Frequent Hand Washing and the Occurrence of Hand Eczema Among Healthcare Workers During COVID-19 Pandemic in Thailand

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ABSTRACT:

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Background: Hand washing is an important method to help prevent COVID-19 infection. Hand eczema is a common skin problem that is often triggered by frequent hand washing with soap and water.

Objectives: To examine the magnitude and related factors of hand eczema among Thai health care workers during COVID-19 pandemic.

Methods: Self-administered, online questionnaire was utilized to collect the data from healthcare workers with 18 to 65 years of age. Data collection included general information, underlying diseases, handwashing practice and behavior, an occurrence of hand eczema.

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Results: From 333 respondents reported, the mean age was 31.3 ± 7.4 years. The prevalence rate of hand eczema was 52.2% (n=174). Those subjects with hand washing practice with soap and water more than 10 times a day, history of atopic dermatitis, allergic rhinitis and allergic contact dermatitis were the statistically significant risk factors to develop hand eczema (p = 0.004, 0.005, <0.001, 0.038, respectively).

Conclusions: Hand eczema in health care workers is common during COVID-19 pandemic. Those persons with frequent hand washing and previous history of atopic dermatitis and allergic rhinitis are the major risk factors. This study encourages awareness about the magnitude of disease awareness, health literacy and health prevention campaigns for hand eczema among health care personnel during the COVID-19 pandemic.

Key words: Hand washing, hand eczema, COVID-19 pandemic

Introduction

Currently, the recommendations from the Centers for Disease Control and Prevention (CDC) for preventing the coronavirus disease 2019 or COVID-19 mainly include facial mask coverage, social distancing and regular hand washing with soap and water or alcohol-based hand sanitizer that contains at least 60% alcohol usage instead of soap or less contaminated hands[1-3]. Healthcare workers are professional staffs that normally recommend a regular, frequent hand washing, thus cause problematic skin dryness and irritation, which could lead to the risk of hand eczema and skin infection later[4].

Frequent hand washing with soap and water is strongly associated with the occurrence of irritant hand dermatitis[4]. Irritant contact dermatitis is the most common cause of hand eczema[5]. Impaired skin barrier function associated with hand eczema[6]. Applying moisturizer or topical hand preparation after hand washing could prevent water evaporation of the skin and helps repair the skin barrier to be able to retain water content. Previous study confirmed regular using of moisturizer after hand washing can prevent hand eczema[7]. The American Contact Dermatitis Society recommended replacing hand washing with soap by using alcohol-based hand sanitizer instead if the skin is non-clearly visible dirt. Moreover, regular use of skin moisturizer every 3-4 hours would highly be recommended to prevent hand dryness[8,9]. Previous study found frequent hand washing and the use of alcohol-based hand sanitizer during the COVID-19 pandemic were associated with hand eczema[10]. Another study confirmed hand eczema increased significantly during COVID-19 pandemic[11]. There was limiting data for the prevalence and associated factors between hand eczema and frequent hand washing in healthcare workers

during covid-19 era in Thai population. This research aimed to examine the frequency and risk factors of hand eczema along with hand sanitizing practice among Thai healthcare workers by online survey questionnaire.

Materials and Methods

This research was a cross-sectional, observational study by online survey through self-administered, questionnaire among health care personnel who worked in any hospitals, medical clinics and primary care units around Bangkok metropolitan area and nearby provinces. The survey was performed from 1 September to 31 October 2021. This study was approved by the Research Ethics Committee, Mae Fah Luang University (EC approval number 21111-20).

Study population

Healthcare personnel define as the workers with relevant duties in health agencies, public health or hospitals, that consist of medical doctors, dentists and dental assistants, nurses and nursing assistants, pharmacists, physical therapists, medical technicians, patient assistants, house keepers and stretcher shift staffs, age between 18 to 65 years with 12 months duration or longer working care of the COVID-19 patients. Sample size estimation was calculated, based on a study of *Altunisik Toplu S. et al*. to report 73.6% prevalence rate of hand eczema[11]. By setting an error of 5% (d=0.05) and type I error of 5% (alpha, α=0.05), a total number of 333 samples were enrolled.

