Our Dermatology Online

Original Article

Hidden behind the mask: An observational study of mask-induced acne during the COVID-19 pandemic in south India

Mohan Eshwar Rao Shendre[1], Chanabasappa Mendagudli[1], Sanjay Ramachandra Thejaswi[2], Naveen Manohar[2], Sushma Halubai Ramakrishna[3], Mitaxari Malleshappa Hugar[1], Jayashree Basavaraju[4]

[1]Department of Dermatology, Karnataka Institute of Medical Sciences, Hubballi, India, [2]Department of Dermatology, The Oxford Medical College Hospital and Research Centre, Bangalore, India, [3]Department of Community Medicine, Karnataka Institute of Medical Sciences, Hubballi, India, [4]Department of Dermatology, Shridevi Institute of Medical Sciences, Tumkur, India

Corresponding author: Sanjay Ramachandra Thejaswi, MD, E-mail: rsanjaythejaswi@gmail.com

ABSTRACT

Background: During the COVID-19 pandemic, masks were used to prevent and interrupt the transmission of the infection. However, wearing masks for prolonged periods of time is associated with a local rise in temperature and humidity around the masked area. Consequently, this resulted in acute flares of acne, especially in healthcare workers who used masks for 8–12 hours a day. **Materials and Methods:** In this questionnaire-based study, we present patient-reported observations regarding acne severity. **Results:** Overall, 104 responses were collected (males: 64.4%; age: 13–46 yrs.). Following the use of a mask, 28.8% of the patients experienced flaring of acne, while 71.2% did not report any significant change. Among the participants who experienced flaring of acne, 30% had mild acne, 60% had moderate acne, and 10% had severe acne. **Conclusion:** N95 masks and a duration of mask use above six hours were related to the development of maskne.

Key words: COVID, Acne, Maskne, Masks

INTRODUCTION

Sars-CoV-2 infection resulted in a global pandemic of corona virus disease (COVID-19). During the pandemic, wearing a mask was encouraged for the prevention of the dispersal of droplets during talking, coughing, and sneezing, thus reducing the transmission of the virus.

Acne vulgaris is a chronic recurrent inflammatory disease of the pilosebaceous unit. It is one of the most common skin diseases globally and affects all ethnicities and races. The cutaneous findings in acne may include open or closed comedones, papules, pustules, abscesses, and nodules. The most common anatomical sites affected include the face, back, and chest. While wearing a mask may help prevent aerosol infections, wearing it for prolonged durations may result in flaring of acne due to a localised increase in temperature and humidity on the facial skin secondary to respiration and perspiration. Such acne has also been termed *maskne* or *mask-acne*.

Mask-acne is a variant of *acne mechanica* that arises due to the friction between textile/mask and the facial skin, thus leading to the disruption of the skin microbiome [1]. Furthermore, increased virulence of *Cutibacterium acnes* due to the disturbances in the cutaneous microbiome has been hypothesized to be the primary factor that results in inflammation in mask-

How to cite this article: Rao Shendre ME, Mendagudli C, Thejaswi SR, Manohar N, Ramakrishna SH, Hugar MM, Basavaraju J. Hidden behind the mask: An observational study of mask-induced acne during the COVID-19 pandemic in south India. Our Dermatol Online. 2025;16(1):33-36.

Submission: 22.08.2024; **Acceptance:** 19.10.2024
DOI: 10.7241/ourd.20251.4

© Our Dermatol Online 1.2025

acne [1]. Additionally, hair follicles may be occluded by the mask along with increased sebum production and sweating, which also contribute to mask-acne [2]. Hu et al. reported that surgical masks and personal protective equipment modified the levels of hydration, transepidermal water loss, pH, erythema, and sebum production [3,4]. Generally, in such cases, dressings and moisturizers must be used to prevent dehydration and pressure ulcers; however, topical agents may also worsen facial dermatoses, especially acne [5]. Increased sebum production may work in favor of *Demodex folliculorum* as well, thus intensifying the inflammatory component of acne and resulting in pustules and erythema [6].

The objective of this study was to investigate the effects of face masks on acne.

MATERIALS AND METHODS

In this cross-sectional, web-based survey, an online questionnaire was employed to collect responses from various geographical regions and populations of people. The preformed questionnaire included questions regarding the type of mask, duration of its use, changes in the severity of acne, and symptoms of COVID-19, if applicable. The sample size was chosen for convenient sampling. The participants included students at a government medical college who received the questionnaire via email and text messages. A pilot study was conducted with five participants to evaluate the questionnaire; consequently, the necessary changes were incorporated into the questionnaire. Three dermatologists with a combined experience of 30 years designed and evaluated the questionnaire.

