



A cross-sectional study to assess Behavioral risk and Occupational injuries among construction workers in Bangalore, India:

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Abstract:

The construction industry is one of the most dangerous industries in the world. Injuries in the construction sector are one of the biggest public health problems and can be prevented with appropriate measures. The aim of this study was to determine the behavioral characteristics of construction workers and their connection to accidents at work. A cross-sectional study was conducted at construction sites in the city of Bangalore, Karnataka. The survey was conducted at eight construction sites in Bangalore between January and April 2022. A total of 300 respondents were selected using non probability convenient sampling techniques. A semi-structured questionnaire was used in the interview process to collect the information. The inferential test, such as Chi-square test, and the likelihood test were used to find the associations and odds ratio, and its 95% confidence interval was obtained. $P < 0.05$ was considered as statistically significant. Accidents at work during the last 12 months were reported by 51.3% of employees. The most common body parts injured were lower limb (46.3%) and upper limb (16.7%). Most of the injuries reported were cuts (27.4%) and abrasions (68.6%). Age, work experience, and various other risk factors such as alcohol consumption, inadequate sleeping pattern, tobacco consumption, lack of PPE were significantly associated with occupational injuries. Care should be taken to reduce the incidence of accidents in construction. Health and safety training should be provided to workers to increase awareness of workplace hazards and thereby help reduce injuries.

Keywords: Building construction workers, occupational injury, personal protective equipment, Risk behavioral characteristics

Introduction

Construction is an important part of development work in our country. It is the largest human employer after agriculture. One in every seven workers in the country is in construction. However, construction is one of the least regulated sectors in the country¹ and is also one of the most dangerous work in the world, as evidenced by high injury and fatality rates, which are significantly more accident-prone compared to other industries². The construction trade encompasses a wide range of activities that include building, demolition, remodeling and repair¹. The hazards that occur in the construction industry are eight times higher than in the other manufacturing industries³. Occupational hazards for construction workers range from very minor pain to serious and even fatal illness. Musculoskeletal disorders and external causes are major factors limiting the ability of construction workers to work, and these injuries result in an increased rate of disability¹

Occupational accidents in construction are responsible for 16.4% of all fatal accidents at work worldwide. An operational study of accidents in the construction industry found that 70% of problems were related to workers, 49% to workplace problems, 56% to equipment deficiencies and 84% to risk management deficiencies⁴.

A study also found that construction workers have a high risk of 50% musculoskeletal injuries, higher than other industrial workers. Work-related MSDs have a negative impact on the quality of life of the construction worker as they lead to frequent absenteeism, increased work restrictions and disabilities and thus affect the economic situation of the worker⁴.

Most workers employed in construction do not even have personal protective equipment and minimum safety measures. They usually work continuously in extremely dangerous and exploitative conditions with no one to meet their needs¹.

Many construction workers are illiterate or less educated, so they are unaware of the risks of accidents and the precautions to be taken to avoid accidents at work. Accident rates were higher among construction workers working at height without seat belts, unstable walking surfaces, lack of personal protective equipment and poor lighting conditions. The risk of accidents and injuries for workers on construction sites increases with extreme temperatures, male gender, age, personal habits such as alcohol consumption, additional risky behaviors and the physical and mental condition of the worker⁴. Significant differences in smoking rates can be observed between occupational groups, and significantly higher rates of tobacco use have been found among construction site workers. Migration from rural areas to urban life requires changes in social status and living conditions that result in behavioral adaptation to alcohol and tobacco use⁵.

On most construction sites, lack of worker supervision, unsafe worker behavior and a lack of management commitment to safety are major causes of injury³. Such conditions prevail not only on the construction sites of the city of Bangalore, where the present study is located, but throughout the country¹.

In India, little attention is paid to the health of construction workers and very few studies have been conducted on industrial accidents among construction workers. Therefore, this study was conducted to determine the behavioral characteristics of construction workers and their association with workplace accidents.

Materials and Methods

A cross-sectional study was conducted in the southern city of Bangalore, India, aiming to identify the behavioral characteristics of construction workers and their association with industrial accidents. Ethical approval was obtained from the institutional ethics committee. Formal approval from the building authorities was then obtained. The purpose of the study, voluntary participation, the length of the interview, and the right to refuse or withdraw from the study were explained before beginning an interview. A semi-structured interview schedule was used to collect information from construction workers. The study was conducted between January and April 2022. Using a convenient sampling technique, 300 samples were selected for this study. In the southern city of Bangalore, there were 30 large construction sites where the project was running. In the first phase, 8 construction sites were selected from 30 construction sites with a proportion of 30%, and in the second phase, respondents were conveniently selected from 8 construction sites. The construction workers are in the 18+ age group; both skilled and unskilled workers were included in the study. Written informed consent was obtained from all participants. Privacy and confidentiality were assured for each respondent throughout the study.

