Asian Journal of Research in Infectious Diseases

10(2): 40-48, 2022; Article no.AJRID.88086
ISSN: 2582-3221

Skin Irritation Associated with Hand Hygiene Practice and Use of Face Mask during COVID-19 Pandemic among the People in Gazipur, Bangladesh

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/AJRID/2022/v10i230287

Open Peer Review History:
This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: https://www.sdiarticle5.com/review-history/88086

Original Research Article

Received 03 May 2022
Accepted 10 June 2022
Published 13 June 2022

ABSTRACT

Background: In COVID-19 pandemic increasing the frequency of hand washing and disinfection is the most important preventive measure of this disease which is causing in deleterious impact on skin among general population. So the aim of the study was to evaluate whether these measures are associated with development of skin damage.
Methods: This was a descriptive type of cross-sectional, observational study conducted over a period of six months from April 2021 to September 2021 including 1166 patients coming to some private clinics in Gazipur with skin manifestations. Skin diseases were diagnosed by dermatologist on basis of clinical morphology with appropriate investigations. Data were collected by structured questionnaire and analyzed using SPSS.
Results: Out of 1166 patients, 35.68% reported skin changes or symptoms over hands (ScH), and 13.98% reported skin changes on their face (ScF). Around 87.39% and 86.53% of the participants reported a change in hand washing habits and sanitizer using habits during the COVID-19

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pandemic. There were significantly higher percentage (57.21%) of skin conditions in females (ScH: 45.28% vs ScF:17.30%), 43.82% individuals were working in environments requiring frequent hand washing (ScH: 41.88% vs. ScF: 18.59%), 39.88% working in facilities where they have to interact with people during the pandemic (ScH: 42.58% vs. ScF: 19.57%), 5.75% those encountering COVID-19 patients (ScH: 49.25% vs. ScF: 25.64%), 15.78% those exposed to chemicals (ScH: 52.72% vs ScF: 25.82%), and 9.17% healthcare workers (ScH: 57.00% vs ScF: 31.77%). Almost 35.22% reported skin dryness, 9.44% reported changes in the texture, 13.42% reported scaling, 16.52% reported itchiness, 4.46% reported changes in skin color, 14.52% reported redness, and 4.62% reported pain/ burning, while 1.80% reported skin ulcers.

Conclusion: Our study suggests that the general population's skin was negatively affected by COVID-19 precautions where increased frequency of hand washing and the use of alcohol-based sanitizers, overuse of soaps were contributing factors for skin disorders.

Keywords: COVID-19 pandemic; precautions; questionnaire; general population; skin; hand hygiene.

1. INTRODUCTION

The health of the community, people and health workers is currently threatened by the spread of the COVID-19 pandemic [1]. This infection can be spread by droplets inhalation produced through coughing, and sneezing, or touching infected sites [2]. Use of decontaminants, cleaning hands by soaps, hand sanitizers, wearing masks, and personal protective equipment (PPE), social distancing, avoiding touching the face, wearing disposable gloves can protect from this disease.[3] Application of alcohol-containing sanitizer, soaps is the effective, simple, available method for maintaining hand hygiene against COVID-19 infection [4,5]. To minimize the extent by half, WHO recommends cleaning hands for appropriate duration in a proper way [3,6].

Antimicrobial activity of sanitizers increased with increased concentration of alcohol [7,8]. Sanitizers can protect against many organisms [9]. The oils secreted by cutaneous sebaceous glands have antimicrobial activity [10], Frequent use hand sanitizers remove these oils, making easy access to microbial infection in dry eroded skin [3]. Excess use of soap might disturb the normal skin flora and natural protective skin barrier [11], can cause hyper sensitivity to chemical substances [12], also contact dermatitis and eczema [13,14]. Many studies found more occurrences of skin diseases in this period of COVID-19 infection [15-18].

As far as our information no such study has been locally conducted during COVID-19 in Gazipur. In this study development of skin disorders in community people observed with increased preventive measures. Thus our objective was to explore prevalence and associated factors of skin disorders during the period of COVID-19 infection in Gazipur.

