

Original article

An analysis on the relationship between safety measures and dermatological complaints among printing industry workers in Bangladesh

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Abstract

Background: Work-related skin diseases occupy approximately 50 percent of total occupational illnesses and are responsible for an estimated 25 percent of all lost workdays globally in many industries including printing industries. This study aimed to reveal the characteristics of dermatological problems and safety measures among printing workers in Bangladesh. **Materials and methods:** A cross-sectional study was conducted among 196 conveniently sampled printing workers from 51 factories in September 2018. Data were collected by face-to-face interviews using a semi-structured questionnaire. A logistic regression model was applied to estimate the risk factors for dermatological problems. **Results:** Among 196 respondents 74.0% experienced dermatological problems after joining a printing job. Only 30.1% of respondents were found using personal protective equipment (PPE). No use of PPE, barrier cream, hand washing more than 4 times a day, and duty in the printing process had a significant association with skin problems ($P < 0.001$). In the printing process, the workers who handled papers, chemicals, and machines and were involved in cleaning machinery had a higher prevalence of dermatological problems. Logistic regression analysis showed a significant association of skin problems among printing workers in Bangladesh with male (OR 0.23; 95% CI 0.06–0.98), higher monthly salaries (OR 17.98; 95% CI 3.14–103.08) and shorter daily work hours (OR 0.01; 95% CI 0.01–0.56). **Conclusion:** This study revealed a high prevalence of dermatological problems among printing workers in Bangladesh. PPE usage, avoiding excessive hand washing, and hand cream would be helpful in avoiding dermatological problems among printing workers in Bangladesh.

Keywords: Dermatological problem, printing worker, safety measure.

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Introduction

Occupational health problems are collecting more concerns as many workers are suffering and they are related to safety and productivity. Dermatological problem is one of the major occupational health problems, and almost half of all reported occupational diseases included dermatological problems.^{1,2}

Workers involved in a wide range of industries including manufacturing, food processing, building and road construction, machine tool processing, printing and metal plating, tanning process, ship breaking and engine works have been reported to be in higher risks for developing dermatological diseases.^{3,4} The major occupational dermatitis are allergic contact dermatitis and irritant contact dermatitis due to the direct contact with some

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organic and inorganic compounds. In addition to those, workers suffer from a variety of dermatologic problems including ulceration, perforation and cancer.^{3,5-9}

Several counter measures are taken in different industry to protect the workers from dermatological problems. Identification, elimination, modification and alternation of harmful irritants and allergens by alternative engineering method could be effective to reduce dermatological problems in printing workers. Moreover, safety measures like pre-employment screening, distribution of works with higher risks among all workers by turn, taking personal protective measures are also reported to be effective to reduce occupational dermatological problems for workers of many industries. Hand gloves of right type and size are widely accepted for protection from occupational dermatitis.^{10,11}

The printing industry in Bangladesh has the potential to become the second biggest earning sector of foreign currency. Bangladesh plays a substantial economic involvement to be the top in this industry due to low labor cost.¹² Since legislative measures are inadequate to protect the health of the workers, alternative engineering control to reduce dermatological problems in printing workers is very difficult for a developing country like Bangladesh. In these circumstances protective measures including personal protective equipment and safe occupational practices in printing industries would play an important role in minimizing dermatological problems in workers of printing industry.¹³ Although the success of those protective measures depends on awareness on health protection among employees and employers of any industry, practicing safety measures significantly lower the occurrence of occupational dermatological problems.¹⁴

The purpose of this study was to reveal the characteristics of dermatological problems and safety measures among printing workers in Bangladesh. As little information on these could be obtained, we need to shed lights on the neglected issues and develop better control over dermatological problems in printing industry of Bangladesh.

Material and Methods

Study subjects

Workers working in the printing factories, locally called as "printing press" at the printing hub of "Arambagh and Fakirapul" area in the capital city Dhaka of Bangladesh.

In this area, on September 2018 the study was carried out among workers in printing factories of different sizes. On the basis of duty types, workers were categorized into two groups, printing and post printing. Printing included handling of paper with printing machine, handling of chemicals for printing and cleaning. On the other hand post printing included cutting of printed papers, binding papers, and other types of works. Convenience sampling method was applied. Workers from 18 to 60 years of age and had a minimum of one year job experience in printing sector were included.

Data collection

An interviewer administered semi structured questionnaire prepared in Bengali. The data were collected by face to face interview with the respondents who gave informed consent. Five interviewers were hired on payment and trained well about the questionnaire.

