Original Research

Dermatological Morbidity and Risk Factors Among Garment Industry Workers in Chennai, India

Prabakaran R[1], Sahu M[2], Ningombam JD[3], Banerjee SB[4]

[1]Associate fellow of Industrial Health student, All India Institute of Hygiene and Public Health (AIIH&PH), Kolkata, [2]Associate Professor and Head, [3]Assistant Professor, Department of Occupational Health, AIIH&PH, Kolkata, [4]Assistant Professor, Department of Occupational Health, AIIH&PH, Kolkata.

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Abstract

Background: The garment industry, a significant economic sector in Chennai, India, presents notable occupational health risks, particularly dermatological morbidity (DM) due to exposure to chemicals and materials. The aim of this study was to assess the prevalence of DM among garment workers and identify socio-demographic, behavioural, occupational, and environmental factors associated with it.

Methods: A cross-sectional observational study was conducted at Celebrity Fashions Limited, Chennai, from August to November 2024. A total of 100 workers were included, involved in tasks such as dyeing, sewing, ironing, and packaging. Data were collected on socio-demographics, hygiene practices, job nature, exposure to chemicals, and environmental conditions. Dermatological symptoms were examined, and data were analysed using descriptive statistics and chi-square tests. A p-value of <0.05 was considered statistically significant.

Results: Among the participants, 46% reported at least one dermatological symptom, including itching (66%), rashes (67%), redness (54%), and blisters (46%). Significant associations with DM were found for educational level (p=0.001), handwashing frequency (p=0.002), job nature (p=0.000), exposure to harsh chemicals (p=0.000), frequency of leaves taken (p=0.000), high temperature exposure (p=0.000), and dust exposure (p=0.003). This emphasizes the need for improved workplace safety, hygiene practices, and protective measures to reduce dermatological morbidity among workers.

Conclusion: The study highlights a significant burden of dermatological morbidity among garment workers, linked to specific occupational and environmental factors. Improved hygiene practices, protective measures, and better handling of chemicals are essential for mitigating DM. The findings suggest the need for targeted interventions to enhance occupational health in the garment industry.

Key words: Garment, Dermatological, Occupational, Environment

Corresponding Author: Joenna Devi Ningombam, Assistant Professor, Department of Occupational Health, AIIH & PH, Kolkata.

E-mail: ningjoenna@gmail.com

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Introduction

The garment industry plays a crucial role in the global economy, employing millions of workers, including a substantial workforce in Chennai, India.[1,2] However, the industry presents significant occupational health challenges, particularly dermatological morbidity (DM). This encompasses a spectrum of skin conditions, ranging from irritation, redness, and itching to severe cases of blistering, often caused by exposure to various chemicals, dyes, and materials used in garment production. The nature of this exposure makes garment workers highly susceptible to skin-related health issues.[3-5]

Workers in garment manufacturing encounter a diverse array of substances, including textiles, leather, adhesives, and chemicals. Many of these, such as potassium dichromate, disperse dyes, and metals like nickel, cobalt, and chrome, are known irritants or allergens, capable of causing contact dermatitis and other skin disorders. Additionally, finishing agents like colophony and epoxy resins, commonly used for waterproofing and polishing, further heighten the risk of dermatological issues. Inadequate protective measures, such as the lack of gloves, goggles, or protective clothing, exacerbate this risk, leaving workers vulnerable to skin damage and allergic reactions.[6-10]

Beyond physical discomfort, dermatological conditions can cause substantial psychological distress. Persistent itching and visible skin damage often lead to anxiety, depression, and reduced quality of life. This psychological burden compounds the physical symptoms, creating a cycle of distress that significantly impacts workers' well-being and productivity. Social stigma, lowered self-esteem, and reduced workplace efficiency further highlight the multifaceted impact of dermatological issues.[11]

One effective tool for mitigating such risks is the Material Safety Data Sheet (MSDS), which provides essential information about chemicals used in production, including their hazards, safe handling practices, and recommended protective measures. Proper utilization of MSDS can help workers take necessary precautions, such as wearing appropriate protective gear or using ventilation systems. For instance, the MSDS for potassium dichromate and epoxy resins emphasizes protective measures to prevent skin irritation and contact dermatitis. Unfortunately, the use of MSDS in garment factories, especially in developing regions, remains inconsistent, leaving workers exposed to preventable health risks.[12]

Current protective measures in many factories are often insufficient or inconsistently applied, resulting in chronic skin conditions, reduced productivity, and increased absenteeism. Globally, dermatological conditions such as scabies and pyoderma are prevalent in low-income populations, affecting millions, and are often preventable with appropriate interventions. However, workers in industries like garment manufacturing remain disproportionately affected due to their constant exposure to harmful chemicals.[13-18]Research into the prevalence and causes of dermatological morbidity among garment workers in Chennai is limited, creating a significant gap in understanding and addressing these occupational health risks. Hence this study was undertaken with the objectives to assess the burden of dermatological morbidity among garment industry workers in Chennai and to find out socio-demographic, behavioral, occupational, and environmental factors associated with Dermatological morbidity.

