RESEARCH ARTICLE

MASKNE - Prevalence and association of causative factors during Covid-19 pandemic at a tertiary care hospital of Karachi

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Abstract

Objective: To assess the prevalence of mask acne in general population and healthcare workers, and the association of acne breakout due to mask-wearing with different factors.

Method: The prospective, cross-sectional study was conducted from January to April 2022 at the Dermatology Department of Aga Khan University Hospital, Karachi, and comprised patients of both genders of all ages who received acne treatment during the period. Data was collected using a self-designed questionnaire having Cronbach's alpha value 0.789 which was filled by the subjects. Data was analysed using SPSS 19.

Result: Of the 200 subjects, 152(76%) were females and 48(24%) were males. The overall mean age was 25.50±8.49 years. There were 122(61%) non-healthcare workers and 76(38%) were healthcare workers. Acne was prevalent in 157(78.5%) participants, and, of them, 123(78.3) were females. Significant association of acne breakout due to mask-wearing was found with regular mask change habit ($p<0.001$) and past history of acne ($p<0.01$). Participants who wore mask continuously for 6 hours or more came up with more complaints of acne ($p<0.05$).

Conclusion: Prolonged and continuous use of the same mask for 6 hours or more could lead to acne eruption.

Key Words: Maskne, Healthcare worker, non-healthcare worker, HCW, non-HCW, Personal protective equipment, PPE. (JPMA 73: 1221; 2023) **DOI: 10.47391/JPMA.6734**

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Introduction

In December 2019, a novel coronavirus was first identified as a pathogen responsible for a viral outbreak in a city in China after which the coronavirus disease-2019 (COVID-19) spread around the world[1]. This extremely contagious disease can be prevented by wearing personal protective equipment (PPE), like masks that protect the wearer against respiratory infections. Prolonged wearing of face masks due to COVID-19 has been associated with the development of acne and acne flare, commonly referred to as Maskne.[2] Formaldehyde and other preservatives have previously been found in N95 mask, which may cause contact dermatitis[3]. The effects of friction, heat and moisture from breathing while wearing a mask can worsen the symptoms, like itching, redness, rash, burning and increased oil production[4]. It was demonstrated that prolonged use of the masks caused mechanical harm to the skin, including maceration, abrasion, erythema, desquamation, itching and acne, particularly among healthcare workers (HCWs)[5]. One observational study reported that wearing a mask for an extended duration triggered acne and rosacea[6]. Another study reported that mask-wearing can induce the Koebnerisation phenomenon in psoriasis patients[7]. Social media platform Twitter has also reported patients' perception of mask-related acne to be 89.1%[8]. Recent literature suggested that Maskne should be diagnosed in cases of acne that appear 6x weeks after regular mask-wearing or worsening of pre-existing acne in areas covered with mask[9]. Hua et al. assessed the short-term cutaneous effects of wearing surgical masks and PPE on the skin and found a significant change in trans-epidermal water-loss, erythema, hydration and sebum production. To prevent dehydration, masks are frequently used in conjunction with emollients and moisturisers, but these can be greasy and harmful for any existing inflammatory skin conditions, like acne.[6] It has also been observed that acne affects the quality of life in many ways and it has a significant effect on psychological wellbeing, and acne patients generally run the risk of having a poor quality of life[10].

Acne lesions usually appear on areas covered by the mask, and the severity varies from mild to severe. The possible reasons for the outbreak in specific mask-bearing areas are increased humidity and temperature. It is evident from literature that humidity and rise in temperature can affect sebum secretion, and increased humidity also increases the amount of squalene in the skin. It is also postulated that excessive sweating and increased humidity can cause swelling of the epidermal cells. These changes lead to acute obstruction of

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pilosebaceous duct from dead cells, sebum and bacteria, and lead to acne flare. Other factors are humidity and increased temperature under the mask[11]. However, the specific aetiology of acne flare-ups caused by mask usage is still unknown[10]. Skin barrier function is compromised by breathing in a closed environment and by friction with the mask[10]. Non-comedogenic moisturisers are given to reduce friction and protect the skin barrier[12]. Acne should be treated by standard acne treatment depending upon the severity of acne.[13]

Although, it has been observed and reported that continuous PPE usage can cause direct damage to the skin and exacerbates pre-existing skin conditions, such as acne and seborrheic dermatitis, numerous mask-affected dermatoses have been observed in the literature[2]. The current study was planned to examine the prevalence of mask acne in the local context both in HCW and non-HCWs, and to assess the effects of mask material and mask changing habits on acne flare.

