

A Study of Hand Dermatitis and Associated Factors During The COVID-19 Pandemic

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ABSTRACT

OBJECTIVE: This study was conducted to determine the associated factors of hand dermatitis during a COVID-19 pandemic versus a non-COVID pandemic year by comparing the frequency of outpatient clinic visits.

METHODS: This retrospective study used data from the dermatology department from January 2019 to December 2020. As an epidemiological assessment of increased dermatologic clinic visits of hand dermatitis patients, the Poisson mean difference model with generalized estimating equation regression was used.

RESULTS: The study comprised a total of 16,506 outpatient dermatological clinic visits, including 793 hand dermatitis visits. After controlling the confounders such as demographic data, occupation, and corticosteroid use, hand dermatitis visits increased by 30% during the pandemic period compared to the pre-pandemic period. The average age of patients was 55.2 ± 16.4 years. Females mainly composed 70.6% and 62.8% of the subjects during the pandemic and pre-pandemic periods, respectively ($P = 0.022$). Patients reported significantly less hand cream usage ($P = 0.013$) and foot dermatitis diagnosed ($P = 0.009$) during the pandemic period than during the pre-pandemic period. Furthermore, patients were prescribed topical corticosteroids with low to moderate potency more frequently during the pandemic period ($P = 0.019$), whereas the use of topical corticosteroids with moderate to high potency and systemic corticosteroids did not differ between the two time periods.

CONCLUSION: The COVID -19 pandemic had an impact on hand dermatitis in increasing outpatient dermatologic clinic visits. Emollient use is an important preventive factor in hand dermatitis. More hand cream use might help prevent hand dermatitis during COVID-19 pandemic and other infectious pandemics in the future.

KEYWORDS:

associated factors, COVID-19 pandemic, hand dermatitis, hand eczema

INTRODUCTION

Hand dermatitis is a subtype of skin inflammation that affects only the hands and/or wrists. This condition is regarded as one of the most significant dermatologic health issues worldwide with lifetime prevalence of 14.5% in the general population¹. Hand dermatitis is often burdensome and has a substantial effect on patients' quality

of life and a financial burden on society. Hand dermatitis risk factors, both endogenous and exogenous, have been thoroughly investigated. Atopic dermatitis history, exposure to irritants and wet work are risk factors. Health care workers (HCWs), mechanical industry workers, cleaners, hairdressers, farmers, florists and food handlers are

examples of wet work occupations as their hands are frequently exposed to water². Furthermore, lifestyle factors including smoking, alcohol consumption, stress and body mass index (BMI) might have an influence on hand dermatitis³.

The coronavirus disease 2019 (COVID-19) pandemic has resounding global health implications, especially in the dermatologic field due to the hand hygiene recommendations implemented during this time. While the health guidelines recommended increase hand washing and frequent use of hand sanitizer have been integral in preventing the spread of infectious disease, it may have potentially adverse consequences on dermatologic issues such as irritant contact dermatitis and chronic paronychia. In a previous study examining the prevalence of irritant hand dermatitis among German HCWs due to increased hygiene measures, there was a significant increase in the incidence of signs of irritant hand dermatitis despite using emollient as a preventive measure⁴. Risk factors of hand dermatitis include frequent handwashing more than 10 to 20 times per day, wearing latex gloves, and previous hand dermatitis history⁵. While other studies focused on HCW groups, the current study will include a large study population including both the HCWs and non-HCWs and the changes in their hand hygiene habits.

The objective of this study is to determine the associated factors of hand dermatitis during a COVID-19 year versus a non-COVID year by comparing the visit frequency of patients. The results will explore methods to prevent hand dermatitis while performing the necessary hand hygiene during the infectious pandemic.

METHODS

This retrospective study examined hand dermatitis visits between January 2019 and December 2020 to compare the frequency of visits and associated factors pre-pandemic versus during the COVID-19 pandemic. This study was collected from the outpatient unit of the dermatology department data records at Vajira Hospital, Navamindradhiraj University, Bangkok, Thailand. To have a concrete time period for data collection, the COVID-19 pandemic period was defined to be between January 2020 to December 2020 since this time period accounts for multiple

epidemics within Thailand. The pre-pandemic period was defined to be between January 2019 to December 2019. The International Classification of Diseases, tenth revision (ICD-10) codes: L20, L23, L24, L25 and L30 codes were extracted from electronic medical records⁶. All patients were diagnosed and managed by dermatologists who were board-certified. In this study, topical corticosteroids with low to moderate potency were classified as topical corticosteroids class V to VII, while topical corticosteroids with moderate to high potency were classified as topical corticosteroids class I-IV⁷. All data was de-identified to maintain privacy and security of patient records. Inclusion criteria were patients diagnosed with hand dermatitis who were 15 years and older. Exclusion criteria were patients who required inpatient care and patients with incomplete medical records.

