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# Cross Sectional Questionnaire Based Survey On Effects Of Mask On Acne Vulgaris

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**ABSTRACT**

**Introduction: Acne is a concern for many when it comes to being attractive, confident and feel secure. Many people with acne feel insecure about their looks. During COVID 19 pandemic, long time use of masks could increase the flare of acne. Mask-related acne and acne-like eruptions have been referred to as "maskne."**

**Objective: Analysis of the adverse effects of mask on acne vulgaris during COVID 19 and comparing those effects in patients with different types of skin**

**Method:A Cross-sectional questionnaire-based time bound study of 4 months duration was conducted with study population of Pre-existing Acne Vulgaris patients and newly diagnosed patients with Acne Vulgaris seeking out patient care in the Dermatology OPD at a tertiary care hospital of Southern India between 1st July to 1st November 2022 excluding those with age less than 12 years, those who do not wear mask, who refuse to consent for the survey and those who are on other medications known to influence Acne Vulgaris.**

**Result:Out of total 250 participants, 218 (87.20%) participants showed development of new onset of acne and/or aggravation of pre-existing acne. Female gender showed increased prevalence of acne almost 4 times more than males. Wearing surgical mask showed the highest aggravation of acne (95.24%). Acne worsened more in oily skin (92.92%) and combination skin (90.65%) than in dry skin (53.33%). Most common sites for acne eruption following use of mask were cheeks (76.61%) followed by nose (54.59%) and chin (37.16%). Mask usage led to increase in oiliness in 80% and worsening of redness in 38.08% and itching in 28.90% participants, respectively. 67.43% participants with new onset of acne and/or aggravation of pre-existing acne (N=218) believes that mask is responsible for their worsening of acne.**

**Conclusion: This study suggests that mask has increased acne problems. Flare of acne is more in female participants and those with oily skin and those wearing N95 mask. This study also suggests that mask has aggravated the symptoms of acne.**

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## INTRODUCTION:

Coronaviruses belong to a group of viruses causing respiratory illnesses including common cold, severe acute respiratory syndrome (SARS) and Middle East respiratory syndrome (MERS). In 2019, a new coronavirus (SARS-CoV-2) was recognised as the cause of an epidemic arising in China. This has been declared as a pandemic by the World Health Organisation (WHO) since March 2020.1

It is a highly contagious disease which is transmitted via respiratory route.

Wearing a mask is encouraged for preventing dispersal of droplets during talking, sneezing and coughing. Therefore, it is thought to reduce the risk of environmental contamination by SARS-CoV-2 (COVID-19) based on the precautionary principles. However, long-time mask-wearing could increase the flare of acne due to higher temperature and humidity on the surface of facial skin caused by expired air and the perspiration. [2-3]

Mask-related acne and acne-like eruptions have been referred to as “maskne” in the news and on social media [4]

Although, Foo et al[2]found acne to be the most common adverse effect of face mask use, other authors did not find it to be common.[5] This discrepancy might be due to a decreased presentation to Dermatologists given the restrictions on clinic visits brought on by COVID-19 and prolonged wait times for dermatology appointments.

The higher temperature and humidity on the surface of the skin caused by mask wearing have been described as contributors to sebum concentration. It has been reported that an increase of 1°C in facial temperature can increase sebum secretion by 10%, which aggravates acne.[6-7]

The use of masks could result in a higher concentration of CO2 in the transepidermal surface in addition to changes in temperature and humidity. [8-9] This altered dissipation of gas during breathing due to mask use could be an additional factor triggering and aggravating acne.

Among different types of masks, N95 respirator usage in general population demonstrated the highest incidence for only three skin reaction types: abrasion, pain at mask borders and a worsening of pre-existing dermatoses.[10]

The following study aims to analyse the harmful effects of mask on acne vulgaris during covid 19.

**OBJECTIVES:**

To analyse the severity and associated clinical changes in acne vulgaris as a result of prolonged mask wearing during covid 19.

To analyse the adverse effects of mask on acne vulgaris during covid 19.

To collate and compare effect of mask on acne vulgaris in patients with different types of skin (oily skin/dry skin/combination)

## MATERIALS AND METHODS:

A Cross-sectional questionnaire-based time bound study of 4 months duration was conducted in Dermatology OPD of a tertiary care hospital of Southern India between 1st July to 1st November 2022. The study was approved by Institutional Ethic Committee of Kasturba Medical College, Mangalore, Protocol Number: IEC KMC MLR 05-2022/190 dated 18 May 2022. Permission from the Dean of the Medical College and Hospital Authorities were taken to undertake this study.

