatrics service	39.90±10.09	32.51±7.50	28.98±6.83	14.52±4.39	14.50±4.10	130.44±30.96
Psychiatry service	35.88±12.62	29.86±9.74	26.30±8.57	13.55±5.23	13.09±4.36	118.69±38.90
Public health	35.90±12.07	30.41±9.76	26.87±8.34	13.41±4.79	13.61±4.47	123.22±37.55
p	0.155	0.429	0.115	0.301	0.079	0.172

Table 3. contiuned

The state of being aware of the existence of an ethics committee in the institution where you practiced						
Yes	39.56±12.41	32.06±10.36	28.41±8.53	14.47±4.90	14.50±4.43	129.02±39.16
No	34.28±9.75	28.22±7.62	25.04±6.96	12.26±4.10	12.15±3.80	111.97±30.80
I do not know	39.56±10.89	32.57±7.74	28.44±7.20	14.41±4.52	14.18±4.12	129.186±31.66
p	0.021	0.014	0.031	0.021	0.010	0.012
The situation of encountering an ethical problem during practice						
Yes	37.27±11.29	31.69±7.98	27.30±7.65	13.51±4.54	13.14±.4.41	122.93±33.68
No	38.84±11.17	31.33±8.87	27.81±7.58	14.12±4.62	14.09±4.09	126.21±34.33
p	0.362	0.784	0.666	0.388	0.142	0.532
The situation of solving the ethical problem encountered during practice*						
I solved it on my own	32.40±11.12	29.22±9.31	24.50±8.38	12.63±4.97	12.18±4.59	10.95±36.56
I solved by getting help	41.45±10.97	33.95±7.35	29.79±7.48	14.25±4.63	13.91±4.63	133.37±32.77
I could not solve	37.68±9.93	31.68±6.11	27.43±5.71	13.62±3.79	13.31±3.82	123.75±26.62
p	0.028	0.213	0.064	0.435	0.538	0.117

It was determined that "Autonomy" subscale mean score was higher in students who chose their profession voluntarily, followed publications on ethics, and had an ethics committee in the institution where they went for practice (<0.05).

It was observed that there was no statistically significant difference between the students' gender, grade, high school they graduated from, the geographical region where they grew up, the area where they practiced, and encountering ethical problems in practice in terms of NPVS and its subscales mean scores (p> 0.05).

The findings regarding the comparison of the introductory characteristics of the students and the ICSA-Nurse mean scores are shown in Table 4.

It was observed that "Clinical situation" subscale mean score was higher in female students who grew up in Central Anatolia and practiced in an institution with an ethics committee and that "Personal life situation" subscale was higher in male students (p<0.05).

It was observed that the mean score of the "Decisional control over care" subscale was higher in female students who were practicing in an institution with an ethics committee (p<0.05).

It was observed that there was no statistically significant difference between the students' grade, the high school they graduated from, the status of willingly choosing the profession, the area of practice, the situation of going to practice with love/willingness, the status of following ethical publications, the situation of encountering ethical problems in practice and the the situation of solving ethical problem in terms of ICSA-Nurse and its subscales score means (p>0.05).

The correlation analysis results of the students' age, weekly clinical practice days, moral sensitivity, professional values, individualized care scales subscales mean scores are shown in Table 4.

There was a significant negative correlation between the students' mean age and their personal life situation subscale score of ICSA-Nurse (p=0.024). A positive significant correlation was determined between the mean number of days in weekly clinical practice and the mean scores of "autonomy" and "conflict" subscales, which was subscales of MSQ (p<0.05).

There were significant negative correlations found between the mean score of holistic approach subscale of the MSQ and the overall total of the NPVS and the mean scores of human dignity, responsibility, action, safety, autonomy subscales of the NPVS (p<0.001) and the mean scores of "clinical situation", "personal life situation" and "decisional control over case" subscales of the ICSA-Nurse (p<0.001). There were significant negative correlations found between the mean score of orientation subscale of the MSQ and the overall total of the NPVS and the mean scores of human dignity, action, safety, autonomy subscales of the NPVS (p<0.05) and the overall total of the ICSA-Nurse, and the mean scores of "clinical situation", "personal life situation" and "decisional control over case" subscales of the ICSA-Nurse (p<0.05). A positive significant relationship was found between the overall total f the NPVS and the subscales of human dignity, responsibility, action, safety, autonomy, and the overall total of the ICSA-Nurse, and the mean scores of "clinical situation", "personal life situation" and "decisional control over case" subscales of the ICSA-Nurse (p<0.001).

Table 4. Individualized care perceptions according to students' demographic characteristics and their knowledge on ethics

Demographic features	Individualized Care Scale-A-Nurse Version (ICSA-Nurse)			ICSA-nurse total
	Clinical situation Mean ± SD	Personal life Mean ± SD	Deciding Mean ± SD	Mean ± SD
Gender				
Female	1.51±0.43	0.85±0.24	1.32±0.43	0.21±0.06
Male	1.39±0.36	0.80±0.19	1.19±0.29	0.20±0.04
p	0.042	0.102	0.017	0.029
Grade				
3rd grade	1.45±0.39	0.85±0.21	1.28±0.41	3.59±0.94
4th grade	1.47±0.42	0.81±0.24	1.24±0.35	3.54±0.99
p	0.677	0.270	0.495	0.697
High School from where you graduated				
Health vocational high school	1.43±0.25	0.83±0.18	1.30±0.23	3.57±0.66
High school	1.42±0.41	0.81±0.24	1.26±0.46	3.49±1.01
Private high school	1.77±0.41	1.00±0.21	1.44±0.28	4.21±0.78
Science/Anatolian high school	1.47±0.39	0.84±0.21	1.26±0.34	3.58±0.91
Other	1.49±0.57	0.81±0.28	1.27±0.47	3.58±1.30
p	0.235	0.495	0.563	0.395
Geographical region where you grew up				
East	1.36±0.34	0.77±0.20	1.19±0.29	3.33±0.80
West	1.20±0.39	0.74±0.24	1.41±0.96	3.60±1.32
South	1.49±0.42	0.84±0.23	1.27±0.36	3.62±0.99
Central Anatolia	1.72±0.31	0.96±0.20	1.38±0.31	4.08±0.77
p	0.003	0.010	0.227	0.052
Choosing the profession willingly				
Yes	1.48±0.45	0.83±0.55	1.27±0.39	3.60±1.07
No	1.44±0.37	0.83±0.20	1.26±0.38	3.55±0.86
p	0.544	0.982	0.767	0.725
Knowledge on ethics				
Status of following publications related to ethics				
Yes	1.31±0.45	0.75±0.25	1.22±0.62	3.29±1.17
No	1.48±0.39	0.84±0.22	1.27±0.33	3.61±0.91
p	0.056	0.060	0.145	0.131
Participating in clinical practice with love/ willingness				
Yes	1.43±0.43	0.83±0.23	1.26±0.36	3.57±1.00
No	1.43±0.36	0.84±0.20	1.28±0.42	3.56±0.88
p	0.444	0.768	0.710	0.953
Service of clinical practice				
Gynecology/maternity service	1.39±0.37	0.78±0.20	1.33±0.56	3.51±0.97
Pediatrics service	1.49±0.40	0.87±0.21	1.28±0.34	3.65±0.92
Psychiatry service	1.50±0.44	0.83±0.23	1.28±0.35	3.63±1.00
Public health	1.38±0.40	0.75±0.25	1.16±0.34	3.29±0.98
p	0.281	0.037	0.350	0.174

Table 4. contiuned

The state of being aware of the existence of an ethics committee in the institution where you practiced				
Yes	1.55±0.46	0.87±0.25	1.33±0.38	3.77±1.07
No	1.26±0.35	0.73±0.20	1.10±0.32	3.10±0.84
I do not know	1.50±0.38	0.86±0.21	1.31±0.39	3.68±0.89
p	0.001	0.002	0.003	0.001
The situation of encountering an ethical problem during practice				
Yes	1.48±0.39	0.85±0.21	1.26±0.31	3.60±0.85
No	1.45±0.41	0.82±0.23	1.27±0.41	3.55±1.01
p	0.675	0.462	0.974	0.752
The situation of solving the ethical problem encountered during practice*				
I solved it on my own	1.47±0.44	0.81±0.23	1.21±0.33	3.49±0.95
I solved by getting help	1.53±0.34	0.91±0.18	1.34±0.27	3.79±0.73
I could not solve	1.41±0.37	0.81±0.21	1.24±0.32	3.47±0.88
p	0.478	0.251	0.297	0.392

Discussion

Professional values and caring accordingly are as important as moral sensitivity in making ethical decisions (5). In this direction, the findings obtained from the study conducted with the aim of examining the effect of the moral sensitivity and professional values of nursing students on the perception of care were discussed below in line with the literature knowledge and similar studies.

It was determined that the nursing students encountered ethical problems during the practice and thought that the problems they encountered should be solved with the help of the clinical guide. Ethical dilemmas arise from confusion between two values during clinical practice or in a situation where a decision has to be made. In value conflict, a decision should be made in line with ethical principles (27,28). In the studies conducted by Gül et al. (28) with nursing students and by Aydın et al. (29) with senior midwifery students, it was reported that the students could not make decisions in line with the ethical principles due to the lack of clinical experience. In the studies conducted by Aksu and Akyol (30) with nurses working in the clinic and by Dikmen (31) with nurses working in the intensive care unit, it was stated that more than half of the nurses had problems in making the right decisions and finding solutions to ethical dilemmas. The results of the studies are similar to the findings of the study, and it is thought to be due to the limited experience in clinical practice and insufficent ethics education of the students.

It is thought that the reason why the students' level of moral sensitivity is at a medium level is due to the opportunity to observe the ethical problems between patients and nurses during the four years of their university education and their high awareness due to taking the ethics course. Similarly, in studies conducted with nursing students in the literature, it has been reported that the moral sensitivity of nursing students is moderate (29,32,33). In the study by Selçuk and Demir (34) and Aydın et al. (29), it was stated that moral sensitivity was low, whereas in the study of Kim et al. (35), 4th grade students had higher moral sensitivity.

It is emphasized that knowing the qualifications and working conditions of the profession and then willingly choosing the profession facilitate the adoption of professional values that form the basis of the attitudes and behaviors specific to the profession and to reflect them on their behaviors (17). Professional values are high in students who willingly choose the profession and go to clinical and field practice fondly. In the study in which Karamanoğlu et al. (36) examined the professional values of nurses working in surgical clinics, it was determined that nurses who loved their profession had higher professional values. In the study by Beydağ and Arslan (37) examining the factors affecting the professionalism of midwives-nurses working in obstetrics clinics, it was reported that the professionalism level of nurses-midwives who did not intend to change their profession was higher.

Having knowledge about laws and professional ethical codes, clarifying their individual values and beliefs and developing their philosophy, and adopting ethical principles are important factors that can guide nurses to make the best decision when they face an ethical dilemma (17). According to the mean orientation score, one of the subscales of the MSQ; it was determined that the students were insensitive to the importance of individuality in patient care, did not reflect the physician-nurse-patient cooperation and professional values to their care practices, and did not care about patient participation in care and treatment.

Table 5. Findings Related to the Correlation of Age and Duration of Practice and MSQ, NPVS, ICSA-Nurse Scales

				Subscales of Moral Sensitivity Questionnaire						Subscales of Nurses Professional Values Scale				Subscales of Individualized Care Scale-A-Nurse Version		
		Age	Practice duration/ Day autonomy	Benevolence	Holistic approach	Conflict	Practice	Orientation	Human dignity	Responsibility	Action	Safety	Autonomy	Clinical situation	Personal life	Deciding	
Age	r	1	0.323**	0.003	-0.019	-0.038	0.066	0.000	-0.033	-0.029	0.081	-0.046	-0.036	-0.049	-0.079	-0.161*	0.105
	p		0.000	0.964	0.789	0.597	0.362	0.998	0.647	0.685	0.260	0.526	0.616	0.496	0.270	0.024	0.146
Practice Duration/Day	r	0.323**	1	0.145*	0.113	0.069	0.158*	0.051	0.005	-0.071	-0.083	-0.091	-0.047	-0.107	0.028	-0.084	-0.055
	p	0.000		0.045	0.117	0.335	0.027	0.479	0.947	0.323	0.247	0.205	0.518	0.138	0.694	0.241	0.448
Autonomy	r	0.003	0.145*	1	0.677**	0.796**	0.563**	0.491**	0.757**	-0.087	0.026	-0.054	-0.086	-0.118	-0.052	-0.066	-0.020
	p	0.964	0.045		0.000	0.000	0.000	0.000	0.000	0.233	0.722	0.455	0.238	0.103	0.473	0.366	0.786
Benevolence	r	-0.019	0.113	0.677**	1	0.648**	0.536**	0.365**	0.664**	-0.047	0.040	-0.023	-0.035	-0.103	-0.105	-0.098	-0.082
	p	0.789	0.117	0.000		0.000	0.000	0.000	0.000	0.512	0.580	0.748	0.625	0.155	0.145	0.175	0.257
Holistic approach	r	-0.038	0.069	0.796**	0.648**	1	0.425**	0.421**	0.856**	-0.129	-0.043	-0.125	-0.136	-0.172*	-0.089	-0.134	-0.095
	p	0.597	0.335	0.000	0.000		0.000	0.000	0.000	0.073	0.551	0.082	0.059	0.017	0.217	0.063	0.186
Conflict	r	0.066	0.158*	0.563**	0.536**	0.425**	1	0.396**	0.394**	-0.005	0.064	0.052	0.023	-0.024	0.080	0.095	0.020
	p	0.362	0.027	0.000	0.000	0.000		0.000	0.000	0.942	0.372	0.473	0.749	0.743	0.270	0.185	0.784
Practice	r	0.000	0.051	0.491**	0.365**	0.421**	0.396**	1	0.371**	0.020	0.021	0.003	0.003	0.021	0.051	0.055	0.100
	p	0.998	0.479	0.000	0.000	0.000	0.000		0.000	0.779	0.771	0.962	0.970	0.773	0.477	0.448	0.165
Orientation	r	-0.033	0.005	0.757**	0.664**	0.856**	0.394**	0.371**	1	-0.219**	-0.100	-0.219**	-0.233**	-0.259**	-0.195**	-0.189**	-0.137
	p	0.647	0.947	0.000	0.000	0.000	0.000	0.000		0.002	0.164	0.002	0.001	0.000	0.006	0.008	0.058
Human dignity	r	-0.029	-0.071	-0.087	-0.047	-0.129	-0.005	0.020	-0.219**	1	0.829**	0.911**	0.836**	0.860**	0.511**	0.468**	0.463**
	p	0.685	0.323	0.233	0.512	0.073	0.942	0.779	0.002		0.000	0.000	0.000	0.000	0.000	0.000	0.000
Responsibility	r	0.081	-0.083	0.026	0.040	-0.043	0.064	0.021	-0.100	0.829**	1	0.859**	0.828**	0.790**	0.529**	0.464**	0.559**
	p	0.260	0.247	0.722	0.580	0.551	0.372	0.771	0.164	0.000		0.000	0.000	0.000	0.000	0.000	0.000
Action	r	-0.046	-0.091	-0.054	-0.023	-0.125	0.052	0.003	-0.219**	0.911**	0.859**	1	0.861**	0.893**	0.539**	0.489**	0.434**
	p	0.526	0.205	0.455	0.748	0.082	0.473	0.962	0.002	0.000	0.000		0.000	0.000	0.000	0.000	0.000
Safety	r	-0.036	-0.047	-0.086	-0.035	-0.136	0.023	0.003	-0.233**	0.836**	0.828**	0.861**	1	0.818**	0.560**	0.475**	0.426**
	p	0.616	0.518	0.238	0.625	0.059	0.749	0.970	0.001	0.000	0.000	0.000		0.000	0.000	0.000	0.000
Autonomy	r	-0.049	-0.107	-0.118	-0.103	-0.172*	-0.024	0.021	-0.259**	0.860**	0.790**	0.893**	0.818**	1	0.513**	0.460**	0.464**
	p	0.496	0.138	0.103	0.155	0.017	0.743	0.773	0.000	0.000	0.000	0.000	0.000		0.000	0.000	0.000
Clinical situation	r	-0.079	0.028	-0.052	-0.105	-0.089	0.080	0.051	-0.195**	0.511**	0.529**	0.539**	0.560**	0.513**	1	0.883**	0.807**
	p	0.270	0.694	0.473	0.145	0.217	0.270	0.477	0.006	0.000	0.000	0.000	0.000	0.000		0.000	0.000
Personel life	r	-0.161*	-0.084	-0.066	-0.098	-0.134	0.095	0.055	-0.189**	0.468**	0.464**	0.489**	0.475**	0.460**	0.883**	1	0.754**
	p	0.024	0.241	0.366	0.175	0.063	0.185	0.448	0.008	0.000	0.000	0.000	0.000	0.000	0.000		0.000
Deciding	r	0.105	-0.055	-0.020	-0.082	-0.095	0.020	0.100	-0.137	0.463**	0.559**	0.434**	0.426**	0.464**	0.807**	0.754**	1
	p	0.146	0.448	0.786	0.257	0.186	0.784	0.165	0.058	0.000	0.000	0.000	0.000	0.000	0.000	0.000	

MSQ: Moral Sensitivity Questionnaire, NPVS: Nurses Professional Values Scale, ICSA-Nurse: Individualized Care Scale-A-Nurse Version

Therefore, this situation shows that among the professional values of the students, human dignity, action, safety and autonomy values and individualized care perceptions are weak. Similarly, Tazegün and Çelebioğlu (38) emphasized in their study that the factors affecting the level of ethical sensitivity of pediatric nurses were influenced by the value systems of nurses.

The mean scores of the ICSA-Nurse and its subscales, "clinical situation" and "decisional control over case" were found to be significantly higher in female students. In line with this result, it is concluded that because women understand the individuals they care for as part of their maternal instinct and respond with compassion, female students support individualized care in issues that include the reactions of sick individuals to illness, their feelings, thoughts and the meaning of the illness for them and that they care about patients having a say in their care and that they enable them to participate in decisions about their care. Lee et al. (39) found a difference in favor of female colleagues in some caring behaviors in terms of gender differences. Contrary to this result, in different studies (18,40) examining nurses' perceptions of individualized care, it was observed that there was no statistically significant difference between gender and individualized care perception.

The discipline of nursing focuses on the philosophy of humanistic and holistic care by treating the individual with a holistic approach that evaluates the individual with his or her family, close and wide environment (19). Care is an appropriate process for the patient's values and expectations to conflict with the nurses' own values and judgments (41). It was observed that the students with poor professional value perceptions could not evaluate individuals in the holistic approach philosophy within the framework of their moral sensitivity, and therefore their individualized care perception was also weak.

It was observed that students with high professional value perception also had a high perception of individualized care. Students with a high perception of professional value also had a high perception of individualized care. According to the philosophy of the nursing profession, which directs care decisions and actions with professional value judgments, the individual is a unique entity with honor, dignity, individuality, values, beliefs and attitudes. The realization of these beliefs, attitudes and values adopted by nurses in the field of practice is expressed as individualized care (17).

Study Limitations

Since this research was conducted in third and fourth grade nursing students graduating in one university, the findings could not be generalized to all nursing students in Turkey. Conducting the study only with nursing students and not with health professionals, using scales in data collection that limited the responses of students to the expressions contained in the scales were other limitations. Therefore, there were limitations in terms of the quantitative research method used in the study and the findings obtained.

Conclusion

According to the findings of the study, the moral sensitivity levels of nursing students were found to be similar to the levels of moral sensitivity found in many previous studies. Students who did their profession with love/willingly had a higher level of moral sensitivity, and in parallel, it could be said that professional value development was important for students' individualized care skills. In addition, it can be said that distributing ethics-related courses into four years of Nursing Education will be useful in terms of raising students' awareness. It is thought that including activities that will make students recognize their own value systems and gain positive personal and professional values, and increasing case studies in order to improve their skills regarding ethical decision-making processes in clinical practice will positively affect students' ethical sensitivities.

Ethics

Ethics Committee Approval: The study was approved by the "Mersin University Clinical Research Ethics Committee" (2017/142) and the "Mersin University Directorate of İçel Health High School ".

Peer-review: Externally peer reviewed.

Authorship Contributions

Concept: D.L., E.Y., Design: D.L., E.Y., Data Collection or Processing: D.L., E.Y., K.A., G.Ç., Analysis or Interpretation: D.L., E.Y., K.A., G.Ç., Literature Search: D.L., E.Y., K.A., G.Ç., Writing: D.L., E.Y., K.A., G.Ç.

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Original Article

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Retrospective Analysis of Demographic, Epidemiologic, and Clinical Characteristics of Poisoning in Pediatric Intensive Care Unit

Çocuk Yoğun Bakım Ünitesinde İzlenen Zehirlenme Olgularının Demografik, Epidemiyolojik ve Klinik Özelliklerinin Değerlendirilmesi

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ABSTRACT

Objective: Poisonings are significant causes of preventable morbidities and mortalities in pediatric patients hospitalized in pediatric intensive care units. In this study, we aimed to evaluate demographic and epidemiologic features, interventions, treatments, clinical course, and prognosis of patients hospitalized in pediatric intensive care unit for poisoning retrospectively.

Methods: The recordings of 172 patients admitted to the pediatric intensive care unit with acute poisoning between 2015 and 2019 were evaluated retrospectively.

Results: A total of 172 patients were admitted to our pediatric intensive care unit with the diagnosis of poisoning. Eighty-eight of them (51.2%) were girl. The average age was 5.8±5.6 years, and mean length of stay was 2.9 days. It was noted that 72.1% of patients with poisoning were accidental, whereas 27.9% of them were suicidal. Majority of suicidal patients were girls (89.5%), and the mean age was 13.1±4.9 years. However, only 36.2% of patients with accidental poisoning were girls and the mean age was 3.1±2.6 years. Patients with poisoning were most commonly seen during spring. The most common cause of poisoning was drugs (76.7%). Poisoning with multiple drugs were seen in 36 patients (20.9%). Central nervous system drugs were the most common cause (32.7%). Nausea-vomiting (17.4%), altered mental status (12.7%),

ÖZ

Amaç: Zehirlenmeler çocuk yoğun bakım ünitelerine yatan hastalarda önlenebilir morbidite ve mortalitenin önemli bir kısmını oluşturmaktadır. Bu çalışmada, çocuk yoğun bakım ünitemizde zehirlenme nedeniyle tedavi edilen hastaların demografik ve epidemiyolojik özelliklerini, uygulanan tedavileri, klinik seyir ve prognozu geriye dönük olarak değerlendirmeyi amaçladık.

Yöntemler: Zehirlenme nedeniyle 2015-2019 tarihleri arasında çocuk yoğun bakım ünitemize yatırılan hastaların dosyaları geriye dönük olarak incelendi. Hastaların demografik özellikleri, uygulanan tedavi ve klinik bulgular kaydedildi.

Bulgular: Çocuk yoğun bakım ünitemize zehirlenme tanısıyla 172 hasta yatırıldı. Zehirlenmeler tüm hastaların %8,7'sini oluşturdu. Hastaların %51,2'si kız, %48,8'i erkekti. Ortalama yaş 5,8±5,6 yıl, ortalama yatış süresi 2,9 gündü. Olguların %27,9'u özkıyım amaçlı, %72,1'si kaza sonucu meydana gelmişti. Özkıyım amacı ile zehirlenmelerde yaş ortalaması 13,1±4,9 yıldı ve hastaların %89,6'sı kızdı. Kaza ile zehirlenmelerde ise yaş ortalaması 3,1±2,6 yıl iken, hastaların %36,29'u kızdı. En sık başvuru ilkbahar mevsiminde ve nisan ayında oldu. Hastaların 132'sinde (%76,7) zehirlenme nedeni ilaçlar iken, 40 (%23,2) hastada ilaç dışı maddeler etkendi. Otuz altı hastada (%20,9) çoklu etkenle zehirlenme vardı. En sık zehirlenme nedeni santral sinir sistemi ilaçlarıydı (%32,7). İlaç

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and abdominal pain (7.5%) were the most common symptoms. Thirteen patients required invasive mechanical ventilation. Five patients were treated with hemodialysis and eight patients treated with plasma exchange.

Conclusion: Poisonings are important part of pediatric intensive care unit hospitalization. Accidental poisoning is common especially in children under five years of age. Taking preventive measures, educating parents about home accidents, storing medications in safe and locked places and keeping them out of reach of children can reduce the rate of accidental poisoning.

Keywords: Poisoning, pediatric intensive care, plasma exchange, continuous renal replacement treatment

dışı etkenler arasında en sık neden mantar zehirlenmesiydi (%3,7). En sık karşılaşılan klinik bulgular, bulantı-kusma (%17,4), bilinç değişikliği (%12,7) ve karın ağrısıydı (%7,5). On üç hasta entübe edilerek izlendi. Beş hastaya hemodiyaliz, 8 hastaya plazma değişimi tedavisi yapıldı.

Sonuç: Zehirlenmeler çocuk yoğun bakım yatışlarının önemli bir kısmını oluşturmaktadır. Özellikle beş yaş altı çocuklarda kaza sonucu zehirlenmeler sık görülmektedir. Koruyucu önlemlerin alınması, ebeveynlerin ev kazaları konusunda eğitimi, ilaçların çocukların ulaşamayacağı, kilitli yerlerde ve emniyetli kapaklarla saklanması kaza ile gerçekleşen zehirlenme oranlarını azaltabilir.

Anahtar Sözcükler: Zehirlenmeler, çocuk yoğun bakımı, plazma değişimi, sürekli renal replasman tedavisi

Introduction

Poisoning is the emergence of some signs and symptoms as a result of taking a substance in high doses or by different routes. Childhood intoxications can progress with life-threatening symptoms, and early diagnosis and treatment are important in terms of morbidity and mortality.

All over the world, patients with intoxication occupy an important place among the patients admitted to the emergency department and hospitalized in intensive care unit. In the United States of America, more than 2 million people are admitted to the emergency department every year due to poisoning, and approximately 2/3 of them are in the childhood age group (1). Of pediatric patients who are admitted due to poisoning, 80% are under the age of 5 (2). Among the childhood accidents in our country, intoxication ranks fourth after traffic accidents, falls and burns (3,4).

Causes of poisoning may vary according to age group, socio-cultural characteristics, education level of parents, country and regions. In our country, drug intoxication is seen most frequently. It occurs frequently as a result of accident between the ages of 1-5, and in adolescents due to drug intake for suicide purposes (5).

The aim of this study was to determine the prevalence and demographic characteristics of patients with intoxication followed up in our pediatric intensive care unit, and to retrospectively examine the clinical course of the disease, the treatments applied and the duration of intensive care stay.

Method

The files of patients who were hospitalized in our pediatric intensive care unit due to poisoning between 2014 and 2019 were retrospectively analyzed. The study was approved by Mehmet Ali Aydınlar University Ethics committee (2019-11/18). Age, gender, poisoning agent, route of intoxication, cause of poisoning, month of admission, clinical findings, treatment and length of stay were recorded. Poisoning was divided into 2 groups as accident and suicide attempt.

Statistical Analysis

Statistical analyzes in this study were performed using the NCSS (Number Cruncher Statistical System) 2007 Statistical Software (Utah, USA) package program. In the evaluation of the data, besides descriptive statistical methods (mean, standard deviation, median, interquartil range), the Mann-Whitney U test was used in the comparison of binary groups of variables that did not show a normal distribution, and Fisher's Exact test and chi-square test were used in the comparison of qualitative data. The results were evaluated at the significance level of $p<0.05$.

Results

One hundred and seventy two patients were admitted to our pediatric intensive care unit with the diagnosis of poisoning between January 2015 and May 2019. The number of patients followed up in intensive care unit between the same dates was 1955. Poisoning constituted 8.7% of all patients. Of the patients, 51.2% were girl and 48.8% were boy. The mean age was 5.8±5.6 years (Table 1).

The reason for poisoning in 48 (27.9%) patients was intake of drugs or non-drug substances for suicide purposes, the average age of these patients was 13.1±4.9 years and 43 (89.6%) were girl. The number of patients poisoned as a result of accident was 124 (72%) and while the average age of these patients was 3.1±2.6 years, 45 (36.3%) of them were girl. Female gender was found to be significantly higher in intoxications due to suicide (p=0.0001). The most common admission month for all patients was April. When the evaluation was made according to the seasons, the frequency of poisoning for suicide in the spring was significantly higher than the frequency of poisoning due to accident (p=0.006) (Table 1).

While the cause of poisoning was drugs in 132 (76.7%) of the patients, non-drug substances were the cause in 40 (23.3%) patients. Intake of 214 drugs was detected in 175 patients. Thirty-six patients (20.9%) had multiple agent intoxication. Thirty patients took 2 different drugs while 6 patients took 3 different drugs. Multiple drug intake was higher in patients of suicidal poisoning (p=0.0001). Among the drugs, the most common

Table 1. Patient characteristics, age, gender and seasonal distribution

n		Whole group n=172		Accident group n=124		Suicide group n=48		p
		%	n	%	n	%		
Gender	Boy	84	48.8%	79	63.7%	5	10.4%	
	Girl	88	51.2%	45	36.3%	43	89.6%	**0.0001**
Event season	Spring	54	31.4%	31	25%	23	47.9%	**0.006+**
	Summer	42	24.4%	33	26.6%	9	18.7%	0.379+
	Autumn	38	22.1%	29	23.4%	9	18.7%	0.651+
	Winter	38	22.1%	31	25%	7	14.6%	0.203+
Single/Multiple drugs	Multiple	36	20.9%	14	11.3%	22	45.8%	**0.0001+**
	Single	136	79.1%	110	88.7%	26	54.2%	
Age (years)	Mean ±SD	5.8±5.6		3.1±2.6		13.1±4.9		**0.0001***
Stay at intensive care unit (days)	Mean±SD	2.9±2.7		2.7±2.8		3.6±2.5		**0.0001***

*Mann-Whitney U test, ǂFisher Exact test, +Chi-square test

cause of intoxication was central nervous system drugs (32.7%) and antidepressants were in the first place (14.9%) among them. When all drugs were evaluated, analgesic-antipyretic drugs (13.5%) were the second and cardiovascular system drugs (10.7%) were the third. Among the non-drug factors, the most common cause was mushroom poisoning (3.7%) (Table 2).

Ninety eight different clinical signs were detected in 78 patients. The most common symptoms in patients with clinical findings were nausea-vomiting (17.4%), altered consciousness (12.7%) and abdominal pain (7.5%). Hypotension (4.6%), respiratory distress (4%), diarrhea (4%), tachycardia (4%) and agitation (2.3%) were other findings (Table 3).

Thirteen patients were intubated (4 amitriptyline, 3 carbamazepine, 2 colchicine, 1 valproic acid, 1 metformin, 1 verapamil, 1 mushroom poisoning). Of these patients, 76.9% poisoned for suicide purposes. Continuous venovenous hemodialysis (2 carbamazapine, 1 metformin, 1 colchicine, and 1 valproic acid intoxication) was administered in 5 patients, and plasma exchange (3 mushroom, 3 colchicine, 2 carbamazepine poisoning) treatment was performed in 8 patients (Table 4).

Average length of stay in intensive care unit was 2.9±2.7 days. The mean hospitalization period (3.6±2.5 days) in intoxications for suicide was found to be significantly higher than in intoxications by accident (2.7±2.8 days) (p=0.0001). No patient died due to poisoning, all patients were discharged without any sequelae. No complications were observed due to the medical and extracorporeal treatment methods applied. All patients who presented with suicidal poisoning at discharge were evaluated by a child psychiatrist.

Discussion

Poisoning is one of the major causes of preventable mortality and morbidity in children. All over the world, patients with poisoning increase over the years (6,7,8). In a study performed in Turkey in 5,077 children with poisoning, 0.9% of patients admitted to the emergency were identified as patients with poisoning (7). According to the report of the National Poison Control Center childhood poisonings constitutes 60% of all poisonings in Turkey. While accidents are the most common cause of intoxication in children under 4 years of age, in the childhood age group, drug intake for suicidal purposes is more common above the age of 15 (9).

In a study conducted in India, 9.3% of patients admitted to intensive care unit were patients with poisoning (10), while in a study conducted in Turkey, this rate was 10.7% (11). In a study in which Toptaş et al. (12) evaluated patients with poisoning in intensive care unit over 6 years, it was found that 59 patients were admitted to intensive care unit with a diagnosis of poisoning and these patients accounted for 1.4% of the total intensive care hospitalization. Although admission rates differ, in our study, the total number of patients admitted to our children's intensive care unit over a 4-year period was 1955, and we found that patients with acute poisoning accounted for 8.7% of these patients.

Accidental poisoning is mostly seen in boys aged 1-5 years (13). Increasing physical activity and learning curiosity, families not being educated about poisoning, and keeping medicines and non-pharmaceutical substances in easy reach of the child can be listed among the reasons for this. In our study, the average age of intoxication due to accidents was 3.1 years and 63.7% of the patients were boy. Poisoning for suicide purposes is mostly seen in the adolescent age group and girls (11,14). Similar to the studies conducted, we found that 89.6% of the patients with poisoning with suicidal purposes were girls at adolescent age. We think that the reason for this is that in our society, the responsibility and value attributed to girls in the family are different than that of boys, the expectation for housework and home dependency is kept high, and therefore they are more exposed to domestic problems.

Table 2. Prevalence of drugs and non-drug substances that cause intoxication

	Total number of drugs		Number of drugs taken by accident		Number of drugs taken for suicide purpose		
	n=214	%	n=134	%	n=80	%	p
Central nervous system drugs	70	32	36	26.8	34	42.5	0.320+
Antidepressants	32	14.9	22	16.4	10	12.5	**0.469+**
Antipsychotics	21	9.8	8	5.9	13	16.2	**0.047+**
Antiepileptics	10	4.6	3	2.2	7	8.7	**0.028+**
Psychostimulants	7	3.2	3	2.2	4	5	0.577‡
Analgesics and antipyretics	29	13.5	13	9.7	16	20	0.890+
Cardiovascular system drugs	23	10.7	15	11.1	8	10	0.851+
Antidiabetics	8	3.7	4	2.9	4	5	0.665‡
Antibiotics	7	3.2	4	2.9	3	3.7	0.659‡
Antihistamines	5	2.3	3	2.2	2	2.5	0.561‡
Bronchodilator drugs	3	1.4	2	1.4	1	1.2	0.999‡
Muscle relaxants	3	1.4	2	1.4	1	1.2	0.999‡
Other drugs	26	12.1	16	11.9	10	12.5	0.851+
Colchicine	13	6	7	5.2	6	7.5	0.320+
Iron	4	1.8	2	1.4	2	2.5	0.665‡
Antitussive	3	1.4	2	1.4	1	1.2	0.999‡
Levothyroxine	2	0.9	1	0.7	1	1.2	0.999‡
Anticoagulant	1	0.4	1	0.7	0		
Urinary antispasmodic	1	0.4	1	0.7	0		
Potassium permanganate	1	0.4	1	0.7	0		
Leukotriene antagonists	1	0.4	1	0.7	0		
Non-pharmaceutical	40	18.6	39	29.1	1	1.2	**0.002‡**
Mushroom	8	3.7	8	5.9	0		
Bonzai	5	2.3	5	3.7	0		
Carbon monoxide	4	1.8	4	2.9	0		
Organophosphate insecticides	3	1.4	3	2.2	0		
Other insecticide	3	1.4	3	2.2	0		
Alcohol	3	1.4	3	2.2	0		
Methyl alcohol	3	1.4	3	2.2	0		
Eucalyptus oil	3	1.4	3	2.2	0		
Rat poison	3	1.4	2	1.4	1	1.2	
Firecracker	2	0.9	2	1.4	0		
Bitter apple oil	2	0.9	2	1.4	0		
Corrosive substances	1	0.4	1	0.7	0		

*Mann-Whitney U test, ‡Fisher Exact test, +Chi-square test

Table 3. Clinical findings of the patients

	n	%
Nausea and vomiting	30	17.4
Change in consciousness	22	12.7
Abdominal pain	13	7.5
Hypotension	8	4.6
Respiratory distress	7	4
Diarrhea	7	4
Tachycardia	7	4
Agitation	4	2.3

Table 4. Procedures applied to patients

	n	%
Gastric lavage	44	25.5
Activated carbon	30	17.4
Mechanical ventilation	13	7.5
Plasma exchange	8	4.6
Continuous renal replacement therapy	5	2.9

Özdemir et al. showed in their study that 64.4% of intoxications occurred with drugs in patients who were followed up in pediatric intensive care unit (15). This rate was 60.2% in the study by Tekerek et al. (16). Similarly, in our study, the cause of intoxication in 76.7% of the patients was drugs.

Many studies have shown that central nervous system drugs are the most common cause of intoxication in children (17). Studies conducted in our country show similarities with the whole world (16,18). Central nervous system drugs were the most common cause of drug intoxication in our patients. Among these, the most common group was antidepressant drugs. Similar to our study, analgesic drugs are frequently in the second place in the studies. In our country, easy access to antidepressants and analgesic drugs, the availability of many drugs in this group without a prescription, frequent use by adults, being in every home, being kept in accessible places for children, and not having locked covers cause frequent poisoning with these drugs.

In the study conducted by Lijun et al. (19) in China, CO poisoning, food poisoning and pesticides took the first place in non-drug poisoning. In studies conducted in our country, corrosive substances are frequently encountered among non-drug intoxication agents (16). In the study conducted by Ayoğlu et al. (20), medical drugs were the leading agents in children brought to the emergency room due to poisoning, followed by corrosive substances, organophosphate insectists, mushrooms, alcohol and rat poison, respectively. In another study conducted by Akbaba et al. (21), organophosphate pesticides were the most common cause of non-drug intoxication. In our study, mushroom intoxications took the first place among non-drug intoxications. Acute liver failure may develop in mushroom poisoning and it is recommended that risky patients be followed up in liver transplant centers. Since our hospital is a liver transplant center, these patients are admitted to our unit from various centers. For this reason, we see mushroom poisoning more frequently than other studies.

In our study, we found clinical findings in 45.3% of patients with intoxication. Of the patients, 17.4% had nausea-vomiting, 12.7% change in consciousness, and 7.5% abdominal pain. In the study conducted by Ağın et al. (22), 59% of the patients were symptomatic and the most common finding was nausea and vomiting (18%). Tekerek et al. (16) detected change in consciousness in 53% of the patients who were followed up in the pediatric intensive care unit due to poisoning. Oner et al. (23) found nausea-vomiting in 22.9% and restlessness and arrhythmia in 19.4% of patients with intoxication. In other studies, it has been reported that more than half of the patients are asymptomatic, but clinical findings and altered consciousness can be observed (9,24,25). Kendirci et al. (26) found nausea in 73 patients (28.6%) and abdominal pain in 52 patients (20.4%) in their study. In other studies, Binay et al. (25) found vomiting (30.2%), Sümer et al. (17) nausea-vomiting (14.1%) and change in consciousness (13.3%) as the most common findings among all intoxications.

The main treatment in poisoning is the general approach to the emergency patient and providing basic and advanced life support. In addition, preventing and reducing the absorption of the active substance that causes intoxication, administration of systemic antidotes, accelerating the excretion of the active substance from the body, and symptom-oriented treatment should be performed (27). The rate of activated charcoal administration in pediatric patients admitted to the emergency department for poisoning varies between 50-55%. The most common treatments we applied were gastric lavage (25.5%) and activated charcoal administration (17.4%). Although the rates of intubation due to poisoning vary in studies, 13 patients (7.5%) in our study were intubated and followed up on a mechanical ventilator.

In our country, mortality rates due to poisoning in pediatric patients vary between 0-5% (28,29). Tekerek et al. (16) showed in their study that the mortality rate was 5.4% in patients who were followed in the pediatric intensive care unit due to poisoning and found that 50% of the patients who died had ingested corrosive substance and 20% of them took colchicine. In another study in our country, the mortality rate was 0.4% (17). While the death rate due to poisoning was 0.4% in England, this rate was found to be 8.9% in India (30,31). In our study, no patient died.

Conclusion

Poisoning constitutes an important part of pediatric intensive care unit admissions and is one of the preventable causes of mortality and morbidity in childhood. Accidental drug intake constitutes the majority of intoxications. Since accidental poisoning is common especially in children under the age of five, it is very important to implement protective measures. Educating families on home accidents, raising awareness, safe caps for medicines, and reducing over-the-counter medications can reduce accidental poisoning rates.

Ethic

Ethics Committee Approval: Mehmet Ali Aydınlar University Ethics Committee decision number: 2019-11/18.

Informed Consent: Informed consent was not obtained as the study design was retrospective.

Peer-review: Externally peer reviewed.

Authorship Contributions

Concept: A.Ç., G.Ş. Design: G.Ş., A.Ç. Data Collection or Processing: G.Ş., A.Ç., Analysis or Interpretation: G.Ş., A.Ç., Literature Search: G.Ş., Writing: G.Ş.

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Original Article

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The Turkish Validity and Reliability of The Physical Activity Self-efficacy Scale For Children

Çocuklar İçin Fiziksel Aktivite Öz Yeterlik Ölçeği Türkçe Geçerlik ve Güvenirliği

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ABSTRACT

Objective: Purpose of this study is to determine validity and reliability of the Physical Activity Self-efficacy scale for Turkish children (PASSC).

Methods: The study was conducted as a methodological epidemiological study in the province of Ankara. The study aimed to reach all fourth grades (9-11 years) in the selected six schools (n=641). Six hundred and seven students participated in the first stage of the study and 499 students in the second (test-retest) which was carried out two weeks later. In the study, personal information form and data collection tool including PASSC were used. The data were analyzed using SPSS 18 and AMOS programmes.

Results: Among the children who participated in the first stage of the study; 53.0% were male and 36.2% were from schools with low socioeconomic level . Results from the confirmatory factor analysis for boys showed: p<0.001, χ^2/sd=2.6, RMSEA=0.07 and GFI=0.95, and for girls: p<0.001, χ^2/SD =2.4, RMSEA=0.07 and GFI =0.95. The Cronbach's alpha value was determined as 0.84 for boys and 0.81 for girls in the validity and reliability analyzes for the PASSC. The analyzes which were performed for boys and girls seperately led to a model consisting of a single factor with no modification requirement.

ÖZ

Amaç: Bu araştırmanın amacı Çocuklar için Fiziksel Aktivite Öz Yeterlik ölçeğinin (Ç-FAÖY) Türkçe geçerlik ve güvenirliğini belirlemektir.

Yöntemler: Araştırma metodolojik tipte epidemiyolojik bir araştırmadır ve Ankara ilinde yapılmıştır. Araştırmada örneklem seçilmemiş altı okulda ki tüm dördüncü sınıflara (9-11 yaş) ulaşılması hedeflenmiştir (n=641). Araştırmanın ilk aşamasına 607 öğrenci, iki hafta sonra gerçekleştirilen ikinci (test-tekrar test) aşamasına 499 öğrenci katılmıştır. Araştırmada, kişisel bilgi formu ve Ç-FAÖY ölçeğini içeren veri toplama aracı kullanılmıştır. Verilerin analizinde SPSS 18 ve AMOS programları kullanılmıştır.

Bulgular: Çalışmanın ilk aşamasına katılan çocukların %53,0'ı erkektir ve %36,2'si düşük gelir grubundadır. Ç-FAÖY ile ilgili erkek çocuklar için yapılan doğrulayıcı faktör analizinde p<0,001, χ^2/SD=2,6, RMSEA=0,07 ve GFI=0,95; kız çocuklar için yapılan doğrulayıcı faktör analizinde p<0,001, χ^2/sd=2,4, RMSEA=0,07 ve GFI=0,95 olarak bulunmuştur. Ç-FAÖY geçerlik ve güvenirlik analizlerinde, Cronbach alfa değeri erkek çocuklar için 0,84; kız çocuklar için 0,81 olarak saptanmıştır. Erkek ve kız çocuklar için ayrı ayrı yapılan analizler sonucunda tek faktörden oluşan ve modifikasyona gerek duyulmayan bir model oluşmuştur.

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Conclusion: The PASSC which was adapted into Turkish for boys and girls was a valid and reliable assessment tool.

Keywords: Child, Physical activity, Self-efficacy, validity, reliability.

Sonuç: Erkek ve kız çocuklar için ayrı ayrı Türkçe uyarlaması yapılan Ç-FAÖY geçerli ve güvenilir bir ölçme aracıdır.

Anahtar Sözcükler: Çocuk, fiziksel aktivite, öz yeterlik, geçerlik, güvenirlik.

Introduction

Regular physical activity has an effect on the protection and improvement of the health of both the individual and the society (1). Physical activity reduces smoking (1), depression (2), cardiovascular diseases, some types of cancer, stroke, diabetes and obesity, prolongs the life expectancy and ensures a healthy life (3).

While physical activity in childhood ensures the development of muscles, the development of psychosocial behavior positively and the increase of self-esteem (4), it reduces the occurrence of cardiovascular diseases, hypertension and obesity, and prevents sedentary lifestyle (passive activities such as watching television and computer) (5). The behaviors of individuals who start physical activity in childhood change over time, and their desire for physical activity becomes permanent (3, 6).

Self-efficacy associated with physical activity is an important concept that determines attitudes and behaviors such as how a person sees his/her own capacity, what activities he/she will choose and how much effort he/she will spend for these activities, and how long he/she will continue to do physical activity when faced with failure (7). Understanding the characteristics of childhood period, encouraging children to physical activity by examining children's knowledge, abilities and attitudes, and ensuring the sustainability of this situation are possible by improving children's self-efficacy (3). Self-efficacy, which is among the determinants of human behavior, refers to the belief that the individual can successfully perform the behaviors that enable him/her to achieve the desired results (regulatory activity) and his/her belief in his/her own ability in a specific area (task activity) (8, 9). Self-efficacy associated with one's belief, cognitive process, motor activities and physical performance is both the result and an important determinant of physical activity. While regular physical activity contributes to the formation of self-efficacy, it also creates a desire for regular physical activity (by increasing the number and frequency of physical activity) in time (10). Being successful and increasing self-confidence create a change in behavior towards increasing physical activity self-efficacy (11). In particular, while active and regular physical activity in children increases the child's physical activity self-efficacy (10), inadequate physical activity reduces the child's sense of confidence and negatively affects the child's and the community's health (12).

