

EFFECT OF CHEMICAL STUFFS USED IN TEXTILE INDUSTRY ON THE EMPLOYEE'S OF SANGANER INDUSTRIAL AREA, JAIPUR

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ABSTRACT

The excessive consumption of water and the very toxic chemicals used by the textile industry are well known for being harmful to both the environment and people. This study's goal is to assess the occupational risks of otolaryngology, dermatitis, and ophthalmological symptoms among textile workers in a textile factory in the Sanganer industrial area of the Jaipur district in order to look into the relationship between the chemicals used and the symptoms that have already been mentioned. A sample of 1000 workers from the Sanganer industrial area's recognized textile industries were evaluated. The study's goal was to create a framework for comprehending the risks to textile workers brought on by lax health and safety regulations in workplaces.

Keywords: *Textile industry, Chemicals, Dyeing and Printings, Human health*

INTRODUCTION

India's textile industry contributes significantly to the nation's economy and employs a sizable portion of the people in both urban and rural areas. It serves as a depository for the nation's cultural legacy and produces around 27% of the country's foreign exchange. By 2017, it is seen that this business has value around US\$ 150 billion in India (Statista, 2018). The increased exploitation of natural resources, particularly water, goes hand in hand with industrial expansion. The production of many different products involves the large use of hazardous chemicals, which poses a severe threat to water quality and has a negative impact on human health by creating a number of infectious and chronic diseases (Omor, 2018). The textile industry is one of the most intricate industrial sectors and uses a staggering number of chemicals—more than 8000—as well as a significant amount of raw water (Baruthio, 1992). The architecture of the dye molecules are lipophilic and have functional groups built on either azo benzene or anthraquinones. As a result, the toxic and non-biodegradable character of these dyes is the cause of a number of diseases that can be transmitted to humans through ingestion, inhalation, or even skin contact. Additionally, exposure to azo textile dyes might have a harmful effect on reproductive factors with variable results (Wong, *et al.*, 2009). Women who work in the textile industry and are exposed to synthetic and natural fibres are at a higher risk of miscarriage (Chen *et al.*, 2017). Due to their complex structure and large molecular weight, azo dyes are not biodegradable. Additionally, due to their electronic deficiencies—which are brought on by the electro-attraction of azo groups—azo dyes are resistant to oxidative catabolism in aerobic environments (Stolz, 1999). As a result of their prolonged exposure to azo dyes, some studies found an increase in lung and nasal malignancies, and others revealed health risks specific to azoic dyes, such as carcinoma of the larynx, lung parenchyma, and paranasal sinuses (Zeng *et al.*, 2013). Insoluble dyes and surfactants have been reported to have some carcinogenic and mutagenic effects (Cao *et al.*, 2018) as well. These last two are well-known carcinogens, and the International Agency for Research on Cancer (IARC) and United States Environmental Protection Agency (USEPA) have both reported bladder cancer from them (Wani *et al.*, 2012).

The purpose of this study is to look into the relationship between exposure to organic solvents and other chemicals used in the textile industry and the likelihood that workers there would develop dermatitis or other ophthalmological symptoms.

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MATERIALS AND METHODS

Area of study is Sanganer Jaipur Rajasthan's, At 26°55'N 75°49'E (26.92°N 75.82°E). In addition to other goods, Jaipur is well known for its textile dyeing business. The location of Jaipur's textile cluster units was chosen as the study area. These Jaipur cluster units take a lot of water to process the dye, and the untreated waste water from these units is then directly drain to the Dravyavati river. A cross-sectional study design was used. A total of 35 apartments in Jaipur city were chosen at random for the investigation. The exposed group consisted of all 1000 of the men who worked in the dyeing units. In the exposed group, those who refused to consent to the study were not included. The questionnaire, a modified version of one from past research (9–10), was as follows:

- a) Personal information includes things like age, gender, length of employment, daily hours worked, marital status, number of children, educational attainment, and medical history.
- b) The second section of the survey was separated into sections for general disease, musculoskeletal disease, respiratory disease, and physical disorders. The experiment's subjects were workers in the target demographic who were between the ages of 20 and 65.

RESULTS

Age group

The data illustrate that the majority (47%) of workers were middle aged (35-50), while one-fourth (26%) were young (35-50 years) and (27%) of the workers belonged to old age (50- 65 years).

Gender

The respondents were asked about their gender and responses are offered in Table 4 which shows that a vast majority (87%) of the respondents were male and only 13% were female workers. This shows that the dye industry prefers male workers rather than female.