All Acne Vulgaris patients including Pre-existing acne patients and newly diagnosed patients with acne seeking out patient care in the Dermatology OPD of the tertiary care hospital were enrolled in the study. Patients with age less than 12 years, those who do not wear mask, who refuse to consent for the survey and those who are on other medications known to influence Acne Vulgaris were excluded from the study.

Sample size was as per OPD visits during the study duration The study participants were selected using simple random sampling technique.

The data was collected by means of Interviewer administered, aim oriented, brief questionnaire which included questions on topics such as demographic information (age, sex, etc), pre-existing skin disorders, perceived acne aggravating and ameliorating factors, reported mask-related symptoms, daily mask-wearing duration and frequency, types of masks used, type of skin and source of their information on mask related acne.

The questionnaire was validated by one internal

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member from Department of Dermatology and by one external member from Community Medicine department before administrating it to the study subjects.

The eligible participants were explained about the goals of the study following which an informed consent was taken from each one of them. They were explained that the information that they would provide would remain confidential and would be used solely for the purpose of research and study.

Data collected was computed and analysed by using Statistical Package for the Social Sciences (SPSS) version 25.

Results - using suitable tables and graphs.

Implications of wearing a mask is varied. WHO and other National and International health organisations insist on continued use of mask in public places expecting the pandemic to go on for few more years. Keeping this in mind, masks have been subjected to various criticism due to its potential adverse effects on certain dermatological conditions. Hence any scientific research which can prove or disprove the adverse effects of mask on the skin may help in development of masks that are skin friendly.

**RESULT:**

After including inclusion and exclusion criteria, total number of participants is 250 out of which 70 (28%) were male and 180 (72%) were female.

Out of 250 participants, 166 (66.40%) developed new onset of acne during pandemic. Among patients with pre-existing acne, 52(20.80%) patients had aggravation of preexisting acne and rest of the 32(12.80%) participants had no change in their preexisting acne severity. (Chart 1)

This shows that prevalence of acne Vulgaris after using mask during pandemic was 87.20% (N=218)

Female gender showed increased prevalence of acne. (Chart 2) In our study 177 (81.19%) of Females and 41 (18.81%) of males (N=218) showed development of new onset of acne and/or aggravation of pre-existing acne.

Using different types of masks showed significant difference in regard to aggravation of acne. (Table 1) Wearing surgical mask showed the highest aggravation of acne (95.24%) followed by wearing N95 type of mask (89.77%) and wearing cloth mask (68.42%).

Increase in the duration of wearing mask also showed development of new onset of acne and/or aggravation of pre-existing acne. (Table 2) 74.28% of participants wearing mask for <4 hrs/day had acne aggravation, while 77.55% those who were wearing mask for 4-8 hrs/day and 91.20% of those wearing mask for 8-12 hrs/day and 94.67% those who were wearing mask for >12 hrs/day showed aggravation.

Frequency of changing masks in a day showed significant difference in aggravation of mask. (Chart 3) Participants who change mask twice daily showed only 35% aggravation of acne as compared to 86.04% aggravation in those who changes mask once daily. Also, participants who changes mask on alternate days and those who changes mask once weekly showed 98.70% and 100% of aggravation of acne in the form of development of new onset of acne and/or aggravation of pre-existing acne.

166 (66.40%) patients had new onset of acne only after starting of Pandemic. 52(20.80%) patients had preexisting acne which had worsened to higher grades due to wearing of face mask for prolonged period. And rest of the 32(12.80%) participants did not feel aggravation of the acne.

