

# Frequency of skin lesions in healthcare workers during the COVID-19 pandemic: an update from Iran

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**Background:** During the recent coronavirus disease 2019 (COVID-19) pandemic, we witnessed an increased incidence of contact dermatitis in the hands and other body areas of healthcare workers secondary to using antiseptics and personal protective equipment. This study aimed to investigate the prevalence of skin lesions in healthcare workers in hospitals affiliated with Babol University of Medical Sciences during the COVID-19 pandemic.

**Methods:** In a cross-sectional study, the healthcare workers of Ayatollah Rouhani, Shahid Yahya Nejad, and Shahid Beheshti hospitals in Babol, Iran, were asked to fill out information collection forms about cutaneous lesions during the COVID-19 pandemic.

**Results:** Three hundred healthcare workers were included in the study. Skin lesions were seen in 240 patients (80%), and the hands were the most common site of involvement (36.7%). Skin lesions in healthcare workers had no statistically significant relationship with the variables of age ( $P = 0.84$ ), sex ( $P = 0.52$ ), and COVID-19-dedicated wards ( $P = 0.16$ ). However, skin lesions were more common in those with more working hours ( $P = 0.01$ ) and increased handwashing frequency ( $P < 0.001$ ).

**Conclusion:** The present study showed a high prevalence of skin lesions among hospital healthcare workers during the COVID-19 pandemic. Therefore, preventive measures are recommended.

**Keywords:** pandemics, skin manifestations, coronavirus, health personnel, Covid-19

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## INTRODUCTION

The coronavirus disease 2019 (COVID-19) pandemic represents the greatest worldwide infectious disease challenge of the modern world, with asymptomatic to severe presentations <sup>1,2</sup>. Besides the usual respiratory manifestations <sup>3</sup>, COVID-19 can cause skin lesions like a maculopapular rash, urticaria, petechial or purpuric eruptions, chickenpox-like blisters with



erythematosus or temporary discoloration, chilblain-like lesions, and livedoid or reticular lesions<sup>4-8</sup>.

Occupational hand dermatitis is an important complication observed in healthcare workers in the COVID-19 era<sup>9</sup>. The humid environment of the hospital, along with other risk factors such as exposure to irritant materials such as detergents, latex gloves, or other personal protective equipment (PPE), and the presence of underlying dermatologic disorders such as atopy can predispose hospital staff to cutaneous complications<sup>10</sup>, which might lead to reduced morale and inconvenience among healthcare workers. Hence, monitoring these PPE-related complications and taking appropriate preventive measures are necessary.

This study aimed to investigate the prevalence of skin lesions in healthcare workers in hospitals affiliated with Babol University of Medical Sciences during the COVID-19 pandemic.

## METHODS

We performed a cross-sectional study on the healthcare workers (all professors, residents, medical students, nurses, and paramedics) of three hospitals affiliated with Babol University of Medical Sciences, Babol, Iran (Ayatollah Rouhani, Shahid Yahya Nejad and Shahid Beheshti hospitals), during the COVID-19 epidemic between October and November 2020.

The calculated sample size was 244. The survey target population was those wearing one or more different PPE at work, including surgical or N95 masks, latex gloves, face shields, protective goggles, or waterproof full-body gowns. After explaining the purpose of the study to the participants, informed consent was obtained, and data collection was performed using a questionnaire regarding demographic characteristics as well as the data about using different PPEs and precaution protocols and the presence of any related adverse effects.

### Ethical consideration

The study was approved by the local Ethics Committee (registration number: IR.MUBABOL.HRI.REC.1398.208).

## RESULTS

Among the 300 healthcare workers involved in this study, 240 (80%) developed skin lesions during

the COVID-19 pandemic. The mean age of the participants was  $32.93 \pm 5.73$  years (range: 25 to 52 years), and 70% were females. Thirteen participants (4.3%) reported a history of eczema, and 287 (95.7%) did not mention a history of any skin disorders. A summary of demographics and a part of the data collected from participants is shown in Table 1.

