Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

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The prevalence, characteristics, and related factors of pressure injury in medical staff wearing personal protective equipment against COVID-19 in Turkey: A multicenter cross-sectional study

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A B S T R A C T

Objective: The aim of this study was to determine the prevalence of device-related pressure injury (DRPI) related to the use of personal protective equipment (PPE) among healthcare professionals during the COVID-19 pandemic and the associated risk factors effective in the development of DRPI.
Materials and methods: This descriptive, cross-sectional and correlational study was conducted with 1465 healthcare professionals working in healthcare institutions in Eastern Turkey during the COVID-19 pandemic. The study data were collected by means of an online anonymous survey questioning the prevalence, characteristics, and associated factors of DRPI in the first week of April 2021, using the snowball sampling method. Number, percentage, arithmetic mean, Chi-Square, and regression analysis were used for the evaluation of the study data.
Results: The prevalence of DRPI due to the use of PPE use among healthcare professionals was calculated to be 60.5%. Of the developed DRPIs, 79.5% were stage 1, and the most frequent anatomical locations of DRPI were the bridge of the nose (30.2%), behind the ears (24.6%), and cheeks (20.8%). The logistic regression analysis revealed that male gender, age <35 years, being a physician and nurse, prolonged duration of PPE use (>4 h), working in a high-risk clinic (COVID-19 clinic and COVID-19 intensive care unit), and sweating during the use of PPE were predictive factors for the development of DRPI ($p < 0.05$).
Conclusions: The prevalence of DRPI due to PPE use among healthcare workers was quite high. Gender, age, occupation, long duration of PPE use, working in a high-risk clinic, and sweating during the use of PPE were found to be risk factors in the development of DRPI.

1. Introduction

Coronavirus disease 19 (COVID-19) emerged in in Wuhan, Hubei Province of China, in late 2019. In a short time like March 2020, it turned into a pandemic that has affected the whole world [1]. The COVID-19 pandemic is one of the most serious epidemics of the last century [2]. COVID-19, which is transmitted through droplets, is an infectious disease that spreads rapidly to many people. The World Health Organization reported that there have been 169,597,415 confirmed cases of COVID-19 globally, as of May 30, 2021, including 3, 530,582 deaths [3]. The situation in Turkey, on the other hand, has been reported to be 5,242,911 confirmed cases of COVID-19, with 47,405 deaths from the disease as of the specified date [4]. Compared with the general population, especially front-line healthcare professionals are at 10 times higher risk of infection during the COVID-19 pandemic [5–7]. A meta-analysis study found that approximately 40% of the healthcare professionals, who make up 3% of the total population worldwide, were infected in this period. The same study reported that serious complications developed in approximately 5% of infected healthcare professionals and 0.5% died [8]. In Turkey, an army of approximately 540,000 healthcare professionals is on the front line of the fight against the pandemic. According to the data of the Turkish Medical Association, one out of every 10 confirmed cases of COVID-19 is a healthcare worker, the number of healthcare professionals infected with COVID-19 exceeds 120,000, and 282 healthcare professionals died of the disease [9]. As in the entire world, healthcare professionals have a great role to play in reducing the death rates of COVID-19 and in controlling the pandemic in our country. Therefore, it is important to protect the health and safety of healthcare professionals. Adequate supply and appropriate use of personal protective equipment (PPE) are of great importance in preventing the spread of infection among healthcare professionals [10].

While the use of PPE protects healthcare professionals from infection, PPE-related pressure ulcers develop especially on the faces of healthcare professionals due to prolonged use of PPE [11]. PPE-related pressure ulcers are a type of device-related pressure injury (DRPI). DRPIs can be defined as injuries caused by pressure, friction, and shearing caused by medical or non-medical devices and objects designed and used for diagnostic or therapeutic purposes in healthcare services

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[12]. PPE-related DRPIs develop develops due to frequently used PPE such as surgical masks, N95 masks, protective glasses, overalls, and visors [13,14]. Although DRPIs are a common problem seen in different healthcare settings, the literature on this subject has mostly focused on patients [15]. However, with the COVID-19 pandemic, DRPIs related to the use of PPE among healthcare professionals have evolved into a significant problem [16]. The whole world has become aware of the problem with the media coverage of the skin problems on the faces of healthcare professionals who had to work by wearing PPE for long hours during the pandemic. A multi-center study conducted by Jiang et al. in China in 2020 on 4306 healthcare professionals at the beginning of the pandemic found the prevalence of DRPI related to the use of PPE to be 30% [13]. Another study conducted by Tang et al. in China in 2020 reported a prevalence of DRPI related to the use of PPE of 60.8% [17]. The study conducted by Coelho et al. in Brazil on 1,106 healthcare personnel during the COVID-19 pandemic estimated the prevalence of PPE-related pressure ulcers as 69.4 [18].

