

Hand Hygiene Practices and Risk and Prevention of Hand Eczema during the COVID-19 Pandemic

Background

The world is experiencing severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) pandemic and in the absence of an effective vaccine or drug(s), the scenario is expected to prolong. Though trials are on to identify the effective and safe vaccine/drug among the several candidates, the results are expected to be delayed. Till then preventive measures remain the best option to contain the transmission of COVID-19 virus. Hand hygiene is one of the most important and widely publicized preventive measures apart from physical distancing, cough and sneezing etiquettes, and wearing face masks. However, there are reports of increased incidence of dermatology consultations for hand eczema attributed to frequent hand washing/ sanitization in healthcare workers and the general public.^[1-3] This might just be the tip of the iceberg as a significant proportion of patients fail to seek expert advice especially in the current situation of stay at home directives. Further, the presence of hand eczema itself may decrease the adherence to hand hygiene practices. Any breach in skin continuity consequent to contact dermatitis reportedly allows SARS-CoV-2 to gain entry into dermal blood vessels and thereby defeats the very purpose of hand hygiene.^[4] Thus, hand eczema/dermatitis and various predisposing factors need to be identified and avoided along with advice for a proper hand care regimen.

Hand Eczema Overview and Risk Factors

Hand eczema is a chronic and multifactorial dermatosis characterized by inflammation of skin over hands clinically presenting as irritant contact dermatitis or allergic

contact dermatitis. Its estimated 1-year prevalence is about 10% in the general population which is still higher among personnel involved in high-risk occupations affecting up to 30% of these individuals.^[5,6] The exposure to contact allergens can be occupational or non-occupational. Frequent use of mild irritants also causes subclinical skin irritation and over time that will evolve to cumulative irritant contact dermatitis. Thus, irritant and allergic contact dermatitis remain the topmost preventable etiologies of hand eczema.^[7] The major risk factors for hand eczema and high-risk occupations are listed in Table 1.

Hand Hygiene Recommendations

Hand hygiene practices have proved their strength in the past by decreasing transmission of SARS and Ebola in addition to decreasing hospital-acquired infections and have become more relevant during this ongoing COVID-19 pandemic.^[8] World Health Organization (WHO) and the Center for Disease Control (CDC) recommend stringent hand hygiene practices to curb transmission of COVID-19 virus.^[9,10] This includes frequent handwashing with soap for at least 20 s to mechanically remove the pathogens. When handwashing is not possible, hand sanitization with frequent use of alcohol-based sanitizer (60% ethanol or 70% isopropyl alcohol) will inactivate the virus. According to CDC, handwashing is better and should be preferred to hand sanitization as sanitizers may not get rid of all types of germs, harmful chemicals, and heavy metals especially when hands are visibly dirty or greasy.^[10] However, when soap and water are not available, alcohol-based hand rub/sanitizer can be substituted. Opportunities for hand hygiene for the general public are enumerated in Table 2.

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Table 1: Risk factors for hand eczema and high-risk occupations

Risk factors for hand eczema	High-risk occupations
Wet work	Housekeepers
Frequent hand washing	Healthcare workers
Wearing of occlusive gloves	Cleaners
Exposure to soaps, detergents, weak alkalis, organic solvents	Chefs, bakers, caterers
Atopy and atopic dermatitis	Construction workers
	Fishermen
	Hairdressers
	Farmers

Table 2: Opportunities of hand hygiene for general public

Before, during, and after preparing food
Before and after eating food
Before and after caring for someone sick
After using toilet
After coughing, blowing nose, and sneezing
After touching/feeding animals
After visiting public places
After touching items frequently touched by other people (door handles, tables, shopping carts, electronic screens)
Before touching one's eyes, nose, or face

Soaps Versus Sanitizers

Soaps, available as bars or liquid, are detergent-based products containing esterified fatty acids and sodium/potassium hydroxide. They cleanse the skin by removing lipids along with dirt and soil. Handwashing with soap for 15–30 s significantly decreases surface bacterial load. However, there are reports of a paradoxical increase in bacterial counts as well.^[11] The addition of antimicrobial agents such as triclosan, chlorhexidine, and chloroxylenol to soaps does not confer any extra advantage and rather increases the chances of irritant contact dermatitis. However, the inherent property of soaps to cause skin irritation and dryness can be reduced by the addition of humectants such as glycerol. Fragrance-free and preservative-free soaps too have a low sensitizing potential and therefore should be preferred. However, the potential of cross-infection from soap bars remains unsubstantiated. Synthetic surfactant (syndet) bars are less irritating but are likely to be ineffective for being mild.

