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Manuscript Title: Study of Health Awareness in Population Working In Industry in Mohali and Chandigarh, India.

Kavya Kriti Kaul[1], Dr. Savita Prashar[2]
[1]Ph.D. Scholar, Department of Public Health, OPJS University, Churu, Rajasthan, India, MPH (Masters in Public Health), MSc. (Disaster Mitigation) and BSc. (Medical),[2]Professor, Department of Biochemistry, Panjab University, Sector-14, Chandigarh, India

Abstract
Objectives*: Occupational diseases and injuries result from the specific exposures at work. The present study analysed the health awareness amongst the industrial workers and various factors affecting the awareness of health amongst the industrial workers.*
Design and methods*: This cross-sectional (comparative) study was conducted during February 2009 to April 2009. Analysis of data was by Chi-square test and T-test.*
Results*: The high proportion of population working in industry in Mohali and Chandigarh were aware of the health facilities provided by the industries for the industrial workers; 97% of first aid in industry; 56% of toxicity of solvents or steel; 60% of diseases due to exposure to toxins and 82% had no illness. The high proportion of population working in industry (53%) had history of disease such as lower back pain, injuries at work, fever and nosebleeding. The industrial workers (88%) used the personal protective equipment; 96% used ventilator or fans or air purifier and 95% used seating facilities such as workbench or stool or chair in these industries. The industrial workers working in industry (50%) in paints industry got compensation and 41% of industrial workers working in steel industry visited ESI hospital for medical treatment as the industrial workers and their family got various benefits from the ESI hospital and (99%) are sent to doctors/ hospitals in case of accident by the industries.*
Conclusions*: It can be concluded that occupational health and safety practices were provided to the high proportion of population working in industry in Mohali and Chandigarh in India.*
Keywords: *Aware, Diseases due to exposure to toxins, Industrial workers, Paints industry, Personal protective equipment, Steel industry*

What is known on this subject:

- There was lot of literature available on the scientific knowledge of this subject which includes health diseases among industrial workers due to work exposure before the study was done.
- But there was lack of literature on health awareness among industrial workers about diseases due to work exposure while working in industry. Therefore, this research study was conducted.

What this paper adds:

- As a result of this study, we now know that high proportion of population working in industry in Mohali and Chandigarh are aware of the health facilities provided by the industries for the industrial workers and they use the personal protective equipment as well as industrial workers in paints industry got compensation and industrial workers working in steel industry visited ESI hospital for medical treatment and his family got various benefits from the ESI hospital.
- The important policy or practice implication of this research study is that more efforts should be made by industries for industrial workers in terms of health facilities provided by the industries for the industrial workers such as compensation, doctors/ health staff, personal protective equipment.

I. Introduction

The major categories of environmental stress for the worker are chemical agents; physical agents and conditions; and psychosocial factors. Occupational accidents result from the joint action of both environmental and human factors. Occupational diseases and injuries result from the specific exposures at work [1]. When toxic chemicals are released, either through industrial or agricultural processes or when these toxins are released from consumer products make their way into our bodies through the lungs (inhalation), skin (dermal absorption) or mouth (ingestion)-these are known as routes of exposure. Industrial toxins are the industrial chemicals developed or manufactured for use in industry operations or research by industry, government or academia. Even the mildest exposure to such harmful chemicals can lead to their accumulation in the body over long periods and expose industrial workers to serious health risks [2].

The industrial workers in Bhushan Industries Co Ltd. which manufacture steel are exposed to air pollutants such as hydrochloric acid, manganese compounds, phenol, naphthalene, benzene and carbon dioxide in industry [3]. The industrial workers in ICI India Ltd. which manufacture paints are exposed to chemical risk factors such as Tolenate HDT-90 Desmodur, sulphur oxides, nitrogen oxides, VOCs, particulate matter, carbon monoxide, carbon dioxide and dioxins [4]. The interaction between man and his environment may lead to betterment of health, when work is fully adapted to human needs and factors, or to ill health, if work stresses are beyond human tolerance [5].

Aims and Objectives

The present study analysed the health awareness amongst the industrial workers and various factors affecting the awareness of health amongst the industrial workers. The present study made the comparative analysis of general population with population exposed to risk factors working in industry.

