Research Article

Prevalence and Occupational Risk Factors of Glove-Induced Hand Dermatitias Among Healthcare Workers in A Tertiary Care Hospital

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Abstract

Background:
Occupational hand dermatitis is a very common and poorly recognised issue among healthcare workers that is thought to be tied mainly to prolonged glove use, wet work and repetition of hand hygiene practices. Continuous exposure to glove materials, such as latex and rubber additives, can compromise the integrity of the skin barrier, increasing susceptibility to irritant and allergic contact dermatitis.
Objectives:
To estimate prevalence with glove contact-induced dermatitis in healthcare workers, and to specify occupational factors that correlate with severity of symptomatic expression.
Methods:
A cross-sectional study was conducted at a tertiary care teaching hospital in Chennai with 373 healthcare workers, including doctors, nurses, laboratory personnel, and healthcare students. A structured self-administered questionnaire was used to gather information on sociodemographic characteristics, glove use patterns, and dermatological symptoms. The data was summarized using descriptive statistics, and the Chi-square test was used to determine associations between occupational variables and symptom burden. A p-value <0.05 indicated statistical significance.
Results:
The study included 373 healthcare workers, 72.9% of whom were females, with the majority (71.3%) falling between the ages of 20 and 30. The overall prevalence of glove-induced dermatitis was 11.5%. The most common dermatological symptoms reported were dry skin (30%) and itching (26%), followed by redness (12%) and cracked skin (10%). Almost half of the participants (49.9%) reported using multiple types of gloves, with 40.2% wearing gloves for 2-4 hours per day. A significant correlation was found between professional category and symptom burden ($p < 0.0001$), with doctors reporting the highest proportion of symptoms. Weekly working hours were also significantly associated with symptom severity ($p = 0.003$), indicating an increased risk for those with longer occupational exposure.
Conclusion:
Glove-induced hand dermatitis is a common occupational health concern among healthcare workers, especially those who wear gloves for long periods of time and work long hours. Implementing preventive strategies such as appropriate glove selection, skin care education, and occupational exposure monitoring may help to reduce the prevalence of occupational dermatitis in healthcare settings.

Keywords: Occupational Skin Diseases, Contact Dermatitis, Protective gloves, Health Personnel.

Introduction

Globally, occupational skin diseases account for a sizable proportion of reported occupational illnesses, causing significant morbidity, decreased productivity, and increased healthcare costs among affected workers.[1,2]. Within this broad category occupational contact dermatitis (OCD) appears to account for up to 90-95% of cases which, predominantly, affects the hands due to the intensive contact with occupational irritants and allergens to this body region [3,4]. Healthcare workers (HCWs) are at especially high risk for occupational hand dermatitis as their regular work tasks require repetitive hand hygiene, frequent use of hand and/or surface soaps and disinfectants and/or the prolonged use of protective gloves [5–7]. In epidemiological studies the incidence of occupational related contact dermatitis in HCWs is variable depending on the study design and population however it consistently shows the hands to be one of the most affected locations which implies the clinical and public health importance of hand

dermatitis in this population[3,8,9].

The role of the use of gloves and wet-work in the precipitation of occupational hand dermatitis has been reported in a few studies. Repeated occlusion, sweating, and friction while wearing gloves may weaken the epidermal barrier, allowing irritants and allergens to penetrate. Gloves, which are indispensable in infection control, provide a microenvironment of increased humidity and temperature which, by disrupting the skin barrier, predispose to irritant and allergic type reactions [3,10,11]. Apart from the physical occlusion technics, elements of glove materials such as latex proteins and rubber accelerators can themselves serve as sensitizing agents [10,12,13]. A study conducted among nurses from a tertiary care hospital in India revealed that symptoms compatible with the occurrence of latex glove related dermatoses were present in around 9.9% of the study subjects, with patch testing giving validation for the diagnosis of allergic contact dermatitis in a subset of test subjects[14]. This helps to highlight the fact that glove use, in particular the use of latex gloves, not only plays a role in the development of irritant dermatitis through the mechanical and moisture effects but also through allergic reactions secondary to chemical constituents[13,15].

