

An overlooked risk for healthcare workers amid COVID-19: Occupational hand eczema

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ABSTRACT

OBJECTIVE: Hand hygiene, one of the most critical preventive methods against Coronavirus Disease-2019 (COVID-19) cross-transmission, has increased during the COVID-19 outbreak. The present study aims to investigate the prevalence and risk factors of hand eczema (HE) and associated symptoms in healthcare workers (HCWs) during the COVID-19 outbreak.

METHODS: We distributed a self-administered online survey to physicians and nurses in Kahramanmaraş, Turkey. The survey included questions about HE-associated symptoms and risk factors before and during the pandemic.

RESULTS: Five hundred sixty-four individuals (349 physicians and 215 nurses) answered the survey. Post-COVID-19, the prevalence of HE increased from 6.6% to 11.7% and the prevalence of HE-associated symptoms increased from 39.5% to 79.3%. Female gender (odds ratio [OR]: 3.92; 95% confidence interval [CI]: 2.12–7.25), a history of atopic diseases (OR: 1.7; 95%CI: 1.03–2.8), more frequent handwashing (OR: 1.03; 95%CI:1.01–1.05), and more frequent use of moisturizers (OR: 1.12; 95%CI: 1.01–1.24) were independently associated with the risk of HE-associated symptoms.

CONCLUSION: Because of increased handwashing during the COVID-19 outbreak, there is a significant increase in HE-associated symptoms in HCWs. Proper education and preventive strategies for HE are urgently needed for HCWs fighting on the front lines of COVID-19.

Keywords: COVID-19; hand eczema; healthcare workers.

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Coronavirus disease-2019 (COVID-19) has caused a global pandemic that continues to spread worldwide. There are currently no specific treatments or vaccines available for COVID-19, so it is very important to avoid infection. Proper hand hygiene is one of the main preventive measures against COVID-19 cross-transmission. Healthcare workers (HCWs) are at the front-line of the COVID-19 outbreak. They should pay attention to hand hygiene to protect themselves and the patients they care for. However, frequent handwashing may damage the skin barrier and cause hand eczema (HE) [1].

Hand eczema is the most common occupational skin disease [2–5]. Regardless of COVID 19, HCWs have an increased risk for HE [6, 7]. During the COVID-19 pandemic, recent studies have revealed an increase in the prevalence of HE in HCW and the general population [7–13]. Hand eczema is difficult to treat, and it may progress to a frequently relapsing chronic disease [14]. Thus, it is important to determine the prevalence and risk factors of HE, which may help us develop proper preventive strategies against HE as we combat COVID-19 [14].



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In the present study, we sought to investigate the prevalence and risk factors of HE and associated symptoms among HCWs during the COVID-19 outbreak.

MATERIALS AND METHODS

Study Groups and Questionnaire

Between June 20 and July 20, 2020, we distributed self-administered online questionnaires to physicians and nurses working in Kahramanmaras, Turkey. The questionnaire solicited demographic information: gender, occupation (physician or nurse), and age. The questionnaire surveyed HE risk factors and associated symptoms: frequency of handwashing at work and home, the frequency of use of alcohol-based hand disinfectants, frequency of use of moisturizers, use of the hand disinfectants while handwashing, daily and weekly working hours, frequency of use and type of gloves [latex or latex-free (vinyl or nitrile)], an atopic disease history (asthma, allergic rhinitis, atopic dermatitis), administering direct care to patients with COVID-19. Both now and before COVID-19, frequency of each HE and associated symptoms (dryness, itching, erythema, desquamation, pain/burning, vesicle, oozing, and fissure) were asked separately. Survey respondents were asked to self-evaluate the current state of their hands for HE and related symptoms. The survey's HE symptom-related questions were asked individually, with a YES/NO response.

The participants were divided into two groups in this study. Individuals with HE-associated symptoms were designated the hand eczema group (HEG), and individuals without HE-associated symptoms were labeled the non-hand eczema group (NHEG). A participant was included in the HEG group if he/she reported one or more self-evaluated symptoms associated with HE. The distribution of these symptoms was evaluated.

