



Original Research Article

Evaluation of facemask associated acne/ “Maskne” among health care workers and non-health care workers of India during COVID-19 pandemic-A cross-sectional study

Savfeena M. Nagani¹, Aanal T. Patel¹, Nirav Bapat¹, Krina B Patel^{1,*}¹Dept. of Dermatology, GMERS Medical College, Sola, Ahmedabad, Gujarat, India

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ABSTRACT

Introduction: “MASK-NE”-Mask associated Acne, is a common form of acne during COVID-19 pandemic. It is type of acne mechanica seen when external factor occludes the skin, leads to irritation, inflammation and starts/aggravates all grades of acne.

Materials and Methods: We conducted a cross-sectional study among 773 participants, using a Self-administered, aim oriented, questionnaire which includes demographic data, acne related history, type and duration of wearing mask & other mask related skin problems in COVID-19 pandemic during 15th October to 15th December, 2020.

Results: Among 773 participants, age ranged 18-45 years with mean 30.69 (SD: 61.30) and M:F was 1:1.78. After starting of Pandemic, occurrence of new development of mask associated Acne/ Maskne was higher among Health Care Workers (HCW) (34.98%) as compared to non- Health Care Workers (non-HCWs) (17.36%). Moreover, more number of HCWs had aggravation of their pre-existing acne and/or development of new of acne during pandemic (81.2%) than non-HCWs (61%). Wearing N95 type of mask showed the highest aggravation (82%) of Maskne as compare to wearing Surgical mask (75.5%) and wearing cloth (cotton) mask (65.6%).

Wearing a face mask for 4 to 8 hours/day and >8 hours/day showed increase in the aggravation of Maskne as compared to wearing a facemask <4 hrs/day.

Conclusion: Though wearing face masks can be the best strategy against COVID-19 infection, HAZARD OF THIS SAFETY is not negligible especially in front-line workers-doctors, nurses, pharmacist, policemen, hospital staff who are at higher risk due to several factors including type of mask use, duration of mask use etc.

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1. Introduction

Corona virus (COVID-19) pandemic is currently the most challenging threat to human health. Wearing a facemask is encouraged for preventing dispersal of droplets during talking, sneezing and coughing & therefore reduce the risk of environmental contamination by SARS-CoV-2 (COVID-19). However, long-time wearing of mask could lead to

the flare of acne due to higher temperature and humidity on the surface of facial skin caused by expired air and the perspiration.^{1,2} Acne flare ups seen over the regions of the face covered with the masks are type of acne mechanica and is also called as “MASK-NE”.

Higher temperature has a close correlation with the flare of acne, which can be explained by the effect of temperature on the sebum excretion rate which is shown to increase by 10% for each 1°C rise and also there is higher quantity of squalene in surface lipid when temperature of skin increases

* Corresponding author.

E-mail address: drkbpatel66@gmail.com (K. B. Patel).

underneath the mask.³

The ambient high humidity precipitates acne due to poral occlusive effect of skin hydration and irritation to the upper parts of pilosebaceous duct. In addition, sweat and increased humidity might cause swelling of epidermal keratinocytes, thus affecting the keratinocytes of pilosebaceous follicle and causing obstruction and aggravation.⁴ The constant friction & continuous occlusion with mask can lead to comedones, papules, pustules & even cystic acne.

Moreover, changes in both surface sebum composition and skin hydration could contribute to disruption of skin barrier, leading to bacterial microflora imbalance and these all together will form a perfect Petridish for bacterial growth.

There were several reports of adverse skin reaction related to the personal protective equipment, for example mask, gloves, etc, during this pandemic.⁵⁻⁹

Summary of possible mechanisms for development of MASKNE has been sited in the Figure 1

The aim of the present study was to evaluate the occurrence of mask associated acne & aggravation of acne during this pandemic in HCWs and non-HCWs.

2. Materials and Methods

A cross sectional study was conducted by department of dermatology at tertiary care hospital of western India, between 15th October to 15th December 2020. The study was approved by Scientific & Ethics committee (Ref.: GMERSMCS/IEC/30/2020).

Participants above 18 years of age, both sexes and willing to participate and filled up questionnaire were enrolled in the study. Both HCWs as well as non-HCWs were included in the study.

A Self-administered, aim oriented, brief questionnaire which includes basic demographic data (age, sex, occupation), acne related history (aggravation, past history of acne), type of masks (N95, surgical, cloth mask), duration of wearing mask & other face mask related skin problems were used for the study. There were two different ways of filling the questionnaire as follows-

1. 353 participants filled up the questionnaire in Out Patient Department (OPD) before consultation. All of them were evaluated for mask related side effects by consulting dermatologist. Out of which 113 Patients who had acne as per their responses and as observed by physician were included under OPD BASED study of acne and detailed history and examination regarding their grades of acne before and after pandemic were taken and photographs were taken.
2. Same questionnaire using live link Google form was sent via Whatsapp to HCWs and non-HCWs of Western India in equal proportion. Out of 420 responses received during stipulated time duration, 240

patients who had acne as per response received were included in the study.

