



Risk factors for the development of acne in healthcare workers during the COVID-19 pandemic

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Abstract

The COVID-19 pandemic has led to many healthcare workers having prolonged contact with tight-fitting masks, leading to maskne. “Maskne” is defined as acne secondary to mask use. There are limited studies on maskne during the COVID-19 pandemic. The objective of this study is to identify risk factors for the development of maskne amongst healthcare workers. A cross-sectional survey was completed by 227 medical students, resident physicians, and nursing students at Johns Hopkins Medicine, with 68.7% of participants reporting development of maskne. Surgical masks and respirators were the most prevalent mask types worn at work. The most common prevention methods were the use of mild cleansers and moisturizers. Chi-squared analysis was used for data analysis. The results of this study indicate that gender ($p=0.003$) and duration of mask use ($p=0.048$) are significant risk factors for maskne development. These factors are non-modifiable, but may be used for more targeted education for prevention.

Keywords Maskne · Acne · Occupational health · Contact dermatitis · COVID-19 pandemic

Introduction

The COVID-19 pandemic has significantly changed the work environment for healthcare workers, with many subject to prolonged contact with tight-fitting masks, including N-95 masks and other respirators, as well as wearing masks outside of work [1]. Various dermatologic conditions have been described amongst healthcare workers due to these circumstances, such as dermatitis and the exacerbation of previous skin conditions [2]. “Maskne” is defined as acne secondary to mask use. However, existing literature and knowledge about maskne during the pandemic is limited. Current theories for the pathophysiology underlying maskne development include a combination of mechanical stress and imbalance of the skin microbiome. Occlusion of the skin with masks can lead to dysbiosis of the skin flora, retention of bio-fluids, and increased skin temperatures associated

with heat and sweat-related dermatoses. Furthermore, friction from masks can lead to acne mechanica and frictional dermatitis and can also exacerbate existing inflammatory skin conditions [3]. This acne-prone environment may be further exacerbated and more easily triggered by underlying risk factors, such as a history of acne, pre-existing skin conditions, duration of mask use and type of mask, amongst others. Existing maskne guidelines emphasize using gentle moisturizers and cleansers, barrier creams, and frequent mask changing or cleaning, which may alleviate friction and skin microbiome dysbiosis [4].

The objective of this study is to assess risk factors for developing maskne in healthcare workers with a hypothesis that history of acne may be associated with maskne development.

Methods

The survey was designed to assess awareness and adherence to maskne guidelines, mask use, acne, and acne treatment history as well as the presence of maskne in this population. After exemption was granted from the Johns Hopkins University IRB, this survey was administered via email to 3rd and 4th year medical students, resident physicians, and

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nursing students at Johns Hopkins Medicine. Responses were recorded for 227 individuals between January 2021 and March 2021. Descriptive statistics and analytical comparisons of demographics between respondents reporting maskne were reported using Chi-squared analysis. Characteristics of the history of acne were assessed based on the duration of acne history, treatments used indicating severity of the acne, and period of onset relating to adolescence.

Results

The majority of respondents were familiar with maskne (81.9%) and used at least one recommendation for the prevention of maskne (94.7%). More than 2/3 of participants developed maskne. Surgical masks and respirators were the most prevalent mask types at work. The most common

prevention method was the use of mild cleansers and moisturizers. As seen in Table 1, amongst demographic factors, gender identity was the only significant factor found, with women being more likely to develop maskne ($p = 0.003$). Furthermore, risk factors relating to acne history, including overall acne history, period of onset, duration, and severity of acne treatment, were not significant. Table 2 indicates that among occupational risk factors, including mask type, trainee group, and setting, duration of mask use was the only significant risk factor ($p = 0.048$).