Most participants reported washing their hands more than six times daily and using antiseptic solutions between 6 to 10 times daily at work. The most commonly used PPE was goggles with shields

**Table 1.** Demographics and clinical characteristics of the participants

Variable	n (%)
Age, years	
≤ 35	222 (74%)
> 35	78 (26%)
Gender	
Man	90 (30%)
Woman	210 (70%)
Hospital ward	
Corona-related	174 (58%)
Others	126 (42%)
Profession	
Nurse	110 (36.7%)
Registrar	50 (16.7%)
Intern	104 (34.7%)
Extern	36 (12%)
Hand disinfecting method	
All-liquid alcohol	110 (36.7%)
Alcohol-containing emollient	119 (39.7%)
Gel-based alcohol	58 (19.3%)
Betadine	13 (4.3%)
Hand washing frequency	
1-3 times/day	22 (7.3%)
4-6 times/day	38 (12.7%)
> 6 times/day	240 (80%)
Ordinary soap	104 (34.7%)
Hand hygiene method	
Dermatologic pains	14 (4.7%)
Glycerin soap	100 (33.3%)
Cream soap	74 (24.7%)
Only water	8 (2.7%)
Antiseptic usage frequency	
1-5 times/day	97 (32.3%)
6-10 times/day	105 (35%)
> 10 times/day	98 (32.7%)
Cutaneous lesions	
Present	240 (80%)
Absent	60 (20%)
History of eczema or other dermatoses	
Positive	13 (4.3%)
Negative	287 (95.7%)

and gowns (27%). Among 112 healthcare providers who used isolation gowns, 28.6% had them on for less than 4 hours a day, 21.4% for 4 to 6 hours, and 0.50% for more than 6 hours a day. Furthermore, 38.7% wore N95 masks, 28% had a surgical mask with a back ear band, and 33.3% had a surgical mask with a back strap.

Among those with dermatologic complications, 15.15% worked four days a week, 38.7% worked five days, 0.28% had six working days, and 0.18% were at work seven days a week. Moreover, 12.7% used PPE for less than 6 hours, 36% for 6 hours, and 51.3% for more than 6 hours a day in the hospital. The most commonly used gloves were latex ones (52.7%). Most subjects preferred to use one-layer gloves (92%). The prevalence of allergic reactions to latex gloves was 52.7% among our participants. Among the involved individuals, 12.3% had no close contact with a COVID-19 patient, while 20.3% had a history of COVID-19 in their family or themselves.

Among this study's 300 healthcare workers, 10.0% used prophylactic agents to prevent COVID-19. The most commonly used medications were hydroxychloroquine (34.6%), followed by a combination of hydroxychloroquine and azithromycin (26.9%) and oral vitamin C (3.3%). Cutaneous adverse events occurred in 1.1% of individuals who had used hydroxychloroquine; however, none stopped taking this agent. These adverse events included erythema, bruising, hypopigmentation, or hyperpigmentation, reported in 4.3% of the participants. The hand was the most prevalent site of hydroxychloroquine-induced pigmentary changes (36.7%). In addition, 24.7% complained of skin dryness leading to an itch or burning sensation.

There was no significant difference in skin lesions among medical staff regarding age, sex, and the ward of work. However, skin lesions were much more common in healthcare personnel working more hours daily ( $P = 0.01$ ). Frequent hand washing was also associated with more skin lesions ( $P < 0.001$ ).

## DISCUSSION

We investigated the prevalence of skin lesions in healthcare workers in three hospitals affiliated with Babol University of Medical Sciences. The hand was the most common site of skin involvement, followed by the nasal bridge and retro-auricular region. This

is due to the constant use of protective masks for an extended period in a working shift. The most common symptoms reported were dryness and itching. Similar findings were seen in previous studies<sup>11</sup>.

Darlenski *et al.* reported pressure injury, contact dermatitis, and exacerbation of pre-existing skin disorders such as seborrheic dermatitis and acne as the most prevalent dermatologic features of COVID-19<sup>3</sup>. Occupational skin involvement can happen quite commonly in the context of COVID-19 due to using PPE and disinfectants<sup>12</sup>. Among the healthcare workers of an educational hospital in the Netherlands, the prevalence of cutaneous adverse reactions in the medical staff was considerably higher than in the general population (24% vs. 10%)<sup>5</sup>. In another study in the Netherlands, approximately 50% of health personnel reported symptoms of hand eczema<sup>13</sup>. In a study by Lan *et al.*, 97% of participants involved in the isolation ward or medical clinic had skin lesions caused by PPE<sup>14</sup>. Similarly, the prevalence of eczema in Chinese and German healthcare workers was reported to be about 75% and 90%, respectively<sup>15</sup>, congruent with our results.

