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Original Research Article

Cutaneous manifestations among health-care workers caring for COVID patients

Krishna Rajesh Kilaru*, Kavya Chekuru, Pooja Munnangi, Malleswari Chennur, Babitha Sukhavasi, Manogna Chowdary Kilaru

Department of DVL, NRL Medical College and General Hospital, Chinakakani, Guntur, Andhra Pradesh, India

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***Correspondence:**
Dr. Krishna Rajesh Kilaru,
E-mail: krishnarkilaru@gmail.com

ABSTRACT

Background: Due to the high transmission ability of the SARS-CoV-2 virus, front-line healthcare workers (HCWs) are at a greater risk of contracting the infection during the management of COVID patients. As a result, prevention measures against COVID-19 disease transmission like personal protective equipment (PPE) and frequent hand washing have become a necessity. While these measures are effective against COVID-19 transmission, they have negative implications as well, one of which is their detrimental effects on the skin. The objective of the study was to understand the prevalence and pattern of cutaneous manifestations among HCWs caring for COVID patients.
Methods: A descriptive study on HCWs caring for COVID-19 patients was conducted at a designated COVID hospital from September to October 2020. Data on protective measures taken and cutaneous examination findings were recorded and analyzed.
Results: Among 310 HCWs in this study, 137 HCWs (44.19%) had skin rash. The highest incidence of cutaneous manifestations was seen among nurses (48.33%), followed by doctors (42.29%) and support staff (33.33%). Hand eczema (43.80%) was the most common manifestation, followed by acne (22.63%), hair fall (18.98%), sweat dermatitis (11.68%), pressure dermatitis (10.22%), irritant contact dermatitis (7.30%). Seborrhea capitis, pruritus, xerosis, hyperpigmentation, urticaria, tinea corporis, and eczema over legs were the other cutaneous manifestations seen in this study.
Conclusions: Nearly half of the HCWs in this study had cutaneous manifestations. Hence, there is a need to educate the HCWs regarding best practices for the prevention of skin damage caused by PPE and frequent hand wash.

Keywords: Health-care workers, Personal protective equipment, Skin rash

INTRODUCTION

Coronavirus (SARS-CoV-2) was first isolated in patients with pneumonia in Wuhan, China, in December 2019. It is highly contagious and has spread across the globe within a short span of time, following which a pandemic was declared in March 2020 by the world health organization (WHO).[1] The WHO has proposed various containment strategies and protective measures ever since, to prevent the rapid spread of infection. Front-line HCWs caring for COVID-19 infected patients are at a higher risk of contracting coronavirus infection when compared to the general public.[2] Hence, the usage of PPE, frequent hand washing with topical disinfectants has become mandatory for the HCWs. As a consequence, occupational skin damage among the medical personnel has become a norm.[3,4]

According to a survey by Lan et al the prevalence of skin damage among HCWs due to PPE and hand hygiene

practices was 97%.[6] Adverse cutaneous reactions to PPE include contact dermatitis, pressure-related skin damage, acneiform eruptions, and moisture-associated skin irritation etc.[5] Increased prevalence of hand dermatitis among HCWs can be correlated with excessive hand cleansing practices during the pandemic.[6]

In this study, we observed the prevalence and pattern of cutaneous manifestations among HCWs caring for COVID-19 patients.

METHODS

This study was conducted at a designated district COVID hospital for a period of 2 months from September 1, 2020, to October 31, 2020. Front-line HCWs caring for COVID-19 infected patients were included in the study. HCWs not involved in the care of COVID patients were excluded from the study. The nature of the study was explained to the subjects, and informed consent was taken. The demographics like age, gender, occupation was recorded, and information regarding hand hygiene practices and other protective measures taken by the HCWs were collected. Cutaneous examination was done, and findings were recorded into the computer database. Descriptive statistics including frequencies and percentages were used to present the results. Ethical clearance certificate was obtained for the study from the institutional ethics committee.

RESULTS

A total of 310 HCWs dedicated to the treatment of SARS-CoV-2 virus-infected patients were included in this study. Majority of the HCWs were in the age group of 21-30 years (61.94%), followed by 31-40 years (30.97%). 229 HCWs (73.87%) were females, and 81 HCWs (26.13%) were males. Among them, 175 were doctors (56.45%), 120 were nurses (38.71%), and 15 were other support staff (4.84%). The mean time spent in PPE by nurses was 7.2 hours, by doctors was 3.5 hours and by support staff was 2.6 hours.

Among the 310 HCWs in this study, skin rash was seen in 137 (44.19%) HCWs. The majority (66.42%) of the HCWs with skin damage belonged to 21-30 years age group. Among them, 75.18% were females and 24.82% were males. The highest incidence of skin damage in this study was seen among nurses (48.33%), followed by doctors (42.29%) and support staff (33.33%) (Table 1).

