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**DETERMINATION OF HEALTH-RELATED PROBLEMS DEVELOPED DUE TO THE USE OF PERSONAL PROTECTIVE EQUIPMENT IN NURSES DURING THE COVID-19 PANDEMIC PROCESS
COVID-19 PANDEMİ SÜRECİNDE HEMŞİRELERDE KİŞİSEL KORUYUCU EKİPMAN KULLANIMI NEDENİYLE GELİŞEN SAĞLIKLA İLİŞKİLİ SORUNLARIN BELİRLENMESİ**

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ABSTRACT

This study was conducted to determine the health-related problems experienced by nurses due to the use of personal protective equipment during the Covid-19 pandemic process. This descriptive study was conducted between June-September 2021 with nurses working in three different hospitals and filiation teams in two different cities. It was found that 93.4% of the nurses received training on the use of personal protective equipment, 58.3% thought that the equipment had poor quality, and 61% restricted their fluid intake while using personal protective equipment. It was also found that 48.2% of the nurses had pressure sores, 84.6% had excessive sweating, 44.3% had hyperthermia, and 52.6% had dehydration. In addition, 64.9% of the participants were found to experience latex allergy due to the use of gloves, 82% of them experienced pain/deformation in the auricle, and 89% of them had a headache due to the use of masks. In conclusion, this study determined that the majority of nurses experienced health problems related to the use of personal protective equipment, and more than half of them thought that the equipment had poor quality.

Keywords: Covid-19, filiation, nurse, personal protective equipment.

ÖZ

Bu çalışma hemşirelerin Covid-19 pandemi sürecinde kişisel koruyucu ekipman kullanımı nedeniyle yaşadıkları sağlıkla ilişkili sorunların belirlenmesi amacıyla yapılmıştır. Tanımlayıcı tipte olan bu araştırma, iki farklı ildeki üç farklı hastanede ve birinci basamakta fiyasyon ekiplerinde görev yapmakta olan hemşirelerle Haziran-Eylül 2021 tarihleri yürütülmüştür. Hemşirelerin %93.4'ünün kişisel koruyucu ekipman kullanımı ile ilgili eğitim aldıkları, %58.3'ünün ekipmanlarda kalite sorunu olduğunu düşündükleri ve %61'inin koruyucu ekipman kullanırken sıvı alımında kısıtlamaya gittikleri belirlenmiştir. Hemşirelerin %48.2'sinde basınç yaraları olduğu, %84.6'sında aşırı terleme, %44.3'ünde hipertermi ve %52.6'sında dehidratasyon sorunu yaşandığı saptanmıştır. Ayrıca eldiven kullanımına bağlı %64.9'unda lateks alerjisi, maske kullanımına bağlı %82'sinde kulak kepçesinde ağrı/deformasyon ve %89'unda baş ağrısı yaşandığı belirlenmiştir. Sonuç olarak, bu çalışmada hemşirelerin büyük çoğunluğunun kişisel koruyucu ekipman kullanımına bağlı sağlık sorunları yaşadıkları ve yarısından fazlasının ekipmanları kalitesiz bulduğu saptanmıştır.

Anahtar kelimeler: Covid-19, fiyasyon, hemşire, kişisel koruyucu ekipman.

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INTRODUCTION

The World Health Organization (WHO) declared the highly contagious new coronavirus disease (SARS-CoV-2) that emerged in China as a "Public Health Emergency of International Concern" and a pandemic (1). SARS-CoV-2 could infect others through direct contact with respiratory droplets and bodily fluids. Similarly, droplets of an infected person through sneezing, coughing, and speaking could spread the disease to others. Besides, asymptomatic individuals are also known to spread the infection (2).

Fighting with the SARS-CoV-2 pandemic effectively requires the use of Personal Protective Equipment (PPE), early diagnosis, isolation measures, right treatments, and maintenance of an effective surveillance system (3). Due to risks such as having an active role in the diagnosis, monitoring, and treatment phases of the disease and carrying the risk of being infected, infecting others, and even dying in this process, health professionals are the groups that have the highest risks. The protection of health professionals from viruses is highly important in terms of preventing the infection of the disease and maintaining the sustainability of health services. Therefore, the appropriate use of PPE is the most effective method in decreasing the infection risk among health professionals to a minimum. Besides, the equipment should be appropriate to standards and it should be used correctly (4).

The use of security protocols for health professionals is recommend by WHO as well as national and international public health authorities (5). Appropriate and correct use of PPE is among the measures to be taken by health professionals who provide care to SARS-CoV-2 patients. PPE used in health services includes medical / surgical masks, N99/FPP3 or N95/ FPP2 masks, shields, googles, liquid soap, alcohol-based hand antiseptic, disinfectant, bone, feet protector, waterproof coverall, long-sleeved coverall, and gloves (6).

