A Postmortem Study of Pedestrian Injuries to Find out Risk Factors And Preventive Measures

Dr. Rajeshkumar R. Bhoot*, Dr. D.A. Silajiya, Dr. P.R. Patel***, Dr. D.S. Patel****, Dr. H.T. Khubchandani*****, Dr. Kamesh A. Modi******

*Assistant Professor **Professor*****Associate Professor ******Tutor, Department of Forensic Medicine and Toxicology, GMERS Medical College, Gandhinagar, ***Professor and Head, Department of Forensic Medicine and Toxicology, SMT. NHL Mun. Medical College, Ahmadabad, ****Professor and Head, Department of Forensic Medicine and Toxicology, GMERS Medical College, Sola, Ahmadabad

Abstracts: Objectives: Present study is a little effort to understand factors responsible for pedestrians accidents, to determine risk factors, sources and causes of mortality involved in pedestrians accidents, to reach a conclusion regarding prevention of pedestrians accidents and reducing pedestrians mortality. Materials and **Method:** Present study is a retrospective study based on an analysis of 156 autopsies on cases of pedestrian accidents at Sheth V.S. General Hospital, Ahmadabad during two consecutive years from May 2008 to April 2010. **Result:** Following risk factors are identified from this study- old age, heavy motor vehicles, city life, morning hours of the day etc. Pedestrians are the most vulnerable to vehicular injuries and victims of road traffic accidents. There is less awareness in pedestrians as well as in drivers of vehicles regarding road traffic accidents and its consequences. [Bhoot R NJIRM 2014; 5(6):94-97]

Key Words: Pedestrians, Vehicular injuries, Collision

Author for correspondence: Dr. Rajeshkumar R Bhoot, Assistant Professor, Department of Forensic Medicine and Toxicology, GMERS Medical College, Civil hospital campus, Sector-12, Gandhinagar, Gujarat.
Email: rajeshbhoot@gmail.com

Introduction: In the United States, in 2003, the National Highway Traffic Safety Administration [1] reported that approximately 4,700 pedestrians were killed and another 70,000 injured due to pedestrian-vehicle crashes. On average, a pedestrian is killed in a traffic collision every 113 minutes and injured every eight minutes. Although only 8.6 percent of all trips are made on foot, 11.4 percent of all traffic deaths are pedestrians. Injuries to all regions of the body increased with age and with the weight of the vehicle in the collision. Accidental injuries were often concerned to young children or the elderly.

A study done by L.Jean, L.Swee Han, V. Anantharaman and Y.Allen [2] in singapore during year 2003, male patients made up 47.1% and female patients 52.9% of the injuries. There were 2 age group peaks for the road traffic accident victims: 17 to 36 years and older than 57 years of age. The victims younger than 16 years were treated at the Kandang Kerbau Children's hospital unless the injuries were life threatening. The highest incidence of accidents occurred between 11 AM and 2:59 PM. Pedestrians were hit while crossing the road in 35.6% of cases. Other locations included collisions at pavements (4.8%), traffic lights (4.8%), zebra crossings (2.9%), car parks (1.9%), and bus stops (1%). Cars were the most frequently involved vehicles (62.5%); 4.8% of victims were intoxicated during the accident.

Factors contributes to pedestrian fatalities are Pedestrian jaywalking, pedestrian alcoholism, pedestrian speed vs crossing device speed, unawareness of law and safety, volume of traffic, type of vehicle, poor timing of crossing signals, poor road design, poor or absent sidewalks in streets, street dogs and other wandering animals etc.

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 risk factors and prevention 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 vehicle involved, age and sex of the person, survival period, 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 Performa 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 Cases

Age group	M	F	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%) victims 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 Type of Offending Vehicle

Type of vehicle	Numbers of victims
Truck	32(20.5%)
Bus	18(11.5%)
Tractor	4(2.5%)
Jeep	11(7%)
Car	17(10.9%)
Three wheeler	16(10.2%)
Motor cycle	25(16%)
Scooter	13(8.3%)
Not known	20(12.8%)
Total	156 (100%)

Table shows that Truck is the most common involved offending vehicle (20.5%) followed by Motor cycle(16%) and Bus(11.5%). Drivers of heavy motor vehicles like Truck and Bus have poor perception of vehicle-pedestrian distance and pedestrian velocity leading to more accidents and fatalities. Two wheelers and light motor vehicles like Car, Jeep etc are involved commonly in city traffic.

Table 3: Distribution of Cases According To Place of Accident

Place of incidence	Numbers of victims
Highway	25(16%)
City	92(59%)
Village	39(25%)
Total	156 (100%)

Table shows maximum accidents take place in Cities (59%) followed by Villages (25%) and Highways (16%). Tempo of life is very fast in cities. All are in hurry including vehicular drivers and pedestrians.