Statistical analysis

Data were analyzed using the Statistical Package for Social Science (SPSS) software version 16 (SPSS Inc.). A chi-square test was performed to examine the associations of skin problems with usage of PPE and barrier cream, hand wash and type of duty. Logistic regression model was applied to estimate the crude and adjusted odds ratios (COR and AOR) and 95% confidence interval (CI). A P-value of less than 0.05 was considered as statistically significant.

Ethical consideration

Ethical approval was obtained from the Planning & Research Wing of Directorate General, Health Services (DGHS) of Ministry of Health and Family Welfare, Bangladesh (Memo No: DGHS/PMR/MISC/2013/981, Date: 20/09/2018). After obtaining the permission to conduct the study from Printing Industry, Owners Association and the person responsible for each factory, the aim of the study and the contents of questionnaires were explained to the workers in printing industry. The data were collected anonymously throughout the study.

Results

In total, 196 workers from 51 factories of printing industry completed the questionnaires and were included in the analysis. The age of the respondents ranged from 21 to 55 years old with a median (inter quartile range) value of 27.0 (24.0–33.0).

Table No. 1: Socio-demographic characteristics of the respondents (n=196)

Characteristics	Printing work a) (n=118)		Post printing workb) (n=78)		Total (n=196)	
	n	%	n	%	n	%
Age (years)						
≤ 27	74	62.7	28	35.9	102	52.1
> 27	44	37.3	50	64.1	94	47.9
Gender						
Male	113	95.8	72	92.3	185	94.4
Female	5	4.2	6	7.7	11	5.6
Marital status						
Married	59	50.0	69	88.5	128	65.3
Unmarried	59	50.0	9	11.5	68	34.7
Education						
Primary	40	33.9	40	51.3	80	40.8
Secondary	38	32.2	20	25.6	58	29.6
Higher	40	33.9	18	23.1	58	29.6
Monthly salary (BDT^c)						
≤ 12,000	55	46.6	39	50.0	94	48.0
> 12,000	63	53.4	39	50.0	102	52.0
Daily work hours						
≤ 8	108	91.5	19	24.4	127	64.8
> 8	10	8.5	59	75.6	69	35.2
Job period in printing industry (years)						
< 6	62	52.5	22	28.2	84	42.8
≥ 6	56	47.5	56	71.8	112	57.2
Family earning persond)						
One	79	66.9	25	32.1	104	53.1
Two	39	33.1	53	67.9	92	46.9
Religion						
Muslim	115	97.5	71	91.0	186	94.9
Hindu	3	2.5	7	9.0	10	5.1

a) Handling of paper with printing machine, handling of chemicals for printing and cleaning

b) Cutting of printed papers, binding, other paper works, and other types of works

c) Bangladesh Taka (1 USD = 84.4 BDT) on 15th April, 2019.

d) The number of family members who earns.

Table 1 shows the socio-demographic characteristics of 196 respondents who were divided into two different working groups. Among them 60.2% (n=118) and 39.8% (n=78) were involved in printing works and post

printing works, respectively. Among the respondents 52.1% were 27 years old or younger, and 94.4% of the workers were male. Most of the respondents (40.8%) had primary education and the remaining had secondary or higher education with the same percentage (29.6% each). Monthly salary of 48.0% was 12,000 or less than 12,000 Bangladesh Taka (BDT), while 52.0% had more than 12,000 BDT. Of the respondents, 64.8% worked for ≤ 8 hours per day and the group with ≥ 6 years of job period were the highest (57.2%). Muslims (94.9%) were the majority in religion. The workers engaged in the post printing works were younger, had less proportion of males and less daily work hour than those in printing works.

TableNo. 2: Characteristics of the respondents related to job and skin problems (n=196)

Characteristics	Printing work a) (n=118)		Post printing workb) (n=78)		Total (n=196)	
	n	%	n	%	n	%
Experienced skin problems after joining job						
Yes	117	99.2	28	35.9	145	74.0
No	1	0.8	50	64.1	51	26.0
Types of skin problems						
Dermatitis	49	41.5	0	0.0	49	25.0
Itching	68	57.6	19	24.4	87	44.4
Fungal Infection	0	0.0	9	11.5	9	4.6
No problem	1	0.9	50	64.1	51	26.0
Any treatment received for skin problems						
Yes	117	99.2	28	35.9	145	74.0
No	1	0.8	50	64.1	51	26.0
Family history of skin problems						
Yes	77	65.3	18	23.1	95	48.5
No	41	34.7	60	76.9	101	51.5
Use of PPE^c)						
Yes	11	9.3	48	61.5	59	30.1
No	107	90.7	30	38.5	137	69.9
Use of barrier cream						
Yes	11	9.3	48	61.5	40	20.4
No	107	90.7	30	38.5	156	79.6
Hand wash (per day)						
< 4	9	7.6	50	64.1	59	30.1
≥ 4	109	92.4	28	35.9	137	69.9