2. METHODOLOGY

2.1 Study Design and Study Population

This was a descriptive, cross-sectional, observational study, conducted over a period of six months from April 2021 to September 2021 including the 1166 skin patients coming to some private clinics in Gazipur, Bangladesh. Skin diseases were diagnosed by dermatologist on basis of clinical morphology with appropriate investigations like complete blood count (CBC) or scrapping.

2.2 Data Collection

Data were collected in printed form. The questionnaire was developed after thorough literature review and was reviewed by a dermatologist. Eight questions for socio-demographic data, seven for hand washing and eight for sanitizing habits, two for gloves, and three for mask usage were included in questionnaire.

2.3 Statistical Analysis

A descriptive analysis was carried out, as well as a chi-squared test. A *P*-value of 0.05 or less was considered as significant. Tables and graphs are used to present data. The analysis was performed using SPSS version 25.

3. RESULTS

Data from 1166 individuals were collected. Out of the total number of participants, 57.21% were

females, 76.59% were single, 26.41%were employed or self-employed, and 73.58% were students (Table 1).

When asked about their hand washing practices, 43.82% of the employees reported that they work in settings that require frequent hand washing, and 39.88% reported that they work in settings that necessitate encounters with customers. Additionally, 15.78% reported working in settings that require the use of irritating materials like chemicals, soaps, or other detergents. Only 5.75% of participants were working in settings in which there was direct contact with COVID-19 patients, and 9.17% were healthcare workers (Table 1).

The following demographics have a significantly higher prevalence of skin disorders on their hands and faces : females (skin condition on hands (ScH): 45.28% and skin condition on face (ScF): 17.30%), married individuals (ScH: 49.82% and ScF: 17.95%), those who were employed (ScH: 40.58% and ScF: 19.48%), individuals working in environments that require hand washing several times (ScH: 41.88% vs. ScF: 18.59%), those who were working in facilities where they have to interact with people during the pandemic (ScH:42.58% vs. ScF: 19.57%), those who were encountering COVID-19 patients (ScH: 49.25% vs. ScF: 25.64%),those working in facilities where they have to work with chemicals (ScH: 52.72% vs. ScF: 25.82%), and healthcare workers (ScH:57.00%vs.ScF:31.77%) (Table 1).

More than two-thirds (87.39%) of the participants reported that their hand washing habits changed during the COVID-19 pandemic. During the pandemic, the frequency of hand washing increased drastically more than 10 times for 55.57% of individuals. Nearly two-thirds (69.04%) reported washing their hands for less than 1 minute every time, while 26.41% reported washing it for 1–2 minutes. 81.47% reported using warm water when washing their hands. Nearly half reported using antiseptic soaps for washing their hands, 53.60% reported using regular soaps, 51.20% reported using perfumed soaps, and 85.51% reported using liquid soaps (Table 2).

Table 1. Socio-demographics and hand hygiene practices during the COVID-19pandemic, and the prevalence of skin conditions

Skin conditions	Total = 1166 (%)	Skin conditions on hand (n=416)	P value	Skin conditions on face (n=163)	P value
Gender					
Male	499 (42.79)	114 (22.84)	<0.001	47(9.42)	<0.001
Female	667 (57.21)	302 (45.28)		116 (17.30)	
Marital Status					
Single	893 (76.59)	280 (31.35)	<0.001	114 (12.76)	0.19
Married	273 (23.41)	136(49.82)		49(17.95)	
Employment					
Employed	308 (26.41)	125 (40.58)	<0.001	60 (19.48)	0.004
Housewife/Student	858 (73.58)	291 (33.92)		103 (12.00)	
Healthcare worker					
Yes	107(9.17)	61 (57.00)	<0.001	34 (31.77)	<0.001
No	1059 (90.82)	355 (33.52)		129 (12.18)	
Hand washing required					
Yes	511 (43.82)	214 (41.88)	<0.001	95 (18.59)	0.022
No	655 (56.17)	202 (30.84)		68 (10.38)	
Encounter with people					
Yes	465 (39.88)	198 (42.58)	<0.001	91 (19.57)	<0.001
No	701 (60.12)	218(31.09)		72 (10.27)	
Encounter with COVID-19 patients					
Yes	67 (5.75)	33 (49.25)	0.003	17 (25.64)	0.006
No	1099 (94.25)	583 (34.85)		146 (13.28)	
Use of chemicals					
Yes	184 (15.78)	97 (52.72)	<0.001	47 (25.82)	<0.001
No	982 (84.22)	319 (32.48)		116 (11.81)	