PPE-related pressure ulcers impair the well-being of healthcare professionals who are on the frontline of the fight against COVID-19, leading to the loss of inner strength [11]. Moreover, PPE-related pressure ulcers induce slight abrasion, itching, and burning sensation in the individual, thus causing an unintentional violation of the PPE use protocol, such as touching the mask and adjusting the position of PPE, and the risk of infection [19,20]. Furthermore, the impairment of skin integrity by the use of PPE makes healthcare professionals more susceptible to infection [16].

Prevalence studies are of great importance in understanding the extent of the problem [21]. The literature review showed a limited number of studies investigating the prevalence of DRPI related to the use of PPE during the COVID-19 pandemic [11,13]. There was no study on this subject in Turkey. Accordingly, this study aims at determining the prevalence, characteristics, and associated risk factors of DRPI related to the use of PPE by healthcare professionals working in healthcare institutions in the east of Turkey during the COVID-19 pandemic, and providing resources for the development of necessary preventive measures all over the world, especially in Turkey.

2. Materials and Methods

2.1. Study design

This study has a descriptive, cross-sectional, and correlational design.

2.2. Study questions

- What is the prevalence of DRPI related to the use of PPE among healthcare professionals working in healthcare institutions in eastern Turkey?
- What are the risk factors affecting the development of DRPI related to the use of PPE among healthcare professionals working in healthcare institutions in eastern Turkey?

2.3. Participants

The universe of the study consisted of healthcare professionals working in healthcare institutions in eastern Turkey during the COVID-19 pandemic. The minimum sample size required for the conduct of the study was determined to be 1302 individuals in the G*Power 3.0.1 statistical software, with 95% power, 0.05 significance level, and small effect size (0.05) [22,23]. Considering the 10% loss in the study, it was planned to include 1432 healthcare professionals in the study.

The inclusion criteria were as follows:

- Being 18 years or older,
- Working in a healthcare institution in eastern Turkey during the COVID-19 pandemic,
- Using personal protective equipment.

The exclusion criteria were as follows:

- Not using personal protective equipment,
- Incomplete and invalid response to the survey.

In the planned data collection process, 1485 healthcare professionals met the inclusion criteria and responded to the online survey. It takes about 5 min to fill out the survey. To ensure the quality of the surveys, incomplete surveys and 20 surveys that were completed in less than 1 min or more than 10 min were excluded from the study. Finally, 1465 participants were recruited in this survey, with a valid response rate of 98.6%.

2.4. Ethical considerations

The ethical approval for the study was obtained from the Republic of Turkey Ministry of Health, Scientific Researches Platform with the date of January 08, 2021 and number of 2020–05-02T09_49_46 and from the Non-Invasive Clinical Research Ethics Committee of Siirt University with the date of February 04, 2021 and number of E.2697). Participants volunteering to participate in the study were informed online and their consent was obtained.

2.5. Data collection tool

The survey, which was prepared by reviewing the relevant guidelines and literature [11,13,16,24], consists of 3 sections. The first section includes questions about sociodemographic information of participants (age, gender, profession), the second section includes questions about the use of PPE (clinic, type of PPE used, duration of PPE use, sweating during PPE use), and the third section includes questions about the development of DRPIs related to the use of PPE (anatomical location and stage of DRPI). Prior to the collection of study data, expert opinion was obtained for the prepared survey from 2 healthcare professionals, 2 wound care specialists, and 2 experts in the field of nursing, and item and content validity analyses were carried out to finalize the questionnaire [25].

The Pressure Injury Staging System of the National Pressure Ulcer Advisory Panel (NPUAP) was used to determine the stage of DRPI [24].