New development of Mask associated acne, aggravation of pre-existing acne among HCWs and non-HCWs during pandemic was analyzed, variations in degree of aggravation of acne with different types of facemasks, variation in acne associated with duration of mask wearing and other skin problems because of regular wearing of facemasks were noted.

The collected data were analyzed using Microsoft excel; version 2010. Descriptive statistical methods, mean, standard deviations (SD), Confidence Interval (CI), Odds Ratio (OR), Chi square test, p value were used to analyze the demographic data.

3. Results

During the study period, 773 responses to self administered questionnaire were received. Age of the participants ranged from 18-45 years (Mean: 30.69; SD: 61.30) and M:F ratio 1:1.78. (M= 279, F=494) . 595(77%) responses were from HCWs and 178(23%) were from non-HCWs.

Among 595 HCWs, 132(22.18%) patient had already existing acne before pandemic, 162(27.22%) patients developed new onset of Acne and 301 responders (50.58%) had no Acne.

Among 178 non-HCWs, 34(19.10%) had preexisting acne, 25(14.04%) patients developed new onset of Acne, and 119 responders (66.85%) had no Acne.

Analysis of participants showed that new onset of acne development was higher among HCW (34.98%) as compared to non-HCWs (17.36%). (OR 2.56; 95% CI -1.59 to 4.10; p value 0.0001)(Chart 1)

Out of total 773 participants; 353 (45.66%) were found to have acne and they were further evaluated. Among 353 patients having acne, age of the patients ranged from 18-45 years (Mean: 31.58; SD: 73.32) and M:F ratio was 1:2.29. (M= 107, F=246). Out of 353 patients having acne, 113 (32%) were evaluated directly (OPD based survey) and 240(68%) were evaluated indirectly (via google form survey).

Among 353 patients of having acne; 294 (83.28%) were HCWs while 59 (16.72%) were non-HCWs. New onset of acne and/or aggravation of pre-existing acne was seen in 81.2% (N=239) of HCWs in comparison to 61%(N=36) of non-HCWs, which was statistically significant. (OR =2.77; 95% CI =1.52 to 5.07; p value 0.0008)

Among 294 HCWs, 162(55.1%) had new onset of acne, 77(26.19%) had aggravation of preexisting acne and 55(15.3%) had no change in their acne severity. While among 59 non- HCWs, 25(42.37%) had new onset of acne, 11(18.64%) had aggravation of preexisting acne and 23(38.98%) had no change in acne severity. (Chart 2)

Using different types of masks showed significant difference in regards to Maskne. Wearing N95 type of mask showed the highest aggravation of Acne (82%) as compare to wearing Surgical mask(75.5%) and wearing cloth/cotton mask(65.6%). (Chi-square=23.243, p value 0.0001)(Chart 3)

Increase in the duration of wearing mask also showed development of new onset of acne and/or aggravation of pre-existing acne. 65.5% of participants wearing mask for <4 hrs/day had acne aggravation, while 73.8% those who were wearing mask 4-8 hrs/day and 93.5% of those wearing mask for >8 hrs/day showed aggravation. (Table 1)(Chi-square=24.78, p value 0.0001)

Among 113 patients of acne directly analyzed after filling up questionnaire, 71(62.8%) patients had showed new onset of acne only after starting of Pandemic(Table 2). 28(24.8%) patients had preexisting acne which had worsened to higher grades due to wearing of facemask for prolonged period(Table 3). And rest of the 14(12.4%) participants did not change in their preexisting acne. Figure 2 shows images of patients with acne before and after starting of pandemic.

We also observed that development of maskne was only over particular areas of face like bilateral cheeks, chin, perioral, nose, mandibular margin, upper part of neck as compared to forehead, upper trunk and arms.(Figure 3).

During the study, facemask associated other cutaneous problems observed were itching, darkening of the skin, redness, burning sensations over face, folliculitis, dermatophytic infection, warts etc.

Summary of all the statistical analysis have been given in the Table 4; which shows that all the data are statistically significant and there was definite association of maskne due to face mask.