The inclusion criteria included students and faculty members at a government medical college who used masks regularly. The exclusion criteria included only a participant's refusal to participate in the study. In view of the questionnaire-based study design, the requirement for ethic committee approval was waived. Informed consent was obtained from the participants before presenting the questionnaire to them.

Statistical Analysis

Data was initially recorded in Excel (Microsoft® for Mac, 2023, Redmond, WA, USA). The data was exported to SPSS v23 (Armonk, NY, USA) for further analysis. Numbers and proportions were calculated for the overall study population and subgroups.

RESULTS

Overall, 104 responses were collected, which included 67 (64.4%) males and 37 (35.6%) females (Table 1). The participants were aged 18–46 years, with the most common age being 24 years. Regarding the educational status, most had completed bachelor's level of education (data not shown).

Overall, 39.4% of the patients reported acne before using a mask, while 60.6% did not report pre-existing acne. In those with pre-existing acne, the severity of the acne was mild in 75.6%, moderate in 22.0%, and severe in 2.4% of the participants. The overall type of mask used included N95 masks (67.3%), surgical masks (16.3%), cloth masks (12.5%), and respirators (3.8%). The average daily duration of use was 6–8 hours in 29.8%, > 8 hours in 26.9%, 4–6 hours in 17.3%, 2–4 hours in 15.4%, and < 2 hours in 10.6% of the participants (Table 2).

Following the use of masks, 28.8% of the participants experienced flaring of acne, while 71.2% did not report any significant change in the severity of acne. Among the participants who experienced flaring of acne, 30% had mild acne, 60% had moderate acne, and 10% had severe acne. Additionally, among those with the flaring of acne, 43.3% had pre-existing acne, while 56.7% had not have acne before.

The analysis was furthered according to the type and duration of mask use (Table 3). Among 30 patients who experienced worsening of acne, a majority (56.7%) did not have pre-existing acne. Furthermore, 76.7% had used N95 masks, and 56.7% had used masks for > 8 hours daily; interestingly, 76.7% of the patients had worn their masks for a minimum of 6 hours. Lastly, moderate acne was the most common severity grade (60%), while N95 masks were the most common type of masks used by these participants (Table 3).

Table 1: Demographic data and status of acne in the respondents

Parameter	Males	Females	Total
Number (*n*)	67 (64.4%)	37 (35.6%)	104
Age (yrs.)	26.5±5.9	27.5±6.6	27.1±6.3
Pre-existing acne			
Yes	24 (35.8%)	17 (45.9%)	41 (39.4%)
No	43 (64.2%)	20 (54.1%)	63 (60.6%)
Severity of pre-existing acne			
Mild	19 (28.4%)	12 (32.4%)	31 (75.6%)
Moderate	5 (7.5%)	4 (10.8%)	9 (22.0%)
Severe	0 (0%)	1 (2.7%)	1 (2.4%%)

Table 2: Type and duration of mask use and the changes in acne

Parameter	Males	Females	Total
Duration of mask use			
< 2 h	5 (7.5%)	6 (16.2%)	11 (10.6%)
2–4 h	10 (14.9%)	6 (16.2%)	16 (15.4%)
4–6 h	14 (20.9%)	4 (10.8%)	18 (17.3%)
6–8 h	18 (26.9%)	13 (35.1%)	31 (29.8%)
> 8 h	20 (29.9%)	8 (21.6%)	28 (26.9%)
Type of mask			
Cloth	7 (10.4%)	6 (9%)	13 (12.5%)
Surgical	9 (13.4%)	8 (11.9%)	17 (16.3%)
N95	49 (73.1%)	21 (31.3%)	70 (67.3%)
Respirator	2 (3%)	2 (3%)	4 (3.8%)
Change in acne post-mask			
No change	51 (76.1%)	23 (34.3%)	74 (71.2%)
Worsened	16 (23.9%)	14 (20.9%)	30 (28.8%)
Pre-existing acne (n = 30)	6 (37.5%)	7 (50%)	13 (43.3%)
No pre-existing acne (n = 30)	10 (62.5%)	7 (50%)	17 (56.7%)
Masks used by those with worsening acne post-mask			
Cloth	0 (0%)	2 (5.4%)	2 (6.7%)
Surgical	1 (1.5%)	0 (0%)	1 (3.3%)
N95	13 (19.4%)	10 (27%)	23 (76.7%)
Respirator	2 (3%)	2 (5.4%)	4 (13.3%)
Severity of maskne			
Mild	8 (11.9%)	1 (2.7%)	9 (30%)
Moderate	8 (11.9%)	10 (27%)	18 (60%)
Severe	0 (0%)	3 (8.1%)	3 (10%)

