

Prevalence and Risk Factors of Occupational Contact Dermatitis in Healthcare Workers

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Abstract

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Background: Occupational contact dermatitis (OCD) is prevalent among healthcare workers, especially during the COVID-19 pandemic. Symptoms include dryness, itchiness, and redness, with hands being the most affected. Risk factors include frequent hand washing, increased glove use, allergies, and lack of health and safety training. This review emphasizes the need for targeted prevention strategies and awareness programs.

Methods: We conducted a systematic review using PubMed, focusing on studies involving healthcare workers and OCD. Keywords included "occupational contact dermatitis," "contact dermatitis," "healthcare workers," and "risk factors for OCD." Data were collected using a structured, interviewer-administered questionnaire, including the Nordic Occupational Skin Questionnaire (NOSQ-2002).

Result: The review included 2,706 healthcare workers. Hand dermatitis was the most common, affecting 22% of participants. Key risk factors were a personal history of allergies, frequent hand washing, high glove usage, and insufficient health and safety training.

Conclusions: This review identifies significant risk factors for OCD among healthcare workers, highlighting the need for interventions focused on reducing hand washing frequency, managing glove use, and improving health and safety training.

Introduction

Ninety percent of workplace-related skin illnesses are caused by occupational contact dermatitis (OCD). It has two types: allergic contact dermatitis and irritant contact dermatitis, the latter accounting for 80% of cases. Both types of usually present as eczematous lesions on exposed areas, especially the hands.¹ Occupational contact dermatitis (OCD) can be triggered by allergens or irritants that contact the skin, often originating from the workplace. Hand sanitizers, frequent hand washing, and personal protective equipment (PPE) such as masks, goggles, face shields, hazmat

suits, closed shoes, and shoe covers are used to protect healthcare workers from infections. However, PPE use has also been identified as a source of various skin health issues for these workers.² Several factors affecting OCD in healthcare workers include physical, chemical, and biological exposures in the workplace. These risks can exacerbate contact dermatitis. Contributing factors include frequent hand washing, prolonged glove use, exposure to chemicals like methacrylate agents and cleaning agents, and microbial exposure such as methicillin-resistant *Staphylococcus aureus*.

Healthcare workers with a history of psoriasis or eczema are more likely to experience OCD. Women who handle household chores have a higher incidence of OCD. Since healthcare workers are predominantly women, this increases the risk of OCD in the medical workforce.² A study in Saudi Arabia estimated the prevalence and investigated the risk factors of occupational contact dermatitis among healthcare workers during the COVID-19 pandemic. The prevalence was found to be 46.4%, with risk factors including female gender, a history of eye allergies, and being in the young age group.³

Alluhayyan et al. reported that the most common skin symptom was dryness (92.9%). The majority (76%) of healthcare workers wore latex gloves, which adversely affected the skin. Additionally, females and younger healthcare workers (mean age 26.4 years) were more prone to developing contact dermatitis.³ In Ethiopia, a study investigated the prevalence (31.5%) and risk factors (hand washing frequency, number of gloves used per day, personal history of allergies, and lack of health and safety training) of occupational contact dermatitis among healthcare workers in Gondar town.⁴ Mekonnen et al. reported that hand dermatitis was the most common type, affecting 22% of participants. Risk factors included a personal history of allergies, frequent hand washing, using multiple pairs of gloves per day, and lack of health and safety training.⁴

Contact dermatitis is an inflammation of the skin characterized by spongiosis or intercellular edema of the epidermis, resulting from irritants or external allergens interacting with the skin. It can manifest as: a) allergic contact dermatitis or b) irritant contact dermatitis, depending on the substances involved.

