

Awareness and safety practices regarding occupational hazards of dyestuff industrial workers of Vatva industries, Ahmedabad

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ABSTRACT

Background: Dyestuff industries have growing market in India. India's dye industry produces every type of dyes and pigments and production of dyestuff and pigments in India is close to 80,000 tones. **Objectives:** (1) To assess the health and sociodemographic profile of workers, (2) to give an overview on occupational hazards and personal protective equipment (PPE), and (3) to assess the knowledge and practices of workers after educational intervention. **Materials and Methods:** An educational interventional study was conducted among dyestuff industrial workers of Vatva industries, Ahmedabad, during January to April 2015. Pretested Performa was used for the study after informed consent of workers. **Results:** Out of 142 industrial workers of dyestuff industries, 118 (83.1%) were male. Mean age of workers was 29.9 ± 8.5 . Mean duration of working hour of workers was 9.1 ± 2.2 . The majority of the workers have habits of Pan-Masala (96, 67.6%). Mean of working years in dyestuff industries of workers was 6.8 ± 3.9 . Most of the workers (78, 54.9%) were suffered from malaria in the last 6 months. A significant difference was found between pre- and post-test score of knowledge and practices of workers ($P < 0.0001$). **Conclusion:** Overall, pre-test score was 42.3 and post-test score was 65.1. There was a significant difference between pre- and post-test score ($P < 0.0001$) of awareness regarding different occupational hazards and personal hygienic and utilization practices of PPE.


KEY WORDS: Industrial Workers; Knowledge; Personal Protective Equipment; Practice

INTRODUCTION

India's dye industry produces every type of dyes and pigments. The production of dyestuff and pigments in India is close to 80,000 tones. India is the second largest exporter of dyestuffs and intermediates developing countries, after China.^[1] Dyes are so problematic because the families of chemical compounds that make good dyes are also toxic to humans. Each new synthetic dye developed is a brand new compound, and because it's new, no one knows its risks to humans and the environment. Reactive dyes have good

technical characteristics, but they have been found to cause adverse effects on workers in textile factories and on the environment. The toxicity was not caused only by textile dyes but also by a large number of different textile chemicals. Allergic dermatitis and respiratory diseases are known to be caused by reactive dyes.^[2,3] Contact dermatitis and asthma were also studied by Thoren et al. Other researchers have shown textile industry workers exposed to reactive dyes to have changes in their immunoglobulin levels. Wollin et al. Showed several azodyes to have genotoxicity and have tendency to do mutagenicity.^[4]

The chemicals used to produce dyes today are often highly toxic, carcinogenic (especially bladder/scrotal cancer), or even explosive. The chemical aniline, the basis for a popular group of dyes known as azodyes which are considered deadly poisons^[5] (giving off carcinogenic amines) and dangerous to work with them. They are also highly

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flammable.^[6] The incidence of bladder tumors in workers in the dyestuffs industry was first described by Rehn in 1895 and 1906.^[7] Because clothing comes into prolonged contact with one's skin, toxic chemicals are often absorbed into the skin, especially when one's body is warm, and skin pores have opened to allow perspiration. We also know that some individuals have what is known as chemical sensitivity, including when exposed to garments of many types.^[1,8] Symptoms in adults for chemical sensitivity range from skin rashes, headaches, trouble concentrating, nausea, diarrhea, fatigue, muscle and joint pain, dizziness, difficulty breathing, irregular heartbeat, and/or seizures. Symptoms in children include red cheeks and ears, dark circles under the eyes, hyperactivity, and behavior learning problems.^[9] In addition, other harmful chemicals/ Toxic heavy metals such as chrome, copper, and zinc used in the dying process may be responsible for hormonal disturbances.^[2,5] Hence, the study was conducted for industrial workers with following objectives.

1. To assess the health and sociodemographic profile of workers.
2. To give an overview on occupational hazards and personal protective equipment (PPE).
3. To assess the knowledge and practices of workers after educational intervention.

MATERIALS AND METHODS

An educational interventional study was conducted among dyestuff industrial workers of Vatva industries, Ahmedabad city. Details regarding study and their objectives were discussed among owners of industries and workers. Due permission of owners and informed consent of workers were taken before study. Those who denied for the same were excluded from the study. The study was conducted during January to April 2015. Total 142 workers of 11 dyestuff industries were selected. The samples were taken on the basis of availability and consent of workers. Fully structured Performa, which was specially designed and pre-tested, was used for data collection purpose. The Performa has different components, e.g., Health and sociodemographic profile of workers, knowledge and practices regarding occupational hazards, personal hygiene and PPE, etc. Pre-test was conducted to assess the knowledge and current practices of workers. After the data collection, an interactive session was conducted at each industry. The session was conducted using chalk and talk, posters, charts and photographs, etc. In the session, workers were informed regarding different occupational hazards, personal hygienic practices, types of PPE, utilization, and their benefits. 1 month later post-test was conducted to assess the gain in knowledge and practices of workers. Data entry was conducted and data analysis was performed using appropriate statistical software and applying suitable statistical tests, e.g., Student's test, proportion, mean, standard deviation, etc.

