

ORIGINAL ARTICLE

Surgical mask usage effects: a self-questionnaire study of 7.014 responders during the COVID-19 pandemic

 Özlem Soyer Er¹,  Meryem Yavuz Van Giersbergen²

¹Assist. Prof. Dr., Afyonkarahisar Health Sciences University, Faculty of Health Sciences, Surgical Nursing Department, Afyonkarahisar, Türkiye

²Prof. Dr., Ege University, Nursing Faculty, Surgical Nursing Department, İzmir, Türkiye

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Abstract

Objective: WHO has advised to conduct research the adverse consequences of surgical mask use in the community. This study aimed to determine the effects of surgical mask use during the COVID-19 pandemic.

Methods: This descriptive study was conducted with 7014 respondents from 81 provinces of Turkey between August and November 2021. In the collection of data, a form on socio demographic characteristics, knowledge level questionnaire on surgical mask use, surgical mask usage characteristics questionnaire, and questionnaire on symptoms related to surgical mask use were used. In the analysis of the data, number, percentage, mean, standard deviation, Chi-square, and logistic regression analysis were used.

Results: The mean age of the respondents was 33.1±12.5 years, 54.8% of whom were women. 42.4% of the respondents stated that they felt protected by the mask and 69.7% of them stated that they had problems with the use of masks. The mean score of the respondents' knowledge questionnaire regarding the use of surgical masks was found to be 5.33 ± 1.88. The mean symptom score of the respondents after the use of surgical masks was 2.57±2.67. During mask use, respiratory symptoms were seen most commonly, by 72.9% of the respondents. There was a significant relationship between male gender, chronic disease, not washing hands after contact with masks, removing masks in public environment, having spare masks, and symptoms after surgical mask use (p<0.05).

Conclusion: Hand contact with the mask, and not washing the hands afterwards, removing the surgical mask were modifiable factors that increase the risk.

Keywords: Mask, COVID-19, Personal Protective Equipment

Correspondence: Assist. Prof., Özlem Soyer Er, Afyonkarahisar Health Sciences University, Faculty of Health Sciences, Surgical Nursing Department, Afyonkarahisar, Türkiye. **E-mail:** ozlemm_soyer@hotmail.com, **Phone:**+90 553 485 38 71

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INTRODUCTION

Coronavirus disease (COVID-19) was an infectious disease caused by a newly discovered coronavirus, and it was first seen in the world in Wuhan, China in December 2019,¹ and for the first time in Turkey on March 10.² COVID-19 was a global social crisis,³ and the WHO classified the COVID-19 outbreak as a pandemic on March 11, 2020, due to its highly contagious nature.⁴

SARS-CoV-2 virus transmission is known to occur through respiratory droplets and contact. Coughing, sneezing, talking, breathing and touching cause the virus to spread.⁵ WHO recommends that methods of protection against coronavirus include maintaining physical distance, avoiding crowds and close contact, washing hands frequently with alcohol-based hand sanitizer or soap and water, and covering the mouth and nose with bent elbow or handkerchief when coughing or sneezing as methods of protection from coronavirus. In addition, a mask should be worn properly in settings with inadequate ventilation and impossibility of physical distance.⁴ It has been reported that the use of masks in the community during past epidemics prevented transmission during the course of infectious diseases such as influenza.^{5,6} It has been stated that the use of masks should be considered as an additional preventive strategy during the COVID-19 pandemic.⁷

The use of surgical masks has been identified by the WHO as one of the preventive measures to limit the spread of COVID-19 pandemic.⁸ The Centers for Disease Control and Prevention (CDC) has also stated that mask use is a critical public health tool.⁹ With the declaration of COVID-19 as a pandemic,

the use of masks became mandatory, and by the end of June 2020, approximately 90% of the world's population had to comply with mask use laws.⁵ In Turkey, the use of masks became mandatory by province in May 2020 and a mask requirement was introduced when going out in 25 provinces. The mask requirement was lifted after 629 days, with the exception of hospitals.^{8,10,11}