Hand eczema was the most common manifestation seen in 43.80% of HCWs with skin rash in this study (Figure 1). The HCWs reported frequent use of soap, sanitizer, and Betadine for hand cleansing. Among the HCWs with hand eczema, sanitizer (43.33%) was the most common cause, followed by gloves (30.00%), Betadine (23.33%), and soap (3.33%). 61.67% of HCWs with hand eczema had a frequency of hand cleansing with either of soap, sanitizer, and Betadine for more than 10 times/day.

Table 1: Demographics of the healthcare workers.

Variables	Skin rash		Total
	Yes	No	
Age (year)			
21-30	91	101	192
31-40	37	59	96
41-50	9	9	18
51-60	0	3	3
61-70	0	1	1
Total	137	173	310
Occupation			
Doctors	74	101	175
Nurses	58	62	120
Support staff	5	10	15
Total	137	173	310

Figure 1: Hand eczema due to sanitizer.

Acne was seen in 22.63% of HCWs with skin damage, followed by hair fall (18.98%), sweat dermatitis (11.68%), and pressure dermatitis (10.22%). Retro-auricular region (64.29%) was the most common site involved in HCWs with pressure dermatitis, followed by the bridge of nose (35.71%) and wrist (21.42%). More than one site was affected in some HCWs with pressure dermatitis. Irritant contact dermatitis (ICD) was seen in 7.30%, of which 80% had ICD due to Betadine, and in the remaining HCWs, ICD was due to soap use.

Other dermatoses seen in this study were seborrhea capitis (5.11%), pruritus (3.65%), xerosis (3.65%), hyperpigmentation (2.92%). Urticaria, exacerbation of tinea corporis, and eczema over legs were seen in 0.73% of HCWs with skin rash each (Table 2). The most common cause of rash in this study was the gown and head cap of PPE (45.26%), followed by N95 mask (37.96%), sanitizer (18.98%), Betadine (16.06%), gloves

(13.14%), and soap (2.92%) (Table 3). More than one type of rash was present in many HCWs in this study.

Table 2: Type of skin rash seen in healthcare workers.

Type of rash	Number of HCWs	Percentage (%)
Hand eczema	60	43.80
Acne	31	22.63
Hair fall	26	18.98
Sweat dermatitis	16	11.68
Pressure dermatitis	14	10.22
Irritant contact dermatitis	10	7.30
Seborrhea capitis	7	5.11
Pruritus	5	3.65
Xerosis	5	3.65
Hyperpigmentation	4	2.92
Eczema over legs	1	0.73
Urticaria	1	0.73
Tinea corporis	1	0.73

Table 3: Cause of skin rash in healthcare workers.

Cause of rash	Type of lesions	% cases
Sanitizer	Hand eczema	18.98
Betadine	Hand eczema	10.22
	Irritant contact dermatitis	5.84
Soap	Hand eczema	1.46
	Irritant contact dermatitis	1.46
Gloves	Hand eczema	13.14
N95 mask	Acne	22.63
	Pressure dermatitis	9.49
	Sweat dermatitis	2.19
	Hyperpigmentation	2.19
	Pruritus	1.46
PPE gown and head cap	Hair fall	18.98
	Sweat dermatitis	10.22
	Seborrhea capitis	5.11
	Xerosis	3.65
	Pressure dermatitis	2.19
	Pruritus	2.19
	Hyperpigmentation	0.73
	Eczema over legs	0.73
	Urticaria	0.73
	Tinea corporis	0.73

DISCUSSION

Since its emergence, the COVID-19 disease has resulted in 60.26 million infections and over 1.42 million deaths.[9] As COVID -19 continues to change our lives in unimaginable ways, it also poses multiple challenges to the global health care system and front-line HCWs.[10]

In this study, 44.19% of HCWs had skin damage related to the use of PPE and other protective measures taken against the novel coronavirus infection. Gloves, gown, shoe covers, head cap, mask, face shield were included under PPE. According to a survey by Yan et al 71% of HCWs had skin damage due to personal protective measures taken against COVID-19 virus infection.[11] The mean time spent in PPE by the HCWs was highest among nurses (7.2 hours), followed by doctors (3.5 hours) and support staff (2.6 hours). In this study, the highest incidence of cutaneous manifestations was seen among nurses (48.33%), followed by doctors (42.29%) and support staff (33.33%). There is a potential for an increased incidence of skin damage in HCWs who spend more time in PPE. According to Lan et al HCWs in PPE for more than 6 hours had a higher risk of skin damage in corresponding sites than those who used them for lesser time.[6] In a study conducted by Singh et al on HCWs who had skin damage related to PPE, the average duration spent in PPE per day was nearly 8.76 hours.[12] Hence a standard guideline should be set for the amount of time spent by HCWs in PPE to avoid damage to the skin.

