

Fatal Accidental fall from height – Retrospective autopsy study from 2004 – 2009

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Abstract

The incidence of falls and associated mortality due to falls is a major contributor to injury and leading cause of global burden of disease. Falling is a major cause of personal injury. Builders and Miners represent worker categories representing high rates of fall injuries. In this retrospective study, fatal cases of accidental fall were autopsied during the period 01-01-2004 to 31-12-2009, were analyzed at the Department of Forensic Medicine and Toxicology, J.N. Medical College, Belgaum, Karnataka. The majority of cases were male (70 cases; 89.7%) as compared with female (8 cases; 10.3%). The male-to-female ratio was 8.7:1. The commonest age group involved was 31-40 years (26 cases; 33.4%), followed by 21-30 years (18 cases; 23.1%). Exercise interventions reduce risk and rate of falls. Research is needed to confirm the contexts in which multi-factorial assessment and intervention, home safety interventions, and other interventions are effective.

Key Words: Fall from height, accident, prevention, cause of death, mortality

Introduction

Incidence of falls and associated mortality is a major cause of global burden. Fall is a major cause of personal injury in all the age groups. In the world, fall accounted for 3,92,000 deaths in the year 2002 and in India 8,800 deaths in 2003¹. After motor vehicle-related injuries, falls of all kinds are the second leading cause of death from unintentional injury in the United States, accounting for more than 13,000 deaths during 19982. Falls are the leading cause of fatal injury, with several hundred thousand hospitalizations annually and almost nine million persons treated in emergency departments who do not require hospitalization³. In urban settings, fatal falls are a phenomenon that significantly contributes to population mortality. The injuries sustained vary depending on the falling height, the composition of the impact surface, the position of the body when landing and individual factors such as age, body weight and preexisting disease. In some urban areas, falls have represented up to 20% of the deaths from unintentional injury. The majority of fall-related fatalities are associated with falls from heights^{2,4,5}.

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Material & Methods

In this retrospective study, fatal cases of accidental fall autopsied during the period 01-01-2004 to 31-12-2009 were analyzed at the Department of Forensic Medicine and Toxicology, J.N. Medical College, Belgaum, Karnataka. All the deaths which are due to history of fall from height are included and data were analyzed with regard to age, sex, location of fall, pattern of injury, cause of death and seasonal variation based on the medical records and the evaluation of autopsy reports.

Results

Majority of cases were male (70 cases; 89.7%) as compared with female (8 cases; 10.3%). Male-to-female ratio was 8.7:1. The commonest age group involved was 31-40 years (26 cases; 33.4%), followed by 21-30 years (18 cases; 23.1%). The least common age group involved was 61-70years (3 cases; 3.8%) [Table 1]. Majority of falls occurred during the month of June (14 cases; 17.9%) [Table 2]. More than half of the falls (35 cases; 44.9%) occurred during the afternoon hours i.e 12 noon to 6 pm [Table 3]. Most of the victims (48 cases; 61.5%) were from urban areas [Table 4]. Majority of the falls were from roof top (21 cases; 26.9%), followed by balcony (15 cases; 19.2%) and least from the wall (2 case; 2.6%) [Table 5]. Head and face was the most commonly involved region (38 cases; 48.7%), followed by extremity (22 cases; 28.2%). [Table 6]. Intracranial injury (59 cases; 75.6%) was the most common cause of death, followed by hemorrhagic shock resulting from visceral and bony injuries (10 cases; 12.8%) [Table 7]. In intracranial injuries subdural hemorrhage (46 cases; 58.9%) was the commonest cause followed by subarachnoid hemorrhage (30 cases; 38.5%) (Table 8).

Table 1. Age and Sex wise distribution of cases:

Age (Years)	Male	Female	Total	
			No.	%
1-10	02	03	05	06.4
11-20	08	00	08	10.3
21-30	17	01	18	23.1
31-40	26	00	26	33.4
41-50	09	00	09	11.5
51-60	03	02	05	06.4
61-70	02	01	03	03.8
71-80	03	01	04	05.1
Total	70	08	78	100

Table 2. Month wise distribution of cases:

Month	No.	%
January	08	10.3
February	10	12.8
March	04	05.3
April	08	10.3
May	05	06.4
June	14	17.9
July	10	12.8
August	03	03.8
September	05	06.4
October	05	06.4
November	03	03.8
December	03	03.8
Total	78	100

Table 3. Distribution of cases based on time of fall:

Time	No.	%
6 am-12 noon	22	28.3
12 noon-6 pm	35	44.9
6 pm-12 mid night	14	17.9
12 midnight-6 am	07	08.9
Total	78	100