Hand sanitizers containing 60% ethanol or 70% isopropyl alcohol are germicidal and effective against a variety of enveloped and nonenveloped viruses including human immunodeficiency virus, herpes simplex virus, influenza, and respiratory syncytial virus.^[11] Their efficacy against a host of microbes even at a short contact time and a low irritant potential make them superior and are preferred

to soaps. Ethanol tends to be less irritant than isopropyl alcohol without compromising its efficacy and is preferred.^[12] Glycerol can also be added to alcohol-based hand rubs for its moisturizing properties. However, skin previously damaged by frequent use of detergents is prone to irritant effects of all antiseptic formulations.^[11]

Disruption of Normal Barrier Function of Skin with Overzealous Hand Hygiene

Skin is a primary defense against the outside environment preventing entry of foreign pathogens. Stratum corneum composed of corneocytes with their cornified envelopes, corneo-desmosomes, and intercellular lipid lamellae are essentially responsible for this barrier function. Any disruption of this epidermal barrier will result in the entry of microbes, irritants, and allergens into the deeper layers of skin. Frequent handwashing for a prolonged period causes swelling of stratum corneum leading to disruption of epidermal lipid barrier and consequently increased skin sensitivity to physical and chemical irritants. Denaturation of stratum corneum, decrease in corneocytes adhesion and reduction in water-binding capacity of stratum corneum are additional factors implicated for barrier dysfunction.^[13] Wearing gloves for extended duration further worsens this owing to increased occlusion, heat, and sweating.^[14] Soaps and detergents act as weak irritants and their sustained application produces cumulative irritant contact dermatitis in such a scenario. Thus, overzealous use of soap/sanitizer for hand hygiene causes xerosis and compromised skin barrier function that over time eventuates into contact dermatitis. Chances of developing irritant contact dermatitis are manifold compared to allergic contact dermatitis.^[11] The initial presentation is with redness and scaling at web spaces and back of hands that slowly progresses to fissured infiltrative plaques.^[15] Although alcohol-based sanitizers have weak irritant potential and are better tolerated, they tend to make the skin dry and prone to contact dermatitis.^[11,16] Pre-existing atopic dermatitis and hand eczema act as additional risk factors due to the already impaired epidermal barrier.^[17] Healthcare workers are exceptionally susceptible to hand eczema as they have to follow strict hand hygiene practices along with an extended period of wearing gloves. Taking care of various predisposing factors will reduce the chances of hand eczema among them.

Hand Eczema and Hand Hygiene

There appears to be a direct correlation between the frequency of handwashing and hand eczema that has been widely reported even before the current pandemic. During the 2014 Ebola outbreak owing to strict hand hygiene protocols, the incidence of hand eczema in healthcare workers increased significantly and eczema was more severe with handwashing using soap as compared to alcohol-based sanitizers.^[8] A recent study from Wuhan

(China) reported hand eczema in 74.5% healthcare workers and frequency of handwashing (>10 times/ day) was an important predictor.^[18] A higher incidence of 90.2% was also reported from Germany that correlated with two times an increase in the frequency of handwashing during the COVID-19 pandemic.^[1] There are also reports of increased teledermatology consultations for hand eczema from India and Italy.^[2,3] An Indian study reported 16 patients of hand eczema over a short span of 10 days imputed to excessive use of hand sanitizers/ handwashing.^[3] Use of gel sanitizers after handwashing with soap and the prolonged wearing of multilayer latex gloves was considered contributory in 24 new cases of hand eczema in the study in Italy.^[2] Therefore, both the general public and healthcare workers are at an increased risk for hand eczema owing to intensive hand hygiene practices. The solution to the problem lies in selecting less irritant products, avoiding practices that increase skin irritation such as using hot water for hand wash or washing with soap after applying sanitizer.^[11] Washing of hands with lukewarm water and the use of moisturizers every time after hand wash and hand rub will reduce the chances of hand dermatitis. After the hand wash, hands should be patted dry softly rather than rubbing vigorously with a towel.^[19]

Role of Gloves

Gloves are mandatory for healthcare workers to prevent disease transmission among patients. Their use is also advocated for the general public in the current COVID-19 pandemic especially while caring for the sick. The use of protective gloves for a prolonged period results in a state of occlusion and hyper-hydration leading to maceration of the skin and allowing the penetration of soaps and sanitizers. Although wearing cotton glove liners is advocated to prevent this, latex and nitrile gloves provide better protection against coronavirus and are thus preferred. The individuals with hand eczema should prefer nitrile gloves to latex gloves.^[11] However, rubber gloves fare better for routine household work.