Evidence from cross-sectional studies conducted during the covid-19 pandemic emphasizes on a rising incidence of glove induced dermatitis amongst HCWs. During the pandemic, increased infection control practices led to more frequent hand hygiene and longer use of personal protective equipment, raising the risk of occupational dermatoses among healthcare professionals. In a multicentre study in Indonesia, involving 845 healthcare workers, approximately 18.5% of healthcare workers reported glove-associated HD, symptoms (e.g., itching, including palm) highly correlated with glove use of > = 2 hours/day as well as a history of atopy or previous dermatitis [16]. These findings are consistent with data gathered globally that pandemic related increased hand hygiene and use of personal protective equipment has increased the burden of occupational hand dermatitis in clinical environments[5,17].

Despite growing awareness of occupational dermatoses among healthcare professionals, epidemiological data on glove-induced dermatitis in India is limited. Although studies such as that by Tomy et al. have documented latex glove-associated contact dermatitis in nurses, wider epidemiological studies as well, that encompass glove contact-induced dermatitis in various categories of HCW, are lacking[14]. Given the variable levels of prevalence documented in varying geographical settings and the possibility of factor influence including glove types, duration, hand hygiene uses and susceptibility of individual (including atopy) there is an obvious need for institution specific data. Understanding the prevalence and occupational determinants of glove-related dermatitis is critical for developing targeted preventive strategies in healthcare settings.

There is still limited information available in India about glove-induced dermatitis in various healthcare worker categories. The majority of currently available studies focus on nurses or latex allergies, leaving gaps in our understanding of the overall occupational burden among healthcare workers. The current study was conducted to determine the prevalence and occupational determinants of glove-induced dermatitis in healthcare workers at a tertiary care teaching hospital.

Materials and Methods

A hospital-based cross-sectional observational study was carried out among healthcare workers at a tertiary care teaching institution in Chennai, Tamil Nadu, India. The aim of the study was to measure the prevalence of contact-induced dermatitis of gloves and its linked occupational risk factors in healthcare workers. Doctors, nurses, laboratory personnel, and healthcare students were among those who routinely used protective gloves in clinical or academic settings. Participants were recruited through the use of a convenience sampling technique. The official Learning Management System was used to circulate the questionnaire.

The minimum sample size for the study was calculated using the standard formula for prevalence studies, $n = Z^2pq/d^2$, with an expected prevalence of glove-related dermatitis of 30%, a 95% confidence level, and an absolute precision of 5%. The calculated minimum sample size was 323 participants. To account for incomplete responses, more participants were recruited.

A total of 373 participants were considered in the final analysis. All responses received during the data collection period were screened for eligibility and completeness before including them. Healthcare workers and students connected with tertiary care teaching institute with regular use of protective gloves and informed consent were eligible to participate. Individuals who did not use gloves as a normal part of their job, those who had pre-existing

generalized dermatological states not related to glove usage (such as psoriasis, vitiligo or active fungal infections), participants who had incomplete questionnaire responses, and those who refused consent were not included in the study.

Glove-induced dermatitis was operationally defined in this study as the presence of one or more self-reported dermatological symptoms in the hand region after wearing protective gloves, such as dryness, itching, redness, burning sensation, cracked skin, vesicles, or rash. The questionnaire was reviewed by dermatology and community medicine experts to ensure content validity, and it was pilot tested with a small group of healthcare workers to assess clarity and feasibility prior to final data collection.

Data were collected with a structured self-administered questionnaire developed after reviewing the literature pertaining to the problem. The questionnaire was divided into sections dealing with sociodemographic data, occupational profile, glove usage habits (glove type, frequency and duration of use), presence and type of dermatological symptoms, anatomical locations of symptoms and pertinent clinical history. The tool was designed to be concise, easy to understand and appropriate for self-administration.