Smoking Habit

The workers were asked to tell about the smoking practice and their answers are presented in Table- 1 which specifies that majority (77.6%) of the respondents smoke a cigarette and only (22.4%) of the respondents do not smoke cigarette. Among those who smoke, 91.86 percent reported that they smoke up to 2 cigarettes daily and half of the respondents were smoking 5 cigarettes daily. The respondents who smoke were further asked where they used to smoke, 93.50 percent of them argued that they smoke at their work place and 6.50 percent smokes in Canteen of the industry.

Physical health of the workers

The respondents were asked about their physical fitness and the responses which disclose that about one-fourth (54.29%) of the respondents were suffered from chronic diseases and 30.29 percent were hospitalized.

Disease and their occurrence

The respondents were asked about the regularity of suffering from different diseases from the last six months and the responses are presented in Table 2, 3,4 and 5. The highest prevalence of different physical and ergonomic diseases was found in the workers having the age group of 50-65 years followed by the age group of 36-50 years (Table 2). Back pain was found in 20%, 14.4%, 40.4%, of the workers in the age group of 20-35, 36-50, 51-65 years respectively, during the study period (Table 3). Shortness of breath was found in 28.9%, 27.7%, 38.3%, of the workers in the age group of 20-35, 36-50, 51-65 years respectively. Coughing was found in 8.9%, 7.2%, 29.7%, of the workers in the age group of 20-35, 36-50, 51-65 years respectively (table5).

OHS Measure and Awareness

The respondents were asked about the awareness of occupational health and safety and the responses are presented in the study which shows that majority (56%) of the respondents do not have awareness about occupational health and safety and one-third (32%) of the respondents reported their awareness to great extent. However, only 12 percent of the respondents are aware of occupational health and safety to great extent (Table 4.6).

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About 82.9% of the managers reported that they included the basic concept of OHS protection in the induction courses of new employees. 100% workers reported that they had no vaccination of workers against infectious disease conducted during the last 12 months and no medical checkup was carried out before their recruitment in this industry. A simple majority (57.5%) had no effective inspection system and the same number of the managers had no formal system. More than one-third (37.5%) of managers described that they had adequate numbers of competent personnel to carry out OHS programme.

The same number of managers also had the facilities of the ambulance in case of emergency. All managers reported that their enterprises have the waste treatment plant.

In the survey we observed the possible effect of textile waste water on human health. The people working in these industries suffer from various skin diseases such boils, eczema and contact dermatitis.

The skin develops deep cracks on hand and feet due to long exposure of skin to acids which are used for fastening of colors. The skin becomes yellowish in color and acquires roughness. Sometimes the skin becomes senseless which may retain for months together or may become a permanent feature. Certain chemicals which are used frequently in the dyeing process are reported to have carcinogenic effects. A few cases of bladder cancer have been reported from Sanganer. Some workers of these industries also suffer from hematuria in which blood is seen in urine.

In these industries most toxic effects occur due to acids and alkaline sulphuric acids has great affinity for water and damages the tissue by dehydration, fumes of nitric acid causes serious and even fatal injury to the mucous membrane. Sodium hydroxide is extremely carcinogenic to human tissue. It causes deep burns and ulcer on skin. Eye contact leads to severe scarring of the eye and occasionally blindness severe dermatitis has also been reported.

Table 1: Distribution of the respondents according to their smoking habits and frequency of smoke

Smoking habit	Frequency	%
Yes	387	77.6
No	113	22.4
Total	500	100
If yes than how many cigarettes you take daily?		
Up to two (2)	355	91.86
> 3-5	22	5.7
>6-10	10	2.44
Total	387	100
Where do you smoke at your facility?		
At canteen	361	93.5
At the work place	26	6.5
Total	387	100

Table 2: Occurrence of Physical disorder among workers of textile industry

Complaints	Age (20-35) N= 130 (%)	Ag (36-50yr) N= 235 (%)	Age (51-65 yr) N= 135 (%)
Numbness	12(8.9)	3(1.2)	12(8.5)
Injuries	14(11.1)	6(2.4)	32(23.4)
General weakness and fatigue	58(44.4)	54(22.8)	126(93.6)
Weakness in any of your arms	55(42.2)	133(56.6)	101(74.5)
Headache	58(44.4)	29(12.0)	75(55.3)
Depression	9(6.7)	60(25.3)	89(65.9)

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Table 3: Prevalence of Musculoskeletal diseases among workers of textile industry