Subjects and Methods

The prospective, cross-sectional study was conducted from January to April 2022 at the Aga Khan University Hospital (AKUH), Karachi, after approval from the institutional ethics review committee, the sample size was calculated using EpiInfo[14] at 95% confidence level, 50% hypothesised frequency of the desired outcome, and 5% margin of error[15]. The sample was raised using convenience sampling technique. Those included both HCWs and non-HCWs of both genders regardless of age who received acne treatment during the period. Patients with other causes of acne, smokers, acne patients on topical and systemic therapies, those undergoing special diets, like vegans, keto, vegetarians, and those with other comorbidities which could trigger acne were excluded.

Data was collected using a self-designed questionnaire having Cronbach's alpha value 0.789 which was filled by the subjects. The consent form was part of the questionnaire. Responses of those who returned incomplete consent form, or the questionnaire were excluded. The survey tool included questions about age, gender, education, nature of work (indoor or outdoor), duration of mask usage and frequency of mask change, as well aa history of acne.

Data was analysed using SPSS 19. Quantitative variables were presented as mean ± standard deviation, while qualitative variables were reported in frequencies and percentages. Post-stratification, Chi-square test was used to evaluate the differences in the distribution of responses. P<0.05 was considered statistically significant.

Results

Of the 200 subjects, 152(76%) were females and 48(24%) were males. The overall mean age was 25.50±8.49 years. There were 60(30%) married subjects, 171(85.5%) belonged to urban areas, 153(76.5%) had graduate level of education, and 99(59.5%) had middle-income background. There were 122(61%) non-HCWs and 76(38%) were HCWs, 148(74%) wore a surgical mask, 39(19%) wore cotton mask, 11(5.5%) wore N95 mask, 100(50%) wore the mask for ≤6 hours, 100(50%) wore it for ≥6 hours, 110(55%) did not change their mask every six-hourly. All the study variables were compared along gender lines (Table 1). Acne was prevalent in 157(78.5%)

Table-1: Sociodemographic characteristics and mask-wearing habits.

Variables	N Total=200	%	Male) 48	Female 152	P-value
Marital status					
Single	139	69.5	38 (27.3)	101 (72.2)	0.06*
Married	60	30.0	9(15)	51(85)	
Residence area					
Urban	171	85.5	40(23.31)	131(76.6)	0.62
Rural	29	14.5	8(27.5)	21(72.4)	
Education					
Postgraduate	28	14.0	5(17.8)	23(82.14)	0.46
Graduate	122	61.0	28(22.9)	94(77)	
Below graduates	47	23.5	14(29.7)	33(70.2)	
Socioeconomic status					
High	11	5.5	2(18.1%)	9(81)	0.53
Middle	119	59.5	32(26.8)	87(73.1)	
Low	69	34.5	14(20.2)	55(79.7)	
Nature of work					
Indoor	175	87.5	37(21.1)	138(78.8)	0.003*
Outdoor	22	11.0	11(50)	11(50)	
Occupation					
Non-Health worker	122	61.0	27(22.1)	95(77.8)	0.380
Health worker	76	38.0	21(27.6)	55(72.3)	
Type of Mask					
N95	11	5.5	3(27.2)	8(72.2)	0.101
Surgical	148	74.0	39(26.3)	109(73.6)	
Cotton	39	19.5	4(10.2)	35(89.7)	
Duration of wearing mask					
≤6 hours	100	50.0	26(26)	74(74)	0.508
≥6 hours	100	50.0	22(22)	78(78)	
Past History of Acne					
No	85	42.5	21(24.7)	64(75.2)	0.945
Yes	103	51.5	24(23.3)	79(76.6)	
Maybe	11	5.5	3(27.27)	8(72.7)	
Mask changing habit every 6 hourly					
No	110	55.0	21(19)	89(80.9)	0.121
Yes	75	37.5	21(29.5)	54(72)	
Maybe	15	7.5	6(40)	9(60)	
Use of mask caused a flare of acne					
No	43	21.5	14(32.5)	29(67.4)	0.138
Yes	157	78.5	34(21.6)	123(78.3)	

Missing data was due to incomplete responses and unanswered questions.

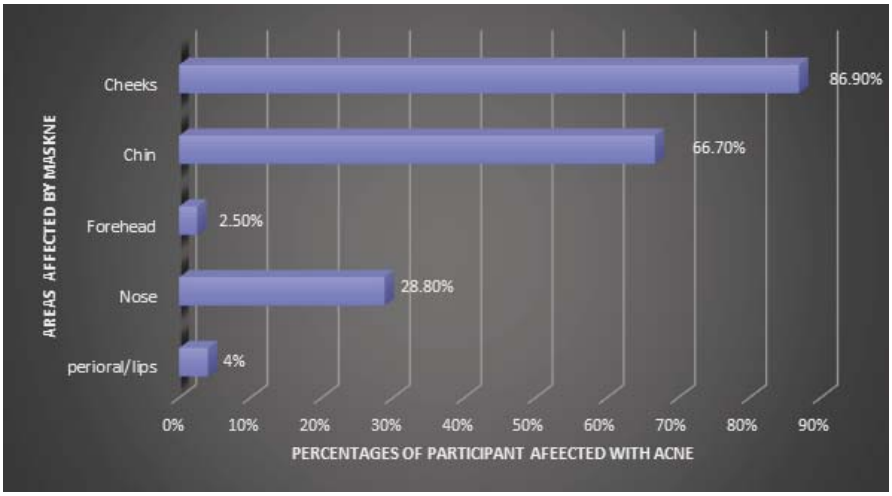

Figure: Areas of the face affected by mask acne (n=200).

participants, and, of them, 123(78.3) were females. The most affected areas on the face were cheeks, followed by chin and nose (Figure).