Table 1: Sociodemographic characteristics

Variables	Frequency (%)
Age in years	
15 – 25	108 (36)
26 – 35	114 (38)
36 – 45	26 (9)
Above 45	52 (17)
Gender	
Male	216 (72)
Female	84 (28)
Religion	
Hindu	246 (82)

Christian	36 (12)
Muslim	18 (06)

Monthly Income in Rupees.

≤ 5000	30 (10)
5001 – 10000	182 (61)
10001 – 15000	64 (21)
Above 15000	24 (8)

Educational status

Illiterate	192 (64)
Primary	48 (16)
Secondary	36 (12)
PUC	24 (8)
Graduation completed	

Marital status

Married	414 (71.9)
Unmarried	124 (21.5)
Divorce	3 (0.5)
Widow	35 (6.1)

Total work experience at construction site

2 years	120 (40)
3 to 4 years	96 (32)
Above 4 years	84 (28)

Nature of Work

Mason helpers	90 (30)
Helpers	210 (70)

Table 2: Pattern of occupational injuries

Variables	Frequency (%)
Had injury	
Yes	154 (51.3)
No	146 (48.6)
Number of times injured	
Once	96 (62.3)
2-4 times	16 (10.3)
>4 times	42 (27.2)
Hospitalized due to injury	
Yes	59 (38.3)
No	95 (61.6)
Lost working days due to injury	
Yes	65 (42.2)
No	89 (57.7)
Average number of days of hospitalization	5-30 days
Average number of working days lost due to injury	7-30 days

Among 300 construction workers, 154 (51.3%) of the respondents had an injury within 12 months. Out of 154 injured workers, 96 (62.3%) injured once, 16 (10.3%) hurt 2–4 times, and 42 (27.2%) were injured >4 times, 59 (38.3%) were hospitalized due to injuries and 65(42.2%) of them had lost their working days. The number of working days lost due to injury is 7–30 days. The number of days of hospitalization is 6–30 days [Table 2].

The most common body parts injured were lower limb (46.3%) and upper limb (16.7%). They reported that 68.6% had injury abrasions, 27.4% of them had cuts, 7.74% had a fracture and 2.87% had fracture and sprain, respectively.

Behavioral characteristics of the respondents

The study found out of 300 workers majority 114 (38%) of them had experienced sleep disturbance sometimes,. The reason for stress was due to heavy work 61 (53.5%), followed by followed by working more than 8 hours 48 (42.1%) and stress in the workplace 29 (25.4%),

Majority workers 184 (61.3%) responded PPE was not using at the job site and 116 (38.6) workers responded PPE was available at job site; the primary reason for not using PPE was due to not comfortable to use 122 (66.3), followed by 106 (55.4) workers responded reduce work performance and 12 (6.5%) workers said due to lack of PPE.

Majority of the workers 176 (58.6%) drink alcohol daily and 124 (41.3%) were not drinking alcohol; most of the workers 194 (64.6%) chew tobacco and 106 (35.3%) of them do not chew tobacco. Majority of the workers 191 (63.6%) do not smoke cigarette/bidi and 109 (36.3%) of them were smoking cigarettes/bidi. Majority of the workers 178 (59.3%) were not satisfied with the job and 122 (40.6%) of them were satisfied with the job [Table 3].

Table 3: Behavioral characteristics of the respondents

Variables	Frequency (%)
Sleep disturbance	
Yes	114 (38)
No	186 (62)
Reasons for sleep disturbance*	
Stress in the workplace	29 (25.4)
Working more than 8 h	48 (42.1)
Heavy work	61 (53.5)
Use PPE	
Yes	116 (38.6)
No	184 (61.3)
Reasons for not using PPE*	
Lack of PPE at the construction site	12 (6.5)
Not comfortable to use	122 (66.3)
Reduces work performance	106 (55.4)
Drink alcohol during working hours	
Yes	176 (58.6)
No	124 (41.3)
Chew tobacco during working hours	
Yes	194 (64.6)
No	106 (35.3)
Smoke cigarette/bidi during working hours	
Yes	109 (36.3)
No	191 (63.6)
Satisfied with the job	
Yes	122 (40.6)
No	178 (59.3)

Association between sociodemographic factors and occupational injury

Study found age group was significant. Individuals aged <35 years have a higher risk of injury than individuals >35 years (crude odds ratio [COR]: 1.75 and confidence interval [CI]: 1.052-90). Age was found to have a significant association with accidents at work. Male Workers were more likely to injure than female workers (COR: 4.34 and CI: 2.52–7.49); similarly, those who had monthly income below Rs.10,000/- were more likely to injure than those who had monthly income more than Rs.10000/- per month

(COR: 1.06 and CI: 0.64–1.44). Workers who were illiterate and primary education were more likely to injure than those who had above primary education (COR: 1.407 and CI: 0.79–2.48) [Table 4].