The goals set by the child directed to physical activity increase his motor development and confidence in his own skills over time (13). Planning activities involving moderate or severe levels of physical activity in primary school-age children-considering the age and gender of the child- increases children's orientation to physical activity, and the most important predictor of this situation is the perceived physical activity self-efficacy (6). Perceived physical activity self-efficacy is affected by personal characteristics such as the child's age, gender (biological factors), as well as the child's access to the gym or ability to do physical activity at school, the ability to access the materials required for physical activity, the ability to allocate time for physical activity, and environmental factors such as peers, parents and teachers (14). Children's physical activity self-efficacy, a concept that is affected by individual and environmental factors and can change, increases especially with the encouragement of parents or teachers (6). The development or adaptation of measurement tools for determining physical activity self-efficacy is important for planning intervention studies for physical activity behaviors and maintaining a long and quality life (15). The studies conducted in our country were the Physical Activity Questionnare for children which was adapted to Turkish by Tanır (16) for the eighth grade students, and the Physical Activity Questionnaire for primary school students which was adapted to Turkish by Emlek Sert and Bayık Temel (17) for the sixth, seventh and eighth grade students. The biggest difference between the Physical Activity Self-efficacy Scale for Turkish Children (PASSC) and these scales is that PASSC is designed for (young) children in the 9-11 age group. The Physical Activity Questionnare for children is intended to recall the activities performed in the last 7 days and gives an idea about the general physical activity habits of the participants and does not contain information about the estimated calorie expenditure, frequency, intensity and duration of the activity (16). The Physical Activity Questionnaire for primary school students questions the status of performing any of the activities (hopscotch, football, basketball, gymnastics, etc.) stated in the questions in the last seven days, the level of participation in physical education lessons, activities performed during breaks, lunch time, after school, in the evening and weekends and the frequency of these activities, the frequency of leisure activities in the last seven days, and the frequency of sports, games, dance and other physical activities for seven days a week. This scale consists of 9 items and the first item includes 21 activities, therefore it is comprehensive and detailed (17). PASSC is a scale consisting of 9 items, easy to answer, without sub-activities or dimensions, and questioning the self-efficacy of the person towards physical activity. No other physical activity scale developed or adapted to Turkish in our country for children studying in the fourth grade or below, has not been found in the literature.

The validity and reliability study of PASSC was included in the first step of a project. The use of scales other than PASSC in the project and the fact that each of the scales used had a certain age range caused the data collection tool to be long. Since the data

collection tool was long, the age range was planned according to all scales and the project was planned to be carried out in primary schools. Children between the ages of 9-11 were included in the validity and reliability study of the PASSC.

The aim of this study was to perform Turkish adaptation of the PASSC, which was developed by Saunders et al. (18) and modified by Sherwood et al. (19), in boys and girls separately to evaluate the physical activity self-efficacy.

Method

The validity and reliability study of the Turkish form of PASSC was conducted in six schools selected from three different socioeconomic levels in Ankara. Socioeconomic level determinants based on income, education and occupation are frequently used in determining the socioeconomic level. Since it is not possible to use these determinants directly for children; in studies on children, determining the socioeconomic level is preferred at the family, community and school levels (20). In determining the socioeconomic level of this study, socioeconomic determinants and classification developed by Yüceşahin and Tuysuz were used (21). For school level socioeconomic classification, all metropolitan districts were listed according to their socioeconomic levels, and all private schools constituted the sample for the high income level. At the top of the list, the state schools in Çankaya and Yenimahalle districts constituted the sample for the middle-income stratum, and at the bottom of the list, the state schools in the Altındağ, Mamak and Sincan districts constituted the sample for low-income stratum. In the study, it was aimed to reach all fourth grades (9-11 years) in six schools ,among schools selected according to their socioeconomic level, in which sample was not re-selected from (n=641). Six hundred and seven students who were at the school during the data collection period and agreed to participate in the study constituted the sample of the study. The data collection phase of the epidemiological study planned as a methodological type consisted of two parts. Six hundred and seven students (94.7%) participated in the first stage of the study and 499 students (77.8%) participated in the second stage (test-retest), which was carried out two weeks later.

The inclusion criteria were defined as being between the ages of 9 and 11, being able to understand the questions and express own opinions and agree to participate in the study.

The data collection tool of the study consisted of a personal information form consisting of 5 questions including some sociodemographic information and a PASSC form. PASSC was developed by Saunders et al. (18). There were three sub-dimensions in its original form. Sherwood et al.(19) modified the scale and transformed it into nine items and a one-dimensional structure in 2004. We used its final form modified by Sherwood et al. While the original form of the scale was being developed, girls in the 8-10 age group were included in the study group, the Turkish adaptation study was conducted for both girls and boys. The validity and reliability study of this scale was included in the first step of a project. Due to the fact that there were other scales used in the project and all scales used were analyzed for both boys and girls, the validity and reliability of the scale was also made for boys. The scoring of the scale is made by reading the items in the scale and giving 1 point to the "not difficult" option, 2 points to the "somewhat difficult" option, and 3 points to the "very difficult" option. Scale total score is calculated by adding the scores obtained from all items. There are no reverse coded items in the scale, the lowest score that can be obtained from the scale is 9 and the highest score is 27. High scores from the scale indicate the strength of self-efficacy for physical activity. The Turkish Form of PASSC is attached at the end of the article.

The data collection phase was conducted between April 5 and May 18, 2015. The data collection form was distributed to the students by researchers and teachers at the same time, and it took students about 20-25 minutes to fill out the form.

Statistical Analysis

The validity and reliability analyzes of the PASSC were made by using SPSS 18 and AMOS programs in the study. Content validity, face validity and construct validity were used for validity analysis. Internal consistency and test-retest method were used for reliability analysis. In construct validity, the minimum value was determined as 0.30 for exploratory factor analysis (22), χ^2/df <3; RMSEA <0.08; GFI >0.90 were determined as acceptable values in the model fit statistics of confirmatory factor analysis (23), α>0.70 was determined as Cronbach alpha value (24), and reliability value for test-retest phase was determined between -1 and +1 (25). In the scope/content validity of the research, the language equivalence of the PASSC, which was valid for both boys and girls, was provided first. First of all, the scale was translated into Turkish by researchers who knew Turkish and English at a good level. The expert panel consisting of experienced people (public health experts, other health professionals, Turkish teachers and Turkish Language and Literature experts) gave their opinions on Turkish translation and tried to ensure conformity in terms of trans-cultural meaning. The Turkish version of the scale was rearranged by making corrections suggested by the expert panel. A pre-application was made with 20 children from the age group in which the study would be conducted and their families, and the Turkish equivalence of the scale was completed. The scale, of whichTurkish equivalence was completed, was evaluated by a team of five Turkish teachers, and experts in Turkish language and literature in terms of language validity. The team gave the form its final form. The scale, which was translated into Turkish, was translated back into English by a professional Translation and Interpretation Office in the USA (United States of America). A group of native English speakers examined the scale, which was translated back into English, to determine its similarity with its original form.

The readability, understandability, applicability of the scale, cultural characteristics and value judgments of the society in which the scale would be applied were examined in order to ensure the face validity of the PASSC. Public health experts and other health professionals evaluated the items in the scale.

The adaptation of the scale was made in 2015 within the scope of the project named "Childhood Obesity, Perception and Approach of Families" (Project No: TUA-2015-5521). In order to conduct the study approved by the Hacettepe University Non-Invasive Ethics Committee (GO 14-429-07), written permission was obtained from the Provincial Directorate of National Education, school administration and students' families, and verbal permission was obtained from the students.

Results

Some characteristics of the children participating in the first and second parts of the study are given in Table 1.

Of the children participating in the first part of the study, 53.0% were male and 36.2% were in the low income group. Of the children participating in the second part of the study (test-retest stage), 52.7% were male and 36.3% were in the middle income group (Table 1).

Validity Analysis

Content and Face Validity

The scope/content validity of the study was examined by experts and the translated text was found to be compatible with the original text.

As a result of the face validity of the research, it was decided to keep the scale in its original form, to use it after language correction and to analyze.

Construct Validity

Exploratory factor analysis

The values of the scale in boys and girls obtained as a result of the principal component analysis are presented in Table 2.

In the exploratory factor analysis of PASSC in boys, the Kaiser-Meyer-Olkin (KMO) value was found to be 0.78 and the sample size was good (Table 2). Item factor loading was found as minimum 0.42 and maximum 0.62, both of which were above the critical value of 0.30. It was determined that PASSC had a one-dimensional structure that explained 30.913% of the total variance for boys and had an eigenvalue of 2.78%.

In the exploratory factor analysis of PASSC in girls, the (KMO) value was found to be 0.80 and the sample size was very good (Table 2). Item factor loading was found as minimum 0.47 and maximum 0.66, both of which were above the critical value of 0.30. It was determined that PASSC had a one-dimensional structure that explained 33.363% of the total variance for girls and had an eigenvalue of 3.00%.

Table 1. Some characteristics of boys and girls participating in the study

Some characteristics of the childrens		Study-1		Study-2 (test-retest phase)	
		%	s	%	
Gender	Boy	322	53.0	263	52.7
	Girl	285	47.0	236	47.3
Income levels (According to the socioeconomic level of the schools)	High income level	189	31.2	166	33.4
	Moderate income level	198	32.6	181	36.3
	Low income level	220	36.2	152	30.4
Total		607	100.0	499	100.0

Table 2. Values of basic component analysis in physical activity self-efficacy scale for boys and girls

Items	Boy[1]	Girl[1]
1. Being physically active instead of watching TV	0.52	0.53
2. Being physically active after school most days of the week	0.62	0.61
3. Asking my family or other elders to do things that require physical activity with me	0.58	0.54
4. Asking my family or other elders to take me to physical activity or sports	0.56	0.66
5. Asking my friends to do physical activity with me.	0.49	0.50
6. Being physically active on weekends (saturday and sunday)	0.62	0.47
7. Playing in sports teams	0.42	0.52
8. Being physically active at home	0.58	0.64
9. Being physically active even when tired	0.53	0.65
Eigenvalue	2.782	3.003
Described variance (%)	30.913	33.363
Cumulative variance (%)	30.913	33.363
Kaiser-Meyer-Olkin (KMO) test	0.788	0.801
Bartlett test	392.08 (p<0.001)	413.07 (p<0.001)

[1]Explanatory factor analysis was done.

Confirmatory factor analysis

The results of the confirmatory factor analysis of the PASSC for boys and girls are presented in Figure 1.

In the confirmatory factor analysis of PASSC for boys; p<0.001, χ^2/df =2.6, RMSEA =0.07 and GFI =0.95 (Figure 1). The single-factor model reached acceptable values and acceptable fit in the fit statistics. This model did not require modification. The factor loading values of the scale items varied between 0.33 and 0.56, and all load values were statistically significant (p<0.001).

In the confirmatory factor analysis of PASSC for girls; p<0.001, χ^2/df = 2.4, RMSEA =0.07 and GFI =0.95 (Figure 1). The single-factor model reached acceptable values and acceptable fit in the fit statistics. This model did not require modification. The factor loading values of the scale items vary between 0.39 and 0.60, and all load values were statistically significant (p<0.001).

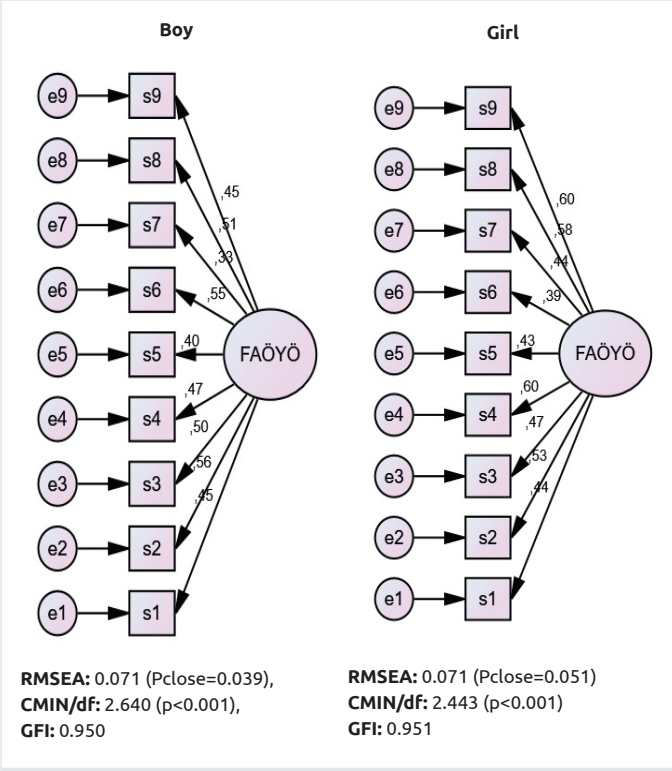

Figure 1. Confirmatory factor analysis results of the physical activity self-efficacy scale for boys and girls

Reliability Analysis

Internal Consistency (Cronbach alpha)

Cronbach's alpha value of PASSC was 0.84 for boys and 0.81 for girls.

Test-Retest Method

In boys, there was a significant, strong and positive correlation between the first round PASSC and the second round PASSC (p<0.01; r:0.73); and in girls, there was a significant, strong and positive correlation (p<0.01; r: 0.75) between the first round PASSC and the second round PASSC.

There was no statistically significant difference between the genders of the boys and girls participating in the study and the mean PASSC (p>0.05). There was no statistically significant difference between the socioeconomic level of the school where the boys and girls participating in the study and the mean PASSC (p>0.05) (Table 3).

Discussion

Studies conducted in our country have emphasized that physical activity self-efficacy studies involving children are limited (26, 27). In this study, it was aimed to adapt the PASSC to Turkish and to contribute to the qualitative and quantitative increase in future studies in this field. Adapting PASSC, increasing the number of researches to be conducted in this field, and determining children's self-efficacy in physical activity are important in order to determine the methods that can make children gain sports habits based on these self-competencies. Good mood, decrease in hunger and increase in food and fat burning (acceleration of metabolism) in children who do sports contribute to child health by increasing endurance and quality sleep (28).

The PASSC was developed by Saunders et al. (18) and modified by Sherwood et al. (19). In this study, the final version of PASSC which was modified by Sherwood et al. (19) and consisted of 9 items was used. Two hundred and ten African American girls participated in the original modified version of the scale. The study was conducted in four different states and the age, income and the education of their families constituted the sociodemographic variables of the study (19). In our study, 285 girls and 322 boys participated. In the literature, it was stated that it would be sufficient to reach 5 or 10 times the number of items in validity and reliability studies, and the number of

Table 3. The relationship between some characteristics of boys and girls participating in the study and the means of the physical activity self-efficacy scale for children

Some characteristics of the children		s	Mean ± SD*	Median	Lowest/Highest
Gender	Boy	322	12.7±3.0	12.0	9.00/23.00
	Girl	285	12.7±3.1	12.0	9.00/23.00
Income levels (According to the socioeconomic level of the schools)	High income level	189	12.8±3.0	12.0	9.00/21.00
	Moderate income level	198	12.4±3.0	12.0	9.00/23.00
	Low income level	220	12.8±3.1	12.0	9.00/23.00

*Standard deviation

individuals should be at least 300 (22). The sample size achieved in this study and in the original study were well above the value it should have been. In the original study, while the income levels of the families were directly asked to the children, in this study, instead of asking the children about the family income status directly, three socioeconomic levels were determined as low, medium and high at the beginning of the study as suggested in the literature (20, 21), and the study was conducted in six schools selected from these levels. Changes in children's eating habits due to the increase in the time spent in front of the computer, the products in the advertisements or other factors; decrease physical activity and it increase the frequency of obesity in our country's children (27). This situation directly affects both girls and boys. Therefore, in this study, it was important to adapt PASSC for both boys and girls and to use the scale for both genders. The authors of the original study explained that their study was conducted only with girls, as physical activity decreased more rapidly in adolescents compared to boys, and obesity in girls was a problem for public health (19). This study is the first step of a project. Due to the fact that there were other scales used in the project and all scales used were analyzed for both boys and girls, the validity and reliability of the scale were also made for boys.

In the literature, there are physical activity scales for children developed by some researchers or adapted to their own countries (29, 30, 31, 32). When the studies conducted in our country were examined, two physical activity scales, which were valid and reliable, were reached to measure the physical activity competence of children. The first of these is the Physical Activity Questionnare for older children developed by Crocker et al. (33). Its Turkish adaptation was made by Tanır (16) for the eighth grades. The second is that Physical Activity Questionnaire for primary school students developed by Kowalski et al. (34). Its Turkish adaptation study for our country was conducted by Emlek Sert and Bayık Temel for the sixth, seventh and eighth grades (17). A Physical Activity scale, which was developed or adapted to Turkish for fourth grade (9-11 years) or younger children in our country, was not found in the literature. In addition to age group, another feature that distinguishes PASSC from other scales is that it measures children's self-efficacy towards physical activity, not their state or frequency of physical activity. Therefore, the results of this study are very important in measuring the physical activity self-efficacy of young children.

In the validity analysis of this study, firstly, the findings regarding the content validity of PASSC were evaluated. In a study, it was emphasized that instead of creating measurement tools on various subjects separately for each country, translation and adaptation of the measurement tool from the original language was cheaper, time-saving and advantageous in terms of its use in international studies (35). In this study, no changes were made in the dimensions and scope defined in the original form of the scale in the content validity section, only language validity of the scale was made. Not every word in the expressions was translated and care was taken to preserve the integrity of the meaning. It was determined that there were sentences in the scale that did not fully reflect the content of the sub-dimension. In order to preserve the original form, the items of the scale were only regulated in terms of language, in a way to bear the meaning expressed.

Secondly, the face validity of the scale was evaluated in terms of validity. Studies have emphasized that the number of experts involved in face validity should be at least three (36, 37, 38). The face validity assessment of the scale was made by four public health experts, two health professionals, and a total of four experts. In line with the opinions of the experts, language arrangements were made by preserving the meanings of the expressions.

Thirdly, in terms of validity, factor analysis of the scale was conducted. In the factor analysis performed in the original study of the PASSC, the item factor loading was found to be the lowest 0.34 and the highest 0.71. As a result of the factor analysis performed in the original study, a one-dimensional structure that explained 28% of the total variance and had an eigenvalue of 2.53% emerged (19). In this study, when the results of boys and girls were evaluated together, item factor loading was found to be the lowest 0.42 and the highest 0.66. The original study and the factor loading results obtained in this study were found to be above 0.30, which was accepted as the limit in the literature (22). As a result of the factor analysis performed in this study, a one-dimensional structure (explaining 30% and 33% of the total variance, respectively) for boys and girls emerged. In the literature, there are resources stating that the variance rate in factor analysis should be at least 50% (22, 39) or at least 60% (40). The total variance rates found in this study and the original study were found to be lower than the limit values in the literature.

Fourthly, in terms of validity, findings regarding the construct validity of the scale were evaluated. In the literature, there is no clear suggestion about which indices (except χ^2/df) used in construct validity should be (23, 41, 42, 43). In a study, it was stated that the index values that were important for determining the construct validity were RMSE, SRMR, CFI, GFI, NFI and NNFI (23). In the original form of the study, fit indices were not mentioned (19). When the results of this study were examined, it was found that the values obtained from the data of both boys and girls reached the acceptable values (χ^2/sd <3; RMSEA <0.08; GFI >0.90) required to provide fit statistics (23). No modification was required in both models and acceptable fit was achieved in the fit statistics.

In this study for the reliability analysis of the PASSC, internal consistency was determined first. The Cronbach alpha value of the PASSC in the original study was found to be 0.67 (19). In this study, the Cronbach alpha value of PASSC calculated separately for boys and girls was found to be significantly higher than both the limit value (24) and the original study. In the PASSC results obtained from this study, the values required for the acceptance of validity and reliability studies were reached.

In this study regarding the reliability analysis of the PASSC, secondly, test-retest phase was evaluated. The correlations obtained as a result of the PASSC test-retest phase were found

to be significant, high and positive for both girls and boys. A moderate correlation was found in the test-retest phase of the PASSC's original study (19). The results obtained from our study were quite high and were compatible with the limit values in the literature (25). The results of this study and the original study were in agreement with each other.

Study Limitations

The research was a methodological study. It showed similar limitations with other methodological studies. The limitations of the study were that the adaptation study was carried out with a group living in Ankara, this group was selected by the researchers, the selected age group was only 9-11 years old, and the socioeconomic status was not measured individually.

Conclusion

The Turkish adaptation of PASSC, which was modified by Sherwood et al. (19), was found valid and reliable for boys and girls.

Ethics

Ethics Committee Approval: The study approved by the Hacettepe University Non-Invasive Ethics Committee (GO 14-429-07)

Informed Consent: Written permission was obtained from the Provincial Directorate of National Education, school administration and students' families, and verbal permission was obtained from the students.

Peer-review: Internally peer reviewed.

Authorship Contributions

Concept: E.U.A., M.S.Y., T.H., N.B., H.Ö., Design: S.Ü., E.U.A., M.S.Y., T.H., N.B., H.Ö., Data Collection or Processing: E.U.A., M.S.Y., T.H., N.B., H.Ö., Analysis or Interpretation: S.Ü., Ö.A., H.K.Ü., Literature

Search: A.G., S.Ü., Writing: A.G., S.Ü.

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APPENDIX 1. Physical Activity Self-efficacy scale for children in Turkish

Below are some situations about how hard it can be to be physically active and more physically active. Check the option (not at all difficult, somewhat difficult or very difficult) that best expresses how difficult each sentence is for you.

How hard do you think it is to do the following?	Not at all difficult	Somewhat difficult	Very difficult
1. Being physically active instead of watching TV			
2. Being physically active after school most days of the week			
3. Asking my family or other elders to do things that require physical activity with me			
4. Asking my family or other elders to take me to physical activity or sports			
5. Asking my friends to do physical activity with me.			
6. Being physically active on weekends (saturday and sunday)			
7. Playing in sports teams			
8. Being physically active at home			
9. Being physically active even when tired			

Evaluation: There is no reverse-coded item in the scale. While scoring; not at all difficult = 1 point, slightly difficult = 2 points, very difficult =3 points. Scale total score is calculated by adding the scores obtained from all items. The lowest score that can be obtained from the scale is 9, the highest score is 27. High scores from the scale indicate the strength of self-efficacy for physical activity

Original Article

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A Study of Obesity Prevalence in the Rural Population in Turkey: Güzelyurt (Aksaray) Example

Türkiye'de Kırsal Nüfusta Obezite Sıklığı Üzerine Bir Araştırma: Güzelyurt (Aksaray) Örneği

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ABSTRACT

Objective: Obesity is a common health problem in almost all societies. The aim of this study was to investigate obesity in rural areas.

Methods: Descriptive, cross-sectional study included patients who applied to Güzelyurt District Hospital in September-November 2018 for any reason over 18 years of age. Body weight, height, body mass index (BMI), waist/hip circumference ratio (WHR), waist-to-height ratio (WHtR), and blood pressure measurements were evaluated. In addition, age, gender, marital status, education level, occupation, smoking habits, the disease was diagnosed, whether the drug was recorded.

Results: The mean age of the 191 participants was 46.8±15.6 years, 79.1% were female, 36.6% were primary school graduates, 72.8% were housewives, 85.9% living in town or village. The frequency of obesity 46.6%, 51.7% in females, 27.5% in males. Abdominal obesity; according to WC, 25.0% males, 68.2% females, according to WHR, 70.0% males, 57.6% females, and according to WHtR, 77.5% males and 90.7% females. There was a moderate positive correlation between the age and BMI. BMI was strong positively significantly correlated with WHtR, WC and HC, a weaker correlation between BMI to NC and WHR.

Conclusion: The prevalence of obesity was 46.6%. It is possible to say that such a high rate in living conditions does not allow

ÖZ

Amaç: Obezite, hemen hemen tüm toplumlarda yaygın görülen bir sağlık sorunudur. Bu çalışmanın amacı kırsal kesimdeki obeziteyi araştırmaktır.

Yöntemler: Tanımlayıcı, kesitsel tipteki bu araştırmaya Eylül 2018-Kasım 2018 tarihleri arasında Güzelyurt İlçe Devlet Hastanesi aile hekimliği polikliniğine 18 yaş ve üzeri herhangi bir nedenle müracaat eden hastalar dahil edildi. Tüm katılımcıların vücut ağırlığı, boy, beden kitle indeksi (BKİ), bel/kalça çevresi oranı (BKO), bel-boy oranı, boyun çevresi (ByÇ) ve kan basıncı ölçümleri değerlendirildi. Ayrıca yaş, cinsiyet, medeni durum, eğitim düzeyi, meslek, sigara kullanım alışkanlığı, tanı aldığı hastalık ve kullandığı ilaç olup olmadığı kaydedildi.

Bulgular: Çalışmaya kabul edilen 191 katılımcının yaş ortalaması 46,8±15,6 yıl (19-85) %79,1'i kadın, %36,6'sı ilkokul mezunu, %72,8'i ev hanımı, %85,9'u kasaba veya köyde yaşamakta idi. BKİ'ne göre obezite sıklığı genelde %46,6, kadınlarda %51,7, erkeklerde %27,5 olarak saptandı. Abdominal obezite sıklığı; BÇ'ye göre erkeklerde %25,0, kadınlarda %68,2, BKO'ya göre erkeklerde %70,0, kadınlarda %57,6 ve bel/boy oranına göre erkeklerde %77,5, kadınlarda %90,7 olarak bulundu. Katılımcıların yaşı ile BKİ arasındaki korelasyon incelendiğinde pozitif yönde orta derecede bir korelasyon saptandı BKİ ile bel-boy oranı, BÇ ve KÇ arasında pozitif yönde çok kuvvetli derecede bir korelasyon saptanmasına rağmen, BKİ ile BynÇ ve BKO arasında pozitif yönde daha zayıf bir korelasyon mevcuttu.

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sedentary life and families with low socioeconomic status have such a high rate. Obesity is health problem of our age in rural areas.

Keywords: Obesity prevalence, rural, body mass index, waist-to-height ratio, waist/hip circumference ratio, neck circumference

Sonuç: Bu çalışmada obezite prevalansı %46.6 olarak tespit edildi. Yaşam koşulları sedanter yaşama elvermeyen, sosyoekonomik düzeyi düşük ailelerin çoğunlukta olduğu bir ilçede bu kadar yüksek bir oran saptamamız obezitenin kırsalda da çağımızın en önemli sağlık sorunu olduğunu söylemek mümkündür.

Anahtar Sözcükler: Obezite prevalansı, kırsal, beden kitle indeksi, bel-boy oranı, bel/kalça çevresi oranı, boyun çevresi

Introduction

Obesity is defined by the World Health Organization (WHO) as the accumulation of excess fat in the body to the extent that it disrupts human health. It is a common public health problem all over the world. The WHO reported in 2016 that the the country with the highest prevalence of obesity in Europe was Turkey with the rate of 29.5% (1). According to the studies of TURDEP-I (1998) and TURDEP-II (2010) conducted with an interval of twelve years in the adult population in our country and in the same centers, the prevalence of obesity increased from 22.3% (32.9% in women, 13.2% in men) to 31.2% (44.2% in women, 27.3% in men) (2).

Although obesity is mostly a problem of developed countries, it is estimated that the prevalence of obesity is increasing rapidly in developing countries. Knowing the body fat distribution is important in predicting the health problems that may be related and determining the risk factors. Performing some anthropometric measurements contributes to the determination of these risk factors (3). Increased waist circumference (WC) or waist/hip ratio (WHR) is defined as abdominal (central or visceral) obesity. Abdominal obesity is an important risk factor for cardiovascular problems. It has been reported that waist circumference in particular reflects the current risk better as an indicator of abdominal obesity (4).

Overweight is defined as body mass index (BMI) of 25 kg/m^2 or above, and obesity as 30 kg/m^2 or above. Abdominal obesity is a waist circumference of 88 cm or above for women and 102 cm or above for men (5). The frequency of abdominal obesity was found to be 64.3% in women and 34.6% in men in the TURDEP-II study (6).

The aim of this study was to determine the prevalence of obesity with anthropometric measurements in adults whose living conditions did not allow for sedentary life, in a rural district where families with low socioeconomic levels were in the majority and to determine the sociodemographic status of obese people. In the literature review, no clear data showing the prevalence of obesity in Aksaray province and its districts was found, and our study was intended to be a guide on this issue.

Method

In this descriptive, cross-sectional study, patients aged 18 or over who were admitted to the District State Hospital General Outpatient Clinic between September 2018 and November 2018 for any reason were included. Before starting the study, the study was approved by The Aksaray University Ethics Committee with the number 152 on 10.07.2018. Afterwards, administrative permission was obtained from the Provincial Health Directorate.

Data Collection

Sociodemographic characteristics, smoking and chronic illnesses status, drug use, height, weight, WC, hip circumference (HC), neck circumference (NC), and blood pressure (BP) values were recorded in the questionnaire form previously prepared by the researcher. Before starting the study, the participants were informed about the study and their verbal consent was obtained. Individuals whose standing height and weight could not be measured, those under the age of 18 and those who did not want to participate in the study voluntarily were excluded from the study.

The prevalence of obesity in our country has been found to be 35% in studies based on the general population (1).

Anthropometric Measurements

By the same researcher, the heights of the patients were measured after removing the shoes, and the weights of the patients were measured after removing the jacket and excess clothes with an adult digital scales with height measurement (weight sensitivity range 100 g). While the patients were standing, WC was measured from the midpoint between the lowest rib and lateral iliac spurs, and HC was measured at the level of the greater trochanters. The NC was measured at the superior edge of the cricothyroid membrane while the patients were awake and standing. All measurements were made by the same person and the results were rounded to the nearest 0.5 cm value to reduce the person's margin of error.

BMI was determined with the formula of weight (kg)/height (m)^2.

- BMI ≤18.5 kg/m^2 underweight
- BMI between 18.5-24.99 kg/m^2 normal weight
- BMI between 25.00-29.99 kg/m^2 overweight
- BMI ≥30 kg/m^2 obese
  - BMI between 30.00-34.99 kg/m^2 mild obese
  - BMI between 35.00-39.99 kg/m^2 moderate obese

- BMI between 40.00-49.99 kg/m^2 morbid obese
- BMI ≥50 kg/m^2 super obese

Abdominal obesity criteria; waist circumference ≥100 cm for men, ≥90 cm for women, waist circumference to hip circumference ratio >0.85 and waist-height ratio ≥0.5 (1).

Statistical Analysis

Statistical analyzes were performed using SPSS version 20 software. The normal distribution of the variables was examined by visual (histogram and probability graphics) and analytical methods (Kolmogorov-Smirnov/Shapiro-Wilk tests). Descriptive analyzes were given for variables without normal distribution, using median and minimum-maximum values (and frequency tables for ordinal variables). Since it was determined that WC, HC, NC, systolic and diastolic blood pressure variables did not show normal distribution, these and the ordinal BMI variable were compared using the Kruskal-Wallis test. Chi-Square test was used to compare categorical data. Pearson's correlation analysis was used to determine the relationship between numerical variables. The significance was evaluated at the p<0.05 level and the results were evaluated within the 95% confidence interval. Correlation coefficient (r); between 0.00-0.24 was determined as weak, between 0.25-0.49 as medium, between 0.50-0.74 as strong, and between 0.75-1.00 as very strong.

Results

The mean age of the 191 patients included in our study was 46.8±15.6 years (min: 19, max: 85). Of the participants, 79.1% (n=151) were female, 20.9% (n=40) were male, 36.6% (n=70) were primary school graduates, 72.8% (n=139) were housewives, % 85.9 (n=164) were living in a town or village. Of the participants, 11.5% (n=22) were current smokers (Table 1). The mean systolic BP was 123.69±14.33 mmHg and the mean diastolic BP was 75.35±8.57 mmHg. In anthropometric measurements; average height was 1.58±0.08 m (1.40-1.94), average weight was 73.80±13.39 kg (45-110), mean WC was 94.65±12.92 cm (60-124), mean HC was 108.56 ± 12.76 cm (72-145), and mean NC was 37.17 ± 3.91 cm (29-46). According to BMI, 1.0% of the participants were underweight (n=2), 22.0% (n=42) were normal weight, 30.4% (n=58) were overweight, 46.6% (n = 89) were found to be obese (Figure 1). According to BMI, the frequency of obesity was 51.7% in women and 27.5% in men. The frequency of abdominal obesity was 25.0% (n=10/40) in men, 68.2% in women (n=103/151) according to WC, 70.0% in men (n=28/40) and 57.6% in women (n=87/151) according to WHR, and 77.5% (n=31/40) in men and 90.7% (n=137/151) in women according to the waist/height ratio.

In our research, some variables were compared in the 3 groups we classified according to BMI (Table 2). Median values of WC, HC, BMI, systolic BP were significantly higher in the normal weight group than the normal-underweight group (p<0.001, p<0.001, p=0.007, and p=0.001, respectively). Median systolic and diastolic BP values were significantly higher in the obese group compared to the normal-underweight group (p<0.001 and p=0.001, respectively). In addition, systolic BP value was significantly higher in the obese group compared to the overweight group (p=0.002) (Figure 2).

The comparison of various sociodemographic characteristics of obese and non-obese participants is given in Table 3. According

Table 1. Sociodemographic characteristics of the participants

	n	%
Gender		
Female	151	79.1
Male	40	20.9
Age (median:45, min:19, max: 85 years)		
18-35 years	52	27.2
36-55 years	83	43.5
>55 years	56	29.3
Education status		
Illiterate	28	14.7
Literate	30	15.7
Primary school	70	36.6
Middle school	21	11.0
High school	24	12.6
College-university	18	9.4
Occupation		
Housewife	139	72.8
Officer	15	7.9
Retired	23	12.0
Worker	8	4.2
Student	6	3.1
Marital status		
Married	152	79.6
Single	24	12.6
Widow	15	7.8
Income level of family		
<500 TL/month	24	12.6
500-1000 TL/month	46	24.1
1001-2000 TL/month	81	42.4
>2000 TL/month	40	20.9
Living place		
District center	27	14.1
Town	152	79.6
Village	12	6.3
Smoking status		
Yes	22	11.5
Never smoked	152	79.6
Left	17	8.9
Total	191	100.0

to this; the frequency of obesity was significantly higher in the group aged 45 or over than in the group under 45 years of age (p<0.001). The BMI in the group aged 45 or over was 3.669 times higher than in those under 45 years of age [OR = 3.669, 95% CI; (2.012-6.693)]. The incidence of obesity was statistically significantly higher in the non-working group than in the working group, and in those with education level of primary school or below, compared to the group with high school or above (p<0.001). Obesity was found to be significantly higher in patients with a diagnosed disease than in patients without a diagnosed disease (p=0.006).

When the correlation between participants' age and BMI was examined, a moderate positive correlation was found (r=0.407, p=0.000) (Table 4). When linear regression analysis was performed, 16.5% of the increase in BMI was attributed to the increase in age (R^2=0.165) (Figure 3). When the correlation between WC and NC was examined, a moderate positive correlation was found (r=0.455, p=0.000). When the correlation between HC and NC was examined, a moderately significant positive correlation was found (r=0.429, p=0.000) (Table 4). The variables showing the best correlation coefficient value with systolic BP in all participants were BMI (r=0.504, p<0.001) and waist/height ratio (p<0.001; r=0.454), respectively. The variables showing the best correlation coefficient value with diastolic BP were determined as age (r=0.391, p<0.001) and waist/height

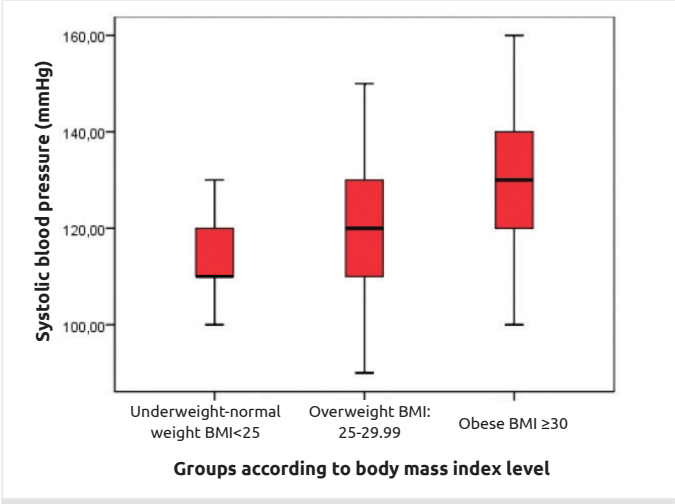

Figure 1. Relationship between body mass index (BMI) and systolic blood pressure values

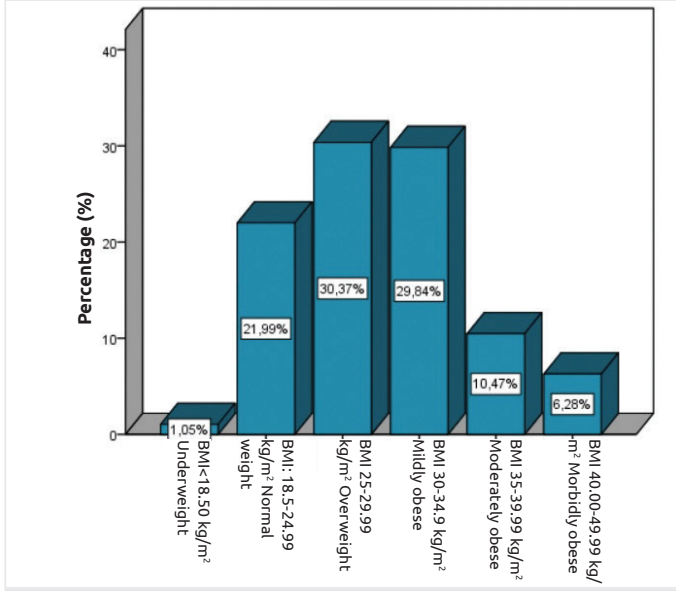

Figure 2. Classification of patients according to their body mass index (BMI)

Table 2. Relationship between some variables and body mass indexes

Variables	BMI <25 kg/m² (a) (n=44) Median (min-max)	BMI 25-29.99 kg/m² (b) (n=58) Median (min-max)	BMI ≥30 kg/m² (c) (n=89) Median (min-max)	x²	p
Waist circumference (cm)	81.0 (60.0-102.0)	91.5 (68.0-110.0)	103.0 (82.0-124.0)	90.127	**<0.001ab*** **<0.001ac*** **<0.001bc***
Hip circumference (cm)	95.0 (78.0-122.0)	108.0 (72.00-121.00)	117.0 (101.0-145.0)	91.435	**<0.001ab*** **<0.001ac*** **<0.001bc***
Neck circumference (cm)	35.0 (29.0-41.0)	37.0 (30.0-45.0)	39.0 (29.0-46.0)	25.356	**0.007ab*** **<0.001ac*** **0.004bc***
Systolic blood pressure (mmHg)	110.0 (90.0-160.0)	120.0 (90.0-150.0)	130.0 (100.0-160.0)	36.868	**0.001ab*** **<0.001ac*** **0.002bc***
Diastolic blood pressure (mmHg)	70.0 (60.0-90.0)	75.0 (60.0-90.0)	76.0 (60.0-100.0)	10.457	**0.001ac***

Kruskal-Wallis test, *Mann-Whitney U test, BMI: Body mass index, min: Minumum, max: Maximum

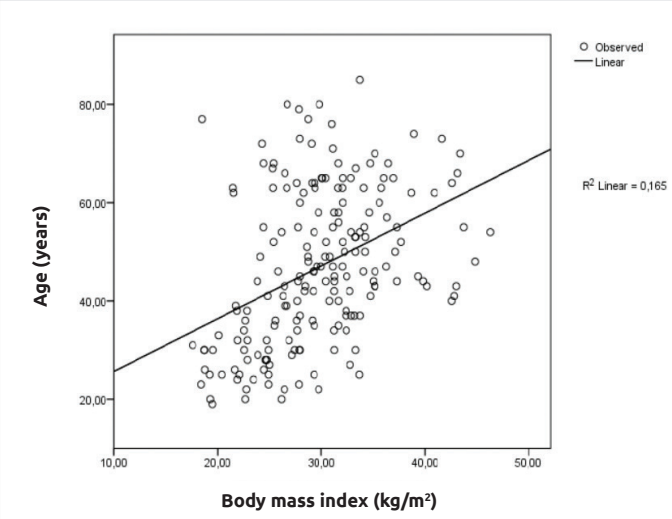

Figure 3. Linear regression analysis between age and body mass index

R2 =Coefficient of determination (R2 =0.165, p=0.000)

ratio (r=0.309, p<0.001), respectively. When the correlation between anthropometric measurement variables was examined, there was a very strong positive correlation between BMI and waist/height ratio, WC and HC (r=0.826, p<0.001, r=0.769, p<0.001; r=0.751, p<0.001), a very strong positive correlation BMI and waist/height ratio (r=0.826, p<0.001) between BMI and WC (r=0.769, p<0.001) and a very strong positive correlation between BMI and HS (r=0.769, p<0.001) =0.751, p<0.001). In addition, a strong positive correlation between BMI and NC (r=0.504, p<0.001) and a weak positive correlation between BMI and WHR (r=0.196, p<0.001) were found (Table 4).

Discussion

While smoking is the first cause of preventable deaths in our era, the second important reason is obesity. The prevalence of obesity is above the critically high value of 30% in the adult population in our country. In our study, it was determined that 30.4% of the participants were overweight and 46.6% were obese according to BMI. The frequency of obesity according to BMI was 51.7% in

Table 3. Relationship between some demographic features and body mass indexes

Variables		BMI < 30 kg/m² (n=102)		BMI ≥ 30 kg/m² (n=89)		Total (n=191)		x²	p
n		%	n	%	n	%			
Age	<45 years	64	69.6	28	30.4	92	100.0	18.632	**<0.001**
	≥45 years	38	38.4	61	61.6	99	100.0		
Gender	Female	73	48.3	78	51.7	151	100.0	7.415	**0.006**
	Male	29	72.5	11	27.5	40	100.0		
Education status	Primary school or below	69	46.3	80	53.7	149	100.0	13.705	**<0.001**
	High school or above	33	78.6	9	21.4	42	100.0		
Marital status	Married	78	51.3	74	48.7	152	100.0	1.303	0.254
	Single	24	61.5	15	38.5	39	100.0		
Living place	District center	14	51.9	13	48.1	27	100.0	0.030	0.862
	Village-town	88	53.7	76	46.3	164	100.0		
Occupation	Working	41	78.8	11	21.2	52	100.0	18.588	**<0.001**
	Not working	61	43.9	78	56.1	139	100.0		
Income level	<1,000 TL	27	38.6	43	61.4	70	100.0	9.768	**0.002**
	≥1,000 TL	75	62.0	46	38.0	121	100.0		
Type of family	Nuclear family	90	55.2	73	44.8	163	100.0	1.466	0.226
	Extended family	12	42.9	16	25.1	28	100.0		
Smoking	Current smoker	18	81.8	4	18.2	22	100.0	8.068	**0.005**
	Not smoking	84	49.7	85	50.3	169	100.0		
Diagnosis of a disease	Yes	35	42.2	41	57.8	83	100.0	7.445	**0.006**
	No	67	62.0	41	38.0	108	100.0		
Drug use	Yes	33	41.8	46	58.2	79	100.0	7.324	**0.007**
	No	69	61.6	43	38.4	112	100.0		

BMI: Body mass index

Table 4. Correlation status between some variables

Değişkenler	Age	Height	Weight	WC	HC	NC	SBP	DBP	WHR	BMI	WHeR
Age											
r											
p	1										
n	191										
Height											
r	-0.334**										
p	**0.000**	1									
n	191	191									
Weight											
r	0.264**	0.099									
p	**0.000**	0.175	1								
n	191	191	191								
WC											
r	0.472**	-0.163*	0.759**								
p	**0.000**	0.024	**0.000**	1							
n	191	191	191	q191							
HC											
r	0.397**	-0.258**	0.682**	0.798**							
p	**0.000**	**0.000**	**0.000**	**0.000**	1						
n	191	191	191	191	q191						
NC											
r	0.258**	-0.129	0.467**	0.455**	0.429**						
p	**0.000**	0.075	**0.000**	**0.000**	**0.000**	1					
n	191	191	191	191	191	q191					
SBP											
r	0.423**	-0.285**	0.392**	0.418**	0.393**	0.232**					
p	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.001**	1				
n	191	191	191	191	191	191	q191				
DBP											
r	0.391**	-0.154*	0.214**	0.281**	0.211**	0.260**	0.682**				
p	**0.000**	**0.034**	**0.003**	**0.000**	**0.003**	**0.000**	**0.000**	1			
n	191	191	191	191	191	191	191	191			
WHR											
r	0.218**	0.104	0.281**	0.505**	-0.111	0.137	0.120	0.153*			
p	**0.000**	0.152	**0.000**	**0.000**	0.127	0.060	0.098	**0.035**	1		
n	191	191	191	191	191	191	191	191	191		
BMI											
r	0.407**	-0.419**	0.857**	0.769**	0.751**	0.504**	0.508**	0.280**	0.196**		
p	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.007**	1	
n	191	191	191	191	191	191	191	191	191	191	
WHeR											
r	0.533**	-0.470**	0.645**	0.946**	0.796**	0.454**	0.473**	0.309**	0.418**	0.826**	
p	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	1
n	191	191	191	191	191	191	191	191	191	191	191

* Correlation is significant at 0.05 level, ** Correlation is significant at 0.01 level, WC: Waist circumference, HC: Hip circumference, NC: Neck circumference, SBP: Systolic blood pressure, DBP: Diastolic blood pressure, WHR: Waist/hip ratio, BMI: Body mass index, WHeR: Waist/height ratio, BMI: Body mass index

women and 27.5% in men. Similar to our study, the prevalence of obesity was found 51.0% in women and 15.1% in men in a study conducted with a total of 1672 adults aged between 25-64 and residing in the working community in Ankara (7). Similarly, in a study conducted in Kocaeli University, the rate of obese women was higher than men among 207 patients who were admitted to the family medicine outpatient clinic (8). In the study conducted by Akman et al., the frequency of obesity was found to be 31.6% and overweight 33.3% according to BMI. It was found that obesity gradually increased in the patients starting from the 40s and decreased relatively by the age of 60s (9). Similarly, in our study, the frequency of obesity was significantly higher in the 45 years or older group than the group below 45 years. In another study, obesity status was evaluated in housewives and working women and it was reported that weight, WC, BMI, and WHR values among body composition variables were significantly different between groups in favor of working women (10). The reason we found high frequency of obesity in our study might be that women and housewives were in the majority. Similar to our study, the incidence of obesity was statistically significantly higher in the group that did not work compared to the group working, and also in those with education level of primary school or below compared to the group with education level of high school or above. As a matter of fact, in the study of Erkol et al., it was found that there was a relationship between the obesity and occupation, and that housewives were more obese (11). In the study conducted by Baugman et al. (12) in 665 overweight or obese people, it was found that higher BMI was associated with low education level.

In the "National Health and Nutrition Examination Survey" (NHANES) study, it was reported that 5-9.9 kg of excess weight in women with overweight (BMI 25 kg/m^2 or above) increased the risk of developing hypertension 1.7 times, and an excess of 25 kg or above increased 5.2 times (13). Similarly, in our study, the median systolic and diastolic BP values were found to be significantly higher in the obese group compared to the normal-underweight group, and the systolic BP value was significantly higher in the obese group compared to the overweight group. In addition, the correlation coefficient value of both systolic and diastolic blood pressure and waist/height ratio was found to be higher than WC and WHR measurement.

Measurement of BMI and WC is usually sufficient in the diagnosis of obesity. The most important deficiency of BMI measurement is that it cannot give an idea about the body fat distribution that predicts complications caused by obesity (14). Waist/height ratio is a valid measurement in determining abdominal obesity (15). In a systematic review and meta-analysis study by Ashwell et al. (16), it was shown that waist/height ratio is a better screening tool for cardiometabolic risk factors for adults than WC. In this study, we hypothesized that waist/height ratio and NC measurements could show body fat distribution together with WC and WHR. Although there was a very strong positive correlation between BMI and waist/height ratio, WC and HC; the correlation coefficient value between BMI and NC and WHR was found to be lower. There was no clear data in the literature about waist/height ratio, NC, and the prevalence of abdominal obesity in rural areas. The frequency of abdominal obesity in our study was 25.0% in men, 68.2% in women according to WC, 60.2% according to WHR and 88% according to waist/height ratio.

