

A Study of Pattern of Vehicular Injuries over Pedestrians: A Retrospective Study

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Abstracts: Objectives: Present study makes a little effort to understand patterns of injuries over pedestrians during road traffic accidents, to set on record a statistical statement of the severity and survival period in pedestrians accidents and to define, delineate and compare present study with other available studies.

Materials and Methods: Present study is based on an analysis of 156 autopsies on victims of pedestrian accidents at Sheth V.S. General Hospital, Ahmedabad during two consecutive years from May 2008 to April 2010. **Result:** This study shows the males (80.8%) are outnumbered the females (19.2%). Evaluation of patterns of injuries shows head injury is overall most common in pedestrians. In primary impact injury head injury (41%) and lower limb injuries (36.5%) are most common followed by pelvic injuries (12.1%). Head injury (33.9%) is again most common in secondary impact injuries. Chest injuries (16.6%) and abdomen injury (12.8%) are most common secondary injuries to pedestrians followed by head (8.3%) and neck (5.1%). Road traffic accidents are the major contributors of unnatural deaths worldwide. Pedestrians are the most commonly involved victims in such cases. [Bhoot R NJIRM 2014; 5(6):78-80]

Key Words: Pedestrian, Injuries, Autopsy, unnatural deaths.

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Introduction: A study done by R M Atkins, W H Turner, R B Duthie and B R Wilde¹, revealed the incidence of death in pedestrians was significantly higher than in car occupants or motorcyclists. The principal determinant of death was the weight of the vehicle concerned. The age distribution was triphasic, showing a large peak at 15-20 years and small peaks at 5 years and 70-75 years. The most common region of injuries was the head (33%) because of a high incidence of brief concussion, but the most common region for serious injuries was the leg with a prevalence varying from 19% in people under 15 to 39% in those over 60. Most of the accidents concerned motorcars or taxis (68%). Other vehicles were motorcycles (11%), buses and coaches (5%), pedal cycles (5%), light goods vehicles (4%), and heavy goods vehicles (4%). A large variety of injuries are sustained by persons involved in traffic accidents. It is always not possible to associate injuries sustained by pedestrians with specific features of external automobile design, especially when the victims are children or the accident is of the low speed type.

INJURIES OF PEDESTRIANS: Three patterns of injury are often seen^{2,6}. (1) Primary impact injuries (the first part struck). (2) Secondary impact injuries (injuries caused by the vehicle), (3) Secondary

injuries, sometimes called tertiary injuries, (injuries caused by the victim's striking objects, such as the ground). In primary impact injuries, the part of the body involved depends upon the position of the person in relation to the vehicle when struck, i.e., whether crossing the road from one side to the other or walking with or against the traffic. The injuries also depend upon the relative heights of various parts of the vehicle, i.e., bumper, fenders, radiator, door handles, etc. If a person is struck from behind, the back of the legs are first struck. If the foot is fixed, a fracture results, and the buttocks and back will come in contact with the car and then pushed forward. He may sustain a fracture-dislocation of the lumbar or thoracic spine, sometimes associated with the fractures of adjacent ribs.

Materials and Method: The present study is a retrospective study consisted of study of 156 cases of pedestrian deaths due to vehicular accidents to determine pattern of injuries whose autopsies were conducted at mortuary of Sheth V.S. General Hospital, Ahmadabad, from May 2008 to April 2010. Total 2369 medico legal autopsies were conducted during the same period.

Analysis of the cases has been carried out, taking into consideration age and sex of the person, circumstances of accidents, time of accidents and regional distribution of pattern of external and internal injuries. While trying to suggest the remedial measures for the reduction of accidents rate, the nature of vehicle used on the road, the widening of narrow roads and the observance and non-observance of traffic rules have been kept in mind. All findings were recorded in specially designed proforma for study. These data was reduced to tables and subsequently subjected to computer added statistically analysis and conclusions were drawn after comparing and discussing with similar type of the work carried out by foreign and Indian scholars. Following are the observations during study-

Analysis:

Table 1: Age and sex wise distribution of pedestrians victims

Age group	Male	Female	Total
0-10 years	7	3	10(6.4%)
11-20 years	14	4	18(11.5%)
21-30 years	22	5	27(17.3%)
31-40 years	15	4	19(12.1%)
41-50 years	21	2	23(14.7%)
51-60 years	30	1	31(19.8%)
Above 60 years	17	11	28(17.9%)
Total	126(80.8%)	30(19.2%)	156 (100%)

126(80.8%) cases out of 156 are males. Males are outnumbered due to more involvement in outdoor activities. Incidence of pedestrian accidents is higher in old age after fifth decade of life. Above 50 years age there is 59(37.8%) fatalities out of total 156. This is due to general age related debility and poor perception of crossing vehicle.