Allergic contact dermatitis is a type IV hypersensitivity reaction, which is cell-mediated or delayed. It occurs when a person becomes sensitized to an allergen and subsequently reacts upon exposure, regardless of the amount. Reactions can range from minor to severe and may develop within days or take months or years. Irritant contact dermatitis results from repeated exposure to mild irritants (e.g., detergents) over a long period or from exposure to strong irritants (e.g., acids, alkalis) that cause immediate skin damage. Only the skin in direct contact with the irritant is affected.^{5,6}

PRISMA Chart

Five studies met the screening and inclusion criteria, involving 2,706 healthcare workers with occupational contact dermatitis. After evaluating these studies using the Newcastle-Ottawa Scale (NOS), they were found to be compatible and relevant. All studies demonstrated a significant association between healthcare workers and occupational contact dermatitis.

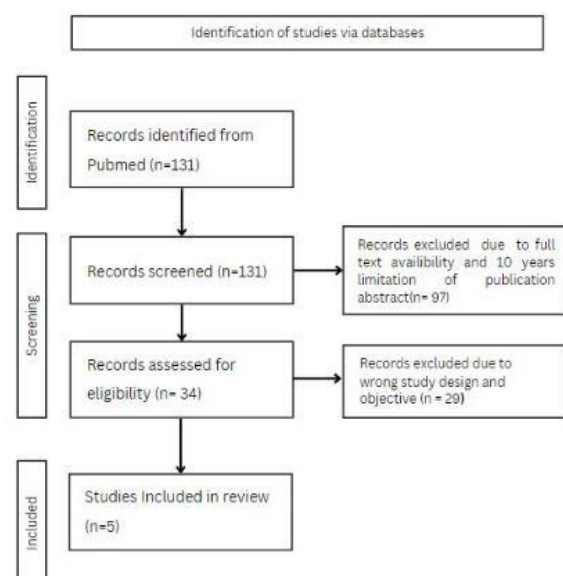


Figure 1. PRISMA Chart

Material And Methods

This systematic review included cross-sectional and retrospective cohort studies on contact dermatitis among healthcare workers and its risk factors, involving a total of 2,706 participants. Studies were included if they reported contact dermatitis in healthcare workers; those involving individuals with no direct patient contact were excluded. Data were sourced from the US National Library of Medicine's PubMed database on July 9, 2024, using keywords such as "contact dermatitis," "healthcare worker," and "risk factor and prevalence." The literature search covered publications from the past 10 years, with no restrictions on language or publication status.

A total of 131 journals were identified from the PubMed database using a combination of keywords and screened. Of these, 5 were selected for review based on their relevance within a 10-year period and were included as reference journals. The quality of these cohort and cross-sectional studies was assessed using the Newcastle-Ottawa Scale (NOS), focusing on study group selection, comparability, and outcomes. All included journals were rated as of fair quality. Data extraction from the database was performed independently by two reviewers, with any disagreements resolved through discussion with a third reviewer.

Result

The study involved cohort and cross-sectional analyses of 2,706 healthcare workers, evaluated using the Newcastle-Ottawa Scale, which indicated fair quality across the studies. The review included four cross-sectional studies and one retrospective cohort study. Three studies assessed the prevalence, risk factors, and

clinical features of contact dermatitis in healthcare workers. One study focused on hand eczema and contact allergy related to occupational exposures, and one study investigated whether healthcare work was associated with contact allergy to thiuram mix, a rubber accelerator used in protective gloves.

Prevalence of Contact Dermatitis

Mekonnen et al. reported that occupational contact dermatitis was found in 31.5% of healthcare workers, with nurses experiencing the highest proportion (12.1%), followed by midwifery professionals (11.8%).⁴ Alluhayyan et al. found that 46.3% of healthcare workers reported skin changes, with nurses having the highest prevalence of contact dermatitis. Erdem Y et al. detected hand eczema in 54 of 107 participants (50.5%).³

Hamnerius et al. reported that 193 (62%) healthcare workers had occupational hand eczema. Among these, 22 (11%) had occupational contact allergy, including 17 with allergies to rubber additives (14 related to surgical gloves, 3 to nitrile examination gloves), 1 to myristyl alcohol, and 4 to formaldehyde or formaldehyde releasers.⁹

Risk Factor of Contact Dermatitis

According to Mekonnen et al., healthcare workers who washed their hands 11 or more times per day were 1.80 times more likely to develop contact dermatitis compared to those who washed their hands 5 or fewer times daily. Additionally, those using 5 or more pairs of gloves per day had 3.22 times higher odds of developing contact dermatitis than those using only one pair daily. Workers who had not received training on workplace health and safety were 2.12 times more likely to develop contact dermatitis compared to those who had received such training.

