Original Research

An Autopsy Study of Patterns of Injuries at Workplace

Shylaja N,[1] Ravikumar R[2]

Abstract

Work accidents are accidents occurring at or in the course of work which may result in death, personal injury or disease. A detailed study of workplace accidents and fatal injuries at workplace provides valuable data for implementing effective preventive devices to reduce the burden of injuries, related mortality and morbidity and to strengthen legal measures. Vydehi hospital a tertiary care hospital receives most of the medico-legal cases from eastern part of bengaluru both for treatment and autopsy services. An autopsy study of deaths due to fatal injuries at workplace was conducted with an aim to know the incidents, occupation wise distribution, events leading to patterns and nature of injuries and cause of death. Data in the current study was collected from all the cases of fatal injuries at workplace autopsied for a period of 5 years from September 2007 to august 2012. Male and young workers constituted the bulk. Majority of the victims were construction laborers. Fall from height was common type of event followed by fall of objects, electrocution, burns and least common being faulty machinery, drowning and consumption of poison. Protective measures were not available in most of the cases.

***Key words**:* Workplace accidents, construction laborers, fall from height, electrocution.

Introduction:

Occupational injuries include deaths, personal injuries and diseases resulting from work accidents. The event or exposure must have been related to the persons work or status as an employee. The census excludes fatalities that occur during a person's commute to or from work place.[1, 2] globally, over 264 million industrial accidents happen every year, with over 350,000 mortalities.[3] Although more than half of these mortalities occur in developing countries, the estimation of accident costs is especially difficult there.[4] The potential for compromises in safety and health due to economic factors lead to an increase in the number of workplace accidents and disease.[5] Injuries can occur everywhere, at home, at work, at public places or during recreational and leisure time activities.[6] In India occupational accident is steadily rising especially in construction workers, quarries, workshops and heavy industries. Age, sex, habit, personality, physical and mental state of the worker, play an important role in occurrence of accidents at work place.[7] In the past two decades, India has witnessed rapid urbanization, industrialization and migration of people resulting from socio economic growth and development. It is estimated that 19 fatal and 1930 non-fatal accidents occur every year per 100,000 workers.[8] According to ILO around 403,000 people in India die every year due to work related problems. More than 1,000 workers die every day from work related diseases; that's about 46 every hour.[9] There is an alarming increase in fatal work place injury deaths in Bengaluru city which is the hub of all developmental activities due to changing patterns of social, cultural, economic development. In this altered scenario there is very much a need for studying various patterns of injuries and deaths through skillful analysis and to incorporate preventive strategies to avert further tragedies.

[1]District Forensic expert, District Hospital, Madikeri, [2]Associate Professor, Dept of Forensic Medicine and Toxicology, Kodagu Institute of Medical Sciences, Madikeri, Karnataka State – 571201
Correspondence: Dr. Ravikumar R
Contact: 9448387665
Email: dr_ravikumar_fm@yahoo.com

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Materials & Methods:

The data is collected from cases of fatal injuries at work place from 2007 to 2012,

autopsied at Department of Forensic Medicine and Toxicology, Vydehi Institute of Medical Sciences and Research Centre, Bengaluru. The clearance for the study was obtained from the college ethnical committee. The particulars of deceased in the form of age, sex, occupation, patterns and nature of injuries, the cause and outcome of the event were extracted based on autopsy reports, police records, information from relatives. This is a type of observational study, to collect data regarding magnitude and type of problems involved. A Descriptive and inferential statistical analysis was carried out and Fisher Exact test was used to find the significance of study parameters.

Results and observations:

A total number of 848 autopsies were carried out over a period of 5 years from September 2007 to August 2012. There were 78 cases of deaths due to fatal injuries at workplace constituting 9.2 %. (Fig 1) Out of the 78 cases 73 [93.6%] were males and 5 [6.4%] were females. Highest incidence of 35 cases [44.8%] was noted in the age group of 21 to 30 years.

Majority of the fatalities [69.2%] occurred at the construction site involving the laborers. (Fig 2)

According to the history, majority of deaths were due to fall from height [59%] followed by fall of objects [15.4%] and electrocution [15.4%] respectively. 2.6% were due to burns, 3.8% due to combination of fall and electrocution/electrocution and burns. 1.2% due to drowning. (Fig 3)

Among 48 cases of fall from height 83.3% had fall from varied heights and 16.7% had fall from same height/standing height. Out of 12 deaths due to fall of objects 41.7% were due to fall of objects from a height of 1 to 5 feet followed by 33.3% due to height of more than 20 feet.