Study procedure

The Thai version questionnaire was developed and modified based on previous studies[10,11-14]. The online questionnaires created by using Google form were sent to those health care workers who met the study criteria for enrolment and were voluntarily willing to participate in this study via LINE application and Facebook social media. The validity and reliability of questionnaires was tested on a group of 30 volunteers before sending to participants. Study data included baseline demographics, underlying diseases, an occurrence of hand eczema within 12 months, hand washing practices and moisturizer use were collected and analyzed.

Statistical analysis

Descriptive data analysis was reported with the means and standard deviation (SD) in quantitative data and with frequency and percentage for qualitative data. For inferential data analysis, student unpaired *t* test was used to compare between hand eczema group versus non-hand eczema group if normal-distributed data in quantitative data and use of chi-square test or Fisher' exact test for qualitative data. Significant variables ($p < 0.05$) were entered in multivariate analysis using backward, stepwise, logistic regression models to identify significant

independent variables associated with hand eczema. Statistical Package for Social Sciences (SPSS program), version 23.0 was utilized for data analysis.

Results

A total number of 333 healthcare workers were enrolled, 250 participants (75.1%) were females and 83 (24.9%) were males. The mean age was 31.3 ± 7.4 years. Most of the study participants were medical doctors (46.5%), nurses (14.1%) and dentists (13.8%). Regarding underlying diseases, allergic rhinitis (53.8%), atopic dermatitis (30.3%) and allergic contact dermatitis (17.1%). There were 39.0% reported with confirmed cases of COVID-19 infection. (Table 1)

Table 1 Baseline demographics of study participants (n=333)

Clinical data	Results
Mean age (years ± SD)	31.3 ± 7.4
Gender, n (%)	
Female	250 (75.1)
Male	83 (24.9)
Occupation, n (%)	
Doctors	155 (46.5)
Nurses	47 (14.1)
Dentists	46 (13.8)
Nursing assistants	27 (8.1)
Pharmacists	16 (4.8)
Dental assistants	15 (4.5)
Medical technologists	12 (3.8)
Physical therapists	7 (2.1)
Others (e.g., hospital cleaners, patient transporters)	8 (2.4)
Average duration of job (years)	7.4
Average working hours per week	51.7
History of atopic dermatitis, n (%)	
Yes	101 (30.3)
No	226 (67.9)
Don’t know	6 (1.8)

Table 1 Baseline demographics of study participants (n=333)

Clinical data	Results
History of allergic rhinitis, n (%)	
Yes	179 (53.8)
No	154 (46.2)
History of allergic contact dermatitis, n (%)	
Yes	57 (17.1)
No	234 (70.3)
Don't know	42 (12.6)
Previous exposure with confirmed COVID-19 patients within 12 months, n (%)	
Yes	130 (39.0)
No	203 (61.0)

SD; standard deviation

Most of the subjects reported with 6-10 times daily (42.3%) and 11-20 times daily (25.8%) hand washing practices. There were 99.4% of the participants using liquid soap. Uses of antiseptic containing soap were more common than non-antiseptic soap. There were 79.9% reported increasing the frequency of handwashing daily during the COVID-19 pandemic. Uses of alcohol-based hand sanitizer during the COVID-19 pandemic were 91%. There were 56.2% use of alcohol-based hand sanitizer greater than or equal to 10 times daily, and 43.8% with less than 10 times daily. Most of the study participants (76.6%) reported at least 60% alcohol-based concentration preparation. Only 5.1% of all participants reported regular hand cream or moisturizers application after hand washing. Average duration of medical grade, hand gloves use was 3.8 $\pm$ 2.6 hours daily. (Table 2)

Table 2 Hand hygiene practice and behaviors

Hand hygiene, practice and behaviors	Results
Frequency of hand washing per day, n(%)	
0-5 times/day	44 (13.2)
6-10 times/day	141 (42.3)
11-20 times/day	86 (25.8)
>20 times/day	62 (18.6)