Table 2. Determinants of skin diseases on hands in period of COVID-19 infection

Variables	Total *n*: 1166(%)	Yes (%)	*P* value
Altered Hand cleaning practice			
Yes	1019 (87.39)	403(39.55)	<0.001
No	147(12.61)	13(8.84)	
Hand cleaning frequency			
≤10times	648 (55.57)	289(44.60)	<0.001
>10times	518(44.42)	127(24.52)	
Washing duration			
>1min	805(69.04)	277(34.41)	
1–2min	308(26.41)	118 (38.31)	0.040
<2min	53(4.55)	21(39.62)	
Temperature of water			
Tepid/warmish	950 (81.47)	328(34.55)	
Cold	121(10.38)	29(23.97)	0.004
Hot	95(8.15)	59(62.10)	
Variety of soap			
Regular	625 (53.60)	220(35.20)	0.375
Antiseptic	541 (46.34)	196(36.23)	
Fragranced soap			
Yes	597 (51.20)	206(34.51)	0.644
No	569 (48.79)	210(36.91)	
Consistency of soap			
Solid	169(14.41)	56(33.14)	0.395
Liquid	997 (85.51)	360(36.12)	
Altered hand sanitization practice			
Yes	1009 (86.53)	382(37.86)	<0.001
No	157(13.46)	34(21.66)	
Frequency of hand sanitization			
≤10times	935(80.19)	376(40.21)	0.023
>10times	231(19.81)	40(17.32)	
Alcohol concentration			
>60%	108(9.26)	44(40.74)	
<60%	261(22.38)	124(47.51)	<0.001
Do not know	797 (68.35)	248(30.74)	
Fragranced sanitizer			
Yes	287(24.61)	94(32.75)	0.538
No	879 (75.38)	322(36.63)	
Sanitizing when touching person/surface			
Yes	802 (68.78)	306(38.15)	<0.001
No	364 (31.22)	110 (30.22)	
Each1 or 2hours			
Yes	260(22.29)	108(41.54)	0.003
No	906(77.70)	308(33.99)	
After entering home from exterior			
Yes	741 (63.55)	278(37.52)	0.044
No	425(36.45)	138(32.47)	
Before and after eating			
Yes	577 (49.48)	229(39.69)	<0.001
No	589(50.51)	187(31.75)	
Use of hand gloves daily			
Do not wear	550 (47.17)	173(31.45)	0.010
<1pair	616 (52.83)	243(39.45)	
Quit wearing gloves			
Yes	114(9.78)	65(57.02)	<0.001
No/donotknow	1052(90.22)	351(33.36)	

Variables	Total *n*: 1166(%)	Yes (%)	*P* value
Had hand dermatitis			
Yes	192(16.47)	104(54.17)	<0.001
No	974(83.53)	312(32.03)	
Household work			
≤2 hours/week	729(62.52)	237(32.51)	0.027
>2 hours	437(37.48)	179(40.96)	

Regarding the usage of hand sanitizers, 86.53% reported that their habit of using hand sanitizers has changed during the pandemic, 80.19% were using them more than 10 times per day, and 75.38% were not using perfumed sanitizers. 68.78% reported using hand sanitizers after coming in to contact with any person or surface, while 22.29% were using it every one or two hours. In addition, 63.55% used it every time they entered their homes after being outside, and 49.48% reported using it before and after eating (Table 2). In regard to glove usage, 49.48% were not using any gloves, with 9.78% of participants being reported not using gloves because of skin problems. Out of those who did wear gloves, 53.83% used 1–2 pairs per day (Table 2).

Persons who did not change their hand washing habits during the pandemic (37.1%), some who washed their hands several times per day (43.1%), some who washed their hands for more than 2 minutes (38.7%), but those who washed their hands with cold water (38.9 %) all had significantly higher rates of skin conditions on their hands. Individuals also indicated that skin issues were substantial and more common, who altered their usage of hand sanitizers during the pandemic (36.3%), those who used sanitizers several times per day (39.2%), those who used sanitizers with a greater alcohol concentration (46.1%), those who sanitized every one to two hours (40.8%), those who sanitized after coming from outside (36.4%), and those who sanitized before and after eating (38.7%) (Table 2).

