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Hand hygiene habits and hand eczema prevalence of healthcare workers during the COVID-19 pandemic

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Abstract

Aim: Hand hygiene has become an important building block in the prevention of the spread of coronavirus disease 2019 (COVID-19). The current study was conducted to determine the hand hygiene habits of healthcare workers and possible risk factors for hand eczema during the COVID-19 pandemic.

Materials and Methods: The hand hygiene habits of healthcare personnel working at a university hospital since COVID-19 pandemic started were questioned between December 2020 and February 2021 and they were dermatologically examined to screen for hand eczema.

Results: Of the 150 healthcare workers, 56 (37.3%) were doctors and 94 (62.7%) were nurses, and 40 (26.7%) were men and 110 (73.3%) were women. The rate of participants that reported washing their hands more frequently than 25 times daily was 46.0% (n=69), and the rate of disinfectant use was 59.3% (n=89). While 88 (58.7%) of the participants used a moisturizer daily, 62 (41.3%) did not use a moisturizer. Fifteen (10.0%) participants were diagnosed with hand eczema.

Conclusion: There was an increase in the daily frequencies of hand washing and use of disinfectants during the COVID-19 pandemic, but our data did not reveal any statistically significant risk factor of hand eczema.



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Introduction

Since COVID-19 is transmitted by contact, as well as respiratory droplets, hand hygiene has become an important building block in preventing the spread of the virus. The World Health Organization recommends the use of water and soap or alcohol-based hand sanitizers before and after contact with body fluids and/or patients [1]. With this new hand hygiene habit, there has been an increasing in the prevalence of hand eczema [2-5]. However, excessive washing, use of detergents, and disinfection of hands disrupt the hydrolipid barrier of the skin, affecting its natural flora and protective barrier, leading to skin dryness and irritation [6,7]. Recent studies have identified skin problems caused by extensive hand hygiene measures among healthcare workers during the pandemic [8, 9] and reported an associated increase in hand eczema in this population [9, 10]. Previous studies have found some risk factors associated with hand eczema, including frequent handwashing of more than 10 to 20 times a day and wearing gloves [8]. Healthcare workers often wear latex gloves, which, in

some cases, can lead to the development of contact dermatitis, resulting in blister formation, occlusion, and maceration [11]. Most studies conducted in this area have a survey design. In the current study, the dermatological examination of all participants was performed. We aimed to determine whether hand hygiene habits caused adverse cutaneous reactions, frequency of hand eczema, and possible risk factors among healthcare workers working at a tertiary hospital.

Materials and Methods

We conducted a single-center cross-sectional study between December 2020 and February 2021 with doctors and nurses working at a university hospital since the beginning of the pandemic. The hand hygiene habits of the personnel participating in the study were questioned, and a dermatological examination was performed to screen for hand eczema. Healthcare personnel with flexible working hours were excluded. The participants were questioned about the frequencies of daily hand washing, hand disinfection, cologne and hand cream use and the types of gloves they used. The study was approved by the ethics committee of Istanbul Medipol University.

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Statistical analysis

Data were analyzed using IBM SPSS v 23.0. The normality of data distribution was examined using the Kolmogorov-Smirnov method. The Fisher's exact, chi-square, and Yates correction tests were conducted to perform the comparison of categorical variables by gender. The Mann-Whitney U test was conducted for the comparison of the age variable that was not normally distributed according to gender. Independent risk factors affecting the diagnosis status were analyzed using the binary logistic regression analysis as univariate model. The results of the analysis were presented as mean \pm standard deviation and median (minimum and maximum) values for quantitative variables, and frequencies and percentages for categorical variables. The significance was set to $p < 0.05$.

Results

Of the people participating in the study, 73.3% were women, 62.7% were nurses, 95.3% had no history of disease, 91.3% had no history of atopy, 90% wore latex gloves, 98% used liquid soap, 46% had a daily frequency of hand washing greater than 25 times, 59.3% used disinfectants more than 25 times a day, 64% did not use cologne at all, 58% used moisturizers, 92.7% did not have any contact with Batticon or other chemicals, 54.7% had contact with detergents 90% did not have hand eczema, 7.3% had eczema localized on the dorsum of the hand, 69.3% had no xerosis, 11.3% had itching, 2% had burning complaints, and none had any nail findings. All the participants stated that they began to wash their hands and used disinfectants more frequently during the pandemic (Table 1).

