



(RESEARCH ARTICLE)



## Investigation of the effects of mask use on the skin in medical students

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### Abstract

**Objective:** The aim of our study is to investigate the existence of signs, symptoms, and dermatitis related to face masks in medical students and to raise awareness about this new dermatological condition.

**Methods:** Our study was conducted among Izmir Katip Çelebi University 3rd-year medical faculty students. The questionnaires were filled out face-to-face by the researchers. Age, gender, mask type (cloth, surgical or N95) and duration of use, symptoms (itching symptom or other symptoms which were burning, tingling, prickling, or pain with or without itching), and signs-(erythema, scale, fissure, papule, pustule or vesicle) were asked. Dermatitis if diagnosed by a doctor was also questioned in the survey.

**Results:** Dermatitis was detected more frequently in students whose median mask use time was 5 hours compared to 4 hours ( $p=0.017$ ) and who used all cloth, surgical, and N95 masks ( $p=0.018$ ).

**Conclusion:** As the duration of mask use increases, the incidence of dermatitis increases regardless of the mask type. The use of different types of masks also increased the incidence of dermatitis.

**Keywords:** Mask; COVID-19; Medical students; Dermatitis; Survey

### 1. Introduction

Mask is important in preventing COVID-19 disease [1]. It is recommended to wear a mask from the age of 6 [2]. With the COVID-19 disease, wearing a mask became mandatory, but as the effect of the disease eased, it was left to personal preference. We aim to study the existence of signs, symptoms, and dermatitis related to face masks in medical school students and to raise awareness about this new dermatological condition.

### 2. Material and methods

Our study is survey research and was conducted among Izmir Katip Çelebi University 3rd- year medical faculty students between 24.11.2022 and 12.01.2023. The questionnaires were filled out face to face by researchers who were previously trained in primary and secondary skin lesions. Age, gender, mask type (cloth, surgical or N95) and duration of use, symptoms (itching symptom or other symptoms which were burning, tingling, prickling, or pain with or without itching), signs (erythema, scale, fissure, papule, pustule or vesicle), and dermatitis (development due to mask use and diagnosed by a doctor) were questioned in the survey.

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Descriptive statistics were given as number of units (n), percentage (%), mean  $\pm$  standard deviation, and median (interquartile range) values. In comparing four-group numerical variables, the Kruskal Wallis H test was used since the data did not show a normal distribution. Pearson and Fisher's exact tests were used to compare categorical variables with each other. A value of  $p < 0.05$  was considered statistically significant.

This study was conducted under the Helsinki criteria after approval by the Izmir Katip Çelebi University Ethics Committee (approval number: 428, date 20.10.2022).

### 3. Results

A total of 175 students, 89 female and 86 male, participated in the study. The average age was 21. Among the symptoms, those who only had itching were 37, and those who had burning, tingling, stinging, or itching along with at least one of these were 26. Signs of erythema, scale, fissure, papule, pustule, or vesicle were present in 40 students. Dermatitis was diagnosed in 24 students who consulted a doctor. Diseases specifically diagnosed within the dermatitis group were 8 irritant contact dermatitis, 1 allergic contact dermatitis, 8 atopic dermatitis, and 2 seborrheic dermatitis. Among the masks, the most commonly used was the surgical mask which 132 students used (Table 1).

**Table 1** Descriptive statistics

Age	Mean $\pm$ Standard Deviation
Female / Male / Total	21.12 $\pm$ 0.81/21.15 $\pm$ 0.76/21.14 $\pm$ 0.78
Gender	n (%)
Woman	89 (50.9)
Male	86 (49.1)
Presence of symptoms	
No	112 (64.0)
Itching	37 (21.1)
Burning, tingling, and/or stinging with or without itching	26 (14.9)
Signs	
No	135 (77.1)
Yes	40 (22.9)
Presence of dermatitis	
No	151 (86.3)
Yes	24 (13.7)
Irritant dermatitis	
No	167 (95.4)
Yes	8 (4.6)
Allergic contact dermatitis	
No	174 (99.4)
Yes	1 (0.6)
Atopic dermatitis	
No	167 (95.4)
Yes	8 (4.6)
Seborrheic dermatitis	

No	173 (98.9)
Yes	2 (1.1)
Mask type	
No	7 (4.0)
Cloth	26 (14.9)
Surgical	132 (75.4)
N95	5 (2.9)
Cloth, Surgical, N95	4 (2.3)
Surgical, N95	1 (0.6)

When the relationship between mask usage status and the presence of dermatitis, signs, and symptoms was examined, no statistically significant relationship was found (Table 2).

**Table 2** The relationship between mask use and dermatitis, symptoms, and signs

	Presence of dermatitis		<i>p</i> -value *
Mask use	No ( <i>n</i> =151)	Yes ( <i>n</i> =24)	1,000
No	6 (4.0)	1 (4.2)	
Yes	145 (96.0)	23 (95.8)	
	Presence of symptoms		0.424
Mask use	No ( <i>n</i> =112)	Yes ( <i>n</i> =63)	
No	6 (5.4)	1 (1.6)	
Yes	106 (94.6)	62 (98.4)	
	Presence of signs		
Mask use	No ( <i>n</i> =135)	Yes ( <i>n</i> =40)	1,000
No	6 (4.4)	1 (2.5)	
Yes	129 (95.6)	39 (97.5)	