The most important advantage of using masks in infectious diseases such as COVID-19 is that when used correctly, it prevents the spread of viruses and reduces the risk of transmission.¹² The use of masks has positive effects as well as negative effects. Negative effects of mask use in the community include increased potential risks such as touching the eyes with contaminated hands after touching the face mask, the possibility of self-contamination by the user, experiencing problems such as headaches and/or difficulty breathing, skin lesions, irritation or worsening of acne, difficulty communicating, discomfort with the mask, and a false sense of security.⁸ Prolonged mask use has been associated with complaints of dizziness, as well as increased perceived exertion and perceived shortness of breath. Other problems such as acne, nasal bridge scarring, facial itching, redness/irritation, dry eye and discomfort associated with increased facial temperatures have also been reported with mask use.¹³⁻²⁰ It is thought that mask use may have psychological as well as physiological effects.²¹ While WHO recommends the use of masks in the general population, it advises decision-makers to take a risk-based approach. In the risk-based approach, one of the issues to be addressed is to assess the feasibility of using masks. In other words, it is the determination of the negative effects of mask use on people.⁸

This study was aimed to determine the characteristics and effects of surgical mask use during the COVID-19 pandemic and its effects on humans who are not healthcare professionals.

METHODS

Study Design and Participants

This study was a descriptive study designed to determine the characteristics and effects of surgical mask use during the COVID-19 pandemic in Turkey.

This study was conducted between August 12 and November 18, 2021. The study was conducted face-to-face in 81 provinces of Turkey after obtaining the necessary ethical permission to conduct the study. The sample of the study included people over the age of 18 who were not health care professionals, who were not mentally and visually impaired, and who volunteered to participate in the research. To reach the sample, a stratified sampling method was used according to geographical regions to cover all provinces in order to reflect the use of masks in Turkey. In 2019, 83,154,997 people lived in our country. 1,061,635 of them were health care professionals. 22,876,798 of them were children under the age of 18.²² It was known that there were approximately 788,941 mentally and visually impaired citizens in our country.²³ If health care professionals, children, and the mentally handicapped population were excluded, the total population of the research was 58,427,623 people. The value we predict for the incidence of problems related to the use of masks is 20%. Calculating according to the formula²⁴ used in cases where the size of population was known, if we accept the sampling error as 1.0% and

the statistical significance level as 5%, it was necessary to conduct this study with at least 6146 people. 6150 adults were planned to be included because some data might be lost. A total of 7474 people were interviewed. It was found that 460 questionnaires were stopped before completion and there were missing data. The sample consisted of 7014 people. The participation rate in the study was 93.8%.

Data Collection

The data of this study were collected face-to-face between August 12 and November 18, 2021. The study was conducted out simultaneously in all provinces of Turkey. For this purpose, services were purchased to conduct the surveys. The collected data were entered into the online system on a weekly basis. Therefore, when all available data were entered, more data were obtained. After eliminating the missing data in the data, the analysis was done with the available data. It took about 8-11 minutes to complete the questionnaire. In the study, a form on socio demographic characteristics, a questionnaire on knowledge of surgical mask use, a questionnaire on characteristics of surgical mask use, and a questionnaire on symptoms related to surgical mask use were used as data collection tools.

Instruments

In the data collection of the research; in accordance with the Sociodemographic Characteristics Form²¹ and "Knowledge Level Questionnaire on Surgical Mask Use", "Surgical Mask Usage Characteristics Questionnaire" and "Questionnaire on Symptoms Related to Surgical Mask Use", which were developed by the researchers in accordance with the literature, were used. After the questionnaire

forms were developed, they were submitted to the expert review. The content validity of the questionnaire was ensured. Cronbach's alpha value was calculated and presented for each questionnaire to assess reliability.

Sociodemographic Characteristics Form; There were a total of 9 questions about respondents' sociodemographic characteristics including age, gender, educational status, place of residence, employment, and chronic disease status.

Knowledge Level Questionnaire on Surgical Mask Use was developed by researchers in accordance with the literature.²¹ In the questionnaire form, there were a total of 7 questions including the characteristics of a good surgical mask, the protective properties of the surgical mask, the times and situations when the surgical mask should be put on and taken off, the ways to obtain a surgical mask, methods to avoid the problems associated with the surgical mask, and knowing how to dispose of the surgical mask after use. Respondents answered the questions as I know, partially know, or I don't know. The I know the option was scored 1 point, the partially option was scored 0.5 point, and the I don't know option was scored 0 point. The total score obtained from the questionnaire varies between 0 and 7 points. The Cronbach alpha value of the questionnaire for this study was found to be 0.881.