The questionnaire was distributed through LMS. The purpose of the study was explained on the first page of the form and electronic informed consent obtained prior to participation. Responses were automatically recorded and placed in a secure password-protected database accessible to the investigators.

Data was entered into Microsoft Excel software and analysed using Statistical Package for the Social Sciences (SPSS) version 25.0. Descriptive statistics were presented as frequencies and percentage. Associations between categorical variables were tested with the Chi-square test or the Fisher's exact test as appropriate. A P-value less than 0.05 was deemed statistically significant. Ethical approval was taken from the Institutional Ethics committee of the institution before commencing the study. Anonymity and confidentiality of the participants were strictly kept at all stages of this study.

Result:

A total of 373 healthcare workers were a part of this study. The majority of participants were female (72.9%, n = 272), with males accounting for 27.1% (n = 101). The majority of participants (71.3%, n = 266) were between the ages of 20 and 30. Those between the ages of 18 and 20 accounted for 17.7%, or 66 people. Participants aged 30-40 years accounted for 8.0% (n = 30), with only 2.9% (n = 11) over the age of 40. Students made up the largest professional group (53.6%, n=200), followed by doctors (21.2%, n=79), nurses (13.9%, n=52), laboratory technicians (4.8%, n=18), and other healthcare personnel (6.4%, n=24) .

The majority of participants had less than one year of work experience (73.7%, n = 275), while 20.6% (n = 77) had one to ten years of experience. A lower proportion reported 11-20 years (3.5%, n = 13) or more than 20 years of work experience (2.1%, n = 8).The majority of participants reported working fewer than 30 hours per week (63.8%, n = 238). However, a significant proportion reported longer working hours: 30-39 hours (11.8%, n = 44), 40-49 hours (16.4%, n = 61), and ≥50 hours per week (8.6%, n = 32). Overall, the study population was predominantly young, female, and made up primarily of healthcare students and early-career professionals.

Table 1. Sociodemographic and Occupational Characteristics of Healthcare Workers with Glove-Induced Hand Dermatitis (n = 373)

Characteristics	Category	n	%
Gender	Male	101	27.1
	Female	272	72.9
Age group (years)	18–20	66	17.7
	20–30	266	71.3
	30–40	30	8.0
	>40	11	2.9

Profession	Doctors	79	21.2
	Nurses	52	13.9
	Students	200	53.6
	Laboratory technicians	18	4.8
	Other professions	24	6.4
Working history	< 1 year	275	73.7
	1–10 years	77	20.6
	11–20 years	13	3.5
	> 20 years	8	2.1
Working hours per week	< 30 hours	238	63.8
	30–39 hours	44	11.8
	40–49 hours	61	16.4
	≥ 50 hours	32	8.6

Overall, dermatological symptoms suggestive of glove-induced dermatitis were reported by 11.5% (43/373) of the healthcare workers. However, individual dermatological symptoms were reported more frequently because participants could report multiple symptoms and some symptoms may occur intermittently without fulfilling the criteria for dermatitis.

Nearly half of the participants (49.9%, n = 186) reported wearing more than one type of glove, while 28.4% (n = 106) used only latex gloves. The majority of participants reported wearing gloves for 2-4 hours per day (40.2%, n = 150), followed by less than 30 minutes (30.8%, n = 115) and 1-2 hours (24.9%, n = 93). The most frequently reported dermatological symptoms were dry skin (30.0%, n = 112) and itching (26.0%, n = 97). Other reported symptoms were redness (12.0%, n = 45) and cracked skin (10.0%, n = 37). Fluid-filled blisters (3%), papules (2%), wheals (1%), and discharge (1%) were less common. Rash was reported by 6.2% (n = 23) of participants, most commonly affecting the palms (4.3%, n = 16) and interdigital spaces (3.5%,n=13). Overall, the symptom profile indicates that most dermatological manifestations were mild and primarily caused by irritant contact dermatitis rather than severe allergic reactions.