II. Methods and Material

This cross-sectional (comparative) study was conducted during February 2009 to April 2009. The semi-structured questionnaire was used for data collection. The data was collected by interviewing fifty industrial workers of ICI India Ltd. (paints manufacturing industry) and fifty industrial workers of Bhushan Industries Co Ltd., Industrial Area-1, Chandigarh and fifty individuals from general population. All data entry and analysis was conducted using SPSS (version 16) for windows. Analysis of data was by Chi-square test and T-test.

III. Results

The high proportion of population (82%) working in industry in Mohali and Chandigarh had no illness versus 22% of general population had illness. The high proportion of population working in industry in Mohali and Chandigarh were aware of the health facilities provided by the industries for the industrial workers; (97%) of first aid provided in the industry for the industrial workers versus 74% of general population; (56%) of toxicity of solvents or steel versus 2% of general population; (60%) of diseases due to exposure to toxins versus 18% of general population. The high proportion of population (53%) working in industry had history of disease such as lower back pain, injuries at work, fever and nosebleeding versus 20% of general population. The high proportion of population (88%) working in industry used the personal protective equipment versus 38% of general population; (96%) of ventilator or fans or air purifier versus 88% of general population and (95%) of seating facilities such as workbench or stool or chair in these industries versus 90% of general population. The high proportion of population (50%) working in industry in paints industry got compensation versus 100% of general population do not get compensation and (41%) of industrial workers working in steel industry visited ESI hospital for medical treatment as the industrial workers and his family got various benefits from the ESI hospital versus 50% of general population visited government hospital. The high proportion of population (99%) working in industry are sent to doctors/ hospitals in case of accident by the industries versus 82% of general population.

IV. Discussion

Joshi S K et al (2008) reported that the occupational health and safety practices in small scale industries in Kathmandu have found to be unsatisfactory. This relationship has not been confirmed in the study of health awareness in population working in industry in Mohali and Chandigarh as majority of industrial workers (65%) had pre-employment medical examination (Fig. V); (85%) have periodic medical examinations; (69%) have health check-ups once in a year (Table IV); (56%) had dental check-ups and (74%) get health advice/ assessment from doctors after periodic health check-ups in the industries [6].

The high proportion of population working in industry were aware of the facilities provided by the industries such as (71%) was aware of the emergency room; (92%) of the ambulance; (53%) of the health officer in industries in emergency; (100%) of the exits of industries in case of emergency and drinking water facilities in industries; (99%) of the fire extinguisher in industries (Table II) and (90%) how to operate fire extinguisher and (98%) of industrial workers used sanitary facilities, for e.g., toilets and washbasins.

Emma J K et al (2008) showed that seafarer's fatigue could impact on safety within the industry and may be linked to longer term individual ill-health. This relationship has not been confirmed in the study of health awareness in population working in industry in Mohali and Chandigarh as few industrial workers (18%) had illness such as fatigue or depression and high proportion of population working in industry (82%) had no illness (Fig. I) [7].

Omolase C O et al (2007) reported that all the respondents knew of the potential ocular hazards of their occupation through personal experience and stated that they use protective goggles with varying degree of compliance. This relationship has not been confirmed in the study of health awareness in population working in

industry in Mohali and Chandigarh as majority of industrial workers (60%) were aware of the diseases due to exposure to toxins and some of industrial workers (40%) were unaware of the diseases due to exposure to toxins (Fig. III). The high proportion of population working in industry (56%) was aware of the early symptoms of diseases and some of industrial workers (44%) were unaware of the early symptoms of diseases which they can come across by working in these industries. Majority of industrial workers (88%) used the personal protective equipment such as helmets, goggles, facemasks, gloves, safety shoes at work (Fig. IV). Some of industrial workers in paints industry (50%) used protective clothing such as jackets and (50%) did not use any protective clothing such as jackets at work [8] [9] [10].