Table 2 Hand hygiene practice and behaviors

Hand hygiene, practice and behaviors	Results
Forms of soap, n(%)	
Liquid soap	331 (99.4)
Bar soap	2 (0.6)
Types of soap, n(%)	
Regular, non-antiseptic containing	108 (32.4)
Antiseptic containing	225 (67.6)
Increasing handwashing frequency daily during the COVID-19 pandemic, n(%)	
Yes	266 (79.9)
No	67 (20.1)
Use of alcohol-based hand sanitizer during the COVID-19 pandemic, n(%)	
Yes	303 (91.0)
No	30 (9.0)
Frequency of alcohol-based hand sanitizer uses during the COVID-19 pandemic, n(%)	
≥ 10 times daily	187 (56.2)
< 10 times daily	146 (43.8)
Alcohol-based concentration, n(%)	
< 60% alcohol	16 (4.8)
≥ 60% alcohol	255 (76.6)
Don't know exactly	62 (18.6)
Frequency of hand cream or moisturizers application after hand wash, n(%)	
Never (0%)	95 (28.5)
Occasionally (1-25%: once or twice a month)	132 (39.7)
Sometimes (26-50%: once or twice a week)	66 (19.8)
Often (51-75%: 3-4 times a week)	23 (6.9)
Regular (>75%: almost everyday)	17 (5.1)
Medical hand gloves use, n (%)	
Yes	286 (85.9)
No	47 (14.1)
Duration of medical hand gloves, hours per day, mean (SD)	3.8 (2.6)

The prevalence rate of hand eczema main this present study was 52.2% (174/333) (95%CI: 46.8%-57.6%). Hand dryness was the most frequent symptom of hand eczema reported in the study population (48.3%), followed by scaly skin (28.5%), and itching (27.5%). Most participants (89.1%) never ever consulted medical doctors for their clinical hand eczema. Regarding a comparison between those subjects with and without hand eczema, those subject with 10 times or greater hand washing with soap and water daily, history of atopic dermatitis, allergic rhinitis and allergic contact dermatitis were significantly greater in hand eczema group than those without hand eczema group ($p < 0.001$). Those subjects who increased handwashing frequency during the COVID-19 pandemic were common to have hand dermatitis. ($p = 0.028$) Moreover, those subjects using hand moisturizing preparation after hand washing were associated with higher percentage of hand eczema ($p = 0.010$). (Table 3)

Table 3 A comparison of associated factors between those with and without hand eczema

Associated factors	With Hand eczema group (n=174)	Without Hand eczema group (n=159)	p value
History of atopic dermatitis	72(41.4%)	29(18.2%)	<0.001
History of allergic rhinitis	116(66.7%)	63(39.6%)	<0.001
History of allergic contact dermatitis	44(25.3%)	13(8.2%)	<0.001
Hand washing with soap and water more than 10 times daily	92(52.9%)	56(35.2%)	0.001
Increasing frequency of handwashing daily during the COVID-19 pandemic	147(84.5%)	119(74.8%)	0.028
Regular apply hand cream/moisturizer after handwashing	135(77.6%)	103(64.8%)	0.010

From Univariate analysis, significant factors ($p<0.05$), included hand washing with soap and water at least 10 times or greater per day, history of atopic dermatitis, history of allergic rhinitis, history of allergic contact dermatitis, increasing frequency of handwashing daily and regular apply hand cream/moisturizer after handwashing during COVID-19 pandemic were considered in multivariate analysis.

From multivariate analysis using backward stepwise, multiple logistic regression model, those subjects practicing hand washing with soap

and water more than 10 times per day had 2.01 times significant greater risk of hand eczema than those with less than 10 times per day (adjusted odds ratio; OR=2.01, 95%CI (Confidence interval) of OR: 1.24-3.24), p = 0.004). Those subjects with history of atopic dermatitis had 2.16 times greater risk of hand eczema (adjusted OR=2.16, 95%CI of OR: 1.25-3.71), p = 0.005). Those subjects with history of allergic rhinitis had 2.57 times greater risk of hand eczema (adjusted OR=2.57, 95%CI of OR: 1.59-4.16), p < 0.001). Moreover, those subjects with history of allergic contact dermatitis had 2.13 times greater risk of hand eczema (adjusted OR=2.13, 95%CI of OR: 1.04-4.36), p. = 0.038) as shown in Table 4.