Use of protective equipment for long hours could cause a set of cutaneous complications in health professionals (allergic contact dermatitis, skin irritation caused by surgical masks, peeling in the nasal bridge, or pressure bruise) (7,8). Besides, the skin problems experienced could cause a decrease in the desire for working as well as consequences affecting anxiety and quality of life (3). In this regard, this study aims to determine nurses' health-related problems caused by the use of PPE during the Covid-19 pandemic.

MATERIALS AND METHODS

Study Design

This study utilized a descriptive design.

The setting of the Study

This utilized a descriptive study design and was conducted between June and September 2021 with nurses working in three different hospitals and primary health care filiation teams in two different cities.

Target Population and Sample

The target population of the study was 562 nurses who worked in the aforementioned hospitals and primary health care filiation teams. The sample size was composed of 228 participants calculated using the sampling with a known population (confidence interval 95%, the margin of error 5%, and response distribution 55%)

(Raosoft) Nurses who were accessed using the random-snowball method were included in the study until the sample size was achieved (9).

Inclusion criteria

The study included nurses who worked in the aforementioned institutions, who used PPE, and who agreed to participate in the study.

Data Collection Tools

Personal Information Form: The Personal Information Form was developed by the researchers (3,7,8). The form included 29 questions that collected data concerning the participants' descriptive characteristics, use of PPE, PPE quality assessments, and health problems due to PPE use.

Data Collection

Data were collected online through the questionnaire prepared in an electronic environment and filled in by the participants via their mobile phones.

Ethical considerations

Before the study was conducted, Ethics Committee approval was received from the Scientific Research Ethics Committee of the University. Verbal consent was received from the participants, who had been informed about the purpose of the study online. Ethics Committee (Document date and number: 26.05.2021- E. 95531)

Analysis

Data analyzed using IBM SPSS 20.0 version Chicago/ USA statistical package program included descriptive statistics tests (numbers, percentages). Statistical significance was taken ($p < 0.05$).

RESULTS

The participants' average age was 29.37 ± 6.26 , and while 80.3% were females, 39% worked in other units. The median of the working duration was 5; the interquartile range was 8; the median working with patients with suspected or confirmed Covid 19 was 11; the interquartile range was 8; the median of the daily duration of working with patients with suspected/confirmed Covid19 was 8; the interquartile range was 2; continuous use of the PPE median was 3; and the interquartile range was 4. (Table I).

Of all the nurses, 93.4% had training about the use of PPE, 72.8% never used the equipment wrongly, 65.8% did not have problems with the supply or numbers of the equipment, and 58.3% thought that the equipment used had poor brand quality. In addition, 66.7% reported that mask strings broke easily, 52.2 % thought the googles did not fit on the eyes well, 90.4% thought googles caused fogging and limited vision, 79.4% thought wearing two layers of gloves restricted their manual skills, 71.1% thought that protective equipment was not comfortable, 94.7% thought protective equipment made them sweat, and 61% limited fluid intake while using protective equipment (Table II).

Of all the participating nurses, 48.2% had pressure sores and 43% had serious health problems. It was found that 84.6% experienced excessive sweating, 44.3% had hyperthermia, 52.6% had dehydration problems, 64.9% had latex allergy caused by the use of gloves, 82 % had pain/deformation in auricle caused by using masks, 89% had headaches, and 77.6% experienced stress/anxiety caused by the use of protective equipment. Apart from these health problems, 3.9%

Table I. Nurses' Descriptive Characteristics (n=228)

		n	%
Gender	Female	183	80.3
	Male	45	19.7
Unit of working	Filiation	50	21.9
	Covid Policlinic	13	5.7
	Covid Intensive care	25	11.0
	Covid Clinic	51	22.4
	Other (units that are not separated as covid units but during service could include patients diagnosed with covid)	89	39.0
	$\bar{X} \pm SD$	Min.	Max.
Age	29.37±6.26	20	49
Years of professional experience	Median 5 Interquartile Range=8	1 (months)	30
The total duration of working with patients with suspected/ confirmed Covid-19 (months)	Median 11 Interquartile Range=8	1	24
The average daily duration of working with patients with suspected/confirmed Covid 19 (hours)	Median 8 Interquartile Range=2	1	24
The average duration of continuous use of personal protec- tive equipment (hours)	Median 3 Interquartile Range=4	15 (ms)	24

Table II. Evaluations of Nurses regarding the personal protective equipment they use (n=228)

	Yes		No	
	n	%	n	%
Do you have training or knowledge about the correct procedures for putting on and taking off personal protective equipment?	213	93.4	15	6.6
Have you ever used your protective equipment wrongly?	62	27.2	166	72.8
Do you have a shortage of personal protective equipment supply or numbers in your unit?	78	34.2	150	65.8
Do you have any problems with the brand quality of the personal protective equipment?	133	58.3	95	41.7
Do the strings of the mask you are wearing break easily?	152	66.7	76	33.3
Do googles you are wearing fit well?	119	52.2	109	47.8
Do googles cause fogging and limit vision?	206	90.4	22	9.6
Does wearing two layers of gloves restrict your manual skills?	181	79.4	47	20.6
Do the protective materials not fit well on the body and are they not comfortable?	162	71.1	66	28.9
Do protective materials make you sweat?	216	94.7	12	5.3
Have you had to restrict fluid intake while using protective equipment?	139	61.0	89	39.0

experienced various health problems, and these problems commonly included skin problems (33.3%) (Table III).