The **Surgical Mask Usage Characteristics Questionnaire** was developed by researchers in accordance with the literature.²¹ The questionnaire contained 13 questions regarding the characteristics of the respondents' use of surgical masks, the process of obtaining the mask, the characteristics of mask use, applications for problem solving,

hygiene rules, and mask disposal methods. The Cronbach alpha value of the questionnaire for this study was found to be 0.702.

A **Questionnaire on Symptoms Related to Surgical Mask Use** was developed by researchers in accordance with the literature.²¹ The questionnaire contained a total of 30 questions, including 29 different symptoms that may be experienced due to the use of masks in accordance with the literature, 30 closed-ended questions, and one open-ended question about the practices they have used to solve the problems they have experienced. Respondents answer to closed-ended questions as having problems or not having problems. The I have problems option was scored as 1 point, and the I do not have problems option was scored as 0 points. The symptom score was obtained as a sum of the symptom responses. The total score obtained from the questionnaire varied between 0 and 29 points. The Cronbach alpha value of the questionnaire for this study was found to be 0.744.

Data Analysis

SPSS (Statistical Package for the Social Sciences) for Windows 21.0 (IBM SPSS Statistics for Windows, Version 21.0. Armonk, NY: IBM Corp.) was used to analyze the data obtained from the research. Sociodemographic characteristics, knowledge levels, and symptoms of the respondents were described with numbers, percentages, means, and standard deviations. The Kolmogorov-Smirnov Test was used to determine whether the data followed a normal distribution. An independent two-sample t-test was used. The level of knowledge about the mask was grouped by cluster analysis according to the occurrence of symptoms. Logistic regression

was used to predict the relationship between mask use symptoms and mask wearing characteristics. Respondents were divided into two groups for logistic regression analysis: “those with 2 or less symptoms” and “ those with 3 or more symptoms”. Respondents who were younger than 33 years, female, postgraduate, living in a village, not working, had no a chronic disease, had a high level of mask knowledge, usually wore a mask, wore four or more masks, changed a mask often, wore a mask for 1-6 hours, did not touch the mask with their hands, did not remove the mask in a public environment, believed that the mask was protective, and always kept a spare mask were included in the logistic regression analysis as dummy variables. P values less than 0.05 were considered statistically significant for all results. ($p < 0.05$).

RESULTS

Sociodemographic Characteristics

The distribution of the respondents participating in the study by provinces in Turkey was shown Figure 1. The highest participation in the study was from Kahramanmaraş province with a rate of 28.0%, and the lowest participation was from Kırıkkale and Kilis provinces with at a rate of 0.1. In terms of population density, the participation rates in almost all provinces were close to each other (Figure 1).



Figure 1. Distribution of Respondents by Province

The mean age of the respondents was 33.1 ± 12.5 years, of which 54.8% were female. 35.4% of the respondents had a bachelor's degree. 69.2% of the respondents lived in the province. 52.8% of the respondents were employed. 18.8% of the respondents had at least one chronic disease. The sociodemographic information of the respondents was shown in Table 1.

Table 1. Distribution of respondents' sociodemographic characteristics

	n	%
Age (Mean±SD)	33.1±12.5	
Gender		
Female	3842	54.8
Male	3172	45.2
Education		
Literate	108	1.5
Primary school	659	9.4
Middle school	824	11.7
High school	1699	24.2
Associate degree	759	10.8
Bachelor's degree	2482	35.4
Postgraduate	483	7.0
Residence		
City	4855	69.2
District	1682	24.0
Village	477	6.8
Working		
Yes	3702	52.8
No	3312	47.2
Chronic Disease		
Yes	1321	18.8
No	5693	81.2

Level of Knowledge About the Mask

55.9% of the respondents stated that they knew the characteristics of a good surgical mask and 62.7% knew the protective properties of the surgical mask. 78.8% of the respondents knew when to wear on

and remove the surgical mask. 79.4% of the respondents knew where to buy the surgical mask, 55.1% knew how to avoid problems caused by a surgical mask and 52% knew how to dispose of the surgical mask (Figure 2).

