

Frequency of acne formation with usage of face masks and its associated factors

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Abstract

Objective To determine the frequency of acne formation with usage of face masks among health care workers and to determine factors associated with acne formation in relation to usage of face masks.

Methods This was a cross sectional study, conducted in a tertiary care hospital. Study participants were 191 healthcare workers in different categories. Data was obtained on face mask related factors and acne development or exacerbation. Chi Square test was applied to see the relationship between acne formation and usage of face masks.

Results Among the participants 70% were female and 30% were male. Surgical mask were the most common type of mask used by them. On average the duration of mask use was 6 to 12hrs/day and majority was using facemasks for more than 6 weeks. Among the participants 20% of those experienced acne at O-Zone of face.

Conclusion There is an association of acne formation at O-zone of the face and duration of mask usage per day among healthcare workers.

Key words

Face mask; Acne; Maskne; Surgical mask; O-zone; Acne mechanic.

Introduction

Acne is one of the foremost complains in skin conditions and it affects around 85% of the population.¹ There are several known risk factors of acne formation mainly consumption of high glycemic index foods, including dairy products and chocolate, higher fat intake, obesity, smoking and alcohol use.²

There has been a considerable surge in the incidence of acne and skin conditions during the

COVID-19 pandemic. The likely reason is exacerbation of pre-existing conditions.³ These conditions include atopic dermatitis, psoriasis and autoimmune bullous disorders.⁴ The pivotal factor in the exacerbation of acne is the use of personal protective equipment (PPE). PPE is used by many workers belonging to different occupations and is considered a mandatory part of workplace attire. However, owing to the recent COVID-19 pandemic; the use of PPE has become more and more prevalent in any and every occupation, especially healthcare workers. The cutaneous or systemic complications⁵ require a new therapeutic regime.^{6,7}

Maskne or acne mechanica is a term that is used to delineate acne caused by frictional pressure⁸. The term maskne has become increasingly popular during the pandemic; particularly within

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the spectrum of the public domain where it is used to represent several facial problems like dry skin, rosacea and contact irritant dermatitis in association with mask use.⁸ Individuals often buy expensive but potentially ineffective treatment regimes, facial creams, soaps and cosmetic products in an attempt to treat and prevent the occurrence and recurrence of these conditions.

In the pandemic there was prolonged wearing of facemask among health care workers (HCWs) as part of PPE. Certain studies have reported that up to 97% of HCWs showed skin lesions related to the enhanced protective measures employed mainly affecting the cheeks, forehead, nasal bridge, ear lobes and hands.⁹⁻¹¹

As the demand of face masks increased, the mask manufacturers were not able to meet the demands. Centers for Disease Control (CDC) in an attempt to meet the ever-increasing demand for masks to combat Covid-19 spread, recommended the use of scarves, bandanas and homemade fabric as face masks. This resulted in fabric type masks being manufactured and utilized in addition to recommended masks like N-95, KN-95, respirator and disposable surgical masks. Fabric masks have gained popularity in the public eye as an alternative to surgical masks.^{11,12} Single layer masks can filter ultra-fine particles, about 35%, but multilayered mask filter a higher percentage of particles, about 45%.¹¹ In certain studies, efficiency of a fabric mask was tested after being washed and showed a decreased filtration capacity of the mask.^{11,13} Literature had shown higher prevalence of self-reported adverse skin reactions to surgical and cloth masks.¹⁴

Face masks are recommended as part of personal protective equipment (PEE) and as a public health measure to prevent the spread of disease through respiratory droplets and saliva from infected individuals.¹⁴ By mid-2020, nearly 90%

of the global population lived in regions that had almost universal mask use or had laws requiring mask use in some public locations.¹⁵ One adverse effect of prolonged mask wearing is the emergence of Maskne. It affects all individuals but is specifically prevalent amongst frontline healthcare personnel. This study aimed to identify the factors leading to maskne in healthcare workers.