Finally, individuals with a previous diagnosis of allergies were 2.37 times more likely to develop occupational contact dermatitis than those without a history of allergies.⁴ Alluhayyan et al. found that participants aged 20-29 years were more likely to have contact dermatitis. Female healthcare workers had 2.36 times the odds of reporting contact dermatitis compared to males. Pharmacists and interns had 3.69 and 4.90 times higher odds of developing contact dermatitis than other occupations.

According to Erdem et al., healthcare workers with a history of hand eczema (HE) within the past year had an odds ratio (OR) of 18.5 (95% CI: 3.82–89.9), and those washing their hands more than 20 times per day had an OR of 3.28 (95% CI: 0.995–10.8), both independently associated with a higher risk of HE.³ Hamnerius et al. found that sick leave was associated with allergic contact dermatitis (ACD) with an adjusted odds ratio (OR) of 5.1. Sick leave was also linked to contact allergy to glove-related allergens, with an adjusted OR of 5.6. Schwensen et al. reported that healthcare workers with occupational contact dermatitis, hand dermatitis, and those over 40 years old were more likely to have an allergy to thiuram mix.⁹

Symptoms of Contact Dermatitis

According to Mekonnen et al., the most commonly reported skin changes were redness (28.6%, n=38) and burning (17.3%, n=93). The hand was the most affected body site (22%, n=93), followed by the face (5%, n=9).⁴ Alluhayyan et al. found that the most recorded symptoms were dryness (92.9%), itchiness (50%), and redness (46.4%). The hand was the most affected site (93.5%). The top three factors worsening skin changes in the workplace were hand cleansers/soaps (59.2%, n=109), antiseptics/disinfectants (47.8%,

n=88), and protective gloves (2.2%, n=75).³ Erdem et al. reported that the most common clinical type was irritant contact dermatitis (96.3%), the most frequent morphology was erythematous-squamous (75.9%), and the most affected area was the hand dorsum (85.2%).¹⁰ Hamnerius reported that 71% of healthcare workers with hand eczema found it difficult to use alcoholic hand disinfectants, while the majority had no difficulty using disposable gloves.⁹

Discussion

In our review, we found that 31.5% to 62% of healthcare workers have occupational contact dermatitis, with nurses exhibiting the highest prevalence. This may be due to the high proportion of nurses among the participants and their extensive direct patient contact. A 2020 study noted that increased hand hygiene could lead to skin changes such as dryness. The pandemic has intensified the need for frequent hand hygiene, contributing to these adverse skin changes.¹¹

In our systematic review, the identified risk factors for contact dermatitis include frequent hand washing, glove use (particularly those containing thiuram mix), a history of allergic dermatitis, being female, and being aged 20-29.

Frequent hand washing is crucial for preventing infections in healthcare settings but can damage the skin barrier and lead to irritant contact dermatitis due to prolonged exposure to water, soaps, and detergents, which strip away natural oils from the skin. This review consistently links frequent hand washing to a higher risk of contact dermatitis among healthcare workers. Strategies such as using moisturizers and implementing skin protection protocols are essential to mitigate this risk while maintaining effective hand hygiene practices.

Gloves are vital for protecting healthcare workers from infectious agents, chemicals, and other irritants. However, gloves made from latex or containing irritants like thiuram mix can cause allergic reactions or irritant contact dermatitis. Prolonged use of such gloves can exacerbate dermatitis due to sweating, mechanical friction, and occlusion of the skin. Mekonnen et al. noted that individuals sensitized to thiuram mix may experience delayed-type hypersensitivity reactions when exposed to gloves containing this chemical.