Study Limitations

First, this study was performed only in the adult population, and obesity is increasing rapidly in childhood and adolescence. Second, this study had a relatively small number of participants. In addition, the ratio of women to men was not equal in the participants, and the higher number of women was the weakness of our study.

Conclusion

In this study, the prevalence of obesity was determined as 46.6%. We detected obesity at a high rate in a rural district with living conditions that were not suitable for sedentary life, where families with low socioeconomic level were in the majority. People who did not have eating habits of simple and refined sugars called as fast-food, did not reach food easily, and were not lack of physical activity due to spending time with technological devices such as computers at home, lived in this rural district. It is possible to say that obesity is also the most important health problem of our era in the countryside.

Ethics

Ethics Committee Approval: The Aksaray University Ethics Committee with the number 152 on 10.07.2018. Afterwards, administrative permission was obtained from the Provincial Health Directorate.

Informed Consent: Obtained.

Peer-review: Externally peer reviewed.

Authorship Contributions

Concept: D.İ.Ö., Design: D.İ.Ö., Ö.Ö., Data Collection or Processing: D.İ.Ö., Analysis or Interpretation: D.İ.Ö., Ö.Ö. Literature Search: D.İ.Ö., Writing: D.İ.Ö., Ö.Ö.

Conflict of Interest: No conflict of interest was declared by theauthors.

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Original Article

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Menopause Does Not Reduce Hematoma Risk After Reduction Mammoplasty Surgery: A Retrospective Analysis

Menopoz Meme Küçültme Ameliyatı Sonrası Hematom Riskini Azaltmaz; Retrospektif Analiz

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ABSTRACT

Objective: Hematoma is one of the early complications of breast reduction surgery. According to our literature review, this concomitance was not discussed in detail. The aim of this study is to show the relationship of postoperative hematoma with menopausal status in reduction mammoplasty patients.

Methods: This study included 153 patients who underwent breast reduction surgery from 2014 to 2018, and had no comorbid disease and were questioned for menopause retrospectively. The patients were divided into two groups: Group 1 comprised premenopausal women, and Group 2 comprised postmenopausal women.

Results: The mean age of the patients in Group 1 and Group 2 was 33.26±7.58 years and 52.96±4.34 years, respectively (p=0.00). The mean of total resected tissue weights in Groups 1 and 2 were 2.104±1.201 grammes and 2.492±1.098 grammes, respectively (p=0.119). Hematomas were seen in six (4.8%) patients in Group 1, and no hematoma was seen in Group 2 (p=0.593).

Conclusion: Our findings showed that menopause does not reduce the risk for hematoma, but we recommend further clinical studies.

Keywords: Breast reduction, hematoma, menopause

ÖZ

Amaç: Hematom, meme küçültme cerrahisinin erken komplikasyonlarından biridir. Literatür taramamıza göre birlikteliğini sorgulayan detaylı bir çalışmaya rastlamadık. Bu çalışmanın amacı meme küçültme ameliyatı geçirmiş hastalarda menopozal durum ile hematom ilişkisini göstermeye çalışmaktır.

Yöntemler: Bu çalışmaya, 2014-2018 yılları arasında meme küçültme cerrahisi geçiren, eşlik eden hastalığı olmayan ve menopoz için sorgulanmış 153 hasta dahil edildi. Hastalar; premenopozal ve postmenopozal olarak 2 gruba ayrıldılar.

Bulgular: Grup 1 ve Grup 2'deki hastaların yaş ortalaması sırasıyla 33.26±7.58 ve 52.96±4.34 idi(p=0,00). Grup 1 ve Grup 2'de çıkartılan ortalama doku miktarları sırasıyla 2.104±1.201 gram ve 2.492±1.098 gram (p=0,119). Grup 1'de 6 hastada hematom görüldü (%4,8) ve Grup 2'de hiçbir hastada hematom görülmedi(p=0,593).

Sonuç: Sonuçlarımız göstermiştir ki: menopoz, hematoma riskini düşürmez fakat daha geniş serili klinik çalışmaların yapılmasını öneririz.

Anahtar Sözcükler: Meme küçültme, hematom, menopoz

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Introduction

Reduction mammoplasty is one of the most common procedures performed around the world with the highest patient satisfaction rates. Contrary to common belief, it is not only an aesthetic operation, but also a reconstructive procedure, since most patients have been referred for relief of symptoms due to macromastia, such as neck and back pain, shoulder grooving, intertrigo and poor self-image (1,2). Breast reduction surgery is a complex procedure. It involves adjusting tissue, respecting the pedicle and controlling the bleeding that requires extraordinary attention since wound healing problems are common (3,4).

Breast reduction at older ages is more demanding according to several aspects of vital differences in surgical practice, i.e. diminished metabolism and reduced immune defence mechanisms and slowed wound healing. In addition, major hormonal changes occur during menopause that affect breast tissue as well (5). At older ages, adipose tissue replaces breast glandular tissue due to decreased vascularity and hormonal inactivity. The cumulative effects of these adverse reactions compromise flap surgery (3,4,6-8). Early surgery-related complications are hematoma, seroma, skin loss, wound separation, cellulitis and nipple-areola ischaemia (2). Late wound healing dependent complications are scar deformities, unfavourable scars, loss of shape and fat necrosis (2).

Hematoma is one of the early and devastating complications of breast reduction surgery. It is neither a simple, early surgery nor a complex late wound-related complication since it generally requires evacuation in revisional surgeries. If it is not treated correctly and timely, it can not only delay wound healing but also serious infection with increased intramural pressure tissue necrosis and loss of tissue are common.

In this study, we plan to show the relationship between postoperative hematoma and menopausal status in patients who had reduction mammoplasty. Although it is widely accepted that blood supply to the breasts is expected to decrease in postmenopausal patients, no study has inspected the difference in the incidence of hematoma in breast reduction surgery between premenopausal and postmenopausal women in a statistical and scientific manner. We aimed to put forward a definitive and statistical study to find whether this difference exists. According to our literature review, this concomitance was not discussed in detail.

Method

This study retrospectively reviewed 185 consecutive patients who underwent breast reduction surgery from 2014 to 2018. Patients with comorbid disease and hormone replacement therapy were excluded. This study included 153 patients who had no comorbid disease and were questioned about menopause. The patients were divided into two groups as Group 1 was premenopausal, and Group 2 was postmenopausal women, respectively. Demographic data, such as menopausal status, age, total resection weight (in grammes) and hematoma complication count, were obtained from medical records.

All patients were assessed preoperatively for breast pathology by ultrasonography, and those >40 years of age underwent breast mammography.

This article does not contain any studies with human or animal subjects.

Statistical Analysis

An independent samples test was performed to compare age and total resection weight. Complication data were then analysed using Fisher's exact test. All calculations were done with SPSS for Windows 16 (SPSS, Inc., Chicago, Ill.).

A p-value of less than 0.05 indicated statistical significance.

Results

Demographic data for the two groups are summarised in Table 1. The mean age of the patients in Group 1 and Group 2 was 33.26±7.58 years and 52.96±4.34 years, respectively. As expected, there was a significant difference between the two groups (p=0.00). The mean of total resected tissue weights in Groups 1 and 2 were 2.104±1.201 grammes and 2492±1098 grammes, respectively. Regarding the total resection weight, there were no significant differences between the two groups (p=0.119). Hematomas were seen in six (4.8%) patients in Group 1 and drained in the operating room. No hematoma was seen in Group 2. However, there was no statistical difference between Group 1 and Group 2 in the rate of hematoma (p=0.593).

Discussion

Reduction mammoplasty is a common surgical procedure. The aims of this surgery are the correction of breast aesthetically and relief of physical problems due to macromastia (2-9). This surgery

Table 1. Patient demographic data showing the number of patients, age, total resection weight and the rate of hematoma

	Group 1	Group 2	p
Number of patients	125	28	
Age (years)	33.26±7.58	52.96±4.34	0.00*
Total resection weights (gramme)	2.104±1.201	2.492±1.098	0.119
Rate of hematoma (%)	4.8	0	0.593

*indicates statistical significance

may be associated with bleeding and blood loss (10). Hematoma is one of the acute complications. It needs an urgent operation to stop the bleeding of vessels and to drain. To avoid this complication, it is recommended that haemostasis is performed under normotensive and bleeding perioperative is checked under hypertensive anaesthesia (3). In our case series, we performed all surgeries under normotensive anaesthesia and before closing incisions, we checked bleeding under perioperative hypertensive anaesthesia. In this study, the patients who had hematoma underwent a secondary operation to evacuate it. According to the BRAVO study results, the incidence of hematoma was 3.7% (4). In a large case series, hematoma incidence was 0.82% (6). A different study reported hematoma complications as 4.1% and 6% overall and larger than 1.000 gramme per breast, respectively (7). Chun et al. (8) found the hematoma rate as 1%. In the current study, the overall hematoma incidence was 3.9%; in the premenopausal group, the hematoma rate was 4.8%. These results were similar to those in the literature.

Menopause is the permanent absence of menstrual periods (11). In the postmenopausal period, oestrogen levels decrease and the loss of oestrogen causes some structural changes in breast tissue (11). It was shown that menopause caused fibroglandular tissue to decrease in breast magnetic resonance imaging (12). In a different study, age and menopause affect dense breasts changing them into nondense breasts. Nondense breasts have less glucose uptake than dense breasts (13). Thus, this decrease indicates a reduction in vascularity.

In the current work, all hematomas were seen in premenopausal patients. There was no significant difference between Groups 1 and 2. If we had a significant difference between Groups 1 and 2, this result would have been thought of as a technical fault in the premenopausal group.

The incidence of hematoma reported in the literature varies between 1% and 6%. The hematoma rate in our study is 3.9% for all patients, 4.8% in premenopausal and 0% in postmenopausal patients. Even though, the weakness our study was the unequal number of patients between groups might have caused the statistical insignificance between hematomas incidents, the higher hematoma incidence in premenopausal women could have been due to surgical error in the study.

On the other hand, age is another difference between the premenopausal and postmenopausal groups. Nelson et al. have found that age was not a significant risk factor for early complications after breast reduction surgery (14). The current work also has similar results.

Conclusion

The weakness of this study was that the number of cases in the groups was not equal. Although we have found that menopausal status does not reduce the risk for hematoma after breast reduction surgery, we advise that additional clinical studies, including larger numbers of patients, be conducted to clarify and resolve this issue accurately.

Ethics

Ethics Committee Approval: This study retrospectively reviewed.

Informed Consent: All participants signed an informed consent agreement.

Peer-review: Externally and internally peer reviewed.

Authorship Contributions

Surgical and Medical Practices: O.K., Concept: O.K., Ç.Y., E.G., Design: O.K., Ç.Y., E.G., Data Collection or Processing: O.K., Ç.Y., R.F., O.A., Analysis or Interpretation: O.K., Ç.Y., R.F., O.A., E.G., Literature Search: O.K., Ç.Y., R.F., O.A., E.G., Writing: O.K., Ç.Y., O.A.

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Original Article

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The Influence of Usage of Tourniquet in Total Knee Arthroplasty on Serum Ischemia Modified Albumin Levels

Total Diz Artroplastisinde Turnike Kullanımının Serum İskemi Modifiye Albümin Seviyeleri Üzerine Etkisi

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ABSTRACT

Objective: Ischaemia-modified albumin (IMA) has frequently been studied in recent years in ischaemia-based studies. In this study, IMA changes and postoperative pain were investigated in patients who underwent tourniquet and non-tourniquet knee arthroplasty, and the effect of the tourniquet on pain was investigated quantitatively.

Methods: After obtaining institutional review board approval, 64 patients who underwent total knee arthroplasty were divided into two groups: tourniquet and non-tourniquet using the block randomisation technique. Blood was collected at the 15th minute and 24th hour postoperatively. A visual analogue scale (VAS) was used by patients to evaluate their pain.

Results: According to the results, a significant correlation was found between VAS scores and IMA levels in the blood taken at the postoperative 15th minute ($p<0.001$). In addition, IMA levels were significantly higher in the tourniquet group ($p<0.001$).

Conclusion: Less frequent loss of quadriceps muscle strength, less postoperative pain and avoidance of ischaemia-related complications are the main advantages of non-tourniquet knee arthroplasty. IMA is effective in demonstrating these advantages and can be used for problems such as compartment syndrome, which may be accompanied by muscle damage in the extremity.

Keywords: Ischemia modified albumin, knee arthroplasty, tourniquet

ÖZ

Amaç: İskemi modifiye albümin (İMA) son yıllarda iskemi temelli çalışmalarda sıkça incelenmiştir. Bu çalışmada turnikeli ve turnikesiz diz artroplastisi uygulanan hastalarda İMA değişimleri ve postoperative ağrı incelenmiş olup turnikenin diz artroplastisinde ağrı üzerine etkisi kantitatif olarak araştırılmıştır.

Yöntemler: Kurumsal Etik kurul onayının alınmasının ardından diz artroplastisi uygulanmış 64 hasta blok randomizasyon tekniği ile turnikeli ve turnikesiz olarak iki gruba ayrıldı. Preoperatif, postoperative 15. dakika ve 24. saatlerde kan alındı. VAS skorlaması kullanılarak ağrı düzeyleri değerlendirildi.

Bulgular: Elde edilen verilere göre postoperatif 15.dakikada alınan kanda incelenen IMA değeri ile VAS değeri arasında anlamlı korelasyon tespit edilmiştir ($p<0,001$) Ayrıca İMA değerleri turnikeli grupta anlamlı olarak yüksek bulunmuştur ($p<0,001$).

Sonuç: Quadriceps kas gücü kaybının daha az olması, postoperatif ağrının daha az olması, iskemiye bağlı komplikasyonlardan kaçınılmış olması turnikesiz diz artroplastisi uygulamasının temel avantajlarıdır. İMA bu avantajların gösterilmesinde etkin olduğu gibi, ekstremitede kas hasarının eşlik edebildiği kompartman sendromu gibi problemlerde de kullanılabilecektir.

Anahtar Sözcükler: İskemi modifiye albümin, diz artroplastisi, turnike

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Introduction

Knee arthroplasty is a surgical procedure with successful results in over 90% of cases when pain and functional recovery are considered based on cases of gonarthrosis during advanced age (1). The use of a tourniquet in knee arthroplasty has been examined regarding pain, function, muscle strength and prosthesis survival. It is unquestionable that a tourniquet facilitates surgical exposure; however, studies indicate that there is no benefit of tourniquet use other than showing a positive effect in cement adhesion (2-4). It is also thought that tourniquets increase postoperative pain due to ischaemia and nerve compression. However, studies on this subject have not shown a quantitative value that would be a significant ischaemia criterion (2,5,6).

The use of a tourniquet in knee arthroplasty has been associated with increased risk of deep venous thrombosis (7), wound healing impairment (8) and postoperative pain (8,9). A limited number of markers are significant in the literature to investigate the presence and possible consequences of ischaemia. Ischaemia-modified albumin (IMA) is a derivative of albumin. It is known that a reduction occurs in the metal binding capacity of albumin by the modification of the N-terminal end of the albumin caused by hydroxyl ions formed as a result of oxidative stress (10,11). IMA, which is known to be elevated in the event of ischaemia, has been accepted as a quantitative marker for ischaemia and investigated in many pathologies, including cardiac ischaemia, abdominal compartment syndrome and asthma attacks (12).

The aim of this study is to investigate the effect of ischaemia and oxidative stress on pain occurring after knee arthroplasty.

Method

Approval was obtained for this prospective, randomised controlled trial from the local Ethics Committee with decision numbers 2017/161. Sixty-four patients who underwent unicompartmental knee arthroplasty were divided into two groups, tourniquet and non-tourniquet, using the block randomisation technique; homogeneity was provided between the groups.

Patients with a history of symptomatic diabetic microangiopathy, cardiovascular disease, peripheral arterial disease and previous extremity surgery within the last three months were excluded from the study.

In all patients, 2 g cefazolin was administered perioperatively, and 4*1 g perioperatively over 24 hours as perioperative antibiotic prophylaxis. In all patients, standard posterior cruciate ligaments cutting posterior-stabilised designs were preferred. All procedures were performed by two different surgeons with at least five years' experience in knee arthroplasty. Hemovac drains were placed as a standard procedure to prevent hemarthrosis. Five hundred milligrammes of tranexamic acid was injected into the joint in all patients during the postoperative period to reduce blood loss. Blood was collected from the cubital fossa veins before tourniquet application at the 15th minute (min) and 24th hour postoperatively by the same person.

A visual analogue scale (VAS) was used by patients to evaluate their pain (Figure 1).

The blood taken from patients for IMA measurement was placed into serum-separating tubes and centrifuged at 3000 rpm for 10 min using a Sigma centrifuge. Serum samples were placed in Eppendorf tubes for 1 hour and kept at -80 °C until the time of the study. From the dissolved patient serum, 200 gL was placed into the sample tube and 200 gL into the blank tube. Fifty microliters of 1 g/L $CoCI_2$ (Cobalt-2-chloride)(Merck, K102539.0100, Darmstadt, Germany) was added to both the sample tube and the blank tube. The prepared mixture was mixed with a vortex and allowed to incubate for 10 minutes at room temperature. After 10 min, 50 gL 1.5 g/L DTT (dithiothreitol) (Merck, K111474.0005, Darmstadt, Germany) was added to the sample tube. This was kept at room temperature for two min to observe the colour change. After two min, 1 mL of normal saline (0.9% NaCl) was added to both the sample and blank tubes. Absorbances were measured at 470 nm in a Perkin Elmer Lambda 25 Spectrophotometer. The sample and blank tube results were recorded separately. The results were recorded as Absorbance Units (ABSU). In addition, IMA values of each patient were calculated according to their operation group and albumin. Albumin determination was performed on a Beckman Coulter Au 5800 device using the bromocresol green method. The results are presented as mg/dL.

Corrected IMA (ABSU,): IMA x patient's albumin/Albumin average of the group.

Statistical Analysis

The IBM SPSS Statistics Version 21 programme was used for statistical analyses. The values to be examined were subjected to normality analysis using the Shapiro-Wilk test. Student's t-test (independent sample t-test) was used to compare values between the tourniquet and non-tourniquet groups that were evaluated as parametric (sig. >0.05) in the normality test. The Mann-Whitney U test was used for the groups that were evaluated as nonparametric (sig. <0.05). In addition, for correlations between numeric values, Pearson's test was used for the groups that were evaluated as parametric in the normality test. Spearman's test was used for the groups that were evaluated as nonparametric. For the results, assessments of $p<0.05$ were considered statistically significant. In the correlation evaluations, the power of significance was determined by the value of r.

Results

A total of 64 patients, 58 females and six males were included in the study. The mean surgical duration was determined as

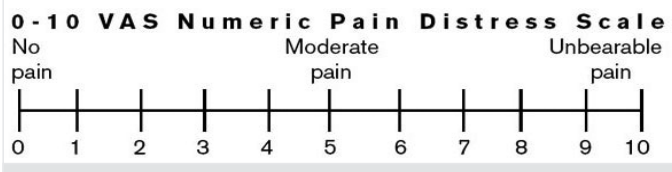

Figure 1. The visual analogue scale (VAS)

73.6±11.4 min. Regarding surgical duration, the mean time of the tourniquet group was 80.4±8.7 min, and the non-tourniquet group was 66.8±9.6 min, and this difference was statistically significant (p<0.001) (Table 1).

Patients had significantly higher VAS scores in the tourniquet group than the non-tourniquet group at the 12th postoperative hour (p<0.001) (Table 1). A significant correlation was found between the postoperative 15th min IMA and corrected postoperative 15th min IMA values and 12th hour VAS scores (p<0.001) (Table 3). A significant positive correlation was found between VAS scores and surgical duration (p=0.002) (Table 3).

When IMA levels were measured preoperatively and at the 15th min and 24th hour postoperatively, it was determined that the postoperative 15th min IMA and corrected IMA (13) values were significantly higher in the tourniquet group (Graph 1). However, no significant relationship was found between the two groups in the preoperative and postoperative 24th hour IMA values. There were no significant correlations observed between patient-linked factors, such as body mass index (BMI) and age, between both groups (Table 1).

When the correlation between IMA values and surgical duration was examined, IMA values at the postoperative 15th min and corrected postoperative 15th min were found to be highly correlated with surgical duration (Table 2).

Discussion

Regarding the difference in surgical duration between the tourniquet and non-tourniquet groups, this may have been caused by the wrapping of the tourniquet to prevent infection in patients, draining the limb blood with a non-sterile esmarch bandage, the time from starting the tourniquet to inflation, and the time lost during the case preparation. No studies could be found in the literature investigating the differences in surgical duration in patients undergoing knee arthroplasty with and without tourniquets. However, Willis et al. (14) reported that long surgery time and long tourniquet time were associated with an increased infection rate. No infections were detected in our patients, and we believe that these data can be supported with more extensive case studies.

The use of a tourniquet in knee arthroplasty is an application that depends on the surgeon's preference and is reliable. Refaai et al. found that in 23 knee arthroscopy cases in which a tourniquet was used, IMA was significantly higher compared with preoperative levels in correlation with myoglobin in the material taken after the tourniquet was lowered (15). In our study, IMA and corrected IMA levels in the blood taken at the postoperative 15th min was found to be significantly higher in the tourniquet group. In a prospective study, Wakanhar et al. (16) reported that only postoperative early flexion movements were better in knee arthroplasties performed without tourniquet application. However, there was no long-term difference, and there was no significant difference in blood volume, analgesic requirement, and postoperative pain (16). In a meta-analysis by Zhang et al. (8), non-tourniquet knee arthroplasty was found to be superior regarding thromboembolic events and associated complications. It has been reported that tourniquet use may prevent postoperative exercise, but no significant difference was found in blood loss [8]. Also, the use of tourniquets was reported to improve surgical conditions, surgical vision and reduce blood loss in different studies (5,6,17-19). Although the

Table 2. Statistical examination of correlation between surgical duration and postoparative IMA levels

	r	p
Surgical duration-postoperetive 15th min IMA	0.435	<0.001
Surgical duration corrected postoparative 15th min IMA	0.298	0.017

IMA: Ischemia modified albumin

Table 3. Examination of the corelation between postoparative 15th min IMA, VAS and surgical duration values

	r	p
Postoperetive 15th min IMA-VAS	0.790	<0.001
Corrected postoparative 15th min IMA-VAS	0.782	<0.001
VAS-Surgical duration	0.380	<0.002

IMA: Ischemia modified albumin, VAS: Visual analog scale

Table 1. Statistical evaluation of the changes in surgical duration, BMI, and age variables related to tourniquet

	Tourniquet	Non-tourniquet	p
Surgical duration (minutes)	80.4±8.7	66.8±9.6	**<0.001**
Preoperative IMA	1.06±0.03	1.06±0.04	0.995
Postoperative 15th min IMA	1.25±0.21	1.02±0.23	**<0.001**
Postoperative 24th hour IMA	1.08±0.28	1.03±0.23	0.528
VAS 12th hour	8.85±0.65	7.95±0.73	**<0.001**
IMA first change	-0.19±0.20	0.03±0.20	**<0.001**
Corrected IMA first change	0.20±0.27	-0.0065±0.25	**0.002**
BMI	32.7±6.9	32.7±3.7	0.975
Age	64.7±7.8	63.6±6.6	0.560

BMI: Body mass index

use of a tourniquet provides better adhesion of cement, studies also reported that there is no difference (2-4). Estebe et al. (5) stated that the most important complication of a tourniquet is pain caused by mechanical compression or ischaemia-reperfusion injury. However, Spruce reported that tourniquets could be used safely when in compliance with the appropriate conditions of use. In addition, complications would be minimised to ensure the best possible visualisation of the surgical environment, reduction of blood loss, and optimisation of surgical conditions (6). Kumar et al. (19) examined pain in patients undergoing total knee arthroplasty with and without a tourniquet, and the group without a tourniquet reported less early postoperative pain and early functional return. In our study, the early VAS score and IMA values were significantly higher in the tourniquet group, which implies less postoperative early pain in the non-tourniquet group.

In the present study, a significant positive correlation was found between the postoperative 15th min IMA and the corrected postoperative 15th min IMA values and surgical duration. It is reported in the literature that surgical duration is important, especially for pain. The duration of ischaemia and IMA correlations have been examined in abdominal compartment syndrome in the literature, and IMA levels were found to be elevated with increased ischaemic time (12). However, there are no data in the literature on limb ischaemia time and IMA levels.

IMA was found to be higher in obese cases linked to the disruption of adipose tissue oxygenation (20). In our cases, IMA levels taken 24 hours after the end of ischaemia were not significantly different between the two groups. Since there were no significant differences between the two groups regarding BMI and age values, patient characteristics, such as BMI and age, did not have a significant negative effect.

Study Limitations

The limitations of our study include the functional results, the short postoperative follow-up period regarding the evaluation of the relationship between stability and IMA, the patients' BMIs being above normal values, and working with two different surgeons. We believe that more extensive case studies can be conducted by increasing the number of patients, and perhaps more accurate results can be obtained. We believe that tourniquet application is an appropriate, accessible, and effective method for the future to examine the early effects of compartment syndrome. The less frequent loss of quadriceps muscle strength, less postoperative pain and avoidance of ischaemia-related complications are the main advantages of non-tourniquet knee arthroplasty. IMA is effective in demonstrating these advantages and can be used for problems such as compartment syndrome, which may be accompanied by muscle damage in the extremity.

Conclusion

This prospective, randomised, controlled study evaluated the effects of the use of a tourniquet in knee arthroplasty concerning IMA, which is a quantitative value. This study is unique because it is a controlled study of IMA in orthopaedic surgery.

When we evaluate our findings, it is important to remember that the use of a tourniquet in knee arthroplasty procedures is a safe method if the rules are followed. However, postoperative pain on the first day is more common in patients with tourniquets compared with those without tourniquets. In addition, we think that the tourniquet forms a controlled compartment syndrome model. Therefore, IMA is an easy marker to reach and examine during the early stages in patients with suspected compartment syndrome. However, new studies are needed to increase the value of IMA in the diagnosis of compartment syndrome and to increase its use in orthopaedic surgery.

Ethics

Ethics Committee Approval: Approval was obtained for this prospective, randomised controlled trial from the local Ethics Committee with decision numbers 2017/161.

Peer-review: Internally and externally peer reviewed.

Authorship Contributions

Surgical and Medical Practices: Ö.F.E., A.Y., Concept: S.Ç., Design: A.Y., B.K.A., Data Collection or Processing: S.Ç., E.P.H., Analysis or Interpretation: S.Ç., B.K.A., Literature Search: S.Ç.

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

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Original Article

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Knowing and Use Situations of Hemovigilance System in the Scope of Blood Transfusion Safety of Nurses: Rural Example

Hemşirelerin Kan Transfüzyon Güvenliği Kapsamında Hemovijilans Sistemini Bilme ve Kullanım Durumları: Kırsal Bölge Örneği

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ABSTRACT

Objective: This study was carried out to determine the nurses' knowledge of the hemovigilance system and their use of it, within the scope of blood transfusion safety.

Methods: The sample of this descriptive and cross-sectional study consisted of all nurses (n=65) working at Gümüşhane State Hospital. The data were collected with "Structured Question Form" Number, percentage, mean, Continuity Correction, Pearson Chi-Square and Fisher Exact tests were used to evaluate the data.

Results: Of the nurses, 90.8% were women, the average age was 27.01±5.16 (20-48) years and 86.1% had undergraduate or higher education. Of the nurses, 84.6% knew that they were supervised by a hemovigilance nurse. Nurses (43.1%) who received training on the hemovigilance system had higher levels of knowing that "each unit of blood taken from the donor follows the final destination (100.0%)" than the nurses who did not receive training (p <0.05). The nurses who knew that they were supervised during transfusion related processes performed the following steps at a higher rate than those who did not know that they were inspected (p <0.05): "Wearing gloves before the application (100.0%)", "using appropriate branches in children (87.3%)", "obtaining written consent before blood transfusion (100.0%)", and "completing the blood transfusion within a maximum of four hours (87.3%)" were higher than nurses who did not know that they were supervised (p

ÖZ

Amaç: Bu çalışma; hemşirelerin kan transfüzyon güvenliği kapsamında hemovijilans sistemini bilme ve kullanım durumlarını belirlemek amacıyla yapıldı.

Yöntemler: Kesitsel tipteki araştırmanın örneklemini, Gümüşhane Devlet Hastanesi'nde çalışmakta olan tüm hemşireler (n=65) oluşturdu. Veriler, "Yapılandırılmış Soru Formu" ile toplandı. Verilerin değerlendirilmesinde sayı, yüzdelik, ortalama, continuity correction, pearson chi-square ve fisher exact testi kullanıldı.

Bulgular: Hemşirelerin %90,8'i kadındı, yaş ortalaması 27,01±5,16 (min: 20 - maks: 48) yıldı ve %86,1'i lisans ve üstü eğitime sahipti. Hemşirelerin %84,6'sı bir hemovijilans hemşiresi tarafından denetlendiğini bilmekteydi. Hemovijilans sistemi ile ilgili eğitim alan hemşirelerin (%43,1) "hemovijilansın, bağışçıdan alınan her bir ünite kanın son varış yerine kadar izlediğini (%100,0)" bilme durumları eğitim almayan hemşirelerden daha yüksek bulundu (p<0,05). Hemovijilans hemşiresi tarafından denetlendiğini bilen hemşirelerin "uygulama öncesi eldiven giyme (%100,0), çocuklarda uygun branül kullanma (%87,3), kan transfüzyonu öncesi yazılı onam alma (%100,0), kan transfüzyonunu azami dört saat sürede tamamlama (%87,3)" gibi transfüzyon basamaklarını gerçekleştirme durumları denetlendiğini bilmeyen hemşirelere göre yüksek bulundu (p<0,05). Ayrıca; hemşirelerin büyük bir çoğunluğunun (%90,8) kan transfüzyonuna ilişkin güncel prosedürü kullandıkları belirlendi.

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<0.05). Also; the majority of nurses (90.8%) were determined to use the current procedures for blood transfusions.

Conclusion: In line with the findings of the study, it was stated that the nurses who were educated about the hemovigilance system and who knew that they were supervised by the hemovigilance nurse, had high hemovigilance system usage.

Keywords: Nurse, hemovigilance, hemovigilance nurse, blood transfusion

Sonuç: Araştırmadan elde edilen bulgular doğrultusunda, hemovijilans sistemi ile ilgili eğitim alan ve hemovijilans hemşiresi tarafından denetlendiğini bilen hemşirelerin hemovijilans sistemi kullanım durumlarının yüksek olduğu belirlendi.

Anahtar Sözcükler: Hemşire, hemovijilans, hemovijilans hemşiresi, kan transfüzyonu

Introduction

The term hemovigilance consists of the combination of the Greek words "hema = blood" and Latin "vigilance = alertness" (1). International Haemovigilance Network (IHN) defines hemovigilance as "a set of monitoring procedures covering the entire blood transfusion chain (from collection of blood and its components to monitoring recipients) to collect and evaluate information on unexpected or undesirable effects arising from therapeutic use of blood products and to prevent their occurrence or recurrence (2).

Hemovigilance was first used in France in 1990, and the national hemovigilance system was established in France for the first time in 1992 (1). Later, various organizations were established to increase blood transfusion safety in many countries such as the United Kingdom, Canada, the Netherlands, Japan, Russia, Switzerland and the United States of America (3). In Turkey, first definition of hemovigilance was made in the 4th item of the Blood and Blood Products Regulation which was published in the Official Gazette (No:27074, date: 04/12/2008) (4). According to this Regulation; the main goal of the hemovigilance system is to increase transfusion safety. The actor of the system is the hemovigilance nurse. Hemovigilance nurse monitors and inspects whether all transfusions performed in the hospital are carried out safely within the scope of the "Transfusion Monitoring Form", organizes periodic trainings about safe blood transfusion, informs the transfusion committee about improprieties, makes sure that the regulator and preventive actions are initiated by the relevant clinic and keeps records and documents on these issues (5).

Clinical nurses have a responsibility to provide safe transfusion and to provide high standards of care during transfusion. In the literature, it has been reported that blood transfusion errors are mostly practitioner-related and mostly occur during the transfusion process (6,7). Therefore; nurses should have sufficient knowledge and skills to provide safe blood transfusion to the right patient, to inform the patient about transfusion, to keep the blood in appropriate conditions and for the appropriate time, to observe the patient in terms of warming and reaction symptoms that may occur during transfusion, and to prevent complications that may occur. They should have sufficient knowledge and skills about what can be done when complications develop (8). The nurse should follow the patient closely for any complications that may develop. Vital signs should be checked at appropriate intervals before, during and after any transfusion. Early detection of a complication that develops during transfusion and immediate initiation of treatment is an important issue in terms of preventing mortality (9).

Blood and blood products are used to improve the clinical condition of many patients and to save lives (10). Human errors that prevent blood transfusions from being carried out properly are largely caused by non-compliance with relevant blood transfusion procedures (11). It is important for nurses to use up-to-date evidence-based clinical guidelines for safe and effective transfusion (6). In this context, the Ministry of Health in Turkey has published National Directory Hemovigilance in 2016 (5). According to this guide; in providing safe blood transfusion, nurses should pay attention to the elements included in the Transfusion Follow-up Form, such as appropriate blood, correct patient, appropriate procedure and timing (5,12).

Nurses with transfusion-related roles and responsibilities should be able to use the hemovigilance system and make relevant notifications (13). The correct use of the hemovigilance system by nurses ensures the safety of the patient in the process of taking the blood product from the donor and transfusing it to the recipient. However, misuse of the hemovigilance system such as transfusing the blood product containing wrong group or antigen to the patient, not checking the identity information of the patient before the transfusion, not being monitored and evaluating the changes in the patient's condition adequately during the transfusion, not following the unwanted or unexpected reactions, not reporting the developing reaction to the physician, not following the patient sufficiently after blood transfusion, and not complying with the storage conditions of the blood product, can cause morbidity and mortality in patients (5,14,15). Therefore, this study was conducted to determine the nurses' knowledge and use of the hemovigilance system within the scope of blood transfusion safety.

Research Question

1. Is there a difference between nurses knowing that they are being supervised by the hemovigilance nurse and nurses that do not know that they are being supervised, in terms of using the hemovigilance system within the scope of blood transfusion safety?

Method

Research Type

The research was done in cross-sectional type.

Research Universe-Sample

The population and the sample of the study consisted of all nurses (n=65) who worked in a State Hospital between June and August 2018 and performed blood transfusions. The number of nurses were as follows: ınternal medicine 4, chest diseases 4, surgery 3, urology 3, orthopedics 3, otolaryngorhinology 2, neurology 3, cardiology 3, ophthalmology 2, gynecology 3, delivery room 4, pediatrics 5, ıntensive care units 10, dialysis 5, laboratory 6 and operating room 5. The participation rate in the study was determined as 100%.

Data Collection Tools

The research data were collected by the researchers using the "Structured Question Form" created by scanning the literature (5,13) and presented to the "expert panel" (three lecturer nurses) to receive their opinions on the content of the form. In line with the recommendations of the experts, seven questions were removed and the form was finalized. The form included questions about nurses' knowledge on the hemovigilance system within the scope of blood transfusion safety and its use.

The "Structured Question Form" consisted of three parts.

In the first part; there were nine open-ended and closed-ended questions to determine the nurses' introductory information (age, gender, marital status, education level, total years of work in the profession, the clinic in which the nurse worked, the year of working in the clinic, whether training on the hemovigilance system, and whether knowing that it was supervised by the hemovigilance nurse).

In the second part, there were a total of 12 closed-ended questions. There were 7 questions aimed at determining the nurses' knowledge of the hemovigilance system (monitoring the blood component to the final destination, unexpected/unwanted reactions, main target of hemovigilance, preventing the recurrence of adverse reactions, etc.), and 5 questions aimed at determining the status of knowing the duties and responsibilities of the hemovigilance nurse (organizing trainings, reporting non-conformities to the transfusion committee, reporting adverse events and reactions to the hospital hemovigilance coordinator, etc.)

In the third part, there were a total of 24 questions: Six questions on "pre-transfusion" (washing hands before transfusion, wearing gloves, administering medication at the request of a physician, following and applying the current procedure, etc.) within the scope of the "Transfusion Control Form"; 7 questions on "Patient and Blood Component Identification" (identity check, patient's blood type, blood donor number, final check of ingredient, check of cross-match test, reporting status when encountering incompatibility, etc.); 8 questions on "Application Techniques and Monitoring" (recording vital signs, monitoring adverse reactions, recording etc.); 3 questions on "Timing" (starting time after the blood component comes from the blood bank, recording the start and end time of the transfusion, the maximum duration of the transfusion, etc.)

Data Collection Method

The "Structured Question Form" was administered by the researcher using a face-to-face interview technique between June and August 2018, within a suitable time frame in the units where the nurses work. Nurses' names were not included in the form. The form took about 15 minutes to fill.

Evaluation of Data

Statistical Package for Social Sciences (SPSS) for Windows 24.0 program was used for the coding and statistical analysis of the data obtained from the study. Descriptive statistics (number, percentage, mean, standard deviation), continuity correction, pearson chi-square and Fisher Exact tests were used to evaluate the data. The results were evaluated at 95.0% confidence interval and $p<0.05$ significance level.

Ethical Aspect of the Research

The necessary institutional permission to conduct the research was obtained from the Gümüşhane Provincial Health Directorate (date: 10/07/2018 and number: 38032705-044-E.113), and the ethics committee permission was obtained from the Gümüşhane University Ethics Committee (number: 2018/6 and date: 02/07/2018). Verbal consent was obtained from each of the nurses after the necessary explanations were given to the nurses about the purpose and application of the study before starting the study.

Results

Of the nurses participating in the study, 90.8% were women, 61.5% were single and 86.1% had undergraduate or higher education and the average age was 27.01±5.16. It was determined that 44.6% of the nurses had been working in the clinic for 1-5 years, 93.7% of them had been working for five years or less. Of the nurses, 56.9% did not receive training on the hemovigilance system and 84.6% knew that they were supervised by the hemovigilance nurse (Table 1).

All of the nurses (100%) who received training on the hemovigilance system (43.1%) answered "yes" for the statements of "hemovigilance monitors each unit of blood or blood component from the donor to the final destination", "hemovigilance collects information about unexpected/ adverse reactions from clinical use", "hemovigilance system takes corrective actions to prevent the recurrence of unwanted reactions and improper applications during the blood donation and transfusion process", "hemovigilance follows the document confirming that the blood transfusion has been completed", and "hemovigilance monitors the information about whether early and adverse reactions are observed"; 96.4% answered "yes" for the statements of "hemovigilance, in the case of a suspected transfusion-related reaction in the recipient, traces the patient

to the donor in order to identify the donor who has donated the blood component that is likely to lead to the reaction". Their state of knowing was significantly higher than those who did not receive training (p<0.05). Of the nurses who received training on the hemovigilance system, 85.7% knew that "the hemovigilance nurse works directly under the transfusion committee and is also a natural member of the transfusion committee" and 96.4% knew that "the hemovigilance nurse should report all adverse events and reactions to the hospital hemovigilance coordinator". Their state of knowing was significantly higher than those who did not receive training (p<0.05) (Table 2).

Nurses who knew that they were supervised during transfusion-related processes performed the following steps in the "pre-transfusion" section at a higher rate than those who did not know that they were inspected (p<0.05) (Table 3): "Wearing gloves before application (100%)", "washing hands before application (96.4%)", "benefiting from the current procedure related to blood transfusion (94.5%)", "establishing vascular access with a minimum 23G branch in children (87.3%)", "Administering medication to the patient with the physician's request before the transfusion (83.6%)", and "being constantly aware of the current procedures and information about blood transfusion (78.2%)".

Nurses who knew that they were supervised during transfusion-related processes performed the following steps in the "Patient and Blood Component Identification" section at a higher rate than those who did not know that they were inspected (p<0.05) (Table 3): "Informing the patient about the benefits of blood transfusion, the reason for administration, possible complications and reaction symptoms (100%)", "having the patient/relative sign the informed consent form before the blood transfusion (100%) and" reporting the situation to the transfusion center when encountering any inconvenience (98.2%)".

Nurses who knew that they were supervised during transfusion related processes performed the following steps in the "Application Techniques and Monitoring" section at a higher rate than those who did not know that they were inspected (p<0.05) (Table 3): "Making blood transfusion using a standard 170-200 µm diameter filter set (81.8%)", "Monitoring and recording the vital signs (fever, pulse, blood pressure, respiration) of a patient every 30 minutes during transfusion (100%)" , "Not using a solution other than 0.9% NaCl for filling or washing the transfusion set in transfusion of whole blood, erythrocyte, platelet suspensions (80%)", "Following the patient for a minimum of 60 minutes after the end of the transfusion (92.7%)" and "Destroying an empty blood bag after transfusion (72.7%)".

Nurses who knew that they were supervised during transfusion related processes performed the following steps in the "Timing" section at a higher rate than those who did not know that they were inspected (p<0.05) (Table 3): "Starting the blood transfusion within 30 minutes at most after the blood component comes from the blood bank if the patien's condition is appropriate (90.9%)" and "Completing the transfusion of whole blood and erythrocyte concentrate within a maximum of 4 hours (87.3%)".

Table 1. Introductory features of the nurses

	n	%
Gender		
Female	59	90.8
Male	6	9.2
Marital status		
Married	25	38.5
Single	40	61.5
Education level		
High school/associate degree	9	13.9
Undergraduate or higher	56	86.1
Working year in the profession		
1 year ↓	16	24.6
1-5 years	29	44.6
6 years or ↑	20	30.8
Working year in the clinic		
5 years or ↓	61	93.7
5 years ↑	4	6.3
Training status on the hemovigilance system		
Yes	28	43.1
No	37	56.9
Knowing that you are being supervised by a hemovigilance nurse		
Yes	55	84.6
No	10	15.4
Mean age: 27.01±5.16 (Min:20-Max:48)		

Discussion

The hemovigilance system covers all processes such as monitoring, reporting and investigating adverse events throughout the transfusion chain, from the collection of blood and blood components to the follow-up of recipients. Safe transfusion success is closely related to the knowledge and behavior of healthcare professionals participating in the treatment. Therefore, safe transfusion should be well coordinated between hospital's clinical staff and transport laboratories, hospital transport committees, regulatory agency and national health authorities, and healthcare professionals who perform blood transfusion should be constantly trained by a hemovigilance nurse (3,5). In our study, all of the nurses (43.1%) who received training on the hemovigilance system (100%) stated that they monitored the blood component of hemovigilance from the donor to the final destination, gathered information about unexpected /unwanted reactions and took action to prevent them, and followed up the document confirming that blood transfusion was completed. In a study, it was reported that 64.7% of the nurses defined hemovigilance as collecting information about unexpected or undesirable effects during blood transfusion (16).

