OPEN AIMJ ORIGINAL ARTICLE

Dermatology, Venereology and Andrology

Role of prolonged use of facial masks in induction or exacerbation of facial dermatoses during Covid-19 pandemic in Egyptian populations

Mohammad Hamed Shaaban Khalil,[1] MBBCH, Hamed Mohammed Ahmad Abdo,[1] MD, Amr Mohammad Ahmad MahmoudAmmar,[1] MD.

** Corresponding Author:*
Mohammad Hamed Shaaban Khalil
kalilomahamad866@gmail.com

Received *for publication December 5, 2021; Accepted May 14, 2022; Published online May 14, 2022;*

doi: 10.21608/aimj.2022.109192.1701

[1]*Dermatology, Venereology and Andrology Department, Faculty of Medicine, Al-Azhar University, Cairo, Egypt.*

ABSTRACT

Background: COVID-19 pandemic made all healthcare providers and the general public have to wear masks and other personal protective methods, so they are vulnerable to personal protective equipment-related adverse skin reactions.
Aim of the study: The aim of this study was to evaluate the role of prolonged use of facial masks in induction or exacerbation of facial dermatoses, in the era of Covid-19 among Egyptian population.
Patients and Methods: This study was a cross-sectional study that was carried out at the outpatient clinics of dermatology and venereology departments of Al Hussein and Sayed Galal hospitals Al-Azhar University in Cairo from March 2021 to November 2021.
Results: There were 154 (30.8%) who felt itching, there were 55 (11%) who felt dryness, there were 59 (11.8%) who felt erythema, there were 54 (10.8%) who felt indentation, there were 139 (27.8%) who noticed skin lesions which were as following; acne and flare of acne (16%), contact dermatitis (4%) seborrheic dermatitis and flare of seborrheic dermatitis (3%), flare of gram negative folliculitis (3.8%), and flare of rosacea (1%).
Conclusion: The prevalence of face mask related facial dermatoses during COVID-19 pandemic was 27.8%. The most frequent one was acne. There was statistically significant relation between adverse skin reaction and age, sex, occupation, duration of daily use of mask, mask type, reuse of masks and use of moisturizers.

Keywords: *Facial masks; COVID-19 pandemic and facial dermatoses..*

Disclosure: *The authors have no financial interest to declare in relation to the content of this article. The Article Processing Charge was paid for by the authors.*
Authorship: *All authors have a substantial contribution to the article.*

INTRODUCTION

Facial masks help prevent the spread of infectious pathogens from infected patients by providing an immediate barrier between the respiratory system and the environment.[1] SARS-CoV-2 is the cause of Coronavirus Disease (COVID)-19, which was initially found in late December 2019 in Wuhan, China.[2] COVID-19, which was later labelled a pandemic by the World Health Organization (WHO) due to its fast spread, has had an influence on many aspects of life around the world, including personal habits and lifestyles. The Center for Disease Control and Prevention (CDC) and the World Health Organization (WHO) warned individuals to take precautions to avoid the transmission of the virus, such as wearing a mask to cover their mouth and nose when in close proximity to others.[3] As a result COVID-19 pandemic made all healthcare providers and the general public have to wear masks and other personal protective methods, so they are vulnerable to personal protective equipment -related adverse skin reactions.[4]

Severe sweating, wetness, and irritation can easily occur when wearing protective respirators, medical, or fabric masks for long periods of time. Despite having an lead over medical masks in terms of protection against respiratory infections, high performance filtering masks are correlated with more skin reactions than medical masks, most likely due to the increased air impermeability.[5]

A lot of facial dermatoses, including acne, seborrheic dermatitis, and rosacea have been recorded specially in healthcare workers since the COVID-19 pandemic began.[6]

Dermatologists deal with a great number of facial dermatoses, but there are certain unique challenges to deal with during the COVID-19 pandemic. Even though it has been revealed that facial coverings causing occlusion and as a result humid and warm

microenvironment present, which can induce or aggravate these dermatoses.[7]

The aim of this study was to evaluate the role of prolonged use of facial masks in induction or exacerbation of facial dermatoses, in the era of Covid-19 among Egyptian population.