Table 2: Distribution of Cases According To Pattern of Primary Impact Injury

Involvement of Body part	Numbers (%)
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Head	64(41%)
Neck	-
Upper limbs	6(3.8%)
Chest	6(3.8%)
Abdomen	3(1.9%)
Pelvis	19(12.1%)
Lower limbs	57(36.5%)

Table shows head injury (41%) is most common primary impact injury followed by lower limb injuries (36.5%) and pelvic injuries (12.1%).

Table 3: Distribution of Cases According To Pattern of Secondary Impact Injuries over Involved Body Part

Involvement of Body part	Numbers (%)
Head	53(33.9%)
Neck	-
Upper limbs	2(1.3%)
Chest	-
Abdomen	1(0.6%)
Pelvis	1(0.6%)
Lower limbs	-

Table shows head injuries (33.9%) is most common secondary impact injury

Table 4: Distribution of Cases According To Pattern of Secondary Injuries

Body part injured	Numbers
Head	13(8.3%)
Neck	8(5.1%)
Upper limbs	2(1.2%)
Chest	26(16.6%)
Abdomen	20(12.8%)
Pelvis	2(1.2%)
Lower limbs	-

Table shows chest injuries (16.6%) and abdominal injuries (12.8%) are most common secondary injuries.

Table 5: Distribution of Cases According To Circumstances of Accident

Pedestrian movement	Numbers
Crossing the road	83(53.2%)
Walking with traffic	40(25.6%)
Walking against traffic	18(11.5%)
Not known	15(9.6%)
Total	156 (100%)

Table shows that the most commonly accidents occur while pedestrian crossing the road (53.2%) followed by walking with traffic (25.6%) and walking against traffic (11.5%).

Discussion: This study shows the males (80.8%) are outnumbered the females (19.2%). This is due to the fact that males are more involved in outdoor activities.

Above 50 years age group most commonly involved (37.8%). Elderly pedestrians are slower and have movement related limitations. This is the group with dulled senses and delayed motor skills. They usually met an accident during crossing a busy road. At some wider roads traffic signals do not allow enough time to this group of pedestrians to cross safely.

Most of the accidents take place while pedestrian is crossing the road (53.2%). A study done by L. Jean, L. Swee Han, V. Anantharaman and Y. Allen³ in Singapore during year 2003, also show 35.6% pedestrian accidents occur while they were crossing the roads. Some pedestrians might not understand or be aware of signs that convey safe walking procedures. Therefore, some pedestrians might inadvertently enter roads and be struck by oncoming traffic because they are confused. For instance, some pedestrians may jaywalk simply because they do not know where and when they have the right-of-way.

Evaluation of patterns of injuries shows head injury is overall most common in pedestrians. In primary impact injury head injury (41%) and lower limb injuries (36.5%) are most common followed by pelvic injuries (12.1%). Fracture of femur, tibia, fibula and pelvic bones occur when bumper of vehicle struck to lower limbs of pedestrian. Head may injured by direct impact with the vehicle and by striking the road. Head injury as a primary impact present in 41% cases and as a secondary impact present in 33.9% cases. If the vehicle strikes a person below the center of gravity of his body, he is thrown upward and slides on to the hood of the vehicle and may sustain head injury. Injury to upper limbs (1.3%), abdomen (0.6%) and pelvis (0.6%) also seen as secondary impact. Chest injuries (16.6%) and abdomen injury (12.8%) are

most common secondary injuries to pedestrians followed by head (8.3%) and neck (5.1%). When pedestrian thrown away to road after impact with vehicle, injuries to chest (rib fractures, hemothorax, lung lacerations) and injuries to abdomen (liver lacerations, spleen lacerations, thoraco-lumbar spine injury, hemoperitoneum) are commonly seen. Injuries to neck (cervical spine injury) also present as secondary injury.

Conclusion: Head injury is overall most common injury leads to fatalities in pedestrians. It is common in primary as well as secondary impact injuries. Injuries to lower limbs and pelvis are also common in primary impact injuries. Injuries to chest, abdomen and spine are common in secondary injuries. Road safety awareness should be increased to prevent pedestrian deaths. After understanding pattern of injuries in pedestrians we can make proper safety measures.

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