One of the duties of the hemovigilance nurse is to control transfusion safety. Every staff who is involved in the organization of the hemovigilance system has transfusion-related duties and responsibilities and can make all notifications related to

Table 2. According to their hemovigilance training status. nurses' knowledge of the hemovigilance system and their knowledge of the duties and responsibilities of the hemovigilance nurse

	Receiving hemovigilance training			
	Yes	No	Total	x^2
Hemovıgılance system	n (%)	n (%)	n (%)	p
Hemovigilance monitors each unit of blood or blood component from the donor to the final destination (patient. disposal. manufacturer).				
Yes	28 (100.0)	31 (83.8)	59 (90.8)	x^2=5.002
No	-	6 (16.2)	6 (9.2)	p=0.035
Hemovigilance collects information about unexpected/adverse reactions from clinical use.				
Yes	28 (100.0)	27 (73.0)	55 (84.6)	x^2=8.943
No	-	10 (27.0)	10 (15.4)	p=0.002
The main goal of hemovigilance is to increase the safety of the blood donor and the recipient (transfusion) by preventing the recurrence of adverse reactions and events.				
Yes	24 (85.7)	31 (83.8)	55 (84.6)	x^2=0.046
No	4 (14.3)	6 (16.2)	10 (15.4)	p=1.000
Hemovigilance takes corrective actions to prevent the recurrence of unwanted reactions and improper applications during blood donation and transfusion process.				
Yes	28 (100.0)	28 (75.7)	56 (86.2)	x^2=7.905
No	-	9 (24.3)	9 (13.8)	p=0.004
If there is a suspicion of a transfusion-related reaction in the recipient. hemovigilance traces back from the patient to the donor to identify the donor who has donated the blood component likely to cause the reaction.				
Yes	27 (96.4)	19 (51.4)	46 (70.8)	x^2=15.656
No	1 (3.6)	18 (48.6)	19 (29.2)	p=0.000
Hemovigilance follows the document confirming that blood transfusion has been completed.				
Yes	28 (100.0)	29 (78.4)	57 (87.7)	x^2=6.904
No	-	8 (21.6)	8 (12.3)	p=0.032
Hemovigilance monitors information on whether early and adverse reactions are observed.				
Yes	28 (100.0)	29 (78.4)	57 (87.7)	x^2=6.904
No	-	8 (21.6)	8 (12.3)	p=0.008
Hemovigilance nurse				
The hemovigilance nurse works directly under the transfusion committee and is also a natural member of the transfusion committee.				
Yes	24 (85.7)	17 (45.9)	41 (63.1)	x^2=9.183
No	4 (14.3)	20 (54.1)	24 (36.9)	p=0.002
The hemovigilance nurse organizes periodic training on blood transfusions.				
Yes	24 (85.7)	25 (67.6)	49 (75.4)	x^2=2.828
No	4 (14.3)	12 (32.4)	16 (24.6)	p=0.093
The hemovigilance nurse notifies the transfusion committee of nonconformities regarding blood transfusions.				
Yes	27 (96.4)	30 (81.1)	57 (87.7)	x^2=3.478
No	1 (3.6)	7 (18.9)	8 (12.3)	p=0.065
The hemovigilance nurse reports all adverse events and reactions to the hospital hemovigilance coordinator.				
Yes	27 (96.4)	28 (75.7)	55 (84.6)	x^2=5.273
No	1 (3.6)	9 (24.3)	10 (15.4)	p=0.021
The hemovigilance nurse inspects the appropriateness of transfusion-related processes within the scope of the "Transfusion Control Form"				
Yes	26 (92.9)	29 (78.4)	55 (84.6)	x^2=2.567
No	2 (7.1)	8 (21.6)	10 (15.4)	p=0.103

Continuity Correction. Pearson Chi-Square. Fisher Exact Test

Table 3. The status of the nurses to perform the transfusion steps within the scope of the "Transfusion Control Form" according to their knowledge that they are supervised in transfusion-related processes

	Knowing that you are being supervised			
	Yes	No	Total	x^2
Before transfusion	n(%)	n(%)	n(%)	p
I wash my hands before procedure.				
Yes	53 (96.4)	9 (90.0)	62 (95.4)	x^2=0.778
No	2 (3.6)	1 (10.0)	3 (4.6)	p=0.399
I wear gloves before procedure.				
Yes	55 (100.0)	8 (80.0)	63 (96.9)	x^2=11.349
No	-	2 (20.0)	2 (3.1)	p=0.022
I establish vascular access with a minimum of 23 G branules in children.				
Yes	48 (87.3)	5 (50.0)	53 (81.5)	x^2=7.809
No	7 (12.7)	5 (50.0)	12 (18.5)	p=0.014
If there is a physician's request before the transfusion. I will give medication to the patient.				
Yes	46 (83.6)	3 (30.0)	49 (75.4)	x^2=13.118
No	9 (16.4)	7 (70.0)	16 (24.6)	p=0.001
I am constantly aware of current procedures and information regarding blood transfusion.				
Yes	43 (78.2)	4 (40.0)	47 (72.3)	x^2=6.161
No	12 (21.8)	6 (60.0)	18 (27.7)	p=0.022
I use the current procedure for blood transfusion.				
Yes	52 (94.5)	7 (70.0)	59 (90.8)	x^2=6.084
No	3 (5.5)	3 (30.0)	6 (9.2)	p=0.042
Patient and blood component identification				
While the transfusion is starting. I finalize the patient's blood type. blood donor number and component				
Yes	54 (98.2)	9 (90.0)	63 (96.9)	x^2=1.899
No	1 (1.8)	1 (10.0)	2 (3.1)	p=0.286
I check that the serological test results of the blood product are negative.				
Yes	48 (87.3)	7 (70.0)	55 (84.6)	x^2=1.939
No	7 (12.7)	3 (30.0)	10 (15.4)	p=0.175
I check that the blood product number on the blood product label and the blood product number on the cross label are the same.				
Yes	53 (96.4)	9 (90.0)	62 (95.4)	x^2=0.778
No	2 (3.6)	1 (10.0)	3 (4.6)	p=0.399
I check the appearance of the blood product and the bag (clot. color. residue. particles).				
Yes	55 (100.0)	9 (90.0)	64 (98.5)	x^2=5.586
No	-	1 (10.0)	1 (1.5)	p=0.154
I inform the patient about the benefits of blood transfusion. application reason. possible complications and reaction symptoms.				
Yes	55 (100.0)	8 (80.0)	63 (96.9)	x^2=11.349
No	-	2 (20.0)	2 (3.1)	p=0.022
I have the patient or the patient's relative sign the informed consent form before blood transfusion.				
Yes	55 (100.0)	8 (80.0)	63 (96.9)	x^2=11.349
No	-	2 (20.0)	2 (3.1)	p=0.022
I report any inconvenience to the transfusion center.				
Yes	54 (98.2)	7 (70.0)	61 (93.8)	x^2=11.637
No	1 (1.8)	3 (30.0)	4 (6.2)	p=0.010

Table 3. contiuned

Application techniques and monitoring				
I perform blood transfusion using a standard 170-200 µm diameter filter set.				
Yes	45 (81.8)	3 (30.0)	48 (73.8)	x^2=11.764
No	10 (18.2)	7 (70.0)	17 (26.2)	p=0.002
I monitor and record the patient's vital signs (fever. pulse. blood pressure. respiration) 15 minutes after the transfusion starts.				
Yes	51 (92.7)	8 (80.0)	59 (90.8)	x^2=1.636
No	4 (7.3)	2 (20.0)	6 (9.2)	p=0.228
I monitor and record the vital signs (fever. pulse. blood pressure. respiration) of a patient every 30 minutes during transfusion.				
Yes	55 (100.0)	8 (80.0)	63 (96.9)	x^2=11.349
No	-	2 (20.0)	2 (3.1)	p=0.022
In transfusion of whole blood. erythrocyte. platelet suspensions. no solution other than 0.9% NaCl should be used for filling or washing the transfusion set.				
Yes	44 (80.0)	4 (40.0)	48 (73.8)	x^2=7.010
No	11 (20.0)	6 (60.0)	17 (26.2)	p=0.015
I monitor the patient for adverse reactions during blood transfusion				
Yes	55 (100.0)	9 (90.0)	64 (98.5)	x^2=5.586
No	-	1 (10.0)	1 (1.5)	p=0.154
When the patient develops an adverse reaction. I stop the transfusion and record the clock.				
Yes	54 (98.2)	9 (90.0)	63 (96.9)	x^2=1.899
No	1 (1.8)	1 (10.0)	2 (3.1)	p=0.286
After the transfusion is over. I follow the patient for a minimum of 60 minutes for adverse reactions.				
Yes	51 (92.7)	6 (60.0)	57 (87.7)	x^2=8.397
No	4 (7.3)	4 (40.0)	8 (12.3)	p=0.016
I destroy the empty blood bag after transfusion.				
Yes	40 (72.7)	3 (30.0)	43 (66.2)	x^2=6.899
No	15 (27.3)	7 (70.0)	22 (33.8)	p=0.013
Timing				
I start the blood transfusion within 30 minutes. if the patient's condition is suitable. after the blood component comes from the blood bank.				
Yes	50 (90.9)	5 (50.0)	55 (84.6)	x^2=10.878
No	5 (9.1)	5 (50.0)	10 (15.4)	p=0.005
I record the start and end time of the blood transfusion.				
Yes	53 (96.4)	8 (80.0)	61 (93.8)	x^2=3.923
No	2 (3.6)	2 (20.0)	4 (6.2)	p=0.109
I complete the transfusion of whole blood and erythrocyte concentrate in a maximum of 4 hours.				
Yes	48 (87.3)	4 (40.0)	52 (80.0)	x2=11.818
No	7 (12.7)	6 (60.0)	13 (20.0)	p=0.000
Continuity Correction. Pearson Chi-Square. Fisher Exact Test				

hemovigilance. The hemovigilance officers of the relevant clinics and the hospital's hemovigilance nurse are responsible for the proper execution of these notifications (5). In our study, the majority of the nurses who received training (85.7%) reported that the hemovigilance nurse was a member of the transfusion committee and organized periodic trainings, and that the hemovigilance nurse inspected the appropriateness of transfusion-related processes within the scope of the "Transfusion Control Form" (92.9%), and that transfusion incompatibilities were reported to the transfusion committee and the events/reactions to the hemovigilance coordinator by the hemovigilance nurse (96.4%). In a study investigating the importance and effectiveness of the training given by the hemovigilance nurse in terms of patient safety, the success rate was reported as 88.8% (Mat et al., 2017). In another study, Günişen, Özdemir, and Tok (18) reported that 66.1% of the participants did not attend any training, course or seminar on blood transfusions.

In the literature, it is strongly emphasized that the knowledge level of nurses on blood transfusion is insufficient and that this situation should be standardized by supporting with trainings and supervision should be carried out (12,19). In the presented study, it was determined that 96.4% of the nurses who knew that they were supervised by a hemovigilance nurse (84.6%) washed their hands before transfusion, and that all (100%) wore gloves before transfusion. Before starting blood transfusion, hands should be washed according to the hand washing standard and gloves should be worn (20,21). Göktaş Baltacı et al. (22) reported in their study based on observation that 60% of the nurses washed their hands before the application and 74% wore gloves (22).

It is appropriate to use number 23 needles for pediatric patients (23-25). It was determined that 87.3% of the nurses who knew that they were supervised by a hemovigilance nurse opened vascular access with a minimum of 23G branules in children before transfusion. Göktaş Baltacı et al. (22) reported in their study that 88% of the nurses could choose the appropriate cannula for blood transfusion depending on whether the patients were adults or children. In the study of Hijji et al. (19), it was reported that after the blood product came to the clinic, the vascular access was established with a suitable cannula and the vascular access was controlled, which caused the blood to be kept and the duration of the transfusion to prolong.

Human errors that prevent the proper conduct of blood transfusions are largely due to non-compliance with the relevant blood transfusion procedures (11). It is important for nurses to use up-to-date evidence-based clinical guidelines for safe and effective transfusion practice (6). In our study, it was determined that 78.2% of the nurses were constantly aware of the current procedure and information regarding blood transfusion and that 94.5% of them benefited from the current procedure for blood transfusion.

It was determined that almost all of the nurses (98.2%), who knew that they were supervised by the hemovigilance nurse, made the final check of the patient's blood type, blood donor number and the component at the beginning of the transfusion. Misidentification of the blood unit or recipient is the most common cause of hemolytic transfusion reactions. Identifying the patient and the blood sample correctly, matching the patient's ID bracelet with the identification barcode of the blood or blood product are among the necessary steps for safe transfusion (26). Hijji et al. (19) reported that 29% of 49 nurses compared the information on the blood bag and the patient's wristband. Again, Gürkan (27) reported that the expiration dates of blood and blood products were controlled, while Bayraktar (28) reported that nurses had control deficiencies.

In the literature, it was reported that 76% of healthcare professionals verified the identity of the patient, blood or blood product, serial number, amount of blood product to be taken before transfusion, and performed the pre-transfusion instructions including transfusion time, expiry date of blood product, blood type, serological cross match and doctor's request form. It was reported that 90% of them rejected the blood product in case of any turbidity or foamy appearance of the blood (26). In the study presented, nurses who knew that they were supervised by a hemovigilance nurse, checked that the serological test results of the blood product were negative (87.3%), that the blood product number on the blood product label was the same as the blood product number on the cross label (96.4%), and that the appearance of the blood product and the bag (clot, color, sediment, particles) was appropriate (100%).

Whole blood, erythrocyte and platelet suspensions, fresh frozen plasma and cryoprecipitate are sent with a standard blood donation set due to the fibrin fragments and particles they contain. Filters in these sets have 170-200 micron diameter pores (24,25). It was determined that 81.8% of the nurses, who knew that they were supervised by a hemovigilance nurse, used a standard 170-200 μm diameter filter set for blood transfusion.

The first 15 minutes of a blood transfusion is very important for signs of severe reaction. According to the literature, vital signs should be measured and recorded before and 15 minutes after the start of transfusion. It has been reported that the patient should be followed up for other reactions during the transfusion and a few hours after the end of the transfusion, and the patient's vital signs should be monitored every half hour or hourly (29). In our study, 92.7% of the nurses who knew that they were supervised by a hemovigilance nurse, monitored and recorded the patient's vital signs (fever, pulse, blood pressure, respiration) 15 minutes after the start of transfusion, and all of them (100%) observed the vital signs of a patient (fever, fever, etc.) every 30 minutes during transfusion. It was found that 92.7% of them watched the patient for a minimum of 60 minutes after the end of the transfusion in terms of an adverse reaction.

In the literature, it is reported that the blood component should be given to the patient within 30 minutes after it is taken out of the refrigerator (23,29). In our study, it was determined that 90.9% of the nurses, who knew that they were supervised by a hemovigilance nurse, initiated the blood transfusion within 30 minutes at most after the blood component came from the blood bank, if the patient's condition was suitable, in accordance with the literature.

According to what is stated in the National Hemovigilance Guide Blood Transfusion Control Form (5); the start and end time of blood transfusion should be recorded and the transfusion should be completed in a maximum of four hours. In this study, it was determined that 96.4% of the nurses, who knew that they were supervised by the hemovigilance nurse, recorded the start and end time of the blood transfusion, and that 87.3% completed the transfusion of whole blood and erythrocyte concentrate within a maximum of four hours.

Study Limitations

Since this study was conducted in a public hospital, the results of the study were valid only for the nurses working in this hospital. Another limitation was the small size of the research sample. Therefore, it could not be generalized to all nurses. In

addition, only the data obtained from the statements of nurses were included. Observational findings were not included.

Conclusion

In conclusion, in our study, the use of the hemovigilance system was high in the nurses who received training on the hemovigilance system and knew that they were supervised by the hemovigilance system. Nurses, who knew that they were under supervision, had high rates of performing transfusion steps including "wearing gloves before the application", "using appropriate branches in children", "getting written consent before blood transfusion", and "completing the blood transfusion in a maximum of four hours".

For nurses who have not received training, it is recommended to plan periodic in-service trainings for hemovigilance system and blood transfusion practices and to update transfusion information in cooperation with hospital managers. In addition, it is recommended to install systems that can control security in every hospital in order to increase the security in blood transfusion applications. Despite the limitations of the study, it is thought that the findings of the research may have an important contribution in terms of guiding the researches and training programs to be carried out to determine the nurses' knowledge of the hemovigilance system and its use.

Ethics

Ethics Committee Approval: The necessary institutional permission to conduct the research was obtained from the Gümüşhane Provincial Health Directorate (date: 10/07/2018 and number: 38032705-044-E.113), and the ethics committee permission was obtained from the Gümüşhane University Ethics Committee (number: 2018/6 and date: 02/07/2018).

Informed Consent: Obtained.

Peer-review: Externally and internally peer reviewed.

Authorship Contributions

Concept: H.D., S.H., Design: S.H., Data Collection or Processing: S.H., Analysis or Interpretation: H.D., Literature Search: S.H., Writing: H.D., S.H.

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

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Original Article

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Effects of Gold Nanoparticles on Angiogenesis in A Chick Chorioallantoic Membrane Model

Tavuk Chorio Allantoik Membran Modelinde Altın Nanopartikülünün Anjiogeneze Etkisi

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ABSTRACT

Objective: Today, nanotechnology is widely used in many fields because of its ability to alter the structure of molecules at the atomic level. Metallic nanoparticles attracted great attention from researchers because of their unique properties. Based on the notable features of gold nanoparticles (AuNPs), they have long been evaluated as a potential diagnostic tool for several cancers and for drug delivery applications. Angiogenesis is the development of new vessels that support embryonic up growth and critically modulate many biological processes through adulthood. The inhibition of angiogenesis causes regression of development and metastasis of malign tumours. In this study we aim to examine the effects of AuNPs on angiogenesis in an *in vivo* chick chorioallantoic membrane (CAM) model.

Methods: We applied 20 mL concentrations of AuNPs solution to 24 eggs of the CAM on the fifth day. After then, we evaluated results macroscopically on the 6th and 7th days.

Results: In our study, we observed that AuNPs induced angiogenesis.

Conclusion: We suggest that AuNPs may not be ideal nanoparticles to make biosensors due to increasing angiogenesis during the course of cancers.

Keywords: Angiogenesis, chorioallantoic membrane, gold nanoparticles, cancer

ÖZ

Amaç: Günümüzde nanoteknoloji, atom yapısındaki moleküllerin yapısını değiştirme kabiliyeti nedeniyle birçok alanda yaygın olarak kullanılmaktadır. Metalik nanopartiküller, benzersiz özellikleri nedeniyle araştırmacılardan büyük ilgi görmüştür. Altın nanoparçacıkların (AuNP) belirgin özelliklerine dayanarak, uzun zamandır birçok kanserin teşhisi ve ilaç verme uygulamaları için potansiyel bir araç olarak değerlendirilmiştir. Yeni damarların gelişimi olan anjiyogenez, embriyonik büyümeyi destekler ve yetişkinlik dönemindeki birçok biyolojik süreci kritik bir şekilde düzenler. Anjiyogenezin inhibisyonu, gelişme regresyonuna ve malign tümörlerin metastazına neden olur. Bu çalışmada AuNP'lerin *in vivo* civciv koryoallantoik membran (CAM) modelindeki anjiyogenez üzerindeki etkilerini incelemeyi amaçladık.

Yöntemler: Beşinci gün yirmi dört yumurtanın CAM'ye 20 mL konsantrasyonda AuNP çözeltisi uyguladık. Ardından 6. ve 7. günlerde makroskopik olarak sonuçları değerlendirdik.

Bulgular: Çalışmamızda AuNP'lerin anjiyogenez oluşturduğunu gözlemledik.

Sonuç: AuNP'lerin kanser seyri sırasında artan anjiyogenez nedeniyle biyosensör yapımında ideal nanoparçacıklar olamayabileceğini düşünüyoruz.

Anahtar Sözcükler: Anjiogenez, korioallantoik membran, altın nanopartikülleri, kanser

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Introduction

Nanotechnology is the engineering of very small structures having a size of 0.1 to 100 nm that are called "nanoparticles" (NPs). Nanotechnology means any technology that uses things on a nanometre scale and has real-world applications. Today, nanotechnology has been extensively used in many areas thanks to its ability to alter the structure of atomic molecules. Metallic NPs attracted great attention from researchers by their unique properties. Some of these features include thermal features [1], catalytic features (2-4), electrical conductivity (5), biological applications (6) and optical features (7). Their advantageous characteristic features are affected by high surface areas and relatively very small dimensions (8). In the polymer medium, the synthesis of NPs is encouraging due to their solubility. The processing is simplified, has less toxicity and allows controlling the growth of emerging NPs.

Gold NPs (AuNPs) are the most suitable and efficient inorganic structures for various applications. They can conform to living tissue due to the virtue of controllable stability and low virulence, small dimensions and opportunity to interact with several substances (9). Based on the notable features of AuNPs, they have long been evaluated as a potential diagnostic tool for several cancers and drug delivery applications (10). The physical size of AuNPs is important for its uptake into the cell (Figure 1) (11). Although AuNPs are biologically inactive and have less toxicity, they are relatively difficult to clean from the circulation and tissues, which can cause some diseases (12). Due to the large surface area of AuNPs, in addition to their stability, they can accommodate multiple binders that provide better binding sites for drugs or cancer-targeting groups. The typical physicochemical properties of AuNPs are used to bond with several biomolecules with or without a polymer functionalised for diagnostic and therapeutic applications (13).

Angiogenesis, that is the development of new vessels supports embryonic up growth and critically modulates many biological processes through adulthood (14). However, angiogenic leakage plays a role in many pathologic processes including diabetic retinopathy, haemangiomas, psoriasis, arthritis, solid tumour growth and fibrosis (15-17). For instance, the hypoxic microenvironment that is created by discomposed tumour perfusion may support the selection of more aggressive and invasive tumour cells (18). In this process, endothelial cells lose their apical-basal polarity and adhesion properties to form highly aggressive, migratory, extended mesenchymal cells and induce different pathological processes (19). This allows AuNPs to pass through the enlarged wall of the vessel more easily. If AuNPs have a potential-inducing effect on angiogenesis, they may more easily pass through the enlarged vessel walls and infect the tissue.

The mesodermal layers of the allantois and chorion conjugate to form the chorioallantoic membrane (CAM) throughout avian development. This structure quickly expands, generating a rich vascular network that supplies an interface for gas and waste exchange. The CAM allows studying tissue grafts, tumour growth and metastasis, drugs delivery and toxicologic analysis and angiogenic and anti-angiogenic molecules (20). The CAM model is appropriate for studying cancer invasion because the basement membrane of the chorionic epithelium mimics the human epithelial tissue (21). It is cheap and easy to observe, as well. This is the reason why it makes this model useful. In this study, we purposed to determine the effects of AuNPs on angiogenesis in the CAM model.

Method

Preparation of AuNPs Solutions

The synthesis of 20 nm AuNPs uses the sodium citrate approach. In brief, 20 mL of 0.01 M $AuCl_2$ solution is prepared with (20 mL of pure H_2O and 4.08 mg of $AuCl_2$) and left on a magnetic stirrer until it reaches boiling (around 15 mins at 150 rpm at ambient temperature). After this process, 8 mL of 0.1 M sodium citrate solution was prepared and added to the reaction mixture. The colour of the mixture turned from purple to red. Thus, the obtained AuNPs size was approximately 20 nm (22-23).

Preparation of Atak-S Type Fertilised Chicken Eggs

Atak-S fertilised chicken eggs were obtained from Poultry Institution (Tokat, Turkey) and incubated at 37 °C, and 85%-90% relative humidity was maintained throughout the experiment. Experiments were performed to examine the mode of action of AuNPs on vascular development on the 5th, 6th and 7th day on CAM. Forty-five eggs were used and kept on hold in an incubator for five days (at 37 °C, 85%-90% humidity). Five days later, the eggs were perforated after the eggshells were cleaned with an antiseptic solution.The eggs were kept under suitable heat and humidity until the day that the application was performed. A solution can be applied to eggs. They are kept under appropriate conditions until the evaluation of the results. Results were evaluated at the 24th and 48th hour after application, as stated in the literature, and visual data were recorded using digital cameras (24).

Application of Solutions on Fertilised Chick CAM

On the 5th day, between 11 a.m. and 4 p.m., a hole was opened on each egg to see to the CAM, and 20 mL of AuNPs solution was applied to the surface of each CAM. After that, all the holes on the eggs were covered with transparent tape. On the 6th and 7th days, CAMs were screened and photographed twice using a Canon 80d, 18-135 mm. Finally, the change in vessel formation was determined.

Knighton et al. (25) s scoring methodology was applied in consideration of vascularisation in our study. According to this scoring protocol, CAM blood vessels were observed after 24 hours by two different blinded observers. Observation of the vessels at the end of 24th hour was enough for accurate scoring. In addition, a 48 hour observation was made for to detect embryos for viability based on the literature. In Knighton et al. (25) s scoring methodology, CAM blood vessels near the treatment points were recorded after 24 hours by two different observers. This vascular response was graded as 0.1+ and 2+. As a score, 0 means no change in vessel formation. 1+, and 2+ reflect an

increased density and length of vessels converging toward the treatment point (26). This protocol describes the state of angiogenesis in CAM experiments.

Results

Although we used 45 eggs for this study, on the 5th day, when we perforated the eggshells, we saw that nine eggs had died before application of AuNPs solutions. Twelve of the remaining 36 eggs were used as controls. We applied 20 mL concentrations of AuNPs solution to the CAM of the remaining 24 eggs on the 5th day (27). Finally, we assessed the results of vessel formation and growth on the 6th and 7th days.

On 6th day, the CAM with AuNPs-treated solutions caused a remarkable development in CAM vascular region of 16 eggs. Furthermore, we observed a yellow tint on the CAM of nine eggs from the treatment group. In the control group, physiological angiogenesis was observed in the form of some allantoic vessels. In contrast, the macroscopic increase in the CAM area of the eggs treated with AuNP solution was observed (Figure 2).

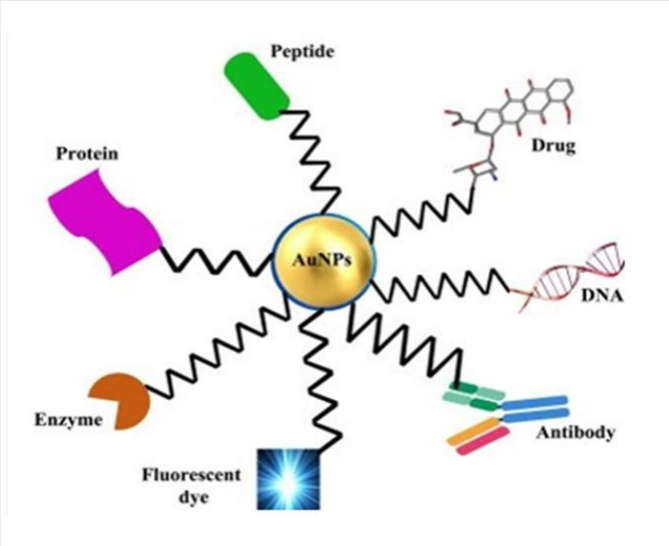

Figure 1. Properties of AuNPs as drug carriers. AuNPs are covalently bound to drugs, DNA, an antibody, an enzyme, a peptide, a fluorescent dye or a protein

On 7th day, likewise, we observed a significant improvement in the CAM vascular area of nine eggs; we observed a yellow tint on the CAM of the other seven eggs. The vessels of the effected CAM were thicker and also showed more branching. There was a notable increase in angiogenesis in comparison with the control group. The results of the macroscopical evaluation of CAMs are shown in Table 1.

Discussion

The CAM is appropriate, especially for studying the effects of angiogenic or anti-angiogenic molecules. Although we used 45 eggs for this study, on the 5th day, when we have perforated the eggshells, we saw that nine eggs died before the application of AuNPs solutions. Some possible explanations for the deaths should be suggested. A few of them had not been fertilised, and/or the membranes of a few of them were perforated when we tried to open the eggshell. Also, the balance of heat did not provide some of them adequate warmth because they stayed in the corner of the incubator. Nevertheless, the remaining eggs were adequate for obtaining preliminary information related to the effects of AuNPs on angiogenesis on CAM.

Angiogenesis is a period of new blood vessel formation. Current studies show that the induction of angiogenesis is a strategy, especially for the treatment of ischaemic diseases, instead of repressing angiogenesis for the treatment of cancers (28). The growth of solid tumours is accompanied by the stimulation of angiogenesis. So, the inhibition of angiogenesis causes the regression of development and metastasis of malignant tumours (29).

The CAM assay of chick embryos is widely used as an *in vivo* model for angiogenesis. The CAM assay is preferable because it is highly sensitive and cheaper than other *in vivo* or *in vitro* models (26). AuNPs have long been evaluated as a potential tool for the diagnosis of several cancers and drug delivery applications. Up to the present, no study on the angiogenic or anti-angiogenic effect of AuNPs on the CAM model has been reported whereas there are several studies on some other *in vivo* and *in vitro* models (30-31).

Al-Trad et al. (30) and Shen et al. (31) used a rat retinal model to determine the effects of AuNP on angiogenesis. They reported

Table 1. Macroscopic evaluation of the effects of gold nanoparticles application on chorioallantoic membrane

	Group		Efficiacy			
			Ineffective	+1	+2	Total
Day 6	Control	n	10	2	0	12
		%	83.3	16.7	0.0	100.0
	20 mM	n	0	13	11	24
		%	0.0	54.2	45.8	100.0
Day 7	Control	n	9	3	0	12
		%	75.0	25.0	0.0	100.0
	20 mM	n	0	4	7	11
		%	0.0	36.3	43.7	100.0

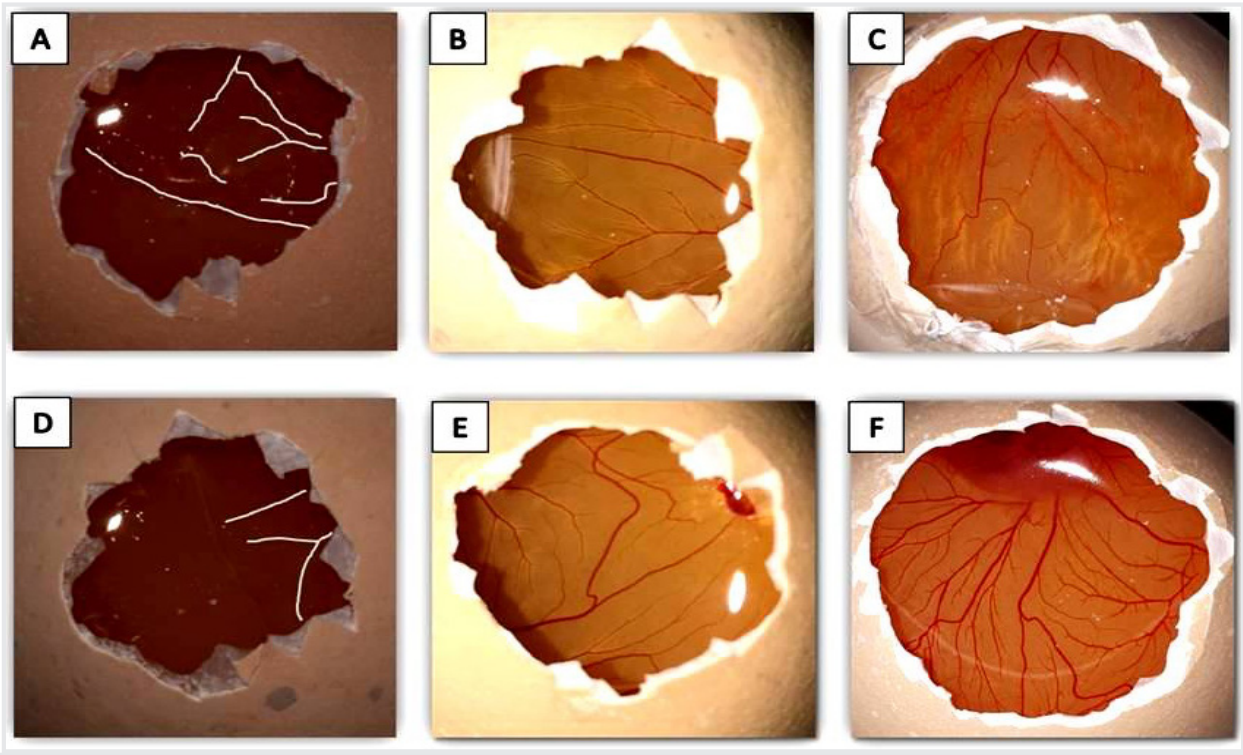

Figure 2. Effects of AuNPs on angiogenesis in the CAM model
A, B, C: Controls. A: On the 5th day (A), the eggshell was opened and then covered with parafilm. Macroscopic appearances on the 6th day (B) and 7th day (C) are shown.
C, D, E: AuNPs. On 5th day before AuNPs was not applied (D), on the 6th (E) and 7th day (F). Macroscopic appearances are shown.

Group			Efficiacy			
			Ineffective	+1	+2	Total
Day 6	Control	n	10	2	0	12
		%	83.3	16.7	0.0	100.0
	20mM	n	0	13	11	24
		%	0.0	54.2	45.8	100.0
Day 7	Control	n	9	3	0	12
		%	75.0	25.0	0.0	100.0
	20mM	n	0	4	7	11
		%	0.0	36.3	43.7	100.0

the inhibitory effect of AuNPs on angiogenesis of the rat retina. Conversely Marza et al. (32) by using a wound-healing model reported the stimulation effect of AuNPs on angiogenesis. Similarly, we detected that AuNPs induced angiogenesis on the CAM assay as *in vivo* model. We suggest that these contradictory results of the studies are not enough to certify the real effect of AuNPs on angiogenesis. However, based on the results we have obtained, we suggest that AuNPs may not be ideal NPs to make biosensors because of the risk of inducing angiogenesis in cancers. Conversely, since AuNPs increase angiogenesis, they should be beneficial in the treatment of various diseases characterised by ischaemia (33). Based on the notable features of AuNPs, they have long been evaluated as a potential tool for the diagnosis of several cancers (10). As a side effect, they may induce angiogenesis and secondarily may induce growth or metastasis of tumours.

Conclusion

As a result of this preliminary study, we suggest that further detailed studies are needed to assess the effect of AuNPs on angiogenesis and tumour growth and metastasis.

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Authorship Contribution

Surgical and Medical Practices: S.C., M.El., E.Y., E.A., M.Er., F.Y., S.M., R.Ç., M.Y.İ., M.E., Design: S.C., M.E., Concept: S.C., E.Y., M.E., Data Collection or Processing: S.C., M.Y.İ., O.F., Analysis or Interpretation: S.C., M.El., E.Y., E.A., M.Er., F.Y., S.M., R.Ç., M.E., Literature Search: S.C., M.El., E.A., M.Er., F.Y., S.M., R.Ç., M.Y.İ., Writing: S.C., M.El., E.Y., E.A., M.Er., F.Y., S.M., R.Ç., M.Y.İ., M.E.

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Original Article

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Medical Error Status of Nurses and Midwives Work in Gynecology and Obstetrics Clinics and Their Opinions About the Reasons

Kadın Doğum Kliniklerinde Çalışan Hemşire ve Ebelerin Tıbbi Hata Yapma Durumları ve Nedenlerine İlişkin Görüşleri

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ABSTRACT

Objective: To determine the medical errors of nurses and midwives work in gynecology and obstetric services and their opinions about the reasons of medical errors.

Methods: The sample of this study consisted of 365 nurses and midwives working in gynecology&obstetrics services of nine hospitals in a city of Turkey. Ethics committee and institution permissions were obtained for the study. Data were collected using a form developed by the researchers according to literature.

Results: It was determined that 14.2% of the nurses and midwives did medical errors, the most common errors were medication (54.5%) and communication (18.3%) errors. Nurses and midwives stated that the insufficient number of health care workers, excessive workload, carelessness, neglect and lack of information were very important reasons of medical errors. There was a statistically significant relationship between the status of medical errors of nurses and midwives and their age, working year in profession and the number of patients they were responsible for care ($p<0.05$).

Conclusion: It is important to reduce medical errors that cause significant problems for the health system, patients and health care personnel. For this purpose, it is considered important to include medical errors in the vocational and in-service trainings of nurses

ÖZ

Amaç: Araştırma, kadın doğum kliniklerinde çalışan hemşire ve ebelerin tıbbi hata yapma durumları ve tıbbi hata nedenlerine ilişkin görüşlerinin belirlenmesi amacıyla yapılmıştır.

Yöntemler: Tanımlayıcı olarak yapılan çalışmanın örneklemini Türkiye'nin bir ilinde yer alan dokuz hastanenin kadın doğum kliniklerinde çalışan 365 hemşire ve ebe oluşturmuştur. Araştırma için etik kurul ve kurum izinleri alınmıştır. Veriler araştırmacı tarafından literatür doğrultusunda geliştirilen anket formu ile toplanmıştır.

Bulgular: Çalışmamızda hemşire ve ebelerin %14,2'sinin tıbbi hata yaptığı, en sık ilaç uygulama (%54,5) ve iletişim (%18,3) hatası yaptıkları belirlenmiştir. Hemşire ve ebeler tıbbi hata nedenleri arasında; sağlık çalışanı sayısının yetersizliği, aşırı iş yükü, dikkatsizlik, ihmal ve bilgi eksikliğini önemli olarak belirtmiştir. Hemşire ve ebelerin tıbbi hata yapma durumları ile yaş, meslekte çalışma yılı ve bakım verdikleri hasta sayısı arasında istatistiksel olarak anlamlı ilişki bulunmuştur ($p<0,05$).

Sonuç: Sağlık sistemi, hasta ve sağlık personeli açısından önemli sorunlara yol açan tıbbi hataların azaltılması önem taşımaktadır. Bunun için sağlık bakım hizmetlerinde önemli rolleri olan hemşire ve ebelerin mesleki ve hizmet içi eğitimlerinde tıbbi

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and midwives, to provide orientation of the newly graduated nurses to the clinic they work, and to ensure the corporate culture where medical errors are reported without hesitation.

Keywords: Medical errors, nurses, midwifery, malpractice

hatalara yer verilmesi, yeni mezun hemşirelerin çalıştıkları birime oryantasyonunun sağlanması, tıbbi hataların çekinmeden bildirildiği kurum kültürünün sağlanması konularının önemli olduğu düşünülmektedir.

Anahtar Sözcükler: Tıbbi hata, hemşire, ebe, malpraktis

Introduction

Medical errors are becoming a growing problem every day due to changing and developing health needs. Medical error is defined as the harm of the patient as a result of the inappropriate and unethical behavior of a healthcare professional, inadequate and negligent behavior in professional practice (1,2). It is noted that the majority of medical errors are preventable (3,4). In USA, medical errors cause about $ 20 billion in additional costs and about 100,000 deaths each year (5).

Although medical errors are considered a major problem for the entire medical team, they are more important for nurses and midwives who have important roles in patient care (6,7). Research conducted on this subject in Turkey shows that a significant part of medical errors occur in obstetrics clinics (8,9). It is stated that 30% of the files asked for opinions from the forensic institution in terms of the presence of medical errors are related to obstetrics and gynecology, and 90% of them are caused by complaints about pregnancy follow-up and births (8).

In the literature, medical errors that nurses and midwives most often make are noted as errors in drug administration, errors in material use and communication, insufficient patient monitoring, and hospital infections (2,4). Causes of medical errors in nurses and midwives are; lack of skills and training, lack of attention, neglect, fatigue, irregular working hours, communication problems, and large number of patients (4,10,11).

Medical errors cause serious problems for the healthcare system, patients and healthcare personnel, and cause problems such as a decrease in the quality of care in the healthcare system, an increase in costs and a shaken trust in the healthcare institution. Death, organ loss, severe pain, psychological disorders, financial loss and similar damages may occur in patients. Medical errors cause problems such as burnout, guilt, low performance, compensation or trial by imprisonment in healthcare personnel (3,7,8). It is stated that medical errors, which are mostly considered to be preventable, cause an additional cost of $ 8.8-15 million per year (4). Because the culture of patient safety in hospitals in Turkey has not developed, the consequences of medical errors cannot be known for sure, but it is estimated that they are similar with the countries of the world (12).

Although there are many studies of medical errors made by nurses in the literature, studies of medical errors made by nurses and midwives working in obstetrics clinics have not been reached. For this reason, this research was conducted to determine the opinions of nurses and midwives working in obstetrics clinics about the medical errors, their causes and the severity of medical errors.

Method

This descriptive and cross-sectional study was conducted in the maternity clinics of 6 training and research hospitals, 2 universities and one state hospital located in the center of a city in Turkey (high-risk pregnancy, delivery room, operating room, postpartum, gynecology, and perinatology, in vitro fertilization). A total of 426 nurses and midwives working in the specified clinics made up the universe of the study. In the study, the entire universe was included in the sample selection. But of the 426 nurses and midwives, 30 did not agree to participate in the study, 26 were on annual leave or assignment, and 11 were not included in the study due to incomplete completion of the survey, and the study was conducted with a total of 365 (85.6%) nurses and midwives. Data collection took five months. The criteria for inclusion in the study were to work in obstetric clinics, to be literate in Turkish and to volunteer to participate in the study.

A questionnaire prepared by the researcher by scanning the literature and supported by expert opinion was used when collecting data. In the first part of the questionnaire, there were 21 questions about the socio-demographic characteristics of nurses and midwives, as well as medical errors and their consequences. In the second part, a five-part likert-type questionnaire consisting of 18 questions aimed at determining the views of nurses and midwives on the importance of the causes of medical errors was applied. The researcher asked nurses and midwives to complete the questionnaire by going to the units where they worked, and participants took an average of 10-15 minutes to complete the questionnaire.

Before the questionnaire forms were applied, nurses and midwives were informed about the research and informed consent was obtained. The study was approved by Gazi University Clinical Research Ethics Committee with Decision No. 122 dated 27.04.2011. In addition, written permissions were obtained from the health directorate of the province where the study was conducted and from the research and application centers of hospitals.

Data were evaluated using SPSS 15.0 (SPSS Inc. Chicago, IL, USA). Descriptive statistics were evaluated by number, percentile and Chi-square tests. Logistic regression analysis was performed to determine the risk factors affecting medical error. $P<0.05$ was accepted as the statistical significance value in the comparison of groups.

Results

Of the study participants, 58.1% were nurses and 41.9% were midwives. Of nurses and midwives, 68.7% were 31 years old or older, 16.5% were in the 26-30 age group and 14.8% were 25 years old or younger. It was determined that 51% of nurses and midwives were high school or associate degree graduates, and 49% were undergraduate or had higher level of education. The proportion of nurses and midwives who were married was 78.4%. Of nurses and midwives, 38.1% worked in the postpartum service, 90.7% worked as a clinical nurse or midwife, 9.3% worked as a responsible or training nurse or midwife, and 63.8% worked for 10 years or more. Of nurses and midwives, 54.2% stated that they worked in the unit for 2-5 years, 54.2% worked more than 40 hours per week and 66.8% worked an average of eight hours per day. It was found that 44.3% of nurses and midwives worked in shifts and 46.6% had 6-10 duties a month. It was determined that 27.6% of nurses and midwives cared for an average of 11-15 patients daily, and 27.6% cared for over 21 patients.

Of nurses and midwives, 14.2% stated that they had made medical errors. Nurses and midwives most often stated their medical errors as drug administration (54.5%), communication (18.3%), follow-up (16.8%) and other (10.4%) (incorrect or incomplete material use, recording error and infection). Of nurses and midwives, 65.4% who made medical errors stated that they reported their errors after medical errors. They stated that 57.1% of them reported to team members, 38.1% to hospital administration and 4.8% to patients. All of the nurses and midwives who made medical errors stated that patients were not harmed after the incident.

Almost all nurses and midwives stated that carelessness (98.6%), neglect/sloppiness (97%) and lack of information (97%) were the most important reasons for medical errors caused by personal reasons. Almost all nurses and midwives expressed that number of health workers (96.5%) and excessive workload (96.5%) were very important among the reasons for medical errors caused by the institution (Table 1).

A statistically significant difference was found between the age groups of nurses and midwives, the years of working in the profession, the number of patients they were responsible for providing care, and the situations of making medical mistakes ($p < 0.05$). It was determined that the educational status of the nurses and midwives, the duration of working in the unit they were in, the number of monthly shifts, weekly and daily working hours and working patterns did not affect doing medical error ($p > 0.05$) (Table 2).

Table 1. Distribution of opinions of nurses and midwives regarding the importance of the causes of medical errors (n=365)

Causes of medical errors	Not important/ Less important *		Moderately important		Important/ Very important*	
Institutional causes	**n**	**%**	**n**	**%**	**n**	**%**
Insufficient number of healthcare professionals	3	0.8	10	2.7	352	96.5
Excessive workload/inability to spare time for the patient/excessive number of patients	5	1.4	11	3.0	349	95.6
Inadequate registration system	22	6.0	32	8.8	311	85.2
Lack of supervision	38	10.5	41	11.2	286	78.3
Irregular working hours	19	5.2	24	6.6	322	88.2
Problems with the devices used (not working, broken, no device)	16	4.4	16	4.4	333	91.2
Unfavorable physical conditions (ventilation, light, temperature, noise)	20	4.6	25	6.8	320	88.7
Insufficient vocational and in-service training	17	4.6	24	6.6	324	88.7
Undetermined task definitions	5	1.4	15	4.1	345	94.5
Individual causes						
Negligence /sloppiness	5	1.4	6	1.6	354	97.0
Lack of skills (lack of knowledge on the use of new tools)	5	1.4	16	4.3	344	94.3
Lack of experience	3	0.8	22	6.0	340	93.2
Carelessness	1	0.3	4	1.1	360	98.6
Lack of self-renewal and development	3	0.8	16	4.4	346	94.8
Not predisposed to teamwork	7	1.9	22	6.0	336	92.1
Lack of in-team communication	6	1.6	23	6.3	336	92.1
Inability to communicate with the patient	9	2.4	24	6.6	332	91.0
Lack of information (inability to treat and care the patient/not knowing the principles and procedures of treatment)	2	0.5	9	2.5	354	97.0

*The expression "not important" was given together with the expression "less important". The expression "important" was given together with the expression "very important"; n=365

Table 2. Distribution of medical error states according to sociodemographic characteristics of nurses and midwives (n=365)

	Medical error maker n=52		Medical error-free n=313		χ^2	p value
Age groups	**n**	**%**	**n**	**%**		
≤25 years	14	25.9	40	74.1		
26-30 years	16	26.7	44	73.3	19.779	0.001
≥31 years	22	8.8	229	91.2		
Education status						
Health vocational high school/ associate degree	20	10.7	166	89.3	3.790	0.052
License or above	32	17.9	147	82.1		
Year of working in the unit						
0-1 year	21	18.9	90	81.1		
2-5 years	26	13.1	172	86.9	3.559	0.175
≥6 years	5	8.9	51	91.1		
Years of work in the profession						
≤4 years	17	27.4	45	72.6		
5-9 years	12	17.1	58	82.9	12.822	0.003
≥10 years	23	9.9	210	90.1		
Working hours per week						
≤40 hours	23	13.8	144	86.2	0.057	0.812
≥41 hours	29	14.6	169	85.4		
Daily working hours						
8 hours	36	14.8	207	85.2	0.167	0.683
≥9 hours	16	13.2	106	86.8		
Number of duties per month *						
1-5	7	15.9	37	84.1		
6-10	26	15.3	144	84.7	0.478	0.787
≥11	7	11.9	52	88.1		
Type of working						
Day	14	12.8	95	87.2		
Night (duty)	8	8.5	86	91.5	5.127	0.077
Shift	30	18.5	132	81.5		
The number of patients they were responsible for providing care to						
1-5	-	-	14	100		
6-10	9	15.2	50	84.8		
11-15	14	13.9	87	86.1	10.532	0.012
16-20	6	6.7	84	93.3		
≥21	23	22.7	78	77.3		

* Only nurses and midwives who were on duty were assessed.
χ2= Chi-square test; n=365; p<0.05 was accepted as statistically significant

In Table 3, multivariate logistic regression analysis performed to determine independent risk factors affecting medical error is presented. The number of working years in the profession and in the current unit, shifts, the number of patients cared for, and age which were considered to increase the risk of medical errors, were included in the model. According to the model obtained as a result of multivariate analysis; it was found that the age, working style and the number of patients who were given care affected the condition of making medical errors, but the working year in the profession and in the current unit did not. According to the results of the analysis, the risk of medical errors was statistically reduced at the age of 31 or over compared to the age of 25 or younger (OR=0.188, p <0.001), while the decrease in the 26-30 age group was not statistically significant (OR=0.846, p=0.714). When the risk of medical error was examined according to the shifts in which nurses and midwives worked, the risk of medical errors was statistically significantly reduced in night shift workers compared to daytime work (OR=0.287, p=0.017), while the decrease observed in mixed shifts (OR=0.802, p=0.573) was not statistically significant.

Table 3. Evaluation of factors affecting medical error using logistic regression model

Variable (Reference)		OR	Confidence İnterval	p value
Age	26-30 years	0.846	0.346-2.067	0.714
(≤25 years)	≥31 years	0.188	0.082-0.431	p<0.001
Type of working	Night	0.287	0.304-0.789	0.017
(Day)	Mixed	0.802	0.373-1.726	0.573

n=365; OR: Odds ratio
*The number of patients given care was determined as one of the factors affecting the medical error status, but due to the insufficient number of participants in the subgroups, no value could be given regarding the risk

Discussion

Medical errors are seen at different rates in the world and continue to exist as an important problem. In our study, approximately one fifth of nurses and midwives stated that they made medical errors. The rate of making medical errors was 13.7% in the study by Er and Altuntaş (6), 42.9% in the study by Külcü and Yiğit (13), 19% in the study by Hwang and Park (14), 64.5% in the study by Cheragi et al. (15), 42.1% in the study by Bayazidi et al. (16) and 30% in the study by Balas et al. (17). It is seen in the literature that there are findings similar and dissimilar to our results regarding medical errors. It is stated that the approach of the healthcare personnel to reporting medical errors is influenced by the patient safety culture in that hospital (10). It is thought that the differences presented above regarding the rate of medical errors may be due to safety culture and similar situations.

More than half of the nurses and midwives stated that the medical errors they made were medication errors. Similar to our results, Yücesan and Alkaya (4) and Çırpı et al. (18) stated in their study that nurses mostly encountered medication errors. In the study by Mrayyan et al. (19), approximately half of the nurses reported medication administration errors. The reasons such as the need for intense attention in drug administration, the availability of too many risky drugs, the high number of patients in the wards put nurses and midwives in a risky situation in terms of drug administration.

In our study, nurses and midwives stated that they made communication errors most frequently after medication administration errors. In the study of Yiğitbaş et al. (20), it was determined that nurses got the highest score from the communication sub-dimension after medication and transfusion errors in the medical error tendency scale. Cebeci et al. (21) stated that the nurses got the highest score from the communication sub-dimension in medical error tendency scale. Külcü et al. (13) stated that they got the lowest score from the communication sub-dimension. In the systematic review by Keers et al. (22), when the underlying causes of medication administration errors were examined, it was stated that more than half of them were factors related to communication. Similarly, in a study where Manias (23) examined 4008 medication errors that occurred in a pediatric hospital over a 5-year period, it was determined that 83.3% of them were related to communication. It is seen that the result obtained from our research is similar to the literature. In line with these studies, considering that medication errors and communication errors are closely related and the most common errors, strengthening communication will contribute to the prevention of both medication and communication-related medical errors. Joint Commission emphasized the importance of both issues as "increasing the efficiency of communication among caregivers" and "increasing drug use safety" among the national patient safety targets of 2018 (24). Tshiamo et al. (25) emphasized the importance of strengthening the nursing curriculum in preventing medication errors and suggested that medication errors should be included in both undergraduate and postgraduate periods.