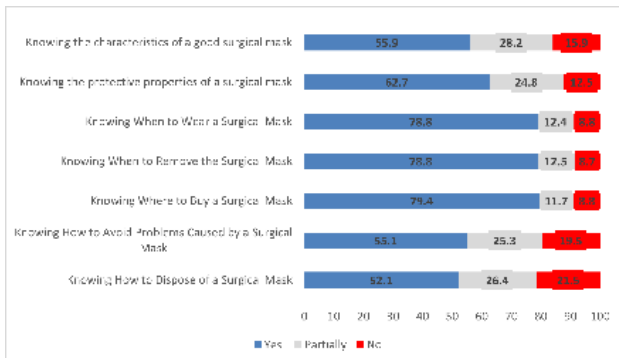


Figure 2. Distribution of respondents' answers to the questions about knowledge about surgical mask use

The mean score of the respondents' knowledge level questionnaire on the use of masks was 5.33 ± 1.88 . The rate of respondents with a knowledge level of 4.5 points or less (low) on the use of masks was 28.9%, the rate of respondents between 4.6-5.5 points (moderate) was 16.1%, and the rate of respondents with more than 5.5 points (high) was 54.9% (Table 2).

Table 2. Distribution of the knowledge level of the respondents regarding the use of surgical masks

Knowledge Level	n	%
0 – 4.5 points-Low	2028	28.9
4.6 ve 5.5 points - Middle	1132	16.1
5.6 – 7.0 points- High	3854	54.9
Total Points (Mean±SD)	5.33 ± 1.88	

Information on the Use of Surgical Masks

81.4% of the respondents reported that they provided the surgical masks themselves and 34.1% reported that they wore double masks. 51.3% of the respondents reported that they sometimes changed their masks, and 49.4% reported that they used a mask between 1-6 hours. 80.5% of the respondents reported

touching the mask with their hands and 37.8% reported washing their hands after touching the mask with their hands. 55.8% of the respondents stated that they took the mask off when they were in public and 56.7% stated that they took the mask of while eating. 48.9% of the respondents stated that they disposed of the mask by throwing it in an outside trash can after use. 42.4% of the respondents stated that they felt protected by the mask. It was understood that 83.8% of the respondents chose by considering the protection level of the mask. It was noted that 48.0% of the respondents always carry a spare mask with them (Table 3).

Table 3. Distribution of characteristics regarding the use of surgical masks

	n	%
Mask Supply		
Myself	5709	81.4
Workplace	836	11.9
Friend/Relatives	443	6.3
Other	26	0.4
Stacked Mask Wearing		
Yes	2510	35.8
Two Masks	659	34.0
Three Masks	117	1.7
Four and over Mas- ks	4	0.1
No	4504	64.2
Mask Change Frequency		
None	511	7.3
Sometimes	3599	51.3
Often	2375	33.9
Usually	529	7.5
Time to Use a Mask		
1-6 hours	3465	49.4
7-12 hours	1925	27.4
13-18 hours	886	12.6
19-24 hours	462	6.6
More than 24 Hours	276	4.0
Hand contact with the mask		
Yes	5645	80.5

Table 3. (continued) Distribution of characteristics regarding the use of surgical masks

No	1086	15.5
Sometimes	283	4.0
Washing hands after touching the mask		
Yes	2647	37.8
No	1502	21.4
Sometimes	2865	40.8
Removing the mask in a public environment		
Yes	3915	55.8
No	3099	44.2
Reason for removing the mask in Public *		
Eating/Receiving Catering	3975	56.7
Taking Photo/Video	1555	22.2
A face-to-face operation	1514	21.6
Driving	1148	16.4
Coughing/Sneezing	793	11.3
Talking on the Phone	560	8.0
Making Presentation	537	7.7
Exercising	541	7.7
Dispose of the mask after use		
No trash outside	3432	49.0
Any trash in the house	3031	43.2
Spool in one place	424	6.0
Waste Bin/Separate Trash	119	1.7
Other	8	0.1
Feeling Protected with a Mask		
Yes	2976	42.4
No	1035	14.8
Partially	3003	42.8
Features Considered in the Mask *		
Protection	5878	83.8
Number of Ply	3640	51.9
Produced Material	2332	33.2
Price	1927	27.5
Color/Pattern	1589	22.7
Shape	1380	19.7
Availability of Reserve Masks		
Always	3368	48.0
Sometimes	3020	43.1
Never	626	8.9

* More than one option has been ticked.

