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COVID-19 pandemic and personal protective equipment: Evaluation of equipment comfort and user attitude

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ABSTRACT

This study aimed to evaluate the comfort of personal protective equipment (PPE) used during the COVID-19 and attitudes of healthcare professionals regarding the use of PPE. Descriptive research was conducted with 553 healthcare professionals, who work in a pandemic center in Turkey. Findings showed that all participants used masks, 99.3% wore gloves, 89% wore protective glasses, and 89% wore aprons during the COVID-19. The most-reported physical complaints have been dryness, irritation, and wound on the hands. Age and gender, as well as PPE discomfort, has been determined to affect the use of PPE. It might be concluded that age and sex, as well as the discomfort caused by PPE, affected the use of PPE and the attitudes of healthcare professionals.

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personal protective
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1. Introduction

Personal protective equipment (PPE) is defined as specific clothing or equipment that protects the employees against infectious materials.¹ PPE is one of the most important components of the safety programs prepared for health workers. Personal protective equipment provides a physical barrier between the microorganisms and the user. It provides protection by preventing the contamination of microorganisms on hands, eyes, clothes, hair, and shoes.^{1–3} The most common types of PPE in the field of healthcare are gloves, aprons, masks/respirators, glasses and face shield masks. Healthcare workers must use one or more of the different personal protective equipment together in different procedures to protect both themselves and the patients they deliver treatment to.² The novel coronavirus (COVID-19) has had a devastating impact upon the world since December 2019, when the first case was recorded in China, and in our country since March 10, 2020 when the first case was recorded in İstanbul. It is known that the infectivity of this virus is extremely high and fast.¹

Because of the intensity of the virus's infectivity and contact with patients, healthcare workers are the highest-risk occupational group in the fight against this pandemic. The use of personal protective equipment such as gloves and masks, which are often used

in routinely due to this high risk, and additional use of equipment such as protective suits, face shield masks and glasses to take stronger measures in accordance with the procedures, is of great importance.^{1–4}

Although healthcare workers' exposure to the COVID-19 via body fluids other than respiratory secretions are not clearly associated with the transmission of COVID-19 in the risk classification, unprotected contact with other body fluids such as blood, feces, vomit and urine may create a risk of COVID-19 for healthcare workers. Healthcare workers who are exposed to material whose nose and mouth area is infected, and who have a close contact for long time with COVID-19 confirmed patients who do not wear face masks, are included in the high exposure risk classification. Long-term close contact with COVID-19 patients wearing face masks (48 hours before symptoms start) and exposure to material whose nose and mouth area is infected is classified as moderate risk, while short interactions with COVID-19 patients or long-term close contact with patients wearing face masks for source control while medical personnel wear a face mask or respiratory mask, are classified as low risk.^{4–6}

Kang et al.⁷ reported that the possible cause of virus transmission of the nurses infected with the Ebola virus in America, was due to inconsistency in

the type of personal protective equipment worn and procedures for wearing and removing personal protective equipment during patient care.⁷

The main factors affecting the acceptance of health-care personnel to use PPE are;

- Perceived management example,
- Convenience, comfort and ease of use,
- Understanding the need to use equipment,
- Economic and disciplinary losses resulting from failure to use,
- Perceived acceptance of other workers.⁸

It is expected that the materials used in the field of healthcare will increase with the development of technology and that these materials will be ergonomically designed for the comfort and safety of both patients and employees. The presence of ergonomic risk factors such as psychological, environmental and individual risks, which disrupt the comfort situation of healthcare personnel in the work environment and cause various ailments, also have a risk value for patient safety, and they negatively affect emergency processes such as pandemic. The ergonomics of the tools and equipment used in the workplace may reduce the potential health problems and adverse health effects of the personnel.⁹ Çalışkan¹⁰ determined that the physical convenience factor was effective on behavior in his study in which he examined factors affecting the behavior of PPE use in healthcare workers. Considering that protective equipment that is not suitable for the body size of medical personnel may interfere with interventions during work, it was determined that the attitude of using PPE was associated with the physical convenience of the equipment.¹⁰ The study conducted by Kang et al.⁶ revealed that physical problems, particularly in protective suits and masks, increase the risk of contamination since masks cause wounds on the face and jaw and increase contamination.⁷ Commonly reported problems with PPE use, include difficulty in breathing, asphyxiation, heat stress, and fogging up glasses.¹¹ In a randomized controlled trial, it was reported that long aprons caused less contamination than protective suits and that the suits were particularly uncomfortable during putting on and removing.¹²