In order to reduce and prevent medical errors, a system where employees can report medical errors without fear of punishment should be established (9). In our study, more than half of the nurses and midwives who made medical errors stated that they reported after medical errors. Nurses have difficulties in reporting medication errors due to reasons such as taking disciplinary punishment or fear of being fired (19). Therefore, it is important to create a corporate culture where nurses and midwives can report medical errors without hesitation. In our study, more than half of those who reported medical errors reported verbally to team members, less than half reported to the senior management, and a very small part reported to the patients. Similarly, Er and Altuntaş (7) reported that more than half of the nurses and Mrayyan et al. (19) reported that approximately half of the nurses reported their medical errors, and Bayazidi et al. (16) reported that nurses reported less medical errors than they did. Garbutt et al. (26) stated that more than half of the physicians (72%) shared medical errors only with team members. Çırpı et al. stated that 60% of the nurses made written and 40% verbal reporting (18). Kılıç and Elbaş stated in their study that 38.2% of the nurses made written and 30.9% verbal reporting (27). Cohen stated that 18% of nurses always reported medical errors to patients (28). In the study conducted by Dursun et al., it was stated that a very significant portion of the participants (71.3%) did not report any incident that could endanger patient safety (29). These results showed that although medical error reports were made in our study, written reporting was not sufficient and the reportings made to patients were insufficient. Reporting medical errors is very important in terms of reducing the frequency of errors, understanding their causes, and improving patient safety by learning from errors (27). The most important obstacles to nurses' error reporting in studies are reported as managerial factors, fear of legal problems, inappropriate reactions of managers, fear of disciplinary action, fear of patient complaints, fear of losing license, and difficulty in bringing up undesirable events (19,30,31). For this reason, it is important for hospitals to improve the culture of patient safety, to inform the members of the healthcare team, to make the error reporting systems comfortable for the staff and to introduce them. It is thought that it is important for hospitals to develop a solution-oriented system by adopting a non-judgmental/non-punitive attitude towards employees reporting errors.

Although there are studies in the literature stating that medical errors result in death or serious harm (32,33), all of the nurses and midwives in our study stated that patients were not harmed as a result of their medical error. It is thought that nurses and midwives avoid disclosing the harms of the patients because of the fear of being sued, of losing professional reputation and losing the trust of healthcare team members. For this reason, it is thought that it is important to create a system where all members of the healthcare team can report medical errors without fear, and that the system should be organized in a way that prevents medical errors.

Medical errors in health care occur due to institutional and personal reasons. Almost all of the nurses and midwives in our study stated that carelessness, negligence and carelessness were important personal causes of medical errors. Shahrokhi et al. (34) and Hicks et al. (35) found that medical errors made by nurses mostly stemmed from attention deficit and fatigue. In the study of Kahriman and Öztürk, 13.7% of the nurses stated that medical errors were caused by negligence and 6.2% of them stated that medical errors were caused by carelessness (12). It is known that irregular sleep periods due to irregular and long working hours and attention deficit due to fatigue are important in the development of medical errors (36). Therefore, it is important that nurses and midwives do not work without getting enough rest. More than half of the nurses and midwives in our study work more than forty hours a week, and approximately one third of them work more than eight hours a day. These conditions increase the tendency of nurses and midwives to make medical errors. Arimura et al. stated that shift work and fatigue affect medical errors (36).

Almost all of the nurses and midwives in our study stated that the lack of information was very important among the causes of medical errors. Similarly, in the study of Er and Altuntaş, 69.5% of the nurses stated that insufficient professional knowledge and skills caused medical errors (6). In line with these results, in order to increase the professional knowledge and skills of healthcare professionals; it is thought that it is important to ensure the standardization of the education provided at the undergraduate level firstly, and to update the information of the employees and to raise their awareness with the in-service trainings, courses and certificate programs that will be organized on this subject after graduation.

Almost all of the nurses and midwives stated that insufficient number of healthcare professionals was very important in medical errors caused by the institution. Studies in Turkey and other countries on this issue have stated that inadequate number of nurses, burnout of nurses and excessive workload are the most important causes of medical errors (2,4,11,12,30,37). Insufficient number of nurses and midwives increase the probability of medical errors due to fatigue and attention deficit together with longer working hours and excessive workload. As a result, insufficient number of nurses adversely affects patient outcomes, quality of care, patient safety, and nurses' health (38). In line with the results obtained from the study, it is thought that the opinions of nurses and midwives in Turkey regarding the causes of medical errors are similar to the literature.

It was detected that 1/3 of nurses and midwives provided care to an average of 11-15 patients in a day and 1/3 to more than 21 patients in a day. We found a statistically significant relationship between the number of patients that the nurses and midwives provided care and the number of medical errors ($p<0.05$). In the literature, there are studies supporting that the probability of medical error increases as the number of patients given care increases (11,39). In the study by Cho et al., covering 51 hospitals, it was found that there was a statistically significant relationship between the increase in the number of patients per nurse and unsuccessful/poor patient safety reporting and abandoning care due to insufficient/poor quality of care and lack of time (40). In addition, it is thought that with the increase in the number of patients that nurses and midwives are responsible for, fatigue and distraction occur and the possibility of medical errors increases. In a systematic review conducted on this subject, it was determined that there was strong evidence supporting the positive relationship between the negative outcomes and long working hours of nurses (41).

Almost all of the nurses and midwives (95.6%) stated that excessive workload was very important as a cause of medical errors caused by the institution. Thirty six point four percent of nurses in the study of Alemdar and Aktaş (7), 72.8% in the study of Kahriman and Öztürk (12), and 75.6% in the study of Er and Altuntaş (6) stated that the excessive workload was among the causes of medical errors. In our study, the rate of nurses and midwives who stated excessive workload as a cause of medical error was found to be higher than other studies on this subject.

The relationship between the ages of nurses and midwives and years of working in the profession and their status of medical error was found to be statistically significant ($p <0.05$). Koçak and Yaman (39) stated in their study that nurses mostly made medical errors in the 26-35 age group and when their professional experience was 5 years or less. In the same study, it was stated that healthcare workers who worked in the profession for 10 years or more made less medical errors (39). Similar studies on this subject found that less serious medical errors occur where there were more experienced nurses, and this was statistically significant (38,42). In the study conducted by Smith et al. (37) with newly graduated nurses, it was determined that lack of communication, excessive workload and long working hours contributed to the occurrence of medical errors. It was determined that our result was similar to that of literature.

No statistically significant difference was found between the educational status of nurses and midwives and their medical errors ($p> 0.05$) (Table 2). Similar to our results, Sears et al. (38) stated that there was no statistically significant relationship between the training of nurses and the state of making medical errors ($p> 0.05$). It is expected that medical errors will decrease as the education level and knowledge level increase. However, no result supporting this was obtained in our study. Other studies are recommended to be performed on this subject.

In our study, no statistically significant correlation was found between the duration of work in the unit and the number of monthly shifts and the status of making medical errors ($p> 0.05$). Similarly, Göktaş (43) stated that there was no statistically significant relationship between the working year and monthly number of shifts in the unit where the nurses were located, and the status of making medical errors ($p> 0.05$). Rogers et al. (44) found that the rate of medical errors increased in nurses working more than 12 hours a day, and determined that working more than 40-50 hours per week might cause medical errors. In the study of Izadpanah et al. (45), it was determined that the number of medication errors increased as working hours increased. However, the determination in our study that weekly and daily working hours did not affect medical errors was thought-provoking. Other studies are recommended to be performed on this subject. In a systematic review examining the working hours of nurses and the outcomes of patients, it was stated that more evidence was needed to say that there was a positive relationship between long working hours and negative patient outcomes (41).

No statistically significant correlation was found between the shifts in which nurses and midwives worked and their status of making medical errors ($p> 0.05$) (Table 2). In the study of Seki and Yamazaki (46), it was determined that there was no statistically significant difference between working in different shifts and the number of medication administration errors. In the systematic review by Bae and Fabry (41), it was stated that there was no relationship between medical errors and the shifts in which the nurses worked. Other studies are recommended to be performed on this subject.

When the factors affecting making medical errors were evaluated with logistic regression analysis in our study; it was determined that age, working style and the number of patients given care were among the factors that affected making medical errors. The relationship between age and the number of patients treated and making medical error was discussed above. In our study, when medical errors were examined according to the working styles of nurses and midwives, it was determined that those who worked in shifts, worked in days and worked in nights, respectively, made more medical errors. In a study similar to our result, it was determined that medical errors mostly occured in the morning hours (47). In contrast, Pham et al. (48) stated that the highest rate of errors occurred during the evening shift. In our research results, it was determined that nurses and midwives who worked

in shifts (mixed day and night) made medical errors at the highest rate. This result is thought to be caused by problems such as fatigue and inattention, which develop due to irregularities in the sleep patterns of nurses and midwives who work in shifts. In the research conducted by Peker (49), it was found that not having the opportunity to rest during the shift negatively affected the level of attention. In our results, the reason for the lowest risk of making medical errors in night shift workers was that more patient hospitalizations, examinations and similar proceduress during the day shift caused distraction and concentration disturbance in nurses and midwives; and at night, the work was more routine and confounding factors were reduced, therefore, the risk of making medical errors was thought to decrease.

Study Limitations

This study was conducted with nurses and midwives working in nine hospitals located in only one city center. Nurses and midwives working in private hospitals were excluded. While interpreting our results, it should not be forgotten that there was a group of healthcare professionals working in hospitals located in a city center with a high workload.

Conclusion

In the study, it was determined that nurses and midwives most frequently made medication errors. In order to reduce medication errors, an effective reporting system should be established in hospitals and necessary measures should be taken by determining the factors that prevent medical error reporting. In addition, it is recommended to increase knowledge and awareness by emphasizing the importance of the issue in vocational and in-service trainings performed with nurses and midwives. It was determined that the medical error reporting behaviors of nurses and midwives were not sufficient and they preferred to report medical errors verbally. It is recommended to provide an institutional culture where medical errors can be reported without fear of punishment.

In the study, a significant relationship was found between the working years of nurses and midwives and their status of making medical errors. In line with this result, it is thought that newly graduated nurses and midwives, who are younger and have little professional experience, should work under the supervision of their experienced colleagues during the orientation process.

Ethics

Ethics Committee Approval: Ethics committee approval was obtained from Gazi University Clinical Research Ethics Committee with the decision dated 27.04.2011 and numbered 122.

Informed Consent: Obtained.

Peer-review: Externally and internally peer reviewed.

Authorship Contribution

Surgical and Medical Practices: M.U., Design: M.U., Concept: M.U., G.V., Data Collection or Processing: M.U., G.V., Analysis or Interpretation: M.U., Literature Search: M.U., G.V., Writing: M.U., G.V.

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Original Article

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Assessment of the Optimal Anaesthesia Technique for Caesarean Section and Clinical Effects on Mothers and Newborns

Sezaryen için Optimal Anestezi Tekniğinin Değerlendirilmesi, Anne ve Yenidoğan Üzerine Etkileri

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ABSTRACT

Objective: Regional anaesthesia is mostly preferred for elective caesarean delivery. This study aimed to compare general, epidural and spinal anaesthesia techniques in terms of their foetal and maternal effects.

Methods: Parturients undergoing elective caesarean delivery were randomly divided into three groups: general anaesthesia (GA), epidural anaesthesia (EA), and spinal anaesthesia (SA). The APGAR score, foetal blood gas level, free O_2 requirement and positive-pressure ventilation, phototherapy requirement, bilirubin level and weight loss were recorded. The time to the first breastfeeding, perioperative bleeding, crystalloid requirement, ephedrine consumption, first analgesic requirement, the time of defaecation and mobilization were also measured.

Results: The APGAR scores and SpO_2 were lower in the GA group ($p<0.05$). Six newborns required O_2 supply and positive-pressure ventilation and one newborn from the GA group was intubated and transferred to the NICU. The time to first breastfeeding was prolonged in the GA group compared with the other groups ($p<0.05$). Postnatal 48-hour weight loss of the newborns was higher in the EA and SA groups than in the GA group ($p<0.05$). Peropertive

ÖZ

Amaç: Sezaryen ile doğumlarda rejyonal anestezi çoğunlukla tercih edilir. Bu çalışmada genel, epidural ve spinal anestezi tekniklerinin fetal ve maternal etkileri açısından karşılaştırılması amaçlandı

Yöntemler: Sezaryen ile doğum yapan gebeler rastgele üç gruba ayrıldı: genel anestezi (GA), epidural anestezi (EA) ve spinal anestezi (SA). APGAR skoru, fetal kan gazı seviyesi, serbest O_2 gereksinimi ve pozitif basınçlı ventilasyon, fototerapi gereksinimi, bilirubin seviyesi ve kilo kaybı kaydedildi. Ayrıca ilk emzirme zamanı, perioperatif kanama, kristalloid gereksinimi, efedrin tüketimi, ilk analjezik gereksinimi, ilk defekasyon ve mobilizasyon süresi ölçüldü.

Bulgular: APGAR skorları ve SpO_2 GA grubunda düşüktü ($p<0,05$). Altı yenidoğanda O_2 desteği ve pozitif basınçlı ventilasyon gerekti ve GA grubundan bir yenidoğan entübe edildi ve NICU'ya transfer edildi. İlk emzirme zamanı GA grubunda diğer gruplara göre uzadı ($p<0,05$). Yenidoğanların doğum sonrası 48 saatlik kilo kaybı EA ve SA gruplarında GA grubundan daha yüksekti ($p <0,05$). Peropertif kanama GA grubunda daha yüksekti. SA grubunda, efedrin ve sıvı gereksinimleri daha yüksekti ve mobilizasyon süresi daha kısa idi ($p<0,05$). İlk analjezik gereksinimi ve ilk defekasyon süresi EA grubunda daha kısaydı ($p<0,05$).

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bleeding was higher in the GA group. In the SA group, ephedrine and fluid requirements were higher and the mobilization time was shorter ($p<0.05$). The first analgesic requirement and defaecation time were shorter in the EA group ($p<0.05$).

Conclusion: With general anaesthesia, there are lower APGAR scores, a requirement for a free O_2 supply and more frequent positive-pressure ventilation and a longer time to the first breastfeeding compared to those with regional anaesthesia. Therefore, regional techniques are preferable for caesarean delivery.

Keywords: General anaesthesia, regional anaesthesia, obstetric anesthesia, anaesthesia techniques on clinical effects

Sonuç: Genel anestezi ile, daha düşük APGAR skorları, serbest O_2 gereksinimi ve daha sık pozitif basınçlı ventilasyon gereksinimi ve ilk emzirme zamanı rejyonel anestezi ile karşılaştırıldığında daha uzundu. Bu nedenle sezaryen ile doğumda rejyonel teknikler tercih edilebilir.

Anahtar Sözcükler: Genel anestezi, rejyonal anestezi, obstetrik anestezi, anestezi tekniklerinin klinik etkileri

Introduction

Regional anaesthesia is preferred for caesarean delivery to avoid maternal risks of general anaesthesia (GA) (1). Despite the apparent advantages regarding maternal safety, the effects on the foetus remain controversial. As a result of an acute reduction in uteroplacental blood flow, spinal anaesthesia (SA) may lead to foetal acidosis, hypoxia or low Apgar scores (2,3). Evidence that the effects of drugs in GA affect neonatal neurological consequences (7) continues to increase. The influence of anaesthetic drugs on growing new brain cells has become a considerable concern. Recently, both the apoptotic properties of volatile agents have been reported (10,11).

This study aimed to compare general, epidural and SA techniques regarding their maternal and foetal effects. The primary outcome of the study was to evaluate the effect of the anaesthesia technique on the Apgar score, foetal acidosis and the need for respiratory support in newborns. The secondary outcome was to compare the time until the first breastfeeding.

Method

The Ethics Committee approved the study (B104ISM4340029-1009-90) and written informed consent was obtained. The clinical trial number is ACTRN12618002051224. Seventy-five ASA II parturient females undergoing caesarean section for their first delivery and in their 38th week of pregnancy were included. The exclusion criteria were endocrine, cardiopulmonary, renal, hepatic or neuromuscular diseases; preeclampsia; or known foetal abnormalities, including growth retardation, umbilical artery anomalies or malposition. Patients were randomly divided into three groups (n=25): GA, epidural anaesthesia (EA) and SA. The randomisation was performed using sequentially numbered, opaque sealed envelopes.

In the GA group, patients received 5 mg/kg thiopental sodium and 0.6 mg/kg *rocuronium bromide iv* for induction of anaesthesia. After the patients were intubated, anaesthesia was maintained with 30% O_2, 70% N_2O and 1%-2% sevoflurane. Patients were ventilated with 100% O_2 during the period between the placement of the bladder retractor and cord clamping after delivery. The neuromuscular block was antagonised with 0.03-0.07 mg/kg neostigmine and 0.02 mg/kg iv atropine sulphate.

Patients in the EA group were administered 16 mL of 0.5% bupivacaine + 3 mg morphine while lying in the lateral position *through the L4-L5* intervertebral space using an 18 G Touhy needle as identified by the loss of resistance technique. An epidural catheter was left 5 cm in the epidural space.

In the SA group, 3 mL of 0.5% heavy bupivacaine was injected with 200 μg of morphine *through the* L4-L5 *intervertebral space by a* 25 G spinal needle (Quincke) in the lateral decubitus position. In Groups EA and SA, surgery was started by the time the sensory block reached the T4 dermatome. The *level* of *sensory block* was assessed by the "*Pinprick" test.* Motor block was assessed using the Bromage scale.

The mean arterial pressure (MAP), heart rate (HR) and SpO_2 values were recorded before and after anaesthesia induction and at the 1st, 5th, 10th, 20th and 40th minute after the surgical incision. A decrease in HR below 30% of basal values was considered bradycardia, and 0.5 mg of atropine was administered. When the MAP showed a decrease of more than 30%, it was regarded as hypotension, and 10 mg of ephedrine was injected iv as a bolus dose.

The skin-uterine incision time, uterine-incision delivery time, perioperative bleeding, crystalloid requirement and the total amount of iv ephedrine required were recorded. The time of defaecation and mobilisation, discharge of the mother and the time to first breastfeeding from delivery of the newborn were also recorded.

The time when the postoperative pain score (according to the Numeric Rating Scale (NRS), 0= no pain, 10= extreme pain) increased by 3 or more was recorded as the first analgesia requirement time. The GA and SA groups were administered 1 mg/kg meperidine iv every 6 hours and 1 g of paracetamol iv every 8 hours. The EA group received a mixture of 3 mg of morphine and 15 mg of bupivacaine in a volume of 9 cc through the epidural catheter.

A paediatrician examined the newborns. They were monitored, and their SpO_2 and Apgar scores were recorded at the 1st, 5th and 10th minute. The blood gas level obtained from the umbilical vein was examined. In the postoperative period, the time to first breastfeeding; phototherapy requirement, level of bilirubin,

weight loss of the newborn at the 24th and 48th hour, and need at birth for free O_2, positive-pressure ventilation (PPV), chest compressions, intubation and intensive care admission were also recorded.

Statistical Analysis

The SPSS programme version 21.0 was used for the statistical analyses. Descriptive statistics of the data were expressed as the mean, standard deviation, median, minimum, maximum, rate and frequency values. The distribution of variables was examined using the Kolmogorov-Smirnov test. While quantitative data were analysed with ANOVA (Tukey test) and Kruskal-Wallis (Mann-Whitney U test), qualitative data were assessed primarily with the chi-square test. Fisher's exact test was used to analyse the qualitative data when the conditions required for the chi-square test were not met. A value of $p<0.05$ was used for a significant difference. The sample size was based on preliminary clinical observations of the Apgar scores. The power of our study was determined to be 90% with 5% error and a standard effect size of 1.28.

Results

No subjects were excluded from the study. The demographic data of the patients were comparable in the study groups ($p>0.05$) (Table 1). The MAPs were significantly higher in the GA group compared with those in the EA and SA groups ($p<0.05$). The MAP recorded after the induction of SA was significantly lower than that of the EA group (91.0±14.1, 77.5±14.5, respectively) ($p=0.000$). SpO_2 levels were significantly lower in the GA group compared with those in the EA and SA groups, but the values were in the normal range ($p<0.05$) (Table 2).

The total amount of iv fluid given to patients was lower in the GA group (1180±284 mL) compared with those in the SA group (1480±420 mL) and EA group (1528±386 mL). The SA and EA groups were similar regarding the total amount of iv fluid given. Total blood loss was higher in the GA group than in the other study groups ($p<0.05$). Seven parturient females in the EA group and 12 parturient females in the SA group needed iv ephedrine. The mean ephedrine requirement was 10 mg in both groups.

The maternal mobilisation time was longer in the GA and EA groups compared with that in the SA group ($p<0.05$). The first defaecation time was significantly prolonged in the GA group (34.2±1.2 h), and the shortest time was recorded in the EA group (26.0±4.1 h) ($p=0.000$). The discharge of patients was similar among the study groups (Table 1).

The time to the first analgesic requirement was significantly longer in the EA group (390±28.3 min) ($p=0.000$) (Table 1).

Although the *time* intervals for the skin-uterine incision were comparable in the study groups, the time interval for the uterine-incision delivery was longer in the GA group (2.0±1.2 min) than in the EA group (1.6±1.0 min) and SA group (1.0±0.7 min) ($p<0.05$).

The Apgar scores of newborns were significantly lower at the 1st, 5th and 10th minute in the GA group than in the other groups ($p<0.05$), and were comparable in the EA and SA groups. The SpO_2 values of newborns were lower in the GA group than in the EA and SA groups ($p<0.05$). Six newborns required a free O_2 supply and PPV, and one newborn from the GA group was intubated and transferred to the neonatal intensive care unit (NICU). Neither of the newborns delivered in the EA or SA groups required these intentions. The blood gas analysis of blood from the umbilical vein of the newborns produced similar results for the three study groups. (Table 3)

The postnatal 48-hour weight loss of the newborn was higher in the EA group (5.6%±2.5%) and SA group (5.7%±2.2%) than in the GA group (4.0±2.0) ($p<0.05$). All three study groups were comparable regarding plasma bilirubin levels at postnatal 24 and 48 hours and hypoglycaemia incidence at postnatal 24 hours. No newborn had phototherapy requirements (Table 3).

The first breastfeeding time differed among the study groups. The newborns in the GA group were breastfed 2.9±0.9 hours after delivery, which was significantly later than the times in the EA and SA groups ($p<0.05$). The first breastfeeding time was similar in the EA (2.1±0.3 h) and SA (2.2±0.4 h) groups ($p>0.05$) (Table 2).

Table 1. Maternal parameters

	GA	EA	SA	p
Age (years)	28.4±4.3	28.6±4.1	29.7±4.4	0.493
Weight (kg)	78.9±11.5	73.0±10.9	77.0±12.7	0.207
Bleeding (mL)	736.6±163.7	350±108.0	344±92.8	**0.000**
Ephedrine Requirement (mg)	0	70	120	**0.000**
Fluid requirement (mL)	1,180±284	1,480±420	1528±386	**0.003**
Defaecation time	34.2±1.2	26.0±4.1	28.5±1.0	**0.000**
Mobilisation time	7.2±1.1	7.1±0.5	5.9±1.0	**0.000**
NRS	3.84±0.8	0.44±0.65	0.64±0.76	**0.000**
First analgesic requirement (minute)	35.0±9.5	390±28.3	230±35.7	**0.000**

GA: General anaesthesia, EA: Epidural anaesthesia, SA: Spinal anaesthesia

Table 2. Maternal mean arterial pressure and SpO2 values

MAP (mmHg)	GA	EA	SA	P
0 minute	104.0±13.8	102.2±12.7	98.2±10.5	**0.02**
Induction	108.0±16.6	91.0±14.1	77.5±14.5	**0.000**
Incision 1st minute	114.0±14.3	85.1±15.4	77.6±14.4	**0.000**
Incision 5th minute	107.8±17.4	85.0±10.4	81.9±12.2	**0.000**
Incision 10th minute	95.6±20.4	84.8±9.3	79.3±9.3	**0.002**
Incision 20th minute	88.0±16.2	77.9±9.3	73.2±7.1	**0.000**
Incision 40th minute	104.5±11.3	73.0±6.5	72.4±7.8	**0.000**
SpO_2				
0 minute	98.9±1.2	99.0±0.7	99.0±0.9	**0.001**
Induction	98.9±0.7	99.7±0.7	99.5±0.6	**0.000**
Incision 1st minute	98.6±1.2	99.8±0.5	99.5±0.6	**0.000**
Incision 5th minute	98.7±0.9	99.8±0.4	99.4±0.7	**0.000**
Incision 10th minute	98.3±0.9	99.8±0.5	99.4±0.7	**0.000**
Incision 20th minute	98.1±0.9	99.7±0.5	99.4±0.6	**0.000**
Incision 40th minute	98.7±0.7	99.8±0.4	99.4±0.6	**0.000**

GA: General anaesthesia, EA: Epidural anaesthesia, SA: Spinal anaesthesia

Table 3. Postpartum assessment parameters of the newborns

	GA (n=25) Mean ± SD	EA (n=25) Mean ± SD	SA (n=25) Mean ± SD	p
Apgar Score				
1st minute	7.6±1.4	8.9±0.3	9.0±0.3	0.000
5th minute	9.0±0.9	9.8±0.4	9.9±0.3	0.000
10th minute	9.8±0.4	10.0±0.0	10.0±0.0	0.015
SPO_2				
1st minute	77.3±4.2	90.2±2.2	89.8±2.8	0.000
5th minute	85.3±3.8	94.2±1.9	94.4±1.7	0.000
10th minute	91.4±4.0	97.0±1.6	97.0±1.3	0.000
30th minute	97.8±1.4	99.1±1.4	99.3±1.0	0.000
Blood gas analysis				
Ph	7.3±0.0	7.3±0.0	7.3±0.0	0.052
pCO_2	48.5±5.4	45.4±3.7	44.5±6.7	0.026
pO_2	26.5±7.6	23.4±6.6	24.4±6.8	0.295
BE	-0.3±1.5	-0.8±2.1	-1.2±2.0	0.308
HCO_3	24.8±1.7	24.3±1.9	23.8±2.4	0.246
Phototherapy (yes/no)	0/25	0/25	0/25	-
Bilirubin (mg/dL)				
24 hours	4.0±1.9	3.8±1.5	3.2±1.4	0.198
48 hours	5.2±2.3	4.9±1.5	5.0±2.2	0.915
Postnatal weight loss (%)				
24 hours	3.3±1.4	3.8±1.4	3.8±1.0	0.260
48 hours	4.0±2.0	5.6±2.5	5.7±2.2	0.630
Hypoglycaemia 24 hours (yes/no)	0/25	0/25	0/25	-
Requirement of Free oxygen	6	0	0	0.001
Positive-pressure ventilation (PPV)		0	0	0.001
Intubation	1	0	0	p>0.05
Intensive care unit admission	1	0	0	p>0.05
Breastfeeding (hours)	2.9±0.9	2.1±0.3	2.2±0.4	0.000

GA: General anaesthesia, EA: Epidural anaesthesia, SA: Spinal anaesthesia, NRS: Numeric Rating Scale, MAP: Mean arterial pressure, SD: Standard deviation

Discussion

This prospective randomised study compared the maternal and foetal effects of different anaesthesia techniques during caesarean delivery. The newborns had lower Apgar scores, often required free O_2 supply and PPV and had a longer time to first breastfeeding when GA was performed. The recovery of the mothers' bowel functions occurred earliest in the EA group.

General and regional anaesthesia techniques for caesarean delivery have both advantages and disadvantages. Studies conducted to date have researched the effects of the anaesthesia method on mothers, and neuraxial anaesthesia techniques have become the preferred method for supporting maternal safety. However, there remains controversy about their effects on newborns.

The most significant adverse effect of regional anaesthesia, which also directly affects the foetus, is perioperative hypotension. Maternal hypotension related to sympathetic block is the most common complication of regional anaesthesia. The incidence of maternal hypotension has been reported to be 39% in EA and 48% in SA (12). As uterine blood pressure depends upon perfusion pressure, severe hypotension may lead to foetal acidosis and neonatal depression or maternal nausea and vomiting by decreasing uterine and intervillous blood flow (13). In a previous study conducted on umbilical cord arterial pH and the Apgar scores of newborns, hypotension due to SA did not lead to any change in neonatal Apgar scores and blood pH when treated immediately (14). In our study, arterial blood pressure values were lower in the EA and SA groups than in the GA group. The pre-incision blood pressure level of the SA group was lower than that of the EA group, and the ephedrine requirement of the SA group was higher than that of the other groups. Although early development of hypotension in the SA group and its requirement for higher doses of ephedrine is a disadvantage, this does not reveal a negative clinical consequence, as the newborns' Apgar scores and SpO_2 values were higher in the SA group than in the GA group. In addition, there was no difference in the newborns' blood gas analysis values.

There is no specific data on the superiority of one method versus another regarding the prevention and treatment of hypotension that develops during a caesarean section (15). The effectiveness of preoperative fluid loading for the prevention of maternal hypotension during regional anaesthesia remains a controversial issue. In this study, we determined the amount of iv fluid given according to haemodynamic data without any preloading, and the amount was found to be significantly higher in patients receiving epidural and SA. This may have resulted because GA has less of an effect on the sympathetic nervous system, resulting in vasodilation.

The studies comparing GA and regional anaesthesia regarding perioperative bleeding in caesarean section procedures had conflicting results. Even if the bleeding was high in GA, there was no need for blood transfusion (16,17). Similarly, in our study, the amount of bleeding in the GA group was significantly higher compared with that in the other groups, and no patient required blood transfusions.

Most studies considering the effects of different anaesthesia methods on newborns do not include detailed information, such as skin incision-uterine incision time and time of delivery. Kamat et al. (18) analysed the influence of time to induction-delivery and uterine-incision delivery on Apgar scores. They concluded that intervals are shorter in the GA group compared with those in the SA group (57 vs 68 seconds, respectively). Nevertheless, Steinbrook et al. (19) reported that the time between uterine incision and delivery was longer in the GA group compared with that in the SA group (59 vs 45 seconds, respectively). In our study that included more data, the interval between the skin and uterine incision was similar between groups; however, the interval between uterine incision and delivery was shorter in the SA group. This finding may have resulted because of the more intense motor block during SA.

Spinal and EA techniques are known to provide earlier recovery of bowel function during the postoperative period (20). Sympathetic block plays a significant role in the recovery of bowel function. The parasympathetic system is activated and increases the motility in the stomach, small intestine and proximal colon. Another reason for the delayed recovery of bowel function in patients operated under GA may be late oral intake after GA (19). In this study, the time to the first defaecation was significantly shorter in the EA group but significantly prolonged in the GA group.

In Solangi et al.'s (21) study that evaluated the effect of anaesthesia on newborns, the Apgar scores of newborns at the 1st and 5th minute in the SA group were higher than those in the GA group. Kavak et al. (22) reported that Apgar scores were similar in the EA and SA groups at both the 1st and 5th min. Similarly, in our study, the scores measured at the 1st, 5th and 10th minutes were higher in the SA and EA groups compared with those in the GA group. A significant number of newborns in the GA group required a free O_2 supply and PPV. Longer exposure to inhalational agents during GA may have caused decreased Apgar scores in newborns. As the baby delivery time was under three minutes in all three groups and inhalational agents were not administered during the interval between bladder retractor and umbilical cord clamping in the GA group, no acidosis was observed in the present study. However, other studies state that umbilical cord pH values of the newborn were different in general and regional anaesthesia (23). Yegin et al. (24) reported that maternal hypotension develops as a result of regional anaesthesia decreases uteroplacental perfusion and causes foetal acidosis. These results have shown the significance of the prevention or treatment of maternal hypotension during caesarean section.

The correlation between regional anaesthesia and breastfeeding has not been clearly identified because of the limitations of previous studies. Although several studies indicated that epidural anaesthesia does not affect postnatal milk release and the success of breastfeeding (25,26), Szabo (27) reported that the duration and frequency of breastfeeding in the EA group were higher than in the GA group. In our study, the time to first breastfeeding was prolonged in the GA group and was nearly one hour longer than that in the SA and EA groups. A longer length of recovery room

stay may have caused this result. The World Health Organization (WHO) advises that newborns should start breastfeeding within one hour of birth (28).

Fluid loading to prevent hypotension during epidural and SA leads to infusion of fluid into the foetus through the placenta and increases the volume of foetal extracellular fluid. This may result in excessive weight loss during the first days of life. In this study, we administered more iv fluid to control maternal hypotension. We believe that the administration of excessive fluid loading to prevent hypotension led to more weight loss in newborns in the SA and EA groups at the 48th hour.

In the present study, the incidence of early hypoglycaemia and the need for phototherapy in neonates were similar among the groups. In addition, Tonni et al. (29) reported that the hypoglycaemia incidence was similar in the infants of patients undergoing spinal and GA. Several studies have suggested that epidural and SA techniques are superior to GA regarding neonatal hyperbilirubinemia but do not increase the need for phototherapy (30,31). In our study, no neonates developed hypoglycaemia or required phototherapy.

Conclusion

We concluded that GA might lead to lower Apgar scores, a more frequent requirement for a free O_2 supply and PPV, and a longer time to first breastfeeding than spinal and EA. Therefore, regional anaesthesia techniques should be preferred to caesarean delivery with less negative clinical consequences on newborns.

Ethics

Ethics Committee Approval: The Ethics Committee approved the study (B104ISM4340029-1009-90) and written informed consent was obtained.

Informed Consent: Obtained.

Peer-review: Externally and internally peer reviewed.

Authorship Contributions

Concept: M.O.E., E.Z.E., K.T.S., A.M., E.M., Design: M.O.E., E.Z.E., K.T.S., A.M., E.M., Data Collection or Processing: M.O.E., E.Z.E., K.T.S., A.M., E.M., Analysis or Interpretation: M.O.E., E.Z.E., K.T.S., A.M., E.M., Literature Search: M.O.E., E.Z.E., K.T.S., A.M., E.M., Writing: M.O.E., E.Z.E., K.T.S., A.M., E.M.

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Original Article

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Managing Evidence-Based Research Processes with Systematic Review and Bibliometric Analysis Methods in Covid-19 Pandemic

Covid-19 Pandemisinde Sistematik İnceleme ve Bibliyometrik Analiz Yöntemleri ile Kanıta Dayalı Araştırma Süreçlerini Yönetme

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ABSTRACT

Objective: This article aims to analyze different approaches to a literature review. The publications in the pandemic period were examined by bibliometric analysis method within the framework of systematic review and determined criteria.

Methods: Between 01.01.2020 and 07.06.2020, research on pandemics in WOS and Scopus platforms has been examined with a comprehensive literature study. The first aim of the study is to reveal the quality of the literature research. Another goal is to analyze the results with certain criteria. The bibliometric analysis method was used to analyze the results of the research.

Results: With the determined research strategy, the publications belonging to the pandemic period were analyzed comparatively with charts and tables in WOS and Scopus platforms such as country, type of publication, institution, subject area, author, the most cited publication, and the most published journals.

Conclusion: Within the framework of bibliometric analysis, it is one of the top contributors in the process with the highest number of publications in the US pandemic process. Although there is no direct relationship between the intensity of spreading of the pandemic and the publications produced, these two processes have proceeded almost parallel to each other. It has been determined that

ÖZ

Amaç: Bu makale bir literatür taramasına farklı yaklaşımları analiz etmeyi amaçlamıştır. Pandemi döneminde üretilen yayınlar, sistematik inceleme ve belirlenen kriterler çerçevesinde bibliyometrik analiz yöntemi ile incelenmiştir.

Yöntemler: 01.01.2020-07.06.2020 tarihleri arasında WOS ve Scopus platformlarında pandemiyle ilgili yapılan araştırmalar, kapsamlı bir literatür çalışmasıyla incelenmiştir. Çalışmanın ilk hedefi literatür araştırmasının kalitesini ortaya koymaktır. Diğer hedefi ise ortaya çıkan sonuçları belirli kriterlerle analiz edebilmektir. Araştırma sonuçlarının analiz edilmesinde bibliyometrik analiz yöntemi kullanılmıştır.

Bulgular: Belirlenen araştırma stratejisiyle birlikte, pandemi dönemine ait yayınlar, WOS ve Scopus platformlarında ülke, yayın türü, kurum, konu alanı, yazar, en çok atıf alan yayın ve en çok yayın yapılan süreli yayınlar gibi kriterler seçilerek karşılaştırmalı olarak, grafik ve tablolarla analiz edilmiştir.

Sonuç: Bibliyometrik analiz çerçevesinde ABD pandemi sürecinde en fazla yayın sayısıyla sürece en çok katkı sağlayan devletlerin başında gelmektedir. Pandeminin yayılma yoğunluğu ile üretilen yayınlar arasında doğrudan bir ilişki olmamasına rağmen, bu iki süreç neredeyse birbirine paralel şekilde ilerlemiştir. En çok

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the most broadcasting institutions are universities in the USA. In this process, it was seen that most of the articles were published in order to ensure the rapid dissemination of scientific information. In the fight against epidemic, it has been observed that quite a lot of publications have been produced in the field of medicine on both platforms.

Keywords: Systematic review, meta-analysis, bibliometry, research design, COVID-19, pandemic

yayın üreten kurumlar yine ABD'deki üniversiteler olduğu tespit edilmiştir. Bu süreçte bilimsel bilginin hızlı bir şekilde yayılmasını sağlamak amacıyla en çok makale türünde yayın üretildiği görülmüştür. Salgınla mücadelede iki platformda da tıp alanında oldukça fazla yayın üretildiği görülmüştür.

Anahtar Sözcükler: Sistematik inceleme, meta-analiz, bibliyometri, araştırma tasarımı, COVID-19, pandemi

Introduction

Research methods in medicine and health sciences are updated and developed with the developments in this field. With the Covid-19 pandemic, researchers have aimed to produce research with high evidence level in order to develop a rapid diagnosis-treatment method in a short time. Online literature search tools cover most disciplines and make millions of scientific data searchable in seconds. For this reason, the researches should be subject to a careful literature review and repetition should be avoided in search results. In this process, methods such as systematic review, meta-analysis and bibliometric analysis are considered as important methods for evidence synthesis. Scopus and Web of Science (WOS) are two important research platforms that index the best journals in all disciplines. Within the scope of the study, scientific research belonging to the Covid-19 pandemic period was evaluated according to various criteria using bibliometric analysis method on these two platforms. Systematic review methods in evidence-based research processes were also indirectly addressed in the study. In addition, the subject of evidence-based research was included in this study for the information about databases used in systematic review and meta-analysis processes and the content in the method.

The increasing volume of scientific research makes it increasingly difficult for practitioners and researchers to follow past and current findings in a particular discipline. The field of medicine and health sciences is developing very rapidly in terms of research volume compared to other disciplines. The use of different techniques and methods in medicine and health sciences and the development of medical applications with the changing technology have also been reflected in the medical literature. For this reason, it is known that researchers and practitioners in the field of medicine and health sciences tend to increase the level of evidence in their research with the most up-to-date publications in order to manage research processes. In the process of the Covid-19 pandemic, when the research outputs made in 2020 from the date accepted as the beginning of the pandemic until today are examined, it has been revealed that the cited sources are quite old publications. This situation reveals how important it is to examine all relevant scientific outcomes in affecting the level of evidence within the scope of the research subject. For this reason, researchers and practitioners should know and use research tools with high publication level in their discipline, and increase the level of evidence studies with various research methods.

Evidence-based Research

Evidence-based research has been adopted as an approach for professionals and / or other decision-makers in a particular field, in which evidence showing which method to be used in which application is identified and information about how scientifically strong these users are is given.

In the field of medicine and health, it is very important that the information is up-to-date, correct, reliable, accessible and based on evidence. Factors such as the increase in the amount and speed of all kinds of information produced, the safe access to information sources, easy use and continuous updating of the sources, the emergence of new types of studies for research, the development of new databases by examining and evaluating the evidence values of the researches, and the concepts of cost, quality and efficiency gaining importance day by day especially in medical and health sciences have made the approach of evidence-based research necessary and important.

The practices and approaches that emerge with evidence-based research affect the field of medicine and health most, as well as all disciplines. Among the different user groups in the field of health, the group that needs the most up-to-date and urgent information is the academicians in the field of medicine. In parallel with this, various user studies on the need for evidence-based information and information seeking behavior of user groups working in medicine and health sciences have emerged intensively.

Evidence-based research has required the information to be supported by a systematic approach with qualified and up-to-date research in order to make the right decisions. Among the most important elements of using the best evidence to guide the practice of any professional, there is development of questions using research-based evidence, the level and types of evidence to be used, and evaluation of the effectiveness after the task or effort is completed (1). Evidence-based knowledge is one of the most important and sought information types by academics and practitioners in the medical field.

Today, the number of scientific studies in the field of medicine and health sciences is increasing rapidly. Often different results are obtained in studies conducted on a particular subject, independently from each other. In order to interpret this mass of knowledge and use it in new research, comprehensive and reliable further studies are needed. With the applications of evidence-

based medicine (EBM), new sources that provide analysis of researches on a specific subject have come to the fore (2).

Although all sources that provide evidence information presents evidence, the levels of evidence vary (3).

Evidence-based research methods are grouped differently in different sources. It is most commonly studied at the following four basic levels. In our study, the first two analysis methods within the second of these levels are mentioned.

1. Original studies

2. Resources that synthesize original studies

3. Resources summarizing original studies

4. Systems that provide access to original studies, their synthesis and contents (2).

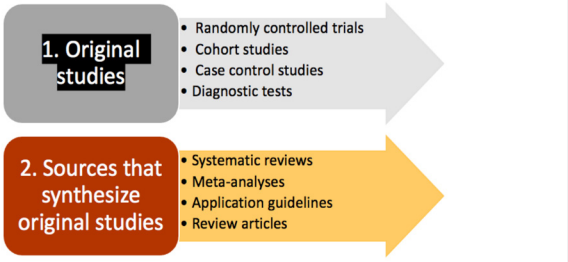


Figure 1. Classification of sources according to levels of evidence

As stated above, it is possible to examine studies classified according to evidence levels under these two headings. The first of these offers original primary sources. The important feature of original studies is that they provide evidence information. Evidence-based information is obtained directly from the field. The second is considered as sources synthesizing original studies that form the level of evidence. Secondary sources are generally considered as studies that guide the researcher with literature reviews and shed light on obtaining original results.The first two levels can also be expressed by the following evidence quality pyramid

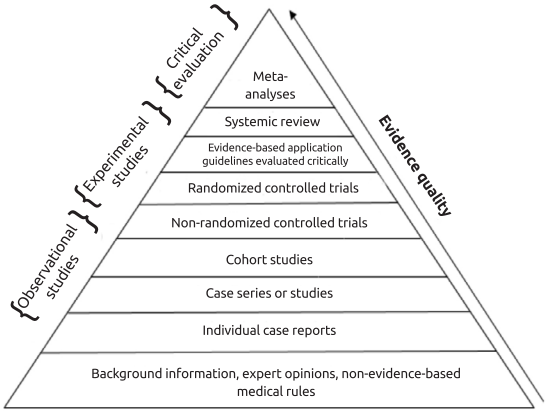


Figure 2. Evidence quality pyramid

The evidence pyramid is explained in various versions. The feature common to all of them is that it focuses on showing weak study designs (basic science and case series) at the bottom, followed by case-control and cohort studies in the middle, then followed by randomized controlled trials (RCTs), and at the top are systematic reviews and meta-analysis studies.

It is emphasized in the lowest ranking that the lower sources of evidence in the hierarchy are the least preferred in practice because it takes more expertise and time to define, evaluate and apply true and most appropriate evidence. Meta-analysis studies, on the other hand, are the highest evidence in the hierarchy, and include those with clinical, methodological or statistical reliability, in which the estimation of treatment results varies greatly depending on the analytical strategy used. There are systematic reviews at the top of the evidence pyramid. In the American Medical Association Journal Guideline, systematic reviews and meta-analysis studies provide a general framework. The guideline presented a two-step approach in which the reliability of a systematic review process was first evaluated (a comprehensive literature review, rigorous study selection process, etc.). If the systematic review is considered reliable enough, the second step is taken where we evaluate the certainty in evidence based on the GRADE approach. In other words, RCTs that are well managed at low risk of bias cannot be meta-analyzed. Therefore, the second modification of the pyramid is necessary to extract systematic reviews from the top of the pyramid and use them as a lens for other types of work to be seen (i.e. evaluated and implemented). Systematic review (the process of selecting studies) and meta-analysis (statistical aggregation that produces a single effect size) are tools for using and applying stakeholder evidence (4).

It is known by everybody that systematic review and meta-analysis are the most used methods especially in scientific studies in the field of health and are important in academic studies. When using systematic review and meta-analysis methods, many scientific sources are needed and care is taken to make these sources especially evidential sources. Like other producers of systematic reviews, it requires authors to provide a repeatable and detailed plan for evaluation of evidence and literature review (5).

Systematic Review

In parallel with the rapid increase of knowledge in medicine and health, the sources of information in which medical information is published vary. One of the most important aspects that increase the quality of the research is that the relevant literature in the field of research has been thoroughly scanned. Today, with the large number of research outputs in many research platforms and databases, it has become very difficult for researchers to search and identify suitable outputs. Systematic review is the evolution of the literature review, including planning, execution, analysis, synthesis and reporting processes (6). Systematic reviews are secondary sources that collect, analyze and synthesize the findings of many primary sources that report the research process and findings. These reviews are the most important sources of EBM practices as the sources that provide the highest level of evidence

among the sources providing evidence-based information. These evidence-based sources addressing a specific health problem are prepared by applying scientific methods in collecting all relevant primary research sources, evaluating these sources with a critical approach and synthesizing their findings (7).

In the planning process, which is the first stage of systematic review, the research subject must be defined. In this process, the researcher must be a knowledge master on systematic review. This stage also includes critical thinking. For planning, which is the first stage of the systematic review, there are two methods used as PICOC (Population-Intervention-Comparison-Outcome-Context) and CIMO (Context-Intervention-Mechanism-Outcome) (6).

The second stage of systematic review is the execution stage consisting of research, selection and evaluation. In a systematic review, the first purpose of the search phase is to identify all or as much of the relevant resources as possible (8). For this reason, a research platform should be chosen that will best cover the research subject. Research tools are important in terms of the subject area, the type of resource it contains, the year range of research outputs, and the inclusion of all research from around the world and a not making geographical separation. The sources resulting from the research are selected and the process of evaluating the quality of evidence within the scope of the research subject is completed at this stage.

The third stage of systematic review is analysis and synthesis. In the following sections of the study, the processes of transforming the data obtained through systematic analysis into meaningful findings with bibliometric analysis and meta-analysis will be covered in detail.

The last stage of the systematic review is the reporting stage. At this stage, it is aimed to transform the information and findings obtained through systematic review into outputs. During the reporting phase, models such as the PRISMA model can be used technically.