With respect to face masks, 74.18% reported using surgical/medical face masks; 53.17% of the participants used the masks for half an hour to 2 hours; and 65.18% reported changing it 1–2 times per day. However, while skin conditions on the face were related to wearing face masks, the duration of wearing face masks and the number of face masks changed per day did not affect skin conditions (Table 3).

Of the total number of respondents, 35.68% (416 individuals) reported skin changes or symptoms during COVID-19, of whom 35.22% reported skin dryness, 9.44%reported changes in the texture, 13.42% reported scaling,16.52% reported itchiness, 4.46% reported changes in skin color, 14.52% reported redness, and 4.62% reported pain/burning, while 1.80% reported skin ulcers (Fig. 1).

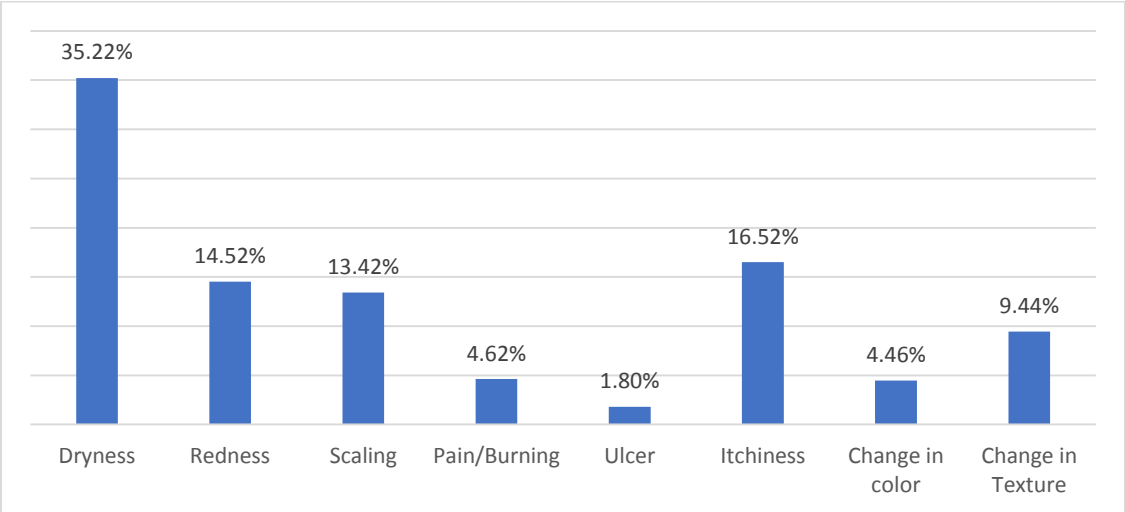

Fig. 1. Skin conditions on hand during the pandemic

Table 3. Determinants of skin diseases on face in period of COVID-19 infection

Variable	Total n : 1166	Yes (%)	p value
Use of face mask			
Surgical	865 (74.18)	133 (15.37)	
Others	225 (19.30)	19 (8.44)	0.018
Do not use	76 (6.52)	11 (14.47)	
Duration of face mask usage			
<2 hours	620 (53.17)	82 (13.22)	
>2 hours	341 (29.25)	52 (15.25)	0.635
Do not use	205 (17.8)	29 (14.15)	
Frequency of mask use			
1-2 times	760 (65.18)	110 (14.47)	
> 2 times	167(14.32)	26(15.57)	0.830
Do not use	239(20.50)	27(11.30)	

4. DISCUSSION

This population-based study was conducted to determine the prevalence and associated factors of hand skin disorders in Gazipur during the ongoing COVID-19 pandemic. In the study, most participants were females, single and unemployed, while 9.17% were healthcare workers. 55.57% practiced frequent hand washing. 87.39% and 86.53% of the participants reported a change in hand washing habits and sanitizer using habits respectively, with their frequency increasing to more than 10 times a day. As a result, 35.68% reported skin changes over hands and 13.98% over the face.