166 patients did not have Acne before beginning of the Pandemic. Out of them, 68 (40.96%) patients developed Grade 1 Acne Vulgaris, 49 (29.52%) patients developed Grade 2 Acne Vulgaris, 31 (18.68%) patients developed Grade 3 Acne Vulgaris, and 18 (10.84%) patients developed Grade 4 Acne Vulgaris after starting of the Pandemic. (Table 3)

Out of the 52 patients in which pre-existing acne worsened, 33 (63.46%) patients were in Grade 1 Acne Vulgaris before pandemic and after starting of the Pandemic the Acne worsened and they developed Grade 2 Acne Vulgaris. Similarly, 11 (21.15%) patients were in Grade 2 Acne vulgaris which aggravated to Grade 3 Acne Vulgaris and 8 (15.39%) patients had Grade 2/3 which worsened and developed Grade 4 Acne vulgaris. (Table 4)

Different types of skin showed difference in aggravation of acne. Participants having oily skin and combination skin showed 92.92% and 90.65% of aggravation of acne compared to those having dry skin which only showed 53.33% of aggravation of acne. (Chart 4)

It was observed that development of new onset acne and aggravation of pre-existing acne was majorly seen over particular areas of face like bilateral cheeks (76.61%), nose (54.59%), chin and jawline (37.16%) as compared to upper part of neck (12.39%) and forehead (4.59%) respectively. (Chart 5)

Among the participants having new onset acne and

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aggravation of pre-existing acne (N=218), 61.47% showed increase in number of acne, 27.06% showed increase in size of acne and 50.92% showed increase in both number and size of acne. (Chart 6)

Prolonged wearing of mask can lead to increase in oiliness on the face. 80% of participants showed increased oiliness on face while 20% showed no change in oiliness.

Increased oiliness due to prolonged wearing of mask can aggravate acne. Participants with increased oiliness showed 95.50% aggravation of acne while those with no change in oiliness showed 54% aggravation of mask. (Table 5)

During the study it was observed that all the symptoms of acne worsened following the use of masks. Highest increase was observed in redness (38.08%) and itching (28.90%) compared to 19.27% increase in pain and 13.76% increase in pus discharge. (Chart 7)

There is no significant relation between change in post acne mark with prolonged use of mask. Among the participants (N=250), in 57 (22.80%) post acne mark got darker, in 6 (2.40%) post acne mark got lighter and in 187 (74.80%) no change in post acne mark was seen. (Chart 8)

Increase in frequency of washing face in a day significantly affects development of new onset of acne and/or aggravation of pre-existing acne. (Chart 9) Participants who wash face thrice daily shows only 17.89% aggravation of acne with mask compared to those who washes face once or twice daily which shows 35.78% and 27.06%, respectively. However, those who wash face more than 3 times in a day shows 19.27% aggravation of acne with mask. (N=218)

Among the participants (N=218), in which acne worsened after using mask, Stress shows 64.22% aggravation of acne, PCOS and skin allergy shows 20.64% and 13.30% of development of new onset of acne and/or aggravation of pre-existing acne, respectively.

Usage of cosmetics and sunscreen shows significant changes in the worsening of acne with prolonged use of mask. (Chart 10)

Among the participants (N=218) with new onset of acne and/or aggravation of pre-existing acne, use of Cosmetics shows 62.84% aggravation of acne compared to Sunscreen showing only 27.06% and Moisturiser showing 39.91% of development of new onset of acne and/or aggravation of pre-existing acne.

Majority of participants think that multiple factors are responsible for their worsening of acne. (Chart 11) However, 67.43% participants with new onset of acne and/or aggravation of pre-existing acne (N=218) believes that mask is responsible for their worsening of acne. 64.22% think that stress is responsible for their acne, 33.49% think that hormones is responsible for their acne and 11.47% think that there is no cause for their acne.

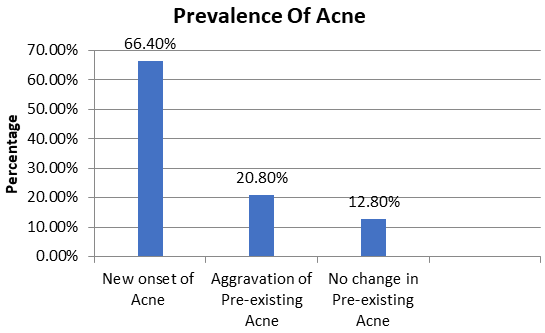


**Chart 1: Aggravation of Mask Induced Acne Vulgaris during Pandemic**

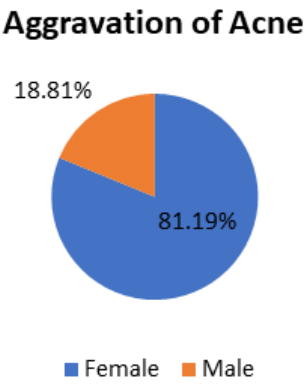


**Chart 2: Association between Aggravation of Mask Induced Acne Vulgaris during Pandemic and Gender**

**Table 1: Aggravation of Mask Induced Acne Vulgaris after wearing different types of Mask**

| Type of Mask | Total Number of Participants | Aggravation of Acne |
|---|---|---|
| N95 Mask | 88 | 79 (89.77%) |
| Surgical Mask | 105 | 100 (95.24%) |
| Cloth Mask | 57 | 39 (68.42%) |