Table 2. Pattern of Glove Use and Glove-Related Skin Complaints of Healthcare Workers (n = 373)

Variable	Category	n	%
Type of gloves used	Latex	106	28.4
	Nitrile	3	0.8
	Pre-powdered rubber	42	11.3
	Vinyl/PVC	6	1.6
	All types	186	49.9
	Unknown	30	8.0
Duration of glove use/day	One procedure	1	0.3
	< 30 minutes	115	30.8
	1–2 hours	93	24.9
	2–4 hours	150	40.2
	4–6 hours	11	2.9
	> 6 hours	2	0.5

	Not regular	1	0.3
Specific rash area present	Yes	23	6.2
	No	311	83.4
	Not applicable	39	10.5
Affected area (if present)	Back of hand	10	2.7
	Fingers/interdigital	13	3.5
	Palm	16	4.3
	Wrist	3	0.8
	Not applicable	331	88.7
Reported dermatological symptoms (multiple responses allowed)	Dry skin	112	30.0
	Itching	97	26.0
	Burning/stinging	30	8.0
	Redness	45	12.0
	Cracked skin	37	10.0
	Papules	7	2.0
	Fluid-filled blisters	11	3.0
	Discharge/crusting	4	1.0
	Wheals	4	1.0
Duration of symptoms	Same day	40	10.7
	Weeks	5	1.3
	Months	5	1.3
	Not applicable	323	86.6

A significant correlation was found between professional category and the presence of dermatological symptoms among healthcare workers (Chi-square test, $p < 0.0001$). Doctors reported the most symptoms compared to other professional groups. In contrast, a higher percentage of students were asymptomatic. Nurses and lab technicians reported significantly fewer symptoms. These findings indicate that the professional role and nature of clinical exposure may influence the risk of glove-related dermatological symptoms.

Table 3. Association between Professional Category and Dermatological Symptoms among Healthcare Workers (n = 373)

Profession	1 Symptom n (%)	1–5 Symptoms n (%)	Not Applicable n (%)	*P* value
Doctors	14 (51.9)	10 (47.6)	55 (16.9)	< 0.0001
Nurses	1 (3.7)	3 (14.3)	48 (14.8)	
Students	8 (29.6)	5 (23.8)	187 (57.5)	
Laboratory technicians	2 (7.4)	0 (0.0)	16 (4.9)	

Chi-square test was applied.

Further analysis was done to determine the relationship between occupational characteristics and the severity of dermatological symptoms among healthcare workers. Weekly working hours were significantly related to dermatological symptoms among healthcare workers (Chi-square test, $p = 0.003$). Participants who worked fewer than 30 hours per week were mostly asymptomatic, whereas those who worked more hours had a higher prevalence of dermatological symptoms. Individuals who worked more than 50 hours per week had the highest proportion of

reported symptoms, indicating a possible exposure-response relationship between cumulative occupational exposure and the development of glove-related dermatological symptoms.

Table 4. Association between Weekly Working Hours and Dermatological Symptoms among Healthcare Workers (n = 373)

Working hours per week	1 Symptom n (%)	1–5 Symptoms n (%)	Not Applicable n (%)	*P* value
< 30 hours	10 (37.0)	9 (42.9)	217 (66.8)	0.003
30–40 hours	5 (18.5)	3 (14.3)	36 (11.1)	
41–50 hours	7 (25.9)	4 (19.0)	50 (15.4)	
> 50 hours	5 (18.5)	5 (23.8)	22 (6.8)	

Chi-square test was applied.