DISCUSSION AND CONCLUSION

Many health professionals worldwide have been infected and some of them lost their lives during the pandemic (10). To take this condition under control, occupational health and safety practices for health professionals have been prioritized. PPE within the scope of these practices has been of importance, yet the use of equipment for a long time has brought several health problems and had negative effects on health profession-

als. In this regard, the findings of the study are discussed in light of the literature.

Of all the participating nurses, 93.4% had training about the use of PPE, 72.8% never used the equipment wrongly, and 58.3% thought the equipment had quality issues (Table II). The study conducted by Hossain et al. with health professionals reported that the majority of the participants had adequate knowledge about PPE and used the materials correctly (11). Similarly, in their study that investigated healthcare staff's barriers to using PPE, Fan et al. reported quality problems in the equipment used (12).

This study found that 84.6% of the participants experi-

Table III. Problems experienced by Nurses during the Use of Personal Protective Equipment (n=228)

	Yes		No	
	n	%	n	%
Have you had pressure sores caused by the use of protective equipment (For example first grade pressure sore around eyes due to the use of goggles?)	110	48.2	118	51.8
Have you experienced serious health problems due to the use of personal protective equipment for a long time?	98	43.0	130	57.0
Have you experienced excessive sweating due to the use of personal protective equipment for a long time?	193	84.6	35	15.4
Have you experienced hyperthermia due to the use of personal protective equipment for a long time?	101	44.3	127	55.7
Have you experienced dehydration due to the use of personal protective equipment for a long time?	120	52.6	108	47.4
Have you experienced latex allergy due to the use of personal protective equipment (gloves) for a long time?	148	64.9	80	35.1
Have you experienced pain/deformation due to the use of personal protective equipment (mask) for a long time?	187	82.0	41	18.0
Have you experienced headaches due to the use of personal protective equipment (mask) for a long time?	203	89.0	25	11.0
Have you experienced psychological problems (stress, anxiety) due to the use of personal protective equipment for a long time?	177	77.6	51	22.4
Have you experienced problems apart from the ones indicated in the questions asked above?	9	3.9	219	96.1
What is the problem? (n=9)	Backache and foot ache	1	11.1	
	Nasal bleeding	1	11.1	
	Skin problems	3	33.3	
	Palpitation	1	11.1	
	Eye infection	2	22.2	
	Cystitis	1	11.1	

enced excessive sweating, 44.2% experienced hyperthermia, and 52.6% had dehydration problems (Table III). In their study conducted with health professionals, Loibner et al. reported that factors such as sweating, hyperthermia, and dehydration restricted wearing PPE (13). In a similar vein, Han et al. reported similar findings to the ones in our study (14). An analysis of the studies showed that the use of protective equipment caused excessive sweating, hyperthermia, and dehydration.

This study found that the participating health personnel frequently experienced pain/deformation in auricle and developed latex allergy caused by the use of gloves (Table III). Studies show that hands were affected the most, which were followed by nasal bridge, ears, cheeks, wrists, and forehead (3,15) Another study showed that the most frequently affected area was the face, which was followed by hands, limbs, trunk, and all body (16); another study indicated that the nasal bridge was affected the most, and it was followed by hands and cheeks (17). Recently, dermatologists reported that they encountered some skin problems during the SARS-CoV-2 pandemic which were caused by the side effects of the PPE and medicine used to treat infections (18, 19).

Of all the participants, 89% experienced headaches, and 77.6% experienced stress/anxiety caused by the use of protective equipment (Table III). The study conducted by Alreshidi et al. also reported a significant relationship between the duration of PPE and headache and stress (20). As the studies conducted suggest, the use of protective equipment could cause headache and stress. In conclusion, the majority of the nurses in this study experienced health problems caused by the use of PPE;

more than half of the participants thought that the equipment did not have good quality. Particularly in the pandemic process, community health nurses should conduct studies that determine health problems that could be caused by the use of PPE, inform nurses about the potential health problems that can be caused by the use of PPE and how to minimize these in light of the current literature, and conduct awareness-raising activities that help institutions to realize the importance of the quality of equipment within the scope of occupational health and safety. All health institutions should obtain quality PPE, and future studies could include different health institutions and larger groups.

Limitations

The limitation of the study is that no applications/evidence were investigated about the health problems reported by the nurses.

Conflict of interest

None

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