STATISTICAL ANALYSIS

The main results were a comparison of the visit frequency of hand dermatitis patients at the outpatient unit of dermatology clinic at Vajira Hospital during the pandemic and pre-pandemic period. Categorical data were displayed as frequency and percentage and were compared using the Chi-square test. For normally distributed continuous data, the mean and standard deviation were used and were compared using the independent t-test. For non-normally distributed continuous data, the median and interquartile range were described and were compared using the Mann-Whitney U-test. Based on the correct distribution of count data, we estimated the impact of the pandemic period on hand dermatitis visits. If the visit data was unbalanced, we assumed zero visit frequency for the pre-pandemic period visit frequency or pandemic period visit frequency if a patient did not visit the department in order to equalize both arms of analysis based on the baseline of the first visit in each period. Poisson mean difference with generalized estimating equation regression was used. With explanatory modeling strategy, the confounders were adjusted. STATA version 13.0 software (Stata Corporation, College Station, TX, USA) was used for all analysis. A p-value of 0.05 or less was defined as statistical significance.

Table 1 A comparison of demographic characteristics of patients with hand dermatitis visited the outpatient dermatology clinic at Vajira Hospital, Navamindradhiraj University, between the COVID-19 pandemic and pre-pandemic periods

Variables	Hand dermatitis visits			P-value
	Total (n=793) n, (%)	Pandemic Period (n=449) n, (%)	Pre-pandemic Period (n=344) n, (%)	
Female*	533 (67.2)	317 (70.6)	216 (62.8)	0.022
Age (years) (Mean±SD)	55.2 ± 16.4	55.2 ± 16.9	55.3 ± 15.8	0.928
Live in Bangkok	653 (82.4)	373 (83.1)	280 (81.4)	0.573
Marital status				
Single	381 (48.7)	223 (50.2)	158 (46.6)	0.348
Married	356 (45.5)	190 (42.8)	166 (49.0)	0.096
Divorced	46 (5.9)	31 (7.0)	15 (4.4)	0.167
Career related to hand wash	102 (16.9)	56 (17.1)	46 (16.7)	1.000
Career unrelated to hand wash	501 (83.1)	272 (82.9)	229 (83.3)	1.000
Exposed to water history	87 (11.0)	37 (8.2)	50 (14.5)	0.006
Body mass index (kg/m ²) (Mean±SD)	24.5 ± 4.4	24.5 ± 4.4	24.4 ± 4.4	0.923
Tobacco use				
Occasionally use	7 (0.9)	2 (0.5)	5 (1.5)	0.249
Active smoker	44 (5.6)	20 (4.5)	24 (7.1)	0.158
Alcohol use				
Occasionally use*	38 (4.9)	13 (3.0)	25 (7.4)	0.007
Active alcohol user	26 (3.3)	17 (3.8)	9 (2.7)	0.424
Hand cream use*	725 (92.6)	401 (90.5)	324 (95.3)	0.013
Foot dermatitis*	142 (18.1)	66 (14.9)	76 (22.4)	0.009
Topical corticosteroids use				
High to moderate potency	618 (80.2)	342 (78.4)	276 (82.4)	0.202
Low to moderate potency*	128 (16.6)	85 (19.5)	43 (12.9)	0.019
Oral prednisolone use				
0-0.5 mg/kg/day	210 (26.5)	124 (27.6)	86 (25.0)	0.418
0.5-1.0 mg/kg/day	5 (0.6)	2 (0.5)	3 (0.9)	0.658
Oral prednisolone duration				
> 14 days	99 (12.5)	59 (13.1)	40 (11.6)	0.588
Mean arterial blood pressure (mmHg) (Mean±SD)	93.5 ± 11.9	94.2 ± 11.7	91.7 ± 12.2	0.060
Fasting plasma glucose (mg/dl) (Mean±SD)	108.8 ± 27.9	109.3 ± 29.3	108.3 ± 26.3	0.754
Triglyceride (mg/dl) (Median, IQR)	104 (75,136)	99 (70,137)	105 (82, 136)	0.146
Total cholesterol* (mg/dl) (Mean±SD)	189 ± 41	184 ± 40	195 ± 41	0.020
HDL (mg/dl) (Mean±SD)	59.7 ± 17.1	60.7 ± 17.8	58.4 ± 16.2	0.245
LDL (mg/dl) (Mean±SD)	112.4 ± 31.9	112.3 ± 31.8	112 ± 32.0	0.921
HbA1c (%) (Median, IQR)	6.0 (5.6,6.8)	5.9 (5.5,6.7)	6.1 (5.7,6.8)	0.151
eGFR (ml/min/1.73m ²) (Mean±SD)	84.3 ± 23.5	86.0 ± 22.5	82.9 ± 24.2	0.201
Vitamin D level (ng/ml) (Median, IQR)	27.5 (19.2,31.9)	29 (19.8,31.9)	19.6 (17.0,36.1)	0.115

