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Dermatosis related to the use of face masks during Covid-19 pandemic

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ABSTRACT

Background: A global pandemic has been brought about by the SARS-CoV-2 virus that causes the new corona virus disease. Face masks should be worn as the virus can spread via respiratory droplets and aerosols. *Aim:* To determine the prevalence of face-mask dermatosis in Ha'il City population and the related risk factors. *Methodology:* A community based cross sectional study (1st December 2021 to 1st May 2022) was conducted. Using online Google form, the retrieved data included patient's occupation, daily mask-wearing duration, pre-existing skin disorders, recently noticed mask-related skin reaction, and types of masks. Then after, data were analyzed using SPSS version 22.0. *Result:* The study included 679 participants from different age groups. Face mask wearing was responsible for about 55.2% of dermatosis among the participants, with contact dermatitis being the most common disorder. There was positive correlation between suffering from previous skin conditions and aggravating the skin disease due to wearing a mask with 0.288 correlation coefficient (P= 0.001). *Conclusion:* A high rate of facial dermatosis is accompanying to utilization of the face masks. Using a face mask causes skin eruptions, and this may help characterize their appropriate usage.

Keywords: Coronavirus, pandemic spread, N95, Acne, atopic dermatitis, facial dermatosis, rosacea, viral infections

1. INTRODUCTION

In an attempt to prevent the pandemic caused by coronavirus, World Health Organization recommends social spacing, avoidance of face touch habit, as well as nose and mouth coverage while started to sneeze or cough, and put on a face mask (Kähler & Hain, 2020). Wearing of face mask is a paramount to decrease the dissemination rate of COVID-19 viruses. In the ongoing pandemic, evidence points to the efficiency of masks, because such virus can be transmitted directly via droplets as a result of coughs or sneezes, in addition it can be transmitted indirectly by touching with mucous membranes of the nose, mouth, or eyes (Leung et al., 2020). In dermatological settings, wearing a mask can cause or worsen various facial dermatoses. Individuals may suffer from acne, allergic contact dermatitis, and other skin

condition (Foo et al., 2006). It has been observed that people with facial dermatitis, such as skin hypersensitivity, acne vulgaris, seborrheic eczema, atopic dermatitis, and contact eczema, experience an increase and exacerbation of facial itching when wearing face masks (Szepietowski et al., 2020).

Due to irritant substances and allergens utilized in the mask preparation, it can give rise to various dermatological pathologies, including skin desiccation, flushness, burning, acne, and puffiness in the face (Lan et al., 2020). Additionally, the utilization of masks likewise contributes to the development of dermatological lesions due to rubbing effects, wetness, and mechanical pressure (Zuo et al., 2020). It has been found that the prolonged use of masks worsens the preexisting dermatoses, as well as it increases the prevalence of occupational dermatitis and acne mechanic resulting from prolonged exposure to the straps and mask material. The augmented warm and humidity of the skin as a result of exhaled air and sweating interfere with skin moistening which in turn leads to irritation of the pilo-sebaceous gland ducts, thus, resulting in alterations in skin microflora (Gomolin et al., 2020). Masks worn without changing them for a prolonged period of time can give rise to an infection, such as impetigo, due to activation of S aureus (Han et al., 2020).

The purpose of this study was to evaluates the incidence of an unfavorable reactions on the face shielded by the masks and the potential issues accompanying such adverse reactions in Ha'il city. The conclusion of this study may lessen the adverse reactions of the skin caused by face masks

2. METHODOLOGY

Study design and sample

A community-based cross-sectional study was accomplished during the period from 1st December 2021 to 1st May 2022, to assess the prevalence of mask dermatitis among the Saudi population in Ha'il Region. Sample size was calculated using the formula; $S = (Z\text{-score})^2 * p*(1-p) / (m)^2$ (Wanamo et al., 2021). The required minimum sample size was 385.

Data collection

A self-administered questionnaire was designed with multiple-choice format questions. It consisted of questions that were guided by the study objectives. The questionnaire included two sections: the first section comprises demographic information about the participants: age, gender, and level of education. The second section comprises an assessment of the community Mask Dermatosis prevalence and possible causes that can lead to, the compatibility of individuals for wearing masks, the aim behind their decision, motivations that lead individuals to use, duration and types they approve of using, affection of long uses on participant's health and increase of mask dermatosis relation with them. These questionnaires were sent out to all populations, including relatives, friends, university students, and employees. At the beginning of the questionnaire, written consent was obtained from each of the participants before start to answering.