Discussion

This cross-sectional survey of maskne development was designed to assess familiarity with the term maskne, the presence of maskne, and risk factors for development of

Table 1 Risk factors by demographics and history of acne

	Maskne $n = 156$ n (%)	No Maskne $n = 71$ n (%)	Total	p value
Gender Identity				
Women	147 (72)	58 (28)	205	0.003
Men	9 (41)	13 (59)	22	
Age				
18–24	32 (70)	14 (30)	46	0.36
25–34	105 (71)	42 (29)	147	
35–44	16 (57)	12 (43)	28	
45–64	3 (50)	3 (50)	6	
	Maskne $n = 86^*$ n (%)	No Maskne $n = 33^*$ n (%)	Total	p value
History of acne	86(74)	33 (46)	119	0.27
Duration of history				
< 1 year	2 (50)	2 (50)	4	
1–5 years	19(70)	8 (30)	27	
6–10 years	25 (71)	10 (29)	35	0.74
> 10 years	39 (75)	13 (25)	52	
Period of onset				
Preadolescence	7 (78)	2 (22)	9	0.43
Adolescence	67 (70)	29 (30)	96	
Post-adolescence	12 (86)	2 (14)	14	
Acne treatment	$n = 191^{**}$	$n = 87^{**}$		
OTC	56	18	74	0.32
Topical prescription	60	30	90	
Oral prescription	75	39	114	

All p -values were in italics, with significant values in bold. The italicized values in parentheses are the percentage of values with or without maskne out of the total values in that category (row)

*119 out of 227 participants reported a history of acne and were asked questions pertaining to it

**Participants were allowed to select multiple choices for questions pertaining to these factors

Table 2 Risk factors by occupational exposure

	Maskne (<i>n</i> = 156) <i>n</i> (%)	No Maskne (<i>n</i> = 71) <i>n</i> (%)	Total	<i>p</i> value
Duration of mask use*				
< 2 h	0 (0)	2 (100)	2	0.048
2–4 h	2 (67)	1 (33)	3	
5–8 h	56 (62)	34 (38)	90	
> 8 h	97 (74)	34 (26)	131	
Healthcare worker group				
Medical student	28 (63)	16 (36)	44	0.63
Nursing student	113 (71)	47 (29)	160	
Resident physician	15 (65)	8 (35)	23	
Setting				
	<i>n</i> = 247**	<i>n</i> = 116**		
Emergency room	32 (78)	9 (22)	41	0.15
Operating room	18 (58)	13 (42)	31	
Inpatient, intensive care	37 (73)	14 (27)	51	
Inpatient, other	120 (70)	51 (30)	171	
Outpatient	37 (60)	25 (40)	62	
Research	3 (43)	4 (57)	7	
Mask type				
	<i>n</i> = 276**	<i>n</i> = 109**		
Cloth	38 (69)	17 (31)	55	0.49
Surgical	149 (70)	64 (30)	213	
Respirators	81 (75)	27 (25)	108	
PAPR	8 (89)	1 (11)	9	

Bold values indicate significant *p*-values. Italicized values in parentheses represent the same percentage of the category with or without maskne

*An incomplete form for this question led the sample to be 155 participants

**Participants were allowed to select multiple choices for questions pertaining to these factors

maskne in healthcare trainees. The results of this study indicate that maskne in healthcare workers can develop without an association with previous acne history overall. In a single-variable analysis, longer duration of mask use and gender are significant risk factors for maskne development. As these factors are non-modifiable, targets for intervention should be to improve maskne prevention education, regardless of acne history, given the continued COVID-19 infection burden in 2022. Due to continued waves of elevated case rates, mask use has remained continuous and maskne will continue to be a chronic issue, experienced by healthcare workers and trainees across all fields.

This study is limited by self-selection for survey completion, small sample size, predominantly women, and single-center study. Although these results provide insights into the risk factors for maskne, gender and duration of mask use are not modifiable factors. With increased availability of PPE, studying the duration of mask use and role of changing masks during the workday may lead to

better recommendations for maskne avoidance. Additionally, future research assessing the management and psychological impact of exacerbated or new acne on healthcare workers may be warranted.

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Declarations

Conflict of interest The authors declare that they have no conflict of interest.

IRB This study was determined to be exempt from approval by the Johns Hopkins IRB (IRB00253532).

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