PATIENTS AND METHODS

This study was a cross-sectional study that was carried out at the outpatient clinics of dermatology and venereology departments of Al Hussein and Sayed Galal hospitals Al-Azhar University Cairo from March 2021 to November 2021. Five hundred patients attending the outpatient clinics of dermatology and venereology departments of Al Hussein and Sayed Galal hospitals Al-Azhar University Cairo.

History sociodemographic & general medical data; age, sex, occupation, and history of drug intake was taken.

A self-conducted questionnaire about possible risk factors of adverse skin reaction (type of masks, duration of use, duration of daily use, using of moisturizers, and the habit of reusing the masks), presence of facial symptoms like itching, presence or exacerbation of facial dermatoses after prolonged use of facial masks.

A pilot study before starting to collect final data, a pilot study was carried out over 100 participants to fulfill the following purposes: determination of the organization and administrative procedures, testing the questionnaire form and detecting any modifications needed, estimation of the time needed to collect the data, and examination and detection of the difficulties that might arise and how to deal with them.

Clinical dermatological examination which determines the size, site, shape, number, color, and provisional diagnosis of the skin lesion.

Operational design: All selected participants received comprehensive information regarding objective and the expected benefit of the study.

RESULTS

The present trial included 40 subjects with various degrees of Spondylolisthesis; They were divided into 2 main groups: group A: TPF (Transpedicular fixation) and group B: TPIF (Transpedicular with interbody fusion).

Among the studied cases there were 20 (4%) who used mask for less than 6 months and 480 (96%) who used mask for more than 6 months, there were 380 (76%) who used mask for from 4 to 8 hours a day and 120 (24%) who used mask for more than 8 hours a day, there were 390 (78%) who used surgical mask, 20 (4%) who used cotton mask and 90 (180%) who used N95 mask, there were 398 (79.6%) who used mask once and 102 (20.4%) who reused their masks, there were 39 (7.8%) who used moisturizers, there were 154 (30.8%) who felt itching, there were 55 (11%) who felt dryness, there were 59 (11.8%) who felt erythema, there were 54 (10.8%) who felt indentation, there were 139 (27.8%) who noticed skin lesions and them there were 33 (6.6%) who felt mild effect of the use of mask, 44 (8.8%) who felt moderate effect of the use of mask and 38 (severe%) who felt severe effect of the use of mask (Table 1&2).

	Cases	
Age (years)	%	
Range	19 – 67	
Mean ± SD.	35.07 ± 10.98	
Sex		
Female	236	47.2
Male	264	52.8
Occupation		
Non-HCW	420	84.0
HCW	80	16.0

Table 1: Distribution of studied cases according to history data. The mean age of studied group was 35.07 (±10.98 SD) with range (19-67) years, among the studied group there were 236 (47.2%) females and 264 (52.8%) male and there were 80 (16%) healthcare workers and 420 (84%) not healthcare workers.

	Cases	
Q1 Duration	No.	%
< 6months	20	4.0
> 6months	480	96.0
Q2 Duration of daily use		
4- 8hours	380	76.0
> 8hours	120	24.0
Q3 Type of mask		
Surgical mask	390	78.0
Cotton	20	4.0
N95	90	18.0
Q4 Reuse or not		
Use once	398	79.6
Reuse	102	20.4
Q5 Using of moisturizers		
Don't use moisturizers	461	92.2
Use moisturizers	39	7.8
Q6 Presence of itching		
No itching	346	69.2
Itching	154	30.8
Q7 Presence of dryness		
No dryness	445	89.0
Dryness	55	11.0
Q8 Presence of erythema		
No erythema	441	88.2
Erythema	59	11.8
Q9 Presence of facial indentations		
No indentations	446	89.2
Indentations	54	10.8
Q10 Presence of skin lesions		
Didn't notice presence	361	72.2
Noticed presence	139	27.8
Q11 severity of the reaction		
Non	385	77.0
Mild	33	6.6

Dermatology, Venereology and Andrology

Moderate	44	8.8
Severe	38	7.6

Table 2: Distribution of studied cases according to questionnaire.

Among the prevalence of adverse skin reaction was 27.8%, the most common reaction was acne and acne flare were found in 16% of cases (acne in 4% and flare of acne in 12%), contact dermatitis in 4%, seborrheic dermatitis and flare of seborrheic dermatitis in 3%, flare of gram negative folliculitis 3.8% , and flare of rosacea in 1% (Table 3,4; Fig: 1-6) .

