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A RETROSPECTIVE STUDY ON PATTERN OF INJURIES FALL FROM HEIGHT AT TERTIARY CARE HOSPITAL

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Abstract:

Objective: *To analyzed the cases fall from height at tertiary care hospital.*

Material and methods: *This retrospective study was conducted at Department of Forensic Medicine, Quaid-e-Azam Medical College, Bahawalpur/ Shahida Islam Medical Complex Lodhran from March 2018 to September 2018 over the period of 6 months. Total 100 cases having age ≤ 80 years either male or female were selected for this study.*

Regarding the data, nature and pattern of injuries, nature of fall, site of primary impact, height of fall, location of fall were obtained from investigating officers. The height of fall has been determined by visiting the scene and taking measurements.

Results: *Out of 100 cases, 97 (97%) were and 3 (3%) were female. In 63 (63%) cases type of height was tree followed by building in 26 (26%) cases and miscellaneous type of height was 11 (11%). Accident cases were 98 (98%) and suicidal caes were 2 (2%). Out of 53 (53%) cases with head injury, 28 cases were with fall from tree, 18 cases were fall from building and 7 cases miscellaneious. In 21 (21%) cases of trunk injury, 17 cases were fall from tree, 2 cases were fall from building and 2 cases were Misc. Among 15 (15%) cases of buttock injury, 11 cases were fall from tree, 4 cases were fall from building. Out of 7 (7%) cases of leg injury, 5 cases were fall from tree, 1 case was fall from building and 1 Misc.*

Conclusion: *Results of present study showed male predominance as compared female. Most common age group 20-40 years. In mostly cases fall from tree was the type of fall. Accidental fall was the most common manner. Higher number of cases found with head injury.*

Keywords: *Fall, autopsy, injury, skull, head, pattern*

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INTRODUCTION:

Fall is dropping from a relatively high position by the force of gravity. The pattern of injuries in cases of fall from height is dependent on the height, weight, velocity, nature of surface impacted and orientation of body at the movement of impact, elasticity and viscosity of tissue of the contact body region. Height of fall is the major determining factor1.Depending on the conditions affecting, the fall could be either Intrinsic [where some events or conditions affect postural control] or Extrinsic [where an environmental factor is the main contributing reason for the fall]2.

As a person falls, severity of injuries is dependent on the height of fall because Kinetic energy increases due to acceleration during the fall and is maximum at the moment of impact and is transferred to the body causing unique pattern of injuries that depends on inertia of body, moment of the body, rigidity of stationary objects and the nature of ground nature against which body falls3.

The medicolegal analysis the nature and pattern of injuries sustained to the victim to form definite opinion of nature of fall. Determination of anatomical site which first impacts the ground is useful in reconstruction of the event. The amount of kinetic energy acquired during the fall has to be fully expended by the time the body comes to rest so that, if only one impact occurs, it is likely to be more damaging than a series of lesser impacts, such as bouncing or rolling strike.4

This retrospective study has been undertaken to determine the profile, manner and pattern of injuries, factors responsible for the fall from height.

MATERIAL AND METHODS:

This retrospective study was conducted at Department of Forensic Medicine, Quaid-e-Azam Medical College, Bahawalpur/ Shahida Islam Medical Complex Lodhran from March 2018 to September 2018 over the period of 6 months. Total 100 cases having age ≤ 80 years either male or female were selected for this study.

Regarding the data, nature and pattern of injuries, nature of fall, site of primary impact, height of fall, location of fall were obtained from investigating officers. The height of fall has been determined by visiting the scene and taking measurements.

All the collected data was entered in SPSS version 20 and analyzed. Mean and SD was calculated for numerical data and frequencies and percentages were calculated for categorical data.

RESULTS:

Total 100 cases were selected for this study. Out of 100 cases, 97 (97%) were and 3 (3%) were female. (Fig.1). In 63 (63%) cases type of height was tree followed by building in 26 (26%) cases and miscellaneous type of height was 11 (11%). (Fig. 2) Accident cases were 98 (98%) and suicidal caes were 2 (2%). (Fig. 3) Cases were divided into 4 age groups i.e. age group 0-20 years, age group 21-40 years, age group 41-60 years and age group 61-80 years. Total 5 (5%) cases belonged to age group 0-20 years and in 2 cases were fall from tree and 3 cases were fall from building. In age group there were 33 (33%) cases of which 16 cases were fall from tree, 14 cases were fall from building and 3 cases were miscellaneous. Total 43 (43%) cases belonged to age group 41+60 years, fall from tree were 28 cases, fall from building were 7 cases and miscellaneous cases were 8. Age group 61-80 years was consisted on 19 (19%) cases, in which 17 cases were fall from trees, 2 cases were fall from building. (Table 1) Cases were divided according to height of all i.e. 0-5 meters, 6-10 meters, 11-20 meter, 21-30 meters, 31-40 meters, 41-50 meters and >50 meters. Head injuries were noted in 53 (53%) cases followed by trunk injures in 21 (21%) cases, buttock injuries in 15 (15%) cases, leg injuries in 7 (7%) cases and unknown injuries in 4 (4%) cases. (Table 2) Out of 53 (53%) cases with head injury, 28 cases were with fall from tree, 18 cases were fall from building and 7 cases miscellaneious. In 21 (21%) cases of trunk injury, 17 cases were fall from tree, 2 cases were fall from building and 2 cases were Misc. Among 15 (15%) cases of buttock injury, 11 cases were fall from tree, 4 cases were fall from building. Out of 7 (7%) cases of leg injury, 5 cases were fall from tree, 1 case was fall from building and 1 Misc. (Table 3)

Fig. 1: Gender Distribution

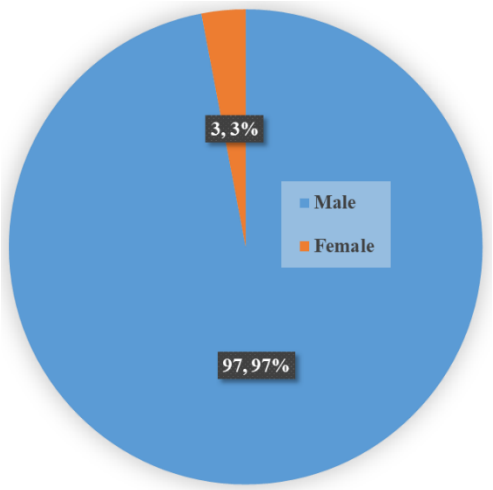

Fig. 2: Type of fall

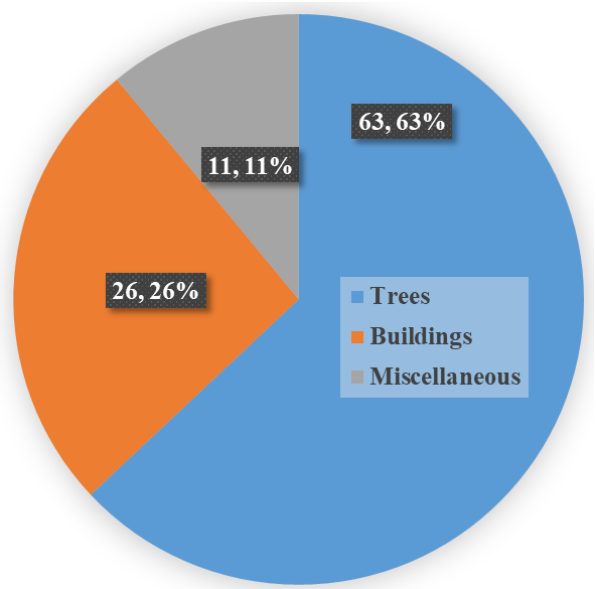

Fig. 3: Manner of fall

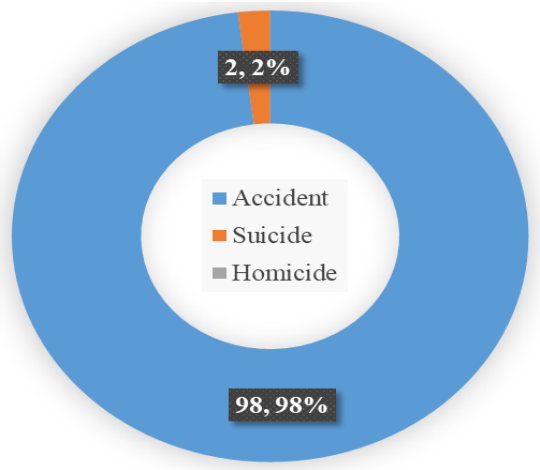

Table 1: Age in relation to type of fall

Age in years	Trees	Buildings	Miscellaneous	Total
0-20	2	3	0	5 (%)
21-40	16	14	3	33 (33%)
41-60	28	7	8	43 (43%)
61-80	17	2	0	19 (19%)
Total	63	26	11	100

Table 2: Pattern of impact in relation to the height of fall

Height of fall in meters	Head	Trunk	Buttock	Leg	Unknown	Percentage
0-5	16	3	2	1	3	25 (25%)
6-10	25	10	9	3	-	47 (47%)
11-20	11	8	4	2	1	26 (26%)
21-30	1	-	-	-	-	1 (1%)
31-40	-	-	-	-	-	-
41-50	-	-	-	1	-	1 (1%)
>50	-	-	-	-	-	-
Total	53 (53%)	21 (21%)	15 (15%)	7 (7%)	4 (4%)	100