Taking into account the risks that may occur as a result of healthcare workers' exposure to the virus, all units that perform diagnosis, treatment and care applications may need personal protective equipment of different characteristics according to the nature and disease of the patient that is treated. This equipment

that is used must be in compliance with the standards. Although personal protective equipment meets the standards, the knowledge and attitudes of healthcare workers on this issue are important. During the COVID-19 pandemic, the attitudes of healthcare personnel working in pandemic hospitals regarding the use of protective equipment are of greater importance, especially when the risks of being contaminated with the virus and creating infections are taken into account.

This study was conducted to evaluate the comfort of the personal protective equipment used during the COVID-19 pandemic and the personnel attitude regarding the use of personal protective equipment.

2. Methods

2.1. Research design

The descriptive study was conducted to evaluate the comfort of the personal protective equipment used during the COVID-19 pandemic and the personnel attitude regarding the use of personal protective equipment.

2.2. Population and sample of the study

The population of the research consists of healthcare personnel working in all pandemic hospitals in Turkey. It is planned to reach 323 samples, which is the minimum number of samples that can be taken with the maximum population with a margin of error of 0.05 for descriptive research.¹³ The study was conducted with 560 participants, excluding 7 data entries out of 553 sampling data entries due to missing data entries. Participants who were active in pandemic hospitals during the COVID-19 outbreak and volunteered to participate in the study were included in the study.

2.3. Data collection

The data was collected electronically and using a Google Survey between the dates of May 18, 2020 and June 10, 2020. Research data was collected with the "Data Collection Form" which was created after the researchers reviewed the literature.^{2,7,8} In the first part of the data collection form, there are nine questions about the socio-demographic characteristics of healthcare workers, in the second part there are nine questions about the use of personal protective equipment by healthcare workers, in the third part there are 29 questions to determine the attitude of personal protective equipment use, and in the last part there are nine questions about the physical complaints that affect the PPE use.

In the third part of the survey form, a questionnaire consisting of 29 questions was prepared. It was based on the relevant literature and interviews with 5 nurses who worked actively during the COVID-19 outbreak, as there was no scale developed to determine the attitude toward the use of personal protective equipment. Firstly, validity and reliability analyses of the items were carried out and as a result of the analysis, it was decided to remove 9 items from the survey. At the end, an attitude inventory consisting of 20 questions and 3 subscales was developed. "The Attitude Inventory Regarding the Use of Personal Protective Equipment" is composed of 5 likert scale type statements such as "1 - Strongly disagree," "2 - Disagree," "3 - Not sure," "4 - Agree," and "5 - Strongly agree." Answers to questions are between 1 and 5 points, so the total score varies between 5 and 100 points. The highest score for each group that can be taken from the "Protection" and "Comfort and Difficulty" subgroups of the inventory, is 40 points, the lowest score is 8 points, the highest score from the "Accessibility" subgroup is 20 points, and the lowest score is 4 points. As the score from each of the subgroups increases, the positive attitude toward the use of personal protective equipment increases. Survey's Cronbach alpha value of protection was determined as 0.88; Cronbach alpha value of Comfort and Difficulty was determined as 0.86; Cronbach alpha value of Accessibility was determined as 0.82 and Total Cronbach alpha value was determined as 0.91.