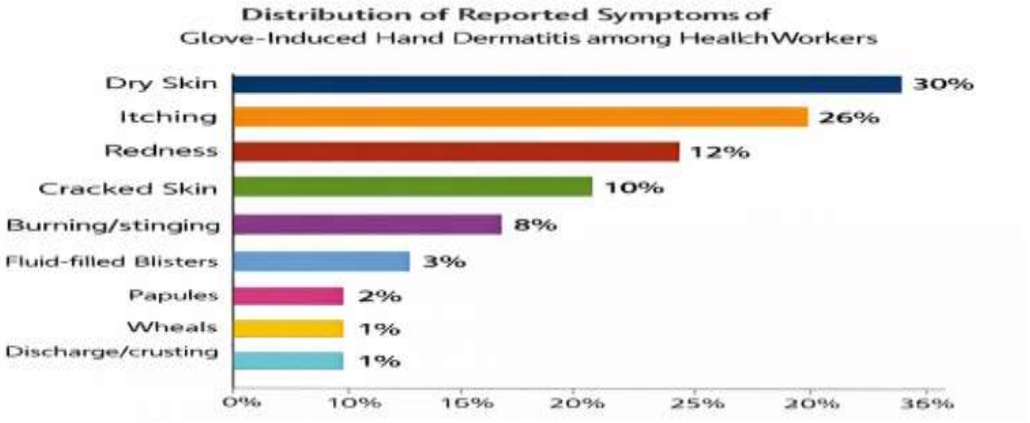
Patterns of skin involvement were different for the different types of gloves. Palm involvement was most frequently linked to latex (8.5% (n 9) and pre-powdered rubber gloves (11.9% (n 5)) and interdigital involvement to pre-powdered rubber (9.5% (n 4) and latex gloves (4.7% (n 5)). Dorsal involvement of the hand was reported more frequently in users of vinyl/PVC (16.7%, n = 1) and unknown gloves (13.3%, n = 4). Nitrile glove users showed minimal involvement. In all the glove types, the majority of study participants remained asymptomatic, and the highest number of participants who exhibited symptoms were those who used multiple glove types (96.2%, n = 179). These findings suggest that prolonged occupational exposure and longer working hours may increase the risk of glove-related skin irritation.

Table 5. Association of Type of Gloves Used and Affected Area of Upper Limb Among Healthcare Workers (n= 373)

Affected area	All types n (%)	Latex n (%)	Nitrile n (%)	Pre-powdered rubber n (%)	Vinyl/PVC n (%)	Unknown n (%)
Back of hand	2 (1.1)	2 (1.9)	0 (0.0)	1 (2.5)	1 (16.7)	4 (13.3)
Fingers/interdigital	2 (1.1)	5 (4.7)	0 (0.0)	4 (9.5)	1 (16.7)	1 (3.3)
Wrist	1 (0.5)	1 (0.9)	1 (33.3)	0 (0.0)	0 (0.0)	0 (0.0)
Palm	2 (1.1)	9 (8.5)	0 (0.0)	5 (11.9)	0 (0.0)	0 (0.0)
Not applicable	179 (96.2)	89 (84.0)	2 (76.2)	32 (76.2)	4 (66.7)	25 (83.3)