In this study, 60 HCWs (43.80%) out of 137 HCWs with skin rash had hand eczema. Among the HCWs who developed hand eczema, 61.67% had a frequency of hand cleansing with one or more disinfectants for more than 10 times/day. Similarly, in a study by Ibler et al 52% of medical staff with hand eczema wash their hands for more than 10 times per day.[13] Guerler et al found that the frequency of hand cleansing before and during the pandemic showed a significant increase from 5-10 times/day to 10-20 times/day among the HCWs in their study.[8] Long-term disinfectant use also influences the microbiome and immune microenvironment on the skin surface, resulting in conditions such as eczema, fungal infection, bacterial infection, and allergic dermatitis.[14] Van der Meer et al recommended that hands should be washed in lukewarm water and dried thoroughly.[15] Using weak acidic or neutral detergents instead of alkaline ones are encouraged, and frequent application of barrier creams is recommended.[11]

Acne was the second most common type of skin rash in this study. It was seen in 22.63% of HCWs with skin rash in this study, occurring over the area covered by N95 mask. In a study by Singh et al on PPE-induced facial dermatoses in HCWs, facial acne was seen in 11.63% of cases.[12] In a survey by Foo et al acne was seen in 59.6% of HCWs wearing N95 mask.[16] Tan et al reported the occurrence of nodular acne in two HCWs who had worn N95 mask daily for a period of three months.[17] The N95 mask is usually worn in a tight-fitting manner against the face. Acne may occur due to the accumulation of humidity under the mask, which is conducive to bacterial proliferation and occlusion of pilosebaceous duct due to pressure at the contact site.[11]

Increased hair fall was reported by 18.98% of HCWs who had adverse effects to PPE in this study. It may be due to stress, seborrhea capitis, increased hydration, and hair contamination due to usage of head caps.[11,14]

Sweat dermatitis was seen in 11.68% of HCWs with skin damage in this study. In a study by Yan et al excessive sweating with PPE use was reported in 64.5% of HCWs.[11] In the study conducted by Singh et al sweat dermatitis was seen in 16.28% of HCWs with skin damage due to PPE.[12] Campbell et al reported two cases of HCWs with localized mid-face miliaria due to filtering facepiece mask after a single use for five hours.[18] When used for a prolonged time, face mask and PPE gown cause increased sweating and its accumulation under the PPE, predisposing to skin barrier breakdown and secondary infection.

Pressure dermatitis was seen in 10.22% of HCWs with skin damage in this study. It was seen over the bridge of nose, retro-auricular region due to the tight-fitting N95 mask and its straps, and over wrists due to the pressure of the elastic band of PPE gown. According to the study by Singh et al pressure dermatitis was seen in 25.58% of HCWs with facial skin damage due to enhanced personal protection measures.[12]

7.30% of HCWs with skin rash had ICD in this study. Betadine was used for hand cleansing and bathing by multiple HCWs in this study. Povidone iodine solution is notorious for causing ICD in many of its users. Murthy et al reported a case of severe ICD resembling second-degree burns at the site of application of Betadine.[19] Oyanguren et al reported seven cases of contact dermatitis to povidone-iodine solution.[20] Awareness should be created among HCWs about the adverse effects of betadine on the skin, and appropriate alternate cleansing agents should be suggested.

Seborrhea capitis was seen in 5.11% and xerosis was seen in 3.65% of HCWs with rash in this study. In a study by Kaihui et al xerosis was reported in 36.1% of HCWs due to the use of protective clothing during the management of SARS-CoV-2 infected patients.[21] HCWs should be counseled about the regular usage of lipid-rich moisturizing agents to counteract xerosis. Pruritus was seen in 3.65% of cases with skin damage in this study.

Hyperpigmentation was seen over the bridge of nose in 2.92% of HCWs with skin damage in this study. It may have occurred due to friction with the tight-fitting N95 mask. In a study by Foo et al pigmentation over the nose, cheeks, chin was seen in 7.3% of HCWs with skin damage secondary to N95 mask.[16]

Urticaria was seen in 0.73% of HCWs with skin rash in this study. In the study conducted by Kaihui et al urticaria was noted in 3.3% of HCWs with skin rash, which occurred in response to protective clothing.[21] Exacerbation of tinea corporis lesions occurred in 0.73% of HCWs with skin damage. Prolonged time in PPE results in a hot and humid microclimate over the skin conducive to the development of fungal infections.[11,14] Eczema over legs (0.73%) also occurred in HCWs with skin damage in this study.

Limitations

Investigations like patch testing to identify the exact cause of skin rash could not be done.

CONCLUSION

In this study, various enhanced infection-prevention measures followed by the HCWs were seen to have adverse effects on the skin. There is a need to educate the HCWs regarding best practices, which include frequent rotations to avoid prolonged use of PPE, well-fitting masks and goggles, usage of alternate materials in cases of ICD, frequent application of emollients, and barrier creams to minimize skin damage.

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