Out of 14 deaths due to electrocution at workplace 78.6% were due to low voltage current and 21.4% were due to high voltage current. (Fig 4) High voltage electrocution

Figure 1: Represents burden of deaths due to fatal workplace injuries.

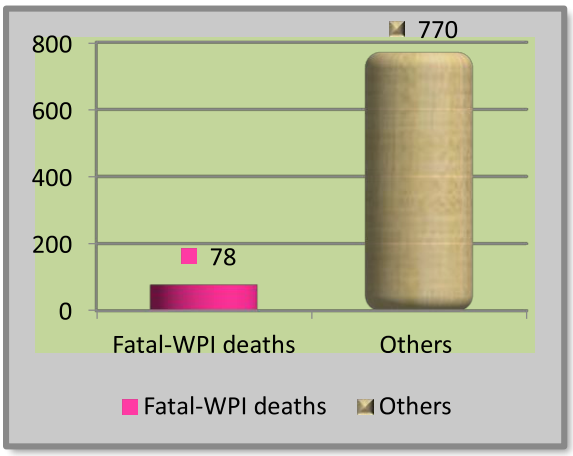


Figure 2: Shows occupation of the victims

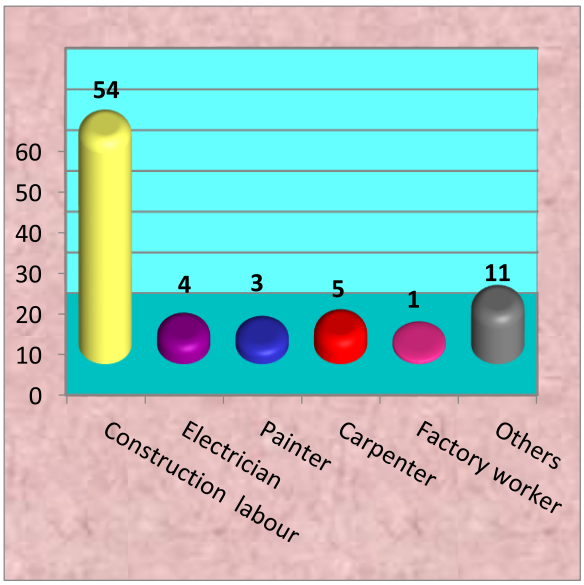


Figure 3: Shows history of incident

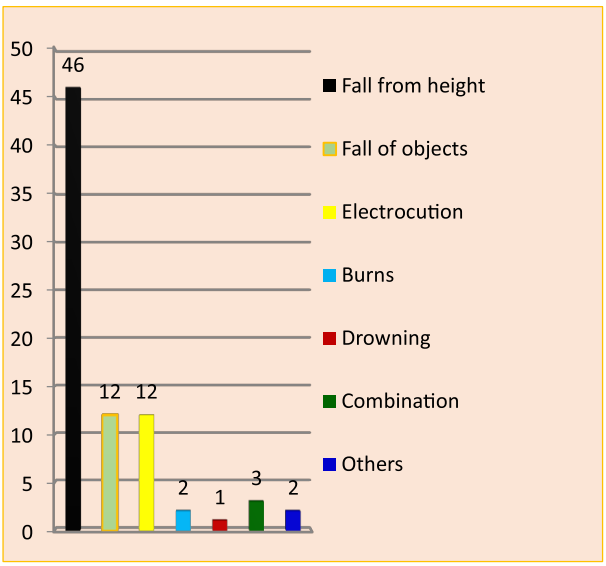
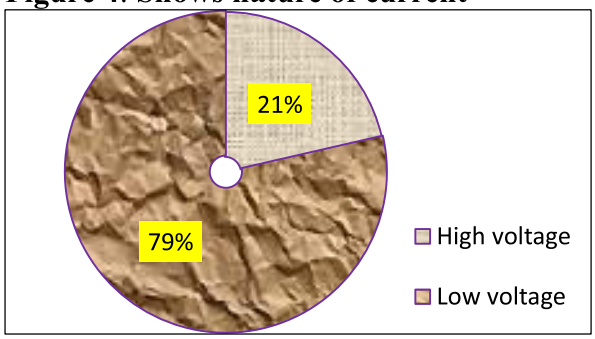