	Cases	
Diagnosis	No.	%
Total	139	27.8
Acne	20	4.0
Flare of acne	60	12.0
Contact dermatitis	20	4.0
Flare of rosacea	5	1.0
Seborrheic dermatitis	10	2.0
Flare of Seborrheic dermatitis	5	1.0
Flare of gram-negative folliculitis	19	3.8

Table 3: Distribution of studied cases according to Diagnosis.

Fig 1: Contact dermatitis.

Fig 2: Flare of acne.

Fig 3: Acne.

Fig 4: Flare of seborrheic dermatitis.

Fig 5: Flare of gram-negative folliculitis.

Fig 6: Flare of rosacea.

	facial dermatoses				χ^2	P
	No		Yes			
Age						
Range.	19 – 67		20 – 46		t= 5.661	<0.001*
Mean ± SD.	36.74 ± 11.70		30.72 ± 7.23			
Sex	No.	%	No.	%		
Female	187	51.8	49	35.3	χ^2= 11.028	0.001*
Male	174	48.2	90	64.7		
Occupation						
Non-HCW	361	100.0	59	42.4	χ^2= 247.345	<0.001*
HCW	0	0.0	80	57.6		
Q1						
< 6months	13	3.6	7	5.0	χ^2= 0.538	0.463
> 6months	348	96.4	132	95.0		
Q2						
4_8 hours	341	94.5	39	28.1	χ^2= 242.601	<0.001*
> 8hours	20	5.5	100	71.9		
Q3						
Surgical mask	341	94.5	47	33.9	χ^2= 282.9	<0.001*
Cotton	20	5.5	3	2.1		
N95	0	0.0	90	64.7		
Q4						
Use once	315	87.3	56	40.3	χ^2= 115.7	<0.001*
Reuse	46	12.7	83	59.7		
Q5						
Don't use moisturizers	322	89.2	136	97.9	Fisher test	<0.001*
Use moisturizers	39	10.8	3	2.1		

Table 4: Correlation between adverse skin reactions and questionnaire. There was statistically significant relation between adverse skin reaction and age, sex, occupation, duration of daily use of mask, mask type, reuse of masks, and use of moisturizers.
(χ^2: **Chi square test**, p: p value for comparing between different categories**;** *: Statistically significant at $p \leq 0.05$).

DISCUSSION

SARS-CoV-2, a new corona virus, was discovered as the virus responsible for a pneumonia outbreak in Wuhan, China, in January 2020. Since then, the disease, which was eventually called coronavirus disease 2019 (COVID-19), has spread throughout the world. COVID-19 dissemination has been prevented by strict controls. Regardless of the fact that there have been millions of documented cases of COVID-19 over the world, we still have a poor understanding of the transmission risk. The majority of person-to-person transmission is thought to occur by respiratory droplets and contact.[8]

Personal protection equipment (PPE), including a mask that guards against chest infections, is suggested for healthcare providers to treat this highly infectious disease (HCWs). Long-term PPE use, but at the other hand, has been related to direct skin damage and exacerbation of pre-existing dermatoses such as contact dermatitis, seborrheic dermatitis, and acne in HCWs. According to a previous observational study, using a mask for a long time caused acne and rosacea flare-ups.[7]

The present study showed that there were 20 (4%) who used mask for less than 6 months and 480 (96%) who used mask for more than 6 months, there were 380 (76%) who used mask from 4 to 8 hours a day and 120 (24%) who used mask for more than 8 hours a day, there were 390 (78%) who used surgical mask, 20 (4%) who used cotton mask and 90 (180%) who used N95 mask, there were 398 (79.6%) who used mask once and 102 (20.4%) who reused their masks, there were 39 (7.8%) who used moisturizers,

While most subjects in the Chaiyabutr et al., [9] research wore face masks for less than 4 hours each day (53.8 %). Fabric masks were used by 644 (52.3%) of the subjects. Surgical masks were worn by 552 (44.8%), while just 35 people (2.8%) wore N95 respirators during the COVID-19 outbreak. Park et al., [10] also found that 61.9 % of the participants in their study used N95 and 54.2 % wore surgical masks

Moreover, according to Techasatian et al., [11] the most commonly used face masks in the study population were surgical masks (63.15 %), cloth masks (35.05 %), surgical masks covered by cloth (1.0 %), and N95 masks (0.72 %).