a) Handling of paper with printing machine, handling of chemicals for printing and cleaning

b) Cutting of printed papers, binding and other paper works, and other types of works

c) Personal protective equipment

Table 2 demonstrates the characteristics of the respondents related to job, skin problems and safety measures. It showed that 45 (74.0%) out of 196 respondents experienced skin problems and 51 (26.0%) were free from skin problems after joining printing job. Regarding types of skin problems, 25.0% reported to have dermatitis, 44.4% had itching, and 4.6% had fungal infection. All respondents (n=145) with skin problems received treatment for that. About one third (30.1%) used personal protective equipment (PPE) but majority (69.9%) did not use that. Barrier cream was used by 20.4% of the respondents while 79.6% did not use it. Habit of daily bathing was found among 95.4% respondents. Of the respondents 69.9% washed their hands ≥ 4 times per day compared to remaining 30.1% who washed less than 4 times per day.

Table No. 3: Associations of skin problems with PPE, barrier cream, hand wash and type of duty in printing industry, Bangladesh (n=196)

Variables	Skin problems				P-value ^{b)}
	Yes ^{a)} (n=145)		No (n=51)		
	n	%	n	%	
Use of PPE					
Yes	10	6.9	49	96.1	<0.001
No	135	93.1	2	3.9	
Use of barrier cream					
Yes	40	27.6	0	0.0	<0.001
No	105	72.4	51	100	
Hand wash (per day)					
<4 times	19	13.1	40	78.4	<0.001
≥ 4 times	126	86.9	11	21.6	
Types of duty					
Printing	117	80.7	1	1.9	<0.001
Post printing	28	19.3	50	98.1	

a) All types of skin problems (allergy, itching and ring worm)

b) Chi-square test

Table 3 shows the associations of skin problems in printing industry with usage of PPE, frequency of hand wash, usage of barrier cream, and type of duty. Among the respondents 137 did not use PPE. Out of them 135 experienced skin problems and only 2 respondents were free from that. Respondents who washed their hands 4 times or more than 4 times a day had significantly higher rate of skin problems than those did less than 4 times a day. On the other hand, all respondents who used barrier cream had skin problems. The respondents who were engaged in printing process experienced significantly higher rate of skin problems than those in duty of post-printing process.

Table 4: Odds ratio (OR) and 95% confidence interval (CI) of skin problem in printing industry, Bangladesh (n= 196)

Characteristics	Skin problems		Unadjusted OR (95% CI)	Adjusted ^{b)} OR (95% CI)
	Yes ^{a)} (n=145)	No (n=51)		
Age (years)				
≤ 27	86	16	1 (Reference)	1 (Reference)
>27	59	35	0.31 (0.16–0.62)**	0.53 (0.20–1.40)
Gender				
Male	139	46	1 (Reference)	1 (Reference)
Female	6	5	0.39 (0.12–1.36)	0.23 (0.06–0.98)*
Education				
Primary	49	31	1 (Reference)	1 (Reference)
Secondary	48	10	3.04 (1.34–6.87)**	0.98 (0.31–3.87)
Higher	48	10	3.04 (1.34–6.87)**	0.60 (0.16–2.17)
Monthly salary (BDT⁹⁾)				
<12,000	64	30	1 (Reference)	1 (Reference)
$\geq 12,000$	81	21	1.81 (0.95–3.45)	17.98 (3.14–103.08)**
Length of daily work (hours)				
≤ 8	116	11	1 (Reference)	1 (Reference)
>8	29	40	0.07 (0.03–0.15)***	0.01 (0.01–0.56)***
Job period in the printing industry (years)				
<6	69	15	1 (Reference)	1 (Reference)
≥ 6	76	36	1.18 (0.72–1.93)	2.84 (0.57–14.23)

* P<0.05, ** P<0.01, *** P<0.001; OR, odds ratio; CI, confidence interval.

a) All types of skin problems (allergy, itching and ringworm)

b) Adjusted by age, gender, education, monthly salary, daily work hours, and job period in the printing industry

c) Bangladesh TAKA

Table 4 evaluates the associations of skin problems and the characteristics of respondents. The unadjusted analysis showed that lower age, higher education status, and shorter daily work hours had a significant association with skin problems in the printing industry. However, there were significant differences after full adjustment such as males, higher monthly salary ($\geq 12,000$), and shorter daily work (≤ 8 hours) were the risk factors for skin problems.