Baig L A et al (2005) reported that appropriate gadgets were absent in majority of industries (93%) and first aid box was present in only one loom. Majority of workers (83%) were working in high temperature and majority of workers (55%) were working with improper ventilation. This relationship has not been confirmed in the study of health awareness in population working in industry in Mohali and Chandigarh as high proportion of population working in industry (56%) were aware of the toxicity of solvents or steel and some of the industrial workers (44%) were unaware of the toxicity of solvents or steel (Fig. VI). Majority of industrial workers (97%) were aware of the first aid in industry (Table III) and (87%) was aware how to use first aid in emergency. Majority of industrial workers (91%) felt that temperature was normal and few industrial workers (9%) felt that temperature was high in these industries. Majority of industrial workers (96%) used ventilator or fans or air purifier in these industries [11] [12].

Joshi S K et al (1994) showed that common working conditions included overcrowding, improper ventilation and poor lighting. Good personal hygiene was more common among the students than the weavers. The weavers more likely than students to suffer from headaches, backache, lower limb pains and acute respiratory infections and also likely to have signs of nutritional deficiency. This relationship has not been confirmed in the study of health awareness in population working in industry in Mohali and Chandigarh as all industrial workers (100%) practice personal hygiene such as hand washing before eating meals and after using bathrooms. Majority of industrial workers (99%) take normal diet and few industrial workers (1%) eat outside their homes daily. Majority of industrial workers (74%) have normal weight, (15%) industrial workers are overweight, (9%) industrial workers are underweight and (1%) industrial workers are obese. Majority of industrial workers (95%) used seating facilities such as workbench or stool or chair [13].

Mostafa Ghaffari et al (2006) reported that lower back pain (LBP) is a common problem in the working population even in a developing country. This relationship has been confirmed in the study of health awareness in population working in industry in Mohali and Chandigarh as high proportion of population working in industry (53%) had history of disease such as lower back pain, injuries at work, fever and nosebleeding and some of industrial workers (47%) had no history of disease (Fig. II). Majority of industrial workers (66%) were not involved in any physical activity as daily routine and some of industrial workers (34%) did physical activity such as morning/ evening walk or jogging or gym or yoga or cycling as daily routine [14] [15] [16] [17]. Regarding work experience significant population had workers for five years in industries.

Rosenman K D et al (2000) showed that the factors significantly associated with filing a claim were increased length of employment, lower annual income, workers' dissatisfaction with coworkers, physicians restriction on activity, type of physician providing treatment, decreased current health status and increased severity of illness. This relationship has not been confirmed in the study of health awareness in population working in industry in Mohali and Chandigarh as high proportion of population working in industry (50%) in paints industry got compensation of Rs. 5000 annually for medical treatment and (50%) did not get any compensation for medical treatment by the industry (Table V) and workers usually visited ESI hospital for medical treatment as the industrial workers and his family got various benefits from the ESI hospital. Majority of industrial workers (59%) visited private hospital and some industrial workers (41%) visited government hospital such as ESI hospital (Table I). Majority of industrial workers (99%) are sent to doctors/ hospitals in case of accident by the industries [18].

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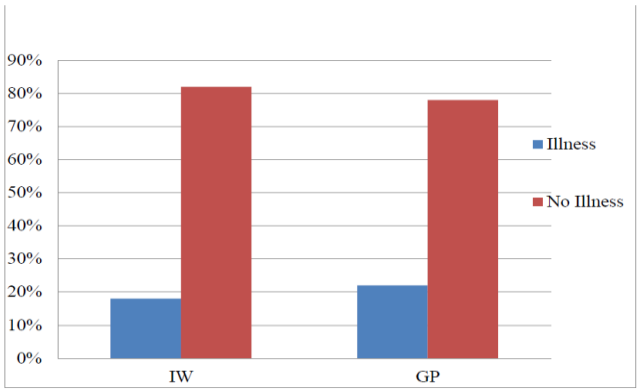
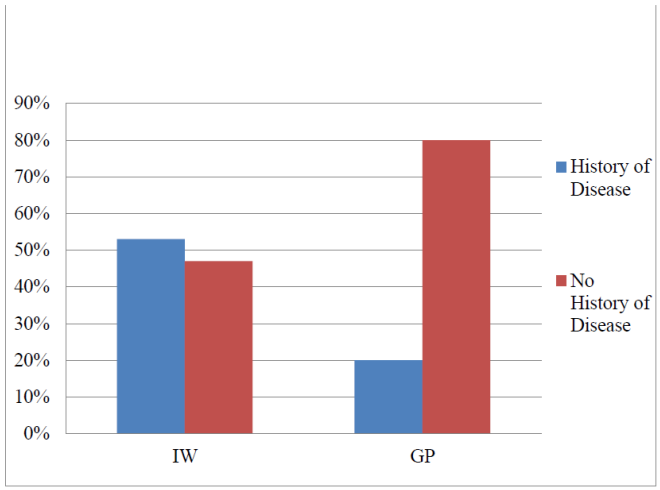
Figure I: Percentage of illness in Industrial Workers (IW) and General Population (GP)