2.6. Data collection method

Data were collected online between April 01, 2021 and April 07, 2021 by means of an online national anonymous survey, using the snowball sampling method. During the data collection period, the study team answered any questions of the participants via mobile phone or e-mail.

2.7. Data analysis

The study data were analyzed using IBM SPSS Statistics version 22 (IBM, Armonk, NY) software. A two-tailed test was used and the level of statistical significance was set at $p < 0.05$. For the evaluation of descriptive data, arithmetic mean and standard deviation were used for continuous variables, while percentage and frequency values were used for categorical variables. To determine the factors affecting the development of DRPIs related to the use of PPE, the Student's t-test (parametric) or Mann-Whitney U tests (nonparametric) was used first to compare continuous variables, while Pearson's chi-square test or Fisher's exact tests, when necessary, was used to compare categorical variables. Multiple linear regression analysis was then performed to determine the effect degrees of the factors that were found to be

significant.

2.7.1. Limitations of the study

The first limitation of the study was that the participation of only volunteer healthcare professionals and the use of the random (snowball) sampling method instead of the random sampling method may have caused sample bias. This may explain the high prevalence found in this study. The second limitation of the study was that the DRPI stages were determined by the healthcare professionals themselves since the study was conducted online and not with a clinical interview due to an existing isolation policy, which may have caused possible errors in remote staging and selection bias.

3. Results

The analysis of the descriptive characteristics revealed that 65.6% of the participants were female. The mean age was 29.18 ± 6.73 years. Of the participants, 80% were under 35 years of age, 61.5% worked in a clinic other than the COVID-19 clinic, and 73.2% were nurses. The most frequently used PPE during the provision of healthcare services were surgical masks (92.9%), gloves (89.6%) and N95 masks (81.9). The mean daily duration of PPE use was 8.65 ± 5.37 h. Of the participants, 77% used protective equipment for more than 4 h a day, 77.5% sweated during the use of PPE, and 60.5% developed DRPIs related to the use of PPE (Table 1).

It was found that 887 healthcare personnel with DRPIs developed a total of 2212 DRPIs related to the use of PPE, of whom 20.6% developed a single DRPI, 79.4% developed 2 or more DRPIs, and with a mean number of DRPI of 2.45 per healthcare personnel. Of the DRPIs, 79.5% were stage 1, and the most frequent anatomical locations of DRPI were the bridge of the nose (30.2%), behind the ears (24.6%), and cheeks (20.8%) (Table 2).

The analysis of the DRPI distribution by the descriptive characteristics of healthcare professionals showed that the prevalence of DRPI was statistically higher in males, individuals under the age of 35 years, those working in the COVID-19 intensive care and COVID-19 clinics, nurses and physicians, those who used PPE for more than 4 h, and those who sweat during the use of PPE ($p < 0.05$) (Table 3).

The regression analysis revealed that the variables significantly ($F = 801.147$, $p = 0.000$) affected the development of DRPI. As a result of tolerance and VIF values, it was found that 6 variables included in the analysis explained 57% of the development of DRPI, and 93.1% of the participants were classified correctly through the model. The regression analysis showed that age <35 years, male gender, being a nurse or a doctor, working in the COVID-19 intensive care unit and the COVID-19 clinic, sweating during the use of PPE, and the use of PPE for more than 4 h a day affected the development of DRPI (Table 4).

4. Discussion

DRPI has become a serious problem due to the use of PPE by healthcare professionals during the COVID-19 pandemic. The results of this study showed a quite high prevalence of DRPI due to the use of PPE among healthcare workers, with 60.5%. When studies, similar to our study, conducted in different countries during the COVID-19 pandemic process in limited numbers were examined, it was found that the prevalence of PPE-related DRPI of health workers was quite high and the prevalence rate varied between 30% and 69% [11,13,18]. The results of the previous study are similar to the results of our study. There may be several reasons for the high prevalence of PPE-related DRPI among healthcare professionals. These; the fact that healthcare professionals have to work long hours with PPE under heavy workload during the pandemic process, excessive sweating and moisture accumulation on the facial skin due to PPEs being heavy and airtight, and since PPEs are produced in standard sizes, the fact that they are not suitable for healthcare professionals with different face sizes and shapes [26,27], and finally, healthcare professionals wear PPE more tightly than they should due to the fear of contact with COVID-19 infection and infecting their loved ones.