The study performed by Gheisari *et al.* in 2020 showed that healthcare workers suffered from acne, itching, and xerosis due to the use of masks, gowns, and shields<sup>16</sup>. In another study by Lin *et al.* in 2020 on medical staff during the COVID-19 epidemic, the prevalence of dermatoses was higher in centers with higher workloads and heavier epidemics. Moreover, a longer daily duration (more than 6 hours) of donning PPE increased the chances of developing dermatoses in association with greater washing frequency (more than ten times)<sup>17</sup>. In the present study, we found a significant relationship between the occurrence of cutaneous complications and total working hours, as well as the frequency of hand washing. Increased working hours result in a greater need for hand washing and masks. This likely explains the relationship between working hours and the occurrence of dermatologic complications.

Contact with disinfectants leads to skin sensitization, inflammation, and dryness. In our survey, 36.7% of the medical personnel used all-liquid alcohol, which could have led to skin allergies. According to Alsaidan *et al.* study, using sanitizers with > 60% alcohol concentration is associated

with more cutaneous complications<sup>18</sup>. Unlike a study conducted in Saudi Arabia in which female and young participants were more likely to develop PPE-related skin lesions<sup>19</sup>, our study showed no significant relationship between skin eruptions and the variables of age, sex, and the working ward.

In our study, 12.3% of the participants had no contact with an infected person, and others had to use PPE due to close contact with the infected person. Notably, if the infected person was a member of the medical personnel's family, using hygienic equipment was needed for a more extended period, resulting in more cutaneous complications.

One of the most interesting findings of our study was the high prevalence of latex allergy in healthcare workers, which was previously claimed by Zack *et al.* They speculated that latex gloves' frequent, prolonged use might lead to exposure to high amounts of latex antigens<sup>20</sup>. Surprisingly, although more than half of the participants in our study claimed they were allergic to latex, the most common gloves they wore were latex ones. Based on our findings regarding the higher prevalence of allergic reactions to latex among healthcare workers, using plastic or cotton gloves instead of latex gloves may help reduce PPE-related cutaneous complications.

Another interesting finding of our study was the relatively high prevalence of skin lesions due to taking prophylactic regimens against COVID-19. Fernandez-Nieto *et al.* reported skin eruptions in a 32-year-old COVID-19 patient following the use of hydroxychloroquine and azithromycin. The lesions included maculopapular rashes (some with a purpuric component) and urticaria<sup>21</sup>. Our survey showed that 10% of the healthcare personnel used prophylactic medications, mostly hydroxychloroquine (34.6%). Three of the medical staff (0.1%) who had used hydroxychloroquine developed dermatologic complications, but none of them ceased taking it.

Our study had some limitations: Firstly, our data was merely based on self-reported questionnaires, and the possibility of recall bias should be considered. Secondly, our study did not cover all of the hospitals in the city. Thirdly, the disproportional number of females versus males may bias some calculations. Nonetheless, to our knowledge, no other study has explored PPE-related complications in healthcare workers in Babol during the COVID-19 pandemic.

Moreover, this is the first study in which the skin lesions related to COVID-19 prophylaxis regimens were also dealt with.

## CONCLUSION

The present study demonstrated the high frequency of dermatologic lesions among healthcare workers in the COVID-19 era. Factors such as PPEs and environmental conditions (e.g., humidity), psychological stress, altered sleep patterns, and prophylactic medications against COVID-19 may explain these dermatologic lesions. Appropriate preventive measures must be taken, including providing standard PPEs regarding size and material, training on their proper use, and reducing the duration of duty to diminish PPE-related complications. Maintaining the health of healthcare workers is essential during such infectious disease outbreaks.

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## Authors contributions

P.H., F.B., A.B and S.E. performed the research. Z.A., A.S and A.G. designed and supervised the research study. P.H, A.S and A.G analyzed the data. P.H. and Z.M. wrote the initial draft. Z.A and Z.N wrote the final paper.

All authors have read and approved the final manuscript.

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**Ethics approval:** The local Ethics Committee approved the study (registration number: IR.MUBABOL.HRI.REC.1398.208).

**Consent to participate and for publication:** Informed written consent was obtained from each patient.

**Availability of data and material:** Data are available under request from the corresponding author.

**Conflicts of interest:** None declared.

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