

Study of Clinical Characteristics and Aetiological Factors of Mask-Induced Acne

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Abstract

Background: Mask induced acne “Maskne” is a term that emerged after COVID pandemic in 2020. It was obligatory to health care workers and non-health care workers to wear protective masks for long periods of time. Aim of the study: the study aim was to determine clinical characteristics and possible aetiological factors of mask-induced acne. Patients and methods: A cross sectional observational study was carried out on 30 patients having Maskne and 10 age and sex matched healthy control conducted in December 2021 to June 2022. All patients were subjected to full history taking, clinical examination, and samples were taken for microbiological examination. Results: Most patients (63.3%) had mild acne. No significant association was found between acne severity score and the type, color, and weight of masks ($p>0.05$). Study results showed more growths of bacteria isolated from the masked area than non-masked areas and more than that found in control group. Conclusion: It was found that prolonged mask use can lead to the new onset of acne and worsening of the previous acne.

Keywords: Mask-induced acne; Clinical characteristics; Aetiological factors

Introduction

Acne vulgaris (AV) is a chronic inflammation of the pilosebaceous unit with development of polymorphic lesions, non-inflammatory (open and closed comedones) and inflammatory lesions (papules, pustules, and nodules) with varying degrees of severity (1).

Mask acne “Maskne” is a term coined during the 2020 COVID-19 pandemic. Face mask is used to prevent spread of respiratory infection. Mask acne was observed commonly in association with the widespread mask wearing to control the pandemic worldwide [2].

Mask wearing exacerbates acne due to sweating and increased humidity, leading to swelling of epidermal keratinocytes of the pilosebaceous follicle. Changes to surface sebum composition and skin pH may disrupt the skin barrier, leading to changes in skin microflora [3].

The human skin microbiome has important roles in skin health and disease. Latest understanding of acne pathogenesis has shifted from *Propionibacterium acnes* to *Cutibacterium acnes* colonization of sebaceous follicles [4].

Various studies demonstrated that other bacteria, namely *Staphylococcus epidermidis*, *Staphylococcus aureus*, *Micrococcus spp.* were related to the pathogenesis of acne vulgaris other than *Propionibacterium acnes*. However, the role of these microorganisms in pathogenesis acne is still controversial [1].

The current study aim was to determine clinical characteristics and aetiological factors of mask-induced acne.

Patients and methods

The study was carried out on 30 patients having acne vulgaris in the form of comedones, papules, pustules and nodules appearing in the area covered by face mask and 10 age and sex matched healthy control with no previous history of AV conducted in

December 2021 to June 2022 who attending the outpatient clinic of the Department of Dermatology, Venereology and Andrology of Benha University Hospital.

Ethical consideration

The study was approved by Ethical Committee on research involving human subjects of Benha Faculty of Medicine (Approval code: MS.20.9.2021). Fully informed consent was collected from all patients prior to the study.

Inclusion criteria

Adult more than 18 years old who agreed to participate in the study. With New onset of acne localized to mask area only or flare of previously treated acne after the era of COVID-19.

Exclusion criteria

Patients receiving topical or systemic therapy (received a systemic antibiotic in the last two weeks) were excluded, and those having facial dermatoses other than acne and pregnant or lactating females.

Methods

All patients were subjected to full history taking, clinical examination of facial skin, and samples were taken for laboratory investigation.

Clinical examination

To assess type, site and the severity of the acne lesions by the Global Acne Grading System (GAGS)⁽⁵⁾.

Laboratory investigations

Specimen was taken from contents of open or closed comedones, papules, pustules, or cystic lesions of acne by using a cotton swab from Acne lesions. Culture and incubation were done using a sterilized swab moistened with nutrient broth. The specimens were immediately split into anaerobic and aerobic conditional treatments in jars containing blood agar, then incubated both anaerobically and aerobically at 37°C for 24 – 48 hours. An AnaeroGen® Compact

sachet was placed into each anaerobic jar for the isolation of anaerobic bacteria, aerobic incubation for the isolation of aerobic bacteria.

Statistical analysis

The collected data was revised, coded, and tabulated using Statistical package for Social Science (IBM Corp. Released 2017. IBM SPSS Statistics for Windows, Version 25.0. Armonk, NY: IBM Corp.). Data were presented and suitable analysis was done according to the type.

Results

In terms of age, the mean age of patients was 23.73 years (± 4.87 SD), while the mean age of controls was 22.70 years (± 3.83 SD). The difference in mean age between the two groups was not statistically significant, ($p=0.546$). The range of ages for patients was 16.0 to 33.0, while the range for controls was 18.0 to 29. Both groups were entirely female (100.0%) (Table 1).