This study demonstrated that the anatomical locations most

Table 1
Distribution of descriptive characteristics of the participants (n = 1465).

Descriptive Characteristics	N (%)		
Gender			
Female	961 (65.6%)		
Male	504 (34.4%)		
Age			
<35 years			
≥35 years	293 (20%)		
Clinic			
COVID-19 clinic	398 (27.2%)		
COVID-19 intensive care	166 (11.3%)		
Clinics other hand COVID-19 clinic	901 (61.5%)		
Profession			
Nurse	1073 (73.2%)		
Physician	268 (18.3%)		
Other	124 (8.5%)		
PPE Used[a]			
N95 mask	1200 (81.9%)		
Surgical mask	1361 (92.9%)		
Visor/Glasses	885 (60.4%)		
Gown/Coverall	498 (34%)		
Apron	976 (66.6%)		
Bonnet	725 (49.5%)		
Gloves	1312 (89.6%)		
Duration of PPE use (daily)			
≤4 h	337 (23%)		
>4 h	1128 (77%)		
Sweating during the use of PPE			
Yes	1135 (%77.5)		
No	330 (22.5%)		
Development of DRPI related to the use of PPE			
Yes	887 (60.5%)		
No	578 (39.5%)		
	Min	**Max**	**x±SD**
Age	19	61	29.18 ± 6.73
Daily duration of PPE use	1	20	8.65 ± 5.37

Abbreviations: DRPI, device-related pressure injury; PPE, personal protective equipment.
[a] Multiple-choice.

Table 2
Distribution of location, number, and stages of DRPIs related to the use of PPE among healthcare professionals.

Characteristics of DRPI	The total number of DRPU developed in 887 medical staff was 2.212 n(%) n(%)		
Number of DRPIs (n = 887)			
Single DRPI	183 (20.6%)		
2 or more DRPIs	704 (79.4%)		
Stage of DRPIs (n = 2,212)			
Stage 1	1758 (79.5%)		
Stage 2	414 (18.7%)		
Stage 3	40 (1.8%)		
Anatomical location (n = 2.212)			
Bridge of the nose	668 (30.2%)		
Behind the ear	545 (24.6%)		
Auricle	460 (20.8%)		
Forehead	237 (10.7%)		
Chin	176 (8%)		
Other[a]	126 (5.7%)		
	Min	Max	x±SD
Mean number of DRPI per healthcare professional	1	7	2.49 ± 1.32

Abbreviations: DRPI, device-related pressure injury.
[a] Other: Auricle, neck, eyebrow arch, groin.

Table 3
Comparison of PPE-related DRPI development by the descriptive characteristics of healthcare professionals.

Characteristics	DRPI		Test value	p-value
	Yes, n (%)	No, n (%)		
Gender				
Female	563 (58.6)	398 (41.4)	$x^2 = 4.498$	**.034**
Male	324 (64.3)	180 (35.7)		
Age				
<35 years	726 (61.9)	446 (38.1)	$x^2 = 4.803$	**.028**
≥35 years	161 (54.9)	132 (45.1)		
Clinic				
COVID-19 intensive care	145 (87.3)	21 (12.7)	$x^2 =$ 252.203	**.000**
COVID-19 clinic	341 (85.7)	57 (14.3)		
Clinics other than COVID-19 clinic	401 (44.5)	500 (55.5)		
Profession				
Nurse	679 (63.3)	394 (36.7)	$x^2 = 23.362$	**.000**
Physician	157 (58.6)	111 (41.4)		
Other	51 (41.1)	73 (58.9)		
Duration of PPE use (daily)				
≤4 h	51 (15.1)	286 (84.9)	$x^2 =$ 377.863	**.000**
>4 h	836 (74.1)	292 (25.9)		
Sweating during the use of PPE				
Yes	883 (73.4)	302 (26.6)	$x^2 =$ 348.080	**.000**
No	54 (16.4)	276 (83.6)		

Abbreviations: DRPI, device-related pressure injury; PPE, personal protective equipment.

Table 4
Analysis of factors effective in the development of DRPI.