\* Fisher Exact test

When the relationship between the type of mask usage and the presence of dermatitis, signs, and symptoms was examined, a statistically significant relationship was found concerning dermatitis and that was due to usage of all 3 types of masks by the 3 students (Table 3)

**Table 3** The relationship between the type of mask and dermatitis, symptoms and signs

	Presence of dermatitis		<i>p</i> -value +
Mask type	No ( <i>n</i> =145)	Yes ( <i>n</i> =23)	<b>0.018</b>
Cloth	22 (15.2) <sup>a</sup>	4 (17.4) <sup>a</sup>	
Surgical	117 (80.7) <sup>a</sup>	15 (65.2) <sup>a</sup>	
N95	4 (2.8) <sup>a</sup>	1 (4.3) <sup>a</sup>	
Cloth, Surgical, N95	1 (0.7) <sup>a</sup>	3 (13.0) <sup>b</sup>	
Surgical, N95	1 (0.7) <sup>a</sup>	0 (0.0) <sup>a</sup>	

	Presence of symptoms		
Mask type	No ( n =106)	Yes ( n =62)	0.058
Cloth	15 (14.2)	11 (17.7)	
Surgical	87 (82.1)	45 (72.6)	
N95	3 (2.8)	2 (3.2)	
Cloth, Surgical, N95	0 (0.0)	4 (6.5)	
Surgical, N95	1 (0.9)	0 (0.0)	
	Presence of signs		
Mask type	No ( n =106)	Yes ( n =62)	0.559
Cloth	19 (14.7)	7 (17.9)	
Surgical	104 (80.6)	28 (71.8)	
N95	3 (2.3)	2 (5.1)	
Cloth, Surgical, N95	2 (1.6)	2 (5.1)	
Cloth, N95	1 (0.8)	0 (0.0)	

\* Pearson chi-square test. Superscripts *a* and *b* indicate the distribution between groups in the categories. The meanings of the same letter are similar.

Dermatitis was found higher when the median mask use time increased from 4 hours to 5 hours (p=0.017) (Table 4).

**Table 4** Comparison of mask usage time to gender, presence of dermatitis, symptoms, signs, and mask type ( n = 168)

Variables	Mask usage time		p-value
	Mean ± SD	Median ( IQR )	
Gender			
Woman	4.33±1.95	4 (3)	0.194 *
Male	3.95±2.21	4 (4)	
Presence of dermatitis			<b>0.017 *</b>
No	3.97±2.02	4 (4)	
Yes	5.22±2.19	5 (4)	
Presence of symptoms			0.301 +
No	4.00±2.12	4 (4)	
Itching	3.57±2.22	3 (4)	
Burning	4.46±2.47	4 (4)	
Presence of signs			0.085 *
No	4.28±1.99	4 (3)	
Yes	3.69±2.35	3 (4)	
Mask type			0.535 +
Cloth	4.42±2.32	4 (4)	
Surgical	4.04±1.99	4 (3)	
N95	4.40±2.88	5 (6)	
Cloth, Surgical, N95	5.75±2.63	6.5 (5)	

\* Mann Whitney U test, + Kruskal Wallis test

#### 4. Discussion

In the design of our study, the diagnosis of dermatitis was made only after the students consulted the doctor and received the diagnosis. The statistical difference between the duration of mask use and the presence of dermatitis might emerge because probably only the students who used masks for longer periods and had intense signs and symptoms consulted the doctor.

In Chaiyabutr et al internet survey study with 1231 participants, surgical mask use was found to be associated with acne, greasy skin, and pruritus more than cloth masks [3]. It was stated that surgical masks consisting of multiple layers might cause this with an occlusive effect [3]. In our study, we asked about the development of newly diagnosed dermatitis, but not about the exacerbation or occurrence of acne. In our study, students using all cloth, surgical, and N95 masks had more dermatitis ( $p=0.018$ ), and that could be due to additive effects of different types of mask use.

Mask use was associated with allergic and irritant contact dermatitis [4-6]. Deterioration of the skin barrier has been reported with long-term mask use [7]. In our study, we found irritant dermatitis and atopic dermatitis, which could be exacerbated by skin barrier dysfunction, high among the students diagnosed with dermatitis.

It was emphasized that using masks for longer periods (more than 6 hours/day) and cotton masks significantly increases acne exacerbation [8]. In Chaiyabutr et al study, >4 hours of daily use of a mask was associated with skin reactions [3]. In our study, a median use of 5 hours/day was found to be associated with dermatitis and correlated with the literature.

Itching was found to be the most common symptom in individuals wearing masks in a multicenter study and that was correlated with our study [8,9].

In a study conducted with 440 hospital employees from Turkey, skin problems were found to be 90.2% [10], in our study only students were evaluated and skin problems were not found at so high percentage.

As cessation of mask use was not an option during the pandemic, to reduce the side effects of mask use, mild cleansers and non-comedogenic moisturizing creams close to the skin's natural pH (pH 5) were recommended [11,12].

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#### 5. Conclusion

Longer mask use time was associated with dermatitis. The use of all cloth, surgical, and N95 mask types by the same student may cause dermatitis with an additive effect.

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#### Compliance with ethical standards

##### *Disclosure of conflict of interest*

No conflict of interest is to be disclosed.

##### *Statement of ethical approval*

This study was conducted under the Helsinki criteria after approval by the Izmir Katip Çelebi University Ethics Committee (approval number: 428, date 20.10.2022).

##### *Statement of informed consent*

Informed consent was obtained from all individual participants included in the study.

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