Problems Related to Mask Use

The mean symptom score of the respondents after the using surgical masks was 2.57 ± 2.67 . While 55.0% (n=3856) of the respondents had two or lower symptoms due to mask use, 45.5% (n=3158) had three or more symptoms. Among the respondents who reported having problems, 72.9% had shortness of breath/difficulty in breathing, 36.6% felt bad/discomfort/restlessness/stress/sense of being in a closed environment, 32.0% had itchy face/nose, 27.5% had ear pain, 24.3% had difficulty smelling, 23.7% were unable to understand their emotions from facial expressions/confusion, 21.3% had fever/sweating, 19.0% had ear sores, 16.3% had acne (Figure 3).

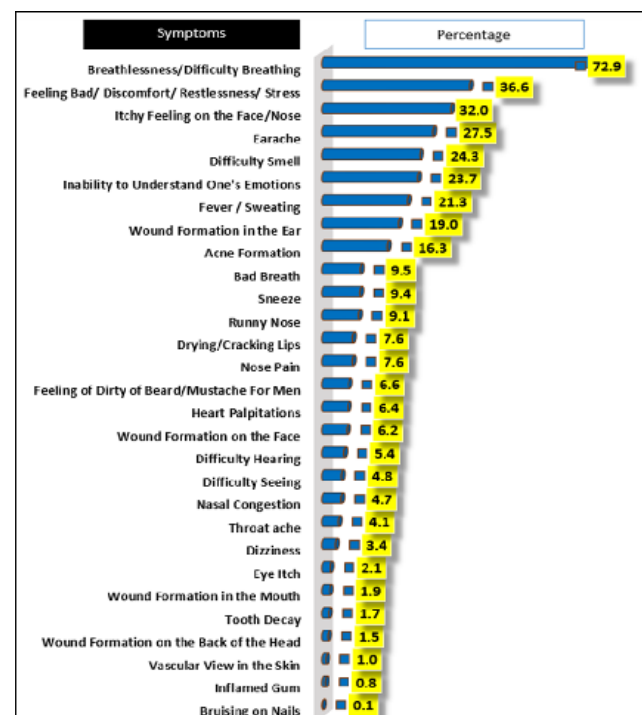


Figure 3. Distribution of Problems Related to the Use of Surgical Masks

Factors Affecting of Mask-Related Symptoms

According to the model constructed according to the symptom score categories related to the use of surgical masks during the COVID-19 pandemic period, there was a

significant association between was male, had a secondary school, high school, and associate degree graduate, had a chronic disease, had a moderate level of knowledge, changed the mask sometimes and often, not washing hands after contact, removing a mask in public, not having a spare mask, and the use of masks and the occurrence of symptoms ($p < 0.05$). Female had approximately 0.8 (OR: 0.805; 95%CI: 0.671-0.967, $p < 0.05$) times more symptoms than men. According to postgraduate education status, the risk of mask related symptoms was 0.5 (OR: 0.591; 95%CI: 0.378-0.924, $p < 0.05$) times lower for middle school, 0.6 times lower for high school (OR: 0.661; 95%CI: 0.477-0.917, $p < 0.05$), and 0.5 times lower for associate degree (OR: 0.582; 95%CI: 0.406-0.833, $p < 0.05$). The risk was 1.5 (OR: 1.575 95%CI: 1.214-2.044, $p < 0.05$) times higher in the group with chronic disease than in those without chronic disease, and 0.6 (OR: 0.622; 95%CI: 0.463-0.837, $p < 0.05$) times

lower in those with medium knowledge than in those with high knowledge. The risk was approximately 2 (OR: 1.904; 95%CI: 1.423-2.548, $p < 0.05$) times higher in the group that changed their mask sometimes, the risk was approximately 1.3 (OR: 1.337; 95%CI: 1.025-1.745, $p < 0.05$) times higher in the group that changed it often. The risk increased approximately 2 (OR: 1.938; 95%CI: 1.461-2.569, $p < 0.05$) times in the group that did not wash their hands compared to the group that washed their hands after touching the mask. The risk increased 1.2 (OR: 0.239; 95%CI: 1.031-1.490, $p < 0.05$) times in the group that did not remove their mask in public, and 2.5 (OR: 2.483; 95%CI: 1.465-4.209, $p < 0.05$) times in the group that sometimes removed their mask in public. It was seen that the risk decreased by 0.5 (OR: 0.522; 95%CI: 0.312-0.872, $p < 0.05$) times in the group that did not have a spare mask compared to the group that did (Table 4).