Table 4. Distribution of cases based on place of residence (urban/ rural):

Residence	No.	%
Urban	48	61.5
Rural	30	38.5
Total	78	100

Table 5. Distribution of cases based on Type/ Place of Fall:

Type/ Place	No.	%
Rooftop	21	26.9
Staircase	09	11.5
Balcony	15	19.2
Bed/ Crib	06	07.7
Chair/ Furniture/ Playing equipment	12	15.5
Window	02	02.6
Wall	02	02.6
Ladder	04	05.1
Tree	07	08.9
Total	78	100

Table 6. Distribution of cases based on Injury to the body region:

Body Region	No.	%
Head & Face	38	48.7
Neck	02	02.5
Thorax	08	10.3
Abdomen & Pelvis	08	10.3
Extremity	22	28.2
Total	78	100

Discussion

The majority of cases were male (70 cases; 89.7%) as compared with female (8 cases; 10.3%). The male-to-female ratio was 8.7:1. Rates of adult injury are significantly higher in men than in women, likely because of occupational predisposition. This is consistent with the other studies 6-8.

The commonest age group involved was 31-40 years (26 cases; 33.4%), followed by 21-30 years (18 cases; 23.1%). The least common age group involved was 61-70years (3 cases; 3.8%). Majority of falls occurred during the month of June (14 cases; 17.9%). This is consistent with the study done by Behera *C et al*⁶.

Table 7. Distribution of cases based on Cause of death:

Causes	No.	%
Intracranial injury	59	75.6
Hemorrhagic shock	10	12.8
Septicemia	5	6.5
Spinal shock	4	5.1
Total	78	100

Table 8. Distribution of cases based on Intracranial injuries:

Intracranial injuries	No.	%
Extradural Haemorrhage	21	26.9
Subdural Haemorrhage	46	58.9
Subarachnoid Haemorrhage	30	38.5
Intracerebral Haemorrhage	38	48.7
Cerebral injuries	17	21.8

Most of the falls occurred during 6am-6pm (35 cases; 44.9%), which is the usually working time for adults. Falls from elevation hazards are present at most every jobsite, and many workers are exposed to these hazards daily. As such, falls are an important topic for occupational safety and health services. Any walking/working surface could be a potential fall hazard¹.

Most of the victims (48 cases; 61.5%) were from urban areas. In the study done by Elisabeth E. Türk, falls from height are a phenomenon that significantly contributes to population morbidity and mortality in urban settings⁹.

Majority of the falls were from roof top (21 cases; 26.9%), followed by balcony (15 cases; 19.2%) and least from the wall (2 case; 2.6%). In the study done by Goren S, et al, the majority of falls were from rooftops or balconies due to the tendency of people to sit and sleep on these places during the hotter months of the year 6,8.

Head and face was the most commonly involved region (38 cases; 48.7%), followed by extremity (22 cases; 28.2%). Intracranial injury (59 cases; 75.6%) was the most common cause of death, followed by hemorrhagic shock resulting from visceral and bony injuries (10 cases; 12.8%). In intracranial injuries subdural hemorrhage (46 cases; 58.9%) was the commonest cause followed by subarachnoid hemorrhage (30 cases; 38.5%). In the study done by Behera C, et al, the most common cause of death was head injury (80.43%) followed by hemorrhagic shock resulting from intra-abdominal and intra-thoracic visceral injuries (9.78%) and injury to the neck (4.34%)⁶.

Conclusions

Injuries resulting from accidental falls are now days increasing drastically. The working adults and elderly people are at risk of significant injury and prolonged hospital stays. The causes for accidental fall are multi-factorial and might be related to increased popularity of home renovations. As a forensic expert we should target this population to educate in right way. Interventions

to prevent falls that are likely to be effective are now available. Costs per fall prevented have been established for the interventions and careful economic modeling in the context of the local healthcare system is important. Exercise interventions reduce risk and rate of falls. Research is needed to confirm the contexts in which multi-factorial assessment and intervention, home safety interventions, and other interventions are effective. A workplace health and safety plan should be prepared by a principal contractor at a construction workplace and by an employer or self-employed person carrying out specified work. The plan should include: hazards to health and safety from working on an elevated position, or a place from which a person can fall, assessment of the risks which may result because of the hazards, control measures to eliminate or minimize the level of risks, how the control measures are to be monitored and reviewed. Control measures must be in place before a person starts working at heights. In some circumstances more than one control measure may be necessary¹⁰.

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