Indian Journal of Forensic Medicine and Toxicology
Volume 16 No. 3, July-September 2022
DOI: http://dx.doi.org/XXXXX/ijfmt.XXXXX.16322.1

Pattern and Distribution of Injuries from the Fall from the Height in Fatal Cases in a Tertiary Care Hospital, Chennai

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How to cite this article: Amirtha Sultana, Yuhesh Somasundaram, Shankar Subramanian et al. Pattern and Distribution of Injuries from the Fall from the Height in Fatal Cases in a Tertiary Care Hospital, Chennai, Indian Journal of Forensic Medicine and Toxicology 2022;16(3):1-5.

Abstract

Background: The second leading cause for the injury related deaths is fall from height. The injuries fatalities depends on the height of fall and its impact surface. Landing position is also considered as an important parameter.

Aim: The aim of the study is to study the pattern and distribution of injuries from the fall from height in fatal cases.

Methodology: This study includes 100 cases of victims brought to the tertiary care hospital with the history of fall from the height. The cases were brought from the accident site or after death as a consequence of fall in this tertiary care hospital. During autopsy all the relevant details like basic details and the injury details like dimensions,injury types and the primary impact site were taken. Blood and urine examination were done for finding alcohol and drugs. Data entered in MS excel and analysis done in SPSS 23 software. P value <0.05 is considered to be significant.

Results: Majority of the study participants belongs to 31-40 years of age group(30%) followed by 41-50 years of age (18%). Male predominance was observed in our study (90%).34% were daily labours. The most common external injury is abrasion noted in 90% of the study participants. The most common primary impact site was head (50%) followed by backside (12%).

Conclusion: Fall from heights cause significant morbidity and mortality. It is important to create awareness among the workers and to provide safety gears for the persons working in construction sites.

Keywords: Fall; height; morbidity; mortality; Impact.

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Introduction

According to the International classification of the disease fall is defined as An event which results in a person coming to rest inadvertently on the floor or the ground or the lower level. Next to the Traffic accidents, it is the fall from the height which is considered as the major cause of the trauma in both developing and the developed countries. Each year 646000 falls occurs approximately. In Low income countries and the middle income countries the falls related fatalities occurs in 80% of the population. Falls accounts for 60% of deaths in the south east asia region and the Western Pacific region. In the year 2019 according to the NCRB (National Crime Records Bureau accident and suicide statistics) it was observed that around 12048 cases of falls have been registered in India.[1] Of which the male female ratio was found to be 5.4:1 where 11997 were fatal cases. The most common victims belongs to 30-45 years of age.[2]

Fall from the height is the most common cause of severe blunt trauma in India. In Present situation the falls from the height was found to be increased in urban areas due to the increased construction activities. It occurs generally in the accidents, suicides and to less extent in homicides. Soon after the fall there is a damage in the body due to the energy absorption at the impact site. This energy is similar to the kinetic energy which will cause the injuries to the body parts. The velocity will depends on the height of fall to some extent. The pattern of injuries depends upon many factors like the height of fall, velocity, the primary impact site, the contact tissue viscosity and elasticity and ground surface etc.[3] Around 37.3 million falls requires medical attention due to the severity of the injury. Such falls will also leads to DALY (Disability adjusted life years) lost. Falls most commonly occurs in 65 years or more followed by 15-19 years of age and <15 years of age. This study was aimed to study the pattern and distribution of injuries from the fall from height in fatal cases.

Methodology

Study setting:

Hospital based cross sectional study was conducted in the Department of Forensic Medicine, Madras Medical College, Chennai which is a tertiary care centre. The study was done for a period of one year, from August 2016 to August 2017.

Sample Size:

All the victims brought from the accident site or after death as a consequence of fall during the study period were included. The sample attained is 100.

Data Collection:

The following parameters were documented in the study proforma.

1. Personal particulars like Name, Age, Gender, occupation, nature of fall, site of primary impact, nature of floor on which they fall, height from which they fall, period of survival were documented from the investigating officers.
2. In fall from height cases,the height was determined by visiting the crime scene and taking measurements.
3. Survival period was calculated from the treatment findings and the autopsy findings.
4. Precipitating factors like mental illness, epilepsy, natural diseases and the use of drugs or alcohol were found with special efforts.
5. Data related to the injury types (internal or external), nature of injury, its dimensions and location where also recorded. Primary impact injuries photo was taken and noted.
6. Blood and urine examimation were done for analysis of alcohol or drugs if suspicion.
7. For the treated patients clinical data was obtained.
8. Autopsy was conducted by Letulle's method of an en masse removal of viscera and dissection of organs.
9. Dissection of head, scalp, dura, vault and base of skull were examined for the head injuries. To find out the kind of hemorrhage like Sub dural Haemorrhage (SDH), Extra dural Hemorrhage (EDH), Sub Arachnoid Hemorrhage (SAH), Intra ventricular Haemorrhage (IVH) and the Intra cerebral Haemorrhage (ICH), brain was dissected carefully. The blood infiltration areas were cleaned with the help of water, then it is dissected an examined to assess the nature of injury and its extent.

