Sociodemographic Profile and Pattern of Injuries Due to Fall From Height in a Tertiary Hospital of South India- A 2 Year Retrospective Study

P Shruthi[1], U.S Tanuja[2]

[1]Associate Professor, Department of Forensic Medicine and Toxicology, Saveetha Medical College, Thandalam, Chennai, Tamilnadu, [2]Undergraduate student, Department of Forensic Medicine and Toxicology, Saveetha Medical College, Thandalam, Chennai, Tamilnadu

Abstract

Globally, falls from height (FFH) are a substantial public health peril and are among the foremost causes of serious and fatal injuries sustained to a victim. Falls are the second leading cause of accidental or unintentional injury deaths worldwide. This retrospective study consisting of 182 cases was undertaken to study the sociodemographic profile and injury pattern in victims of fall from height for a period of 2 years . Males outnumbered the females (3.04:1). Most of the victims were construction workers (43.40%) by occupation . Most of incidents 117 (64.28%) took place in semi urban area and 45 (24.72%) victims occurred in the Urban locality. 49.45% of the cases (90) occurred in the summer season.37.91% of the events were seen between 12 Noon to 6 PM. In majority of cases, side of the body was the primary site of impact (25.27%) followed by head injury (21.43). 12.08% of the cases turned fatal. Implementation of adequate safety measures would effectively reduce the incidence of mortality and morbidity associated with fall from height .

Keywords: *Fall , height, accident, construction, head injury, sociodemographic profile*

Introduction

A fall is defined as an event which results in a person coming to rest inadvertently on the ground or floor or other lower level. An estimated 6,46,000 fatal falls occur each year, making it the second leading cause of unintentional injury death, after road traffic injuries. Over 80% of fall-related fatalities occur in low- and middle-income countries, with regions of the Western Pacific and South East Asia accounting for 60% of these deaths. In all regions of the world, death rates are highest among adults over the age of 60 years. About 37.3 million falls occur each year that are severe enough to require medical attention. Such falls are responsible for over 17 million DALYs (disability-adjusted life years) lost. The largest morbidity occurs in people aged 65 years or older, young adults aged 15–29 years and children aged 15 years or younger.[1]

According to the Accident and suicide statistics of National Crime Records Bureau (NCRB) for the year 2019, a total of 12048 cases of fall from height were registered in India. Out of this, 11997 cases were fatal with male : female ratio being 5.4:1.The burden was seen more in victims belonging to age groups between 30-45 years of age. [2]

Many factors affect the mortality and morbidity of falls, such as age of the victim, height of fall, cause of fall, type of ground on which the victim fell, and body parts injured. This study was aimed to analyze the demographic characteristics of victims of falls from height , the injuries sustained and their effects on morbidity and mortality.

Corresponding Author:
Dr. Shruthi P
Associate Professor, Department of Forensic Medicine and Toxicology, Saveetha Medical College, Saveetha University, SIMATS, Thandalam, Chennai, Tamilnadu-602105. Email: shrupvs@gmail.com
Phone:09741225147

Methodology

A retrospective study of 182 cases due to fall from height for a period of 2 years, from January 2018 to December 2019 was studied in the Department of Forensic Medicine and Toxicology, Saveetha Medical College and Hospital, Chennai. Data pertaining to sociodemographic profile like age, sex, occupation, location of accidents, season , socio-economic status and injury patterns was collected from the records from the emergency medicine and medical records departments related to victims of fall from height. The obtained data was entered in excel sheet and analyzed using appropriate statistical tests using SPSS Software Version 24.

Observations and Results

Out of 182 victims studied, Males (137) outnumbered the females (45) in the present study, with the ratio being 3.04:1. The mean age in the present study was 30.11 years. Majority of cases were in 21-30 years of life (47.25%), followed by cases between 31-40 years (17.04%) and 11 -20 years (12.09%) of life respectively. Least number of cases was reported in the geriatric age group (more than 70 years of age) followed by 1st decade of life. The only age group where females outnumbered the males was in the age group between 41-50 years. However, the maximum incidence of female patients was in 21-30 years of life. The youngest was a baby of 1 year and the oldest being 71 years. [Table 1]

Majority of victims in the present study were construction workers (43.40%) followed by students (26.38%) and housewives (8.24%). Among the study population, retired workers (3.29%) were the least in number. [Fig 1]

