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Prevalence and determinants of external injuries among industrial workers in an urban area of Kancheepuram district, Tamil Nadu

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ABSTRACT

Background: Workers engaged in industries and construction sites faced several problems and often work in substandard conditions, getting exposed to various hazards in the work place without appropriate safety training. Injuries among workers are an important health issue in industries. This study was planned to assess the prevalence of external injuries among industrial workers in an industrial area and to identify the association between sociodemographic risk factors and external injuries among the industrial workers.

Methods: This community based cross-sectional descriptive study was carried out in an urban area of Kancheepuram District. A sample size of 302 was calculated based on a previous study result and Probability Proportional to Size sampling was used to select the required number of workers from the four sites identified. A structured questionnaire was used for data collection. Data analyzed by using SPSS version 21. Descriptive and Analytical Statistical calculations were done.

Results: This study shows that 44.3% workers were affected by some form of external injuries during their working time. Skin Injuries like abrasions and lacerations [43%], contusion [26%], cut injuries [16%], foreign body in the eyes [12%] and falling from a height [10%] were common. There was strong statistically significant association with the occurrence of external injuries in the work place with the habits of smoking and tobacco use, alcohol drinking and the nature of work among the study group.

Conclusions: The study shows high prevalence of external injuries among the workers. They need to be properly trained in safety mechanisms and procedures to follow in work places and also wearing proper personal protective devises during the working hours to prevent such injuries.

Keywords: Workers, Occupation, Injury, Industry

INTRODUCTION

Occupation is a basic need for every individual and family, that is a regular activity performed for wage or salary, profit or family gain, including the production of goods for own consumption, to fulfil their requirements and to lead a financial secured life. It can be a self-employment or under service of another person by hire. Occupation is of various types which include a wide spectrum of activities. Despite these wide possibilities of

various occupations, the global unemployment had reached 199.8 million, and since 2004, the rate remains unchanged at 6% at global level and in India it stands around 3.5%. ^{2,3}

Industrialization and the industries make a major positive contribution to the economy of all countries. Industries provides work for all levels of workforce starting from the low skilled or entry level workers. For example, up to 180 million construction workers are there worldwide,

out of which about 75% are in developing countries.⁴ These workers are basically unskilled, socially backward, uneducated with low bargaining power.

According to the survey of Bureau of Labour Statistics, industry workers occupy half the world's total population approximately 14.1% of population.⁵ According to National Sample Survey (2004-2005), about 25.71 million building construction workers are estimated to be in India. About 18.24 lakh building construction workers are registered with the Tamil Nadu Construction Workers Welfare Board.⁶

Workers engaged in industries and construction sites faced several problems such as work overload, low wages, exposure to chemicals, paints, having the habit of smoking, alcohol consumption and tobacco use in any form leads to occurrence of various occupational diseases. The different types of morbidity among the workers were due to musculoskeletal, external injuries, skin and eye problems, abdominal symptoms, respiratory, dental and urinary problems. Fever, ENT, CNS and Cardiac problems were also prevalent among the workers

Industrial and construction workers often work in substandard conditions, getting exposed to various hazards in the workplace without appropriate safety and health training and information. They engage in many activities that may expose them to unguarded machinery, being struck by heavy equipment, electrocutions, working at high attitudes, falling from rooftops etc. leading to severe physical impairment and lethal injuries.³

Injuries among workers are an important health issue in industries at global level. Various risk factors associated with injuries include age, training before induction, experience, job duration, tobacco use, alcohol use and use of protective measures etc. Majority of the workers engaged in various industries and construction sectors are part of a hugely un-organised sector. Most of them are temporary workers who do not have any kind of social or economical protection when compared to those working in the organised sector.

Based on this background this study was planned to identify how often the workers are exposed to different forms of external injuries which happens as a sudden occurrence. The main aim for the study was to assess the prevalence of external injuries among industrial workers in an industrial belt in Kancheepuram district of Tamil Nadu, and to identify the association between sociodemographic risk factors and external injuries among the industrial workers.

METHODS

Study design

This study was a community based cross-sectional descriptive study.

Study area

This study was carried out in and around Anakaputhur and Pammal Municipality of Kancheepuram district. This area is well known for its wide distribution of small, medium and large industries and construction activities.

Study population

The study population are workers belonging to the industries and construction sites in the area. Most of the workers are local people but there are a sizeable number of migrant workers are also engaged in the industry and construction activities.

Study duration

The study was conducted during the period from November 2016 to May 2017.

Sample size

Based on the studies done among the workers' health profile, it was found that about 23.11% of workers were affected by injuries in one study. Based on this prevalence value, with a margin of error of 5% of the prevalence, sample size was calculated by using the formula: 4PQ/D². The sample size calculated was 273, which was rounded of to 275, by adding 10% for non-response rate, and the final sample size derived was 302.5 which was rounded off to 302.