Statistical analysis:

After collecting the data, it was entered in MS excel Windows 10. Statistical analysis was done in SPSS 23. Continuous data were expressed in terms of Mean±Standard deviation and Categorical variable were expressed in terms of numbers percentages. P value of <0.05 is considered as significant.

Results

Table 1: Age and sex of the Victims

Age of the victim	Male	Female	Total
<10	0	1	1
11-20	7	2	9
21-30	16	0	16
31-40	27	3	30
41-50	18	0	18
51-60	16	2	18
>60	6	2	8
Total	90	10	100

Among the study participants majority were male (90%) followed by Females (10%). Most of male study participants belongs to 31-40 age category followed by 41 to 50 years of age. Among the female majority belongs to 31-40 years of age.

Table 2: Occupational status of the victims:

Occupation	Number
Daily Labour	34
Construction worker	15
Unemployed	14
Student	10
Others	9
Painter	7
Driver	5
Farmer	2
IT worker	2
Own business	2

In our study 34% were Daily laboureres,15% were construction workers and 14% were unemployed.

Table 3: Distribution of primary impact injuries:

Part of the body injured	Primary impact injuries (N)
Head	50
Back	12
Chest	10
Neck	9
Shoulder	7
Foot	7
Face	5

More than 50% of the study participants have primary impact on Head followed by Back 12% and in turn by Chest 10%.

Table 4: Pattern of injuries:

Nature of injury	Number(N)
Abrasions	90
Contusions	11
Lacerations	31
Fractures	131
Intracranial Hemorrhage	82

In our study for majority of victims Fractures were noted 131 Followed by Abrasions which is observed in 90 cases.Intracrainal hemorrhage is noted in 82 Cases. Among fractures noted the most common site of fracture is Skull which alone noted in 40 cases followed by the Base of the skull fracture which is noted in 37 cases.

Table 5: Distribution of the fatal injuries:

Site of injury	Number of cases (N)
Head injury	34
Multiple injury	31
Spinal injury	17
Cerebrospinal injury	11
Pelvic injury	4
Blunt injury abdomen	2
Multiple	1
Total	31

Most of the study participants in our study had head injury 34% followed by multiple injuries 31%. 17% had spinal injury and 11% had cerebrospinal injury.

Discussion

In our study out of the 100 cases with the history of fall from the height 90% were male and the remaining 10% were female.These results were supported by the studies done by Mukesh et al.[4], Lalwani S et al.[5] and Kumar JVK et al.[6] The maximum cases belonged to 31-40 years of age (30%) followed by 41-50 years (18%) and 51-60 years of age (18%). Majority of the victims belongs to 21-50 years of age

(64%). Similar results were observed in Mukesh et al. study, Prathapan V et al.[7] and Kohli A[8] et al. Most of the female victims belongs to 11-20 years of age.

In present study the primary impact site was head (50%) followed by back of the body (12%). Similarly Prathapan V et al.[7] also in his study on fall from the heights observed that 53% of his cases have head as primary site of impact.Similarly 46.6% of the cases have head as the primary site of impact in study done by Kumar JVK et al.[6]

The most common external injury observed in our study is Abrasions 90%. Contusion was least in our study 11%. Similar results was also observed in Mukesh et al.[4] study where he found abrasion alone in 16(40%) and abrasion with other wounds in 27(67.5%). Contusion reported in 3(7.5%) of his cases.

In Fatal injuries head, Spinal and Cerebrospinal injury together constitute 62%. Intracraninal hemorrhage was noted in 82% of our study participants. Sub arachnoid hemorrhage was common type noted followed by subdural type. Similar results was observed in Mukesh et al. study[4] and also in the Hartshorne et al.[9] and also in the Goonetilleke et al.[3]

Liver is the common organ to be injured in the abdomen. Heart damage and Kidney's damage is not observed. Heart is not damaged as it has rib cage to protect it. Kidney's due to its small size and its location it narrowly escapes from the damage. The results of the Hartshone et al. was different from our results .He stated that that chest injury and the abdominal injury were very rare. We can explain that if the height of the fall increases the injury to chest and abdomen will increase.

Limitation:

The main limitation of the study is it is a single centric study and we didn't compare rural and urban population. Secondly in our study we didn't mention the height of the falls. Thirdly the time interval between the injury and death is not noted in our study. Substance abuse history and pattern was not elicited.

Funding:

No funding is given for any of the authors

Competing Interests:

There is no Competing Interest

Acknowledgement

The authors like to thank the Head of the Department of Forensic Medicine, Medical College, ESI medical college Coimbatore.

Conclusion

It is concluded in our study that most of the fall from height occurs in workplace. The patterns were different from that of the ground level fall or of pedestrian injuries. Skull fractures involves vault and the base. Intracranial and intraventricle hemorrhage also noted along with the fractures. Head injury is followed by spinal injury and cerebrospinal injury. Most of the victims were daily labourers followed by the construction workers.

Recommendations:

It is recommended to do a multicentric study all over the country to study all patterns of injuries. Awareness camps should be conducted to the public about the risks involved in the rooftops and about the safety measures for the prevention of falls. Proper lighting and safety railing should be present in all balconies and roofs. For workers involved in construction of multistorey building it is essential to give safety gears like helmet, Airbags and nets. Pre employment risk assessment is essential before placement to rule out comorbidities like hypertension and the diabetes.

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