Significant association of acne breakout due to mask-wearing was found with regular mask change habit (p<0.001) and past history of acne (p<0.01). Participants who wore mask continuously for 6 hours or more came up with more complaints of acne (p<0.05). Acne incidence was significantly between HCWs and non-HCWs (Table 2).

Table-2: Factors associated with mask acne flare-ups.

Factors	Responses	Did mask flare your acne?		*P*-value
		No (%)	Yes (%)	
Do you change your mask every 6 hours?				
	No	14(7)	96(48)	0.000*
	Yes	21(10.5)	54(27)	
	Maybe	8(4)	7(3.5)	
Past history of acne				
	No	15(7.5)	70(35)	0.01*
	Yes	21(10.5)	82(41)	
	Maybe	6(3)	5(2.5)	
Type of mask				
	N95	4(2)	7(3.5)	0.188
	Surgical	34(17)	114(57.57)	
	cotton	5(2.52)	34(17.17)	
Duration of wearing a mask				
	<6 hour	27(13.5)	73(36.5)	0.05*
	≥6 hours	16(8)	84(42)	
Socioeconomic status				
	High	1(0.5)	10(5)	0.56
	Middle	25(12.5)	94(47)	
	Low	16(8)	53(26.5)	
Occupation				
	Non-HCW	20(10)	102(51)	0.02*
	HCW	23(11.5)	54(27)	
Work nature				
	Indoor	40(20)	135(67.5)	0.24
	Outdoor	3(1.5)	21(10.5)	

HCW: Healthcare worker.

Discussion

The current study planned to evaluate the prevalence of acne flare caused by masks during the COVID-19 pandemic, which is an area not widely researched.

Mask acne was prevalent in 78.5% participants which was higher than the earlier reported 53.4% prevalence in HCWs[15]. Other studies reported 59.6% and 56%[16,17]. The current finding of increased incidence among females than males is in line with literature[15]. In the current study, acne prevalence was higher among non-HCWs, which is contrary to another study in which acne was commonly reported in HCWs[15,18]. However, one study reported adverse skin reaction with face masks in both HCWs and non-HCWs[19]. The current study observed that the common areas affected were cheeks (86.9%), chin (66.7%), and nose (28.8%), which is in line with literature[15,18].

The current study found a significant association between participants who did not change their mask every six hourly and eventually had more breakouts of acne flare, and between the ones who wore masks >6 hours compared to those who did not wear for that long. Concordant results were reported earlier, suggesting that wearing a face mask for 4-8 hours or more increased the risk of adverse reactions, and the study also identified the habit of not frequently changing the face mask as a reason behind unfavourable skin reaction[19]. Another significant factor observed in the current study is that mask acne affected non-HCWs more than the HCWs, which is also reported earlier[19]. It may be because, compared to the general population, HCWs has more knowledge about the proper disposal of masks or expiry of masks, and they had better access to fresh masks.

In addition, past history of acne was another important factor in the current study, which is consistent with an earlier study[20,21]. However, the current study found that most of the participants reported acne after using a surgical mask, however, there was no significant difference found among surgical mask, N95 and cotton masks. This was in contrast to another study in which

maximum participants reported acne after using the N95 mask[21]. Another study reported that both surgical and N95 masks caused new acne flare and even increased the pre-existing acne[22].

A study recommended applying non-greasy moisturiser before and after using a mask, avoiding makeup during acne flares, using mild skin cleansers, and advised avoiding irritants, like ethanol and hot water, that break the skin's protective barrier[23]. Another important tip in this regard is to wash hands every time before applying the mask and after removing it. In addition, adding two layers of gauze inside the mask can help to limit the amount of water vapours that come out of the mouth as well as perspiration[24]. N95 should be replaced every 3 days and surgical masks should be changed every 4 hours. It is also important to remove the mask for 15 minutes every 2 hours[25].

The limitation of the current study is its small sample size. Also, some other factors like stress and hormonal variations were not taken into consideration that might be a cause of acne flare. There is a need for large multicentre studies in this regard.

Conclusion

Prolonged use of surgical and N95 masks along with the habit of using the same mask for long hours could flare acne. Non-HCWs were frequently affected by mask acne as they were not fully aware of the required precautions while using face masks.

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