Evidence-based Research Databases Including Systemic Review and Meta-analysis

Databases and Search Systems: Pubmed (MEDLINE), Embase, Cochrane Library, CINAHL, Web of Science, APA PsycInfo, Global Health, Scopus, DynaMed, EbscoHost, ERIC, Google Akademik, LILACS, Nursing Reference Center, ProQuest, PsycINFO, ScienceDirect, Scopus, SportDiscus, TRID, OVID, Roadrunner Search.

Clinical Trials: ClinicalTrials.gov, European Clinical Trials Register, International Standard Randomized Clinical Trial Number (ISRCTN) Register, World Health Organization (WHO) International Clinical Trial Registry Platform.

Gray literature: ProQuest Dissertations & Theses.

Bibliometric Analysis

The main goal of scientific research is to reach significant results from the research outputs achieved on the study subject together with the systematic review. In this process, meta-analysis and bibliometric analysis methods are the most important stages of the research in reaching meaningful results. Bibliometry has been used extensively in evaluating scientific outcomes by analyzing the structure of disciplines and their development. With the bibliometric analysis method, various findings regarding scientific communication are obtained by analyzing certain features of documents or publications in bibliometric research (9). Bibliometric methods are a useful aid in literature reviews even before reading, by guiding the researcher to the most effective studies and mapping the research area without subjective bias (10). Bibliometric analysis is complementary in addition to systematic review and meta-analysis methods which are used as traditional methods in evidence-based research processes and complement each other.

There are varieties of bibliometry that analyze publication metrics, journal metrics, citation metrics, network metrics, research impact metrics, and research impact enhancement processes. There are different content evaluation methods for the mentioned metrics. In publication metrics, information such as publication year, institution, publication name, subject area, author, funding institution and type of publication can be reached and analyzed. In this study, researches on Covid-19 were analyzed with the data obtained from WOS and Scopus platforms with the bibliometric analysis method. Journal metrics are analyzed using Journal Impact Factor (JIF) and Scimago Journal and Country Ranking (SJR) platforms in analysis processes. In bibliometric analysis processes, data obtained from databases and various platforms can also be analyzed using various software tools such as Gephi, Sci2, CitNetExplore, VosViewver and ID3 Algorithm (6).

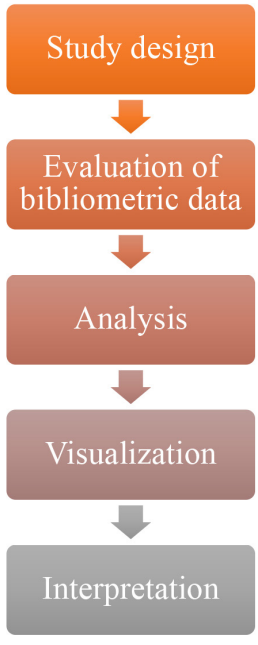


Figure 3. Workflow for science mapping with bibliometric methods (10).

All stages of bibliometric analysis are carried out with systematic review. It includes the processes of having systematic review skills, determining the research subject and determining the research method during the research design phase. This stage is common with the first stage of systematic review. It is the stage of scanning the research subject with various criteria by deciding on the database during the compilation of bibliometric data and obtaining the data. The data obtained are stored in a meaningful integrity with various computer programs and defined with various tools during the analysis phase. In the visualization phase, the data obtained are visualized through softwares such as VosViewver. In the last stage, the findings are defined and interpreted with the researcher's expertise in that field and evidence synthesis.

Method

This study aims to support research with high level of evidence by using systematic review and bibliometric analysis methods in the field of medicine and health sciences during the Covid-19 pandemic. The study also developed a Covid-19 search strategy enabling research within data sources and databases used in systematic review and meta-analysis processes in line with certain criteria. In addition, the subject of evidence-based research was included for the information about databases used in systematic review and meta-analysis processes and the content in the method.

In this study, the researches on the Covid-19 pandemic on the Web of Science (WOS) and Scopus platforms between January 1, 2020 and June 7, 2020 were examined with a comprehensive literature review.

The first goal of the study is to reveal the quality of the literature research. The other goal is to analyze the results with certain criteria. The bibliometric analysis method was used to analyze the research results. At the beginning of the research, two different research strategies were determined for the scanning to be done in WOS and Scopus. First, keywords were determined in order to examine the Covid-19 research outputs in detail. The keywords were chosen commonly for the two platforms. Scanning has been carried out on both platforms with the specified search words. Afterwards, the research conducted on WOS and Scopus platforms were analyzed in terms of the country, type of publication, institution, subject area and the number of citations received by the most publishing author. While analyzing the data, SPSS 22 software and Excel program for table views were used.

Scopus Search Strategy

"Wuhan coronavirus" OR "Wuhan seafood market pneumonia virus" OR "COVID19*" OR "COVID-19*" OR "COVID-2019*" OR "coronavirus disease 2019" OR "SARS-CoV-2" OR sars2 OR "2019-nCoV" OR "2019 novel coronavirus" OR "severe acute respiratory syndrome coronavirus 2" OR «2019 novel coronavirus infection" OR "coronavirus disease 2019" OR "coronavirus disease-19" OR "novel coronavirus" OR coronavirus OR "SARS-CoV-2019" OR "SARS-CoV-19" AND (LIMIT-TO (PUBYEAR , 2020).

Web of Science-Core Collection Search Strategy

("Wuhan coronavirus" OR "Wuhan seafood market pneumonia virus" OR "COVID19*" OR "COVID-19*" OR "COVID-2019*" OR "coronavirus disease 2019" OR "SARS-CoV-2" OR SARS2 OR "2019-nCoV" OR "2019 novel coronavirus" OR "severe acute respiratory syndrome coronavirus 2" OR "2019 novel coronavirus infection" OR "coronavirus disease 2019" OR "coronavirus disease-19" OR "novel coronavirus" OR coronavirus OR "SARS-CoV-2019" OR "SARS-CoV-19")

Refined by: PUBLICATION YEARS: (2020)

Results and Discussion

Covid-19 originated in Wuhan, China and spread to European countries and later to America. With the spread of the epidemic to different continents, the World Health Organization (WHO) declared the disease Covid-19, caused by the new corona virus, as a pandemic. It is understood from the statistics that there has been a rapid increase in the number of publications made on this issue in a very short time.

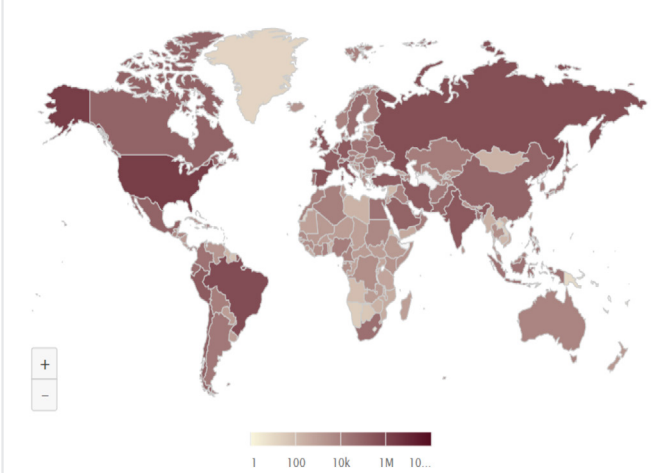


Figure 4. General situation of the Covid -19 outbreak in the world (02.06.2020)
Source: https://www.worldometers.info/coronavirus/worldwide-graphs/#countries-deaths

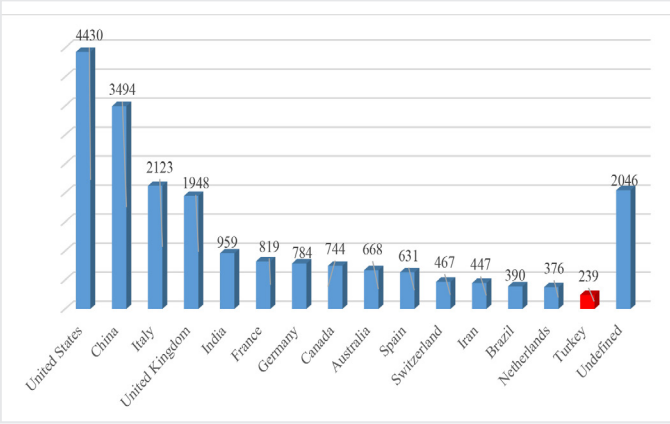
Along with the research strategy determined in the research method, the publications produced in the Covid-19 period were selected considering criteria including country, publication type, institution, subject area, author, the most cited publication and the most published periodicals on WOS and Scopus platforms and analyzed comparatively with graphs and tables.

There is quite a difference between the numbers of results of searches in both platforms performed using the keywords created among the Pubmed MesH terms. It was concluded that during the Covid-19 pandemic period, 18942 publications were carried out in Scopus and 7689 in WOS. The reason for this can be attributed to the different publication selection criteria of both platforms. The most cited publication on the WOS platform in the time interval of research was published in the Lancet journal

with 1217 citations. The most cited publication on the Scopus platform was again from Lancet with 2094 citations.

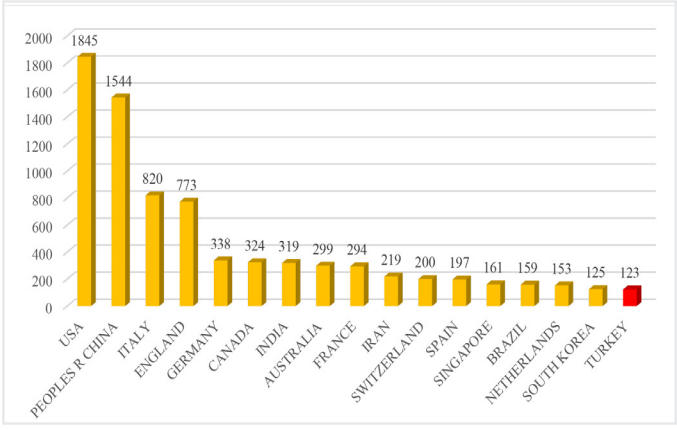
The criteria specified within the scope of the study have been analyzed with the tables below.

Table 1. The number of publications carried out in some countries according to Scopus



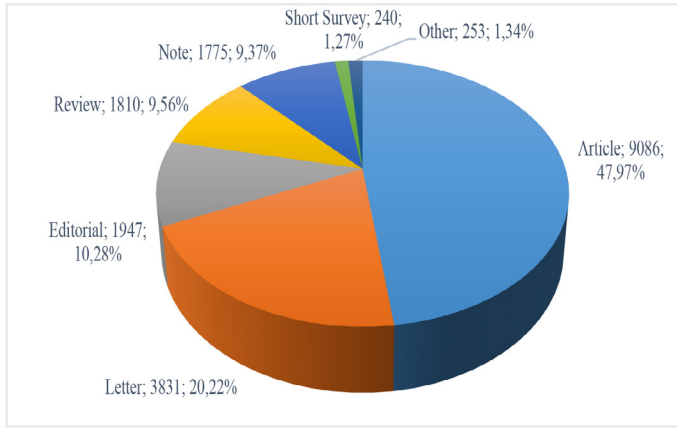
According to the analyses made in the Scopus database, the USA has the highest number of publications among the first fifteen countries. 4430 publications (23.3%) were performed in the USA. This was followed by China with 3294 (17.3%), Italy with 2123 (11.2%) and the United Kingdom with 1948 (10.2%) publications. Although there is no direct relationship between the spread density of the pandemic and the publications performed, we can say that these two tables are almost coordinated with each other. An important detail here is the publications with no country specified. 2046 publications (10.8%) seen in the table as undefined are in a very important position. Turkey has contributed this scientific process with 239 publications (1.2%).

Table 2. The number of publications carried out in some countries according to WOS



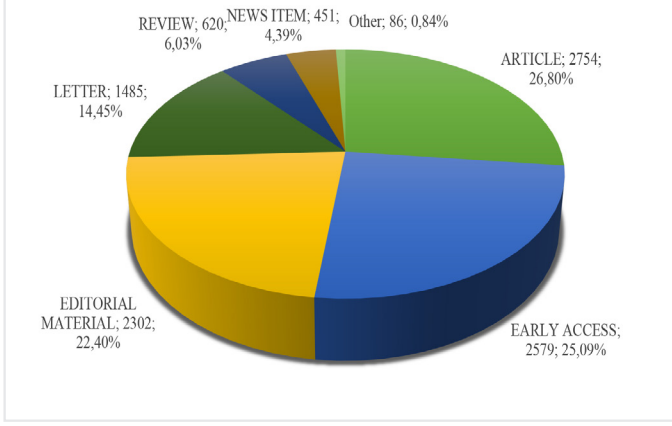
According to the analyses made in the WOS database, the USA ranked first in terms of the number of publications, just like the Scopus database. The USA performed 1845 publications (23.99%) in this period. It was followed by China with 1554 (20.08%), Italy with 820 (10.66%), and England with 773 (10.05%) publications. The similarities with the Scopus database draw attention in the ranking of publication production. Turkey has contributed with 123 articles (1.6%) to this process.

Table 3. Types of publications conducted according to Scopus



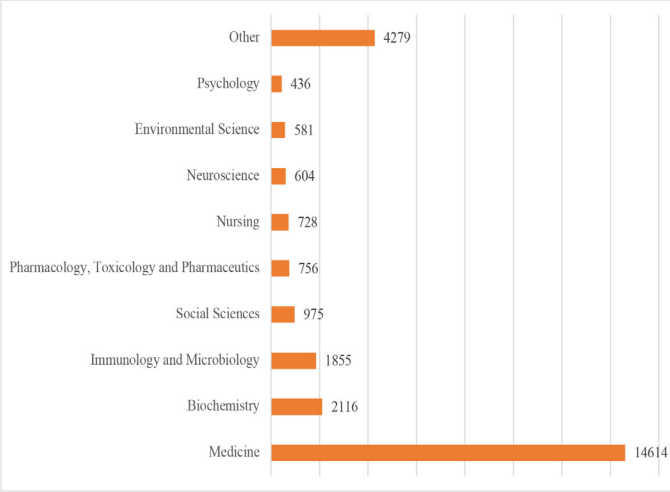
Almost half of the publications performed consist of articles in the Scopus database. This rate is 47.97%. The articles are followed by letters with 20.22% and editorial reviews with 10.28%.

Table 4. Types of publications conducted according to WOS



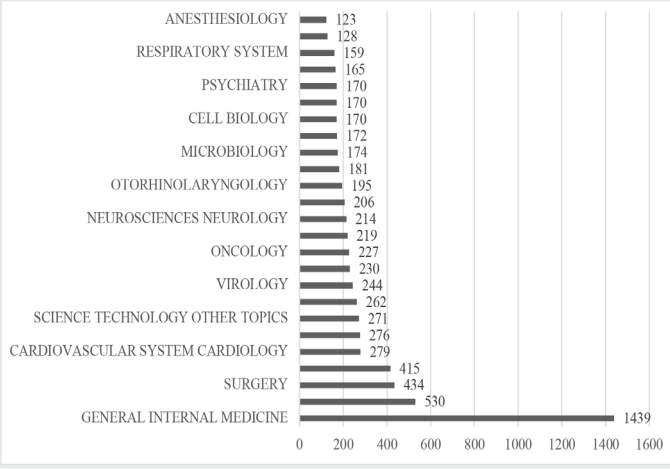
The numbers in the WOS database are identical to the numbers in the Scopus database. 51.89% of the publications between January 1, 2020 and June 7, 2020 were performed as articles. Moreover, almost half of these articles were opened to early view before their publication date. It should be evaluated as a very important datum in terms of showing the speed of scientific developments on this subject. Other publications produced in WOS are editorial reviews with 22.4% and letters with 14.45%. It is seen that the rates of articles are the highest as research outputs on both platforms.

Table 5. Subject distributions of publications in Scopus



When the data in the Scopus database were analyzed, it was seen that 14614 of the publications were performed in the field of medicine. Medicine is followed by biochemistry with 2116, immunology and microbiology with 1855 publications. What is interesting in this table is that social sciences were in the fourth place according to Scopus data. In fact, when evaluating the data, 77.15% of the total publications were in the field of medicine, while 5.1% were in the field of social sciences. From this point of view, it can be evaluated that the consequences of the pandemic affecting the whole world have an important place in terms of social sciences. One of the supporting figures in the table is that 436 (2.3%) publications have been performed in the field of psychology. It is estimated that the pandemic will decrease its impact and the number and rate of studies to be carried out in this field will increase in the following years.

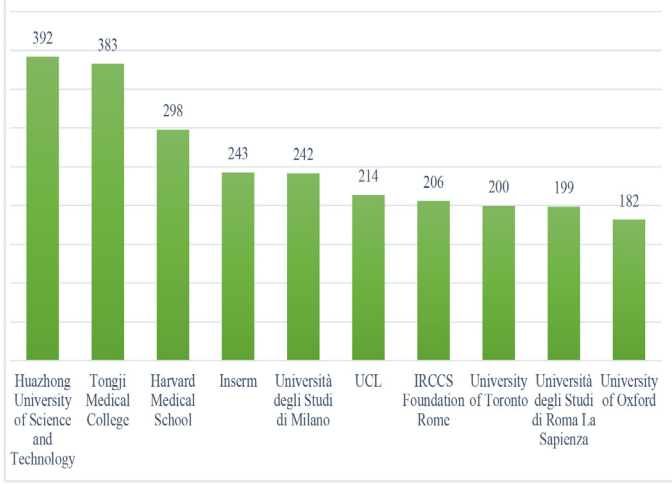
Table 6. Subject distributions of publications in WOS



The WOS platform reveals specifically the medical sciences with a more detailed analysis. Of the publications, 18.71% are in the field of general medicine, 6.83% are in the context of public health, 5.6% are in the field of surgery. When the data in the WOS database were examined, it can be witnessed that medical sciences are seeking solutions for the pandemic with great effort.

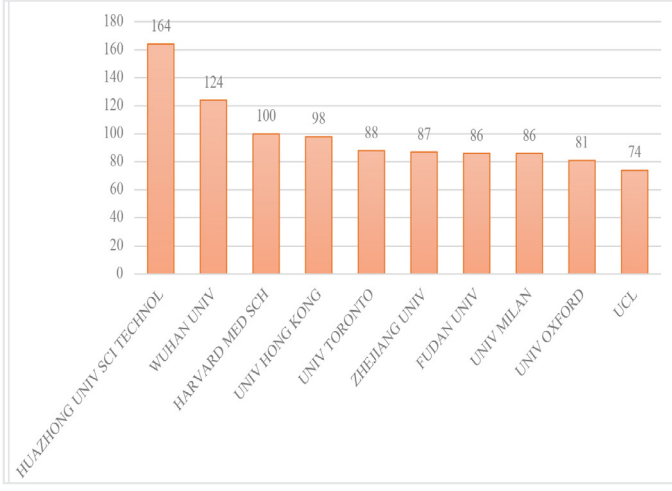
Methods in the field of diagnosis-treatment and medicine have played an important role in combating the disease. It has been observed that quite a lot of publications have been performed in the field of medicine on both platforms in the fight against the epidemic.

Table 7. Number of Publications Produced by the Top Publishing Institutions in Scopus



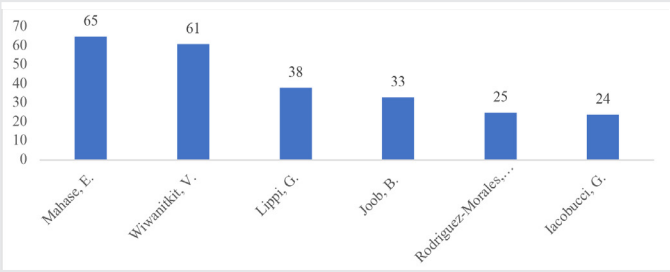
In the Scopus platform, the institutions producing the highest number of publications in the Covid-19 pandemic and their contribution percentages are as follows; Huazhong University of Science and Technology 392 (2.06%), Tongji Medical College 383 (2.02%), Harvard Medical School 298 (1.57%), Inserm 243 (1.28%), Università degli Studi di Milano 242 (1.27%).

Table 8. Number of Publications Produced by the Top Publishing Institutions in WOS



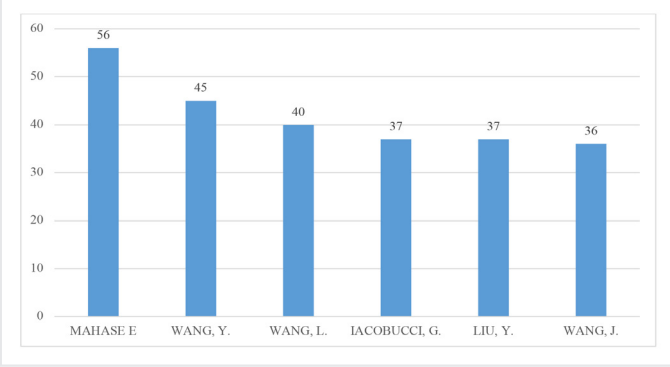
The institutions producing the highest number of publications and their contribution percentages in the Covid-19 pandemic in the WOS platform in 2020 are as follows; 3.2% University of London, 2.3% Harvard University, 2.2% University Of California System, 2.17% Huazhong University Of Science Technology and 1.6% Wuhan University.

Table 9. Top publishing authors according to Scopus



The most frequently publishing authors on the Scopus platform are listed in the table above. As it can be seen in the first row, the fact that a single author conducted 65 publications in about 180 days shows that scientists have worked hard to contribute to this period.

Table 10. Top publishing authors according to WOS



In the WOS platform, the contribution of anonymous authors appears to be 177 publications. Just like Scopus platform, Masahe, E. came first on this platform. A total of 121 publications of the author were published in the period subject to research on both platforms. It can be evaluated as a remarkable author performance in terms of making a very important contribution.

Table 11. The periodicals publishing the highest number of studies on WOS and Scopus platforms

WOS		Scopus	
Source	**Number of publications**	**Source**	**Number of publications**
BMJ British Medical Journal	364	BMJ Clinical Research Ed	269
Lancet	144	Journal Of Medical Virology	255
Journal of Medical Virology	137	BMJ	246
Cureus	96	Lancet	224
Nature	92	JAMA Journal Of The American Medical Association	153

The journal publishing the highest number of studies on the WOS platform was the British Medical Journal (BMJ) with 364 publications and took place in 4.7% of the total research volume. Lancet was second with 144 publications (1.8%), followed by Journal of Medical Virology with 137 publications (1.7%), Cureus with 96 (1.2%), and Nature with 92 publications (1.19%). In Scopus, BMJ Clinical Research journal took the first place with 269 publications. On the Scopus platform, more publications were indexed in BMJ and Lancet journals compared to WOS.

It was seen that the most cited publications in the time interval of the research were also among the journals in Table 11. The most cited study was published in the Lancet journal with 1217 citations.

Conclusion

In the study, the importance of systematic review in research processes was emphasized and the integration of bibliometric analysis method in systematic review processes was explained. In evidence-based research processes, the selection of appropriate search systems is very important. To shorten the research period and to increase the quality of research, mastering the systematic review method provides access to the relevant literature within the scope of the research subject in a short time. With bibliometric analysis, it is possible for researchers to obtain and analyze information about the structure of their fields in various categories.

Within the scope of the study, a bibliometric definition was made in a certain time interval (from the period when the pandemic period was accepted to begin to today) in order to analyze the research outputs related to the Covid-19 pandemic. WOS and Scopus platforms were chosen as the source of systematic review. Research contributions of countries and research institutions to the pandemic were evaluated on the WOS and Scopus platforms.

The United States of America (USA) is one of the countries that contributed most to the Covid-19 pandemic process with the highest number of publications. China, the starting country of the disease, remained behind USA in research processes. Although there is no direct relationship between the spread intensity of the pandemic and the publications performed, we can say that these two processes have proceeded almost parallel to each other. It has been determined that the institutions performing the highest number of publications are also the universities in USA. In this process, it was observed that articles were conducted mostly in order to ensure the rapid transmission of scientific knowledge. It has been observed that quite a lot of publications have been performed in the field of medicine on both platforms in the fight against the epidemic. However, it was observed that publications were produced in the field of social sciences with a rate of 5.1%. From this point of view, it can be evaluated that the consequences of the pandemic affecting the whole world have also an important place in terms of social sciences. The fact that a single author produced a large number of publications in about 180 days shows that scientists have worked hard to contribute to this period. In this period, it is seen that studies were published

Table 12. Bibliography of the 10 Most Cited Publications on the WOS Platform

Title of article	Authors	Source	Total citations
"Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China"	"Huang, Chaolin; Wang, Yeming; Li, Xingwang; Ren, Lili; Zhao, Jianping; Hu, Yi; Zhang, Li; Fan, Guohui; Xu, Jiuyang; Gu, Xiaoying; Cheng, Zhenshun; Yu, Ting; Xia, Jiaan; Wei, Yuan; Wu, Wenjuan; Xie, Xuelei; Yin, Wen; Li, Hui; Liu, Min; Xiao, Yan; Gao, Hong; Guo, Li; Xie, Jungang; Wang, Guangfa; Jiang, Rongmeng; Gao, Zhancheng; Jin, Qi; Wang, Jianwei; Cao, Bin"	LANCET	1221
"Clinical Characteristics of 138 Hospitalized Patients With 2019 Novel Coronavirus-Infected Pneumonia in Wuhan, China"	"Wang, Dawei; Hu, Bo; Hu, Chang; Zhu, Fangfang; Liu, Xing; Zhang, Jing; Wang, Binbin; Xiang, Hui; Cheng, Zhenshun; Xiong, Yong; Zhao, Yan; Li, Yirong; Wang, Xinghuan; Peng, Zhiyong"	JAMA-JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION	722
"Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: a descriptive study"	"Chen, Nanshan; Zhou, Min; Dong, Xuan; Qu, Jieming; Gong, Fengyun; Han, Yang; Qiu, Yang; Wang, Jingli; Liu, Ying; Wei, Yuan; Xia, Jia'an; Yu, Ting; Zhang, Xinxin; Zhang, Li"	LANCET	682
"A Novel Coronavirus from Patients with Pneumonia in China, 2019"	"Zhu, Na; Zhang, Dingyu; Wang, Wenling; Li, Xingwang; Yang, Bo; Song, Jingdong; Zhao, Xiang; Huang, Baoying; Shi, Weifeng; Lu, Roujian; Niu, Peihua; Zhan, Faxian; Ma, Xuejun; Wang, Dayan; Xu, Wenbo; Wu, Guizhen; Gao, George F.; Tan, Wenjie"	NEW ENGLAND JOURNAL OF MEDICINE	681
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"A familial cluster of pneumonia associated with the 2019 novel coronavirus indicating person-to-person transmission: a study of a family cluster"	"Chan, Jasper Fuk-Woo; Yuan, Shuofeng; Kok, Kin-Hang; To, Kelvin Kai-Wang; Chu, Hin; Yang, Jin; Xing, Fanfan; Liu, Jieling; Yip, Cyril Chik-Yan; Poon, Rosana Wing-Shan; Tsoi, Hoi-Wah; Lo, Simon Kam-Fai; Chan, Kwok-Hung; Poon, Vincent Kwok-Man; Chan, Wan-Mui; Ip, Jonathan Daniel; Cai, Jian-Piao; Cheng, Vincent Chi-Chung; Chen, Honglin; Hui, Christopher Kim-Ming; Yuen, Kwok-Yung"	LANCET	431
"Genomic characterization and epidemiology of 2019 novel coronavirus: implications for virus origins and receptor binding"	"Lu, Roujian; Zhao, Xiang; Li, Juan; Niu, Peihua; Yang, Bo; Wu, Honglong; Wang, Wenling; Song, Hao; Huang, Baoying; Zhu, Na; Bi, Yuhai; Ma, Xuejun; Zhan, Faxian; Wang, Liang; Hu, Tao; Zhou, Hong; Hu, Zhenhong; Zhou, Weimin; Zhao, Li; Chen, Jing; Meng, Yao; Wang, Ji; Lin, Yang; Yuan, Jianying; Xie, Zhihao; Ma, Jinmin; Liu, William J.; Wang, Dayan; Xu, Wenbo; Holmes, Edward C.; Gao, George F.; Wu, Guizhen; Chen, Weijun; Shi, Weifeng; Tan, Wenjie"	LANCET	389
"Clinical course and risk factors for mortality of adult inpatients with COVID-19 in Wuhan, China: a retrospective cohort study"	"Zhou, Fei; Yu, Ting; Du, Ronghui; Fan, Guohui; Liu, Ying; Liu, Zhibo; Xiang, Jie; Wang, Yeming; Song, Bin; Gu, Xiaoying; Guan, Lulu; Wei, Yuan; Li, Hui; Wu, Xudong; Xu, Jiuyang; Tu, Shengjin; Zhang, Yi; Chen, Hua; Cao, Bin"	LANCET	348
"Characteristics of and Important Lessons From the Coronavirus Disease 2019 (COVID-19) Outbreak in China Summary of a Report of 72 314 Cases From the Chinese Center for Disease Control and Prevention"	"Wu, Zunyou; McGoogan, Jennifer M."	JAMA-JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION	318

in journals with a very high impact factor in the field of health, and it was observed that the impact factor of the journals with the most cited publications during the pandemic process was quite high. The journals that contribute the most to this process and have a high number of publications have also high impact factors.

As a result, this study, which revealed studies with high evidence level by using WOS and Scopus platforms from systematic databases in the researches conducted during the Covid-19 pandemic period in the field of medicine and health sciences and by making comparative bibliometric analyses with criteria such as country, publication type, institution, subject area, author, the most cited publications and the most publishing periodicals, has also pioneered the development of the Covid-19 search strategy, which enables research within the data sources and databases used in systematic review and meta-analysis processes in line with certain criteria.

In this period, the studies in the field of medicine and health sciences to be more efficient depends on determining the evidence-based research strategy well, using the research tools in the best way and increasing the level of evidence studies with various research methods. Therefore, researchers and practitioners should tend to increase the level of evidence in their research with the most up-to-date publications primarily in order to manage research processes.

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Review

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COVID-19 and Phytotherapy

COVID-19 ve Fitoterapi

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ABSTRACT

SARS-CoV-2 (Severe Acute Respiratory Syndrome Coronavirus 2), emerging in Wuhan city, China, causing COVID-19 disease, has been described as a pandemic by WHO (World Health Organization), leading to outbreaks of pneumonia. The COVID-19 pandemic continues to affect millions of people worldwide. SARS-COV-2 enters the cell via ACE-2 (Angiotensin-converting enzyme 2) receptor. These receptors are predominantly found in lung, small intestine, and vascular endothelial cells. Since ACE 2 is found more frequently in these tissues, common clinical symptoms include fever, cough, sore throat, fatigue, dyspnea, and diarrhea. Currently, although symptomatic treatments are applied for COVID-19, there is no specific treatment yet. It takes a long time before targeted therapies can be found. For this reason, it is necessary to develop emergency treatment or methods that can quickly control the disease. Phytotherapeutic compositions offer a potentially valuable resource for this purpose. Many countries, especially China, aimed to reduce morbidity and mortality by using phytotherapy throughout COVID-19 patients. Phytotherapeutic products are known to be safe and tolerable with their background knowledge. In this regard, the use of phytotherapy as a complementary treatment in COVID-19 patients is very important. In this review, phytotherapeutic approaches related to symptoms that may occur in the clinical course of COVID-19 disease will be discussed.

Keywords: COVID-19, coronavirus, phytotherapy, comlementary therapy

ÖZ

Çin'in Wuhan şehrinde ortaya çıkan ve COVID-19 hastalığına sebep olan SARS-CoV-2 (Şiddetli Akut Solunum Sendromu Korona Virüsü 2), pnömoni salgınlarına yol açarak DSÖ (Dünya Sağlık Örgütü) tarafından pandemi olarak nitelendirilmiştir. COVID-19 pandemisi dünya genelinde milyonlarca kişiyi etkilemeye devam etmektedir. SARS-COV-2, ACE-2 (Anjiyotensin dönüştürücü enzim 2) reseptörünü kullanarak hücre içine giriş yapmaktadır. Bu reseptörler ağırlıklı olarak akciğer, ince barsak ve vasküler endotel hücrelerinde bulunmaktadır. ACE 2'nin bu dokularda daha sık bulunması sebebiyle, yaygın görülen klinik semptomlar arasında ateş, öksürük, boğaz ağrısı, yorgunluk, dispne ve ishal yer almaktadır. Şu anda, COVID-19 için semptomatik tedaviler uygulansa da henüz spesifik bir tedavisi bulunmamaktadır. Hedefe yönelik tedavilerin bulunabilmesi için çok uzun bir zaman geçmesi gerekmektedir. Bu sebeple acil tedavi veya hızlı bir şekilde hastalığı kontrol altına alabilecek yöntemler geliştirilmesi gerekmektedir. Fitoterapötik bileşimler, bu amaçla potansiyel olarak değerli bir kaynak sunmaktadır. Başta Çin olmak üzere pek çok ülke COVID-19 hastalarında, tedavi seyri boyunca fitoterapiyi uygulayarak morbiditeyi ve mortaliteyi azaltabilmeyi amaçlamıştır. Fitoterapötik ürünler geçmişten gelen bilgi birikimi ile birlikte güvenli ve tolere edilebilir olduğu bilinmektedir. COVID-19 hastalığında tamamlayıcı tedavi olarak kullanımı bu açıdan çok önemlidir. Bu derlemede COVID-19 hastalığının klinik seyrinde ortaya çıkabilecek semptomlara ilişkin fitoterapötik yaklaşımlardan bahsedilecektir.

Anahtar Sözcükler: COVID-19, koronovirüs, fitoterapi, tamamlayıcı tedavi

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Introduction

Coronaviruses are enveloped RNA viruses that threaten human health by causing diseases usually in the respiratory tract, digestive system and central nervous system of humans and animals. Six coronavirus species are known to cause illness in humans. Four of these (229E, OC43, NL63 and HKU1) are common and they also cause typical cold symptoms in the individuals with strong immune system. The other two strains which are severe acute respiratory syndrome coronavirus (SARS-CoV) and Middle East respiratory syndrome coronavirus (MERS-CoV) are zoonotic and wile some bodies can survive with mild symptoms, sometimes they can be fatal. SARS-CoV is the virus that caused severe acute respiratory syndrome outbreaks in Guangdong province of China in 2002 and 2003. MERS-CoV is the pathogen responsible for severe respiratory disease outbreaks that occurred in the Middle East in 2012 (1).

In December 2019, as a result of studies conducted on a group of patients with pneumonia of unknown cause, it was determined that the factor causing pneumonia was a previously undiscovered betacoronavirus. This virus, which is different from MERS-CoV and SARS-CoV, was named 2019-nCoV and registered as the 7th member of the coronavirus family (1). The name 2019-nCoV was later changed to SARS-CoV-2 (Severe Acute Respiratory Syndrome Corona Virus 2) by the International Virus Taxonomy Committee (ICTV) (2). The disease caused by the SARS-COV-2 virus was called COVID-19, which means 2019 coronavirus disease by the World Health Organization (WHO) (3). Early reports of COVID-19 point to a similar incubation period with SARS-CoV and MERS-CoV. Clinical features are also very similar among these viruses: fever, cough, chest pain, dyspnea, and respiratory distress (4). This similarity between symptoms of SARS-CoV and COVID-19 is due to the fact that they both use the ACE-2 (angiotensin converting enzyme 2) receptor (4).

Since the first reports of COVID-19, it has been stated that the infection has affected more than 12 million people worldwide. There are approximately 3 million confirmed cases in the USA, where COVID-19 is most effective. Countries with the highest number of cases after the USA were reported as Brazil, India, Russia, Peru, Chile, Mexico, England, Spain, and Iran, respectively. The number of people who died due to the virus has reached to 559.047 (5).

COVID-19 was declared an international public health emergency by WHO on January 30, 2020 (6) and later labeled as a pandemic. Although existing chemical drugs or combinations have been tried against COVID-19 disease, which appears to cause serious morbidity, mortality and economic losses, there is no specific treatment or vaccine yet. Phytotherapeutic prophylaxis is very important at this point. The correct use of phytotherapy with scientific data can reduce the progressive course of the disease and the possibility of side effects, and can benefit the country in terms of cost. Therefore, many countries, especially China, aimed to reduce morbidity and mortality by applying phytotherapy throughout the treatment course in COVID-19 patients (7). In recent years, phytotherapy has gained an increasing usage area in our country as well as in the world. In this review, phytotherapeutic approaches which are used in COVID-19 disease or having potential efficacy against symptoms such as URTI (upper respiratory tract infection), bronchitis etc., that may occur in the course of the disease will be mentioned.

COVID-19 and Clinical Findings

ACE-2 receptor is the intracellular entry receptor for SARS-COV-2 and some types of coronavirus (SARS-CoV, HCoV-NL63). ACE-2 plays an important role in the renin-angiotensin-aldosterone system (RAAS) regulating blood pressure and body-fluid balance. ACE-2 also has functions such as protecting organs from inflammatory damage and regulating intestinal functions. The outer membrane of SARS-CoV-2 contains S (spike) glycoprotein, which binds with high affinity to the ACE-2 receptor in the host cell. Although 79% of the current SARS-CoV-2 genome is similar to SARS-CoV, it has been reported that due to mutations in the S glycoproteins, the ability of SARS-CoV-2 to bind to ACE-2 receptors has increased, and hence the contagiousness of SARS-CoV-2 has risen (8). When glycoprotein S is cut by proteases such as TMPRSS2 in the host cell, it becomes possible to bind to ACE-2 receptors and initiates the infection. ACE-2 receptor and TMPRSS2 are co-expressed in human respiratory and intestinal tract cells. Therefore, these tissues will be the main target of the virus (9).

Like many respiratory diseases, COVID-19 is spread through droplets. Researchers have reported that SARS-CoV-2 can remain infectious in airborne droplets for at least 3 hours (4). Since these droplets will also land on the surface, it has been stated that the virus can remain alive on that surface for a certain time depending on the type of surface (4). The virus can be transmitted by droplets emitted from sick individuals through coughing, sneezing, or by contact with surfaces contaminated by patients (mouth, nose and eye mucosa).

While COVID-19 may be clinically asymptomatic, it may cause clinical pictures ranging from ARDS (acute respiratory distress syndrome) and multiorgan failure. SARS-COV-2, which enters through the mucous membranes, binds to epithelial cells and starts replication. Although the virus can be detected by the RT-PCR method in the asymptomatic phase, there are no clinical symptoms or pathological pulmonary imaging findings (10).

As the virus travels through the airways, a stronger natural immune response is triggered. In individuals with a strong immune system, symptoms and clinical course may be milder due to the natural immune response. This is the case in approximately 80% of infected patients and the disease is mostly limited to the upper airways (10). This group of patients has symptoms such as fever, dry cough, sore throat, nasal congestion / rhinorrhea, fatigue, headache or myalgia. Since ACE-2 receptors, which are the entry receptors of the virus, are present in large numbers in the gastrointestinal system, complaints such as diarrhea, nausea, vomiting and abdominal pain may occur. It has been stated that gastrointestinal symptoms can sometimes occur alone (11).

Unfortunately, in about 20% of infected patients, the disease progresses and pulmonary infiltrates develop, and in some of them the disease progresses very severely (10). In a study, it was reported that 17% of COVID-19 patients developed Acute Respiratory Distress Syndrome (ARDS) and 65% of them died due to multiple organ failure (12).

Presence of pre-existing medical conditions such as asthma, hypertension, diabetes, and old age are important parameters affecting the treatment course of COVID-19 disease (4). In addition to the damage caused by COVID-19 in the lung, failure of various organs may occur. Mild, temporary, or severe liver damage can be seen in the clinical course of COVID-19 patients with abnormal liver function tests. Current evidence suggests that liver damage may result from the direct pathogenic effect of the virus, systemic inflammation, or the toxicity of drugs commonly used in these patients (13). Although the exact pathogenesis of kidney involvement in COVID-19 infection is unclear, it has been reported that acute kidney injury caused by acute tubular necrosis in COVID-19 can occur with multiorgan failure and shock. In addition, since ACE-2 in kidney cells is the direct target of SARS-COV-2, it is possible that it may cause direct damage due to virus (11).

Use of Phytotherapeutic Agents in the Treatment of COVID-19

Phytotherapy is a supportive and complementary treatment method in which medicinally effective parts, extracts of plants and different pharmaceutical forms prepared from these are used as an adjunct to treatment or for preventing diseases. The use of medicinal plants for these purposes is as old as human history. The use of medicinal herbs in Traditional Chinese Medicine and subcontinent of India in Ayurvedic Medicine has a long history and traditionally continues (14).

There are about 20 families of viruses that can infect humans, and some of them can also infect animals. If viruses enter the living organism and cannot be prevented by the immune system, it is almost impossible to prevent their spread. They need to use the host cell's metabolic pathways to enable them to reproduce. Today, there are synthetic drugs that can prevent virus replication by various mechanisms. However, there are adverse conditions such as resistance to these drugs, cytotoxicity and low efficiency. Another antiviral treatment is vaccination, but it is a method that needs to be developed more because it cannot provide sufficient protection (15).

As mentioned above, although specific vaccines and antiviral agents are the most effective methods to prevent and treat viral infection, a treatment protocol that fully targets COVID-19 has not yet been found. It may take months or years to achieve targeted treatments. For this reason, emergency treatment or methods that can control them quickly should be developed. Phytotherapeutic compositions offer a potentially valuable resource for this purpose. Approximately 40% of currently available drugs are direct or indirect components of plants. Plants are the main source of alkaloids, anthocyanins, carotenoids, flavonoids, isoflavones, lignans, monoterpenes, organosulfides, saponins and many more phytochemicals. These phytochemicals have been shown to be responsible for the antimicrobial, antihypertensive, antidiabetic, antioxidant, hepatoprotective, cardioprotective etc. effects (15).

Phytotherapy is often preferred in Traditional Chinese Medicine. The effectiveness of Traditional Chinese Medicine in infectious diseases was also demonstrated during the SARS epidemic in 2003 (16). During the treatment period of COVID-19, more than 3100 healthcare professionals with competence of Traditional Chinese Medicine practice were transferred to Hubei province and the protocol implemented by this team was included in the "Diagnosis and Treatment Guide of COVID-19" in China (17) .

In a study conducted in 102 patients with mild symptoms treated with Traditional Chinese Medicine, the patients were regularly given a mixture of about 30 different herbs, called qingfei paidu decoction, that included cinnamon, licorice root, dried tangerine peel and fresh ginger. According to this study it was reported that: the time to disappear clinical symptoms is shortened by 2 days; the recovery time of body temperature was shortened by 1.7 days; the average hospital stay was shortened by 2.2 days; the rate of improvement in CT (Computed tomography) image increased by 22%; clinical cure rate increased 33 the severity rate of the cases decreased by 27.4% and the lymphocyte count increased by 70% (17).

In addition to these, it has been reported that in traditional Chinese medicine treatment applied to seriously ill patients, the average hospital stay and PCR negativity time are shortened by more than 2 days (17).

In another study in 701 cases where this mixture was applied, it was reported that 130 cases were treated and discharged, clinical symptoms disappeared in 51 of them, clinical symptoms improved in 268 of them and 212 cases remained stable without worsening symptoms. It has been stated that the cure rate is over 90% with the Qingfei paidu decoction (17).

In addition to this, there is a case in which western and Chinese medicine was applied integratively. Oral oseltamivir, intravenous ganciclovir infusion, aerosol etc. treatments have been applied to this patient who had recurrent cough and fever but whose respiratory rales are not apparent at the time of admission to the hospital. Although the RT-PCR result was negative, his BT was considered to be compatible with COVID. Because of the increase in body temperature and sweating, the patient was given a decoction of qingfei paidu with herbal mixture, that is, Traditional Chinese Medicine. It was reported that body temperature dropped to 36.2 °C at the night of the application and then tended to normalize. It was reported that after 6 days of treatment, chest CT was better than before and inflammation regressed. After discharge, he continued to take 7 more doses of this herbal mixture, and his clinical symptoms were reported to have significantly improved (17).

In COVID 19, it has been stated that the application of Traditional Chinese Medicine in the early period reduces the duration of the disease, decreases the mortality and delays the progression of the disease (17).

The Relationship Between Plants and Cytokin Storm

Concerns have been raised that some herbs that act on the immune system may deleteriously increase the cytokine response during acute respiratory viral infections. The excessive immune response that occurs in the post-infection period has been defined as "cytokine storm" and is associated with excessive levels of pro-inflammatory cytokines and extensive tissue damage (18).

It has been suggested that our response to a respiratory virus occurs in three stages: stage I, an asymptomatic incubation period during which the virus can or cannot be detected; stage II, a symptomatic period not severe in the presence of the virus; stage III, symptomatic stage with severe respiratory distress with high viral load. During the incubation or non-severe stages, a specific adaptive immune response is required to eradicate the virus and prevent the disease from progressing to the severe stage. This is a dynamic, innate event involving the local release of cytokines known as signaling agents. Therefore, strategies that increase immune responses in the early stages are considered important at this stage (19).

When the protective immune response is impaired, the virus is expected to spread faster and cause more damage to the tissues affected. In COVID-19 disease, damaged host cells induce inflammatory response in the lungs as a response. It is largely mediated by proinflammatory macrophages and granulocytes and a cytokine storm occurs (19). In other words, cytokine storm is a late clinical finding in viral diseases and occurs when the immune system fails to keep the virus under control.

Plants That May Be Used As a Support Treatment in COVID-19 Infection

Coronaviruses are just one of the viral agents that can cause infection in the upper respiratory tract. The infection is indistinguishable from seasonal flu in many ways and is often not severe.

The main approach in the treatment of bronchitis or pneumonia includes the use of expectorants, mucolytics, and immunosupporting supplements. Antibiotics are especially beneficial in pneumonia. In this section, phytotherapeutic treatments that may benefit the COVID-19 clinic will be discussed. Table 1 summarizes the plants that can be used in the treatment of COVID-19.

• Licorice (Glycyrrhiza glabra)

Licorice (Glycyrrhiza glabra) is an herb that has been used in Egyptian, Indian and Chinese medicine for centuries. The medicinal part of the plant is its root. Licorice root is well known for its antiviral properties. During the SARS epidemic, researchers were attracted to this point because some family members who consumed Traditional Chinese Medicine herbal mixtures containing licorice did not experience infection (20). Since then, there have been many published research articles demonstrating the efficacy of the various phytochemicals found in licorice against the SARS virus. Unfortunately, most of these researches started in the post-SARS period and its interest areas decreased after 2012.