Table 4. Logistic regression results regarding symptoms associated with mask use

Variables	B	S.E.	Wald	p	Exp (B)/OR, (%95, CI)
Age					
<33*					
≥33	0.027	0.138	0.039	0.844	1.027 (0.784-1.346)
Gender					
Female*					
Male	-0.216	0.093	5.379	0.020	0.805 (0.671-0.967)
Education					
Literate	-0.295	0.579	0.258	0.611	0.745 (0.239-2.319)
Primary school	-0.176	0.283	0.386	0.535	0.839 (0.481-1.461)
Middle school	-0.526	0.228	5.326	0.021	0.591 (0.378-0.924)
High school	-0.414	0.167	6.161	0.013	0.661 (0.477-0.917)
Associate degree	-0.542	0.183	8.727	0.003	0.582 (0.406-0.833)
Bachelor's degree	-0.181	0.150	1.446	0.229	0.835 (0.621-1.121)
Postgraduate*					
Residence					
Village*					
District	0.435	0.247	3.110	0.078	1.545 (0.953-2.504)
City	0.370	0.238	2.426	0.119	1.448 (0.909-2.308)
Working					
Yes	-0.058	0.103	0.323	0.570	0.943 (0.771-1.154)

Table 4. (continued) Logistic regression results regarding symptoms associated with mask use					
No*					
Chronic Disease					
Yes	0.455	0.133	11.692	0.001	1.575 (1.214-2.044)
No*					
Mask Knowledge Level					
Low	-0.089	0.146	0.376	0.540	0.914 (0.687-1.217)
Middle	-0.474	0.151	9.876	0.002	0.622 (0.463-0.837)
High*					
Stacked Mask Wearing					
Yes*					
No	-0.168	0.546	0.095	0.758	0.845 (0.290-2.465)
Number of masks					
Two masks	-0.823	1.188	0.480	0.489	0.439 (0.043-4.508)
Three masks	-1.419	1.203	1.391	0.238	0.242 (0.023-2.557)
Four and over masks*					
Mask Change Frequency					
None	-0.084	0.267	0.100	0.752	0.919 (0.545-1.551)
Sometimes	0.644	0.149	18.814	<0.001	1.904 (1.423-2.548)
Often	0.291	0.136	4.591	0.032	1.337 (1.025-1.745)
Usually*					
Time to Use a Mask					
1-6 hours*					
7-12 hours	-0.155	0.111	1.960	0.161	0.856 (0.689-1.064)
13-18 hours	-0.009	0.168	0.003	0.957	0.991 (0.713-1.378)
19-24 hours	-0.280	0.312	0.809	0.368	0.755 (0.410-1.392)
More than 24 Hours	-0.139	0.463	0.090	0.765	0.871 (0.351-2.157)
Hand contact with the mask					
Yes	0.194	0.124	2.475	0.116	1.215 (0.953-1.548)
Sometimes	0.372	0.199	3.496	0.062	1.450 (0.982-2.142)
No*					
Washing hands after touching the mask					
Yes*					
Sometimes	0.244	0.103	5.571	0.018	1.276 (1.042-1.562)
No	0.662	0.144	21.114	<0.001	1.938 (1.461-2.569)
Removing the mask in a public environment					
Yes	0.215	0.094	5.206	0.023	1.239 (1.031-1.490)
Sometimes	0.909	0.269	11.406	0.001	2.483 (1.465-4.209)
No*					
Feeling Protected with a Mask					
Yes*					
Sometimes	0.137	0.093	2.167	0.141	1.147 (0.956-1.377)
No	0.063	0.150	0.176	0.675	1.065 (0.794-1.428)
Availability of Reserve Masks					
Always*					
Sometimes	-0.068	0.098	0.478	0.489	0.934 (0.771-1.133)
Never	-0.651	0.262	6.156	0.013	0.522 (0.312-0.872)