2.4. Data analysis

Statistical Package for Social Science (SPSS) version 21.0 for Windows software (SPSS, Inc., Chicago, IL, USA) was used for all statistical analyses. Before the statistical analysis, the Kolmogorov-Smirnov test was used to assess the distribution of the data. Descriptive statistics, including frequency, percentage for nominal variables, and mean and standard deviation for continuous variables were calculated. The number of physical complaints was compared according to sex by independent sample t-test. The number of physical complaints was analyzed according to age range by one-way analysis of variance with the least significant difference (LSD) post hoc test. Pearson's correlation analysis was used to explore the relationship between the number of physical complaints and the total score of participants' thoughts and beliefs related to personal protective equipment use. The significance level was set as $p < 0.05$. The internal consistency of the scale, which was assessed the thoughts and beliefs

Table 1. Sociodemographic data and work-related characteristics of participants (n = 553).

Parameters		n (%)
Age range	20–30 years	345 (62.4%)
	31–40 years	130 (23.5%)
	41–50 years	70 (12.7%)
	> 51 years	8 (1.4%)
Sex	Female	387 (70%)
	Male	166 (30%)
Marriage status	Single	326 (56%)
	Married	227 (41%)
Education	High school	55 (9.9%)
	College	126 (22.8%)
	Undergraduate	280 (50.6)
	Postgraduate	92 (16.6%)
Occupation	Doctor	60 (10.8%)
	Nurse	332 (60%)
	Midwife	55 (9.9%)
	Laboratory assistant	8 (1.4%)
	Paramedics	25 (4.5%)
	Anesthesia technician	46 (8.3%)
	Medical staff assistant	27 (4.9%)
Total working years	< 5 years	287 (51.9%)
	6–11 years	179 (32.4%)
	12–14 years	48 (8.7%)
	18–24 years	39 (7.1%)
Department	Emergency service	132 (23.9%)
	Intensive care unit	123 (22.2%)
	Internal medicine service	152 (27.5%)
	Surgery service	10 (1.8%)
	Delivery room	10 (1.8%)
	Operating room	69 (12.5%)
	Paramedic service	27 (4.9%)
	Laboratory	6 (1.1%)
	Family health center	24 (4.3%)
	Work shift	Morning shift
Sentry (morning-evening)		404 (73.1%)
Receiving Occupational Health and Safety Training	Yes	461 (83.4%)
	No	92 (16.6%)

Data are expressed as numerical values (percentage of the total number).

related to the use of personal protective equipment against the risk of coronavirus disease, was analyzed through Cronbach's alpha (α).

2.5. Ethic approval

In the study, the Ethics Committee permission no 27 was obtained from xxx University Ethics Committee for Clinical Research on May 18, 2020. Research permission was obtained from the General Directorate of Health Services for the research. The healthcare workers who participated in the study were given a text explaining the purpose and method of the study and the consent to participate voluntarily in the study of the participants were obtained.

3. Results

Sociodemographic data and work-related characteristics of participants are shown in Table 1. 62.4% of the participants were aged between 20 and 30, 70% were female, 56% were single, and 50.6% had a bachelor's

Table 2. Frequency of participants' response to questions related to the use of personal protective equipment against the risk of coronavirus disease (COVID-19) (n = 553).

Personal protective equipment		n (%)
Rate of coronavirus risk	Every patient is risky	508 (91.9%)
	The patient from the emergency department is risky	2 (0.4%)
	A patient coming with an ambulance is risky	2 (0.4%)
	Patient with COVID-19 symptom is risky	41 (7.4%)
The use of medical mask in case of COVID-19 risk	Yes	553 (100%)
	No	0 (0%)
Type of medical mask	N95	161 (29.1%)
	Surgical mask	210 (38.9%)
	3 M mask	22 (4%)
	FFP2	151 (27.3%)
	All of them	9 (1.6%)
The use of protective gloves in case of COVID-19 risk	Yes	549 (99.3%)
	No	4 (0.7%)
Type of protective gloves	Disposable non-sterile gloves	515 (93.1%)
	Sterile gloves	36 (6.5%)
	Sachet gloves	2 (0.4%)
The use of protective glasses in case of COVID-19 risk	Yes	492 (89%)
	No	61 (11%)
The use of medical gowns in case of COVID-19 risk	Yes	510 (92.2%)
	No	43 (7.8)
The use of medical overalls in case of COVID-19 risk	Yes	121 (21.9%)
	No	432 (78.1%)
The risk of running out of personal protective equipment	Yes	293 (53%)
	No	252 (45.6%)
	Sometimes	8 (%1.4)