Maximum cases were noted between mid noon to 6 pm (69, 37.91%) followed by that between 6 PM to midnight (40, 21.98%). 39 (21.43%) cases were noted between 6 am to 12 noon and from midnight to 6 am, 34(18.68%) of them sustained injuries. The maximum cases presented themselves from semi urban locality, 117 (64.28 %) followed by those which occurred in Urban area, 45 (24.72%) and a very minimal case belonged to the village accounting to 11 % (20) cases. In this retrospective study patients sustained injuries most commonly in summer season 90 (49.45%) followed by winter season 63 (34.62%) and rainy season 29 (15.93%). According to Modified Kuppuswamy scale 2020, majority of the cases belonged to upper lower socioeconomic class 85 (46.70%), followed closely by lower middle socioeconomic class 40 (21.97%). The least numbers belonged to Upper socioeconomic status 9 (4.95%). [Table 2] Injury to the side of the body was seen in 46 victims (25.27%) followed by head region in 39 cases (21.43%). [Fig 2]

Among the patients who sustained injuries to thorax, soft tissue injuries (19.78%) was the maximum followed by fracture of ribs (17.58%) and fracture of sternum (7.69%). Soft tissue injuries to abdomen (24.18%) were seen in majority of the cases followed by splenic rupture (14.29%) and injury to liver (12.64%). Fracture of pelvis had the least incidence (2.20%). Among the patients who sustained injuries to head and neck, soft tissue injuries (26.37%) was the highest followed by intracranial hemorrhages (19.78%) and skull fracture (17.03%). [Table 3,4,5] In this study, mortality was seen in 22 cases.

TABLE 1: AGE AND GENDER WISE DISTRIBUTION

AGE IN YEARS	MALE	FEMALE	TOTAL	RATIO
0-10	1	1	2	1:1
11-20	17	5	22	3.4:1
21-30	69	17	86	4.06:1
31-40	25	6	31	4.16:1
41-50	4	11	15	0.36:1
51-60	13	3	16	4.33:1
61-70	7	2	9	3.5:1
71-80	1	0	1	
TOTAL	137	45	182	3.04:1

TABLE 2: PROFILE OF FALL FROM HEIGHT INJURY CASES (N=182)

CHARACTERISTICS		NO. OF CASES	PERCENTAGE (%)
TIME OF ACCIDENT	12:01AM-06:00AM	34	18.68%
	06:01AM-12:00PM	39	21.43%
	12:01PM-06:00PM	69	37.91%
	06:01PM-12:00AM	40	21.98%
SEASON	SUMMER	90	49.45%
	MONSOON	29	15.93%
	WINTER	63	34.62%
PLACE OF ACCIDENT	URBAN	45	24.72%
	SEMIURBAN	117	64.28%
	RURAL	20	11%
SOCIO ECONOMIC STATUS (MODIFIED KUPPUSWAMY SCALE 2020)	UPPER CLASS	9	4.5%
	UPPER MIDDLE CLASS	32	17.58%
	LOWER MIDDLE CLASS	40	21.97%
	UPPER LOWER CLASS	85	46.7%
	LOWER CLASS	16	9.25%
PARTS OF THE BODY INJURED ON PRIMARY IMPACT	UPPER LIMB	14	7.69%
	LOWER LIMB	29	15.94%
	HEAD AND NECK	39	21.43%
	FRONT OF THE BODY	36	19.78%
	BACK OF THE BODY	18	9.89%
	SIDE OF THE BODY	46	25.27

TABLE 3 : DISTRIBUTION OF STUDY POPULATION ACCORDING TO INJURIES TO THORAX

SL. NO.	PRIMARY IMPACT	NUMBER OF CASES	PERCENTAGE
01	Soft tissue injuries	36	19.78
02	Fracture of ribs	32	17.58
03	Fracture of sternum	14	07.69
04	Lungs	10	05.49
05	Heart	08	4.40
06	Diaphragm	07	3.85

TABLE 4 : DISTRIBUTION OF STUDY POPULATION ACCORDING TO INJURIES TO ABDOMEN

SL. NO.	PRIMARY IMPACT	NUMBER OF CASES	PERCENTAGE
01	Soft tissue injuries	44	24.18
02	Fracture of Pelvis	04	2.20
03	Spleen	26	14.29
04	Liver	23	12.64
05	Kidney	16	8.79
06	Intestines and mesentry	08	4.40
07	Fracture of lumbar vertebrae	07	3.85