Complaints	Age (20-35) N= 130 (%)	Ag (36-50yr) N= 235 (%)	Age (51-65 yr) N= 135 (%)
Pain in fingers	78(60)	144(61.4)	49(36.2)
Swelling tonsils	11(8.8)	45(19.3)	66(48.9)
Swelling in your legs and feet	35(26.6)	82(34.9)	63(46.8)
Pain in wrist	69(53.3)	105(44.6)	89(65.6)
Back pain	26(20)	34(14.4)	54(40.4)
Difficulty in fully moving the your arms and legs	46(35.5)	37(15.7)	60(44.7)
Joint pain	52(40)	51(21.7)	63(46.8)

Table 4: Prevalence of allergic reactions among workers of textile industry

Complaints	Age (20-35) N= 130 (%)	Ag (36-50yr) N= 235 (%)	Age (51-65 yr) N= 135 (%)
Occupational contact dermatitis	66(51.1)	62(26.5)	69(51.0)
Pruritus	23(17.7)	3(1.2)	26(19.1)
Eye irritation	61(46.6)	59(25.3)	66(48.9)

Table 5: Prevalence of respiratory symptoms among workers of textile industry

Complaints	Age (20-35) N= 130 (%)	Ag (36-50yr) N= 235 (%)	Age (51-65 yr) N= 135 (%)
Chronic bronchitis	0 (0)	14 (6.0)	9 (6.4)
Shortness of breath	38 (28.9)	65 (27.7)	52 (38.3)
Shortness of breath when walking fast and slow	72 (55.6)	65 (27.7)	12 (87.3)
Coughing	12 (8.9)	17 (7.2)	40 (29.7)
Chest pain when you breathe deeply	0 (0)	3 (1.2)	20 (14.9)

Table 6: Distribution and proportion of general information about OHS management

Statement	Yes		No	
	Frequency	%	frequency	%
Has any medical checkup of workers conducted during the last 12 months?	320	64	180	36
Has any Vaccination of workers against infectious Diseases conducted during the last 12 months?	0	0	500	100
Do you have SHE (Safety Health & Environment) Manger in your industry?	414	82.9	86	17.1
Has any medical checkup conducted at the time of recruitment/selection?	0	0	500	100
Do the OHS policy and arrangement for its implementation been communicated to all employees, contractors and other potentially affected groups?	209	41.8	291	58.2
Do you provide suitable information, instruction and training in PPE use and maintenance to your employees?	363	72.6	137	27.4

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Are basic concepts of occupational health and safety protection included in the induction courses for new employees?	14	2.8	486	97.2
Do you have any waste treatment plant (solid, air, water) at your facility?	0	0	500	100

DISCUSSION

The study which is under discussion brings the fact that the workers in the dyeing industry in Sanganer area of Jaipur are exposed to an increasing number of chemicals and work-related hazards over the years. One of the major causes of concern is occupational dermatoses that account for a large number of occupational diseases and could even exceed all other industrial diseases put together in Jaipur city. Most of the time it was reported by workers working in Jaipur dyeing industry those other vital organs such as the eyes, lungs, liver and urinary bladder are also involved. The reason for occupational dermatoses among the workers of cloth dyeing industry in Jaipur is the constant immersion of hands for prolonged periods in water. Pressure, friction, sweating and also plays an important role for the development of dermatoses among the workers. It was observed that the workers in this industry are also exposed to various types of respiratory symptoms like asthma, chronic bronchitis, cough and chest pain. In addition, imprecise respiratory symptoms in isolation or in combination with respiratory functional impairments, in some cases they were with symptoms or sometimes without symptoms, have also been reported by workers at the study site. The occurrence of organic dyes produced chest stiffness, chest pain, angina, that kept the workers away from the work most of the time, which not only deteriorates the living standard of people but may reduce the productivity of this industry as well. Organic dyes exposure produces symptoms like chest tightness mostly on resuming work after an absence, altered pulmonary functions findings, etc. The elite design of making saris by the textile workers in Jaipur is known as traditional art all over India. The records of the Dyeing and Printing Association revealed that, there are around 50 small scale units employing more than 1000 employees directly and many are indirectly involved including the women and children. This textile industry is mainly dominated by the Muslim community in the city of Jaipur. The procedure of making clothes involves many stages and the whole process is labor intensive which can be broadly divided into printing and dyeing of fabrics. Printing may be either screen printing or batik printing. The fabric is stretched along a long table and the selected design is printed using a screen which has the selected motif engraved in it during screen printing. However, this process exposes the workers to many types of ergonomic disorders that are mostly overlooked by the owners of the units and the workers who are engaged in this profession. The dye is applied on the screen at regular intervals without using any type of personnel protective equipment by the workers that aggravate the problems of the workers in the city of Jaipur. Depending upon the design requirements wax is melted on fabrics using either a block or a brush in batik printing. In the dyeing process, thick rope is used first and is dyed first and then rinsed in water and later sundried to complete the process. The step of tying and dyeing during the whole process of textile industry is a blue-collar job that directly exposes various workers of cloth dyeing industry of Jaipur to various dyes and chemicals used for bleaching, printing and finishing. The most common skin diseases, such as allergic contact dermatitis, irritant dermatitis and inflammation of mucous membranes, result from contact with dyes and chemicals, particularly acids, high salts concentration, oxidizing and reducing agents, detergents and solvents. In the present investigation, the prevalence of contact dermatitis in the 'tie and dye' industries of Jaipur has been reported by the workers was found to be very high as compared to other studies. Usually the solution for dyeing cloths is prepared in the same short working area at one corner of the house and washing and rinsing is done in another. The drainage system of huts as we all know is very poor, open and highly unhygienic in all the areas that were under investigation. From the observations of the textile dye industry of Jaipur, it was evident that the dye workers have to work in fully packed and poorly illuminated conditions because most of the work areas were inside the shops where the light intensity is very poor. The study revealed that dye workers suffered