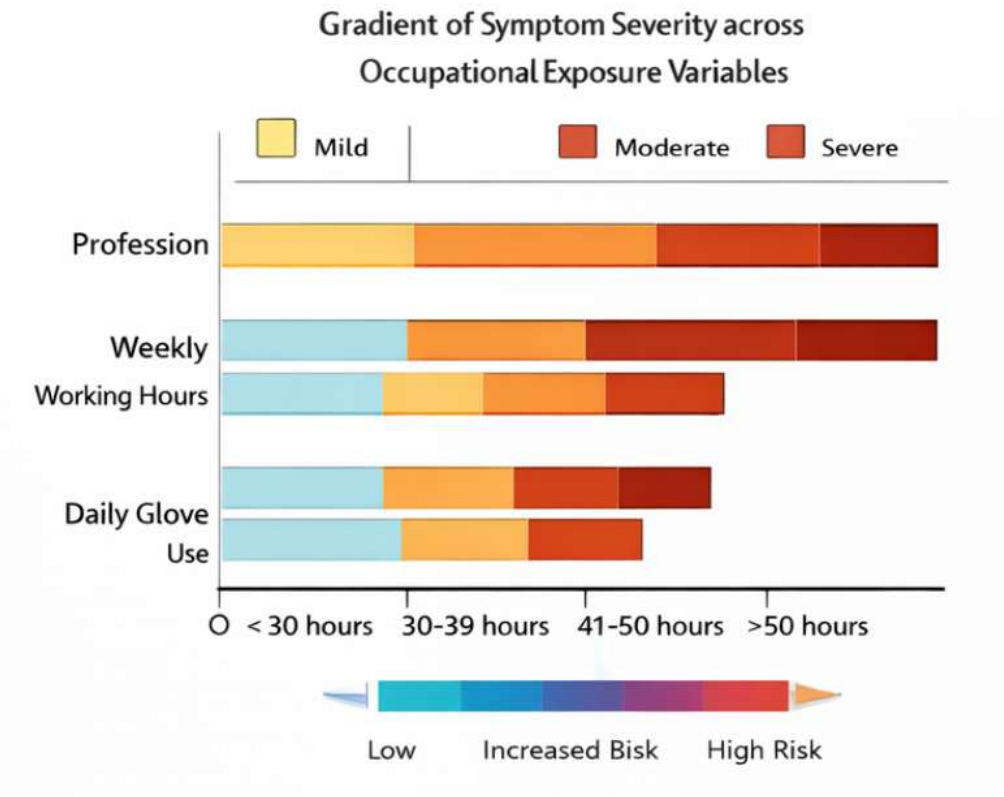
Dry skin (30%), itching (26%) were the most common symptoms studied, which were followed by redness (12%), and cracked skin (10%). Burning or stinging sensation was reported by 8% of the participants. More severe manifestations, such as fluid-filled blisters (3%), papules (2%), wheals (1%) and discharge (1%), were rather uncommon, suggesting that most cases were mild to moderate in nature.

Figure 1: Symptom Pattern Clustering among Healthcare Workers Who Develop Glove-Induced Dermatitis



Symptom severity became higher with higher occupational exposures. Participants with shorter working hours and limited glove use tended to cluster within the low-risk range, whereas those with longer working hours and continuous glove use throughout the day were more likely to fall into the moderate- and high-risk categories. This pattern suggests a clear exposure–response relationship between cumulative occupational exposure and the overall burden of symptoms.

Figure 2. Gradient of Severity of Symptoms with Occupational Exposure Variables



Discussion:

The current study looked at the prevalence and occupational predictors of glove-induced dermatological symptoms among healthcare workers in a tertiary care teaching hospital. In this study, 11.5% of participants experienced glove-induced dermatitis. The most commonly reported dermatological manifestations were dry skin (30%) and itching (26%), indicating that the majority of symptoms were minor and consistent with irritant contact dermatitis. There was a significant correlation between occupational exposure variables and symptom burden, particularly professional category ($p < 0.0001$) and weekly working hours ($p = 0.003$). These findings emphasize the role of cumulative occupational exposure in the development of dermatological symptoms among healthcare workers.

Occupational hand dermatitis is a common work-related condition among healthcare workers, accounting for a significant proportion of occupational skin diseases. The most frequently reported symptoms in the current study were dry skin (30%) and itching (26%), both of which are common early manifestations of irritant contact dermatitis in occupational settings. Filon et al. found that the rate of occupational contact dermatitis in healthcare settings varied between 15.9 to 780 occupational contact dermatitis event per 10,000 person-years and highlighted the high burden of occupational contact dermatitis in clinical settings [3]. In the current study, symptoms caused by gloves were mostly classified as mild to moderate and dry skin (30%) and itching (26%) were among the most common symptoms, reflecting the tendency of irritant type of symptoms common in occupational study populations.