In terms of occupation, the patient group also had a higher percentage of doctors (30.0%), nurses (20.0%), sellers (13.3%) than the control group (0.0% and 20.0%, 10% respectively), while the patient group had a lower percentage of students (30.0%), medical representatives (3.3%) than the control group (60.0%, 10% respectively). However, this difference was not statistically significant ($p=0.389$).

In terms of the type of mask used, most patients (93.3%) used surgical masks, while only two patients (6.7%) used N95 masks. 19 patients (63.3%) reported

having a previous history of acne and/or flare, while 11 patients (36.7%) reported no previous history.

In terms of the duration of mask wearing, 4 patients (13.3%) wore masks for 4 hours, 5 patients (16.7%) wore masks for 6 hours, 15 patients (50.0%) wore masks for 6-12 hours, and 6 patients (20.0%) wore masks for 12 hours.

All patients (100.0%) had lesions on their chin, 20 patients (66.7%) had lesions on their cheeks, and 6 patients (20.0%) had lesions on their forehead. The results indicate that most patients (63.3%) had mild acne, while 30% had moderate acne, and only 6.7% had severe acne.

The results show that there is no significant association between acne severity score and the type, color, and weight of masks ($p>0.05$). The majority of patients in both the mild and moderate/severe acne groups wore surgical masks (94.7% and 90.9%, respectively).

However, a significantly higher proportion of the patient group had positive cultures for M AN compared to the control group (40% vs. 0%) ($p<0.05$).

The results show that there is no significant association between acne severity score and the culture MASK results ($p=0.129$). A higher proportion of patients with moderate/severe acne tested positive for the culture MASK (100.0%) compared to those with mild acne (73.7%). In the mild acne group, 14 patients (73.7%) tested positive for the culture MASK, while 5 patients (26.3%) tested negative. None of the patients in the moderate/severe acne group tested negative for the culture MASK. (Table 2).

Table (1) Clinical characteristics of acne vulgaris among the patient group.

	Patient n = 30	
	N	%
Previous history of acne and \or flare		
Yes	19	63.3
No	11	36.7
Time of naïve lesions or flare after mask wearing		
Mean \pm SD.	14.23 days \pm 6.02	
Median	12.00 days	
Range	3.00 – 24.00days	
Duration of mask wearing		
4hrs	4	13.3
6 hrs	5	16.7
6-12hrs	15	50
12 hrs	6	20.0
Site of lesion		
Chin	30	100.0
Cheeks	20	66.7
Forehead	6	20.0
Increased sweating below the mask		
Yes	30	100.0
No	0	0.0

Table (2) Association between Acne severity score and culture MASK and non Mask results among patient group.

Culture result of	Acne severity score					Test (p)
	Mild n = 19		Moderate/Severe n =11			
	N	%	N	%		
Masked						
Positive	14	73.7%	11	100.0%		X ² =3.474
Negative	5	26.3%	0	0.0%		P=0.129
Non masked						
Positive	8	42.1%	7	63.6%		X ² =1.292
Negative	11	57.9%	4	36.4%		P=0.256

Discussion

Face masks play a vital role in reducing the spread of infection. They mainly cover the oral and nasal apertures, being hooked onto the ears. Three types of face mask are most commonly used in general, cloth masks, surgical masks and N-95 respirators. It was compulsory for healthcare workers (HCWs) attending to patients with COVID-19 to use Face masks, which consequently makes them susceptible to adverse cutaneous reactions, including acne, itch, rash and, pressure injuries [6].

Acne may result in severe discomfort, itching, pain. Acne may also lead to refusal to wear face masks and consequent continued spread of respiratory pathogens [7].

The aim of the present study was to evaluate the clinical characteristics and etiological factors that leads to mask induced acne.

This study was a prospective observational study conducted on 30 patients with mask induced acne, recruited from dermatology outpatient clinic at Benha University Hospitals in addition to 10 age and sex matched controls.

The present study revealed that the mean age of cases was 23.73 (4.87) SD. Females were the dominant gender in our study (100%). The present study showed no statistically significant difference in age between patients with mild or moderate / severe acne.

A similar study in Lahore by **Hayat et al.**, [8] showed a similar female predominance of 102 (67.66%) with a mean age of 30.5 years. This is best explained by the fact that women and people in this particular age group tend to care more about their skin and are more likely to seek medical attention for their skin health. Another reason could be explained that women are more likely to experience stress than men, and stress can aggravate acne.