Occupation significantly differed according to gender ($p < 0.001$), with 25.5% of women being doctors and 74.5% being nurses. The daily frequency of hand washing significantly differed according to gender ($p < 0.001$), with 25.5% of women washing their hands 10-20 times and 40% of men washing their hands 10-20 times a day. The daily frequency of disinfectant use significantly differed according to gender ($p = 0.027$). The rate of those using moisturizers significantly differed according to gender (70% for women and 58% for men, $p < 0.001$) and daily frequency of moisturizer use (57.3% of women and 48.7% of men used moisturizers one to five times a day ($p < 0.001$)). The presence of contact with Batticon or other chemicals significantly differed according to gender ($p = 0.008$), with 96.4% of women and 92.7% of men reporting no such contact. The difference in the rate of those reporting contact with detergents was also significant when the genders were compared (69.1% and 54.7% for women and men, respectively; $p < 0.001$). Lastly, age was determined to significantly differ according to gender ($p = 0.029$), with the median age of women being calculated as 26 years and that of men as 27 years (Table 2).

No gender-related statistically significant difference was observed in the presence of a history of dermatological disease ($p = 0.052$), history of atopy ($p = 0.526$), types of gloves used ($p = 0.115$), soap preference ($p = 0.187$), cologne use ($p = 0.722$), diagnosis of hand eczema ($p = 0.366$), localization of hand eczema ($p = 0.403$, 0.135, and 0.464 for the localization of both hands, dorsum of the hand and fingers, respectively), presence of xerosis ($p =$

1.000), or subjective complaints ($p = 0.493$ and 0.609 for itching and burning, respectively) (Table 2).

The univariate analysis revealed that the presence of itching as a subjective complaint was an independent risk factor of the hand eczema diagnosis. When the participants without itching were taken as reference, the diagnosis risk of those with itching was 0.002 times less ($p < 0.001$). The remaining variables were not identified as independent risk factors of the hand eczema diagnosis ($p > 0.05$) (Table 3).

Discussion

The global incidence of hand eczema is 5-8% in the general population [12]. Hand eczema has higher prevalence, ranging from 6 to 80%, among healthcare workers, hairdressers [13], and those who wash their hands frequently [14]. The majority of studies showing the prevalence of hand eczema among healthcare personnel under the current pandemic conditions are survey studies [9, 15-18]. In a survey conducted by Hamnerius et al. with healthcare professionals during the pandemic, hand eczema was observed in 36% of the participants [18] while other survey studies reported this prevalence as 11.2% [16], 11.7% [17], and 14.9% [9]. Erdem et al. detected even a greater prevalence of hand eczema; i.e., 50.4% in healthcare workers providing patient care in designated COVID-19 clinics [10]. In the current study, hand eczema was found at a rate of 10%, which is similar to the value reported by Huang et al. (9.6%) [15]. In a recent study, Beiu et al. reported that increased hand hygiene might cause changes in the skin, including dryness [19]. The current pandemic has undeniably led to a greater frequency of hand washing, which has resulted in unwanted skin changes. In surveys conducted with healthcare personnel in the literature, the rate of skin dryness has been reported to be 55.7% and above [9, 17, 20, 21,22]. In our study, the rate of skin dryness was determined as 30.7%, which is lower compared to previous literature data. Our lower rate can be attributed to our data not being based on a survey and a dermatological examination being performed in all participants.

Researchers recommend applying moisturizers following hand washing [6, 23, 24]. In a study by Zhang et al., hand eczema frequency was found to be lower in individuals that used moisturizers. The authors also recommended using moisturizers to prevent hand eczema [25]. However, in another study conducted during the pandemic, Kendziora et al. reported that the frequency of moisturizer use was not associated with the presence of hand eczema symptoms [16]. In the current study, 58.7% of the participants regularly used moisturizers, and we observed no statistically significant relationship between regular moisturizer use and hand eczema.