Variables	B	S.E.	p	Odds	95% confidence interval	
					Lower	Upper
Gender (male)	.404	.159	**.011**	1.498	1.098	2.045
Age (<35 years)	.351	.174	**.043**	1.420	1.011	1.996
Profession (Nurse, physician)	.0562	.249	**.024**	1.754	1.076	2.858
Clinic (COVID-19 intensive care)	2.379	.304	**.000**	10.790	5.947	19.574
Clinic (COVID-19 clinic)	1,870	.198	**.000**	6.490	4.404	9.564
Sweating during the use of PPE	2.472	.199	**.000**	11.847	8.024	17.491
Daily duration of PPE use (>4)	2.586	.196	**.000**	13.278	9.037	19.511
R^2	.570					
F	801.147					
P	0.000					

Abbreviations: DRPI, device-related pressure injury; PPE, personal protective equipment.

frequently affected by PPE-related DRPIs were the bridge of the nose (30.2%), behind the ear (24.6%), and cheeks (20.8%). Two different studies conducted by Tang et al. [11] and Jiang et al. [13] in 2020 to investigate the prevalence of PPE-related DRPI among healthcare professionals during the pandemic found that DRPIs related to the use of PPE most frequently developed on the bridge of the nose, cheekbone, and behind the ear. Moreover, the study conducted by Coelho et al. in Brazil in 2020 with 1,106 healthcare personnel during the COVID-19 pandemic showed that the most common locations of DRPIs related to the use of PPE were similar to the results of our study [18]. In DRPIs, the injury type is consistent with the shape of the device used. The material, size, shape, area of use, and duration of use of these devices play an important role in injury [28]. In order to protect against COVID-19, which is transmitted through droplets, healthcare professionals have to use surgical masks, N95 masks, FFP2 masks, FFP3 masks, glasses, and face shields [26,27]. It is natural for DRPIs to develop more frequently on the facial skin, especially on the bridge of the nose, behind the ears, and cheeks, due to the pressure and friction force created by PPE, which is used within the scope of droplet isolation.

The present study showed that the majority of DRPIs was stage 1 (79.5%). This result of our study coincides with the results of the studies conducted by Jiang et al. [13] in China and by Ceolho et al. [18] in Brazil investigating the characteristics and prevalence of PPE-related DRPIs during the pandemic. The fact that most DRPIs in this study were stage 1 injuries is believed to be due to the prevention of their progression by measures to reduce pressure and friction in order to lower the burning, itching, and pain felt by healthcare professionals at the beginning of the development of DRPIs.

The results of the present study showed that 79.4% of healthcare professionals (n = 887) with DRPIs developed two or more DRPIs. In addition, the mean number of DRPI per healthcare professional was 2.4. The study by Jiang et al. found that the majority of healthcare professionals with DRPIs related to the use of PEE developed two or more DRPIs, with a mean number of DRPI per healthcare professional of 2.6 [13]. The study by Ceolho et al. found a mean number of DRPI per healthcare professional of 2.4 [18]. It is believed that PPE (surgical mask, N95 mask, visor, and glasses) used within the scope of droplet isolation to protect from COVID-19, which has a high risk of transmission, causes multiple pressure zones on the face.

The results of this study revealed that the prevalence of DRPI was higher in males than in females, and gender (male) was an important factor affecting the development of DRPIs. While a similar study conducted by Tang et al., in 2020 found that gender was not effective in the development of DRPIs [11], a similar multicenter study conducted on 4306 healthcare professionals during the COVID-19 pandemic in China reported a higher prevalence of PPE-related DRPI in male healthcare professionals than in female healthcare professionals, showing that male gender affected the development of DRPI [13]. This may be due to hormonal differences between the genders, the level of activity, and the fact that men do not care about skincare as much as women.

The results of our study showed a higher prevalence of DRPI in healthcare professionals under 35 years of age than in those over 35 years of age, with age (<35 years) being an important factor affecting the development of DRPI. A study conducted by Jiang et al., in 2020 with 4306 healthcare professionals in China to investigate the prevalence of PPE-related DRPI reported that age was ineffective in the development of DRPI [13]. Likewise, a similar study conducted by Tang et al. showed no effect of age on the development of DRPI [11]. However, the study conducted by Coelho et al. in Brazil with 1,106 healthcare personnel during the COVID-19 pandemic similar to our study found a higher prevalence of DRPI in healthcare professionals under the age of 35 years [18]. The lower prevalence of DRPI among healthcare professionals over the age of 35 years in this study can be explained by their more appropriate use of PPE depending on professional experience.