Karagounis et al. emphasized that repeated contact to irritants, occlusive glove environment and frequent handwashing impair the barrier function of the epidermis rendering these individuals susceptible to chronic hand

dermatitis[4]. This mechanistic explanation is consistent with our finding of 40.2% of people using gloves 2-4 hours a day and symptoms of increasing burden with increasing exposure lengths. Our result that symptom severity was significantly related to the number of hours worked in a week ($p = 0.003$), with only 6.8% of all those working >50 hours being without symptoms, supports the cumulative exposure model proposed in earlier literature.

Glove-related dermatitis was more prominent during the pandemic, the novel coronavirus (i.e. Covid 19). A significant increase in hand dermatitis in healthcare workers has been reported by Gunasegaran et al., who suggested the increase was due to increased glove use and hygiene [5]. Similarly, in our cohort, young and early-career healthcare workers, especially students (53.6%) appeared to be the biggest affected group, depicting a possible vulnerability in groups with less conditioning of the skin due to previous line of work. The role of glove material is very critical. Fay et al. referred to gloves as protective and causative agents that could induce dermatitis by occlusion, sweating and allergenic components [10]. In our study, the involvement of palms was higher in users of latex (8.5%) and pre-powdered rubber glove (11.9%) reinforcing the material risk. The effect that this trend has is supported by Indian data as well. Tomy et al. found latex glove-related dermatoses in 9.9% of nurses; the major presentation type was irritant contact dermatitis [14]. Similarly, our study documented the most common anatomical sites of involvement (palm and interdigital).

Comparable results were also reported by Prakoeswa et al. who identified glove-induced hand dermatitis in 18.46% of Indonesian healthcare workers. Itching was the most prevalent symptom (44.23%) and the palm of the hand was the most affected area (48.72%). Importantly, the risk of glove use >=2 hours/day was significantly associated with a high risk (OR = 1.52; $p = 0.018$) and a history of atopy increased the susceptibility further (OR = 4.01; $p = 0.001$) [16]. These results are consistent with the current study, which found that prolonged glove use and longer working hours were associated with a higher burden of dermatological symptoms. The similarity of findings across geographical settings suggests that cumulative occupational exposure plays an important role in the development of glove-related hand dermatitis.

Together these comparisons emphasize the fact that glove-induced hand dermatitis is affected by Cumulative exposure, Glove Material and Occupational Role. The consistency of our findings with the global evidence highlights the importance of having preventative strategies related to glove choice, skin care education and skin exposure modulation.

From an occupational health standpoint, the findings of this study highlight the need for preventive strategies to reduce the prevalence of glove-induced dermatitis among healthcare workers. Institutional measures such as the use of non-latex or low-allergen gloves, regular skin care education, proper hand hygiene practices, and periodic occupational health surveillance may aid in the prevention of dermatological complications associated with prolonged glove use.

The study's strengths include a relatively large sample size and the inclusion of multiple categories of healthcare workers, which allows for a more comprehensive understanding of occupational exposure patterns. The use of an electronic questionnaire allowed for broad participation and reduced the chances of data entry error. However, the cross-sectional design does limit any causal inference. Self-reported symptoms may be subject to recall and reporting bias and clinical confirmation of dermatitis was not done. Furthermore, the study was conducted in a single tertiary care institution, which may limit the findings' applicability to other healthcare settings.

Conclusion

Glove-induced dermatitis is a significant occupational health concern for healthcare workers. In the current study, 11.5% of participants reported dermatological symptoms associated with glove use, the most common of which were dry skin and itching. Occupational exposure factors, particularly professional roles and longer working hours, were found to be significantly associated with an increased symptom burden. These findings emphasize the importance of cumulative occupational exposure in the development of glove-induced skin irritation. Implementing preventive strategies such as appropriate glove selection, regular skin care education, and monitoring of occupational exposure can help reduce the risk of occupational dermatitis among healthcare workers. More multicentric studies with clinical confirmation of dermatitis are needed to better understand the epidemiology and risk factors for glove-induced dermatitis among healthcare workers.