Table 4: Distribution of Cases According To Type of Offending Vehicle With Relation To Place of Accident

Type of vehicle	Accidents at highway	Accidents at city	Accidents at village	Total
Truck	12	10	10	32
Bus	1	16	1	18
Tractor	0	2	2	4
Jeep	3	4	4	11
Car	3	8	6	17
Three wheeler	0	13	3	16
Motor cycle	0	19	6	25
Scooter	2	9	2	13
Not known	4	11	5	20
Total	25	92	39	156

Table shows that among accidents on highway (25), truck (12) is the most common offending vehicle. In city (92), motor cycle (19) is the most common followed by bus (16) and Three wheelers (13). In village (39), truck (10) is the most common.

Prevalence of pedestrian accident by bus is maximum in city (16 out of 18). Motor cycle (19 out of 25) and three wheelers (13 out of 16) also more prevalent in city. Truck is overall the most

common offending vehicle and equally distributed in highway, city and village.

Table 5: Distribution of Cases According To Survival Period

Survival period	Numbers
Spot death	16(10.2%)
0-6 hours	36(23%)
6-12 hours	17(10.9%)
12-24 hours	16(10.2%)
1-7 days	54(34.6%)
More than 7 days	17(10.9%)
Total	156

Table shows 16(10.2%) cases are spot deaths. 36(23%) died in first 6 hours. Most died within a week. Only 17(10.9%) survived beyond a week.

Table 6: Distribution of Cases According To Time of Accident

Time of incidence	Numbers of cases
6 am to 9 am	30(19.2%)
9 am to 12 pm	24(15.4%)
12 pm to 3 pm	22(14.1%)
3 pm to 6 pm	30(19.2%)
6 pm to 9 pm	28(18%)
9 pm to 12 am	15(9.6%)
12 am to 3 am	5(3.2%)
3 am to 6 am	2(1.2%)
Total	156 (100%)

Table shows pedestrian accidents occur maximum during 6 am to 12 pm. It is minimal after midnight (12 am to 6 am).

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.

Heavy motor vehicles like truck and bus etc(31%) are the most commonest offending vehicles. There is poor perception of pedestrian-vehicular distance by drivers of heavy motor vehicles. Cars and two wheelers arethe most commonest offenders in city traffic. Bus is involved in total 18 cases, out of which 16 are in city accidents. In ahmedabad city there are more numbers of buses of AMTS (Ahmedabad Municipal Transport Service) for local transportation. Drivers of these buses drive very carelessly leading to accidents. Accidents by motor cycle (19 out of 25) and three wheelers (13 out of 16) also most common in city. Numbers of two wheeler and three wheeler vehicles increasing largely in city reflecting more numbers of accidents.

Most accidents occurs in city(59%). Cities are most dens and populated area. Vehicle density is also maximum in cities. Parking areas near shopping centers could be highly problematic as there are fewer clear pedestrian paths. Consequently, pedestrians interact more with cars. Construction of sidewalks, streets, and buildings can create temporary unsafe environments for pedestrians. In villages (25%), accidents occur less accidents due to less vehicular as well population density.

Most pedestrians accidents take place during morning hours, 6 am to 12 pm(34.6%). This is the time when most people are in hurry to reach either their business destinations. It is followed by 12 pm to 6 pm(33.3%) as overall vehicle traffic increases during these hours as drivers commute home from work.

Survival period varies greatly in pedestrians. Most died within 6 hours (33.3%) out of which 10.2% were spot deaths. Remainders died mostly in a week. Only 10.9% survived beyond a week.

Conclusion: *Following risk factors and preventive measures identified:*

1. Age- elderly persons commonly involved. Elderly persons should avoid walking on roads alone.
2. Heavy motor vehicles (buses and trucks etc) are most common offending vehicles. Highways are most common place of accidents.

3. Most pedestrians accidents take place during morning hours, 6 am to 12 pm(34.6%).
4. Better road design- Separate pedestrians and vehicles: Pedestrians and vehicles don't mix. By creating structures and systems to keep them apart, we can keep pedestrians safer.
5. Better traffic enforcement can save Pedestrian Lives.
6. Social education and awareness required.

References:

1. Traffic Safety Facts 2003; Pedestrians, US Department of Transportation, Washington, DC. National Highway Traffic Safety Administration 2004, b.
2. L.Jean, L.Swee Han, V.Anantharaman, Y.Allen. Annals of Emergency Medicine, Volume 44, Issue null, S129-S129
3. Pedestrian Accidents and Fatalities: Taking Steps to Keep Pedestrians Safe. May 26, 2010. Posted by Carol L. Schlitt in Car Accidents, Consumer News, Motor Vehicle Cases, Pedestrian Accidents.
4. Justin A. Heinonen and John E. EckPedestrian Injuries and Fatalities.Guide No. 51 (2007)
5. Ballesteros MF, Dischinger PC, Langenberg P.Pedestrian injuries and vehicle type in Maryland, 1995-1999.

Conflict of interest: None
Funding: None