Statistics

We performed statistical analysis using the IBM SPSS Statistics for Windows, V.25.0 (IBM, Armonk, New York, USA). Descriptive statistics for demographic data were calculated. The continuous variables were investigated using visual (histograms, probability plots) and analytical methods (Kolmogorov-Smirnov /Shapiro-Wilk's test) to determine whether or not they normally distributed. Possible associations between risk factors and HE were assessed with the Mann-Whitney

U test for non-parametric continuous variables and the chi-square test for categorical variables. In addition, the proportion of HE-associated symptoms before and after COVID-19 was compared with the chi-square test. The possible factors identified with univariate analyses were further analyzed with multivariate logistic regression analysis to determine independent predictors of individuals with HE outcome. P-values of less than 0.05 were considered statistically significant.

Ethical Approval

Study participants were enrolled after obtaining informed consent. Ethical approval was obtained from the Medical Ethical Committee of the Sutcu Imam University (date: 27.05.2020, decision number: 06). This research was conducted ethically in accordance with the World Medical Association Declaration of Helsinki.

RESULTS

Five hundred sixty-four individuals (349 physicians and 215 nurses) participated in the survey. Four hundred forty-seven of 564 participants (79.3%) reported symptoms associated with HE. Before COVID-19, 39.5% of participants had symptoms associated with HE, and the prevalence of self-reported HE was 6.6%. After COVID-19, 79.3% of participants had HE-associated symptoms, and the prevalence of self-reported HE was 11.7% ($p < 0.001$). Dryness (70.4%) was the most frequently reported symptom, followed by itching (49.3%), erythema (43.4%), desquamation (36.5%), pain/burning (23%), vesicle (5.3%), oozing (3.5%), and fissure (1.8%). All symptoms associated with HE increased after COVID-19 (Table 1). Symptoms mostly began on the back of the hand and between fingers. The most common areas of the hand where the symptoms began and continued are shown in Table 2.

Forty point eight percent of the women were physicians and 59.2% were nurses. Ninety-two point two percent of the men were physicians, and 7.8% were nurses ($p < 0.001$) (data not shown). The rates of women and nurses were significantly higher in HEG than in NHEG ($p < 0.001$ and $p = 0.004$, respectively). There was no significant age difference between the two groups ($p = 0.079$) (Table 3). The following rates were significantly higher in HEG: the frequency of handwashing at work ($p < 0.001$) and at home ($p < 0.001$), the frequency of moisturizer usage ($p < 0.001$) and hand disinfectant usage ($p < 0.001$),

TABLE 1. Hand eczema associated symptoms

Symptom (s)	Pre-COVID19 (%)	Post-COVID19 (%)	p
HE-associated symptom (s)	39.5	79.3	<0.001
Eczema	6.6	11.7	<0.001
Dryness	32.8	70.4	<0.001
Itching	14.2	49.3	<0.001
Erythema	8.2	43.4	<0.001
Desquamation	8.5	36.5	<0.001
Pain/burning	2.5	23	<0.001
Vesicle	1.8	5.3	0.001
Oozing	1.2	3.5	0.004
Fissure	0	1.8	0.002

HE: Hand eczema; COVID-19: Coronavirus disease-2019.

TABLE 2. Distribution of symptoms

Location of symptoms	The site of hands where the symptom started (%)	The site of hands where the symptom is currently located (%)
Between fingers	11.7	25
Back of hands	52.1	62.2
Palms of hands	9.4	16.7
Wrists	9.2	19.5
Nails	0.9	4.4

daily glove use duration ($p=0.043$), and atopic disease history rate ($p=0.008$). There was no statistically significant difference between the two groups concerning weekly or daily working hours, working directly with COVID-19 patients, using hand disinfectants simultaneously with handwashing, and using latex gloves (Table 3). The statistically significant variables were then evaluated by multivariate logistic regression. Multivariate logistic regression analysis showed that female gender (odds ratio [OR]: 3.92; 95% confidence interval [CI]: 2.12–7.25), frequent handwashing at work (OR: 1.03; 95%CI: 1.01–1.05), the frequent use of moisturizers (OR: 1.12; 95%CI: 1.01–1.24), and a history of atopic disease (OR: 1.7; 95%CI: 1.03–2.8) were independently associated with a high risk of HE-associated symptoms (Table 4).