While Kendziora et al. found that disinfectant was a risk factor of hand eczema [16], other studies in the literature did not detect a relationship between the two [15, 26, 27]. In a clinical trial conducted in Denmark, washing hands with disinfectants and applying moisturizers were shown to improve hand eczema in the absence of visible contamination [28]. In our study, the frequency of disinfectant use was not a statistically significant risk factor of hand eczema, which is supported by other studies in the literature recommending disinfectant use [4, 23, 29].

Table 1. Frequency and percentage values of demographic data.

| Demographic Variable | | n | % |
|--|--------------------------------------|--------------|------------|
| Gender | Female | 110 | 73.3 |
| | Male | 40 | 26.7 |
| Occupation | Doctor | 56 | 37.3 |
| | Nurse | 94 | 62.7 |
| Dermatological disease history | History of hand eczema present | 4 | 2.7 |
| | No history of dermatological disease | 143 | 95.3 |
| | History of atopic dermatitis present | 3 | 2.0 |
| History of atopy | Present | 13 | 8.7 |
| | Absent | 137 | 91.3 |
| Type of gloves used | Sterile (powdered) | 6 | 4.0 |
| | Latex (powder-free) | 135 | 90.0 |
| | Sterile and latex | 9 | 6.0 |
| Soap preference | Liquid | 147 | 98.0 |
| | Solid | 2 | 1.3 |
| | Both | 1 | 0.7 |
| Daily hand washing frequency | 1-5 times | 1 | 0.7 |
| | 5-10 times | 16 | 10.7 |
| | 10-20 times | | 29.3 |
| | 20-25 times | 20 | 13.3 |
| | >25 times | 69 | 46.0 |
| Increase in hand washing frequency during pandemic | Yes | 150 | 100.0 |
| | No | 0 | 0.0 |
| Daily disinfectant use frequency | 1-5 times | 11 | 7.3 |
| | 5-10 times | | 10.7 |
| | 10-20 times | 18 | 12.0 |
| | 20-25 times | | 10.7 |
| | >25 times | 89 | 59.3 |
| Increase in disinfectant use frequency during pandemic | Yes | 150 | 100.0 |
| | No | 0 | 0.0 |
| Daily moisturizer use frequency | 1-5 times | 73 | 48.7 |
| | 5-10 times | 8 | 5.3 |
| | 10-20 times | | 2.7 |
| | 20-25 times | 1 | 0.7 |
| | >25 times | | 1.3 |
| Contact with batticon or other chemicals | Present | 11 | 7.3 |
| | Absent | 139 | 92.7 |
| Contact with detergents | Present | 82 | 54.7 |
| | Absent | 68 | 45.3 |
| Diagnosis | No hand eczema | 135 | 90.0 |
| | Hand eczema present | 15 | 10.0 |
| Localization of eczema** | Both hands | 5 | 3.3 |
| | Dorsum of the hand | 11 | 7.3 |
| | Fingers | 2 | 1.3 |
| Presence of xerosis | Present | 46 | 30.7 |
| | Absent | 104 | 69.3 |
| Presence of nail findings | Present | 0 | 0.0 |
| | Absent | 150 | 100.0 |
| Subjective complaint** | Itching | 17 | 11.3 |
| | Burning | 3 | 2.0 |
| Age* | | 29.14 ± 7.13 | 27 (20-57) |

*Mean ± standard deviation/median (min-max),**indicates percentages of incidence.

In the literature, it has been determined that washing hands >20 per day is a risk factor of hand eczema [10, 25]. In the current study, 59.3% of the participants reported washing their hands >20 per day, and no statistically sig-

nificant risk factor was observed between the participants' hand washing habits and prevalence of hand eczema. This supports the findings presented by Huang et al. [15].

Certain powders contained in gloves have been reported

Table 2. Comparison of demographic data according to gender.