Methods

This cross sectional study was conducted in various departments of Liaquat National Hospital Medical College Karachi. The study participants were health care workers including consultants, residents, interns, technicians, phlebotomists, porters, janitors and housekeeping staff. The sample size calculated was 191 participants. Purposive sampling technique was used for recruitment. Participants who had preexisting skin allergies, preexisting severe acne or were diagnosed with other skin diseases were excluded from the study. The study was conducted from June 2021 to May 2022.

Data was collected on a structured questionnaire at the work place during free time of participants. Clinical criteria proposed for maskne was onset of papules and comedones on the facial skin within 6 weeks of start of regular face mask use or exacerbation of acne over the masked area represented as O-zone in **Figure 1**

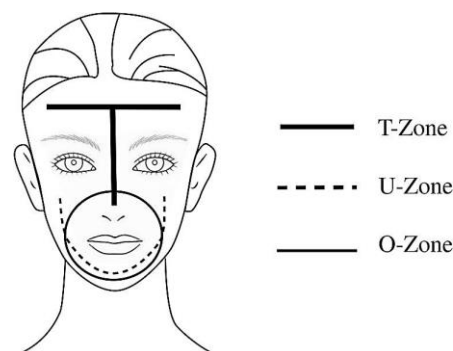


Figure 1 Zones of face.[16]

and exclusion of other diagnosed skin disorders like perioral dermatitis, seborrheic dermatitis, pityrosporum folliculitis and acne rosacea.¹⁶

Ethical approval of study was taken from ERC committee of Liaquat National Hospital Medical College. Informed consent was taken and documented. Statistical analysis of the study data was done using SPSS version 23. Mean and standard deviations was calculated for continuous variables such as age, duration of mask use etc. Frequency and percentages were used for categorical variables like type of mask and duration of mask use. Chi Square test was applied to see the relationship between acne formation and usage of face masks.

Results

A total of 191 participants were recruited for the study, the participants were health care workers wearing PPE on a daily basis and were interviewed at their workplace. More than 2/3rd of the study population was females. Mean age of participants was 27.105±6.79 years. The age range of male participants was between 22 and 56 years and that of females was between 21 and 60 years. About 2/3rd of the study population comprised of medical and nursing interns. More than 90% of study participants had no known comorbid conditions (**Table 1**).

Table 2 discussed work place related characteristics. About 2/3rd had work duration between 6 to 12 hours per day. Less than 1/3rd of healthcare workers perform hand hygiene before removing face mask.

Table 3 explained the mask related characteristics of participants. Most commonly used mask by healthcare workers was surgical mask. More than 1/3rd of study population had exacerbation of acne after mask use. O-zone was affected in about 19.5% participants (the region between bridge of nose, around the lips and

Table 1 Demographic characteristics and history of dermatology of study participants (n=191).

Variable	Frequency	%age
Mean age of study participants	27.105 ± 6.79yrs.	
Gender		
Male	57	29.8
Female	134	70.2
Occupation		
Consultants	7	3.66
Residents	65	34.03
Interns	19	9.90
Nurses	14	7.32
Janitors	17	8.90
Medical/Nursing students	69	36.20
Marital status		
Single	136	71.20
Married	55	28.80
Co-morbid diseases		
Yes	11	5.70
No	181	94.20
Any allergy to makeup		
Yes	32	16.40
No	122	83.60
Allergy to skin care products		
Yes	32	16.70
No	114	78.10
History of Polycystic ovaries		
Yes	19	13
No	127	87
History of skin conditions		
Yes	60	32.10
No	127	67.90

SE = standard error.

chin), U-zone in 14.5% (region along the perimeter of face, along the jaw, chin and ear) and T-zone in 3.7% (region between forehead and bridge of nose).

There was significant association between daily mask use and acne formation (p value <0.05). There was also significant association between duration of mask use (>6 weeks) and acne formation at O-zone among the participants (p value <0.05).