a IW: Industrial Workers

b GP: General Population

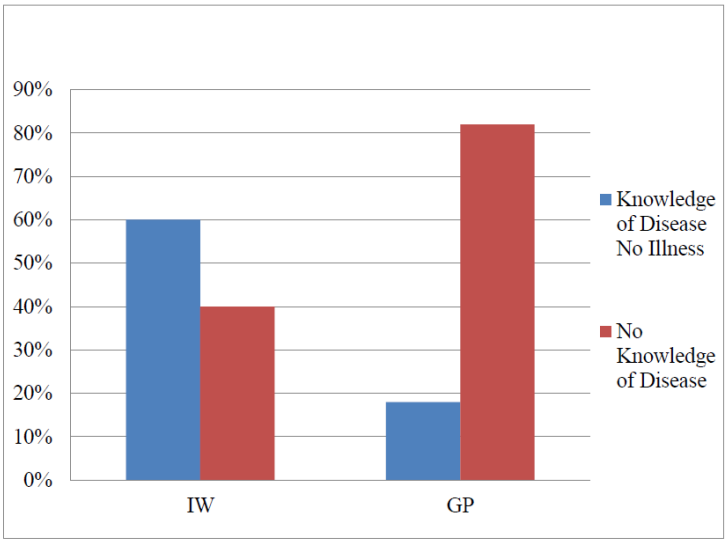
Figure II: History of disease in Industrial Workers (IW) and General Population (GP)



a IW: Industrial Workers

b GP: General Population

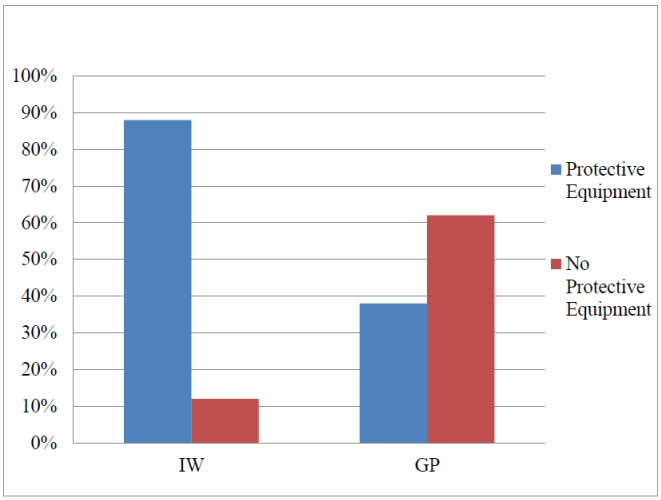
Figure III: Percentage of Industrial Workers (IW) and General Population (GP) with knowledge of diseases due to exposure of toxins