* Reference category/group of the test

DISCUSSION

With the COVID-19 pandemic, the use of surgical masks has been rendered widespread, both as a personal precaution and due to legal obligations, in order to reduce the spread of the pandemic. Çalışmanın yürütüldüğü tarihler arasında maske takma zorunluluğu bulunmaktaydı.⁸ The use of COVID-19 vaccines in Turkey started on January 13, 2021 and 152,734,177 people were vaccinated as of March 3, 2023.²⁵

Level of Knowledge About the Mask

In the study, it was found that more than half of the respondents had a high level of knowledge about the use of masks. In the studies, respondents stated that they were informed that the use of masks is protective against COVID-19.^{26,27} In a study examining the level of knowledge of students, most of the respondents stated the correct way to use masks and that masks act as a barrier. 32.4% of the participants stated that surgical masks can be used for 8 hours, and 92.2% of the participants stated that cloth masks are as effective as surgical masks in protecting against the COVID-19 pandemic.²⁸ In another study, respondents stated that they knew the areas where masks should be worn (closed and public places, public transportation).²⁷ It is thought that the high level of knowledge in this study may be due to the individual answers of the respondents.

Problems Related to Mask Use and Mask Use Behaviours

In the study, it was determined that the most common symptom after mask use in patients was shortness of breath/difficulty in breathing. In one study, after wearing a mask, about half of the respondents reported

an increase in difficulty breathing/coughing while wearing a mask.²⁹ In another study, it was stated that the most common problem encountered by respondents during mask use was breathing difficulties.²⁸ While some studies reported negligible physiological effects of increased CO₂ concentration on dead space volume,^{13,17} other studies have shown a statistically significant decrease in blood O₂ concentration with increased heart and respiratory rate and a feeling of discomfort.^{30,31} In another study, while the use of a mask during exercise decreased peripheral oxygen saturation, no difference was found in hemodynamic parameters.³² The high incidence of respiratory symptoms during mask use in this study was similar to other studies.

The second highest symptom in this study was feeling bad/ discomfort/ restlessness/ stress/ sense of being in a closed environment. In a qualitative study conducted with undergraduate students in Turkey, metaphorical perceptions about the use of masks were frequently identified as “protective shield, prison, and shortness of breath”. In addition, in this study in which the psychological effects of mask use were investigated, the positive sub-theme was determined as “trust”, while the negative sub-themes were determined as “breathlessness, restlessness, discomfort, communication problems, depersonalization, anxiety, addiction, hopelessness”.³³ These symptoms may have emerged due to the obligation to use masks and the perception of the uncertainty and stress caused by the pandemic process as a loss of control.

Again in this study, the inability to understand one's emotions from the facial expression and

the symptoms of confusion are among the first five symptoms. In one study, the use of surgical masks reduced emotion recognition accuracy in both young and old respondents. It showed that it also reduced respondents' overall confidence in their emotional judgments, but not their performance awareness.³⁴ Considering the area covered by the mask, the closure of facial expressions and gestures that reflect emotions can make it difficult for people to understand their emotions.

Long-term use of the face mask can lead to moisture loss in the stratum corneum of the skin's epidermis, changes in the appearance of the skin, and serious skin problems.³⁵ In a study, acne (39.9%), facial rash (18.4%), and itching (15.6%) were determined as the most common symptoms due to mask use. In addition, the surgical mask was found to be more risky in terms of skin side effects than the fabric mask. It has been shown that wearing and reusing a mask for at least 4 hours each day increases the risk of skin side effects compared to daily mask replacement.³⁶ Another study reported itching on the skin at a rate of approximately 20% after 1 week of mask use. Those with atopic predisposition and facial dermatitis (acne, atopic dermatitis) or seborrheic dermatitis are at higher risk.³⁷ It has been stated that after wearing a mask for a long time, skin characteristics change significantly and acne develops after routinely wearing a mask for at least five hours a day. Other factors that increase the risk of developing acne are female gender, gastrointestinal problems, using moisturizing facial products, having oily or sensitive skin, use of oral contraceptives, stress, acne history, and hot weather.³⁸ The most common complaint of healthcare professionals was