Abbreviations: SD, standard deviation; IQR, interquartile range; m, meter; mg, milligram; kg, kilogram; ng, nanogram; dl, deciliter; ml, milliliter; mmHg, millimeters of mercury; LDL, low-density lipoprotein; HDL, high-density lipoprotein; HbA1c, hemoglobinA1c; eGFR, estimate glomerular filtration rate was calculated by the Chronic Kidney Disease Epidemiology Collaboration (CKD-EPI). * P < 0.05 significant difference

RESULTS

The overall number of dermatology clinic visits was 8,424 during the COVID-19 pandemic period and 8,082 during the pre-pandemic period, according to data collected from January 1, 2019 to December 31, 2020. The number of hand dermatitis visits during the COVID-19 pandemic was 449 (5.3%). While the number of hand dermatitis visits during the year preceding the pandemic in 2019 was 344 (4.3%). The patients' average age was 55.2 ± 16.4 years. During the pandemic and pre-pandemic periods, females were predominant in two periods, 70.6% and 62.8%, respectively ($P = 0.022$). The majority of the patients resided in Bangkok, the capital of Thailand. The clinical characteristics of patients were shown in [Table 1](#).

The most common occupations in this study were office workers (32.3%), followed by cleaners (14.1%) as shown in [Table 2](#). However, there was no difference in patient occupation between the two time periods. As compared to the pre-pandemic period, individual behavior of water exposure significantly decreased during the pandemic period ($P = 0.006$).

During the pandemic period, the hand dermatitis patients who were social alcohol drinkers visited clinics less often than pre-pandemic period. While the contradictory result was found in active alcohol users. The hand dermatitis patients who used hand cream and who were diagnosed with foot dermatitis were reported to decrease significantly during the pandemic period ($P = 0.013$ and $P = 0.009$, respectively). Additionally, the hand dermatitis patients who were prescribed topical corticosteroids with low to moderate potency visited the clinic more frequently in pandemic period than pre-pandemic period ($P = 0.019$). The usage of topical corticosteroids with moderate to high potency and systemic corticosteroids did not differ between the two periods. The patients with higher blood cholesterol level visited the clinic less during pandemic time. All other blood investigations were non-significant associated with hand dermatitis visits.

As Kernel density illustration reveals, the frequency of hand dermatitis visits in both periods was right-skewness data ([figure 1](#)). According to the right skewness, Poisson mean difference

Table 2 Occupations of hand dermatitis patients visited the outpatient dermatology clinic at Vajira Hospital, Navamindradhiraj University, between the COVID-19 pandemic and pre-pandemic periods

Occupations	Hand Dermatitis visits			P-value
	Total (n=793) n, (%)	Pandemic Period (n=449) n, (%)	Pre-pandemic Period (n=344) n, (%)	
Occupations related to wet work activities	102 (16.9)	56 (17.1)	46 (16.7)	1.000
Cleaner	85 (14.1)	44 (13.4)	41 (14.9)	0.639
Farmer	5 (0.8)	4 (1.2)	1 (0.4)	0.383
Health care worker	5 (0.8)	5 (1.5)	0 (0.0)	0.066
Hairdresser	4 (0.7)	2 (0.6)	2 (0.7)	1.000
Florist	1 (0.4)	0 (0.0)	1 (0.4)	0.456
Chef	2 (0.3)	1 (0.3)	1 (0.4)	1.000
Occupations unrelated to wet work activities	501 (83.1)	272 (82.9)	229 (83.3)	1.000
Office worker	195 (32.3)	112 (34.2)	83 (30.2)	0.336
Student	34 (5.6)	24 (7.3)	10 (3.6)	0.053
Merchant	29 (4.8)	12 (3.4)	17 (6.2)	0.182
Police	3 (0.5)	3 (0.9)	0 (0.0)	0.225
Other	240 (39.8)	121 (36.9)	119 (43.3)	0.113