Data analysis

The collected data were managed statistically by SPSS version 22.0. Results of the percentage of respondents willing to use a mask, percentage of respondents that have had dermatosis before, percentage of mask dermatosis because of type or long duration or other causes due to wearing mask and association of these factors with the level of education, association with times and duration of using.

3. RESULT

Demographic characteristics

The study enrolled 679 patients 48.5% (n = 329) women and 51.5% (n = 350) men. Table 1 displays the demographic characteristics of the respondents. About 32.1% of participants were aged above 50 years old, while 28.3% were from the age group 41-50 years, and 19.9% of them were aged between 31 to 40 years. Of the 679 patients (55.8%) were graduated, whereas, only 4.6% of them had completed middle school. Figure 1 shows the educational levels of the study participants and for Occupation, 49.0% of them were an employer in the non-healthcare institution, 32.4% were not employees, 8.8% were students, and only 9.7% were working as healthcare providers. Figure 2 shows the occupation of the study participants.

Table 1 Distribution of sociodemographic data among study participants (N=679)

		N	%	Mean	S. Deviation
Gender	Male	350	51.5%	1.48	0.500
	Female	329	48.5%		
Educational level	Middle School	31	4.6%	2.75	0.717
	High School	190	28.0%		
	Graduated	379	55.8%		
	Post graduated	79	11.6		
Occupation	Not Employee	220	32.4%	1.75	1.348
	Student	60	8.8%		
	health care provider	66	9.7%		
	an employer in a non-healthcare area	333	49.0%		
Age	From 15 to 20	45	6.6%	3.66	1.236
	From 21 to 30	89	13.1%		
	From 31 and 40	135	19.9%		
	From 41 and 50	192	28.3%		
	More Than 50	218	32.1%		

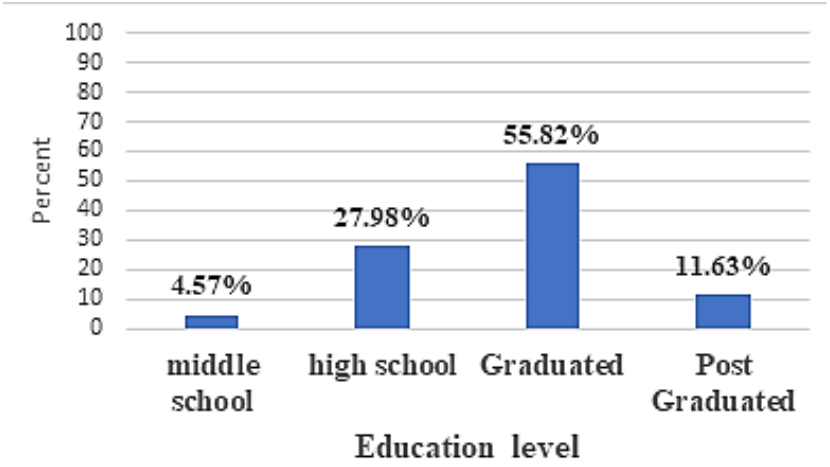

Figure 1 educational level among the study participants

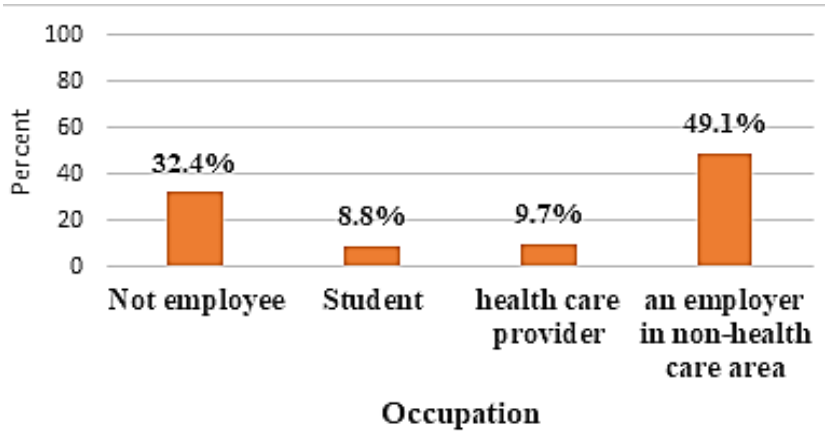

Figure 2 Occupation of the study participants (N=679)

Facemask dermatosis

In total, 55.2% of the patients (n = 375/679) has reported that they have suffered from skin problems due to face mask-wearing. The most common reported disease-related to face mask-wearing was contact dermatitis 63.73%, followed by Acne 26.6%.