Data are expressed as number (percentage of the total number).

degree. 60% of the participants were nurses, 23.9% worked in the emergency service department, 51.9% worked in the profession for less than 5 years, and the majority (73.1%) worked in shifts. The 83% of participants received occupational health and safety training, while 24.46% did not receive any training on occupational health and safety.

Table 2 demonstrates the frequency of participants' responses to questions related to the use of personal protective equipment against the risk of coronavirus disease (COVID-19). Most participants have preferred the use of masks, protective gloves, glasses, and suits to protect themselves against the risk of coronavirus disease (100%, 99.3%, 89%, and 89%, respectively). While the surgical mask was the most frequently used mask type at 38%, disposable non-sterile gloves were the preferred protective gloves type at 41% (Table 2).

Participants' attitudes related to the use of personal protective equipment against the risk of coronavirus disease (Covid-19) are presented in Table 3. The total scores of protection, comfort and difficulty, and accessibility subscales were 27.19 ± 7.78 , 23.15 ± 7.65 , and 13.45 ± 4.46 , respectively. A total of 124 participants reported that the frequency of mask use decreases due to its discomfort, while 209 participants indicated that they do not prefer to use protective glasses due to its discomfort. The majority of the participants (n = 509) reported that gloves should be changed between patients and that 449 of them washed their hands after removing the gloves. In addition, there was a

significant positive correlation between the number of physical complaints and the subscale scores of participants' attitudes related to personal protective equipment ($r = -0.004$, $p = 0.91$ for protection subscale, $r = 0.21$, $p = 0.001$ for comfort and difficulty subscale, and $r = -0.13$, $p = 0.001$ for accessibility).

The frequency of the physical complaints related to the use of personal protective equipment against the risk of coronavirus disease is shown in Table 4. In addition, 121 participants must wear glasses in their daily life, and 70.2% of them reported that using protective glasses cause difficulty in using their daily eye-wear. Moreover, the number of physical complaints related to personal protective equipment was 7.33 ± 2.75 out of 11 physical complaints (Table 4). The most frequently reported physical complaints related to personal protective equipment were dryness, irritation, and scar in the hands. Pain in the face, redness, sores (around the eyes, ears, and nose) and dryness on the throat due to dehydration were the other most frequently reported physical complaints related to the use of personal protective equipment in health-care professionals (Table 4). There was no difference between "yes" and "no" responders of the presence of the dryness, irritation, scar on the hands in terms of the type protective gloves ($p = 0.42$). However, the participants complained about the dryness, irritation, and scar on the hands mostly used the disposable non-sterile gloves at 93.5%. There was a statistically significant difference between "yes" and "no"

Table 3. Participants' Attitudes regarding the use of personal protective equipment against the risk of coronavirus disease (Covid-19) (n = 553).