Sampling technique

A total of 15 sites were identified for the sample size selection in the study area, of these, 3 sites were selected in Anakaputhur (Site A, B, C and 1 site in Pammal D) by simple random sampling. Probability Proportional to Size sampling was used to select number of workers from site A (88), site B (65), site C (88) site D (61), totalling to 302. Each worker was considered as a sampling unit. The workers from each site were selected by simple random sampling method using computer generated random numbers.

Ethical committee approval & informed consent

Institutional Ethical Committee had approved the protocol of this study. Informed consent was obtained from each subject. Translator was used to get informed consent from other state migrated workers.

Pilot study

Pre testing was carried out on 10 workers for standardizing the questionnaire in a site which was not included in the study. Based on observations made during the pilot testing necessary changes were made in the questionnaire.

Data collection tools

A structured questionnaire was used which includes the following details of the workers: Socio-demographic profile and history or presence of external injuries, A General Medical examination was also carried out.

Data collection

A total of 15 sites were identified from among the several industrial sites in the study area for the sample size selection. Out of this four site were randomly selected to carry out the study and from each site the requisite number of samples were randomly selected for data collection. Data was obtained using structured interview schedule. Translator was used in collecting data from migrant construction workers.

Data analysis

Data was entered and analyzed by using statistical software tool SPSS version 21.0.1. Descriptive and Analytical Statistical calculations were done. Percentages were used to describe the various rates. To identify the association between risk factors and injury pattern Chisquare test was used and p value calculated.

RESULTS

This community-based cross-sectional study carried out among 302 industry workers in sites which comes under the urban industrial area of Anakaputhur and Pammal Municipal areas, shows an interesting pattern of prevalence and determinants of external injuries among them. Table 1 shows the Socio demographic profile of the study group.

From this study it is evident that 44.3% of workers were affected by some form of external injury during their working time (Table 2).

Skin Injuries like abrasions and lacerations were found to be the most common form of injuries affecting nearly 43% of the workers, which was followed by contusion (26%), cut injuries (16%), foreign body in the eyes (12%) and falling from a height (10%).

Table 3 shows the association between the Sociodemographic factors and the incidence of external injuries among the workers. From the table, it is evident that there are various factors that contributed to the occurrence of external injuries. In comparison to all other risk factors, workers who are prone to alcohol habit (53.2%) are at high risk i.e., 2.7 times more prone to external injury than those who do not drink (29.5%) $(x_1^2=16, p<0.001)$. The other higher risk was smoking habit, where respondents who are smokers are 2.5 times (52.1%) higher risk than non–smokers (30.6%) $(x_1^2=12.9, p<0.001)$.

In addition, respondents who consumed tobacco had 2.1 times (52%) higher risk of morbidity due to external injury than non-tobacco consumers (33.9%) (x_1^2 =9.8, p<0.002). Respondents with less than 30 years of age had 1.8 times (49%) higher risk of morbidity than greater than 30 years of age (35%) (x_1^2 =5.3, p<0.021). Those workers who are highly skilled and belonging to nuclear type of family are also at higher risk for morbidity due to external injury at 1.9 (50.9%) and 1.7 (51%) times (x_1^2 =5, p<0.022) respectively.

Table 1: Socio-demographic characteristics of the study group.

S.No	Parameters	Frequency [N=302]	Percentage (%)				
1.	Age group (in years)						
	≤23	97	32.1				
	24–27	71	23.5				
	28–33	61	20.2				
	≥34	73	24.2				
2.	Religion						
	Hindu	288	95.4				
	Muslim	12	4.0				
	Christian	2	0.6				
3.	Level of education						
	Illiterate	142	47.0				
	Primary	65	21.5				
	Middle school	83	27.5				
	High school	12	4.0				
4	Type of family						
	Nuclear	148	49.0				
	Extended	154	51.0				
	nuclear	134	31.0				
5	Marital status						
	Married	142	47.0				
	Unmarried	160	53.0				
6	Type of food						
	Vegetarian	14	4.6				
	Non-vegetarian	288	95.4				
7	Type of work						
	Mason	99	32.8				
	Helper	125	41.4				
	Centring work	63	20.9				
	Carpenter	1	0.3				
	Painter	14	4.6				
8	Smoking habit						
	Smoker	193	63.9				
	Non-Smoker	109	37.1				
9	Alcohol habits	100					
	Present	190	62.9				
	Absent	112	37.1				
10	Other form of to						
	Present	174	57.6				
	Absent	128	42.4				

Habit of smoking and other tobacco use, alcohol drinking and the nature of work among the study group of workers

have a strong statistically significant association with the occurrence of external injuries in the work place.

Table 2: Prevalence of different type of external injuries among the study group.

S. No	Type of external injuries	Number (N=302)	Percentage (%)
Overall morbidity from external injuries*		134	44.3
1	Skin injuries (Abrasion, Laceration)	130	43.0
2	Contusion	79	26.0
3	Cut injury	48	16.0
4	Foreign body in the eye	36	12.0
5	Fall from height	30	10.0
6	Struck by falling object	21	7.0
7	Crush injuries	9	3.0
8	Electrical injury	6	2.0

^{*}Multiple responses

Table 3: Association between socio-demographic factors and external injury.