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from discomfort in various parts of the body, especially in lower back, knees and upper extremities due to kneel, squatting and tongue-tied working postures for longer periods of time. Furthermore, in order to see things clearly the workers have to take several harmful postures that render them to various types of muscular skeletal disorders. Wani and Jaiswal (2012) reported that the workers face a severe discomforts or pain is due to heavy spinal loading and recurring movement of the body parts over an extended period. The feeling of discomfort (pain) in different parts of the body among the workers may be due to their prolonged working hours and repetitiveness of the work without sufficient rest, which may lead to severe musculoskeletal disorders. Joshi et al. has obtained a about 60% incidence of MSD (Musculoskeletal Disorder) in their study carried on industrial workers in Delhi and have recommended that due to the high frequency of MSDs in workers, the condition needs urgent consideration from the health associations in industries and labor sectors (Joshi and Kumar, 2011). Although all the workers strongly believe that there should be safe methods of to handle and dispose contaminated packaging in an eco-friendly manner, only 20% of the workers had been instructed on safe methods of handling dyes. The rest of the workers did not receive any instructions on handling of dyes, because in every unit only few people had been identified to prepare the dye solution. The workers reported that using PPE cause them one or the other type of discomfort that interfere with their work practice and lack of awareness on the health hazards of working with dyes may be the other cause for not using the PPE by the workers in these units. The data obtained in this study and other similar studies hint a need to put into practice the common objectives, well-suited policies and programmes for improvement in the industrial waste water treatment methods. The harmful effects of dyestuffs on human health have been reported worldwide for many years. As textile workers are exposed to harsh working conditions, such conditions with no control over the length and frequency of exposure and poor health, safety, and waste management practices may pose several health hazards. Many safety regulations and/or guidelines by various occupational health authorities around the world have established to edge workers' exposures to hazards at the work site, both by controlling the concentrations of solvents in the working environment and by helping workers to keep away from needless exposures through safe practices and personal protective equipment (PPE). Emphasis is mainly made that workers should be attentive of the unfavorable effects of dyes if not handled properly as they are exposed to the same with no control over the length and frequency of exposure. Though a number of studies have been carried out on Jaipur, for the workers in various fields, this is attempt to study the physicochemical properties of water and soil along the remediation of contaminants with associated occupational health hazards on the workers keeping the working conditions into consideration as well.

CONCLUSION

The workers in cloth dyeing industry of Jaipur are exposed to different types of health hazards due to poor working conditions and lack of awareness among working community. There must be established policies binding the owners of cloth dyeing industry to keep conditions favorable for weaving. Most diseases and health problems found in carpet units can be avoided with proper precautions and care. Some protective equipment must be provided, e.g., face masks and first-aid facilities, to protect workers from the adverse effects environment. The owners, with the co-operation of the government, must also provide health insurance. The people working in these industries suffer from various skin diseases such boils, eczema and contact dermatitis. Eye contact with sodium hydroxide, used in textile industry, leads to severe scarring of the eye and occasionally blindness severe dermatitis has also been reported.

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