Attitudes	%				
	Strongly disagree	Disagree	Not sure	Agree	Strongly Agree
Protection					
I feel safe when I use gloves.	11.9%	9.9%	4.9%	25.3%	47.9%
I feel safe when I use hand sanitizer.	14.1%	22.1%	25.1%	26.2%	12.5%
When I use a mask, I feel safe.	13.7%	9.9%	6.1%	28.4%	41.8
I find the protective glasses that I use sufficient.	14.1%	18.8%	23.9%	25.9%	17.4%
I feel safe because I wear protective glasses.	9.8%	15%	21.7%	33.8%	19.7%
I feel safe because I wear protective apron.	11.2%	11.9%	20.4%	34.4%	22.1%
I find the protective suits which are available in case of risk, sufficient.	16.8%	14.8%	20.6%	30.2%	17.5%
I feel safe because I wear protective suit.	11.6%	11.8%	20.4%	34.4%	21.9%
Protection total score, mean ± SD [95% CI]	27.19 ± 7.78 [26.58-27.83]				
Comfort and difficulty					
The use of gloves makes it difficult for me to do my job.	30.2%	35.1%	12.1%	14.5%	8.1%
Using a mask prevents me from doing my job.	29.7%	32.7%	13.7%	16.6%	7.2%
Wearing protective goggles makes it hard for me to do my job.	13.9%	20.8%	18.4%	25.7%	21.2%
I find the protective goggles uncomfortable.	15%	14.1%	17%	31.6%	22.2%
Wearing protective aprons makes it hard for me to do my job.	23.5%	32%	14.5%	18.8%	11.2%
I find the protective aprons uncomfortable.	21.3%	25.5%	18.1%	21.3%	13.7%
Wearing protective suits makes it hard for me to do my job.	14.8%	18.1%	18.8%	26%	22.2%
I find the protective suits uncomfortable.	14.1%	17.9%	19.7%	26.6%	21.7%
Comfort and difficulty total score, mean ± SD [95% CI]	23.15 ± 7.65 [22.48-23.79]				
Accessibility					
I can easily change gloves when needed.	11%	6.1%	2.9%	38%	42%
The unit I work in has enough hand sanitizer.	14.3%	11.9%	14.6%	31.5%	27.7%
I can easily change my mask when necessary.	20.3%	19.3%	14.5%	27.1%	18.8%
I can easily change my protective apron when necessary.	20.1%	21.2%	16.5%	22.4%	119.9%
Accessibility total score, mean ± SD [95% CI]	13.45 ± 4.46 [13.09-13.82]				
The total score, mean ± SD [95% CI]	63.80 ± 16.34 [62.41-65.18]				

Data are expressed as number (percentage of the total number) and mean ± standard deviation [95% Confidence Interval].

Table 4. The physical complaints related to the use of personal protective equipment against the risk of coronavirus disease (Covid-19) (n = 553).

Physical complaints	n (%)	
Pain in the face, redness, sores (around the eyes, ears, and nose)	Yes	494 (89.3%)
	No	59 (10.7%)
Dryness, irritation, the scar on the hands	Yes	507 (91.7%)
	No	46 (8.3%)
Nutritional disorders	Yes	257 (46.5%)
	No	296 (53.5%)
Sleep disorders	Yes	309 (55.9%)
	No	244 (44.1%)
Constipation	Yes	145 (26.2%)
	No	408 (73.8%)
Urine-related problems (infection, pain)	Yes	225 (40.7%)
	No	328 (59.3%)
Dehydration headaches	Yes	410 (74.1%)
	No	143 (25.9%)
Dryness in the skin due to dehydration	Yes	412 (74.5%)
	No	141 (25.5%)
Dryness in the throat due to dehydration	Yes	443 (80.1%)
	No	110 (19.9%)
Odor due to sweating	Yes	414 (74.9%)
	No	139 (25.1%)
Dehydration due to sweating	Yes	439 (79.4%)
	No	114 (20.6%)
Total number of physical complaints, mean ± SD [95% CI]	7.33 ± 2.75 [7.08–7.55]	

Data are expressed as number (percentage of the total number) and mean ± standard deviation [95% Confidence Interval].

responders of the presence of the pain in the face, redness, sores (around the eyes, ears, and nose) in terms of the type of medical mask ($p=0.001$). The participants complained about the pain in the face,

redness, sores (around the eyes, ears, and nose), mostly using the N95 mask at 30.7%.