a IW: Industrial Workers

b GP: General Population

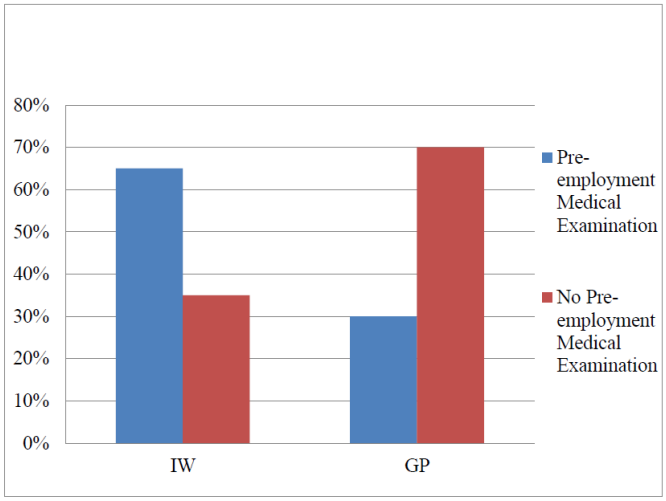
Figure IV: Percentages of Industrial Workers (IW) and General Population (GP) use protective equipment



a IW: Industrial Workers

b GP: General Population

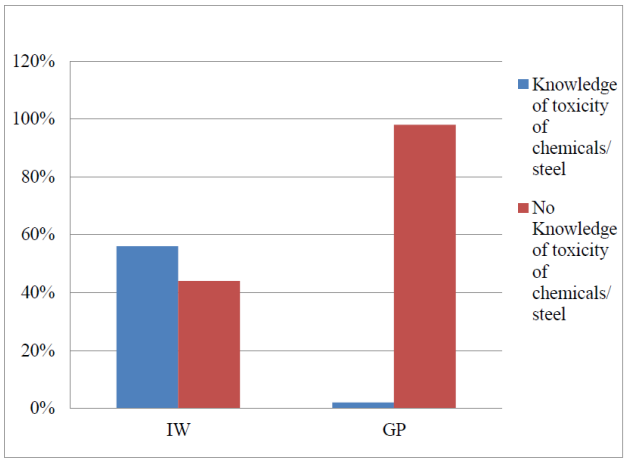
Figure V: Percentages of Industrial Workers (IW) and General Population (GP) had pre-employment medical examination



a IW: Industrial Workers

b GP: General Population

Figure VI: Percentages of Industrial Workers (IW) and General Population (GP) know about toxicity of chemicals/ steel



a IW: Industrial Workers

b GP: General Population

Table I: Percentages of Industrial Workers (IW) and General Population (GP) visit government and private hospitals

	IW No. (%)	GP No. (%)
Govt. Hospital	n = 41 (41%)	n = 25 (50%)
Private Hospital	n = 59 (59%)	n= 25 (50%)
	Pearson Chi-Square = 0.295	

Table II: Percentages of Industrial Workers (IW) and General Population (GP) have fire extinguisher at the workplace

	Fire Ext. IW No. (%)	Fire Ext. GP No. (%)
Yes	n = 99 (99%)	n = 41 (82%)
No	n = 1 (1%)	n= 9 (18%)
	Pearson Chi-Square = 0.000	

Table III: Percentages of Industrial Workers (IW) and General Population (GP) have first aid at the workplace

	FirstaidIW No. (%)	FirstaidGP No. (%)
Yes	n = 97 (97%)	n = 37 (37%)
No	n = 3 (3%)	n= 13 (13%)
	Pearson Chi-Square = 0.000	

Table IV: Percentages of Industrial Workers (IW) and General Population (GP) had health check-ups annually

	Check-up yr. IW No. (%)	Check-up yr. GP No. (%)
1	n = 69 (69%)	n = 9 (18%)
2	n = 15 (15%)	n= 2 (4%)
3	n = 1 (1%)	n = 0 (0%)
4	n = 1 (1%)	n= 0 (0%)
	Pearson Chi-Square = 0.000	

Table V: Percentages of Industrial Workers (IW) and General Population (GP) get compensation for medical expenses annually

	Compensation IW No. (%)	Compensation GP No. (%)
Yes	n= 50 (50%)	n = 0 (0%)
No	n = 50 (50%)	n= 50 (100%)
	Pearson Chi-Square = 0.000	

V. Conclusions

He workers are potentially exposed to a variety of additional chemical and physical hazards that deserve attention [19]. Perhaps the most logical approach in the problem of social medicine is to work with this group, to study the problems of these workers and to build a satisfactory health programme. It can be concluded that occupational health and safety practices were provided to high proportion of population working in industry in Mohali and Chandigarh.

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