DISCUSSION

To our knowledge, our study is the first study in the literature that investigated the presence of HE-associated symptoms in the same individuals before and after the COVID-19 outbreak. We showed an approximately two-fold increase in these symptoms in this study. The increase of HE-associated symptoms was independently significantly higher in women, individuals who washed their hands frequently, used moisturizers frequently and had a history of atopic disease.

In our study, we found that the prevalence of self-reported HE increased from 6.6% to 11.7%, and the prevalence of self-reported HE-associated symptoms increased from 39.5% to 79.3% during the COVID-19 pandemic. In studies conducted before the COVID-19 pandemic, the prevalence of self-reported HE ranged from 11.3–21% and self-reported HE-associated symptoms ranged from 22.4–53.3% in HCWs [5, 6, 14–16]. Few studies have examined the HE experiences of HCWs during COVID-19. Lan et al. [11] found the prevalence of self-reported HE-associated symptoms to be 70.3%. Guertler et al. [10] found the prevalence of self-reported HE to be 14.9%, and the prevalence of self-reported HE-associated symptoms to be 90.4% in HCWs. Lin et al. [13] reported that in their study, 63% of participating HCWs experienced adverse skin reactions on their hands. Kiely et al. [12] reported that over 80% of their cohort was affected with irritant dermatitis, and hands were the most commonly affected site. In a recent study, Erdem et al. [7] reported the prevalence of HE in HCWs as 50.5%. The diagnosis was made by a physical examination, performed by a dermatologist team in this study. We investigated HE-associated symptoms both pre- and post-COVID-19 in the same group of individuals. As a result, we were able to clearly show the increased prevalence of HE-associated symptoms after the COVID-19 pandemic.

In our study, we found a higher prevalence of HE in women. Although the prevalence of HE was found to be common in men [2] and equal in both genders [6] in several previous studies, it was generally observed that the prevalence of HE was higher among women in many studies [17, 18]. Most of the women in our study were nurses, but being a nurse was not associated with HAG in multivariate analysis. One possible explanation for the considerable HE prevalence among women is that they may perform more “wet work” at home or work [17].

TABLE 3. Univariate analysis of the factors associated with hand eczema associated symptoms

Variables	HEG	NHEG	p
Occupation, (%)			
Physician	58.8	73.5	0.004
Nurse	41.2	26.5	
Gender, (%)			
Female	66.9	29.1	<0.001
Male	33.1	70.9	
Age, median (range)	37 (20-60)	38 (25-63)	0.079
Handwashing frequency at work, median (range)	20 (2-100)	15 (2-78)	<0.001
Handwashing frequency at home, median (range)	10 (1-100)	6 (0-100)	<0.001
Hand antiseptic using frequency, median (range)	10 (0-95)	8 (0-96)	<0.001
Hand moisturizers using frequency, median (range)	2 (0-35)	0 (0-31)	<0.001
Weekly work hours, median (range)	40 (3-96)	36 (4-72)	0.123
Daily work hours, median (range)	8 (3-24)	8 (2-24)	0.106
Daily glove use hours, median (range)	3 (0-18)	2 (0-18)	0.043
Type of gloves, (%)			
Latex	88.3	89.7	0.797
Latex-free	11.7	10.3	
(Giving) Direct care of COVID-19 patients, (%)			
Yes	50.3	43.6	0.194
No	49.7	56.4	
Atopic disease history, (%)			
Yes	63.1	76.1	0.008
No	36.9	23.9	
Using hand disinfectants simultaneously with handwashing, (%)			
Always	6.9	5.1	0.797
Often	23.3	21.4	
Sometimes	29.8	29.9	
Rarely	26.2	25.6	
Never	13.9	17.9	
Type of gloves, (%)			
Latex	88.3	89.7	0.714
Latex-free	11.7	10.3	

HEG: Hand eczema associated symptoms group; NHEG: Non-hand eczema associated symptoms group; COVID-19: Coronavirus disease-2019.