This study demonstrated that the prevalence of DRPIin nurses and physicians was higher than that in other healthcare professionals and that the profession (nurse, physician) was a risk factor affecting the development of DRPI. A similar study by Jiang et al. showed a higher prevalence of DRPI in physicians than in other healthcare professionals [13]. However, the studies by Coelho et al. [18] and Tang et al. [11] found no difference between professions in terms of the prevalence of

DRPI. This result of our study may be attributed to the longer contact of nurses and physicians have with PPE as they are required to spend longer time with the patient compared to other healthcare professionals.

The results of this study revealed that the prevalence of DRPI was higher in healthcare professionals with a contact time of more than 4 h with PPE, and prolonged contact with PPE (>4 h) was an important risk factor for the development of DRPI. The literature review shows similar results reported by studies investigating the prevalence of PPE-related DRPI among healthcare professionals [11,13,18]. Healthcare professionals often have to use PPE for more than 2 h until the end of their shift due to the increase in workload and contamination concerns during the COVID-19 pandemic. In this study, the mean duration of PPE use by healthcare professionals was 8.65 ± 5.37. This is approximately 4 times the recommended time in the guidelines for PPE use [28,29]. It is an expected result that the increase in pressure time, which is one of the most important factors in the development of pressure ulcers, has increased the prevalence of PPE-related DRPI.

The results of this study revealed that the prevalence of DRPI was higher among healthcare professionals who sweated during PPE use and that sweating during the use of PPE was an important risk factor for the development of DRPI. A study by Jian et al., on 4306 healthcare professionals found that sweating during the use of PPE was a variable predicting the development of DRPI [13]. The low air permeability of PPE makes it difficult for healthcare professionals to sweat during use and for the water vapor formed by the expired air to evaporate. This causes moisture accumulation in the skin and keeps the skin wet for a long time [13]. The moisture affecting the resistance of the epidermis against external forces reduces the resistance of the skin to physical factors such as friction and tearing [16,30]. At the same time, it paves the way for the development of pressure ulcers by causing maceration in the epidermis layer exposed to moisture for a long time [13,14,31,32].

This study demonstrated that the prevalence of DRPI among healthcare professionals working in the COVID-19 intensive care unit (87.3%) and COVID-19 clinic (85.7%) was higher than those working in other clinics (44.5%) and that the clinic was effective in the development of DRPI. Previous similar studies found a higher prevalence of DRPI in those working in clinics at risk for COVID-19 [11,13]. The use of a range of PPE such as bonnets, visors, N95 masks, and overalls by healthcare professionals working in clinics at risk for COVID-19 increases the development of pressure ulcers by increasing the harmful pressure, friction, shearing force on the skin, and moisture due to sweating [31]. Furthermore, it is believed that the increased daily use of PPE in clinics at risk for COVID-19 and the increased friction force caused by rapid movement while examining patients increase the prevalence of DRPI.

5. Conclusions

The results of this study demonstrated a higher prevalence of DRPIs related to the use of PPE among healthcare professionals. The most frequent locations of DRPI were the nose, behind the ears, and cheeks, and most of DRPIs were stage 1 injuries. Gender (male), age (under 35 years of age), profession (physician and nurse), long duration of PPE use (>4 h), working in high-risk clinics (COVID clinic and COVID intensive care unit), and sweating during the use of PPE were effective in the development of DRPI.

In line with these results, it is recommended that.

- The daily duration of PPE use be evaluated among healthcare workers and the daily duration of PPE use be limited to 4 h or less as much as possible,
- The feasibility and effect of PPE be evaluated in line with the guidelines,
- The skin of healthcare professionals using PPE be checked at least twice a day and the skin condition be optimized by using products that absorb moisture to protect it from moisture-related skin damage (maceration).

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Contributions

Meyreme Aksoy and Zeliha Buyukbayram were involved in the initial conception of the study. Meyreme Aksoy contributed to the study design, data collection, data analysis, and writing of the manuscript. Zeliha Buyukbayram contributed to data entry, data analysis, and writing of the manuscript. Both authors approved the content of the prepared manuscript.

Declaration of interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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