| Demographic Variable | | Gender | | | | | | Test statistic | p |
|--|--------------------------------------|--------------|------------|-------------|------------|--------------|------------|----------------|---------------------|
| | | Female | | Male | | Total | | | |
| | | N | % | N | % | n | % | | |
| Occupation | Doctor | 28 | 25.5 | 28 | 70.0 | 56 | 37.3 | 23.012 | <0.001 ^a |
| | Nurse | 82 | 74.5 | 12 | 30.0 | 94 | 62.7 | | |
| History of dermatological disease | History of hand eczema present | 1 | 0.9 | 3 | 7.5 | 4 | 2.7 | 5.915 | 0.052 ^b |
| | No history of dermatological disease | 106 | 96.4 | 37 | 92.5 | 143 | 95.3 | | |
| | History of atopic dermatitis present | 3 | 2.7 | 0 | 0.0 | 3 | 2.0 | | |
| History of atopy | Present | 10 | 9.1 | 3 | 7.5 | 13 | 8.7 | — | 0.526 ^c |
| | Absent | 100 | 90.9 | 37 | 92.5 | 137 | 91.3 | | |
| Type of gloves used | Sterile (powdered) | 4 | 3.6 | 2 | 5.0 | 6 | 4.0 | 4.318 | 0.115 ^b |
| | Latex (powder-free) | 102 | 92.7 | 33 | 82.5 | 135 | 90.0 | | |
| | Sterile and latex | 4 | 3.6 | 5 | 12.5 | 9 | 6.0 | | |
| Soap preference | Liquid | 109 | 99.1 | 38 | 95.0 | 147 | 98.0 | 3.357 | 0.187 ^b |
| | Solid | 1 | 0.9 | 1 | 2.5 | 2 | 1.3 | | |
| | Both | 0 | 0.0 | 1 | 2.5 | 1 | 0.7 | | |
| Daily hand washing frequency | 1-5 times | 1 | 0.9 | 0 | 0.0 | 1 | 0.7 | 23.591 | <0.001 ^b |
| | 5-10 times | 5 | 4.5 | 11 | 27.5 | 16 | 10.7 | | |
| | 10-20 times | 28 | 25.5 | 16 | 40.0 | 44 | 29.3 | | |
| | 20-25 times | 17 | 15.5 | 3 | 7.5 | 20 | 13.3 | | |
| | >25 times | 59 | 53.6 | 10 | 25.0 | 69 | 46.0 | | |
| Daily disinfectant use frequency | 1-5 times | 8 | 7.3 | 3 | 7.5 | 11 | 7.3 | 10.939 | 0.027 ^b |
| | 5-10 times | 7 | 6.4 | 9 | 22.5 | 16 | 10.7 | | |
| | 10-20 times | 11 | 10.0 | 7 | 17.5 | 18 | 12.0 | | |
| | 20-25 times | 13 | 11.8 | 3 | 7.5 | 16 | 10.7 | | |
| | >25 times | 71 | 64.5 | 18 | 45.0 | 89 | 59.3 | | |
| Daily cologne use frequency | 1-5 times | 31 | 28.2 | 14 | 35.0 | 45 | 30.0 | 1.331 | 0.722 ^b |
| | 5-10 times | 5 | 4.5 | 2 | 5.0 | 7 | 4.7 | | |
| | 10-20 times | - | - | - | - | - | - | | |
| | 20-25 times | - | - | - | - | - | - | | |
| | >25 times | 2 | 1.8 | 0 | 0.0 | 2 | 1.3 | | |
| Moisturizer use | Present | 77 | 70.0 | 10 | 25.0 | 87 | 58.0 | 22.572 | <0.001 ^a |
| | Absent | 33 | 30.0 | 30 | 75.0 | 63 | 42.0 | | |
| Daily moisturizer use frequency | 1-5 times | 63 | 57.3 | 10 | 25 | 73 | 48.7 | 22.463 | <0.001 ^b |
| | 5-10 times | 7 | 6.4 | 1 | 2.5 | 8 | 5.3 | | |
| | 10-20 times | 4 | 3.6 | 0 | 0.0 | 4 | 2.7 | | |
| | 20-25 times | 1 | 0.9 | 0 | 0.0 | 1 | 0.7 | | |
| | >25 times | 2 | 1.8 | 0 | 0.0 | 2 | 1.3 | | |
| Contact with batticon or other chemicals | Present | 4 | 3.6 | 7 | 17.5 | 11 | 7.3 | — | 0.008 ^c |
| | Absent | 106 | 96.4 | 33 | 82.5 | 139 | 92.7 | | |
| Contact with detergents | Present | 76 | 69.1 | 6 | 15.0 | 82 | 54.7 | 32.483 | <0.001 ^a |
| | Absent | 34 | 30.9 | 34 | 85.0 | 68 | 45.3 | | |
| Diagnosis | No hand eczema | 100 | 90.9 | 35 | 87.5 | 135 | 90.0 | — | 0.366 ^c |
| | Hand eczema present | 10 | 9.1 | 5 | 12.5 | 15 | 10.0 | | |
| Eczema on both hands | Present | 107 | 97.3 | 38 | 95.0 | 145 | 96.7 | — | 0.403 ^c |
| | Absent | 3 | 2.7 | 2 | 5.0 | 5 | 3.3 | | |
| Eczema on dorsum of hand | Present | 104 | 94.5 | 35 | 87.5 | 139 | 92.7 | — | 0.135 ^c |
| | Absent | 6 | 5.5 | 5 | 12.5 | 11 | 7.3 | | |
| Eczema on fingers | Present | 109 | 99.1 | 39 | 97.5 | 148 | 98.7 | — | 0.464 ^c |
| | Absent | 1 | 0.9 | 1 | 2.5 | 2 | 1.3 | | |
| Presence of xerosis | Present | 34 | 30.9 | 12 | 30.0 | 46 | 30.7 | 0.000 | 1.000 ^a |
| | Absent | 76 | 69.1 | 28 | 70.0 | 104 | 69.3 | | |
| Itching complaint | Present | 98 | 89.1 | 35 | 87.5 | 133 | 88.7 | — | 0.493 ^c |
| | Absent | 12 | 10.9 | 5 | 12.5 | 17 | 11.3 | | |
| Burning complaint | Present | 108 | 98.2 | 39 | 97.5 | 147 | 98.0 | — | 0.609 ^c |
| | Absent | 2 | 1.8 | 1 | 2.5 | 3 | 2.0 | | |
| Nail finding** | Present | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | — | — |
| | Absent | 110 | 100 | 40 | 100 | 150 | 100.0 | | |
| Age* | | 28.06 ± 5.73 | 26 (20-45) | 32.1 ± 9.51 | 27 (21-57) | 29.14 ± 7.13 | 27 (20-57) | 2711.000 | 0.029 ^d |