The present study showed that patients were mostly doctors (30.0%) in health care workers and students (30.0%) in non-health care workers. In same line with **Yaqoop et al.**, [9] who found that acne was prevalent in 53.4% of participants with maximum cases reported in female doctors (59.1%), (23.8%) nurses, (1.0%) pharmacists, (1.0%) technicians and the remaining (15.0%) constituted other hospital staff.

Nasir et al., [10] conducted across sectional study to determine the prevalence of adverse skin reactions

associated with mask among undergraduate students at University of Cyberjaya in Malaysia, acne was the most common complain which agree with our results.

The current study revealed that in the studied population, surgical masks were the most used type of mask. Similar results were reported by **Bakhsh et al.**, [11] in Jeddah Saudi Arabia. A self-limited electronic survey was distributed to residents of Jeddah city using multiple social media platforms. A total of 630 participants were enrolled. Surgical mask was the most frequently used mask with a percentage of (94.8) %.

Our study revealed that most patients wore masks for more than 6 hours. **Bakhsh et al.**, [11] had found that the majority of participants wear mask for five to seven days per week, and for less than four hours per day. Prolonged mask use for 8–12 h/day led to more chances of skin changes. In **Dash et al.**, [4] study, prolonged usage of mask for more than 6 h/day revealed a higher risk of a mask-induced cutaneous manifestations. The increasing number of mask and type of mask worn were also found to have statistical association with mask induced cutaneous changes.

Also, **Yaqoop et al.**, [9] study had confirmed that, most patients wear masks for 4-8 hours pe day, 57.3% of patients who experienced new onset acne because of the face mask.

In our study, chin was involved in 100% of cases, (66.7%) of them also had acne in both cheeks and 20 % had forehead lesions. Similarly, **Hayat et al.**, [8] found that the most affected area was chin 16 (86%) of cases.

In contrary with our study, **Yaqoop et al.**, [9] found that the most common sites of eruption of acne are along the cheeks (45.1%), followed by nose (40.9%), chin (31.6%), forehead (26.9%), chest and upper back (8.3%).

In our study all patients experienced increased sweating below mask (100%). According to **Teo et al.**, [2] closure by mask increase the humidity and sweating below mask which go with the same line of our study.

Similarly, **Hayat et al.**, [8] found that sebum excretion rate increased by 10% with every rise of temperature 1degree. This high temperature and humidity under the mask cause occlusive effect

thereby hampering skin hydration resulting in irritation of ducts of pilosebaceous glands.

In our study those with previous history of acne were 63.3% which flared again after using masks, while naïve maskne patients were 36.7%.

Kaul et al., [13] published their study in the Journal Of Clinical and Aesthetic dermatology. which gave similar results that most of patients had preexisting acne which flared after using masks, and they needed to wear surgical mask or N95 respirators for several hours a day every day 20. In the contrary **Hayat et al., [8]** found that those with new episodes (72) % while those with flare of preexisting acne were 21 (28%).

The present study revealed that majority of patient group complain of pruritis (80%). **Christopher et al., [14]** study also found that dryness/tenderness, itch, and rash were the most reported symptoms in their patients' group.

The current study showed that the most common type of lesion observed was pustules, in 90.0% of patients. Papules affected 83.3% of patients. Open comedones were observed in 33.3% of patients, while closed comedones were observed in 36.7%. Nodules were the least common type of lesion, observed in only 6.7% of patients.

Anczyk et al., [15] had the same findings with our results, they revealed that the most common type of acne lesions was pustules, then comedones and cystic lesions were the least type.

The current study revealed that patients with mask induced acne had more bacterial skin colonization than control group (83.3% VS 40%). A significant high proportion of the patient group had positive cultures for anaerobic bacteria in the area covered by the mask compared to the control group (40% vs. 0%).

The disruption of the healthy skin microbiome associated with mask-wearing has profound implications on several dermatological conditions such as eczema, acne, and perioral dermatitis, with bacterial dysbiosis implicated in its pathogenesis **[16]**.

The present study showed that majority of patients (63.3%) had mild acne, while 30% had moderate acne, and only 6.7% had severe acne, which agreed with other report by **Yaqoob et al., [9]**.

There was a significant association between acne severity and the culture results for anaerobic bacteria in the area covered by the mask, with a higher proportion of patients with moderate/severe acne testing positive for both anaerobes and aerobes compared to those with mild acne.

Conclusion

The study results showed a significant correlation between the frequent usage of face masks and maskne.

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