increased sweating (55.6%), followed by acne (34.3%) and oily skin (34.3%). A significant correlation was found between skin changes and mask use time (>6 hours/day), increased number and type of mask used (N 95).³⁹ Dermatological symptoms were detected in 48.6% of healthcare workers after mask use, and red papules (33.8%), and itching (27.2%) were frequently observed. Wearing a mask for more than four hours a day increased the risk.⁴⁰ Surgical mask use caused skin changes in 41.7% of the population, and acne and pustules were frequently observed. It has been determined that the most common location of these is the cheeks. While acne vulgaris affected 8.7% of the total population before mask use, 46.2% was affected after mask use. Skin changes were significantly associated with skin type and mask-wearing time.⁴¹ In this study, it was stated that the symptoms related to the skin were the lowest symptoms observed. The use of surgical masks can be a reducing factor, especially in the occurrence of symptoms related to the skin. In particular, the use of apparatus as the most frequently used protective measure by the respondents may also have contributed to the decrease in the incidence of symptoms.

Factors Affecting of Mask-Related Symptoms

Respondents experience an average of at least 3 symptoms after mask-use. In this study, being female, having a chronic disease, having a low level of mask knowledge, changing the mask sometimes and often, not washing hands after contact with the mask, and removing the mask in public were determined as factors that increase the occurrence of symptoms. In addition, having an education level of secondary school, high school or college, having a moderate level of mask knowledge,

and never carrying a spare mask with you were risk factors that reduced the occurrence of symptoms. One study stated that there were no case reports or laboratory evidence to suggest that touching the mask could cause infection. Mask use creates fear that the public will neglect other measures such as physical distancing and hand hygiene because of an exaggerated or false sense of security.⁵ Mask use is positively associated with other preventive measures, including hand hygiene, physical distancing,⁸ and contact reduction.⁴² This false sense of protection may result in ignoring other essential measures such as hand hygiene and physical distancing, resulting in touching the face and eyes through the mask.⁸ In this study, not washing hands after hand contact with the mask increases the risk. For this reason, it is thought that washing hands after mask use can be said as an attempt to prevent symptoms related to mask use and should not be ignored in this sense.

Limitations

This study had some limitations. Due to the descriptive design of the study, no effect of change over time on symptoms related to mask use could be observed. Although there were respondents from all provinces in determining the symptoms and related factors related to mask use, generalizations cannot be made since they were not considered according to population density. Measurement tools were created by researchers in line with the literature. Therefore, its validity and reliability must be tested. However, Cronbach's alpha values calculated from the data obtained were above 0.70. The statements of the responders were taken as basis in determining the symptoms. No physical examination was performed. This may cause some symptoms

to be hidden.

CONCLUSION

This study was determined that the respondents had a high level of knowledge about the use of surgical masks. It was determined that the respondents wore surgical masks one on top of the other for protection, and the majority of the respondents used a surgical mask for at least 6 hours, touched the surgical mask by hand, and removed it when in a public environment. While respiratory problems were frequently experienced, it was determined that at least 3 symptoms were observed in the respondents after the use of surgical masks. It was determined that hand contact not washing hands afterward, removing surgical masks in public environment were modifiable factors that increase the risk.

In pandemic situations such as COVID-19, after the mask application that is mandatory for all people, the severity of the symptoms can be determined and precautions specific to the symptoms can be taken. Symptoms associated with mask use may affect people's habits of wearing or not wearing a mask. Qualitative studies can be conducted to determine this situation. Depending on the findings, the importance of hand hygiene should be emphasized in order to reduce symptoms related to mask use in pandemic situations, prevent spread and increase comfort, and people should be made aware of mask with them. If it is necessary to remove masks in public areas, special areas can be created.

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Ethical Declaration: To conduct the study, permission was obtained from the Non-Interventional Ethics Committee of Afyonkarahisar Health Sciences University (dated 05.02.2021, no. 2021/88). Permission was obtained from the T.R. Ministry of Health to conduct the study during the COVID-19 pandemic (12.02.2021). Permission was obtained from the department chair to conduct the research (dated 04.01.2021, no. E-17155648-605.01-264). Detailed information about the study for the respondents was included in the data collection form. If the respondents filled out the form, the study permit was accepted as received.

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