**Table 2: Aggravation of Mask Induced Acne Vulgaris during Pandemic associated with Duration of wearing Mask**

| Duration of Wearing Mask | Total Number of Participants Wearing Mask | Aggravation of Acne on Wearing Mask |
|---|---|---|
| <4 hrs | 35 | 26 (74.28%) |
| 4-8 hrs | 49 | 38 (77.55%) |
| 8-12 hrs | 91 | 83 (91.20%) |
| >12 hrs | 75 | 71 (94.67%) |

**Table 3: Grade of Acne Vulgaris in Participants who have new onset of Acne during Pandemic (n=166)**

| Grade of Acne | Number of Participants |
|---|---|
| Grade 1 (Comedones) | 68 (40.96%) |
| Grade 2 (Papules) | 49 (29.52%) |

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| | |
|---|---|
| Grade 3 (Pustules) | 31 (18.68%) |
| Grade 4 (Nodulo-cystic) | 18 (10.84%) |

**Table 4: Grade of Acne Vulgaris Before and After Pandemic (onset of Acne before Pandemic) (n=52)**

| Number of Participants | Grade of Acne Before Pandemic | Grade of Acne After Pandemic |
|---|---|---|
| 33 (63.46%) | Grade 1 (Comedones) | Grade 2 (Papules) |
| 11 (21.15%) | Grade 2 (Papules) | Grade 3 (Pustules) |
| 8 (15.39%) | Grade 2/3 (Papules/Pustules) | Grade 4 (Nodulo-cystic) |

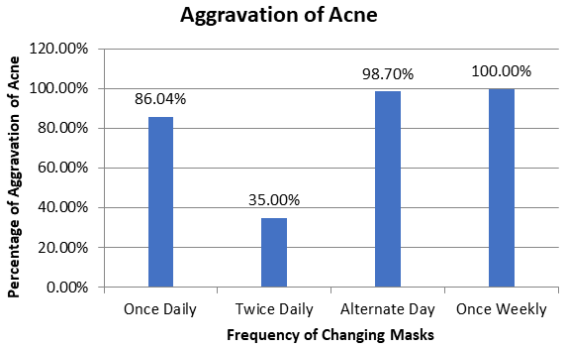


**Chart 3: Association between Aggravation of Acne Vulgaris and Frequency of changing Mask**

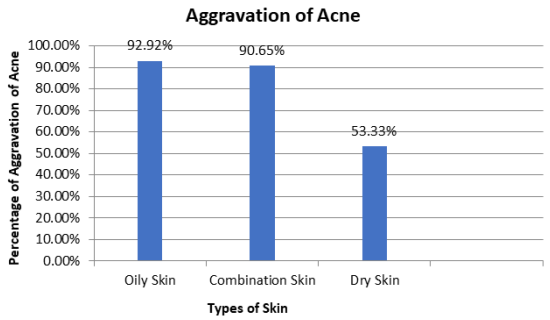


**Chart 4: Association between Aggravation of Mask Induced Acne Vulgaris and Skin Type**

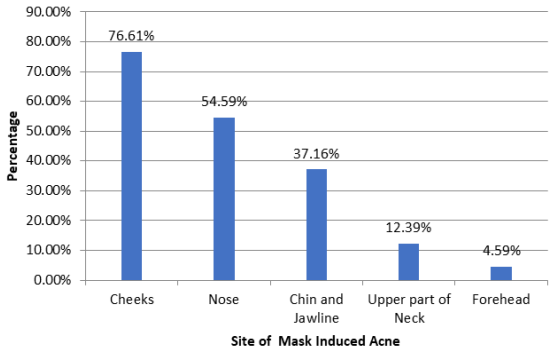


**Chart 5: Association between Mask Induced Aggravation of Acne Vulgaris and Site of development of Acne**

**Table 5: Association between Mask Induced Oiliness and Aggravation of Acne Vulgaris**

| | Number of Participants | Aggravation of Acne |
|---|---|---|
| Increased Oiliness | 200 | 191 (95.50%) |
| No Change in Oiliness | 50 | 27 (54.00%) |