Methods

This cross-sectional observational study investigates dermatological morbidity (DM) among garment industry workers at Celebrity Fashions Limited, Chennai, from August to November 2024. The sample size was calculated using: $n = (Z^2 * P * (1 - P)) / d^2$. Assuming a 95% confidence level ($Z = 1.96$), an estimated prevalence (P) of 50%, and a margin of error (d) of 10%, the required sample size was approximately 97participants.A sample of 100 workers involved in tasks such as fabric dyeing, polishing, cutting, sewing, printing, and finishing for at least six months were included by simple random sampling. Exclusion criteria include workers on leave or relieving duties or those unwilling to participate.

Data collected was entered in Ms-Excel and was analysed using SPSS Vs 21. Descriptive statistics was expressed in percentages or proportions and analytical statistics like chi-square test was used to test the association with variables of interest. A p-value of <0.05% was taken as statistically significant.

Ethical approval for the study was obtained from the Institutional Ethics Committee of the All India Institute of Hygiene and Public Health (AIIH&PH), Kolkata, prior to its commencement IEC no. IEC/2024(3)/132, dated 01st October 2024. Additionally, written informed consent was secured from both the industry authority and the study participants before initiating the research.

Results

The study population consisted of garment industry workers, with the majority (46.0%) aged 26-35 years, followed by 34.0% aged 36-45 years, and 20.0% aged 46-55 years. Female participants accounted for 67.0% of the sample. Regarding marital status, 67.0% were married, and 33.0% were single. Educational attainment varied, with 67.0% having a diploma or graduate education, 19.0% completing higher secondary, and 7.0% each having secondary education or no formal education. Most participants were Hindu (73.0%), followed by Muslims (14.0%) and Christians (6.0%). Additionally, 79.0% of workers came from nuclear families, while 21.0% belonged to joint families. (Table 1)

Table 1: Distribution of socio demographic details of the study participants of garment industry (N=100)

Variables	Category	Frequency	Percent (%)
Age	26-35	46	46.0
	36-45	34	34.0
	46-55	20	20.0
Gender	Male	33	33.0
	Female	67	67.0
Marital status	Single	33	33.0
	Married	67	67.0
Education level	No formal education	7	7.0
	Secondary	7	7.0
	Higher secondary	19	19.0
	Diploma/Graduate	67	67.0
Religion	Hindu	73	73.0
	Muslim	14	14.0
	Christian	6	6.0
Type of family	Nuclear	79	79.0
	Joint	21	21.0

The behavioural characteristics of the garment industry workers revealed that 26.0% washed their hands rarely, while 39.0% did so occasionally, and 35.0% practiced frequent hand washing. Regarding hygiene practices, 20.0% reported wearing the same work clothes for multiple days without washing, whereas 80.0% adhered to the habit of wearing clean work clothes daily. (Table 2)

Table 2: Distribution of Behavioral characteristics of the study participants of garment industry (N=100)

Behavioural Characters	Category	Frequency	Percent (%)
Hand washing	Rarely	26	26.0
	Occasionally	39	39.0
	Frequently	35	35.0
Wearing the same work clothes for multiple days without washing	Yes	20	20.0
	No	80	80.0

The occupational characteristics of the garment industry workers highlighted varied levels of experience, with 7.0% having less than one year, 53.0% between 1–5 years, and 40.0% with 6–10 years in the industry. Job roles were diverse, including dyeing (19.0%), sewing (26.0%), ironing (14.0%), quality control (7.0%), and packaging (34.0%). Most workers (86.0%) worked 6–8 hours daily, while 14.0% worked 8–10 hours. A majority (80.0%) reported using personal protective equipment (PPE). Exposure to harsh chemicals or dyes was noted in 87.0% of the workers, with 13.0% reporting no such exposure. Work performance impact was categorized as minor for 46.0% and moderate for 54.0%. Regarding leave frequency, 27.0% never took leaves, 33.0% rarely took leaves, and 40.0% took them occasionally. (Table 3)

Table 3: Distribution of Occupational characteristics of the study participants of garment industry (N=100)