Table 1. Plants that can be used as an adjunct to COVID-19 treatment and their effects in this treatment

Turkish name of the plant	Latin name of the plant	Major Effective Compound	Effect
Licorice	*Glycyrrhiza glabra*	Glycyrrhizin, Flavonoids (liquiritin and liquiritigenin)	Antiviral Anti-inflammatory, Immunomodulator, Mucoprotective Antitussive
South African Geranium	*Pelargonium sidoides*	Coumarins (eg Umckalin) and polyphenolic compounds	Immunstimulant, Antimicrobial, Antimicobacterial, Antiviral Expectorant
Common Ivy	*Hedera helix*	Alpha-hederine, hederacoside C	Mucolytics, Spasmolytic, Bronchodilator Antibacterial Expectorant
Absinth	*Artemisia annua*	Artemisinin	Antimalarial Immunomodulator
Elderberry	*Sambucus nigra*	Kempferol, Quercetin, Isoramnetin	Antiviral Immunomodulator
Echinacea	*Echinacea purpurea*	Alkylamides, caffeic acid derivatives and polysaccharides	Immunomodulator
Galangal	*Alpinia officinarum*	Diarylheptanoids	Anti-inflammatory Immunomodulator
Thistle	*Silybum marianum*	Silymarin mixture (silibin A, silibin B, isosilibin, silicristin, silidianin)	Hepatoprotective Anti-inflammatory

In an in vitro study by Fiore et al. (21), It was reported that licorice root exerted antiviral effects on various viruses, including SARS-associated coronavirus, HIV-1 and RSV. In a review conducted by Asl and Hosseinzadeh in 2007 with licorice root, it was concluded that it was effective against SARS, HIV, varicella zoster, hepatitis A, B, C, CMV, HSV type 1 viruses (22). In another review in 2014, it was concluded that this plant shows activity against H1N1, H5N1, Influenza A virus (IAV), Hepatitis C virus, Rotavirus, HIV and SARS virus (23).

Glycyrrhiza glabra is a plant approved by Comission E in upper respiratory tract diseases and cough (24). In addition to its expectorant and antitussive effects, it also has anti-inflammatory, immunomodulatory and mucoprotective effects. For this reason, it has traditionally been used in respiratory tract infections (25). The expectorant effect of licorice is related to the stimulation of tracheal mucus secretion. In this way, it helps to remove mucus from the respiratory tract (26). Its antitussive effect has also been shown in animal studies (27). This effect is based on the active ingredients of liquiritine and liquiritigenin contained in licorice root.

In in vitro studies, it has been reported that some compounds obtained from licorice root inhibit the growth of gram positive bacteria and yeast and show strong antibacterial activity against streptococcus mutans. Tanaka Uosuo et al. found that compounds derived from licorice root show activity against upper respiratory tract bacteria (Streptococcus pyogenes, Haemophilus influenzae and Moraxella catarrhalis) (28).

In a randomized, double-blind, controlled study by Yanagawa et al., the effect of glycyrrhizin on URIs was evaluated. The patients were divided into 2 groups and only 500 ml of ringer's lactate was given to one group, while the other group was administered iv 40 ml of glycyrrhizin (0.2%) and ringer's lactate. Glycyrrhizin treatment has been found to be associated with a shorter hospital stay, lower fever and lower treatment costs compared to the control group (25). Considering all these results, it can be predicted that licorice root preparations can be applied as a support to existing treatments in severe cases of COVID-19 with mild symptoms or pneumonia.

• South African Geranium (Pelargonium sidoides)

EPs 7630 (Umcka®), an alcohol extract obtained from rhizomes and tubers of Pelargonium Sidoides, is an approved herbal medicine in Germany for acute bronchitis. Primary active ingredients include highly oxygenated coumarins (eg Umckalin) and polyphenolic compounds. Umcka is used for a three-pronged approach in acute bronchitis: 1- enhances immune function; 2- antimicrobial - antimicobacterial and antiviral and prevents bacteria and viruses from adhering to the mucous membranes of the respiratory tract; and 3- acts as an expectorant. EP 7630 at a dose of 100 mcg / mL prevents the reproduction of seasonal influenza A virus strains (H1N1, H3N2), respiratory syncytial virus (RSV), human coronavirus, parainfluenza virus and coxsackievirus. However, it has been reported to have no effect on highly pathogenic avian influenza virus (H5N1), adenovirus or rhinovirus. EPs 7630 causes a decrease in the Bronchitis Severity Score (BSS) due to improvement in cough, sputum production, chest pain, and shortness of breath after 7 days of treatment (29, 30). In many clinical studies, the efficacy of EPs 7630, a preparation of Pelargonium sidoides, in reducing symptoms caused by infection of the airways, from common cold to acute bronchitis, has been widely demonstrated in the adult population. It has also been noted that the use of the EPs 7630 preparation during the initial period of respiratory tract infection symptoms reduces the severity of symptoms and the duration of the disease. It has been reported that EPs 7630 is well tolerated and can be used in children older than 1 year (30). In addition, it should be considered to be a good complementary therapy in COVID-19 infection in order to reduce the need for NSAII (Non-steroidal anti-inflammatory drug) and antibiotics, and provide preventive effect against clinical deterioration or complications.

• Common Ivy (Hedera Helix)

Extracts obtained from ivy leaves are used for cough and asthma. More than 80% of herbal expectorants prescribed in Germany are preparations containing ivy extract. Ivy leaves contain saponins with expectorant, mucolytic, spasmolytic, bronchodilator and antibacterial effects. The mucolytic expectorant effect is based on the indirect beta-2 adrenergic effect as a result of the saponins alpha-heder and the hederacoside C. Ivy is generally a herb that shows good safety, tolerability, and efficacy in acute and chronic bronchitis. It is usually included in preparations alone. It has been reported that the combination of ivy and thyme (Thymus vulgaris) for acute bronchitis causes earlier throat softening and reduced cough compared to placebo (29).

• Absinth (Artemisia Annua)

Chloroquine (CQ) and hydroxychloroquine (HCQ) are anti-malarial drugs synthesized from the henna henna (Cinchona pubescens) plant and tested for COVID-19, which are also used against autoimmune diseases such as rheumatoid arthritis and systemic lupus erythematosus (SLE). Although HCQ exhibits a safer toxicity profile than CQ, it has significant side effects. The most important side effect is cardiac toxicity. Therefore, HCQ treatment is alarming, especially in patients with COVID-19 who have cardiovascular problems (31). Artemisinins are sesquiterpene lactones with a peroxide part isolated from the Artemisia annua plant. Although the antimalarial mode of action of artemisinin is different from CQ or HCQ, its immunomodulatory effects are similar. It is traditionally used in the treatment of high fever. Since high fever is observed in the vast majority of COVID-19 patients, it is thought to be useful in the treatment of this disease (31). Considering the ability of artemisinin to reduce key mediators such as TNF-α and IL-6, this herb can be seen to be a promising therapeutic agent in the ARDS picture that worsens the condition of COVID-19 patients.

Artemisinin has been reported to exhibit a safe toxicity profile. Thus, high doses can be reached with less worry. It is thought that artemisinin can be used as adjunctive therapy to reduce the

dose required for CQ or HCQ and thus reduce side effects and at the same time suppress cytokine storm (31).

• Echinacea (Echinacea Purpurea)

It is known that echinacea has an activity on the immune system as well as its antimicrobial activity. Alkylamides, caffeic acid derivatives and polysaccharides are important components of the plant. In addition, many in vitro and in vivo studies have shown that alkylamides have a role in the immunomodulatory activity of echinacea extracts (32).

Cytokine antibody arrays are used to investigate changes in proinflammatory cytokines released from human bronchial epithelial cells after rhinovirus exposure. It is stated that the majority of cytokines released by virus infection decrease with the application of E. purpurea extract. By their very nature, in vitro studies have a narrow perspective for clinical prediction due to potentially included bioavailability, dosage issues, etc. problems. Probably the most significant in vitro studies for echinacea are studies involving alkylamides, as the bioavailability of these compounds has been demonstrated in several studies (33).

It has been shown that a lipophilic extract of E. purpurea stimulates TNF-α mRNA (transcription) synthesis in peripheral monocytes, but has no effect on its translation, ie TNF-α protein itself. As is known, for a protein synthesis, first transcription must be followed by translation. In other words, TNF-α protein formation from mRNA is prevented. TNF-α protein production is significantly increased when monocytes are treated with LPS (lipopolysaccharide or endotoxin: a powerful stimulator of the immune system). However, it has been shown that incubation of monocytes with LPS and Echinacea extract strongly inhibits this effect of LPS. In studies conducted for a long time, it has been shown that echinacea extracts interact with CB2 (cannabinoid receptor type 2) receptors, modulating and prolonging TNF-α production if present in an immune stimulation environment. These studies suggest that E. purpurea acts as a modulator or facilitator of the immune response rather than an immune stimulant (33). According to the researches here, it can be concluded that lipophilic echinacea extract rich in alkylamide can increase the immune response before virus exposure due to its immunomodulatory activity and with the retention of the virus, the immune response continues to be maintained in a reduced manner.

Elderberry (Sambucus nigra)

Elderberry (Sambucus nigra) is a plant commonly used in many parts of the world, often referred to as the tree of life. Both its fruits and flowers are rich in flavonols (e.g. Kempferol, quercetin, isoramnetine and derivatives), proanthocyanidins and phenolic acids (e.g. chlorogenic, neuro-chlorogenic or crypto-chlorogenic acid) (34) Initial studies on the use of elderberry are related to the antiviral property of the plant. However, subsequent research is on the immune response and especially its effectiveness in increasing cytokine production (35). According to the results of a meta-analysis conducted in 2019, standardized elderberry extract supplementation has been shown to be significantly effective in reducing the overall duration and severity of upper respiratory tract symptoms compared to a placebo group (36).

473 patients with early flu symptoms (<48 h) were included in a randomized double-blind study. Patients received oseltamivir for 5 days and placebo or a combination of elderberry and Echinacea for the other 5 days. It has been reported that the herbal medicine combination is as effective as the antiviral drug oseltamivir (37).

In another study, 312 passengers traveling from Australia to an overseas country were asked to take elderberry extract or placebo 10 days before the flight and up to five days after arrival at the travel destination. Although the common cold was less common in the elder group, this value was not statistically significant. However, it was reported that the duration of cold symptoms was shorter in the group taking elderberry (38).

There is preclinical evidence showing that elderberry is different from COVID-19 but inhibits the replication and viral binding of Human coronavirus NL63 (HCoV-NL63), which is a member of the coronavirus family (39).

There is no study stating that Sambucus nigra will cause a cytokine storm in coronavirus infections. In a study, it was reported that Sambucus nigra could be more effective in the prophylaxis of corona virus infections or in the early stage of the disease (40). Remarkably, Sambucus has also been reported to significantly increase inflammatory cytokines, including IL-B1 (41). For this reason, it is considered to be discontinued as a result of positive test or when the symptoms become evident. According to an evidence-based systematic review conducted by the Natural Standard Research association, elderberry contains B-level evidence to support its use for influenza (42). Although this result does not support its use in COVID-19 prophylaxis and treatment, more studies are needed on this subject.

• Galangal, (Alpinia Officinarum)

Alpinia officinarum and Zingiber officinale Roscoe (ginger) are aromatic plants belonging to the Zingiberaceae family, both of whose rhizomes are used as spices. Galangal, is a plant rich in bioactive components, mostly used in Far Eastern countries in many diseases such as common cold, bronchitis, stomach pain, diabetes, ulcer, abdominal distension, diarrhea, vertigo, neuropathy, rheumatoid arthritis and inflammatory bowel diseases (43).

There are studies showing that some diarylheptanoids isolated from Alpinia officinarum show antioxidant activity, inhibit iNOS (inducible nitric oxide synthase) expression and biosynthesis of prostaglandin and leukotrienes (44). In *in vitro* studies, it is stated that besides all plant and rhizome extracts, galangin and caemferid content also show activity against some pathogenic bacteria (44-47). In mice, it has been reported that the methanol extract of the rhizomes shows inhibitory activity against the malaria parasite Plasmodium berghei (48). It has also been reported that Alpinia officinarum extract shows anti-influenza activity following oral administration in mice (44).

There are also studies showing that Alpinia officinarum rhizome extracts have anti-inflammatory and immunomodulatory effects. In a study on this subject, the activity of CAME (p-Coumaryl alcohol-γ-O-methyl ether) substance isolated from Alpinia officinarum was evaluated. In this study, it has been shown that CAME inhibits the formation of IFNγ, which is a proinflammatory cytokine, by suppressing T-bet expression. According to this study, it was concluded that CAME may be useful in modulating inflammatory immune disorders mediated by excessive IFNy production (49). In another study, it is stated that the immunomodulatory effect of Alpinia officinarum is due to its antioxidant fraction (especially quersetin), since free radicals are effective in T cell activation (50).

SARS-CoV-2 papain-like protease (PLpro) is required for the survival and replication of the virus and is one of the drug targets to be developed against SARS-CoV-2 (51). According to a study by Goswami D et al., it was concluded that eight compounds found in Alpinia officinarum and ginger rhizomes are potential inhibitors against SARS-CoV-2 PLpro (51).

Other Phytotherapeutic Supplements

There have been many studies showing that curcumin, the essential component of turmeric (Curcuma longa), may be beneficial in the prophylaxis or treatment of diseases from cancer to viral infections (52). In a study conducted on rats in 2015, it was stated that curcumin provides cardiovascular protection by increasing ACE-2 expression and improves myocardial fibrosis (53). Since the ACE-2 receptor is the entry mechanism of the virus, the use of curcumin during COVID-19 infection is currently under discussion. Because it is feared that curcumin will increase the ACE-2 receptor, making the infection worse. At first, ACE-2 is seen as the main target in the fight against coronovirus, but this information is questioned with new studies. As an example, it has been reported that increased ACE-2 protects against viral lung damage by increasing the production of angiotensin 1-7 (54). In another animal study that supports this, it has been shown that SARS-COV reduces ACE-2 receptor expression and ACE-2 is protective against ARDS (55). A double-blind, randomized controlled Phase II clinical trial of the oral spray formulation containing curcumin and artemisinin is currently underway (CT number: NCT04382040) (56). Although preclinical data shed light on clinical data, the efficacy of curcumin in COVID-19 infection needs to be proven by further clinical studies.

Thistle (Silybum marianum) is the best researched herb in the treatment of liver disease. The active complex of thistle is a mixture of silymarin obtained with a lipophilic extract from plant seeds (57). Liver damage associated with COVID-19 is defined as liver damage that can occur during the course of COVID-19 treatment, with or without pre-existing liver disease. According to a study conducted with COVID-19 patients, it was reported that abnormalities in liver function tests were found in one third of patients (58). Recently, it has been suggested that liver failure seen in COVID-19 patients may also be drug-related (59). The effect of silymarin on liver regeneration can be explained by stimulating protein synthesis, increasing cellular glutathione level and suppressing lipid peroxidation (60). Silymarin also reduces liver function tests (61). In order to accelerate liver regeneration and improve liver function tests, its use should be considered as complementary therapy for liver protection in COVID-19 disease. In addition, because silymarin inhibits the p38 MAPK pathway and reduces inflammation and autophagy, a Phase III, randomized, double-blind controlled clinical trial is currently being conducted to test the efficacy of silymarin on COVID-19 pneumonia (CT number: NCT04394208) (62).

Since the clinical course of COVID-19 is not always severe, it is important to use phytotherapeutic products in mild URTI symptoms such as sore throat. In this regard, sage (Salvia triloba), which grows naturally in our country, is frequently preferred in throat infections with its anti-inflammatory properties. According to the results of a randomized, double-blind, clinical study, it was stated that the spray formulation containing echinacea-sage ethanolic extracts provided similar benefits to chlorhexidine / lidocaine spray in reducing symptoms in the patient group diagnosed with acute pharyngitis and tonsillitis (63). Pomegranate (Punica granatum) plant can also alleviate sore throat by reducing the effectiveness of pathogens that cause throat infections due to the polyphenolic components in its shell (64).

Conclusion

In the COVID-19 pandemic, which causes serious morbidity and mortality and economic losses, there is no specific treatment other than supportive treatment. Traditional Chinese Medicine and conventional medicine have been used together at certain stages by the Chinese health system since the first reports of COVID-19. Although most of the plants here are not found in our country, the use of similar plants in terms of their content can both contribute economically and provide an additional benefit to the treatment by using plants that are safe and tolerable. In the last 20 years, coronoviruses have emerged as epidemics and it is possible that the same epidemics will continue for the next years due to reasons such as increased human-animal interactions and frequent mutations of viruses. Since targeted therapies require a long time to be implemented in each new epidemic, phytotherapeutic approaches that can be implemented quickly are very important. For example, using standardized preparations of plants such as licorice and ivy for antitussive and expectorant purposes or using plants with immunomodulatory effects for treatment purposes at the beginning of COVID-19 prophylaxis or disease may shorten the treatment period and increase the quality of life of the person. As the disease progresses, this virus is not limited to the lungs, but may also cause failure in other organs. The use of silymarin at this point is very important. Because it is a plant-based compound that has been studied for a long time and its hepatoprotective activity has been supported by many preclinical and clinical studies. Silymarin should be considered an important supportive therapy in cases of deterioration or failure of liver function that may be seen with COVID-19 disease. Since COVID-19 is not always severe, it can be diagnosed with typical cold symptoms and treated at home. In this case, it may be recommended to use infused teas

or lozenge forms of herbs such as sage, chamomile, pomegranate peel with anti-inflammatory properties. There are many factors that can assist treatment in the field of phytotherapy. However, evidence-based prospective studies are unfortunately inadequate. For this reason, it will be possible to add supportive treatment or prophylaxis protocols if more clinical studies are conducted for plants used for many years.

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Medical Education in Epidemic and Disaster Situations

Salgın ve Afet Durumlarında Tıp Eğitimi

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ABSTRACT

There is no standard practice for the sustainability of medical education in epidemics such as Covid-19 and disasters affecting society. Synchronous or asynchronous trainings have been carried out in some of universities and colleges that have distance education technical infrastructure, during the Covid-19 pandemic. If every student has access to information technologies and the skills of the instructors who will prepare and deliver the training increase their ability to use information technologies, there is no problem in the implementation and maintenance of theoretical lessons. During the Covid-19 pandemic, we had to go to distance education, which we had not yet implemented at Bezmialem Vakıf University Faculty of Medicine. During this period, we applied asynchronous and synchronous education models (mixed model) for theoretical lessons. However, the fact that practical and internship applications were carried out by distance education - although videos about skills and practices were shot and uploaded to the system - it was not possible to replace the formal education. Distance education is inevitable for the continuity of education in epidemic and disaster situations. However, after the epidemic and disaster situations have passed, practical and internship practices should be carried out as much as possible in addition to distance education in medical education. In normal times, distance education can only be used to support formal education in medical education. As a result of all these evaluations and experiences we gained in the Covid 19 pandemic, we think that synchronous/synchronous distance education applications will improve over time and contribute to medical education.

Keywords: Distance education, epidemic, pandemic, disaster

ÖZ

Covid-19 gibi salgın hastalık durumlarında ve toplumu etkileyen afetlerde tıp eğitiminin sürdürülebilirliğine yönelik standart bir uygulama bulunmamaktadır. Yaşadığımız Covid-19 salgınında uzaktan eğitim alt yapıları bulunan bazı yüksek öğretim kurumlarında senkron/eş zamanlı ya da asenkron/eş zamanlı olmayan eğitimler yapılabilmiştir. Her öğrencinin bilgi teknolojilere erişimi sağlandığı ve eğitimi hazırlayacak ve sunacak eğitmenlerin bilgi teknolojilerini kullanma becerileri arttığı takdirde özellikle teorik dersler için uygulanması ve sürdürülmesinde bir sorun bulunmamaktadır. Covid-19 salgını döneminde Bezmialem Vakıf Üniversitesi Tıp Fakültesi'nde henüz o zamana kadar uygulamadığımız uzaktan eğitime geçmek zorunda kaldık. Bu sürede teorik dersler için asenkron ve senkron eğitim modellerini birlikte (karma model) uyguladık. Ancak pratik ve staj uygulamalarının uzaktan eğitimle yapılmasının-her ne kadar beceri ve pratiklere yönelik videolar çekilip sisteme yüklenmiş olsa da -örgün eğitimin yerine geçmesi mümkün değildi. Uzaktan eğitim salgın, afet durumlarında eğitimin devamlılığı için kaçınılmazdır. Ancak salgın, afet durumları geçtikten sonra tıp eğitiminde uzaktan eğitime ek olarak pratik ve staj uygulamalarının mümkün olduğunca gerçekleştirilmesi gerekmektedir. Normal zamanlarda da, tıp eğitiminde uzaktan eğitim ancak örgün eğitime destek olarak kullanılabilir. Bütün bu değerlendirmelerimiz ve Covid-19 salgınında kazandığımız deneyimler sonucu senkron/senkron uzaktan eğitim uygulamalarının zaman içinde daha gelişeceği ve tıp eğitimine katkı sağlayacağını düşünüyoruz.

Anahtar Sözcükler: Uzaktan eğitimi, salgın, pandemi, afet

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Introduction

Although there are preliminary preparations, laws and regulations for health services and disaster management in epidemic diseases such as Covid-19 and in disasters affecting the society, there is no standard practice for the sustainability of medical education in such cases. Due to the intensity of applied courses in both pre-clinical and clinical periods in medical education, the option of conducting medical education completely with distance/web-based education is quite limited. However, with technological developments, there are many options in which particularly theoretical courses can be given by distance education. In the Covid-19 epidemic we experience, some higher education institutions with distance education infrastructures can benefit from this system, as well as synchronous/simultaneous or asynchronous/non-simultaneous education using communication technologies on the internet. In this epidemic, the importance of information technologies has increased even more.

Flexible learning environments offered in distance education/web-based education/online education that can be maintained regardless of time and place are considered as a promising innovation (1). If every student has access to these technologies and the skills of the instructors who will prepare and present the course increase, there will be no problem in applying and maintaining them, especially for theoretical courses. This situation is seen in the reports published by the Turkish Council of Higher Education (CoHE) in the epidemic that we experienced (2).

With the studies, the advantages and limitations of distance/web-based education have been investigated. These include lack of face-to-face interaction, not understanding the developments in the learning process, not being motivated to study on their own by individuals without self-discipline, not being able to communicate when the number of students is high, and naturally, the limitations in laboratory and internship practices as in medical education. In fact, the main process of success in education is good communication between learner and teacher, communication and cooperation among students, giving appropriate feedback and guidance. Distance education has important limitations in these respects. On the other hand, it is thought that the learning methods and environments used today are insufficient to meet the expectations of the generation z, which has grown up in a digital age. Therefore, it has already become compulsory for educational institutions to renew their curricula and support them with advanced technologies (3-7).

History of Distance Education

The first efforts regarding distance education started with education with letter in the 1800s and was supported by means such as radio and tape recorders in the first half of the 1900s (8). Later, with the rapid developments in the technologies of television, video and computer communication systems, the dimensions of the application varied considerably and reached today. Distance education in our country was first initiated in 1950 by Ankara University Faculty of Law as a learning practice with letter. The most rooted practice was started to be implemented by Anadolu University Open Education Faculty. In 1996, Bilkent University established distance education center and started distance education applications via video conference. In 1997, the Middle East Technical University founded Informatics Institute and started to coordinate distance education activities from there (9).

Distance Education at Present

Today, instead of the term "distance education", the concepts of online education/web-based education or simply e-learning are also used. Therefore, if the definition of e-learning is to be made, it is "a general name given to synchronous or asynchronous education and training activities published on the internet as audio, visual and interactive". E-learning is a learning type realized by the individual's self-learning over the internet or local network, having no boundaries for time and place in accessing information, being simultaneous (synchronous) or asynchronous (non-simultaneous), establishing communication between teachers and learners, providing interaction with visual and audio applications offered by computer technology, providing individuals with the opportunity to benefit from lifelong education and training activities. There are three types of models applied in e-learning. These are synchronous (simultaneous), asynchronous (non-simultaneous) and mixed models (9).

Synchronous, in other words simultaneous or live electronic learning, means that the communication between individuals takes place at the same time and the information entry is instant. Simultaneous interactions are only possible when instructors and students work together at the same time. In order for students to hear, see and share applications made over the internet, facilities such as at least a computer and an uninterrupted internet connection are required. Asynchronous, in other words non-simultaneous learning and learning at different times, is a form of instruction that allows the student to complete his/her study within a certain time period according to his/her program and study order without establishing a live connection with any instructor. The biggest disadvantage of synchronous education is that it conflicts with distance education philosophy in terms of time. As it is known, continuity of education regardless of time and place is included in the definition of distance education. However, there is a time limitation in synchronous education. In the asynchronous method, the lessons are prepared in advance by the instructor and the student can access this information at any time. Communication between the instructor and the student and between the students themselves does not occur at the same time and in the same time period. In this way, students can access this information from wherever and whenever they want and complete their education. In the process, they ask the educators or other students about the subjects they do not understand, by means of e-mail, discussion forums, with predetermined addresses and they share information in this way (9). In the mixed model, all the materials related to the same subject are uploaded to the system (asynchronous method) and also live lessons are carried out on the same topic (synchronous method).

In some cases, while a part of the lesson runs asynchronously, certain parts of the lesson continue synchronously (9).

Distance Education in Our Country in Covid-19 Pandemic

In our country, many educational institutions continued synchronously or asynchronously to higher education, which was interrupted in the Covid-19 pandemic (2). In synchronous/simultaneous web-based education, education has been carried out by using the features of information technologies and appropriate web-based programs in accordance with the current course schedule and course hours, ensuring that the instructors and students participate in the training activity live simultaneously. In order for the training to be effective, it is possible to convey the image and/or voice of the instructor to other users, and to provide whiteboard, chat, presentation view, and document sharing. Questions asked by students during the lectures can be answered, and questions can be asked by the instructor. Although limited, communication has been provided. In addition, it is possible to re-watch the records made while lectures are given by the students later. In asynchronous distance education, it has also been possible to upload and share educational slides over similar programs, create and upload audio and video recordings of the lessons, and enable students to watch them whenever they want. In this way, it has been possible for the students to watch the records and documents that were uploaded to the program without a live lesson when they are available. According to the report prepared by CoHE, 121 of 189 universities (64%) started distance education due to Covid-19 pandemic on March 23, 2020 (one week after YÖK suspended education at universities), 41 (21.6%) on March 30, 2020, and 25 (13.2%) on April 6, 2020. Almost all of the universities (99.2%) started to conduct their theoretical courses through distance education and approximately 89% of them started to conduct the theoretical parts of the applied courses through distance education. Live classroom practice was carried out in 22% of the courses opened with the distance education method. While 53.2% of Foundation Universities kept the live course practices as "compulsory in all courses", this rate was 29.1% in state universities (2).

Evaluation of Distance Education

Until today, some concrete data have been obtained from studies in which the opinions of educators and students on distance education were taken in order to use distance education more effectively in our universities and the problems experienced during the implementation process were tried to be determined (10-16). Various questionnaires and scales have been created to be used in these studies. The participants of the questionnaire created by Barış and Çankaya regarding distance education stated that theoretical courses could generally be given through distance education, but applied courses and courses requiring interaction could not be given in this way (17). Similarly, in the study of Özköse et al. (15), it was concluded that distance education was not suitable for applied and interactive lessons. As the positive aspects of distance education, being independent of time and place, offering the opportunity to repeat and presenting rich content have come to the fore, while the negative aspects have been the lack of interaction, less participation in the course and the decrease in the importance of the course in the eyes of students (15).

Distance Education in Medical Education

In medical education, e-learning applications were started to be used, especially after the 1960s, in computer aided postgraduate education (8). When the e-learning applications carried out in medical faculties are examined, it is seen that it is mostly used in basic sciences and relatively less in clinical sciences. However, it is noteworthy that the applications in clinical sciences have increased over the years. There are examples of applications made especially in clinical sciences such as Radiology, First and Emergency Aid, and Surgery (18,19). It is seen that these practices carried out in medical faculties are mostly for trial purposes and generally, students' exam success and satisfaction with the application are examined as a result of the application. It is noteworthy that especially Surgery, Urology, First Aid and Emergency disciplines lead such studies in medical education before graduation (19). Studies show that the level of knowledge of the students is the same or is high in the e-learning group, students are satisfied with the e-learning application supported by rich resources and they want to increase its prevalence. Studies conducted on Medical Faculty students have also found that e-learning is a better method for learning, gaining skills and attitudes than classical courses, students keep information in mind longer and use information better with e-learning (19). It has been stated that e-learning has a more positive effect on learning motivation compared to classical education due to the fact that it enables them to master the learning process, enables them to access information resources more and more easily via the internet, and makes learning more enjoyable (20). Currently, it is generally used as an application to support medical education and is mostly preferred as an asynchronous method. E-learning application is more widely used in postgraduate medical education as well as in graduate medical education. In our country, the practices of the Turkish Medical Association (TMA) in this area are particularly striking (8,9). The potential of existing e-learning applications to be included in the applied parts of medical education seems very high. Many applications that will be prepared especially considering epidemic and disaster situations can be brought together with students thanks to information technologies.

"Augmented reality" applications, which have an important potential to increase the functionality of educational environments in medical education and to provide learning activities by practising, have started to be used in educational environments. Augmented reality technology, which stands out in terms of having the potential to attract the attention of the generation z on the one hand, and responding to the search for effective methods/environments to support and enrich education on the other hand, is a new technology that can be used in web-based education. It is recommended to reveal the potential of this technology in terms of education and to be more recognized and used by educational technology experts and educators (21).

On the other hand, many augmented reality applications related to medical education have been developed today. Augmented reality is considered as an effective solution to create a virtual three-dimensional patient model. The integration of data that can be useful for the patient during the operation with the real patient data by calculating with a computer helps the surgeon. Moreover, with the augmented reality simulators that use information obtained from real patient data such as heartbeat and pulse, the trainees who receive medical education are given theoretical and psychomotor skills. In addition to these, simulators (22) for childbirth and various surgeries and applications showing x-ray images on the patient have also started to be used in medical education. Augmented reality technique is an alternative application in distance medical education especially for practices in epidemic and disaster situations. On the other hand, as a new technology, augmented reality applications such as *Google Glass* are already used in the practices of medicine and health education and they are a technological approach that can be adapted to distance education models (23).

Distance Education at Bezmialem Foundation University Faculty of Medicine during the Covid-19 Outbreak Process

The new coronavirus (Covid-19) disease resistant to treatments, also called SARS-CoV-2, which was first seen in Wuhan, China in December 2019 and caused pneumonia, affected the whole world in a short time. On March 11, 2020, it was declared as a global epidemic (pandemic) by the World Health Organization. The index case was detected in our country on March 11, 2020, and after this date, measures were taken across the country to gradually reduce and prevent the spread of the virus in the society. Within the scope of these measures, education and training were suspended at all schools, including universities, across the country until the end of the month as of March 16, 2020. In the writing of the Council of Higher Education dated 19.03.2020 and numbered 758550160-199-E.22344, upon the decision about universities to provide courses through distance education method for the Spring term of 2019-2020 Academic Year due to the Covid-19 pandemic, distance education started at the Bezmialem Foundation University (BFU) Faculty of Medicine on 23.03.2020 in accordance with the decisions of BFU Education Commission on 19.03.2020.

First of all, in order to compensate for the educational activities to cover the week of March 16-23, 2020, the course contents were immediately uploaded to the *learn.bezmialem.edu.tr* distance education portal as presentation files, lecture notes, etc. materials in the form of a slide (PowerPoint) presentation or pdf, and presented to our students asynchronously. In this system, it can be seen whether the students have opened the slides of the lessons and how long they have completed the lesson. As of March 23, 2020, education and training activities have been continued with presentation file of course contents, lecture note, audio-video recording (to enable students to learn more effectively and increase their motivation) or by uploading all to *learn.bezmialem.edu.tr* system to cover all of these methods asynchronously. At the same time, at the BFU Education Commission meeting dated 19.03.2020, it was decided that the Departments and the Faculty Secretariat, Student Affairs and Information Technology Directorates should work in cooperation in order to carry out the process effectively. Technical support was provided to teach the lessons with audio and / or video recording (asynchronous distance education model) and lecturers were encouraged in this regard. In accordance with the decisions of the BFU Education Commission on 26.03.2020, it was concluded that the ***i-spring suite system***, which was previously available at our university, could be used while recording audio and / or video with the support of the information technologies directorate within our university. Later, *i-spring suite* link was shared with faculty instructors via e-mail. On-line training was provided by information technologies department on how to make course presentations via this link. For those who could not attend the training, training videos were recorded and shared with the faculty members. For our faculty instructors who could not record audio and / or video from their own computers in the environment they were in, cameras and microphones were installed in the objectively structured clinical exam (OSCE) laboratory rooms in the Faculty of Medicine and the computers in these rooms were made ready. With the necessary technical infrastructure and support, audio and / or video recordings of the course subjects were taken by the relevant faculty members and uploaded to the *learn.bezmialem.edu.tr* system by the faculty secretaries. The *i-spring system* is one of the asynchronous education materials such as *camtasia* and *snagit*. This system allows you to record screenshots on presentations, record presentations with audio or video, and also gives detailed information about when and how long educational materials, such as presentations, videos, pictures etc. in e-learning structures similar to moodle, are followed by the students.

Upon the extension of the interruption of education and training due to the epidemic, synchronous education was started after March 30, 2020 in addition to asynchronous education in order to increase interaction with students and to create an environment for questions and answers by ensuring their active participation in the course. The faculty members were provided with the necessary technical equipment and support to provide synchronous education in our Faculty of Medicine (OSCE laboratory rooms), as well as in the realization of asynchronous education. It is similar to other online training programs such as adobe connect, google meeting, webex, zoom and teams. There are some differences among these systems such as licensing models, device compatibility, and number of participants. While most of the courses went parallel to the academic calendar, some of them were carried out retrospectively. After the distance education process started in the BFU Faculty of Medicine, it was observed that 30% of the course subjects were taught with both asynchronous and synchronous distance education methods in all classes (1^{st}, 2^{nd}, 3^{rd}, 4^{th} and 5^{th}). It was found that it was more beneficial for the students to learn the lesson subject first asynchronously and then as synchronously. During this period, videos of the skill lessons were also shot and uploaded to the system. During the Covid-19 epidemic, it was determined that the most synchronous lessons were given to the 2nd and 4th grades, and it was noted that the faculty members of the department of

infection, chest diseases and emergency departments could not do synchronous lessons at all due to their duties in the pandemic. The departments offering the most synchronous lectures were pediatrics from internal medical sciences, microbiology and pathology from basic sciences.

We applied a learner-centered feedback questionnaire, which evaluated the effectiveness of the models we used regarding the distance education system on learning the course and exam success, and also included an additional question about what they thought about using the distance education system when the normal process was started. We also applied a similar teacher-centered feedback questionnaire to lecturers, evaluating the difficulties they encountered during distance education and the effectiveness of education models. We asked the faculty members additional questions regarding their suggestions on distance education. 349 students took part in this survey. 97.7% of the participants were between the ages of 20 and 24 years, and 65.5% were female students. Semester 3 (27.5%) and 2 (26.9%) students had the highest participation in the survey. When our students' survey results were evaluated, it was seen that 8.9% of the students stated that loading the course subjects in the form of a slide alone might be sufficient for both learning the course and exam success; adding videos or audio recordings to the slides and loading them into the system might be sufficient for 31.2% of students to learn the course, and for 20.6% of students for the success in the exam. 43.8% of the students stated that live courses might be sufficient in learning the lesson and 31.2% stated that live courses might be sufficient in the exam success. 63.9% of the students found it more beneficial both to have video-audio narration of the lesson previously and then to make the same lecture live later in accordance with the academic calendar. Only 26.1% of students stated that when the normal process was passed, distance education might be sufficient for theoretical courses and formal education would not be required. On the other hand, 121 instructors participated in this survey. 45.5% of these participants were between the ages of 40 and 49 years, 24% were between the ages of 50 and 59 years, and 68.8% were male (this is related to the higher number of male faculty members). Of them, 47.9% were from internal medical sciences, 38.8% were from surgical departments, and 13.2% were from basic medical sciences (This result is also related to the number of faculty members in those departments). 91.7% of the faculty members had not had any previous experience as an educator in distance education. 53.7% of the faculty members thought that the distance education process contributed to them academically. When the survey results were evaluated, 45.5% of them stated that they had problems in achieving classroom dominance during the live lessons, and 33.7% of them had problems with technical equipment and infrastructure. 51.2% of the lecturers stated that lecturing with video/audio recording (asynchronous model) was more beneficial for students and 41.3% stated that live lectures (synchronous model) were more beneficial for students. Again, 50% of the faculty members stated that they could use distance education models in theoretical lessons when the normal process was started. They made suggestions that it would be necessary to develop technical infrastructure and to give training about it to them, and that it would be more beneficial for students to determine new strategies to keep students active in live lessons. On the other hand, they emphasized that distance education should not be applied except for compulsory cases for practical lessons and case studies.

We hope that wider feedback surveys, which will be applied for distance medicine education focusing on learner and education, will contribute to the shaping of more effective and efficient education in the future, both in the normal process and in extraordinary situations.

Conclusion

During the Covid-19 outbreak, we had to switch to distance education at the Bezmialem Bakıf University Faculty of Medicine, which we did not apply until then. During this period, we applied asynchronous and synchronous education models together (mixed model) for theoretical lessons. We found that the mixed model applied for the same course subjects was more beneficial for students. However, it was not possible distance education in practical and internship practices- although videos on skills and practices were recorded and uploaded to the system- to replace formal education.

In addition, for theoretical courses, distance education has limitations such as the inability to provide face-to-face interaction and opportunities, the inability to immediately solve the difficulties encountered in the learning process, planning difficulties for students who cannot work individually, and limitations in communication due to the excess number of students. As a matter of fact, only a quarter of the students have stated that distance education may be sufficient even for theoretical courses when the normal process is passed. Limitations in conducting theoretical and especially practical exams are also an important disadvantage. Distance education is inevitable for the continuity of education in epidemic and disaster situations. However, after the epidemic and disaster situations have passed, practical and internship applications should be carried out as much as possible in addition to distance education in medical education.

In normal times, distance education in medical education can only be used as a support to formal education. As a result of all these evaluations and the experiences we have gained in the Covid-19 pandemic, we think that synchronous/asynchronous distance education applications will develop further over time and contribute to medical education.

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Concept: Ö.S.K., E.Ç., R.K., Design: Ö.S.K., R.K., Data Collection or Processing: S.Ö., Ö.S.K., Analysis or Interpretation: S.Ö., Ö.S.K., E.Ç., R.K., Literature Search: S.Ö., Writing: S.Ö., Ö.S.K.

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Review

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Examination of Work and Engagement, Activity and Occupation Terms in Occupational Therapy Literature: Turkey Sample

Ergoterapi Literatüründe İş ve Uğraşı, Aktivite ve Oküpasyon Terimlerinin Kullanım Sürecinin İncelenmesi: Türkiye Örneklemi

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ABSTRACT

Although the use of terms of work and engagement (WE), activity, and occupation varies from country to country, time and cultural structure, these terms are among the most commonly used terms in occupational therapy (OT). The aim of our study was to examine the process of use, change and development of WE, activity and occupation terms in the national and international literature in Turkey. A search by using the funnel method using "occupation", "WE", "WE treatment", "activity", "occupation" and "OT" keywords was done. The abstracts of national and international articles published in the Web of Science, Scopus, Index Medicus, Medline, Copernicus, EBSCO, Ulakbim Journal index and TR ATIF index between 1970-2018 were reviewed and 3467 articles were reached. Two hundred and nineteen which met the inclusion criteria were included in the study. The data obtained were recorded. It was found that in national and international studies, the terms "WE", "activity" and "occupation" were both used in similar and different meanings. In the development process, it was observed that there was a shift towards the use of the terms "activity" and "occupation" by moving away from the term "WE" which had a limited conceptual content. Historical development and change in the use of terms "WE", "activity" and "occupation" in OT science are parallel with development of OT in our country. To continue and deepen the studies and harmonize the terminology according to the spirit of time and changing conditions will accelerate the development of OT paradigm in Turkey.

Keywords: Occupation, activity, work and engagement, occupational therapy

ÖZ

İş uğraşı, aktivite ve oküpasyon terimlerinin kullanımı ülkeden ülkeye, zamana ve kültürel yapıya göre değişiklik gösterse de bu terimler ergoterapide en sık kullanılan terimlerdendir. Çalışmamızın amacı; Türkiye'de iş uğraşı, aktivite ve okupasyon terimlerinin ulusal ve uluslararası literatürdeki kullanım, değişim ve gelişim süreçlerini incelemektir. Huni metodu ile "iş-uğraşı", "iş ve uğraşı tedavisi", "aktivite", "oküpasyon" ve "ergoterapi" anahtar kelimeleri kullanılarak 1970-2018 yılları arasında Web of Science, Scopus, İndex Medicus, Medline, İndeks Kopernicus, Ebsco, Ulakbim Dergi Dizini ve TR DİZİN dizininde yayınlanan ulusal ve uluslararası makalelerin özetleri incelenerek 3467 makaleden oluşan bir veri havuz oluşturuldu. Veri havuzundan dâhil edilme kriterlerine uygun seçilen 219 makale çalışmaya dahil edildi. Elde edilen veriler kaydedildi. Ulusal ve uluslararası çalışmalarda "İş uğraşı", "aktivite" ve "oküpasyon" terimlerinin zaman zaman birbirine benzer; zaman zaman ise birbirlerinden farklı anlamlarda kullanıldığı tespit edildi. Gelişim sürecinde kısıtlı kavramsal içeriği olan "iş uğraşı" teriminden uzaklaşılarak "aktivite" ve "oküpasyon" terimlerinin kullanımına doğru bir değişim olduğu gözlendi. Ergoterapi biliminde "iş-uğraşı", "aktivite" ve "oküpasyon" terimlerinin kullanımındaki tarihsel gelişim ve değişim ergoterapinin ülkemizdeki gelişimi ile paralel seyretmektedir. Ergoterapi ile ilgili terminoloji çalışmalarının derinleştirilerek devam etmesi gelişen, değişen koşullara ve zamanın ruhuna göre uyumlandırmaların yapılması Türkiye'de ergoterapi paradigmasının alt yapısını güçlendirecek ve gelişimini hızlandıracaktır.

Anahtar Sözcükler: Oküpasyon, aktivite, iş uğraşı, iş ve uğraşı terapisi

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Introduction

Occupational therapy (OT) has been serving individuals from all groups for over 100 years. In our country, OT is accepted as a newly established professional group that is at the very beginning of its development. Considering the historical development of occupational therapy in our country, the foundations of the profession were first laid with the establishment of the Physical Therapy and Rehabilitation School affiliated to Hacettepe Faculty of Medicine and Health Sciences. This school was opened by Prof. Dr. İhsan Doğramacı to train rehabilitation therapists. The departments specified in the regulation published in the Official Gazette dated July 24, 1964 included Occupational Therapy and Occupational Treatment departments. Studies on these issues have been carried out with the establishment of the School's Work and engagement treatment unit. The Work and engagement treatment unit was first introduced by Prof. Dr. Hülya Kayıhan in Hacettepe University Hospitals Physical Medicine and Rehabilitation Department and Physical Therapy and Rehabilitation School, closed after operating for a while, and started to operate in Hacettepe University Hospitals Physical Medicine and Rehabilitation Department again since 1981. Then, between 1983-2008, it continued its activities in the School of Physical Therapy and Rehabilitation. In 1996, Hacettepe University Institute of Health Sciences, Physical Therapy and Rehabilitation Master and Doctorate Programs were opened. On 18.02.2009, an education program was opened under the Faculty of Health Sciences of Hacettepe University in accordance with the item 7/d-2 of the Law numbered 2880 and the Law numbered 2547 by the High Education Council. Hacettepe Occupational Therapy major education program was accredited by the World Federation of Occupational Therapists in 2012, and by the Health Sciences Education Programs Evaluation and Actreditation Association recognized by the High Education Institution in 2018 [Kayıhan and Köse (12)].

Although the terms "Activity" and "Occupation" have been used similarly to each other in occupational therapy literature for a long time, they also appear as two different concepts that are confused with each other [Salles and Matsukura (21)]. While "Activity" is defined as "activity, being active" according to the Turkish Language Association, it is conceptually defined as a general classification of human actions such as playing games and cooking. Ocupation, on the other hand, is an ergotherapy term that originates from the Latin word occupare/occupatio and was introduced into English from the old French language as "occupation" in the 16th century. Although the Turkish word for "occupation" appears as "iş", "uğraşı", "uğraş" and "meşguliyet", this Turkish equivalents do not meet the comprehensive content of the term "occupation" used in ergotherapy. As a result of the consultations with the Turkish Language Institution, it was agreed that "okupasyon" was used as the Turkish equivalent of "occupation" as a scientific term and that the word "work/occupation", which was a dictionary meaning, would be more appropriate when defining handicrafts and artistic activities.

For different branches of science in the literature, occupation refers to the work that people do to earn a living, while in the occupational therapy science, occupation is defined as all the daily life activities that make us who we are in our daily life (Nelson and Jonsson (17). In addition, occupation is shaped by the cultural structure and includes all the tasks we devote our time to making sense of our lives (Golledge (9). These tasks, on the other hand, contain numerous activities completed in their structure. Therefore, work-engagement defines the work that individuals put forward with their manual skills. Activity describes a general action that the individual is involved in or can be taken by anyone. Occupation, on the other hand, defines all life activities shaped by personal interests, desires, values and means meaning for the person. Especially, occupation reflects the unique characteristics of the individual that can only be interpreted by the person (Breines (2); Evans (8); Golledge (9).

In the literature, Trombly (25), Wilcock (27), Pedretti (1996) have used the term "occupation" to describe "purposeful activity/activity that serves any purpose", while Levine and Brayley (1991) have used the term "activity" in the same sense with "reading". (Pendleton and Schultz-Krohn (19); Trombly (25); Wilcock (27).

The American Occupational Therapy Association (AOTA) defines the distinction between omission, function and purposeful activity in a declaration published in 1995 as follows:

"Occupation expresses primarily the performance dimension of the function with its contextual, temporal, psychological, social, symbolic and spiritual dimensions. While purposeful activity can cover more than one dimension, occupation refers to the biological (body structure and functions, etc.), psychological (well-being, etc.) and sociological (environment, etc.) richness of the concept of human. All readings allow for the creation of a purposeful activity, but all purposeful activities cannot be defined as occupation" [Christiansen et al. (3)].

Nelson (16), on the other hand, explained the relationship between the occupational form and occupational performance. Each occupational form has an objective structure independent of the person performing it. However, it has socio-cultural and physical characteristics. Occupational performance, on the other hand, is the action that is manifested, directed or structured by the pre-existing occupational form. According to Nelson, significance is associated with the occupational form, while occupational performance is related to purpose (Nelson (16).

Khielhofner (1995), on the other hand, defined occupational forms as sequences of action that are pursued for a purpose, consistent and strictly bound to rules, and named within the culture. For example, occupation is exemplified as working as a worker, a floor attendant, a member of a group, etc. and it contains many different literary forms in its structure. Occupational forms are explained as more thematic structures, such as the individual mowing the lawn as a worker, cleaning the kitchen as a floor attendant, working for a newspaper as a member of a group Kielhofner (13); Wu et al. (28).

According to the Model of Human Occupation (MOHO), the ocupational forms have been conceptualized as one of the four

dimensions of the environment that affects the occupation. Occupational forms are pre-formed cultural meanings provided in the face of opportunities and constraints related to the subject. When viewed from the MOHO's perspective, the literary forms depend on the individual's past and present life history (Kielhofne (13); Kielhofner and Barrett (14). Khielhofner avoided using the word "activity" in his model to eliminate the confusion of occupation and activity, and focused on expressions of doing, thinking, and feeling in order to emphasize that occupation always involves the intertwining of an action, thought and feeling (Kielhofner (13); Kielhofner and Barrett (14); Rudman and Dennhardt (20).