In our study, we found that a history of atopic disease increased the risk of HE-associated symptoms in HCWs. Previous studies also support our findings [6, 14, 17]. Atopic diseases increase the skin's susceptibility to irritation, decrease the irritation threshold, and prolong dermal recovery time [14]. As such, it further reinforces the importance of atopic diseases in recognition of HE as an occupational disease and the need for special preventive strategies to help reduce the clinical burden of this condition in atopic individuals [14].

We found that frequent handwashing, as in many previous studies [4, 6, 19], increases the risk of HE-associated symptoms in HCWs. Three studies investigated HE in HCWs during COVID-19. These studies reported that the high frequency of handwashing was associated with the risk of HE, as in our study [7, 10, 11]. Kiely et al. [12] mentioned that the frequency of handwashing increased during the COVID-19 pandemic, but its relationship with HE was not discussed in their study. Lin et al. [13] showed that high frequency of handwashing

TABLE 4. Multivariate logistic regression analysis of the factors associated with hand eczema associated symptoms

Variables	p	OR (95% CI)
Occupation (nurse)	0.115	1.66 (0.89–3.1)
Female gender	<0.001	3.92 (2.12–7.25)
Frequent hand wash at work	0.005	1.03 (1.01–1.05)
Frequent hand antiseptic use	0.615	0.99 (0.97–1.02)
Frequent hand moisturizer use	0.039	1.12 (1.01–1.24)
Glove using duration	0.692	0.99 (0.93–1.05)
Atopic disease history	0.039	1.7 (1.03–2.8)

CI: Confidence interval; OR: Odds ratio.

was associated with HE in univariate analysis, but not in multivariate analysis. Frequent handwashing may cause eczema by gradual depletion of surface lipids, which disrupts the barrier function [1]. Qualified disinfectants, which use ethanol as the main component, are prioritized for hand decontamination [13, 19–21]. During handwashing, it is recommended to avoid overly-hot water and the application of moisturizers after handwashing [20, 21]. In our study, the use of disinfectants was very low. The median use of disinfectants was 10 in HEG and eight in NHEG. Erdem et al. [7] reported that 64.5% of HCWs use hand disinfectants more than 10 times a day. Guertler et al. [10] reported that the median frequency of hand disinfectant use was four times per day during the COVID-19 pandemic. Differences in the frequency of disinfectant use in these studies may be related to the daily or weekly working hours of the HCWs, and the participant's total number of patients with or without COVID-19. In our study, in multivariate logistic analysis, the use of hand disinfectants was not found to be associated with self-reported HE-associated symptoms. We think that the use of disinfectants was low in our study and that handwashing may be replaced with disinfectant use whenever possible.

Hand moisturizers are recommended for the treatment of HE in the literature [9, 13, 20–23]. However, in our study, we found that the increased use of hand moisturizers was independently associated with self-reported HE-associated symptoms. We did not investigate the use of moisturizer before the pandemic. We only investigated the current use of moisturizers. This might suggest that individuals in HEG used moisturizers with a therapeutic intent after the development of HE, rather than for prevention. It is reasonable to suspect that healthcare

workers with dry and damaged skin might use moisturizers more frequently. During the COVID-19 pandemic, Erdem et al. [7] found that frequent use of moisturizing creams was associated with HE, and we agree with their conclusion. Some of our survey responses seemed unrealistic. For example, one respondent answered that “I use 35 moisturizers a day”. However, in cross-sectional survey studies, every response should be accepted as correct and analyzed. We do not think that the statistics were affected by these extreme values since the number of cases in our study was large and because our analysis used the median rather than the mean.