TABLE 5 : DISTRIBUTION OF STUDY POPULATION ACCORDING TO INJURIES TO HEAD AND NECK

SL. NO.	PRIMARY IMPACT	NUMBER OF CASES	PERCENTAGE
01	Soft tissue injuries	48	26.37
02	Fracture of Skull	31	17.03
03	Intracranial haemorrhages	36	19.78
04	Fracture of facial bones	05	2.75
05	Fracture of cervical spine	09	4.95

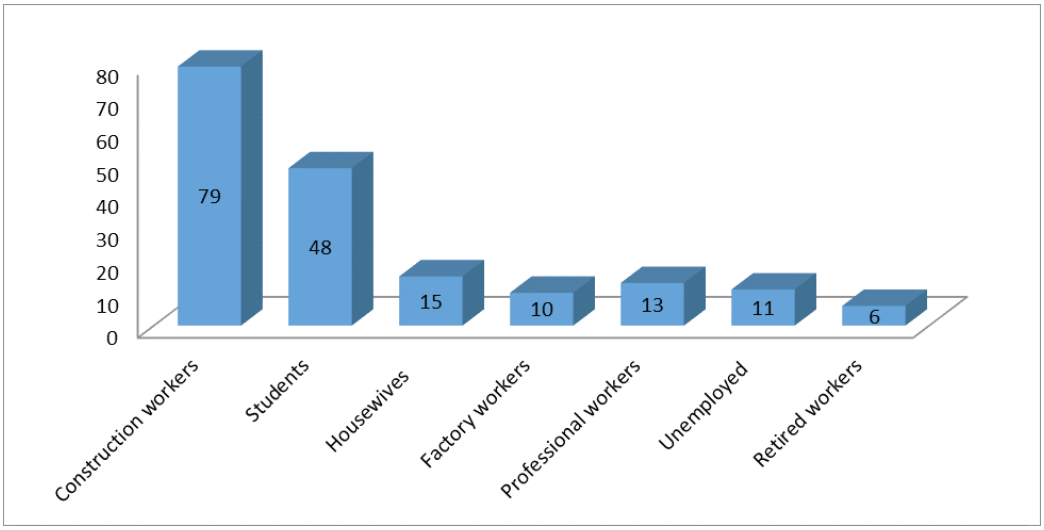

FIG 1: DISTRIBUTION OF STUDY POPULATION BASED ON OCCUPATION

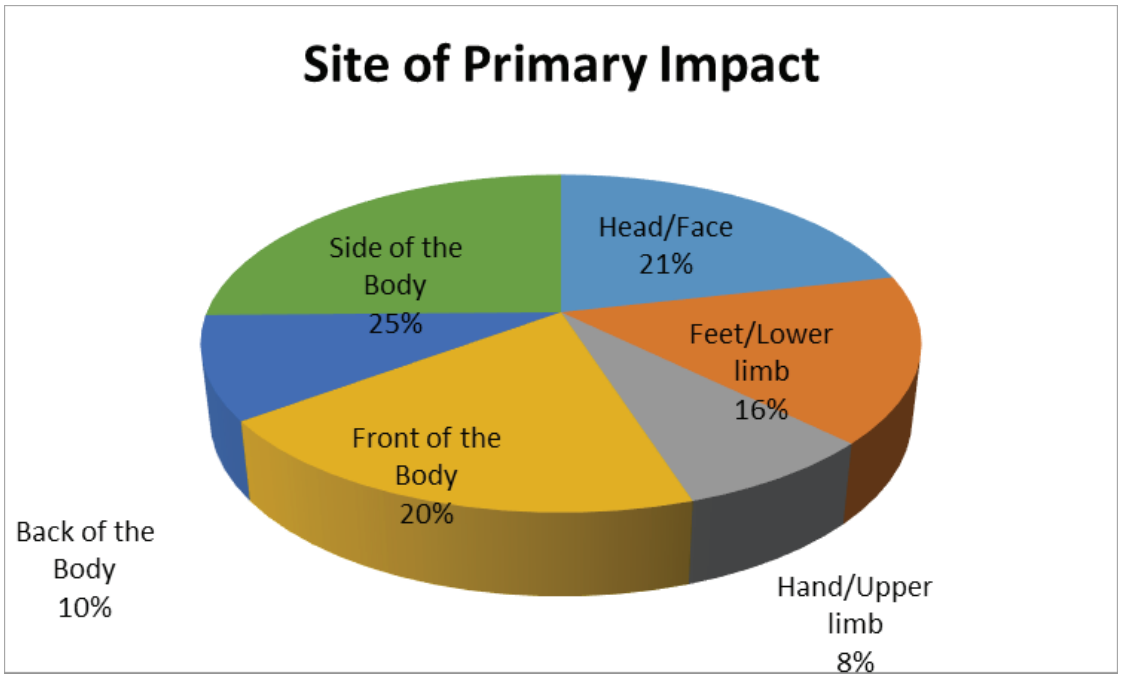

Fig 2: DISTRIBUTION OF INJURIES BASED ON SITE OF PRIMARY IMPACT

Discussion

This study was undertaken to assess the injury patterns of fall from height cases at Saveetha Medical College and Hospital, Chennai. 182 cases who presented over a period of 2 years were retrospectively analyzed.

The victims of fall from height in the present study ranged from 1 to 71 years of age. Majority of victims belonged to 21-30 years of age which was similar to that of the study by Jagannatha SR et al.[3] This may be probably due to reduced work efficiency and expertise in younger age group. Also, younger people with their stressful and ambiguous lifestyles are more vulnerable to falls. However, this finding was dissimilar from the studies done by of authors who reported the highest incidence in 4th and 5th decades of life.[6, 7]

The results of the present study with male: female ratio of 3.04:1 is lesser than that of few authors [3,8]. This variation can be attributed to the regional variations of female and male population of a specific region. The high incidence in males could be due to them being the major breadwinner of the family thereby being exposed to more stress, strain and occupational hazards and also in comparison to females, they have greater amount of eagerness in handling the work at heights.

On looking at the occupation aspect, most of the victims were construction workers (43.40%) which are similar to findings of many authors. [3,4,5,9,10]. Chennai being a developing city, there are lots of emerging buildings employing workers and this could be the main cause behind the accidental falls involving construction workers. Non adoption of basic safety measures, poor working skills, careless attitude, and overconfidence in doing the unusual work could be the reasons causing fatal injuries. Poor sleep hygiene, depression due to excessive workloads, exertion due to rigorous physical activities and working at heights for long intervals are few other predisposing factors for fatigue causing injuries especially in the summer season during the mid noon time period.