When we look at the examples in the literature, it is seen that the paradigm of occupation and occupational therapy also varies from time to time. The example that best explains this situation is the dynamic cultural mechanisms that affect the behavior of individuals living in eastern culture and western culture, separately. Differences arising from the dynamic nature of the mechanisms also change the social and conceptual understanding. While the behavioral patterns and concepts developed to increase the quality of life of individuals in Western culture based on individual independence, shape the life of the individual (Rudman and Dennhardt (20), in eastern culture, the adoption of a communal lifestyle manifests itself in the pattern of behavior in the form of multiple generations living under the same roof and in the form of meeting the needs of people who need help by other family members. For this reason, it is seen that the policies of the states in the Eastern culture have shifted to general preventive/curative and therapeutic approaches rather than person-centered approaches (person-centered approaches, individual quality of life, etc.) to delivering basic health services to all individuals rather than improving the quality of life of individuals (Mahiroğulları, 2005; Süleymanov (22).

In the behavior and life patterns observed in Turkey, a good synthesis of Eastern and Western culture dominates. The reason for this is that the social structure in cities has the characteristics of Western culture and the characteristics of eastern culture prevail in smaller settlements such as villages Süleymanov (22).

When the world literature on the occupational science is examined, it is emphasized that the development of OT is closely related to cultures and cultural differences, and that there is lack of studies examining the use of concepts, terms and approaches related to OT in different cultures in detail Awaad, (1); Watson (26). Our study was planned with the aim of examining the conceptual use of "WE", "activity" and "occupation" terms in Turkey, which were also often used in the national-international occupational therapy literature, mapping the use of these terms and studying the developmental processes of occupational therapy in our country in detail.

Clinical and Research Effects

Our study was planned as a systemic review using quantitative and qualitative data. Inclusion criteria in the study: (1) The articles published between 1970 and 2018, (2) The articles including the keywords of WE, work and occupation therapy, activity, occupation, and OT, (3) The methods used in practice should include evaluation/intervention methods of occupational therapy and rehabilitation. Funnel method was used to scan the publications in the literature. A general sample was created by scanning the summaries of all the studies in which the keywords were included in the framework determined by this method. Publications in Web of Science, Scopus, Index Medicus, Medline, Index Kopernicus, EBSCO, Ulakbim Journal Index and TR ATIF index were used for sampling. Screening was performed by BK and CK using Hacettepe University Access.

While BK scanned English publications included in international indexes published by Turkish researchers, CK searched national publications in the TR ATIF index. The abstracts of the publications that were published in the Turkish Journal of Physiyotherapy Rehabilitation before 1990 but could not be transferred to the online system, were examined by scanning the journal archive with the special permission of the editor DII. The author list, title, age group, subject and content information of the studies obtained as a result of the main searches were systematically recorded. All studies to be included in the study were reviewed for the second time. The full texts of the included studies were examined by MH and grouped in terms of the conceptual content of terms and terms used. All results were interpreted by the research team and turned into quantitative and qualitative outputs.

Results

As a result of the first search, a total of 3467 studies containing keywords were found. When the articles were re-searched in terms of the terms and conceptual content of the terms used, it was found that 2127 studies did not meet the inclusion criteria. When the remaining 1340 studies were examined in detail, it was concluded that the researchers of the 1121 studies were from outside the OT field. A total of 219 studies were included in the study. One hundred and fifty two of these included articles were found to be scanned in national indexed journals and 67 of them were found to be scanned in international indexes (Flow Chart).

In the studies conducted between 1970 and 1996, the words "WE", and "work and occupation" were frequently used, and the studies conducted between 1996 and 2009 included terms such as "activity", "leisure activity", and "occupational activity". In addition, the term ''activity" has been used with increasing frequency since 1970, and especially after 2009, "activity" has not been used alone and used as "activity performance", "activity participation", or "activity balance" which help to reveal more conceptual content (Table 1). In the articles published after 2017, it has been determined that the frequency of use of terms such as "the Human Ocupation Model" and "occupational form" has increased.

When the journals in which the articles were published were examined, it was found that the studies conducted before 2009 were frequently published in journals containing rehabilitation

and physiotherapy, and 96 studies in accordance with the criteria conducted between 2009-2018 were published in journals on rehabilitation and occupational therapy. While 62 of these articles used the keywords "occupation", "activity", "OT"; 34 articles used the words "occupation" and related "activity participation", "activity balance", "role balance", and "person-environment-activity relationship".

It was observed that in all of the 67 English-written studies, which were scanned in international indexes and found in accordance with the criteria; "occupation" and "activity" terms were used in different meanings, and that the term "occupation" was used in a wide sense covering all life activities affecting health and well-being.

Discussion

As a result of our study, which was planned to examine the conceptual meanings of the terms "WE", "activity" and "occupation", which were frequently used in the OT literature, and the usage map of these terms in detail according to the developmental processes of OT in our country; it was observed that while the use of the terms "WE", "work and occupation", "work and occupation therapy" prevailed in early national ergotherapy studies, the use of the term "occupation" with its meanings including health and well-being increased with the establishment of the occupational therapy department and after the graduation of the first occupational therapy in 2014, and increased rapidly after 2017. In addition, it was observed that the conceptual distinction in the use of "activity" and "occupation" terms was evident in the studies of experts dealing with the science of OT and contributing to its development, published in international databases. Also, it was determined that the terms used in studies conducted by Turkish scientists in the field of OT did not differ from other internationally published studies.

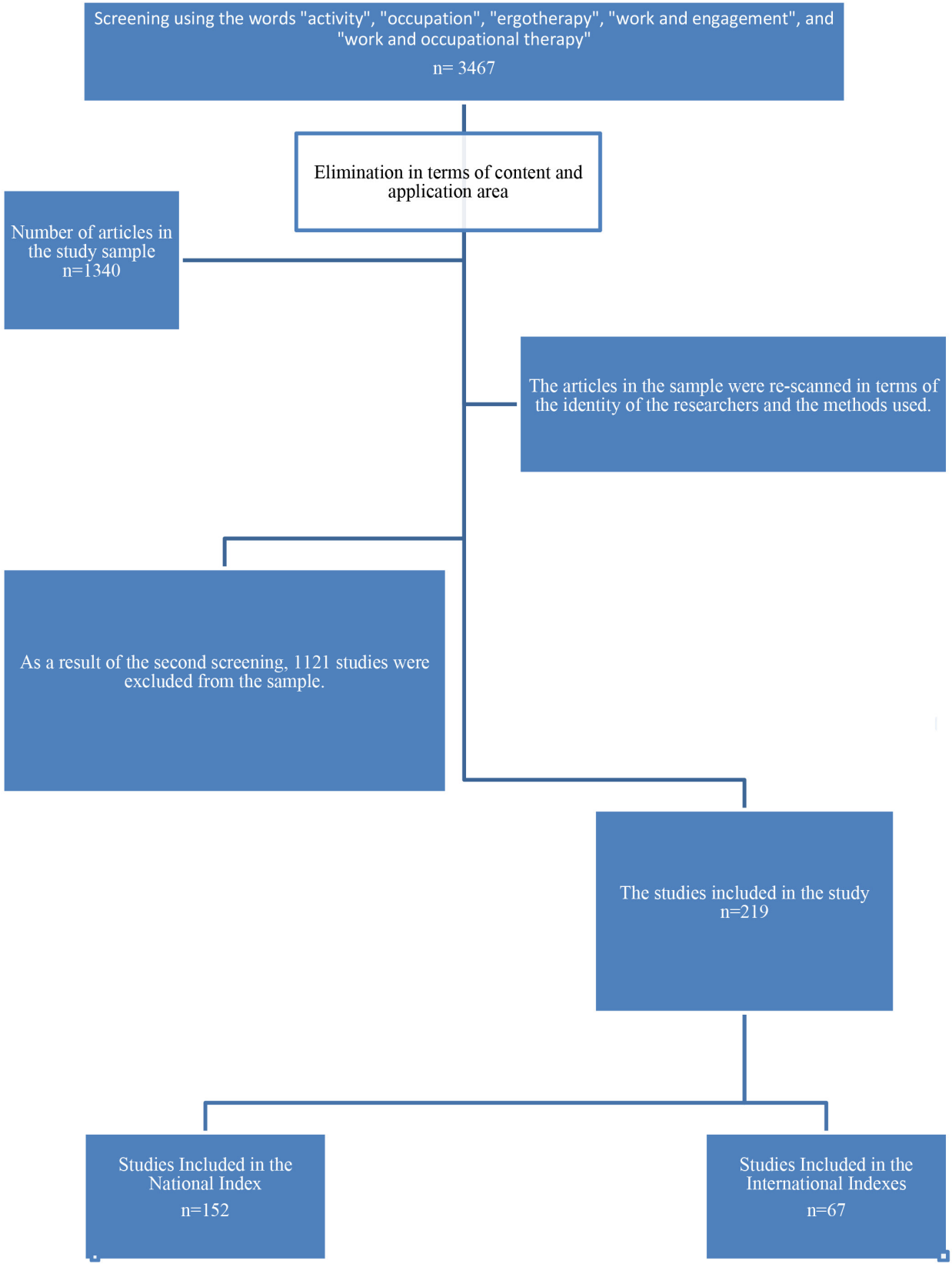
The development of scientific branches occurs as a result of the intense efforts and efforts of scientists who are trying to find solutions to meet the needs of humanity. The first emergence of OT in the world occurred as a result of the work of a group of nurses who expanded their field of study in the United States during World War I (Dunlop (7). In Canada, it started with the development of the work of a child psychiatrist who was influenced by Mill's work on Moral Philosophy to raise the morale of children hospitalized for tuberculosis treatment (Driver (6). In both studies, it was stated that as the science of ergotherapy developed, the methods and terminology used changed. The development of ergotherapy science in Turkey has been pioneered by professionals specializing in ergotherapy from different professional disciplines who are interested in the subject, in parallel with world examples. This result is similar to the study of Cutchin and Dickie. (4) which has demonstrated that OT terminology and occupational therapy paradigm have improved with a better understanding (Cutchin and Dickie (4). According to the results of our study, it is believed that terminology related to ergotherapy in Turkey has developed with an in-depth understanding of the ergotherapy paradigm, the nature of activity and activity participation, and complex relationships related to health.

Table 1. Flow chart

1970-1996	1996-2009	2009-
• The period in which it was involved in another discipline as an undergraduate course • Words used: Work and engagement therapy, work and occupation therapy, activity, activities of daily living.	• The period in which it was involved in another discipline as a graduate program • Words used: Work and engagement therapy, work and occupation therapy, daily life activities, leisure time activities, leisure activities, school activities	• The period when the department was established using the term ergotherapy • Words used: ergotherapy, activity performance, activity participation, activity balance, activity-role performance, activity-role competence

The increase in the competence of newly developing sciences in self-evaluation, clinical decision-making and intervention methods in the literature is directly proportional to the spread of professionals working in the field and the widening of their application areas (Rudman and Dennhardt (20). Scientists emphasized that the in-depth perception of the content and scope of science-specific terminology and science-specific terms begins with specialization (Gleick (11). As a result of our study, in line with the literature, we think that the establishment of WFOT certified occupational therapy education programs in Turkey, transition from Work and Engagement Therapy Department to Occupational Therapy Department, and employment of the first occupational therapists in various sectors and academia after graduation, have led the use of terms such as "WE" and "work and occupation" and have made them widespread by allowing a better understanding of the expressions underlying the terms specific to activity and OT. (Huri and Kayihan (10); Pekçetin et al. (18); Şahin et al. (24); Şahin and Uyanık (23). In parallel with the increasing awareness, specialized terms such as "activity performance", "activity participation", and "activity balance" have started to be used more frequently in studies. However, although scientists who publish their work in the field of OT increase their frequency of using the term "okupasyon" conceptually, they may experience some problems in timing to find the equivalent of words entering or to be entered into Turkish from a foreign language, improper use of suffixes, pronunciation and phonological compatibility, public offering of the word, and use in media and school books. In addition, des Langues et al. (5) in their work on the use of terms in different languages and their translation from the native language to another language; They stated that the subject is expressed using the terminology in the language in which the subject is to be described and that the incomplete or out-of-scope terms are parallel to the variety of terms used in that language (des Langues (5). Similar to the literature, we think that the term of reading is needed from

Table 2. Flow chart



the terms of work-occupation and activity due to its meaning content, but it is still in the process of dissemination. In addition, in their work on the use of terms in different languages and their translation from the native language to another language, des Langues et al. (5) stated that the subject intended to be expressed in a language was made using the terminology in that language in which the subject would be described, and that the missing or excluded terms were parallel to the diversity of the terms used in that language des Langues et al. (5). We think that the term of "okupasyon" is needed to be used due to its meaning content instead of the terms of "WE" and "activity", but it is still in the process of dissemination.

Both printed and digital sources were used in our study. The printed archives were scanned in order to reach the works published between 1970-1990. The fact that there were missing pages in some journals, although in a small number, caused limitations in the evaluation of the conceptual content in the full texts of published studies, and this was a limitation of our study.

Given that the science of ergotherapy in Turkey is developing both clinically and academically; examination of the issues such as terminological usage, practices philosophy and paradigm in detail and deepening of OT related terminology work and its continuation, and adapting to changing conditions and the spirit of time will accelerate the development of ergotherapy by strengthening the infrastructure of the ergotherapy paradigm in Turkey.

Peer-review: Internally and Externally peer reviewed.

Authorship Contributions

Concept: M.H., Design: M.H., B.K., Data Collection or Processing: B.K., C.D., Analysis or Interpretation: M.H., Literature Search: B.K., C.D., Writing: M.H., B.K., C.D.

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Review

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Constipation and Aroma Massage in Elderly Individuals

Yaşlı Bireylerde Konstipasyon ve Aroma Masajı

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ABSTRACT

Constipation is a gastrointestinal motility disorder characterized by decreased bowel movements or difficulty in the defecation process. In the first step of non-pharmacological measures in constipation management, it is generally recommended to increase regular physical activity, and fluid and fiber consumption. In the medical treatment of chronic costipation; suppositories, laxatives and enemas are used. However, the long-term use of some laxatives can cause increased constipation and harmful side effects, including fecal impaction. Abdominal aroma massage is an inexpensive, non-invasive method that can be applied by nurses for the treatment of constipation. It can also be done by the patient himself/herself. Studies have shown that abdominal aroma massage stimulates peristalsis , shortens the colon transit time, increases the frequency of bowel movements, and reduces the accompanying feelings of pain and discomfort and the incidence of defecation in constipated patients. Abdominal effleurage, petrissage, kneading, vibration, and tapotement are thought to reduce muscle tension, increase local circulation, reduce indigestion, stimulate stomach acid secretion, increase appetite, stimulate peristalsis, alleviate constipation and reduce high blood pressure. In this article, the use and effects of abdominal aroma massage in constipation management will be explained.

Keywords: Abdominal aroma massage, constipation, elderly indivudals

ÖZ

Konstipasyon bağırsak hareketlerinde azalma veya defekasyon sürecinde güçlük ile karakterize gastrointestinal motilite bozukluğudur. Konstipasyon yönetimindeki nonfarmakolojik önlemlerin ilk basamağında genellikle düzenli fiziksel aktivite, sıvı ve lif tüketiminin arttırılması önerilmektedir. Kronik kostipasyonun medikal tedavisinde ise; supozituvarlar, laksatifler ve lavmanlar kullanılmaktadır. Fakat bazı laksatiflerin uzun süreli kullanımı, konstipasyonun artmasına ve fekal impakşını da kapsayan zararlı yan etkilere neden olabilir. Abdominal aroma masajı, konstipasyonun tedavisi için hemşireler tarafından uygulanabilecek, ucuz, zararlı etkisi olmayan, non-invaziv bir yöntemdir. Aynı zaman da hastanın kendisi tarafından yapılabilir. Araştırmalar abdominal aroma masajın konstipe hastalarda peristaltizmi uyardığını, kolon geçiş süresini kısalttığını, bağırsak hareketlerinin sıklığını arttırdığını ve eşlik eden ağrı ve rahatsızlık duygularını ve defekasyon görülme sıklığını azalttığını göstermiştir. Abdominal efloraj, petrisaj, yoğurma, vibrasyon ve tapotmanın kas gerginliğini azalttığı, yerel dolaşımı arttırdığı, hazımsızlığı azalttığı, midenin asit sekresyonunu uyardığı, iştahı arttırdığı, peristaltizmi uyardığı, konstipasyonu hafiflettiği ve yüksek kan basıncını düşürdüğü düşünülmektedir. Bu makalede konstipasyon yönetiminde abdominal aroma masajın kullanımı ve etkileri açıklanacaktır.

Anahtar Sözcükler: Abdominal aroma masajı, konstipasyon, yaşlı bireyler

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Introduction

The purpose of nursing is to help protect and improve the health of the individual in all stages of life. The purpose of the service provided to the elderly is to increase the quality of life of the individual and to ensure a healthy life (1). Nurses have active roles and responsibilities in the planning, delivery and development of services provided to the elderly (2,3). Nurses should help elderly people to fulfill their daily life activities, to take care of themselves, to cope with their problems, to feel valuable, and to live in situations where they are not sufficient (1). Nurses have an important role in determining and meeting the health care needs of the elderly living in nursing homes. Changes in health status and systems with advancing age adversely affect the quality of life of the elderly and the elderly face many complex health problems (4).

Many diseases such as cardiovascular diseases, chronic lung diseases and diabetes are seen in the elderly due to factors such as sedentary lifestyle, unhealthy and unconscious dieting, and smoking. In addition, osteoporosis, visual disturbances, hearing difficulties, chronic pains and sleep disorders, mental disorders, urinary and fecal incontinence and constipation are common health problems in the elderly (5). It is stated that the prevalence of constipation increases with age and that 34% of women and 26% of men aged 84 or over have constipation problems. Constipation and defecation problems are more common among the elderly who stay in long-term care facilities and may cause morbidity (6,7).

Constipation and Its Epidemiology in Elderly People

Constipation can be diagnosed with both objective and subjective measurable variables. Constipation is a functional bowel disease in which excessive strain during defecation, infrequent defecation and incomplete defecation are at the forefront. Although there are complaints of abdominal pain and/or abdominal distension, these symptoms should not be prominent symptoms and the symptoms in the patient should not meet the diagnostic criteria of irritable bowel symptoms. Symptoms should have started at least 6 months before diagnosis and should continue for the last 3 months (8).

Factors causing constipation can be listed as lifestyle factors, lack of regular bowel habits, malnutrition and insufficient fluid intake, feeding with foods poor in fiber, insufficient exercise, depression, and weakness of the pelvic floor muscles (9,10). While constipation is a preventable and treatable problem, if left untreated, physical and psychological problems may develop. When constipation is not treated, it can cause health problems such as back pain, rectal pressure, anorexia, incontinence, confusion, nausea and vomiting, urinary dysfunction, fissure, rectal prolapse, hemorrhoids, intestinal obstruction, syncope and bowel perforation or stercoral peritonitis (9,11,12).

Approximately 20% of healthy individuals in the community have one or more complaints related to constipation, including a decrease in stool frequency, hard stool, and excessive strain during defecation (13,14). The prevalence of constipation increases with age, 34% of women and 26% of men aged 84 years or over experience constipation problems. Constipation is defined as an alarming, chronic and repetitive problem affecting 50-73% of the elderly, and it can cause serious problems in the elderly living in nursing homes (6,14,15).

Factors Causing Constipation and Treatment Methods

Factors leading to digestive system problems in the elderly are tooth loss, decreased sensitivity in taste and smell receptors, decreased digestive system secretion and enzymes, decreased activity in bowel movements, decreased absorption in bowels, insufficiency of liver hemodynamics, decreased pancreatic response, sphincter insufficiency, and slowing of metabolism. At the same time, changes such as chronic diseases, polypharmacy, chronic inactivity, insufficient fluid intake, insufficient/inadequate dieting, side effects of drugs and disruption of intestinal flora due to the use of antibiotics cause serious digestive system problems in the elderly (9, 14,16,17). These problems include eating difficulties, anorexia, indigestion, change in eating habits, absorption disorders and constipation (18,19).

Inadequate bowel management may cause a decrease in the comfort and quality of life of the elderly (20). Early evaluation and diagnosis of constipation in the elderly, creating an appropriate bowel management plan and planning individual nursing interventions for bowel elimination are among the primary responsibilities of nurses (15,21). Therefore, the nurse should determine the habits of the individual and include this information in the individualized care plan. It is important to collect data about the general practices regarding the discharge of the individual, to determine whether he or she is independent in performing the evacuation activity, and to reveal the coping mechanisms previously used for evacuation problems and chronic diseases (9).

There are many pharmacological and non-pharmacological approaches to prevent constipation. Generally, in the treatment of constipation, drugs (laxatives, enemas, suppositories, etc.) are used when non-pharmacological approaches such as changes in nutritional habits, adequate fluid intake, education, activities to develop healthy bowel habits, exercise, massage, aroma massage, biofeedback, stress management are not sufficient (9,10,22,23).

Initiatives such as progressive relaxation, therapeutic touch, music therapy, and aromatherapy, which are called complementary-supportive therapeutic approaches, are used by nurses to help individuals meet their physical, emotional and psychological needs (24). In our country, aromatherapy and aromatherapy massage are frequently used as a nursing initiative. However, there is a study examining the effect of aromatherapy on constipation. Aromatherapy massage is an intervention that should be included in practices as a therapeutic nursing intervention in order to reduce the symptoms of constipation, increase the quality of life, and provide comfort (25,26).

Nursing Initiatives for Constipation

Nurses should pay attention to health behaviors in order to gain useful habits that are always applicable and improve health (27).

Individuals should be taught effective bowel habits at home, in hospitals, and in institutions that provide long-term care (28). Normally, nursing interventions including factors such as diet, exercise, squatting position, abdominal massage/aroma massage, timing and confidentiality should be planned and implemented for the development and maintenance of bowel habits (29,30).

a) Diet

The nurse must first reveal the final nutritional status of the individual. The positive habits of the elderly person should be supported and education should be given to gain positive habits. Nutritional factors that facilitate intestinal evacuation are consuming warm/hot drinks and fibrous foods, and sufficient fluid intake. Drinking warm/hot drinks and fruit juices soften stool and increase peristalsis (27-30). Increasing the intake of fibrous and fiber foods reduces the risks of colon cancer, digestive system diseases and other cancer as well as providing regular bowel emptying. In addition, if there is no need for fluid restriction, the nurse should support the elderly person in taking 2000-3000 ml of fluid daily (29,30). Because it dilutes the liquid content and facilitates its passage through the column. When the amount of fluid in the body decreases, as peristalsis slows, more fluid is absorbed from the feces moving through the intestine causing the feces to harden. As a result, insufficient fluid intake causes constipation (27-30). Therefore, it is very important to regulate the nutrition of elderly people with constipation.

b) Exercise

Regular exercise programs such as walking, swimming, and cycling 3-5 times a week are important for maintaining normal gastrointestinal motility. Individuals who remain immobile due to illness should be mobilized as soon as possible, and active ROM (range of motion) exercises should be performed for bedridden individuals (27-30). The nurse should evaluate the elderly person's exercise situation and possibilities. Slow walking, which is reported to be the most appropriate exercise for the elderly person, should be encouraged.

c) Timing and Confidentiality

The nurse should inform the individual in which situations and when the feeling of defecation may occur (29,30). Suppression of the feeling of defecation and the thought that defecation may take time are among the most important causes of constipation (27,30). In order to evaluate the regularity of bowel movements, the individual should know his or her own normal defecation habits and fulfill these habits on time (30). If the individual is bedridden or gets help during movement, the nurse should give the individual a bedpan or help him/her go to the bathroom (28). Giving the person a bedpan in front of other people creates a feeling of embarrassment. In this case, the nurse should take measures to protect privacy and try to comfort the individual by talking about not interrupting defecation (27,29,30).

d) Squatting Position

Squatting is a normal and proper position during defecation. Normal toilets provide this ease of posture and increase the intra-abdominal pressure of the individual and tighten the thigh muscles. However, since squatting is a very difficult situation for the elderly with diseases such as chronic arthritis, which causes weakness in joints and muscles, nurses should help the elderly to crouch and stand up (28). The elderly who are not likely to squat and have to use the toilet should be informed that they can create a squat effect by leaning forward while sitting on the toilet. Defecation is very difficult in immobile individuals. Since it is not possible for the muscles to contract in the supine position for defecation, the patient should be given a sitting position as much as possible when the badpan is given (27,29,30).

e) Abdominal Massage and Aroma Massage

Massage is the art of touching to relax the whole or a certain part of the body. Massage is applied to reduce muscle tension, provide relaxation and stimulate blood circulation in tissues (10,31,32).

Abdominal massage is a non-invasive massage method that is applied to the large intestine in a clockwise direction, including petrissage, effleurage, kneading and vibration movements in order to relax the abdominal wall. Abdominal massage is applied to the individual for 15 minutes (33,34). Massage, applied by applying pressure to the front and back walls of the abdomen and treating the trigger points, stimulates the passage of gas and intestinal sounds, creates peristaltic stimulation, pushing the feces from the intestines to the rectum and reducing the symptoms of constipation (35). In addition, adominal massage stimulates local circulation, reduces muscle tension, stimulates gastric acid secretion and facilitates digestion (35).

Aroma massage is an integrative treatment method that combines the beneficial effects of massage and aromatherapy, making the care offered more effective (36). Aroma massage with diluted essential oils is a combined method that increases the effect of essential oils used in massage. It is known that aroma massage, which is the art of touching and which is applied to relieve the whole or a certain part of the body, has many effects on systems (31,36,37). Absorption of essential oils and their incorporation into the bloodstream is accomplished by massage that provides dilatation of the blood vessels in the dermis (31).

It is known that applying aromatic oil (2-3 drops of selected essential oil containing oil) or lotion locally to the abdomen has an effect on bowel evacuation. In studies, fats have been found to increase bowel movements, the frequency of defecation, the amount of stool, to decrease colon spasm during colonoscopy, the symptoms of irritable bowel syndrome, the severity of constipation, strain during defecation, and to provide a feeling of complete discharge after defecation (38-46).

Process Steps

- The individual is primarily given the supine position. The head of the bed is raised 30-45° if there are risky situations for the person given the supine position. If there is no unfavorable situation, a thin pillow is placed under the knees by bending the knees slightly in order to relax the abdomen.

- The clothes between the lower edge of the ribs and the spina iliaca anterior superiors are removed. There should be no tight clothes that will prevent circulation in the pelvis. The remaining body parts are covered using two sheets.

- The person applying the massage stands on the right side of the patient, facing the patient.

- Before starting the massage, the abdomen is evaluated in terms of distension, flatulence, pain and intestinal fecal material.

- The process should not be applied immediately after meals. It should be ensured that the individual's urinary bladder is empty before the procedure. It can help take advantage of the gastrocolic reflex, especially in the morning or when the intestines are most active 30 minutes after meals.

- Manipulations are started in the left lower quadrant of the sigmoid colon.

- The three basic massage maneuvers for constipation, which are effleurage (3 times), petrissage (3 times), and vibration (3 times), are applied three times each during abdominal massage.

- Abdominal massage is started with effleurage, and the abdominal wall is relaxed. If abdominal massage is applied to the individual for the first time, the deep tissues cannot be reached during the massage due to the contraction of the individual's muscles when first touched. After this tension is removed with effleurage, the main maneuvers are started.

- In superficial effleurage, it is applied in the opposite direction of the heart, over the entire surface of the abdominal wall, over the iliac crest and on both sides of the pelvis, down to the groin.

- Deep effleurage is applied in the direction of column, horizontal column and descending column. The applied pressure increases the contractions in the large intestine. In the application of effleurage, the fingertips are placed on the symphsis pubis, moved on along the M.rectus abdominis with deep effleurage, the hands are opened sideways at the level of the lower ribs, moved on along the line of the transverse abdominal muscles and down to the middle area, and after reaching the starting point obliquely in the second effleurage turn. Effleurage is started on the cecum with the right hand at the bottom and the left hand at the top. It is moved upward on the ascending colon, the direction of the lower hand is changed while moving on the midline, proceeded downward on the descending colon, descended obliquely towards the pubis and passed over the bladder with superficial effleurage.

- Petrissage maneuver is applied with palms and fingers upward in the ascending colon and downward in the descending colon. During the application, the pressure is successively increased and decreased.

- In abdominal massage, friction movement is started in the distal of the descending colon and a 5 cm downward friction is applied each time and it is moved on to the starting point. Deep effleurage is used in between.

- In vibration, the hand does not move in any direction, the movement is limited to the muscle the hand is on. Vibration creates reflex physiological effects during its application for a long time and with sufficient intensity. The effect stimulates the nervous system and allows the muscles to relax. It reduces spasm in the intestine. At the same time, it enables the gas accumulated in the intestines to be removed from the body (34-36,47-51).

Studies on Aroma Massage and Constipation

Considering the studies examining the effects of aroma massage on constipation and intestinal problems in different age groups and diseases, it is seen that the oils used are castor, lavender, lemon, sweet fennel, grapefruit, black pepper, mint, rosemary and these oils are applied by nurses. In the studies conducted, the groups where aroma massage is applied are patients with cancer, patients with Guillian Barre disease, mentally disabled children, female students/women, women, patients undergoing colonoscopy and the elderly. The application times of the aroma massage vary between 5 and 20 days.

Although there are studies on the effect of aromatherapy massage on constipation in developed countries, one study on this issue has been found in our country (44). Studies have shown that aroma massage is applied in different populations, using different oils and at different application durations (39,40,42-45). There are few studies examining the effect of abdominal massage applied with aromatic oils on constipation seen in the elderly (43,44).

When looking at the studies examining the effect of aromatherapy on constipation and intestinal problems;

Kyle stated that castor oil compress applied to the abdominal area of elderly women with constipation increased bowel movements (41).

In a patient with Guillian Barre syndrome with constipation, as a result of the aromatherapy application consisting of a mixture of geranium flower, lavender, roman chamomile, lemon, sweet fennel, grapefruit, black pepper and mint, it was observed that stimulating abdominal massage resulted in defecation. It was reported that the patient requested this treatment as constipation developed (42).

In the study conducted by Kim et al. to determine the effect of aromatherapy on constipation seen in the elderly, it was concluded that the average score of the constipation rating scale after 10 days of aromatherapy massage decreased significantly and that the bowel movements were faster than the control group (43).

In the study by Jeon and Jung, abdominal massage was applied to 31 dependent patients with cerebrovascular events accompanied by aromatherapy. While there was a significant increase in the frequency of defecation in the treatment group, it was observed that there was a significant improvement in constipation according to the constipation scales (46).

In the study conducted by Chung and Choi, it was found that the frequency of defecation increased and the severity of constipation decreased after aromatherapy massage in college students (39).

In the study conducted by Lai et al., it was observed that aroma massage reduced the severity of constipation in cancer patients (45).

In the study conducted by Nam et al., it was observed in hospitalized children that the amount of stool in the group who received aroma massage 5 times a week increased compared to the group that received aroma massage 3 times a week (40). In addition, peppermint oil was shown to reduce colon spasm and symptoms of irritable bowel syndrome during colonoscopy and to have a beneficial digestive antispasmia (38).

In our country, in the study conducted by Gürol, Arslan, and Eşer, it was concluded that the castor oil package was not effective on the number of bowel movements and the amount of stool in the elderly. It was reported that the stool consistency score increased, straining during defecation decreased, and that it provided the feeling of complete discharge after defecation (44).

Conclusion

Since the studies conducted mostly on abdominal massage, different age groups and diseases, there was a need for more studies on evidence-based practices that would examine the effect of aroma massage on relieving constipation. Abdominal aroma massage should be applied as an integrated treatment method in addition to laxatives in order to reduce constipation and alleviate constipation complaints. Nurses working in nursing homes or clinics that provide care to the elderly should be trained on the application of aroma massage within the scope of the certificate program and patients and their relatives should be provided with one-to-one practice. It is thought that informing nurses working with elderly people to increase their awareness about constipation is also very important.

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Case Report

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Solid Pseudopapillary Neoplasm of the Pancreas As a Rare Cause of Relapsing Acute Pancreatitis: A Case Report

Tekrarlayan Akut Pankreatitin Nadir Bir Sebebi Olarak Pankreasın Solid Psödopapiller Neoplazm: Bir Olgu Sunumu

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ABSTRACT

Solid pseudopapillary neoplasm of the pancreas is a rare tumor with low malignant potential. Although they are diagnosed incidentally, acute or relapsing pancreatitis in association with this tumor are reported rarely. A 22-year-old female patient was diagnosed with relapsing acute pancreatitis. Pseudocyst formation was identified based on imaging findings of a well-circumscribed cystic mass lesion located at the posterior aspect of the body and tail of the pancreas. At follow-up, extrapancreatic extension of a newly developed solid component was detected by imaging; thus, solid pseudopapillary neoplasm of the pancreas was suspected, and distal pancreatectomy with splenectomy was performed. Pathological examination revealed pancreatic mass lesion that was diagnosed as solid pseudopapillary tumor of the pancreas. This case implies that radical surgical resection should be the first treatment modality in all cases of solid pseudopapillary neoplasm of the pancreas. Even if typical imaging findings are present, co-occurrence of acute pancreatitis may cause diagnostic difficulty in some cases.

Keywords: Pancreatic neoplasm, solid pseudopapillary, acute pancreatitis

ÖZ

Pankreasın solid psödopapiller neoplazmı düşük malignite potansiyeli olan nadir bir tümördür. Genellikle rastlantısal olarak tanı konulmasına karşın, bu tümörle ilişkili akut veya tekrarlayan pankreatit nadiren bildirilmiştir. Yirmi iki yaşında kadın hasta tekrarlayan akut pankreatit ataklarıyla değerlendirildi. Psödokist formasyonu olarak değerlendirilen, pankreas gövde ve kuyruk kesiminin posteriorunda yerleşmiş iyi sınırlı kistik kitle lezyonu görüntüleme bulguları ile teşhis edildi. İzlemde, ekstrapankreatik uzantısı olan yeni gelişmiş bir solid komponentin görüntüleme ile belirlenmesi üzerine, pankreasın solid psödopapiller neoplazmı ön tanısı ile distal pankreatektomi ve splenektomi yapıldı. Patolojik incelemede pankreasın solid psödopapiller tümörü olarak teşhis edilen pankreatik bir kitle lezyonu saptandı. Radikal cerrahi rezeksiyon, pankreasın tüm solid psödopapiller neoplazm olgularında ilk tedavi yöntemi olmalıdır. Tipik görüntüleme bulguları olmasına rağmen, akut pankreatitin birlikte görülmesi bazı durumlarda tanı zorluğuna neden olabilir.

Anahtar Sözcükler: Pankreatik neoplazm, solid psödopapiller, akut pankreatit

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Introduction

Solid pseudopapillary neoplasms (SPNs) of the pancreas are rare tumors with low malignant potential and account for 2%-5% of all cystic neoplasms of the pancreas (1). Owing to the widespread use of pancreatic imaging with high-resolution techniques and increased familiarity of radiologists, surgeons, and pathologists, SPNs are increasingly detected in the recent decades. Most SPN cases are usually asymptomatic and diagnosed incidentally (2). However, SPN-associated acute or relapsing pancreatitis has been rarely reported (3-5). Although these tumors typically appear as large and well-circumscribed lesions, massive bleeding and extensive necrosis can be present within the compressed pancreatic tissues (6). Additionally, small tumors (<3 cm) without cystic component may be misdiagnosed as pancreatic cancer (5,6). If these atypical features are present, differentiation from other pancreatic malignancies and inflammatory conditions may be difficult.

In this report, we aimed to present the case of a young female patient who was misdiagnosed with pancreatic pseudocyst following relapse of acute pancreatitis and finally diagnosed with SPN following surgical excision. Written consent was obtained from the patient for the publication of this case report.

Case Report

A 22-year-old female patient was assessed due to recurrent abdominal pain, nausea, and vomiting for the last 4 years. She had no history of abdominal trauma, gallstones, and alcohol and drug use. Previous bouts were evaluated by upper endoscopy and treated with proton pump inhibitors.

One year ago, she was diagnosed with acute pancreatitis, which was confirmed by increased levels of serum amylase and lipase. She received conservative treatment and consequently discharged uneventfully. Computed tomography (CT) and magnetic resonance imaging (MRI) were performed, and a well-circumscribed cystic mass lesion located at the posterior aspect of the body and tail of the pancreas was detected (Figure 1). Conservative management and close follow-up were recommended due to the radiological diagnosis of pseudocyst formation following a bout of acute pancreatitis. At 6 months after surgery, MRI showed a decrease in the diameter of the cystic mass, indicating regression of the pseudocyst (Figure 2).

At 1 year after surgery, she was re-admitted to our general surgery outpatient clinic with the same complaints. Results of the physical examination were normal, but mild epigastric tenderness was observed. Results of the laboratory analysis including serum amylase, serum lipase, carcinoembryonic antigen, and carbohydrate antigen 19-9 were also normal. MRI showed enhancement of a newly developed solid component of the mass after contrast administration (Figure 3). Extrapancreatic extension of the solid component was also observed. In view of these imaging findings, SPN of the pancreas was a possible diagnosis.

Surgical excision was planned on the basis of the imaging findings and progression of the pancreatic mass. Laparotomy was performed through bilateral subcostal incision, and a mass (7 cm in diameter) that originated from the posterior aspect of the distal pancreas was detected. The mass was near the celiac trunk and the common hepatic artery. The splenic artery was surrounded by the lesion. Distal pancreatectomy with splenectomy was performed. A pancreatic fistula as a biochemical leak developed after the surgery. She was then discharged, but the drains were not removed. At two weeks after surgery, the fistula closed spontaneously.

A tight capsule was found during macroscopic examination. Solid, hemorrhagic, and cystic components were seen at the cross-sectional surface of the mass. Pathological examination revealed the pancreatic mass lesion (45 mm in diameter) that was diagnosed as a solid pseudopapillary tumor of the pancreas (Figure 4A). There was irregular arrangement of perivascular

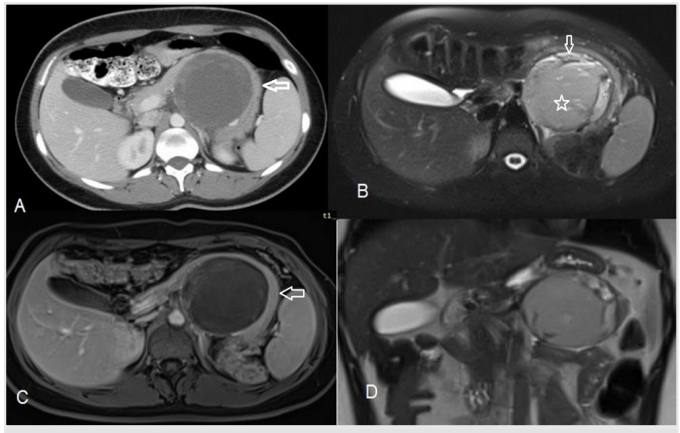

Figure 1. A) A well-circumscribed mass lesion located at the posterior aspect of the body and tail of the pancreas (arrow). No contrast enhancement at the anterior and medial walls of the cystic mass. **B)** Axial T2-weighted image showing a mass lesion with hypointense fluid signal within the center (star), layering debris, and mild early enhancement on the wall and septae (arrow). **C)** Axial T1-weighted image did not show contrast enhancement on the solid components of the mass (arrow). D) Coronal T2-weighted image

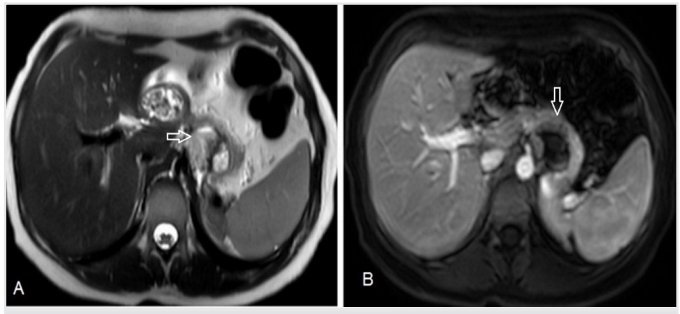

Figure 2. A) Axial T2-weighted image showing regression of the cystic mass (arrow). **B)** Portal phase contrast-enhanced axial T1-weighted image did not show septal or solid tissue contrast enhancement (arrow)

pseudopapillary structures composed of fairly uniform tumor cells (Figure 4B, 4C). Peripancreatic, perineural, and lymphovascular invasions were not observed, and a total of 12 lymph nodes were involved. At 3 months after surgery, the patient had none of the previous complaints.

Discussion

After the first report by Lichtenstein in 1934 and description by Frantz in 1959, recent data have shown that SPN is a rare and slow-growing neoplasm of the pancreas (3, 7). Although its exact etiology is still unknown, several speculations include tumoral development of displaced cells from the ovarian genital ridge or from pluripotent embryonic cells under the influence of sex hormones (2-5).

SPN is usually found in female patients in their 20s or 30s (2, 3). The male-to-female ratio was nearly 1:10 (5). It has been also reported in male patients, pediatric patients, or patients aged >50 years (8). The present case involves a young female patient, which is consistent with previously published articles. Although most cases were reported as asymptomatic or nonspecific, mild abdominal pain without constitutive symptoms were detected in other patients. On the basis of previously published data, a typical patient is predominantly a young female patient with a large mass (5–6 cm in average) and nonspecific abdominal symptoms (2, 5). Besides the presence of mild symptoms in these patients, cases of SPNs mimicking or coexisting with acute pancreatitis or pancreatic adenocarcinoma are rare, as in the present case (1, 3-5). Sakagami et al. (3) reported a female patient with SPN concomitant with acute pancreatitis. Chikuie et al. (5) reviewed patients with both SPN and acute pancreatitis. They reported six cases where the tumors were located in the body or tail of the pancreas. Based on these reports, stenosis of the main pancreatic duct caused by SPN or any fibrous and degenerative changes around the tumor may be regarded as etiological factors. However, the exact mechanism of acute pancreatitis in patients with SPN remains unclear.

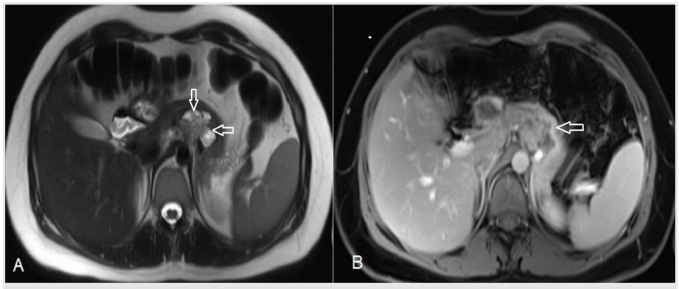

Figure 3. A) Axial T2-weighted image of a solid component of the mass (arrows). **B)** Venous phase contrast-enhanced T1-weighted image showing contrast enhancement of the mass with extrapancreatic extension (arrow)

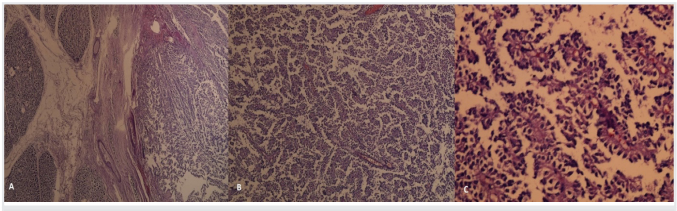

Figure 4. A) Well-circumscribed pancreatic tumor, demarcated from normally appearing pancreatic tissue at the left [hematoxylin and eosin (H&E) staining, 40×]. **B)** Solid pseudopapillary tumor of the pancreas (H&E, 100×). **C)** Pseudopapillary formations (H&E, 400×)

Although studies have reported equal distribution of tumors within the pancreas (6, 7), tumors most often occur in the body and tail, as in the present case (2, 8). SPN can be diagnosed by imaging techniques including CT and MRI (5). A large well-encapsulated mass with variable solid, hemorrhagic, and cystic components are typical CT findings of SPN. The most common features of SPN were round or oval-shaped mass with well-defined margins and slight hyperintensity on T1-weighted images, heterogeneous and hyperintense appearance on T2-weighted images, and enhanced, slightly thickened capsule (6). If these features are present following a bout of acute pancreatitis, diagnosis might be difficult, causing a delay in differentiating pancreatic pseudocyst from SPN as in the present case. Therefore, SPN should be included in the differential diagnosis of all cystic pancreatic neoplasms.

On both CT and MRI, SPNs demonstrate well-defined margins and mixed solid and cystic appearance (6). However, the diagnosis can be difficult in some cases. Although small tumors (< 3 cm) without cystic component can be misdiagnosed as pancreatic cancer, our case was diagnosed as SPN with nearly 1.5 years of delay even if imaging data were available (5, 6). History of acute pancreatitis and subsequent development of a probable pseudocyst might cause these diagnostic problems. However, slow mass growth and development of solid component can alert the attending physicians about the presence of SPN within the pancreas.

In suspicious cases in which SPN is not evident, endoscopic ultrasonography can be performed. In Karsenti's study (8), the sensitivity of endoscopic ultrasonography was 81%. The use of both CT and endoscopic ultrasonography increases the detection of SPN. In the present case, the cystic lesion initially had hypointense fluid containing layering debris. Although endoscopic ultrasonography may be useful for the differentiation of SPN from other cystic lesions of the pancreas, due to the lack of such technology, we could not perform endoscopic ultrasonography.

Radical surgical resection with free resection margins is the standard treatment modality for SPN (2-5). Other adjuvant treatment modalities have no effect on the prognosis. Therefore, local tumor infiltration or metastatic disease should not be a contraindication for surgery, and radical resection should be chosen in all cases.

The World Health Organization has defined SPNs as indolent tumors with potentially malignant behavior (6). Metastasis due to SPN is rarely observed, and the 5-year survival rate can reach 100% (1). Malignancy rates can reach 12.3% considering

the potential features of malignancy including capsular or parenchymal invasion, perineural invasion, angiovascular invasion, and nodal and liver metastases (6). However, in the absence of vascular and nerve sheath invasion or lymph node and liver metastases, other features are deemed controversial for a diagnosis of solid pseudopapillary carcinoma (2). In the present case, we thought that SPN was benign because all these features were absent. However, in Yepuri's report (9), 2.6% of SPN cases recurred after more than 5 years of follow-up. Male sex, positive lymph nodes, R1 margins, and lymphovascular invasion were reported as significant risk factors for recurrence. Therefore, longer follow-up period is needed to clarify its potential malignant behavior.

The lack of immunohistochemical staining for beta catenin and E-cadherin and longer follow-up period were limitations of this case report. However, multiple CT and MR images showing the progression of SPN were essential to overcome potential diagnostic problems.

In conclusion, although SPN is a rare tumor with a favorable prognosis, radical surgical resection should be the initial treatment modality in all cases. Even if typical imaging findings are present, co-occurrence of acute pancreatitis may cause diagnostic difficulty in some cases.

Ethics

Informed Consent: Obtained.

Peer-review: Externally and internally peer reviewed.

Authorship Contributions

Surgical and Medical Practices: M.H., A.C.K., A.U., K.D., Concept: M.H., K.D., Design: M.H., K.D., Data Collection or Processing: M.H., A.C.K., A.U., K.D., Analysis or Interpretation: M.H., A.C.K., A.U., K.D., Literature Search: M.H., K.D., Writing: M.H., A.C.K., A.U., K.D.

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