Figure 4: Shows nature of current



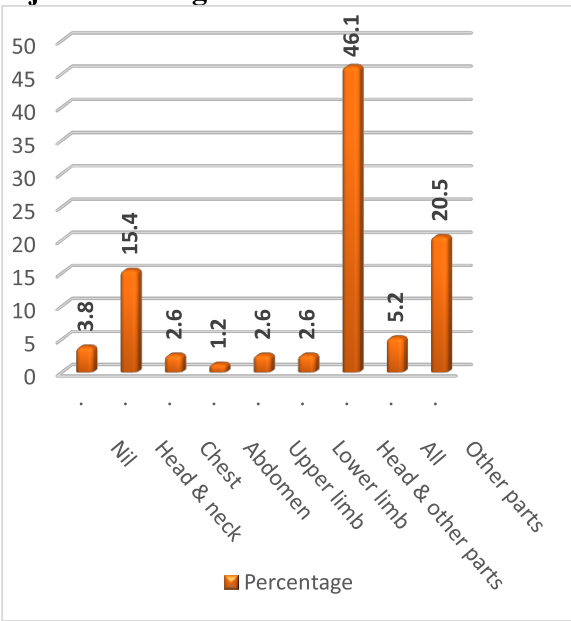
presented as flash burns and low voltage presented as contact mark. Part of the body involved was mainly upper limb followed by both limbs. Electric contact mark of entry was present in 85.7 %. Exit mark was present only in 7.2 %. Out of 3 cases of death due to burns injury at workplace, source of burns was thermal, acid and electric current. 1 death was due to drowning in a lake while fishing by a fisherman. Deaths due to other causes included death due to faulty machinery and device. Protective measures at workplace were available in 5 [6.2%] cases.

Majority of cases [46.1%] had external injuries confined to head and other body parts, 15.4% had injuries confined to head alone. (Fig 5) 37.3% had a combination of external injuries, 26.9% had all types of injuries, 14.2% had only abrasions, 6.4% had only lacerations, and 3.8% did not have any external injuries. (Fig 6)

Among the skull fractures 19.1% had fracture over the base and 14.2% over both vault and base. 2.9% had a fissured fracture, 7.7% had combination of fractures and 6.4% had comminuted fracture. Subdural hemorrhage and subarachnoid hemorrhage in combination was seen in 30.8 %, whereas subdural hemorrhage and subarachnoid hemorrhage alone were seen in 5.1 % each. Brain contusion was seen in 15.4% and laceration in 9%. Common area of brain injury was base and frontal of 11.5% and 7.7% respectively.

Majority of deaths were due to shock and hemorrhage [46.1%], followed by shock [10.3%]. Coma and head injury constituted 10 and 8 cases respectively.

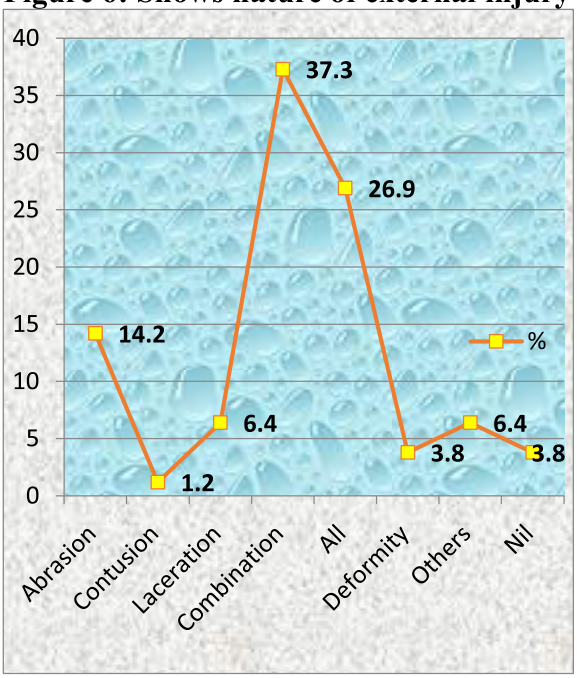
Figure 5: Shows distribution of external injuries among victims



Discussion:

This study was done prospectively and retrospectively for a period of 5 years over the eastern part of bengaluru on fatal injuries at work place. Out of a total of 848 autopsies conducted at Vydehi hospital, 78 cases of fatal workplace injuries were noted which constituted 9.2% of unnatural deaths. Male predominance [93.6%] was noted in our