Table 4: Association between sociodemographic factors and occupational injury

Sociodemographic factors	Injured workers, n (%)	Noninjured workers, n (%)	COR (95% CI)	P
Age				
< 35 years	142	80	1.775 (1.05- 2.90)	0.001**
>35 years	39	39	1	
Gender				
Male	174	42	4.34 (2.52-7.49)	0.001**
Female	41	43	1	
Monthly income				
<Rs.10000/-	114	98	1.06 (0.64-1.44)	0.001**
>Rs.10000/-	46	42	1	
Educational status				
Illiterate and primary education	148	92	1.407 (0.79-2.48)	0.001**
Above primary education	32	28	1	

**Highly significant, *Significant. COR=Crude odds ratios, CI=Confidence interval

Association between behavioral factors and occupational injury

Results showed that sleep disturbances were significantly associated with injury ($P < 0.001$), with those who had sleep disturbances injuring more often than those who did not have sleep disturbances (COR: 4.64 and CI: 2.78–7.73). PPE use was found to be significantly associated with injury ($P < 0.001$), with those using PPE having a lower likelihood of injury than those not using PPE (0.136 [0.08–0.23]). Alcohol use and injury were found to be statistically significantly associated with injury ($P < 0.001$), with those who drink alcohol being more likely to experience injury than those who do not drink alcohol (COR: 1.525 and CI: 0.96–2.42). Tobacco chewing was found to be significantly associated with injury ($P < 0.001$), with those who chew tobacco being more likely to sustain injury than those who do not chew tobacco (COR: 1.151 and CI: 0.71–1.84).

Cigarette/bidi smoking was significantly associated with injury ($P < 0.001$), with those who smoked cigarettes/bidi having a higher risk of injury than those who did not smoke cigarettes/bidi. Job satisfaction was also statistically significant for injuries ($P < 0.001$); It was found that those who were job satisfied had a lower risk of injury than those who were job dissatisfied (COR: 1.48 and CI: 0.92–2.38) [Table 5].

Table 5: Association between behavioral factors and occupational injury

Behavioral factors	Injured workers, n (%)	Noninjured workers, n (%)	COR (95% CI)	P
Sleep disturbance				
Yes	84	30	4.640 (2.78- 7.73)	0.001**
No	70	116	1	
Use PPE				
Yes	27	89	0.136 (0.08-0.23)	0.001**
No	127	57	1	
Drink alcohol				
Yes	98	78	1.525 (0.96-2.42)	0.001**
No	56	68	1	
Chew tobacco				
Yes	102	92	1.151 (0.71-1.84)	0.001**

No	52	54	1	
Smoke cigarette				
Yes	92	17	11.260 (6.18-20.5)	0.001**
No	62	129	1	
Satisfied with the job				
Yes	68	44	1.48 (0.92-2.38)	0.001**
No	86	92	1	

**Highly significant. COR=Crude odds ratios, CI=Confidence interval, PPE=Personal protective equipments

Discussion

In the current study, the prevalence of occupational injuries among construction workers in the last 12 months was 154 (51.3), which is higher than a survey of occupational injuries among construction workers in Egypt (46.2%), Ethiopia (38.7 %) and in India (24.2%). The current study showed that the most commonly injured body parts among construction workers were the lower limbs (46.3%) and upper limbs (16.7%), which was not comparable to the study conducted in the Egyptian city of Mit Ghamr ⁶⁻⁹.

The results of the present study indicate that those belonging to the age group under 35 years old are more prone to injury, which goes in the same direction as the study conducted in Egypt. The present study found that injuries were common in 42.1% of workers working more than 8 hours a day, which is similar to the study in the city of Gondar, Ethiopia and Egypt⁸.

This may be because working overtime can lead to fatigue and therefore a risk of work-related accidents. The study reported that the most common reasons given by workers for not using personal protective equipment were less comfort at work (66.3%) and reduced job performance (55.4%), which was comparable to that in Egypt and Iran and studies conducted in Addis Ababa, Ethiopia⁹⁻¹⁰.

The study found that alcohol consumption, chewing tobacco and cigarette/bidi smoking are significantly associated with occupational accidents. These results are similar to studies conducted in Addis Ababa, Ethiopia and Egypt. This can be due to substance abuse, one of the mind-altering substances that lead to poor employee concentration on work and poor job performance. The study found that job satisfaction is a risk factor for injury. The results are similar to those of the study conducted in Egypt and Ethiopia⁸⁻⁹. This could be related to the fact that if workers are not satisfied with their job, they may not take responsibility and may not use their knowledge and skills in their careers. Such situations lead to reduced safety in their work and increase the risk of injury.

Conclusion

Accident at work is also a significant public health problem in India. Accidents at work can be reduced by being careful to avoid risky behaviors such as poor sleep habits, tobacco and alcohol consumption during working hours, etc. Accidents on construction sites should be properly recorded. Regular health education should be provided to construction workers on the application of safety measures and the use of PPE, risk factors for injury and ways to protect against injury. In addition to monitoring the workplace, safety monitoring should also be carried out by owners and contractors

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