Table 3: pattern of impact in relation to the type of fall

Type of impact	Tree	Building	Miscellaneous	Percentage
Head	28	18	7	53 (53%)
Trunk	17	2	2	21 (21%)
Buttock	11	4	0	15 (15%)
Leg	5	1	1	7 (7%)
Unknown	2	1	1	4 (4%)
Total	63	26	11	100

DISCUSSION:

One hundred cases of fall from heights were studied in detail and analyzed. Cases were divided into 4 age groups i.e. age group 0-20 years, age group 21-40 years, age group 41-60 years and age group 61-80 years. Total 5 (5%) cases belonged to age group 0-20 years and in 2 cases were fall from tree and 3 cases were fall from building. In age group there were 33 (33%) cases of which 16 cases were fall from tree, 14 cases were fall from building and 3 cases were miscellaneous. Total 43 (43%) cases belonged to age group 41+60 years, fall from tree were 28 cases, fall from building were 7 cases and miscellaneous cases were 8. Age group 61-80 years was consisted on 19 (19%) cases, in which 17 cases were fall from trees, 2 cases were fall from building. In one study by Ahmad et al[5], most common age group was 21-30 years and consisted on 36.56% cases. Which is similar to our findings. These results were also in accordance with the results of some other studies.[3-4]

This was in accordance with Murthy et al[6] in Karnataka, India; who reported that the maximum number of fall from height cases was seen in the age group 21-30 years (34.61%), the least number of fall from height cases occurred in age group of 61-70 years and 81-90 years, accounting to 1.9% in each group. Also, Grivna et al[7] in United Arab Emirates (UAE), found that the majority (68%) of victims of fall from height were adults of 20–54 years old and 22% were children <19 years.

In contrast Suleyman et al[8] in Diyarbakir region of Turkey, found that 42.6% of deaths of fall from height were reported in the age group less than 15 years. Meanwhile, Al et al[9] found that in Turkey, the mortality incidence was high in patients who were older than 60 years.

In present study, out of 100 cases, 97 (97%) were male and 3 (3%) were female. This was in agreement with Cripps and Carman[10] in Australia, who reported a 71% male predominance among cases of fall from height. Later on, Driscoll et al[11] in Australia confirmed that the risk of fatal injury from falls was 10 times greater in men. In contrast, Stevens[12] and Sogolow and Orces[13] found that in

USA, the higher prevalence of fall related injuries and deaths among women. Also, Saari et al[14] found that in Finland, the rate of injurious falls per thousand person-years was 188 among women and 78 among men. Mirza et al[15] explained the high prevalence of male death by the fact that males mostly busy in outdoor work and those working at height and thereby likely to die from falls. Females are mostly involved in house work or indoor works, suffer nonfatal fall injuries. Few women may take unnecessary physical risks compared to men.

In present study, cases were divided according to height of all i.e. 0-5 meters, 6-10 meters, 11-20 meter, 21-30 meters, 31-40 meters, 41-50 meters and >50 meters. Head injuries were noted in 53 (53%) cases followed by trunk injures in 21 (21%) cases, buttock injuries in 15 (15%) cases, leg injuries in 7 (7%) cases and unknown injuries in 4 (4%) cases. This was in accordance with Mathis et al[16] in USA; Yagmur et al[17] in Turkey, and Suarez et al[18] in Spain, who found that the majority of fall from height deaths were seen in high level falls. On the other hand Wong et al[19] in Hong Kong and Kumar et al[20] in India confirmed that the majority of cases fell from a height of less than (2 m, 10 m, 6-9 feet) respectively.

In this study, accident cases were 98 (98%) and suicidal caes were 2 (2%). This was not in accordance with Li and Smialek[21] in USA; Richter et al[22] in Germany and Prathapan & Umadethan[23] in India, who found that most of cases of death due to fall from height were accidental (52%, 90%, 98%) respectively. Also, AL et al[9] in Turkey and Sokolewicz et al[24] in Poland, stated that accidental fall from height was the most common manner of death. In contrast, Atanasijevic et al[25] reported that in Serbia and Montenegro, the majority of cases were suicidal (56%), while accidental falls represented 44% of cases. Also, Turk and Toskos[26] found that in Germany, suicidal manner was the most common (50%), followed by accidental manner (34%).

CONCLUSION:

Results of present study showed male predominance as compared female. Most common age group 20-40 years. In mostly cases fall from tree was the type of fall. Accidental fall was the most common manner. Higher number of cases found with head injury.

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