On the other hand, there was a significant difference between woman and man in terms of the number of physical complaints related to the use of

personal protective equipment ($p=0.002$). The mean of the number of physical complaints was higher in women (7.59 ± 2.58) than men (6.72 ± 3.03). In addition, the number of physical complaints related to the use of personal protective equipment was significantly different according to age range ($p=0.005$). The number of physical complaints was significantly lower in participants aged between 41 and 50 years significantly lowered compared to participants aged between 20 and 30 years ($p=0.001$) and participants aged between 31 and 40 years ($p=0.03$).

4. Discussion

This study was conducted to evaluate the comfort of the personal protective equipment used during the covid-19 pandemic and the personnel attitude regarding the use of personal protective equipment.

The study found that participants commonly preferred to use masks (100%), protective gloves (99.3%), glasses (89%) and aprons (89%) to protect themselves or patients during the Covid-19 outbreak. Studies have shown that the use of PPE in the early stages of epidemics is low due to the decrease of health authorities' instructions on infection control and prevention requirements.^{14,15} However, studies have found that PPE use was low in the early stages of epidemics due to the decrease in the health authorities' guidelines on infection control and prevention requirements.^{15,20} The report, published by the WHO-China Joint Mission, expressed that 3,387 medical professionals at 476 hospitals were infected with COVID-19. Single center study conducted by Wang et al.¹⁶ in Wuhan, reported that 29% of 138 patients with COVID-19 in hospital, were healthcare workers. In particular, in some studies, it has been reported that healthcare workers only use PPE during intervention with known infected patients.^{15,17} However, healthcare workers are required to use PPE during treating every patient, not just with known infected patients.

It was shown in the study that healthcare workers preferred to use surgical masks (38%) as the mask type and non-sterile disposable gloves (41%) as the glove type. According to the CDC, gloves have been identified as the most common type of PPE used in healthcare environment. Face masks and respiratory masks are the most commonly used PPEs in hospitals to protect against influenza and other respiratory infections. However, face masks and respiratory masks are not the same. Face masks are not designed for respiratory protection and are used to avoid respiratory droplets and spraying of body fluids on the face.

It is also used to prevent the spread of pathogens from patients to others, or by surgeons in the operating room to maintain a sterile workspace.¹⁸ WHO⁴ reports in their communique which has recommendations for mask use, that healthcare workers should use a N95 or FFP2 type mask and that the protection of the mask, which is produced from cotton or defined as a simple mask, is not effective.⁴

It was determined in the study that 83.4% of the participants had received occupational health and safety training. Similarly, it was been established that nearly all of the personnel had received training in occupational health and safety.¹⁹ However, Chughtai and Kahn²⁰ stated in their study that lack of training on the use of PPE was a common problem. It is gratifying that the staff were trained on this issue. In particular, in-service training positively affects the behavior of personnel. Understanding the reason and benefit of the use of protective materials will have a positive effect on the behavior of protective materials use.

In the study, an attitude inventory that consists of 20 questions and 3 subscales was developed to evaluate attitudes regarding the use of PPE. The subscale score of protection was established as 27.19 ± 7.78 ; the sub-scale score of comfort and convenience was established as 23.15 ± 7.65 and the subscale score of accessibility was established as 13.45 ± 4.46 . Furthermore, a total of 124 participants in the study stated that the frequency of mask use decreased due to discomfort, while 209 participants stated that they did not prefer to wear protective glasses due to discomfort. The majority of participants ($n=509$) reported that gloves needed to be replaced after each patient, and 449 of them washed their hands after removing the gloves. In a study on healthcare workers carried out by Med et al.²¹ it was reported that one of the reasons PPE was not used (18.5%) was difficulty in performing the work. Similarly, in a study conducted by Madan et al.²² it was determined that the reasons for not using PPE were the discomfort caused by PPE. In their study on nurses, Neves et al.²³ found that the discomfort caused by equipment, careless use, forgetfulness, lack of habit, lack of equipment and insecurity in use were important factors which affect the use of PPE. In a study conducted by Çalışkan¹⁰ it was reported that the factor effecting the behavior to use PPE was "physical convenience of PPE."