Hand eczema may easily be overlooked because it is not a fatal disease. However, having HE has many burdens. Hand eczema may cause sleep disturbance, distancing from sports and social activities where hands are using, and embarrassment due to the undesirable aesthetic changes. These may lead to social isolation and depression [17]. HE may reduce the effective HCW workforce [11, 23]. Hand eczema causes a financial burden due to direct treatment costs and indirect loss of working capacity, sick leave and job loss [17]. Depending on the severity of eczema, HE may reduce the quality of life (QoL) [22, 24]. Damaged skin barrier may cause new sensitizations to allergens in atopic individuals by facilitating the migration of allergens [8, 17]. Hand eczema increases the colonization of pathogenic microorganisms on the hand, which indicates a possible risk for the transmission of these microorganisms [19]. Furthermore, angiotensin-converting enzyme 2, the receptor for the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) entry, is abundantly expressed in the skin on blood vessels, basal cells, hair follicles. Thus, damaged skin barrier due to HE may lead to a route of entry for SARS-CoV-2 [20, 23, 25].

For the many reasons stated above, it is important that the focus should be on strategies to prevent HE. For hand care, HCWs should apply a light, fragrance-free moisturizing lotion during the day, and every time after hand hygiene, if conditions allow. A fragrance-free, lipid-rich moisturizer should be used before bedtime [26]. To treat and protect against HE, moisturizers may be insufficient and anti-inflammatory treatment, especially local corticosteroids, may be required [8]. If hands are not visibly soiled, using alcohol-based disinfectants should be preferred rather than handwashing. Because alcohol-based disinfectants show high antimicrobial activity and low risk of skin damage [13, 21, 24]. Alcohol-based hand solutions containing glycerin may use as a moistur-

izer [26]. HCWs can wear protective gloves when necessary and especially during tasks with wet work [24]. A double set of gloves may be used for prolonged periods. Correct alcohol-based glove hygiene is required. To reduce sweating and skin irritation, the use of cotton gloves under medical gloves is recommended [26]. Providing educational information about appropriate hand hygiene methods and HE preventative measures may induce behavioral change and reduce the prevalence of HE [3, 20, 23, 24]. It is important that healthcare professionals be closely evaluated and trained by allergists or dermatologists. Due to the visual character of HE and to reduce the contact of HCWs with each other, who are in the biggest risk group for COVID-19 cross-transmission, HCWs can be easily evaluated by allergists and dermatologists using telemedicine tools.

Our study has several limitations due to the nature of cross-sectional survey studies. Because the participants were not examined directly, a definitive diagnosis of HE could not be made. Another limitation is responder bias: HCWs who suffer from HE may be more likely to respond to the survey because of an interest in improving the working environment. Thus, this may lead to the over-representation of HE-associated symptoms in this study. Finally, questions about pre-existing factors, such as the frequency of handwashing or moisturizer use before COVID-19, were not included in the survey. However, our study provides insights into the prevalence and risk factors for handwashing behavior related HE during the COVID-19 pandemic. Such information could be useful for interventions to minimize these occupational skin problems.

Conclusion

Our study demonstrated that the prevalence of HE-associated symptoms of HCWs was very high due to increased handwashing. Although hand hygiene is one of the most important and practical methods to prevent COVID-19 transmission, HCWs should be aware of proper hand hygiene and avoid excessive handwashing. Rational hand-hygiene measures, HE education and preventative strategies are urgently needed for HCWs, especially during the fight against COVID-19.

Ethics Committee Approval: Ethical approval was obtained from the Medical Ethical Committee of the Kahramanmaraş Sutcu Imam University (date: 27.05.2020, number: 06). This research was conducted ethically in accordance with the World Medical Association Declaration of Helsinki.

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