Side of the body was the site of primary impact in most cases (25.27%) followed by head (21.43%), and front of the body (19.78%). This result is different from other studies where impact to head had the highest incidence. The present study showed intracranial bleeding in 19.78% cases. Subdural bleeding was the commonest amongst the cases with intracranial hemorrhages (63%). It was often associated with fracture

of skull .Fracture of spine was seen in 16 cases of the present study. Maximum number of cervical spine was noted in primary head impacts (4.95%). Fracture of the vertebrae was usually due to the jackknifing of the torso resulting in flexion/extension of the spine at more than one site. The present study revealed injuries to various parts of skeleton. Fracture of ribs was noted in primary thoracic impacts (17.58%).Regardless of the nature of primary impact, various injuries to internal organs like lungs, heart, liver, spleen and intestines are sustained. However maximum number of lung injuries was in the group of trunk impacts. Maximum incidences of liver injuries were seen in primary trunk and buttock impacts. Spleen was found ruptured in 14.29% cases. [3,8,10]

Conclusion

In conclusion, it was observed that accidental fatalities due to fall from height are mainly preventable. The severity of injuries largely depends on the height from which the person falls, the surface and area of impact, presence or absence of safety gears in case of workplace injuries and age. Head injury is the primary cause of mortality. Most of the victims were construction workers. Pre employment risk assessment should be made mandatory and safety gears like Nets, airbags, harnesses, helmets should be provided for the workers. Limitation of the study is that a small population was studied in a semiurban locality and extrapolation of the data to larger community may not bring out exact burden of the issue. In addition, assessment of substance abuse pattern was not determined due to lack of adequate data.

Conflict of Interest : Nil

Ethical Clearance: Obtained

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