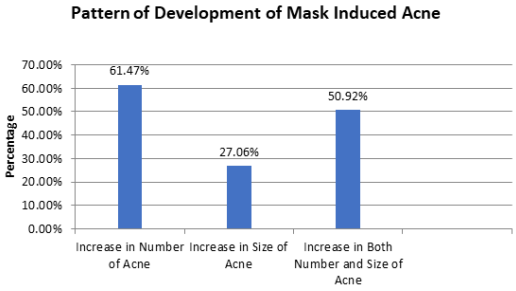


**Chart 6: Pattern of Development of Mask Induced Acne**

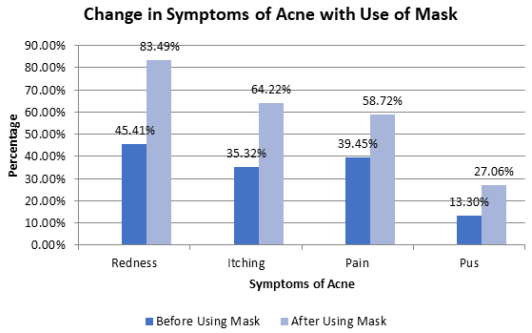


**Chart 7: Change in Symptoms of Acne Vulgaris with Use of Mask during Pandemic**

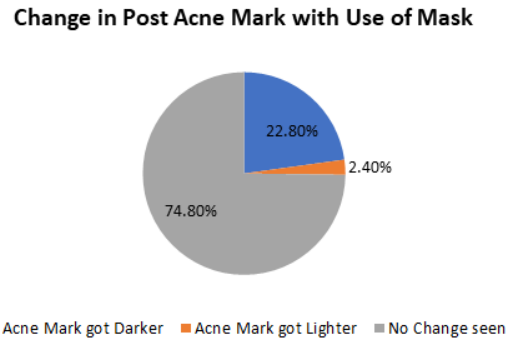


**Chart 8: Change in Post Acne Mark with Use of Mask during Pandemic**

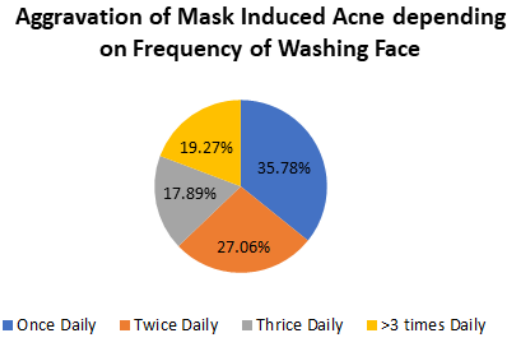


**Chart 9: Association between Aggravation of Mask Induced Acne Vulgaris and Frequency of Washing Face**

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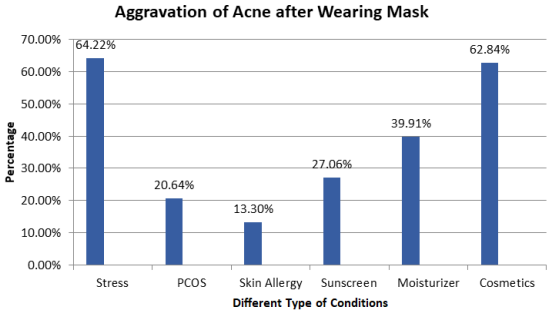


**Chart 10: Aggravation of Mask Induced Acne Vulgaris under different Conditions**

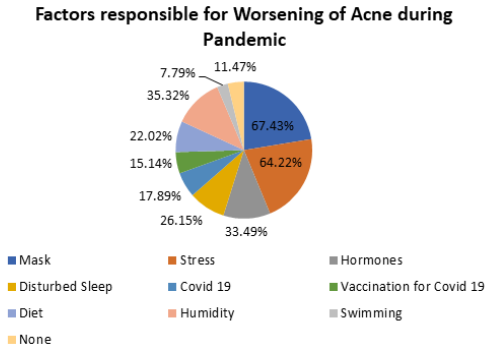


**Chart 11: Factors perceived responsible for Worsening of Acne during Pandemic**

## DISCUSSION:

COVID-19 pandemic has affected human population through-out the world. To slow the spread of COVID-19, face masks have become part of our daily routine. Prolonged use of face masks has led to a significant increase in adverse dermatological conditions. Among these, mask-related acne ("maskne") is one of the most commonly reported manifestations. Maskne is an umbrella term for several skin conditions that can stem from wearing a face mask.