References

1. Srinivas CR, Sethy M. Occupational dermatoses. Indian dermatology online journal. 2023;14(1):21–31.
2. Jain NK, Seth J, Lenka UK, Munda NK. An Epidemiological Study of occupational health Diseases and Prevalence of Scabies among workers in manufacturing industry of Purba Medinipur Cross sectional study. European Journal of Cardiovascular Medicine. 2025;15(2).
3. Larese Filon F, Pesce M, Paulo MS, Loney T, Modenese A, John SM, et al. Incidence of occupational contact dermatitis in healthcare workers: a systematic review. Journal of the European Academy of Dermatology and Venereology. 2021;35(6):1285–9.
4. Karagounis TK, Cohen DE. Occupational hand dermatitis. Current Allergy and Asthma Reports. 2023;23(4):201–12.
5. Gunasegaran J, Teh YY, Lim CK, Ng SF. Review on prevalence, risk factors, and research advancements on the use of medical gloves concerning hand dermatitis among health care workers. Safety and Health at Work. 2024;15(2):129–38.
6. Araghi F, Tabary M, Gheisari M, Abdollahimajd F, Dadkhahfar S. Hand hygiene among health care workers during COVID-19 pandemic: challenges and recommendations. Dermatitis. 2020;31(4):233–7.
7. Loi AS, Aribou ZM, Fong YT. Improving Recovery of Irritant Hand Dermatitis in Healthcare Workers With Workplace Interventions During the COVID-19 Pandemic. Frontiers in Public Health. 2022;10:844269.
8. Sawada Y. Occupational skin dermatitis among healthcare workers associated with the COVID-19 pandemic: a review of the literature. International journal of molecular sciences. 2023;24(3):2989.
9. Tesfaye AH, Engdaw GT, Aragaw FM, Kabito GG. Prevalence and risk factors of work-related contact dermatitis symptoms among healthcare cleaners during the COVID-19 pandemic in Northwest Ethiopia: a multicentre cross-sectional survey. BMJ open. 2022;12(11):e069019.
10. Fay MF. Hand dermatitis. The role of gloves. AORN journal. 1991;54(3):451–4.
11. Hamnerius N, Svedman C, Bergendorff O, Björk J, Bruze M, Pontén A. Wet work exposure and hand eczema among healthcare workers: a cross-sectional study. British Journal of Dermatology. 2018;178(2):452–61.
12. Hansen A, Brans R, Sonsmann F. Allergic contact dermatitis to rubber accelerators in protective gloves: problems, challenges, and solutions for occupational skin protection. Allergologie select. 2021;5:335.
13. Rojruthai P, Sakdapipanich J, Wiriyanantawong J, Ho CC, Chaiear N. Effect of latex purification and accelerator types on rubber allergens prevalent in sulphur prevulcanized natural rubber latex: potential application for allergy-free natural rubber gloves. Polymers. 2022;14(21):4679.
14. Tomy C, Joseph B, Madhukara J. Study of latex glove associated dermatoses among nurses in a tertiary care hospital. Indian Dermatology Online Journal. 2021;12(6):841–6.
15. Patel K, Nixon R. Irritant contact dermatitis—a review. Current dermatology reports. 2022;11(2):41–51.
16. Prakoeswa CRS, Damayanti, Anggraeni S, Umborowati MA, Waskito F, Indrastuti N, et al. Glove-Induced Hand Dermatitis: A Study in Healthcare Workers during COVID-19 Pandemic in Indonesia. Dermatology Research and Practice. 2023;2023(1):6600382.
17. Keng BM, Gan WH, Tam YC, Oh CC. Personal protective equipment-related occupational dermatoses during COVID-19 among health care workers: A worldwide systematic review. JAAD international. 2021;5:85–95.