RESULTS

Out of 142 industrial workers of dyestuff industries, 118 (83.1%) were male and 24 (16.9%) were female. Age distribution of workers shows majority (64, 45.1%) of them was belonging to 25-35 years age group, followed by 15-25 years age group (37, 26.1%). Mean age of workers was 29.9 ± 8.5 . Majority of the industrial workers (57, 40.1%) were studied up to primary level followed by higher secondary (35, 24.6%) illiterate workers were 23 (16.2%). Regarding oral and smoking tobacco habits, majority of the workers have habits of Pan-Masala (96, 67.6%) followed by Gutkha (72, 50.7%), Bidi (68, 47.9%), Khaini (63, 44.4%), etc. Majority of the workers (58, 40.8%) were worked for 8-10 h followed by 10-12 h (44, 31%). Mean duration of working hour of workers was 9.1 ± 2.2 . Majority of workers (58, 40.8%) were worked in dyestuff industries since 5-10 years, followed by 1-5 years (45, 31.7%). Mean of working years in dyestuff industries of workers was 6.8 ± 3.9 (Table 1). As per Table 2 results, most of the workers (78, 54.9%) were suffered from malaria in the last 6 months. The proportion of other morbidity data of the last 6 months shows Pneumonia/other respiratory illnesses (56, 39.4%), hypertension (39, 27.5%), skin diseases (38, 26.8%), occupational accidental injuries (37, 26.1%), etc. Most of the workers had taken treatment for morbid condition, e.g., for malaria 64 workers out of 78, for Pneumonia/other respiratory illnesses 44 workers out of 56, for hypertension 32 workers out of 39, for skin diseases 24 workers out of 38, etc., (Table 2). In the study, knowledge and practices of industrial workers were assessed by Student's T test (Paired type). The results of pre- and post-test score were shown in Table 3. Table is divided into 3 components regarding awareness of occupational hazards, personal hygienic practices, and utilization of PPE of industrial workers. Mean pre- and post-test score of awareness of occupational hazards of workers was 41.7 and 69.3, respectively. Mean pre- and post-test score of personal hygienic practices of workers was 60 and 84.5, respectively. Mean pre- and post-test score of utilization of PPE of workers was 31 and 49.3, respectively. Overall, pre-test score was 42.3 and post-test score was 65.1. There was significant difference between pre- and post-test score ($T: 8.09$, $DF: 13$, $P < 0.0001$) regarding different occupational hazards and personal hygienic and utilization practices of PPE of workers (Table 3).

DISCUSSION

In developing country like India, dyestuff industries are growing rapidly and produce numerous types of dyes and pigments.^[1] This study was conducted to assess sociodemographic and health profile of industrial workers and to know their awareness on occupational hazards and practices for PPE. Total 142 workers of 11 dyestuff industries were selected on the basis of availability and consent of workers at the time of study. Out of 142 industrial workers

Table 1: Sociodemographic profile of industrial workers (n=142)

Sociodemographic profile	n (%)
Age distribution	
≤14 year	2 (1.4)
15-25 year	37 (26.1)
25-35 year	64 (45.1)
35-45 year	31 (21.8)
≥45 year	8 (5.6)
Gender distribution	
Male	118 (83.1)
Female	24 (16.9)
Habits of workers*	
Gutkha	72 (50.7)
Pan-masala	96 (67.6)
Khaini	63 (44.4)
Snuffing	19 (13.4)
Bidi	68 (47.9)
Cigarette	33 (23.2)
Alcohol	24 (16.9)
Drugs	5 (3.5)
Education level	
Illiterate	23 (16.2)
Primary	57 (40.1)
Secondary	22 (15.5)
Higher secondary	35 (24.6)
Graduate	5 (3.5)
Working hours per day	
<8 h	32 (22.5)
8-10 h	58 (40.8)
10-12 h	44 (31.0)
>12 h	8 (5.6)
Working in dyestuff factory since	
<01 year	13 (9.2)
1-5 year	45 (31.7)
5-10 year	58 (40.8)
11-15 year	22 (15.5)
>15 year	4 (2.8)