^a: Yates correction; ^b: Pearson's chi-square test; ^c: Fisher's exact test; ^d: Mann-Whitney U test; **Mean ± standard deviation/median (min-max); **Since there was no participants with nail findings, this variable was not included in the analysis.

Table 3. Examination of risk factors affecting the hand eczema diagnosis with the logistic regression analysis.

| Variable | Univariate analysis | |
|--|----------------------|--------|
| | OR (95% CI) | P |
| Age | 0.948 (0.863-1.042) | 0.272 |
| Gender | 0.7 (0.224-2.19) | 0.540 |
| Occupation | 0.58 (0.176-1.919) | 0.373 |
| History of dermatological disease | 0.097 (0.013-0.719) | 0.051 |
| History of atopy | 3.125 (0.756-12.924) | 0.116 |
| Presence of moisturizer use | 0.81 (0.278-2.363) | 0.700 |
| Contact with Batticon or other chemicals | 2.154 (0.42-11.049) | 0.358 |
| Contact with detergents | 1.274 (0.43-3.778) | 0.662 |
| Subjective complaints (reference: none) | 0.002 (0-0.017) | <0.001 |

OR: odds ratio; CI: confidence interval.

to be related to a higher risk of skin roughness as a result of the varying pH of gloves [30]. It has been reported that glove dust causes allergic reactions and hand eczema is significantly reduced with the use of gloves that do not contain powder [31]. Therefore, one of the recommendations under ongoing pandemic conditions is using powder-free gloves. In our study, most of the healthcare workers (90%) reported using latex (powder-free) gloves. We found no significant association between the types of gloves used and prevalence of hand eczema.

As a limitation of the study, the sample only included healthcare workers, and as a result, the findings cannot be generalized to the whole population. Different results can be obtained in future studies to be conducted with a larger sample, including participants from the general population.

In conclusion, the results of our study indicated a lower prevalence for hand eczema compared to survey studies conducted with healthcare workers in the literature, and despite the implementation of increased hand hygiene measures, we did not determine hand hygiene habits as a risk factor of hand eczema development.

Ethics approval

Ethics Committee Approval: The Istanbul Medipol University Clinical Researches Ethical Board granted approval for this study (date: 07/08/2020, number: E-10840098-772.02-34286).

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