Dermatitis is an inflammatory response of the skin caused by allergens, irritant substances, or both [19]. As seen in this study, frequent hand washing caused skin changes, mostly skin dryness 35.22%, with some cases of redness, scaling, pain, itching, or even ulcers. A review by Cristina Beiu highlighted frequent hand washing for COVID-19 prevention can cause hand dermatitis [13]. A study in India found over-zealous hand hygiene during the COVID 19 pandemic causing an increased incidence of hand eczema among general population [15]. Skin irritation is significantly more among the healthcare workers (57.00%) and individuals who have contact with COVID-19 patients (49.25%) in this study, as they follow strict hygiene practices and wear PPE for a longer period of time. Similarly, a Chinese study reported a 74.5% prevalence [16], ”while another German study reported a 90.2% incidence and of eczema among health care workers” [17]. Moreover, a study conducted in Milan, Italy, reported an increased frequency of hand eczema [18].

The skin’s permeability to various agents can be increased by disruption of the skin’s outer layer by constant and prolonged use of soap water in humid environments [20]. Many diseases including atopic dermatitis can be increased by stress, atmospheric aspects, quarantine, and lockdown [21]. Irritant contact dermatitis can be triggered by wet work and gloves occlusion causes skin barrier impairment, when combined with exposure to soaps or sanitizers [22]. Healthcare workers are prone to adverse skin reactions working in COVID-19 wards wearing PPE for several hours [23]. Other studies have shown that development of contact dermatitis due to use of gloves [5, 24]. Another study showed that dermatitis increased three times with the use of > 5 pairs of gloves [25]. It was also found in our study that dermatitis was significantly prevalent in 39.45% of individuals who used gloves (>1 pair per day).

In our study the skin changes (47.51%) were significantly present in participants who used sanitizers with an alcohol concentration of more than 60%.Analcohol-based hand rubs with alcohol concentration of >60% are the most appropriate alternative, when one’s hands are not visibly dirty or when soaps and water are not available according to the WHO’s recommendation [6]. Similarly, in another study, washing hands >10 times a day and using alcohol-based gel caused skin damage [18]. Since the corona virus is enveloped in a lipid bi-layer, an alcohol-based sanitizer is undoubtedly effective. The major problems are the existence of substandard products in the markets as well as the emergence of alcohol tolerance, antimicrobial resistance (AMR), opportunistic infection, and product toxicity [26-28]. Recent published studies also reported high prevalence of eczema in healthcare workers [5, 29].

In this study, some of the participants also faced skin changes on their faces due to the excessive use of face masks and PPE. A recent study reported that 97% of the skin damage was due to enhanced protective measures, and these include 83% of the nasal bridge lesion [30]. Other studies reported similar finding in addition to other dermatologic side effects like pressure injury, urticaria, dryness of the skin, allergic contact dermatitis, and aggravation of underlying dermatosis. In all of these conditions, occlusion and friction were the main contributing factors [31-34]. These results were more commonly found among healthcare workers, who wear protective gear for prolonged times [16]. Due to the use of remedies that dry the skin, micro-wounds appear on the skin that are not visible and are an entry point for infections, especially when it comes into contact with blood and infected material. The employer must protect its employees by enabling the skin to be treated with remedies that do not cause skin irritation, as well as adequate skin care after washing hands, ie. to be treated with creams that allow for good protection and hydration of the skin.

5. CONCLUSION

In conclusion, our study suggests that COVID-19 infection prevention measures creating deleterious impact on the general population's and health workers' skin. A significant association between more hand washing frequency (>10 times) and duration (>2 min), sanitization with alcohol concentration (>60%) and development of skin damage during the pandemic was detected. Concurrent use of balanced preventive measure with maintaining skin integrity is of utmost importance .Therefore, we recommend spreading awareness of skin protective modalities and the use of regular skin moisturizing for hand protection. With continuous hydration of the skin, proper awareness, suitable knowledge, and good practice can prevent skin changes throughout this pandemic.

CONSENT AND ETHICAL APPROVAL

The consent from patients and approval from Institutional Ethics Board (IRB) was taken prior to the study accordingly.

COMPETING INTERESTS

Authors have declared that they have no known competing financial interests OR non-financial interests OR personal relationships that could have appeared to influence the work reported in this paper.

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Peer-review history:
The peer review history for this paper can be accessed here:
https://www.sdiarticle5.com/review-history/88086