Role of Moisturizers

Hand lotions and creams contain humectants, fats, and oils, which will replace depleted skin lipids and improve the barrier function of the skin. Barrier repair creams have been especially marketed to prevent hand hygiene-related hand eczema. These get absorbed into superficial layers of the epidermis and form a protective layer, which are not removed by standard hand cleaning. However, their superiority over less expensive moisturizing lotions is not proven.^[11] Regular application of moisturizing hand creams can reverse glove induced maceration and minor erosions. Hydropathic compresses with 3% boric acid or normal saline and topical zinc oxide are recommended in case of severe erosions.^[20] A randomized controlled trial has shown a significant improvement in hand eczema

severity score among healthcare workers with regular use of hand creams.^[21] However, due to lack of awareness, even healthcare workers miss this most important step predisposing them to hand eczema. This is also evident from 2019 Chinese consensus guidelines on the protection of skin and mucous membrane barriers for healthcare workers fighting coronavirus reporting inadequate (22%) protective skincare measures taken by them.^[20] It is interesting to note that the frequency of hand hygiene practiced by healthcare workers has risen substantially but the use of moisturizing hand creams remains dismal. Thus, frequent moisturization forms an integral part of hand hygiene protocol and must be stressed upon to prevent hand eczema.

International Recommendations

According to the American Association of Dermatology, hand washing is critical to stop the spread of coronavirus and the general population is urged to wash hands at every opportunity. Further, hand sanitization with alcohol-based sanitizer is preferred intermittently and handwashing with soap is recommended when they are visibly dirty. This must be followed by the application of moisturizer while hands are still damp after washing with soap or are completely dry after using sanitizer.^[22] WHO advises against reusing or sharing towels and advocates the use of disposable paper tissues.^[11]

Hand Eczema Prevention Guidelines

Despite the increasing chances of hand eczema, it is imperative to follow hand hygiene practices unfailingly. The knowledge of following preventive measures can, however, help decrease the burden of hand eczema during these challenging times

- Hands should be washed thoroughly for at least 20 s with a fragrance and preservative-free soap
- Pat dry the hands instead of rubbing them with a towel to minimize physical trauma. Avoid reusing/ sharing of a towel. Disposable paper napkins should be preferred
- Use alcohol-based hand rubs if hands are not visibly dirty as they have less irritant potential. Glycerol can be added to hand sanitizer for its moisturizing effect
- Always moisturize after hand wash while they are still damp with a fragrance-free light moisturizing lotion/cream. Choose a lipid-rich moisturizer at bedtime. Vegetable oils (coconut oil, olive oil) and petroleum jelly are inexpensive and easily accessible alternatives
- Any moisturizer must be applied after using hand sanitizer/ rub once they are dry. It does not interfere with their efficacy
- Do not wear rings/ jewelry to prevent trapping of soap and detergent beneath them
- Healthcare workers and persons using protective gloves should apply an adequate quantity of moisturizer after removing them
- Never wash hands with soap after applying alcohol-based sanitizer and do not wear gloves on wet hands

- In case of development of hand eczema, seek dermatologist's advice either in person or through teleconsultation whichever is feasible
- Most cases of mild hand eczema respond to topical corticosteroids, topical calcineurin inhibitors, and emollients. Systemic steroids and immunosuppressive agents such as methotrexate and cyclosporine may be required for severe cases. Self-medication should be strictly avoided.

Conclusions

It is mandatory to comply with essential hand hygiene practices in order to break the chain of transmission of SARS-CoV-2 during this ongoing COVID 19 pandemic. The knowledge and practice of preventive measures can diminish the chances of hand eczema. Selection of an appropriate soap or hand sanitizer with low sensitizing potential and adherence to adequate skin moisturizing practices can prevent hand eczema to a large extent.

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Conflicts of interest

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