Table 3: Mask type, duration, and severity of acne flare-up

Mask	Duration of mask	Male	Female	Grand Total
Cloth mask	< 2 hours	0 (0%)	1 (7.1%)	1 (3.3%)
	> 8 hours	0 (0%)	1 (7.1%)	1 (3.3%)
Total		0 (0%)	2 (14.3%)	2 (6.7%)
Surgical mask	< 2 hours	1 (6.3%)	0 (0%)	1 (3.3%)
N95 mask	2–4 hours	1 (6.3%)	1 (7.1%)	2 (6.7%)
	4–6 hours	1 (6.3%)	1 (7.1%)	2 (6.7%)
	6–8 hours	2 (12.5%)	4 (28.6%)	6 (20%)
	> 8 hours	9 (56.3%)	4 (28.6%)	13 (43.3%)
Total		13 (81.3%)	10 (71.4%)	23 (76.7%)
Respirator	4–6 hours	1 (6.3%)	0 (0%)	1 (3.3%)
	> 8 hours	1 (6.3%)	2 (14.3%)	3 (10%)
Total		2 (12.5%)	2 (14.3%)	4 (13.3%)

DISCUSSION

In this questionnaire-based study, we evaluated the effects of wearing masks for prolonged periods of time on the severity of acne in young adults aged 18–25 years. We found that 28.8% of the participants experienced the flaring of acne. Furthermore, patients with both mild and moderate acne reported flare-ups.

Teo summarized the diagnostic criteria for maskne as follows: a) *de novo* acne that develops 6 weeks after regular mask wear or b) worsening of pre-existing acne in mask-covered areas, along with c) the exclusion of the main differential diagnoses, such as seborrheic dermatitis [7]. However, 6 weeks may be too long for a threshold since acne may develop into nodulocystic forms much faster during a flare-up.

Kurt studied the prevalence of mask-acne in physicians who had a history of acne and reported that the exacerbation of acne was reported by 45.3% of the responders, while one-third reported relapses as well [8]. Similarly, another study reported mask-acne in 56.0% of healthcare workers [9]. In a larger study, Techasatian et al. evaluated 833 individuals, which included 42.9% of healthcare workers; the authors reported that the most common reported mask-related facial adverse event was acne (39.9%) [10]. Furthermore, the prevalence of mask-acne was higher in healthcare workers than in non-healthcare workers (59.0% vs. 51.0%, respectively). In our study, 28.8% of the respondents reported worsening of acne. We believe that the differences in the prevalence rates are dependent on the type of mask as well as the use of other protective measures such as an occlusive face screen and double masks [11].

Interestingly, a majority of the responders (60%) in our study reported moderate acne during flare-ups, which was in contrast to other studies that reported mild severity of mask-acne [2,12]. We believe that the reason may be the differences in the prevalence of pre-existing acne. Furthermore, only 10% of our patients reported severe acne, most of whom had a history of acne. Therefore, mask-acne tends to be mild or moderate at presentation. Berjawi et al. evaluated 201 responses and concluded that mild acne was the most common severity at presentation [13]. Additionally, they identified several risk factors that contributed to mask-acne, such as age < 30 years, the female sex, and wearing masks for > 8 hours daily [14]. In our study, we found that maskne was predominantly seen in males and with > 6 hours of mask use. The differences in the geographic environments and skin types may have contributed to the differences in our findings.

Regarding the type of masks, studies have reported a correlation between N95 mask use and an increased risk of mask-acne [12,15]. However, Berjawi et al. did not note such an association in their study. Additionally, they reported no significant associations of mask-acne with the reuse of masks and taking breaks from wearing these masks [13]. In our study, a majority of the patients (67.3%) used N95 masks. Additionally, among those with the worsening of acne following the use of masks, 13 (81.3%) and 10 (71.4%) men and women had used N95 masks regularly, respectively. Furthermore, a majority (76.7%)

used their masks for at least 6 hours daily, thus implying that this threshold may be used as the maximum duration of single mask use before changing the masks.