Figure 6: Shows nature of external injury



study. Age group of the victims in our study ranged from 18 years to more than 50 years. The maximum number of deaths occurred in the age group of 21 years to 25 years (25.6%) followed by 26 years to 30 years (19.2%). Similar findings were also observed in the study done at Aurangabad which showed the age range as 21 to 30 years [31.48%] and in Uttaranchal 18 to 36 years [64.28%].[8, 10, 11]

Construction sector accounted for more fatal work injuries than any other industry according to the Bureau of Labor Statistics which correlates with our study where in 69.2% fatalities were among construction laborers. In another study majority of the accidents occurred in construction sectors (48.4%) and demolition sites (16.4%) [10.]

In our study, majority of deaths were due to fall from height (59%). 15.4% each due to fall of objects and electrocution. 2.6% were due to burns, 3.8% due to combination of fall and electrocution/electrocution and burns. 1.2% due to drowning. Accidental falls and being struck by falling objects accounted for 1 in 10 cases. Males and those working at construction were at the greatest risk.[12, 13, 14]

A study was done to estimate the death rates from occupational injuries in Israel over a period of 30 months. It was observed that two thirds of the occupational fatalities were in construction business and were due to fall from a height resulting in death from multiple traumas.[15] Similar findings were observed in another study where, 52.35% of the cases were due to injuries, followed by electrocution, burns, traumatic asphyxia and least with drowning.[14, 16.] The study was conducted during 2002 – 2008 of the construction fatalities. Half of the construction fatalities were caused by fall from height most of which was due to sudden breaking of a surface walkway and nearly 20% by fall of objects including burial.[17]

In our study 46.1 % had external injuries confined to head and other body parts, 15.4% had injuries confined to head alone, 37.3% had a combination of external injuries, 26.9% had all types of injuries, 14.2% had only abrasions, 6.4 % had only lacerations, and 3.8% did not have any external injuries. Similarly, in their study injured parts of the body more frequently affected were head and multiple parts. Similar findings were also observed internally where brain and spinal cord and skeletal injuries were higher in number.[18, 19, and 20.]

Causes of death in 46.1% were shock and hemorrhage, followed by head injury and coma (due to head injury) 23.1%. This is consistent with the other two similar studies.[11, 18]

Majority of victims had a work experience of 6 months to 1 year [33.4%], followed by 1 year to 2 years [30.8%] and this is similar to their study where majority of the accidents at workplace involved workers having 6 months to 2 years of work experience [44.5%]. According to him approximately 50% of the employees had accident in first six months of employment followed by 23% in the next months and 3% subsequently.[18, 21]

An effective training program can reduce the numbers of injuries and death, property damage, legal liabilities, illness, workers' compensation claims and missed time from work. A safety training program can also help a trainer to keep the required OSHA (Occupational Safety and Health Administration) mandated safety training courses organized and up-to-date.[22]

In our study, details of protective measures were not known for 56.4 %. Protective measures at workplace were available in 6.2 % cases. Out of this 3.8 % had utilized the facility and 2.6% had not utilized the facility. According to their study equipment insufficiency has doubled as a cause of work place accident.

Out of 14 cases of fatal electrocution at workplace, low voltage electrocution constituted the majority [78.6%]. High voltage electrocution presented as flash burns and low voltage presented as contact mark. Part of the body involved was mainly upper limb followed by both limbs. Electric contact mark of entry was present in 85.7%. Exit mark was present only in 7.2%. Cause of death was given as shock in 78.6 %. Findings are similar to the studies where upper extremity is commonly involved. [23, 24]

Conclusion:

Male and young workers constituted the bulk. Majority of the victims were construction laborers followed by carpenters and electrical workers. Protective measures were not available in most of the cases. Falls from height was most common type of event followed by fall of objects and electrocution. External injuries frequently noted were abrasions and combinations of other injuries. Head and other parts of the body were commonly injured. Considering the results of the study as well as the importance of construction industries in countries such as India, more emphasis on preventive measures such as training the workers and using standard safety tools plus surveillance of the employers can effectively reduce the burden of such injuries. Such preventive strategies are obviously less expensive for workers, employers, and all societies.

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Conflict of interest Statement: None.

Ethical Clearance: Obtained

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