Discussion

This study revealed the characteristics of dermatological problems, personal safety measures and the risk factors for the dermatological problems among printing industry workers in Bangladesh. Most of the respondents (74.0%) experienced skin problems after joining job in the printing industry. This finding is inconsistent with previously conducted studies such that percentage of occurrence of skin problems came higher than other studies in the United Kingdom (41%), Ghana (58.5%), and Thailand (57.8%).¹⁵⁻¹⁷ This difference occurred due to the questionnaire because respondents of this study were not asked whether they had skin problems or not at the moment of taking the interview while they were asked about getting skin problems after joining the job. The median of their job period was 6 years which was long enough for the respondents to be susceptible to skin problems. Among workers 44% of them had itching and 25% had an dermatitis to skin. Nine percent had experience of suffering from fungal infection. This study collected data on dermatological problems by self-report of participants. That is why instead of dermatological problems it was said dermatological complaints or skin problems. The dermatitis might be consistent with contact dermatitis or hives. Itching could be categorized into two aetiologies contact dermatitis and dry dermatitis. These findings are correlated to previous studies where dermatitis was assessed by medical doctors who reported contact dermatitis as an occupational dermatological problem.¹⁵ This study indicated that skin problems among respondents were interconnected to fewer work hours (≤ 8 hours) per day and less duration of job (< 6 years). A previous study conducted in Thailand revealed converse results.¹⁷ There were two major variables related to the reduction of skin problems such as usage of PPE and usage of barrier cream during work. About one-third (30.1%) of the respondents in this study used PPE on regular basis. Only 20.4% of the respondents used barrier cream that is essential to use in printing related works. It was found that respondents who did not use PPE and barrier cream, they considered those as interference in work and cause of discomfort. Percentage of usage of PPE by respondents in this study showed similar results to non-medical workers at another study conducted in Myanmar,¹⁸ which supports our findings. Our findings demonstrated that workers who did not use PPE but used barrier cream had more skin problems. And more workers who washed their hands 4 times or more than 4 times a day and engaged in printing works had more skin problems. PPE usage is considered to have protective role among workers in many industries. However, usage of hand glove for protection from dermatitis is controversial. Although hand gloves are considered as barriers to separate skin from chemical compounds, dermatitis can occur by contact with the materials of gloves. Usage of PPE, specially hand gloves came as an effective intervention for protecting dermatological problems in this study and

other studies abroad.^{11,13,17} Despite that effectiveness of intervention, new approaches needed to be found for prevention of dermatological problems.¹⁹

There were significant associations between skin problems and the respondents who were engaged in wet works and frequent hand washing with soap or detergent. The dermatological problems according to our findings which is in turn backed by similar studies conducted in different countries of Europe and Asia.^{11,13,20,21}

It was revealed that respondents involved in printing works were more vulnerable to have dermatological problems than those involved in post printing works. This finding is supported by the results of similar studies conducted in the United Kingdom and North America.^{15,22}

There were several limitations in this study. First, dermatological complaints were self-reported and not validated by physicians. Second, usage of hand gloves was not included as a separate question in the questionnaire. Third, the number of times the respondents experienced dermatological problems to calculate incidence rate per year were not collected, so that comparison of the incidence with that in other studies accompanied some difficulties, and response rate was not recorded. Fourth, the causal relations between skin problems and the protection was not clear, because timing between them was not justified. Lastly, as this study did not include all printing industry workers in Bangladesh, it may not reflect dermatological problems among all printing industry workers in the country.

Our findings in this study may help the related authorities to get a snapshot of the situation of dermatological problems and safety measures among printing workers in Dhaka city. Further studies are required to identify effective interventions to reduce dermatological problems among printing workers.

Conclusion

This study revealed a high prevalence of dermatological problems among printing workers in Bangladesh. Washing hands more frequently and working in the printing process had significant associations with dermatological problems. Gender, monthly salary, and length of daily work hours were revealed as risk factors for dermatological problems. Regular PPE users had less prevalence of dermatological problems. PPE usage, avoiding excessive hand washing, and hand cream would be helpful in avoiding dermatological problems among printing workers in Bangladesh.

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Conflict of interest

The authors declare no conflict of interest.

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