Limitations

The main limitation of this study was the use of a web-based and self-designed questionnaire. Consequently, the severity of acne was assessed by the participants, which impacts the quality of evidence. Additionally, the materials used in the masks were not evaluated, which could have helped in the use of appropriate materials to prevent maskne.

CONCLUSIONS

Maskne, or mask-induced acne, is a common occurrence in healthcare workers who wear occlusive masks for prolonged periods of time; such maskne is predominantly of mild or moderate severity, while some may develop severe acne and require systemic therapies. The effects of occlusive masks and changes in the microenvironment of the masks require further research. The materials used to manufacture masks, the duration of contact, and the educational awareness of the user are important factors to consider in maskne. The major risk factors for maskne include N95 masks and mask use longer than six hours.

Statement of Human and Animal Rights

All the procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the 2008 revision of the Declaration of Helsinki of 1975.

Statement of Informed Consent

Informed consent for participation in this study was obtained from all patients.

REFERENCES

1. Teo W. The "maskne" microbiome: Pathophysiology and therapeutics. Int J Dermatol. 2021;60:799-809.
2. Paichitrojjana A, Chalermchai T. The prevalence and related factors of acne exacerbation and face mask wearing during the COVID-19 pandemic. J Med Associat Thailand. 2022;105:594-9.
3. Hua W, Zuo Y, Wan R, Xiong L, Tang J, Zou L, et al. Short-term skin reactions following use of N95 respirators and medical masks. Contact Dermatitis. 2020;83:115-21.
4. Scarano A, Inchingolo F, Lorusso F. Facial skin temperature and discomfort when wearing protective face masks: Thermal infrared imaging evaluation and hands moving the mask. Int J Environ Res Public Health. 2020;17:4624.
5. Gasparino RC, Lima MHM, de Souza Oliveira-Kumakura AR, da Silva VA, de Jesus Meszaros M, Antunes IR. Prophylactic dressings in the prevention of pressure ulcer related to the use of personal protective equipment by health professionals facing the COVID-19 pandemic: A randomized clinical trial. Wound Repair and Regeneration. 2021;29:183-8.
6. Daou H, Paradiso M, Hennessy K, Seminario-Vidal L. Rosacea and the microbiome: A systematic review. Dermatol Ther (Heidelb). 2021;11:1-12.
7. Teo W-L. Diagnostic and management considerations for "maskne" in the era of COVID-19. J Am Acad Dermatol. 2021;84:520-1.
8. Özkesici Kurt B. The course of acne in healthcare workers during the COVID-19 pandemic and evaluation of possible risk factors. J Cosmet Dermatol. 2021;20:3730-8.
9. Cretu S, Dascalu M, Salavastru CM. Acne care in health care providers during the COVID-19 pandemic: A national survey. Dermatol Ther. 2022;35:e15753.
10. Techasatian L, Lebsing S, Uppala R, Thaowandee W, Chaiyarit J, Supakunpinyo C, et al. The effects of the face mask on the skin underneath: A prospective survey during the COVID-19 pandemic. J Prim Care Community Health. 2020;11:215013272096616.
11. Raju SP, Sachdev M, Khunger N, Madnani N. Mask acne in skin of color: A significant dermatological condition amidst the COVID-19 pandemic. J Clin Aesthet Dermatol. 2022;15:44-8.
12. Altun E, Topaloglu Demir F. Occupational facial dermatoses related to mask use in healthcare professionals. J Cosmet Dermatol. 2022;21:2535-41.
13. Berjawi A, Salameh P, Fadel N, El Khoury JR. Mask-acne prevalence and risk factors during the COVID-19 pandemic: A cross-sectional single institution study. Dermatol Ther. 2023;2023:1-6.
14. Lan J, Song Z, Miao X, Li H, Li Y, Dong L, et al. Skin damage among health care workers managing coronavirus disease-2019. J Am Acad Dermatol. 2020;82:1215-6.
15. Falodun O, Medugu N, Sabir L, Jibril I, Oyakhire N, Adekeye A. An epidemiological study on face masks and acne in a Nigerian population. PLoS One. 2022;17:e0268224.

Copyright by Mohan Eshwar Rao Shendre, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Source of Support: This article has no funding source.

Conflict of Interest: The authors have no conflict of interest to declare.