Occupational Characteristics	Category	Frequency	Percent (%)
Work Experience in the industry	< 1 Year	7	7.0
	1 – 5 Years	53	53.0
	6 – 10 Years	40	40.0
Nature of Job	Dyeing	19	19.0
	Sewing	26	26.0
	Ironing	14	14.0
	Quality Control	7	7.0
	Packaging	34	34.0
Working hours per day	6-8 hours	86	86.0
	8-10 hours	14	14.0
Use of PPE	Yes	80	80.0
	No	20	20.0
Use of Harsh chemicals or dyes	Yes	87	87.0
	No	13	13.0
Impact of work performance	Minor	46	46.0
	Moderate	54	54.0
Frequency of leaves	Never	27	27.0
	Rarely	33	33.0
	Sometimes	40	40.0

The work environment data showed that 27.0% of workers faced poor ventilation, while another 27.0% reported high temperatures in their workplace. Around 13.0% were exposed to high humidity, and dust exposure was limited to 7.0% of workers. On the other hand, chemical exposure was more common, affecting 66.0% of workers. (Table 4)

Table 4: Distribution of Environmental characteristics of the study participants of garment industry (N=100)

Work Environment	Category	Frequency	Percent (%)
Poor Ventilation	Yes	27	27.0
	No	73	73.0
High Temperature	Yes	27	27.0
	No	73	73.0
High Humidity	Yes	13	13.0
	No	87	87.0
Dust Exposure	Yes	7	7.0
	No	93	93.0
Chemical Exposure	Yes	66	66.0
	No	34	34.0

Among the study participants 46% of individuals reported experiencing at least one form of skin-related symptoms or clinical features on examination. (Figure 1)

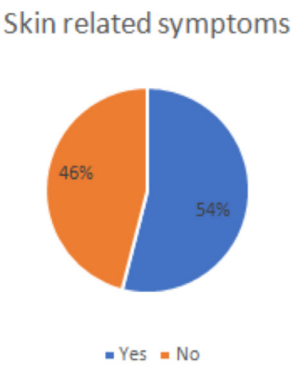

Figure 1. Distribution of study participants according to presence of any skin related symptoms after work (N=100)

The findings on symptoms indicate that 7% of individuals experience them daily, 14% on a weekly basis, 19% occasionally, and a significant 60% rarely. When looking at specific skin-related issues, 66% reported itching, 67% experienced rashes, and 54% had redness. Additionally, 42% reported having dry or cracked skin, while 46% faced blisters. (Table 5)

Table 5: Distribution of the study participants according to the clinical feature of dermatological morbidity (N=100)

Symptoms	Yes/No	Frequency (n)	Percent (%)
Perceived Frequency	Daily	7	7.0
	Weekly	14	14.0
	Occasionally	19	19.0
	Rarely	60	60.0
Itching	Yes	66	66.0
	No	34	34.0
Rashes	Yes	67	67.0
	No	33	33.0
Redness	Yes	54	54.0
	No	46	46.0
Dry or Cracked Skin	Yes	42	42.0
	No	58	58.0
Blister	Yes	46	46.0
	No	54	54.0

The analysis of various factors related to dermatological morbidity reveals significant associations with several variables. Non-significant factors included age, gender, working hours per day and environmental factors such as poor ventilation and high humidity which did not show a notable association with skin issues. However, significant factors included educational level (p=0.001), where those with up to a higher secondary education had a higher prevalence of dermatological morbidity. Handwashing frequency (p=0.002) was also significant, with workers who washed their hands less frequently experiencing more skin problems. Job nature (p=0.000) had a strong impact, with those in dyeing and ironing roles having the highest morbidity rates. Exposure to harsh chemicals or dyes (p=0.000) and the frequency of leaves taken (p=0.000) were also significant, with workers exposed to chemicals or who took more leaves due to skin issues showing higher morbidity. Additionally, high temperature exposure (p=0.000) and dust exposure (p=0.003) were significantly linked to dermatological symptoms, highlighting the role of environmental factors in worker health. (Table 6)

Table. 6: Association between the dermatological morbidity of the study participants in a garment industry with socio demographic, behavioural, occupational, environmental characteristics (N=100)

Variables	Categories	Dermatological morbidity		p- value
		Present	Absent	
Age	26-35	28 (60.9%)	18 (39.1%)	.072
	36-45	13 (38.2%)	21 (61.8%)	
	46-55	13 (65.0%)	7 (35.0%)	
Gender	Male	14 (42.4%)	19 (57.6%)	.103
	Female	40 (59.7%)	27 (40.3%)	