Prolonged use of masks not only aggravates preexisting face dermatoses (acne or rosacea), but also acne mechanica and contact dermatitis caused

by the mask material. Increased skin humidity and warmth generated by expired air and sweating had an occlusive influence, blocking skin hydration, resulting in alterations in skin microfora.[12]

The current study that there were 154 (30.8%) who felt itching, there were 55 (11%) who felt dryness, there were 59 (11.8%) who felt erythema, there were 54 (10.8%) who felt indentation, there were 139 (27.8%) who noticed skin lesions and them there were 33 (6.6%) who felt mild effect of the use of mask, 44 (8.8%) who felt moderate effect of the use of mask and 38 (severe%) who felt severe effect of the use of mask. The present study showed that the prevalence of adverse facial dermatoses was 27.8%, the most common reaction was acne and acne flare were found in 16% of cases, however contact dermatitis were 4%, flare of gram-negative folliculitis in 3.8%, Seborrheic dermatitis were 3%, and flare of rosacea in 1% of cases.

N95 masks are associated with the most severe adverse skin reaction followed by surgical masks while cotton masks are the least in induction or exacerbation of facial dermatoses.

Wearing masks more than 8 hours daily are associated with increasing liability to adverse skin reactions and this explains why health care workers are more affected.

Adverse skin reactions are more common in males, those who reuse the masks and also peoples who don't using a moisturizer after their use of facial masks.

Our results were supported by study of Rosner, [13] who found that 18.1 % of people experienced facial indentation within 3 hours of mask use and 44 % after 3 hours or more. The bridge of the nose (42.9%) and cheeks (28.6 %) were the most common areas of facial indentation. The chin (14.3 %) and behind the ears (32.1 %) are two further regions of facial indentation. 35.6 % of those surveyed used lotions or creams to prevent facial indentation. Dressings were utilized by 8.7% of the participants. 53.1 % of individuals had acne, with 11.1 % revealed acne within 1-3 hours of mask application and 47.8 % revealed acne after 3 hours. Only 35.3% of the subjects have history of acne while the others don't have.

Similarly, Chaiyabutr et al., [9] found that 767 of 1594 participants (62.3 %) reported adverse skin reactions as a result of prolonged use of masks. Acne flare-ups were the most common complaint (32.2 %), followed by pruritus (22.1 %) and oily skin (14.7 %). The additional skin reactions involved facial erythematous rash (12.7 %), facial pain (9.3%), skin dryness (4.7 %), aggravation of pre-existing dermatoses (3.6 %), and skin abrasion (0.6%).

In the study of Singh et al., [6] Irritant contact dermatitis (ICD; 39.5 %) was the most commonly observed dermatosis, followed by friction dermatitis (25.5 %). The nasal bridge (63 %) was the most commonly site affected by dermatoses, followed by the cheeks and chin (26%). Pruritus was the most frequent symptom reported by patients (67.44 %), while facial erythema (53.49 %) was the most frequent sign detected. Notably, they discovered two separate dermatoses, namely, whole-face erythema (21%) induced by doffing after a long shift and perioral dermatitis produced by repetitive licking of lips due to acute thirst caused by limited fluid intake after prolonged wear of PPE.

According to Hua et al., [14] According to Hua, when the protective equipment was worn, trans-epidermal, skin hydration, water loss (TEWL), and pH all increased dramatically. With the use of personal protective equipment, sebum production increased on both covered and uncovered skin. The use of a N95 mask was associated with more adverse reactions than the use of a surgical mask, including a higher level of discomfort.

Furthermore, Park et al., [10] discovered that after 1 and 6 hours of applying a mask, skin temperature, hydration, and sebum secretion all altered dramatically. There were substantial variations in skin temperature, and moisture between covered and non-covered areas by mask.

Techasatian et al., [11] found that the prevalence of negative skin reactions was observed in 454 cases (54.5%). Acne was the most common adverse skin reaction observed in the research population (39.9%), followed by facial erythematous rashes (18.4%), and facial itching (15.6%).