Table 1: Increase in the duration of wearing mask associated with increase in the aggravation of acne (n=353)

Duration of wearing mask	Total number of participants wearing mask	Aggravation of acne on wearing mask (i.e. maskne)
<4 hrs	87	57(65.50%)
4-8 hrs	157	116(73.80%)
>8 hrs	109	102(93.50%)

Increase in the duration of wearing mask also showed increased occurrence of MASKNE. Wearing mask for <4 hrs/day showed 65.50% (57/87) aggravation, those who were wearing mask 4-8 hrs/day showed 73.80%(116/157) and >8 hrs/day showed 93.50%(102/109) aggravation. Wearing a face mask for 4 to 8 hours/day and >8 hours/day showed increase in the aggravation of Maskne as compared to wearing a facemask <4 hrs/day. (Table 1)

As per OPD based study of 113 patients of acne, 71(62.8%) patients had new onset of acne only after starting of Pandemic. (Table 2). 28(24.8%) patients had preexisting acne which had worsened due to wearing of facemask for

Table 2: Grade of acne in patients who have onset of Acne after pandemic (n=71)

Types of acne (Grade)	No. of patients
Comedones (Grade-1)	26(36.61%)
Papules (Grade-2)	18(25.35%)
Pustules (Grade-3)	13(18.31%)
Nodulocystic (Grade-4)	14(19.71%)

prolonged period. (Table 3) And rest of the 14(12.4%) participants did not feel aggravation of the acne.

71 patients did not have Acne before starting of the Pandemic. Out of them, 26(36.61%) patients developed Grade 1 Acne Vulgaris, 18(25.35%) patients developed Grade 2 Acne Vulgaris, 13(18.31%) Patients developed Grade 3 Acne Vulgaris and 14(19.71%) patients developed Grade 4 Acne Vulgaris after starting of the Pandemic.

Out of these 28 patients, 15(53.57%) patients were in Grade 1 Acne Vulgaris; and after starting of the Pandemic the Acne worsened and they developed Grade 2 Acne Vulgaris. Similarly 7(25%) patients were in Grade 2 Acne vulgaris, and 6(21.43%) patients had only Post Acne Scars, all these patients worsened and developed Grade 4 Acne vulgaris. (Table 2)

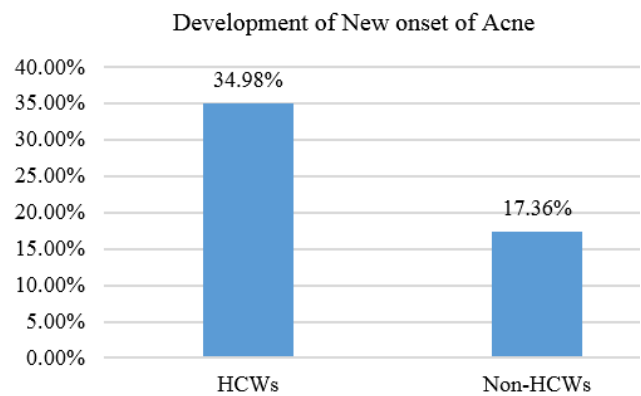


Chart 1: Development of new onset of acne after starting of pandemic Axis: Population
Axis: Development of New onset of Acne(%)

4. Discussion

COVID-19 pandemic has affected human population through-out the world. The recommendation for wearing the hygienic mask in general use was announced in India as a manner to prevent spreading of the virus during the pandemic since the end of March 2020.

In dermatology practice, it was noticed that there were some episodic adverse skin reactions related to facemask wearing in the HCWs as well as non-HCWs. In particular worsening of acne was noticed during this period. This became an objective of our study. This study was aimed to

Table 3: Comparison of Grade of Acne Before and After Pandemic (onset of Acne before pandemic) (n=28)

No. of patients (n)	Types of acne (Grade)	
	Before pandemic	After pandemic
15(53.57%)	Comedones Grade-1	Papules,pustules Grade-2
7(25%)	Papules Grade-2	Nodules GRADE-4
6(21.43%)	Post acne scars	Nodulo-cystic GRADE-4

Table 4: Summary of all the statistical analysis

	n (%) of patients	Statistical analysis
New Onset of Acne		
HCWs	162(34.98.%)	OR 2.56; 95% CI -1.59 to 4.10; p value 0.0001
Non-HCWs	25(17.36%)	
Aggravation of pre-existing Acne progressing to higher grades		
HCW	239(81.29%)	OR =2.77; 95% CI =1.52 to 5.07; p value 0.0008
Non-HCWs	36(61.01%)	
Different types of Facemask and association of Aggravation of Acne		
N95 Mask	196(82.00%)	Chi-square=23.243; p value 0.0001
Surgical Mask	37(75.51%)	
Cotton Mask	42(65.62%)	
Duration of Wearing Mask		
<4 hrs	57(65.50%)	Chi-square=24.78; p value=0.0001
4-8 hrs	116(73.80%)	
>8 hrs	102(93.50%)	