Pre-existing dermatosis

40.2% had pre-exciting dermatosis, 17.3% of them suffered from acne, 14.5% of them suffered from Eczema, and 3.2% suffered from Psoriasis, only 1.6% of them suffered from Pityriasis rosea. 42.439% of those mentioned that wearing a face mask has aggravated their problem. Table 2 shows a positive correlation between suffering from skin diseases and aggravating the skin disease due to wearing a mask at a P-Value > 0.001.

Table 2 correlates between suffering from skin diseases and aggravating skin diseases due to wearing a mask (N=679)

	Do you suffer, or have you had any skin diseases?	
Did wearing a mask aggravate the skin disease that you previously suffered from?	Correlation	0.288**
	P value	0.001

Type of face-mask

The majority (51.5%) wore surgical masks, 22.0% of them wore activated carbon masks, 15.2 % of them wear fabric masks, and only 11.3 % of them wear N95 masks. Figure 3 shows the distribution of Face-mask types used among the study participants.

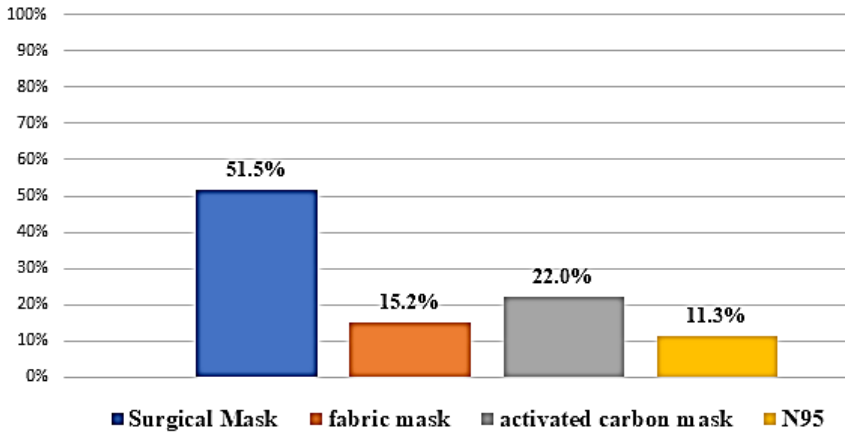

Figure 3 Face masks' types used among the study participants

Duration and reuse

Regarding the duration of hours they wear the face mask, 47.4% of them wear the mask for 1-3 hours, 28.3% of them wear it for 3-6 hours, and 17.7% of them wear it for 9-12 hours. 53.2 % of the patients mention that they reuse the face mask (Table 3).

Table 3 Uses and types of face mask (N=679)

		N	%	Mean	S. Deviation
Type of face mask	surgical mask	401	51.5%	0.12	0.326
	fabric mask	118	15.2%		
	activated carbon mask	171	22.0%		
	N95	88	11.3%		
Do you reuse the mask		361	53.2%	0.53	0.499
The Number of hours you wear the mask	1-3	322	47.4%	1.84	0.943
	3-6	192	28.3%		
	6-9	120	17.7%		
	9-12	45	6.6%		

Risk factors

The data showed that females were exposed to skin problems related to wearing a face mask more than the males, as 67.8% of them were exposed to skin dermatosis associated with wearing a face mask. In comparison, only 32.2% of males were exposed to the same problems (Figure 4). A 54.9% of who wore a mask for 1-3 hours didn't expose to skin problems related to wearing a face mask, while 30.2% of them were exposed to this problem, 23.8% of those who wore a mask for 3-6 hours didn't expose to skin problems related to wearing face-mask while 38.5% of them exposed to this problem, 15% of those who used to wear a mask for 6-9 hours didn't expose to skin problems related to wearing face-mask while 23.4% of them exposed to this problem, 6.1% of those used to wear a mask for 9-12 hours didn't expose to skin problems related to wearing face-mask while 7.8% of them exposed to this problem (Figure 5). Also, 65.9% of whom had experienced dermatosis were wearing surgical mask, while 29.3 % of them were wearing Activated carbon mask, 15.1% of them were wearing Fabric mask, and only 11.7% of them were wearing N95 mask (Figure 6).