In the study, 11 physical complaints related to the use of personal protective equipment were identified and the rates of reporting physical complaints were found to be 7.33 ± 2.75 on average. The most

commonly reported physical complaints about personal protective equipment were dryness, irritation and scars on the hands. Also, facial pain, redness, sores (around the eyes, ears and nose), and dryness on throat stemming from dehydration, can be listed as the most frequently reported physical complaints of healthcare personnel. According to a 2018 study, commonly reported problems related to the use of PPE, are difficulty in breathing, suffocation, heat stress, and fogging up glasses.¹¹ Significant physical ailments suffered by healthcare workers, related to the use of PPE were identified, and it is thought that these ailments reduce the use of PPE. These ailments are fatigue and feeling overwhelmed,²⁴ sweating, dizziness, dehydration and irritation,^{6,24} back pain,⁶ and the fogging up glasses.¹¹ Suitability to body, the fit and quality of PPE have been identified as key elements for the use of PPE.²⁵ Additionally, in a study conducted by Houghton et al.²⁵ it was determined that the disturbance caused by the use of PPE decreased the use of PPE by healthcare workers. In addition, there was a significant positive correlation between the number of physical complaints and the subscale scores of participants' attitudes regarding personal protective equipment ($r = -0.004$, $p = 0.91$ for protection subscale, $r = 0.21$, $p = 0.001$ for comfort and difficulty subscale, and $r = -0.13$, $p = 0.001$ for accessibility).

In the study, no significant difference between glove type and hand dryness, irritation and wound, was found. However, 93.5% of participants reported complaints of dryness, irritation and wound on hands from non-sterile gloves. A statistically significant difference was found between mask type and facial pain, redness, sores (around eyes, ears, and nose) ($p = 0.001$). 30.7% of the participants who reported pain, redness, sores (around the eyes, ears and nose) stated using N95 mask. A 2018 study found that contamination of physical inconveniences, particularly in protective suits and masks, increased the risk of infecting the personnel who use the masks since they caused wounds on the face and jaw.⁶ In healthcare personnel feedback reports, it is clear that even the optimal PPE is not user-friendly in conditions where the temperature is high. Since it is not made of breathable material, it causes sweating. A common reason for breaching PPE's barrier is that when the personnel sweat, they instinctively wipe their faces.⁵ However, there was no significant correlation between the use of suits or aprons and the number of physical complaints in the study ($p > 0.5$).

In the study, a significant difference regarding the use of personal protective equipment was determined

between the number of physical complaints and gender ($p = 0.002$). However, it was determined that the average number of physical complaints reported due to PPE use was higher in women (7.59 ± 2.58) than in men (6.72 ± 3.03). Furthermore, significant differences regarding the use of personal protective equipment were found between the number of physical complaints and age ($p = 0.005$). The number of physical complaints in participants aged between 41 and 50 was significantly lower compared to participants aged between 20 and 30 ($p = 0.001$) and participants aged between 31 and 40 ($p = 0.03$). When the relevant literature was examined, no similar study or conclusion was found supporting or rejecting this conclusion.

5. Conclusion

It was determined that all of the healthcare workers, who participated in the study, preferred to use masks and most of them preferred to use protective gloves, glasses and aprons to protect themselves from Covid-19 infection. It has been determined that age and sex as well as the discomfort caused by PPE affect the use of PPE. In addition, a significant positive correlation was found between the number of physical complaints and the attitude inventory subgroups regarding the PPE use.

According to the results of the study, anxiety in the personnel due to the lack of PPE and inappropriate physical conditions and sizes of PPE creates reluctance in the use of PPE in the staff. Therefore, supplier managers in health institutions should provide sufficient amount of PPE to prevent the lack of PPE for the staff, and to prevent the reluctance and contamination caused by the use of PPE which is not suitable to the physical conditions and sizes and they should provide PPE which is suitable to the physical environment and sizes of the staff. More studies on the use of PPE are necessary, since preventing and minimizing transmission, especially during the pandemic process, will help to get through the process more quickly and healthily.

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