S. No	Demographic Factors	N = 3 0 2	External injury n=133 (%)	Chi - square	P- Value	Odds Ratio (OR)	95% CI
1.	Age (in years)						
	<30	200	98 (49. 0)				
	>30	102	35 (34.31)	5.91	0.015*	1.8	1.12-3.01
2.	Smoking habit						
	Present	193	100 (51.81)				
	Absent	109	33 (30.27)	13.11	0.001*	2.5	1.5 -4. 1
3.	Alcohol habit						
	Present	190	100 (51.81)				
	Absent	112	3 (29. 5)	15.34	0.001*	2.7	1.7 -4. 5
4.	Tobacco habit						
	Present	174	90 (52. 0)				
	Absent	128	43 (33.59)	9.8	0.002*	2.1	1.3 -3. 4
5.	Type of work						
	Skilled	177	89 (50.28)				
	Unskilled	125	44 (35. 2)	6.76	0.009*	1.9	1.16-2.98
6.	Type of family						
	Nuclear	148	75 (51. 0)				
	Joint	154	58 (37.66)	5.2	0.022*	1.7	1.1 -2. 7

^{*}Statistically significant at 95% CI, p<0.05.

DISCUSSION

From this study it is evident that external injuries occurring at the work sites is a major occupational health hazard for the industrial and construction workers. Nearly 44.3% morbidities among the study group of workers were due to external injuries. Workers were often prone for external injuries since they deal with sharp objects, iron rods walking in bare foot, carrying heavy loads in shoulder and head results in external injuries which usually involves in upper and lower limbs and head. In some situations accidental fall from height resulted in fractures of limbs, head injury, coma and death.

The findings of the present study were similar to finding of Wong et al in construction workers in Hong Kong.

His study explained among the 149 injuries categorized based on body region, 49% were external, 26% involved either the upper or lower extremities, and 11% were spinal injuries. Suruda et al observed in their findings that nearly 49% of fatal injuries occurred among 76 young construction workers.⁹ Tiwary et al reported that 47% subjects of the construction workers in Kolkata were victims to injuries/accidents. 10 The injuries were due to cut by sharp objects (54.2%), falling of objects from height (22.5%) and fall from height (15.8%).

Kumar in his study among welders in South India found that all those studied had more than 2 injuries and 44% of them had more than 10 injuries. All of them had abrasions and more than three fourths of them had each of lacerations, foreign body in the eye, flash burns and confusions. 11

A study by Zwerling et al observed that injuries among 1843 workers in Lowa region revealed that 20.28% workers per year were affected by external injuries like fractures and dislocation, flash burns, contusions and open wounds. According to the study of McCann et al. the external injuries (31%) faced by construction workers due to the arc flash or blast. 13

Adane et al analyzed the work-related injuries among construction sector in industrialized and industrializing countries and also in Ethiopia, reported that the major causes of external injuries were common in building construction workers which included fall from elevation (16.1%), over-exertion during lifting (20.6%) and at ground level (21.3%).¹⁴

A study by Lakhani done in Mumbai reported that 16% of men faced injury problem at the workplace. ¹⁵ A Study by Akram reported that self-reported case of injury and disease among the migrant construction workers in one year was 35% and 70% respectively. ¹⁶ A Systematic Review done by Fitzgerald et al in the occupational injury state of surveillance and prevention among migrant workers in China, showed that the migrant workers account for a disproportionate burden of occupational injury morbidity and mortality in China. ¹⁷

Millions of workers lose their lives each year due to unintentional occupational injuries at Global and National level. Occupational injury results from accidents at work place and more than half of this injury burden occurs among men working in the Asia Pacific regions.¹⁸

The findings of the present study are in line with the finding of various previous studies done in different locations, where the morbidity due to external injury is caused due to varied reasons like mechanical, electrical, arc flash or blast, fall from elevation, during lifting weight from ground level, flash burns, contusions and crush and open wounds all contributed to external injuries.

CONCLUSION

This study carried out among the workers/labourers involved in industries and construction activities in the study area gives a wide array of injury related issues faced by them. It shows the nature of the external injuries they sustained which will reflect in absenteeism from work, economic loss and the additional cost of getting proper treatment.

From the study it is evident that the highest incidence of external injuries among the workers was caused due to superficial skin injuries in the form of abrasions and lacerations, contusions, cut injuries and other mechanical injuries. Though many advanced machineries are available, most of the hazardous works were carried out manually by the workers. In addition the workers are not properly trained in safety mechanisms and procedures to

follow in work place and also lack of wearing proper personal protective devises during the working hours.

It is essential to have health education sessions, frequent health check-up and screening at regular intervals, provision of first aid emergency care at the work sites and health insurance cover for the workers will help to reduce the increased burden of external injuries occurring among them.

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Ethical approval: The study was approved by the

Institutional Ethics Committee

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