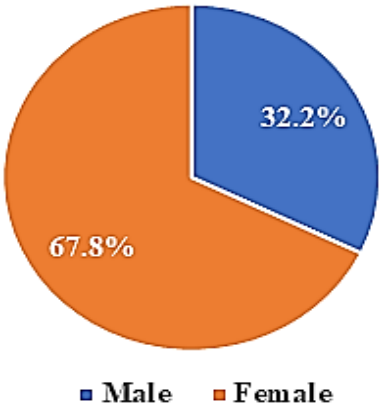

Figure 4 Exposure to skin problems related to wearing face-mask (controlled by gender) (N=679)

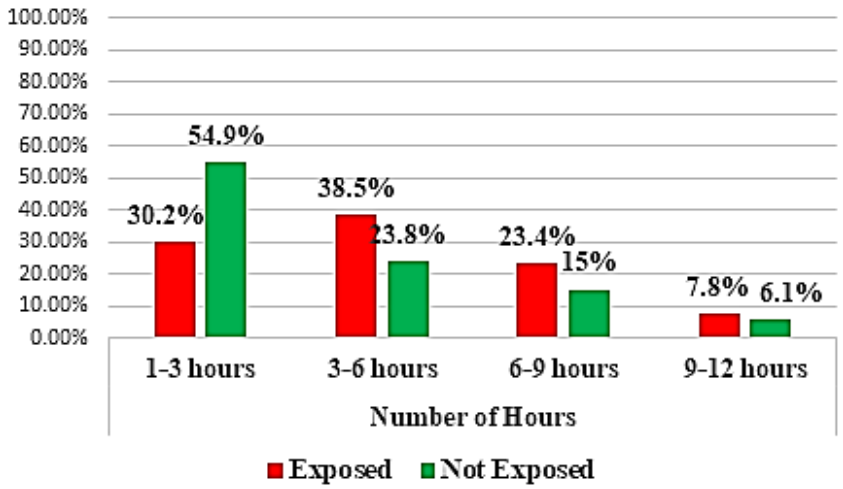

Figure 5 Exposure to skin problems related to wearing a face mask (controlled by the number of hours wearing the face mask) (N=679)

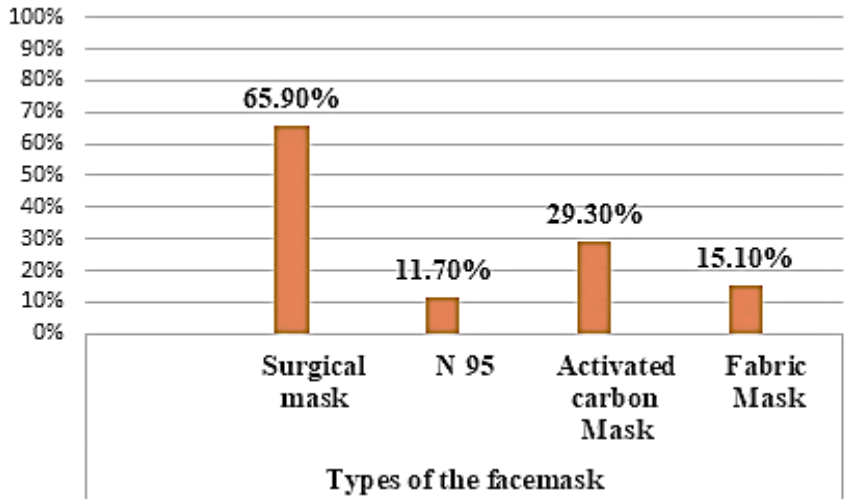

Figure 6 Exposure to skin problems related to wearing face-mask (controlled by the type of face mask) (N=679)

4. DISCUSSION

This study aims to assess the prevalence of mask dermatoses in the general population in Ha'il city after the obligation to wear a mask during COVID19. In this study, the majority of utilized face masks were surgical masks, followed by activated carbon masks and fabric masks. This was in concordance with the population study by Techasatian et al., (2020), when the majority of respondents used to put on surgical masks. Whereas, it was in contradict with Chaiyabutr et al., (2021), when the majority wore fabric masks, and Park et al., (2021), when the majority wore N95 masks. The current study revealed that 52.2% of the respondents experienced adverse skin reaction related to wearing mask, which was higher than 41.7% that previously stated in another study is Saudi Arabia (Althobaiti et al., 2022).

