

Personal protective equipment related dermatoses among health care workers of a tertiary care hospital

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Abstract

Background Personal protective equipment although is the need of the hour to prevent and stay safe from unknown infectious diseases but its use has advantages and disadvantages all depending on its type and duration of use.

Objective To assess personal protective equipment related dermatoses among health care workers attending patients at a tertiary care hospital of Pakistan.

Methods The study was carried out in the department of Pathology (Microbiology), Army Medical College/National University of Medical Sciences from June 10th 2021 to July 10th 2021. A self-administered Performa consisting of multiple-choice items was designed using Google forms. It was distributed electronically to health care workers attending patients at a tertiary care hospital. Data was collected through snowball sampling technique. Questionnaire consisted of type and duration of personal protective equipment used, site of skin lesion, sociodemographic data, department of the hospital, prior dermatological history. Data was analyzed using SPSS version 27.0.

Results The cutaneous manifestations were varied, the most common being acneiform eruption (41%) followed by ulcerating lesions (21%) and erythema with vesicular lesions (9.6%).

Conclusion Use of personal protective equipment plays a crucial role in combating infections but its continuous use brings wide array of dermatological manifestations. In order to avoid these complications, safety measures should be taken. Discovering a balance between this critical protection and methods to mitigate the harmful effects on the skin health is the key.

Keywords Infection control; Personal protective equipment; Skin diseases.

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Introduction

The COVID-19 pandemic has put the spotlight on the global fight against infectious diseases and highlights important role of personal protective equipment (PPE) in keeping frontline workers safe. PPE including masks, face shield, goggles, gowns

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and gloves is a fundamental line of defense against harmful infectious diseases.¹

Personal protective equipment is important for infection control but it has multiple challenges especially when it comes to skin health. PPE prevents the spread of infection by building a physical barrier that precludes pathogens from infiltrating the wearer's skin and mucous membranes. This protection is important in high-risk environments such as hospitals and clinics where healthcare workers are continuously exposed to

infectious pathogens.² Nevertheless, the fundamental process that makes PPE efficacious at preventing infection also presents a new set of challenges. Extended and regular use of PPE can lead to xerosis, pressure ulcers, allergic contact dermatitis, and friction-related dermatitis.³

When wearing personal protective equipment (PPE), healthcare workers can develop skin lesions that are not only of cosmetic concern but can also severely impair the performance of healthcare workers. The constant friction caused by N-95 face masks and goggles can damage the skin's natural barrier causing allergic reactions and irritant dermatitis as well as severe pressure ulcers on the nose and cheeks. This is due to heat and moisture accumulating behind protective gowns, gloves, and face masks.⁴

Personal protective equipment (PPE) is currently considered a necessary evil in the healthcare industry because of its negative effects.⁵ Despite these occupational skin health problems, PPE remains an essential part of infection control strategies where patient and healthcare worker protection is paramount.⁶

Therefore healthcare professionals are turning to the development of skin-friendly materials and the promotion of preventative skincare habits to decrease the unfavorable effects of PPE on the skin. Use of barrier creams, adopting a moisturizing habit, and regularly removing personal protective equipment are easy and effective ways to minimize skin damage while maintaining strict infection prevention measures.⁷

Methods

This cross-sectional study was carried out at the department of Microbiology, Army Medical College/National University of Medical Sciences, Rawalpindi from June 10th 2021 to July 10th, 2021 after obtaining ethical approval from institutional review board of Army Medical College. A proforma was designed consisting of multiple-choice

questions using Google forms. Form was distributed electronically to health care workers attending patients at a tertiary care hospital.

Data was collected through snowball sampling technique. Questionnaire consisted of type and duration of PPE used, dermatoses experienced by health care workers due to PPE use, site of skin lesions, sociodemographic data, department of hospital and prior dermatological history. PPE used included surgical face mask, N95 masks, gloves, face shields and gowns.

Inclusion criteria included health care workers 16-60 years working in tertiary care facility using PPE for more than 2 hours. Exclusion criteria included any chronic dermatological condition like eczema, psoriasis etc. and duplicate specimen from same patient.

PPE induced dermatoses noted for the purpose of study included bruising, laceration, ulceration, acneiform eruption, erythema, papular eruption, urticaria, dry dermatitis, vesication, skin thickening and scaling.

Data was analyzed using Statistical Package for Social Sciences version 27.0. The descriptive statistics were calculated for quantitative variables. Association was calculated using Chi-square test and p value < 0.05 was taken as significant.

Results

Study criteria was full filled by (n=185) health care workers. **Table 1** shows distribution and correlation of skin damage due to PPE use according to gender, duration of PPE use and break time between PPE usage. **Table 2** shows frequency of skin lesions after PPE use. Major sites affected by PPE were cheeks and lower side of face as shown in **Figure 1**. Majority of health care workers who used PPE belonged to medicine ward i.e. 81(43.5%) followed by dermatology 56(30.1%), gynaecology 9(4.8%), pathology 8(4.3%) and equal number in radiology and neurology 7(3.8%) respectively.