Discussion

Healthcare worker showed increase in the exacerbation of acne in relation with the mask use.¹⁷ It is associated with the duration of use, type of mask and hand hygiene while handling

Table 2 Work place related characteristics of study participants (n=191).

Variable	Frequency	%age
Working hours per day		
≤ 6hrs	30	15.80
>6 to 12hrs	131	68.40
>12hrs	30	15.80
Duration of wearing mask per day		
≤ 6hrs	50	26.30
> 6 to 12 hrs	123	64.70
>12hrs	17	8.90
Time spent outdoors		
6 to 12hrs	90	48.40
≥12hrs	101	51.60
Washed hands before removing mask		
Yes	65	34
No	126	66
Used alcohol based cleanser		
Yes	32	16.80
No	159	83.20
Well ventilated workplace		
Yes	109	57.10
No	82	42.90
Mask-off duration at work		
20 to 30 mins	127	66.50
60mins	39	20.45
90mins	25	13.10
Frequency of face wash per day		
2 to 3 times	144	75.40
5 to 6 times	39	20.40
6 or more times	8	4.20

mask. Healthcare worker used it for longer duration during pandemic. In addition, working in COVID ward, prolong shifts duration and stressful environment further augment the development of acne.¹⁸

Similar to the study results, the female gender and young age reported it more commonly.¹⁹⁻²¹

The most common type of mask used among healthcare workers was found to be surgical masks as most tertiary care hospitals provide their staff with a new surgical mask on a daily basis. The most likely reasons for maskne at o-zone were increased facial sweating, increased duration of mask use and frictional pressure from the mask on the chin and lips. Proper skin lubrication and use of mild skin cleanser have been recommended.²²

Table 3 Mask related characteristics of study participants (n=191).

Variable	Frequency	%age
Preexisting Acne		
Yes	72	37.70
No	104	54.50
Not sure	15	7.90
Acne worsen since facemask use		
Yes	72	37.70
No	104	54.50
Not Sure	15	7.90
Duration of acne getting worse		
Less than 6 weeks	15	9.90
More than 6 weeks	51	26.60
Measures taken to control acne		
Yes	64	33.50
No	116	60.70
Not sure	11	5.80
Increase facial sweating since mask use		
Yes	121	63.70
No	69	36.30
Use face mask daily		
Yes	169	88.50
No	21	11.50
Type of face mask		
Fabric	14	7.30
Surgical	160	83.80
KN-95	17	8.90
Used more than one mask at a time		
Yes	52	27.20
No	139	72.80
Use of tri layer mask		
Yes	86	44.80
No	105	55.20
Frequency of mask change		
Everyday	162	84.40
Once a week	26	13.50
Every 10 days	4	2.10
Use of mask with metallic nose wire		
Yes	128	66.70
No	63	33.30
Injury on nose due to metallic wire		
Yes	41	21.50
No	150	78.50
Ear pain due to mask		
Yes	181	94.80
No	10	5.20
Acne Formation		
Yes	72	37.7
No	119	62.5

The problem of frictional pressure on nose due to the metallic nose wire was mainly faced by participants with spectacles. Adjustment of mask wire underneath their spectacles reduced the

pressure injuries as well as prevented fogging of spectacles due to condensation. Placing two or three layers of gauze inside mask have been suggested in literature.²³ Pain behind earlobes due to elastic mask band was also reported by healthcare worker created by increased pressure and tension caused by elastic earlobe band. Wearing masks which had the ties instead of elastic earlobes solved the problem.

The limitation of the study was that due to the lockdown authors did not have access to health care workers from other hospitals.

The strengths of this study are that it identified the type of mask commonly used by healthcare workers, frequency of mask change and duration of mask use by health care workers during their shifts. Most common facial region of acne formation was identified. It also highlighted the development of pressure injury on nose due to metallic wire in masks and pain behind ear lobes due to prolong mask use and suggested possible solutions.

Conclusion

There is an association between acne formation at O-zone of the face and duration of mask use per day among healthcare workers.

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