A recent study by Techasatian et al [11], reported an occurrence of acne as high as 39.9%, in our study it was found to be 66.40%. However, the study by Techasatian focused on the effects of the mask related adverse reactions on face. Whereas our study was aimed to explore mask related acne Vulgaris in-depth including the grades of acne, aggravation of pre-existing acne and development of new onset of acne, symptoms of acne, relation of acne Vulgaris with frequency of changing mask, duration of wearing of mask, type of mask, etc.

Studies examining the changes in the diagnosis of admission to the dermatology outpatient clinic suggest that the increasing number of diseases may be related to the use of face masks. Kutlu et al. [12] investigated the applications to the dermatology clinic during the pandemic and found one of the increasing applications as AV. Roongpisuthipong et al. [13] examined the changes in the number and reason of visits to the dermatology clinic during the pandemic by looking at the hospital admission codes. The findings of the study indicated that while the number of visits to the dermatology clinic did not show any change, a difference was detected in the diseases observed. One of the diseases with increasing frequency was AV. Maskne may occur in people who have a history of AV as well as those who had no history of AV. [14] Akl et al. [15] denoted that personal protective equipment use was found to exacerbate pre-existing diseases including AV. In our study, 66.40% of the participants had new AV development, while 20.80% of students had exacerbation of pre-AV. These findings were compatible with the study done by Hayat et al. [16] which found an increased percentage of new acne in 61 (72%) of participants and acne exacerbation in 24 (28%).

The prevalence of AV in our study after the use of face masks was 87.20% almost compatible with 59.6% reported by Foo et al. [2] and 56% shown by Purushothaman et al. [17] and 61% shown by Tunçer Vural. [18]

A study by Chaiyabutr et al. [10] concluded that being female was significantly associated with adverse skin reactions due to the use of face masks, including AV. Similarly, the findings of our study showed that women are almost 4 times at risk of developing AV compared with men.

It was found that surgical mask showed the highest aggravation of Acne followed by use of N95 mask and cloth mask in our study which was compatible with study done by Techasatian et al. [11] which demonstrated that wearing a surgical mask showed a higher risk of adverse skin reactions including AV compared with a fabric mask. Chaiyabutr et al. [10] reported that the risk of the development of AV caused by using surgical masks was higher than that of fabric masks. However, in a study done by Doğan et al. [19] found no such relationship and the study by Choie et al. [20] found that the use of cotton face masks increased acne flare-ups. A study by Nagani et al. [22] found that use of N95 mask showed the highest aggravation of Acne followed by use of Surgical mask and cloth mask.

Our study showed that prolonged mask use for increasing duration of time directly results in increasing the aggravation of acne. Choie et al. [20] denoted that longer durations of wearing masks increased AV flare-ups. A study done by Daye et al. [21] also denoted the same finding.

One of the other important parameters is the frequency of changing masks during the day. According to Tunçer Vural [18] an increase in the

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number of masks worn daily reduces the risk of the development of AV which is compatible with our study that showed significant decrease in aggravation of acne on changing mask twice daily and significant increase in aggravation of mask almost 98.70% and 100% on changing mask on alternate days and once weekly respectively. However, according to Yaqoob et al. [22] there was no significant relationship between the development of AV and the frequency of the face masks worn per day.

A study by Nagani et al. [23] found that among the patients which had new onset of acne after starting of pandemic, 36.61% developed Grade 1 Acne Vulgaris, 25.35% developed Grade 2 Acne Vulgaris, 18.31% developed Grade 3 Acne Vulgaris and 19.71% developed Grade 4 Acne Vulgaris and among the patients with worsening of pre-existing acne, 53.57% were in Grade 1 Acne Vulgaris before pandemic and post pandemic developed Grade 2 Acne Vulgaris, 25% were in Grade 2 Acne Vulgaris and 21.43% had post acne scar, all of these patients worsened and developed Grade 4 Acne Vulgaris which was compatible with the results of our study that showed 40.96% developing Grade 1 Acne Vulgaris, 29.52% developing Grade 2 Acne Vulgaris, 18.68% developing Grade 3 Acne Vulgaris and 10.84% developing Grade 4 Acne Vulgaris among the patients which had new onset of acne after starting of pandemic. And among patients in which pre-existing acne worsened, our study showed that 63.46% patients were in Grade 1 Acne Vulgaris before pandemic and after Pandemic they developed Grade 2 Acne Vulgaris. Similarly, 21.15% patients were in Grade 2 Acne vulgaris which aggravated to Grade 3 Acne Vulgaris and 15.39% patients had Grade 2/3 which worsened and developed Grade 4 Acne vulgaris.