*Multiple answers

of dyestuff industries, predominantly (118, 83.1%) male were found. Age distribution of workers shows majority (64, 45.1%) of them was belonging to 25-35 years age group. Table 1 shows 2 (1.4%) workers were found ≤14 years of age. According to factory act, it is prohibited to work in industries of ≤14 years of age and it is consider as child labor.^[2] Literacy rate according to census 2011 of India was 74.04% and of Gujarat was 79.31%.^[10] The study reveals out of 142 workers 119 (83.8%) were literate. Among literate, majority of workers (57, 40.1%) were studied up to primary level followed by higher secondary (35, 24.6%). Factory

Table 2: Health profile of industrial workers (Morbidity data of last 6 months) (n=142)

Morbidity/Dz.	n (%)	On medication /treatment taken	(%)
Hypertension	39 (27.5)	32	82.1
Diabetes mellitus	24 (16.9)	21	87.5
Heart disease	18 (12.7)	15	83.3
Asthma	33 (23.2)	30	90.9
Cancer (any)	6 (4.2)	4	66.7
Accidental injury (occupational)	37 (26.1)	36	97.3
Pneumonia/other reparatory illnesses	56 (39.4)	44	78.6
Tuberculosis	23 (16.2)	21	91.3
Malaria	78 (54.9)	64	82.1
Ocular Dz.	29 (20.4)	20	69.0
Skin diseases	38 (26.8)	24	63.2

Table 3: Knowledge and practices of industrial workers (n=142)

Particulars (related to dyestuff industries)	n (%)	
	Pre-test score	Post-test score
Awareness on occupational hazards	-	-
Skin diseases (e.g., dermatitis)	62 (43.7)	98 (69.0)
Allergic conditions	27 (19.0)	56 (39.4)
Occupational cancers	35 (24.6)	71 (50.0)
Respiratory illnesses	43 (30.3)	52 (36.6)
Personal hygiene practices	-	-
Hand washing (with soap) before taking meal	63 (44.4)	94 (66.2)
Hand washing (with soap) after going to toilet	77 (54.2)	102 (71.8)
Regular bath after duty hours	52 (36.6)	78 (54.9)
Regular cleaning/changing of clothes after duty hours	48 (33.8)	64 (45.1)
Practices of PPE	-	-
Gloves	79 (55.6)	115 (81.0)
Mask	33 (23.2)	57 (40.1)
Gumboots	17 (12.0)	26 (18.3)
Apron	10 (7.0)	16 (11.3)
Goggles	28 (19.7)	49 (34.5)
Cap	19 (13.4)	33 (23.2)

Paired t-test: -t value: 8.09, DF: 13, P<0.0001. PPE: Personal protective equipment

act law1948 has prescribed a maximum of 48 h/week, not exceeding 09 h/day. Moreover, there should be half an hour rest period after continuous 05 h working period.^[2,3] As per the results, mean duration of working hour of workers was 9.1 ± 2.2. Majority of workers (58, 40.8%) were worked for 8-10 h (Table 1). As per nationwide survey in India, the prevalence of tobacco use in any form among male was

23.2-69.3% and among female was 4.0-50%.^[2] Study reveals, each worker had single or multiple habits of oral/smoking form of tobacco. Majority of workers (58, 40.8%) were worked in dyestuff industries since 5-10 years and mean working years was 6.8 ± 3.9 . Industrialization, socioeconomic development, urbanization, changing lifestyles have placed India at a position where it is facing a growing burden of non-communicable diseases (NCDs) along with existing burden of communicable diseases. In India, NCDs accounted for 40% of all hospital stays and 35% of all outpatient visits in 2004.^[2,10] The current study shows the proportion of communicable and NCDs among workers in the last 6 months (Table 2). More than half of the workers were suffered from malaria in the last 6 months. Environmental hygienic measures inside and surrounding the industrial areas need emphasized. Awareness regarding different occupational hazards and personal hygienic and utilization practices of PPE are essential pre-requisites to control occupational hazards/diseases in future.^[5] In current study, educational intervention session was carried out for improving the knowledge and practices of workers (Table 3). A significant difference was observed in pre- and post-test score ($P < 0.0001$).

CONCLUSION

Out of 142 workers, majority of them were male. Mean age of workers were 29.9 ± 8.5 . Most of the workers were found >14 years of age as per the factory act. Majority of industrial workers were studied up to primary level and few (16.2%) were found illiterate. Mean duration of working hour of workers was 9.1 ± 2.2 . Regarding oral and smoking tobacco habits majority of workers have habits of Pan-Masala followed by Gutkha and Bidi. Mean of working years in dyestuff industries of workers was 6.8 ± 3.9 More than half of the workers were suffered from malaria in the last 6 months. Educational intervention session was carried out for improving knowledge on occupational hazards and personal hygienic and utilization practices of PPE of industrial

workers. Overall, pre-test score was 42.3 and post-test score was 65.1. There was significant difference between pre- and post-test score ($P < 0.0001$).

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