Healthcare workers with a history of allergic dermatitis are at increased risk of developing exacerbations upon exposure to allergens present in the healthcare environment. Allergic contact dermatitis results from an immune response to specific allergens, such as latex, certain chemicals used in healthcare products, or medications.^{2,6,11}

Alluhayyan et al. stated that common allergens in healthcare settings include latex, formaldehyde (used in some disinfectants and medical products), and various preservatives and fragrances found in skincare products. Individuals with a known history of allergic dermatitis should undergo comprehensive skin assessments to identify potential triggers.³ According to Mekonnen et al., female healthcare workers have a higher prevalence of contact dermatitis compared to their male counterparts. This gender disparity may be due to biological differences in skin structure, hormonal influences, and variations in skincare practices. Hormonal fluctuations during menstrual cycles, pregnancy, or menopause can affect skin sensitivity and reactivity, potentially exacerbating dermatitis. Additionally, women generally have thinner skin than men, making it more susceptible to irritants and allergens.⁴ Alluhayyan et al. also

identified healthcare workers aged 20-29 years as a high-risk group for contact dermatitis. This demographic often includes new professionals who may be less experienced with skin protection practices or more prone to taking risks with personal protective equipment. Younger healthcare workers might underestimate the importance of skin protection or feel less compelled to follow protocols due to perceived invulnerability or inexperience. Additionally, individuals in their 20s may have varying levels of skin sensitivity and resilience, influenced by genetic factors, skincare habits, and prior exposures to irritants or allergens. Their immune systems may still be maturing, making them more susceptible to developing allergic sensitization or exaggerated inflammatory responses from repeated exposure to allergens.³

In our systematic review, dryness, itchiness, and redness were the primary symptoms of occupational contact dermatitis. Mekonnen et al. found redness to be the most common symptom, while Alluhayyan et al. reported dryness as the most prevalent symptom. Despite this difference, the hand was the most common site of occupational contact dermatitis in both studies. A 2020 study indicated that increased hand hygiene could lead to skin changes such as dryness. The pandemic has heightened the need for frequent hand hygiene, thereby exacerbating these unwanted skin changes.¹¹ Alluhayyan et al. reported hand cleanser/soap, antiseptic/disinfectants, and protective gloves were factors that worsened contact dermatitis.³ According to Fitzpatrick et al., irritants for occupational contact dermatitis include wet work, soaps and detergents, alcohol, ethylene oxide, and medications. Allergens identified include latex gloves, anesthetics, antibiotics, antiseptics, phenothiazines, formaldehyde,

glutaraldehyde, and chloroxylenol.⁶ Extended contact with water or moist environments leads to significant changes in the skin's structure. It causes swelling of the outermost layer of skin (stratum corneum) and disrupts the organization of fats between skin cells. Consequently, the skin becomes more permeable and sensitive to irritants, whether physical or chemical.¹² Wearing protective gloves for long periods can lead to excessive sweating and moisture buildup, which exacerbates the skin's inflammatory response to irritants. Common household cleaning products like soaps, surfactants, detergents, and solvents are generally mild irritants that most people tolerate well. However, frequent exposure to these substances can result in chronic, cumulative irritant contact dermatitis. This happens because these products can strip away protective skin oils, damage skin proteins, alter the structure of

keratin in the epidermis, and harm the outer layer of skin cells (keratinocytes).¹³

Conclusion

In conclusion, the prevalence of occupational contact dermatitis among healthcare workers ranges from 31.5% to 62%, with nurses showing a higher prevalence. Our review identified several risk factors: frequent hand washing, use of gloves containing thiuram mix, a history of allergic dermatitis, being female, and being aged 20-29. The primary symptoms reported were dryness, itchiness, and redness. To reduce the prevalence of occupational contact dermatitis, especially among women of reproductive age, it is crucial to address these risk factors. Future research should further investigate these risk factors, and comprehensive training for healthcare workers is essential to mitigate the prevalence of occupational contact dermatitis.

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