Our results were supported also by study of Choi et al., [15] who found that working as an HCW, wearing N95 masks, and using masks every day were all linked to an increased risk of contact dermatitis when compared to people who did not work as HCWs, used surgical or cotton masks, or did not wear masks daily. When compared to the general public, HCWs reported considerably higher acne worsening. Exacerbation of acne was reported by considerably more number of subjects who used facial masks for more than 6 h/day (23.93%) than by those who used facial masks less than 6 h/day (10.18%).

CONCLUSION

The prevalence of face mask related induced or exacerbated facial dermatoses during COVID-19 pandemic in Egyptian population was 27.8% and the most common facial dermatosis was acne and flare of acne which present by 16% followed by contact dermatitis 4%, flare of gram-negative folliculitis in 3.8%, seborheic dermatitis were 3% and flare of rosacea in 1% of cases.

There is also adverse skin reactions which result from prolonged use of facial masks such as itching which present in (30%), facial dryness (11%), facial erythema (11.8%), and facial indentations (10.8%).

There was statistically significant relation between adverse skin reaction and age, sex, occupation, duration of daily use of mask, mask type, reuse of masks and use of moisturizers.

REFERENCES

1. O'Dowd K, Nair KM and Forouzandeh P. Face Masks and Respirators in the Fight against the COVID-19 Pandemic: A Review of Current Materials, Advances and Future Perspectives. *Materials (Basel).* 2020; 13(15):3363.
2. Du Toit A. Outbreak of a novel coronavirus. *Nat Rev Microbiol.* 2020; 18(3):123.
3. World Health Organisation. COVID-19 Transmission and Protective Measures. *s. Geneva*: *World Health Organisation*, 2020.
4. Lin P, Zhu S and Huang Y. Adverse skin reactions among healthcare workers during the corona virus disease 2019 outbreak: a survey in Wuhan and its surrounding regions. *Br JDermatol.* 2020; 183(1):190-2.
5. Oberg T and Brosseau LM. Surgical mask filter and fit performance. *Am J Infect Control*. 2008; 36(4): 276- 82.
6. Singh M, Pawar M and Bothra A. Personal protective equipment induced facial dermatoses in healthcare workers managing COVID-19 cases. *J Eur Acad Dermatol Venereol*. 2020; 34:378–80.
7. Yan Y, Chen H and Chen L. Consensus of Chinese experts on protection of skin and mucous membrane barrier for health-care workers fighting against coronavirus disease. *Dermatol Ther*. 2020; 29:13310.
8. Cinelli E, Fabbrocini F and Fattore D. Safe distance, safe patients! Therapeutic management of oncological patients affected by cutaneous and mucosal adverse events during the COVID-19 pandemic: an Italian experience. *Support Care Cancer*. 2020; 28: 3991–3.
9. Chaiyabutr C, Sukakul T, Pruksaeakanan C, et al. Adverse skin reactions following different types of mask usage during the COVID- 19 pandemic. *Journal of the European Academy of Dermatology and Venereology*. 2020. Doi: 10.1111/jdv.17039. Epub 2020 Dec 21. PMID: 33220083; PMCID: PMC7753376.
10. Park SJ, Han HS, Shin SH, Yoo KH, Li K, Kim BJ, et al. Adverse Skin Reactions Due to Use of Face Masks: A Prospective Survey during the COVID- 19 Pandemic in Korea. *Journal of the European Academy of Dermatology and Venereology*. 2021; 2:17447.
11. Techasatian L, Lebsing S, Uppala R, et al. The effects of the face mask on the skin underneath: A prospective survey during the COVID-19 Pandemic. *Journal of primary care & community health*. 2020; 11, 2150132720966167.
12. Han C, Shi J, Chen Y, et al. Increased flare of acne caused by long- time mask wearing during COVID- 19 pandemic among general population. *Dermatol Ther*. 2020; 29: 13704.
13. Rosner, E. Adverse effects of prolonged mask use among healthcare professionals during COVID-19. *J Infect Dis Epidemiol*. 2020; 6(3), 130.
14. Hua W, Zuo Y, Wan R, et al. Short- term skin reactions following use of N95 respirators and medical masks. *Contact Dermatitis.* 2020; 83(2), 115-21.
15. Choi SY, Hong JY, Kim HJ, et al. Mask induced dermatoses during COVID- 19 pandemic: A questionnaire- based study in 12 hospitals of Korea. *Clinical and Experimental Dermatology*. 2021;46(8):1504-10.