The commonest skin-related adverse reactions were contact dermatitis (63.73%), followed by acne (26.6%). This is maybe due to multiple factors such as lengthy to put on mask, medicinal and textile masks are simply able to cause profuse sweating, dampness, and have the effects of rubbing. This finding was in concordance to the study of Beri et al., (2022), when contact dermatitis was the commonest detected dermatosis. Skin sensitivity to irritant substance is augmented in contained and warm settings, resulting in increase in its permeability, in turn giving rise to contact dermatitis. Whereas, in the other study, acne and pustules were the commonest skin alterations observed in those wearing face masks (Di Altobrando et al., 2020; Kaul et al., 2021; Beri et al., 2022).

About 40.2% of the respondents conveyed that they had skin pathologies prior to start to put on face masks. Among them 17.3% conveyed that they previously had acne before wearing a mask, followed by eczema in 14.5%. Among the participants in the current study, 42.439% stated that wearing masks has aggravated their dermatological problem. It is possible to develop acne exacerbated by masks if the patient has previously suffered from acne or seborrheic dermatitis (Damiani et al., 2021; Yaqoob et al., 2021; Proietti et al., 2022).

The present study shows that there is a positive significant correlation between suffering from skin diseases and aggravating the skin disease due to wearing a mask at P-Value > 0.001. In other hand, there is a strong positive significant relation between suffering from skin diseases and the type of face mask (P= 0.001). The majority of the study participants (51.5%), wore surgical masks, and 65.9% experienced skin problems related to wearing surgical masks. Most of the participants in a previous study used surgical mask and experienced problems associated with this type of face mask as well (Techasatian et al., 2020). Females have reported more facial dermatosis, 67.8% compared to 32.2% of males exposed to the same problem. This was in accordance with others (Lin et al., 2020; Chaiyabutr et al., 2021).

Limitation of the study

First, the self-reported dermatosis is not precise since it is based on participant assumptions. Second, not all types of masks were included.

5. CONCLUSION

In this study, skin eruptions were observed after the use of face masks, and this may help characterize their use. Furthermore, a high rate of acne eruption is accompanying to utilization of the face masks. Suffering from skin diseases and the aggravation due to

wearing a mask and the type of face mask had a significant correlation. Finding such details could aid in discovery of an effective treatments for the purpose of prevention of such pathological skin eruptions from starting. Persons with a previous history of cutaneous manifestations such as contact dermatitis, and acne vulgaris develop impaired cutaneous barrier function. Consequently, this made them more vulnerable to increased temperatures, extreme dampness, and possessing skin abrasions caused by the mechanical friction. Medical professionals should learn the public about mask-induced dermatitis vulnerability among those with pre-existent dermatosis.

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Authors' contribution

Fawwaz F. A: The foremost conductor participated in conceptualization, major contributor in introduction, result and discussion parts of the manuscript.

Abeer E: Contributed in study proposal, manuscript design, introduction and reviewed decisively the central academic contents.

Maryam A: Participated in data organization, recognized the related manuscript for enclosure, chief participant in result division and revised the outlines.

Alanud A: Contributed in gathering of data, recognized the related manuscript for enclosure, contributed in material and method.

Ghadah A: Participated in data collection, contributed in the design, writing discussion, and result parts.

Saadeldin AI: Task coordinator, stated manuscripts' contents, and reviewed study statistics, revised decisively the imperative intellectual contents.

Altogether authors were contributed differently to the manuscript's conceptualization, editing and review.

Ethical approval

This study was approved by the research ethic committee, University of Ha'il, Saudi Arabia (ethical approval code. H-2022-260).

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Conflicts of interest

The authors declare that there are no conflicts of interests.

Data and materials availability

All data associated with this study are present in the paper.

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