Table 1 Association of skin damage due to Personal Protective Equipment usage.

Characteristic	Skin damage		P value
	Yes	No	
Gender			
Male	63	45	0.63
Female	49	28	
Duration of time PPE was used			
More than 12 hours	18	15	0.18
12 hours	24	22	
10hours	13	3	
8 hours	30	8	
6 hours	26	6	
Hand hygiene performed			
More than 10 times	34	24	0.23
10 times	33	19	
6 times	27	15	
3 times	17	16	
Layers of gloves used			
Triple	52	44	0.017
Double	57	29	
Single	2	1	
Break in between PPE usage			
6 hours	14	4	0.059
4 hours	22	10	
2 hours	20	12	
No break	55	48	

Table 2 Frequency of skin lesions after using PPE

Skin lesions	Frequency	Percentage
Acneiform	41	22.1
Bruising	8	4.3
Laceration/ulceration	11	5.9
Erythema /vesiculation	18	9.7
Papular eruption	10	5.4
urticaria	10	5.4
scaling	10	5.4
Hyperkeratotic skin	2	1.1
Dry dermatitis	2	1.1

Discussion

Our study shows the burden of dermatoses due to use of PPE. Their use causes a spectrum of common dermatoses. The most common dermatologic manifestation reported was acneiform lesions representing 22.1% in our study consistent with international studies. Foo *et al.* reported acne as most common cutaneous reaction comprising 59.6% of all cases.³ Lujia C *et al.* also reported that 23.3% of their study population complained of rapid rise in facial acne following use of face mask.⁸ Similar results were shown by daye *et al.*⁹ Zhong S *et al.*

studied the effects of mask use on face and found that wearing a mask may disrupt the skin’s natural barrier leading to issues like erythema, irritation and acne.¹⁰ Jiang *et al.* reported excessive sweating in 91% health care personal was responsible for acneiform reaction.¹¹

In this study, out of 185 participants, 55.7% (n=103) males and 44.3% (n=82) females were enrolled. The result of our study varied from another similar study conducted in Pakistan in which 34.3% were male, and 65.7% were females. Another study also showed that females were effected four time more than males in contrast to our study.¹² Possible reason for this difference in percentage is mainly due to random sampling technique.¹³

Cheeks and lower side of face 33% (n= 61) was the most effected site in our study followed by hands 11.8% (n=22). Similar results were shown by international studies conducted in USA and China.^{14,15}

This study also identified that increasing layers of gloves was less associated with dermatologic symptoms ($p=0.017$). However, gender ($p=0.63$), duration of work ($p=0.18$) and hand hygiene practices ($p=0.23$) failed to show any significant association.

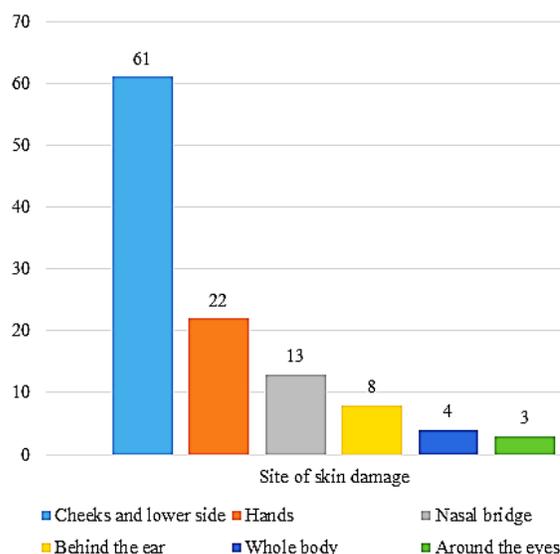


Figure 1 Major sites affected by use of PPE.

Health care workers who used PPE for more than 10 hours developed dermatoses 16% (n=30). Similar results were shown by international studies.^{16,17}

As this study utilized an online self-administered questionnaire and snowball sampling technique, the findings may be subject to selection and reporting bias. Dermatological evaluation was based on participant self-report rather than clinical examination, which may limit diagnostic precision. Additionally, the study was conducted over a short duration and within a limited population, restricting generalizability. Future studies employing larger, randomized samples with objective dermatological assessment are recommended to validate these observations.

Conclusion

Prolonged and consistent use of personal protective equipment, although essential for infection prevention, was associated with a range of dermatological manifestations among healthcare professionals, most notably acneiform and eczematous lesions. Strengthening awareness, promoting preventive skincare measures, and optimizing PPE use protocols may help minimize these occupational complications. Achieving a balance between infection control and skin health remains vital for the comfort and performance of healthcare workers.

Declaration of patient consent Authors certify that they have obtained all appropriate patient consent.

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Conflict of interest No conflict of interest.

Author's contribution

AN,WF,SB: Substantial contributions to study design, acquisition of data, manuscript writing.

AE,MK,HW: Substantial contributions to concept, study design, critical review of the manuscript writing.

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