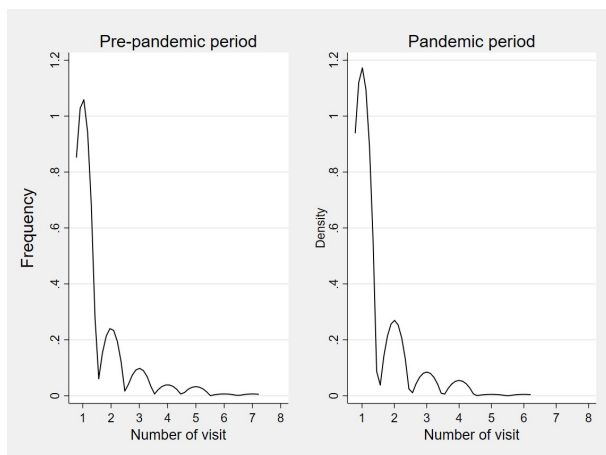


Figure 1 Kernel density plot of number of hand dermatitis visits during pre-pandemic and pandemic periods

model with generalized estimating equation was used for multivariate analysis.

Hand dermatitis visits significantly increased by 30% of the Poisson mean difference during the pandemic period compared to the previous period after adjusting for the demographic factors including age, gender, body mass index, living in Bangkok, marital status, occupation, hand cream use, present with foot dermatitis, tobacco use, alcohol consumption and corticosteroid use (table 3).

The margins plots revealed the mean of the number of hand dermatitis visits and the pandemic event and visualized the change of mean between the periods (figure 2).

Table 3 The Poisson mean difference with generalized estimating equation results: effect modifications of the demographic factors on the mean difference of hand dermatitis visits between pandemic and pre-pandemic periods

	Adjusted Poisson mean difference*	S.E.	95% Confidence interval		P-value
			Lower	Upper	
Pandemic period	0.30	0.11	0.09	0.50	0.005

*Adjusted with gender, age, body mass index, live in Bangkok, marital status, health care job, exposure to water job, hand cream use, present with foot dermatitis, low to moderate potency topical corticosteroids, moderate to high potency topical corticosteroid, tobacco use, alcohol use.

Abbreviations: S.E., standard error

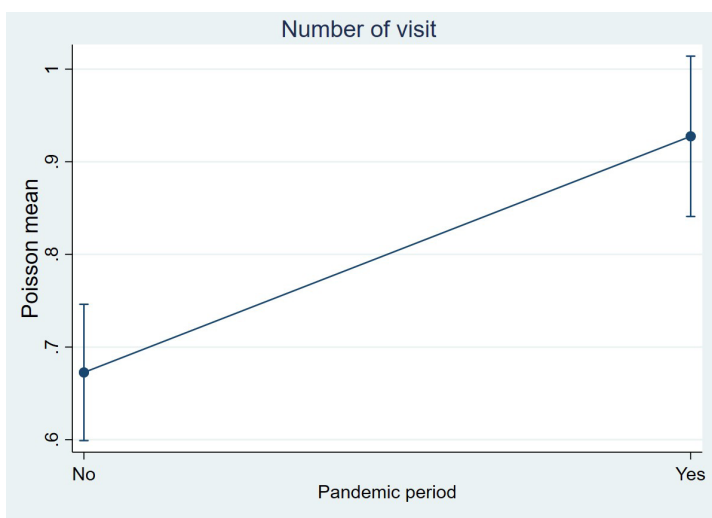


Figure 2 Plots of Poisson mean versus period for the pandemic effect when comparing the number of hand dermatitis visits

DISCUSSION

The number of outpatient dermatologic visits for patients diagnosed with hand dermatitis increased by 30% during the COVID-19 pandemic compared to pre-pandemic period based on the electronic medical databases collected at Vajira Hospital, Bangkok, Thailand. The findings of this study revealed that approximately two-thirds of patients with hand dermatitis were females which was similar to the findings of previous study¹. According to another published study, the disease had a greater impact on females, as there were reported a lower quality of life even at the same disease severity as males, as well as more aggravating factors and sick leave⁸. The reason of this finding might be because of the more awareness of personal health care in females than males, including hand hygiene⁹.