In the study done by Yaqoob et al. [22] 62.1% of the HCWs with oily skin developed acne, demonstrating a strong relationship between maskne and oily skin type. In our study also oily skin resulted in 92.92% of aggravation of acne.

Our study revealed that cheeks were the most frequent site involved in eruption of acne, followed by nose and chin. Study conducted by P. Lin et al. [24] and Yaqoob et al. [22] manifested similar results to our study. However, this is conflicting with what M. Singh et al. [25] reported in their study with nose being the most common location.

We see that masks were used during gym workouts and in the subway/traveling in hot crowded places, which leads to the increased entrapment of oil in the face and a higher risk of acne [26]. This is compatible with the results of our study which showed that 80% of participants had complained of increased oiliness on face after wearing of mask. Also, among these participants with increased oiliness due to mask, 95.50% showed aggravation of acne.

Our study showed worsening of all the symptoms of acne following the use of masks with 38.08% increase in redness, 28.90% increase in itching and 19.27% increase in pain which is compatible with the findings of study done by Tuncer Vural [15] which documented that 35.5% of participants experienced itching and 26% experienced erythema and 14% experienced tenderness. Szepietowski et al. [27] reported that approximately 20% of young individuals wearing face masks experienced episodes of itch, further corroborating our findings.

Our study showed that increase in frequency of washing face in a day significantly decreases the development of new onset of acne and/or aggravation of pre-existing acne. However, it was contradicted after washing face for more than 3 times. Participants who wash face thrice daily shows only 17.89% aggravation of acne with mask compared to those who wash face once or twice daily which shows 35.78% and 27.06%, respectively. However, those who wash face more than 3 times in a day shows 19.27% aggravation of acne with mask. Study done by Metin et al. [28] found no relationship between the frequency of face washing and the development of AV.

Study done by Bakhsh et al. [29] found a positive correlation between the use of make-up products and the emergence of acne (p-value-0.005) as seen in 50 (51.5%) participants using makeup products and also showed that Acne flare-ups were less likely in participants who used sunscreen and moisturisers, with only 23 (17.7%) of participants using sunscreen and 61 (46.9%) of participants using moisturisers reporting increased severity of acne.

These findings are compatible with the finding of our study which showed 62.84% aggravation of acne with cosmetics usage and only 27.06% aggravation of acne with sunscreen usage and 39.91% development of new onset of acne and/or aggravation of pre-existing acne with moisturisers usage.

Sunscreens have soothing and hydrating components, like moisturisers. However, the effect of sunscreens and moisturisers can be difficult to assess due to the variable comedogenicity of different topical products as well as different individual susceptibilities for acne development. Using non-comedogenic oil-free moisturisers and sunscreens remains an important part of acne treatment. [30]

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Health officials have declared that social distancing and confinement induce feelings of loneliness, despair, and depression. [31] Our study found that stress alone is the cause of more than half of the patients with maskne during pandemic.

## CONCLUSION:

This study suggests that mask has increased acne problems. Flare of acne is more in female participants and those with oily skin and those wearing N95 mask. This study also suggests that mask has aggravated the symptoms of acne. Mask has become vital part of our attire as the best strategy against fighting COVID-19 infection and this study show adverse effects of same, further studies are needed to find counteracting measures for mask related acne.

## LIMITATION:

Sample size of the study is small, future larger studies are required to generalise the results of the study and participants were not followed up and evaluated prospectively.

## ETHICS

The study was approved by Institutional Ethic Committee of Kasturba Medical College, Mangalore, Protocol Number: IEC KMC MLR 05-2022/190 dated 18 May 2022. Permission from the Dean of the Medical College and Hospital Authorities were taken to undertake this study.

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## CONFLICT OF INTEREST:

None

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