Table 4 Univariate and multivariate analysis to determine associated factors with hand eczema

Associated factors	Crude odds ratio (95%CI)	p value	Adjusted odds ratio (95%Confidence interval)	p value
Hand washing with soap and water more than 10 times per day	2.06 (1.33-3.21)	0.001	2.01 (1.24-3.24)	0.004
History of atopic dermatitis	3.16 (1.91-5.23)	<0.001	2.16 (1.25-3.71)	0.005
History of allergic rhinitis	3.05 (1.94-4.77)	<0.001	2.57 (1.59-4.16)	<0.001
History of allergic contact dermatitis	3.80 (1.96-7.37)	<0.001	2.13 (1.04-4.36)	0.038
Increase frequency of handwashing daily during the COVID-19 pandemic	1.83 (1.06-3.16)	0.028		
Regular apply hand cream/moisturizer after handwashing	1.88 (1.16-3.05)	0.010		

Discussion

Regarding the result of this study, the occurrence of hand eczema in healthcare workers was commonly found during the COVID-19 pandemic with prevalence rate of 52.2%. This finding was familiar with a study by Erdem et al. that reported the prevalence of hand eczema of 50.5%[15]. This study found hand dryness was the common presenting symptom of hand eczema (48.3%) that was consistent with a research by Jindal et al. that hand dryness was common (83.8%)[16]. Regarding hand hygiene practice and behavior, this research revealed that those subjects who washed their hands with soap and

water more than 10 times a day were 2.01 times more likely to develop hand eczema than those people with less than 10 times a day (p =0.004). This was consistent with research by Celik et al. showed that the persons who frequently washing their hands with soap and water and female gender contained higher risks of hand dermatitis in health workers during the COVID-19 pandemic[17]. Another study by Metin N et al. also found those persons who washing hands more than 10 times a day and a duration of handwashing longer than 10 seconds per 1 time contained the risk to develop hand dermatitis among healthcare workers during the COVID-19 pandemic[18]. Nonetheless, there was no difference in term of alcohol-based hand sanitizer usage between those subjects with or without hand eczema. It might explain by most of the subjects (91%) in this present study regularly applied alcohol-based hand sanitizer during the COVID-19 pandemic. This finding differed from previous research that showed an association between alcohol-based hand sanitizer usage and hand eczema[10] Furthermore, this research found very low number of subjects using hand moisturizer after hand washing. On the contrary, the study found that the proportion of those subjects applying skin moisturizer in the hand eczema group was slightly higher than those subjects without the hand eczema group (77.6% and 64.8%, respectively). This was possibly because the subjects with hand eczema had likely to apply skin moisturizer to relieve their skin symptoms. This research revealed that the persons with personal history of allergic disease such as atopic dermatitis, allergic rhinitis and allergic contact dermatitis had significantly greater risks to develop hand eczema than those without allergic diseases ($p<0.05$). This was consistent with previous study reported that the persons with a history of skin allergies confirmed an association with hand eczema[17-18]. This can be explained by the fact that those persons with allergic disorders commonly presented with chronic eczema, skin dryness, redness and peeling that affect to losing their skin barrier mechanism and being sensitive to irritating agents[7]. The participants reported symptoms of hand eczema during past 12 months, However, the outcome might not include participants who had symptoms more than 12 months.

The limitations of the study included self-administered online questionnaires, hand eczema determined by study subjects and recall bias from their experience in the past of study subjects. Especially, history of allergic contact dermatitis that should be diagnosed by dermatologist and patch test should be done to confirm. Due to insufficient detail about diagnosis and investigation from participants, history of allergic contact dermatitis might be weakened. Finally, the word “soap” was misleading, there might be

other categories of cleansing products, such as liquid cleansers or liquid disinfectants that participants use but they might not mention about it and the real results might be affected.

Conclusion

This study showed that hand eczema in healthcare workers was common, which was found to be up to 52.2%. The factors that associated with the occurrence of hand eczema during the COVID-19 pandemic included the persons with washing hands with soap and water more than 10 times a day, personal history of atopic dermatitis, allergic rhinitis and allergic contact dermatitis. This study encourages awareness about the magnitude of disease awareness, health literacy and health prevention campaigns for hand eczema among health care personnel during the COVID-19 pandemic.

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