Water exposure habit is a known risk factor to hand dermatitis. In this study, individual behavior of water exposure was significantly decreased, while hand dermatitis visits were increased during the pandemic period. This could imply that people probably used alcohol sanitizer as dry hand rub for infectious control but unaware that alcohol is one of most common irritant contact dermatitis causes. For infectious control strategies, most people pay more attention to the sanitation of their hands over feet. That could be the reason for less foot dermatitis in pandemic time. The patients also reported less frequent used of hand cream during the pandemic period. As an important preventive measure for hand dermatitis, emollient or moisturizer has an important role in moist the affected area, immediate barrier repair, decrease transepidermal water loss and irritation¹⁰. Patients should be educated to choose a lipid-rich moisturizer free of perfumes and preservatives with the lowest allergen potential¹¹. These findings implied that inadequately educated hand dermatitis prevention can cause public health problems. Individuals should be encouraged to use hand emollients after washing their hands with water or with alcohol sanitizers especially during infectious pandemic.

Lifestyle factors such as smoking and drinking had an impact on hand dermatitis¹². In this study, people who were social drinkers had lesser hand dermatitis, while active users found more

hand dermatitis diagnosed in the pandemic period. As people are staying indoor, the social drinkers are not socializing with their friends and not participating in outdoor activities. On the other hand, the active alcohol user may be using alcohol to cope with their stress during the pandemic period, which might affect the immune-mediate and increased hand dermatitis. These findings were different from a systematic review and meta-analysis study that showed no association of alcohol and hand dermatitis³. Tobacco use of ≥ 8 cigarettes per day or ≥ 15 pack-years was found to be related to hand dermatitis¹². However, smoking did not differ between the two periods in this study. Other lifestyle factors, such as obesity, have been linked to hand dermatitis in previous studies. Hand dermatitis was more common in obese patients with $BMI \geq 30 \text{ kg/m}^2$ ¹². However, BMI did not differ between the two time periods in the current study. Topical corticosteroids were the first-line treatment in management of hand dermatitis due to their effectiveness in the short term, however long-term use poses adverse effects of inhibiting epidermal barrier repair and causing skin atrophy¹³. The consideration of using topical corticosteroids potency was determined by the affected sites and the severity of diseases. In this study, patients with hand dermatitis who were prescribed with low to moderate potency topical corticosteroids visited the dermatologic clinic more frequently during the pandemic, while there was no change in patients who were prescribed moderate to high potency topical corticosteroids visits.

Nature of hand dermatitis affected the palmar side more than the dorsal side due to almost all activities used the volar side of the hand such as writing, typing, washing, painting and cooking¹⁴. Moreover, the volar side is the thickest epidermis in the body¹⁵. Therefore, moderate to high topical corticosteroids are more suitable than low to moderate topical corticosteroids in the treatment of hand dermatitis. Total cholesterol was the only blood test that showed a lower level in patients with hand dermatitis who visited during the pandemic period compared to the pre-pandemic period, but this finding needed to be confirmed.

The strengths of this study include all diagnoses and management of hand dermatitis

made by board-certified dermatologists. The study's limitations included the warm and humid temperature of Bangkok, Thailand, where the data was collected. This may not represent the incidence of hand dermatitis in other climate zones. Second, because the study was carried out as a retrospective study, some important details such as the number of cigarettes smoked, the frequency of daily water exposure, and the number of alcohol consumption could not be determined. Further studies are needed to address more specific in larger research sites to reflect hand dermatitis in the real world.

CONCLUSION

The COVID-19 pandemic had an impact on hand dermatitis that required dermatologic consultation. It is imperative to put more education in the preventive strategies against hand dermatitis during infectious pandemic periods in order to reduce unnecessary dermatologic clinic visits, especially to encourage the use of hand emollients.

CONFLICT OF INTEREST

The authors declare that they have no conflict of interest regarding the publication of this article.

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DATA AVAILABILITY STATEMENT

All data generated or analysed during this study are included in this article. Further enquiries can be directed to the corresponding author.

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