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Educational level	Up to higher secondary	19 (57.5%)	14 (42.5%)	.001
	Graduate and above	35 (52.2%)	32 (47.8%)	
How often wash your hands while at work	Rarely	20(76.9%)	6 (23.1%)	.002
	Occasionally	13(33.3%)	26(66.7%)	
	Frequently	21(60.0%)	14(40.0%)	
Nature of the job	Dyeing	19(100%)	0 (0%)	.000
	Sewing	14(53.8%)	12(46.2%)	
	Ironing	14 (100%)	0 (0%)	
	Quality control	0 (0%)	7 (100%)	
	Packaging	7 (20.6%)	27(79.4%)	
Working hours per day	6-8 hours	47(54.7%)	39(45.3%)	.746
	8-10 hours	7 (50%)	7 (50%)	
Handling of harsh chemical or dyes	Yes	54(62.1%)	33(37.9%)	.000
	No	0 (0%)	13(100%)	
Frequency of leaves taken	Never	7 (25.9%)	20(74.1%)	.000
	Rarely	7(21.2%)	26(78.8%)	
	Sometimes	40 (100%)	0 (0%)	
Poor ventilation	Yes	20(74.1%)	7(25.9%)	.475
	No	34(46.6%)	39(53.4%)	
High temperature	Yes	7 (25.9%)	20 (74.1%)	.000
	No	47(64.4%)	26 (35.6%)	
High humidity	Yes	7 (53.8%)	6 (46.2%)	.990
	No	47 (54%)	40 (46%)	
Dust Exposure	Yes	7 (100%)	0 (0%)	.003
	No	47(50.5%)	46 (49.5%)	

Discussion

In our study, 54% of study participants experienced skin symptoms after work. Comparable results were found in a study by Paste V et al[15], which reported a prevalence of 51.7% among polyester dyeing and printing workers in Mumbai. Similarly, a study by Mobolaji et al[16]. among garment workers in Bangladesh found a higher prevalence of 73%, with itching, skin rashes, and irritation being the most commonly reported symptoms. Regional differences in the types of chemicals and dyes used might have contributed to the increased prevalence.

The most frequently reported symptoms in this study were rashes (67%), itching (66%), redness (54%), dry or cracked skin (42%), and blisters (46%). A study conducted in Singhi Mk et al[17] in a dye unit found that 24.4% of workers experienced itching, and 35.6% reported a burning sensation. Another study in Isarael[18] noted that 30% of textile workers experienced a burning sensation in their hands. These symptoms can likely be attributed to allergic reactions caused by the chemicals and dyes handled by workers, often without protective gloves. A significant association between the exposure to harsh chemicals or dyes with dermatological morbidity is seen in this study. Previous research has also indicated that disperse blue dyes are among the most potent skin-sensitizing agents, leading to contact dermatitis.[19.20,21]

In our study, 27% of workers reported poor ventilation, while another 27% experienced high temperatures in their workplace. Approximately 13% were exposed to high humidity, and 7% faced dust exposure. Similar findings were reported in a study by Padmini DS et al[22], which assessed physical and environmental hazards in garment industries in Tirupur.

In our study, 35% of workers reported frequent handwashing practices and significantly lower

dermatological morbidities with frequent handwash was reported. A previous study by Paramasivam P et al.[23] in Tamil Nadu found that 35% of workers used bleaching powder to remove stubborn dye stains from their hands. An earlier study by Yawalkar N et al[24] noted that bleaching powder and ammonium persulfate could trigger occupational dermatitis through an immunologic mechanism involving T cells. Additionally, 80% of workers in our study stated they used personal protective equipment (PPE) regularly, particularly hand gloves. Similar findings were reported in a study by Acharya et al in Nepal.[25]However, proper technique of use of PPE and usage duration must be ensured. Studies by Paste V et al.[15] and Parimalam P et al[26] reported lower PPE usage, which may be due to improved health education in recent years.

This study highlights the impact of dermatological morbidity on work performance and a significant increase in the number of sickness leaves taken by workers. Similar findings were reported in a study by Yuan D et al.[27]

The study found that workers involved in dyeing and ironing jobs had a higher incidence of dermatological morbidity. A similar observation was made in a study by Paste et al[15], which also highlighted the association between the dyeing process and the duration of exposure with skin symptoms. Prolonged exposure increases cumulative contact with harmful substances and triggers a sensitization process, resulting in allergic dermatitis. Additionally, the use of various reactive dyes in the dyeing process is known to negatively impact skin health.

The limitations of this study include the lack of thorough testing, such as patch testing, to identify the allergenicity of particular chemicals. Furthermore, the cross-sectional nature of the study restricts the ability to assess causal relationships. The use of self-reported measures may lead to reporting bias. The generalizability of the findings may also be constrained due to the study's focus on garment workers at a single facility in Chennai.

Conclusion

The study reveals a significant prevalence of more than half of the study participants in a garment industry with dermatological morbidity in Chennai. Key factors such as job nature, exposure to chemicals, and handwashing frequency were significantly associated with dermatological issues. These findings showed the importance of improved protective measures, hygiene practices, and better work environments to reduce the incidence of skin conditions and enhance worker health and productivity.

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