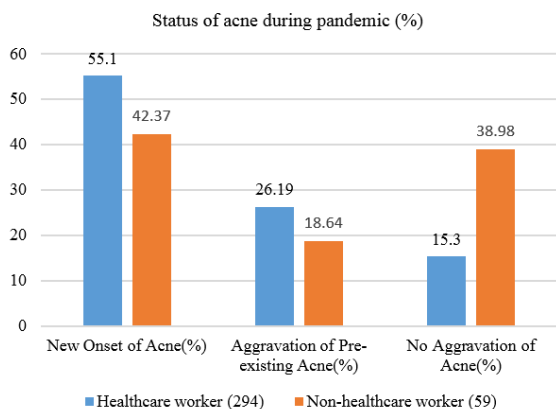


Chart 2: Aggravation of acne(%)-After Starting of Pandemic
X-axis: Patients with different types of Acne
Y-axis: Population

focus in both HCWs and non-HCWs because its effects are not only on HCW, as reported in similar previous pandemic diseases¹ but also on the general population.

A recent publication about the effects of facemask on the skin underneath-surveyed during COVID-19 pandemic in Thailand by Techasatian et al reported an occurrence of acne as high as 39.9%,¹⁰ in our study we found the same to be 34.98% in HCWs and 17.36% in non-HCWs. The study by Techasatian et al, focused on the effects of the mask related adverse reactions on face. Whereas, our study was aimed to

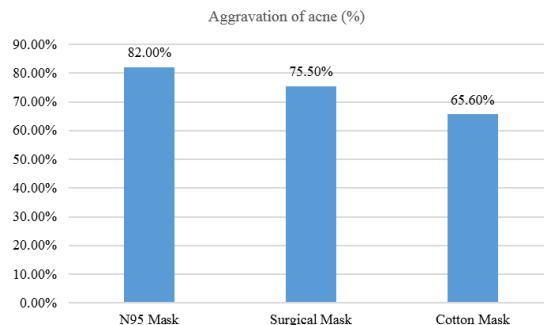


Chart 3: Aggravation of acne after wearing different types of mask(%) X-axis: Type of Mask
Y-axis: Aggravation of Acne(%)

explore face mask related acne in-depth including the grades of acne, aggravation of pre-existing acne and development of new onset of acne among HCWs and non-HCWs.

In our study, use of N95 mask showed the highest aggravation of Acne followed by use of Surgical mask and cloth mask. Whereas Techasatian et al study showed that Surgical masks had a higher risk of adverse skin reaction compared to cloth masks. There was a way of making a cloth cover on top of a surgical mask (surgical mask covered by a piece of cloth) in Thailand. This method showed a higher risk of adverse skin reaction compared to cloth masks, however, the risk was still less than the group with surgical



Fig. 1: Mechanism of action for development of maskne



Fig. 3: Grade 3 Acne Vulgaris (Onset of Acne after pandemic); development of maskne was only over particular areas of face like bilateral cheeks, chin, perioral, nose, mandibular margin, upper part of neck



Fig. 2: Progression of post acne scars to grade 4 acne vulgaris (comparison of acne grade before and after pandemic)

masks.¹⁰ It suggests that there were significant association between type of masks used and development of acne & other face mask related side effects.

Increase in the duration of wearing mask for >4 hrs/day has showed increased occurrence of MASKNE in our the study as well as Techasatian et al study.

A study of two women HCWs conducted in 2003 by Kian Teo Tan et al¹¹ in Singapore showed acne outbreaks associated with use of N95 masks continuously for about 3 months. Both patients had nodular acne in similar distribution over cheeks, chin, perioral area as seen in our study.¹² In our study development of new onset of acne and aggravation of preexisting acne were observed in both the groups; but it was higher among HCWs as compared to non-HCWs and was also confirmed by OPD based (direct) survey.

It was not possible to evaluate the grades of acne through google form survey but this limitation was partially compensated by our OPD based survey where patients were directly analyzed after filling up form.

Other aggravating/confounding factors like Stress/Anxiety among the Healthcare workers was not analyzed in the study.

5. Conclusion

Although Wearing face masks can be the best strategy against COVID-19 infection, HAZARD OF THIS SAFETY is not negligible especially in front-line workers who are at

higher risk of maskne and other mask associated cutaneous disorders because of their tighter fitting masks & wearing it for longer duration. As lower risk of maskne was found to be associated with cloth mask as compared to N-95 mask, special fabric use for mask with better protection may be explored for future use.

6. Source of Funding

No external funding was received to carry out this work.

7. Conflict of Interest

None.

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Author biography

Savfeena M. Nagani, 3rd Year Resident

Aanal T. Patel, 2nd Year Resident

Nirav Bapat, Assistant Professor

Krina B Patel, HOD

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