

Study of the Medicolegal Aspects of Traffic Accident Cases in North Bihar.

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ABSTRACT

Background: Traffic accidents have become one of the leading causes of death in recent times. Out of all types of accidents confronting the mankind, traffic accidents claim a major share and the morbidity and mortality due to these is progressively on increase. On a general analysis, several factors seem to be responsible for causing these accidents on the roads including errors on the part of the drivers of the vehicles, the pedestrians or victims, lack of proper traffic system, mechanical defects or failures in the vehicles, bad condition of the roads, overcrowding and encroachment of the main roads or junctions and poor visibility on the pathways. The present study is aimed to assess the magnitude of the problem in northern part of the state. **Methods:** The present work was carried out categorising subjects into two groups. The first group was of those victims brought directly to the mortuary from the site of accident and the second group of those victims who succumbed due to injuries received in the accident in course of treatment in the hospital and later brought to mortuary for autopsy. A case-sheet was prepared for each individual case and all information as per the proforma were noted in it. **Results:** In the present series, a study of 75 cases of traffic accidents have been made. These cases accounted for 23.43% of total medicolegal autopsies conducted in the department during the period. This figure indicated that fatal traffic accidents have a considerable share among all unnatural deaths. **Conclusion:** The present study revealed that traffic accidents take a heavy toll of human lives in this region. Being preventable this should be given due consideration by public health authorities, all the members of medical profession, road safety authorities, legislators and other concerned persons. All the safety measures to prevent these should be evaluated from time to time so that the problems could be highlighted and newer methods employed for safe guarding majority of the population at risk from falling prey of these.

Keywords: Road traffic accident, Primary impact injuries, Thoraco-abdominal injury.

INTRODUCTION

In highly industrialised and developed countries, Traffic accidents are number one killer of human beings while in developing countries like India they rank fourth or fifth in order according to an assessment made some years ago. The advancement in the medical science in relation to its investigative and therapeutic aspects besides tremendous revolution in the field of surgery has been able to at least minimise the morbidity and mortality due to various diseases to a greater extent. Some of the epidemic diseases like small pox has even been completely eradicated. It is however, disheartening that loss of human life due to traffic accidents has of late taken an epidemic form all over the world including the developing countries like India. The preventive and remedial aspects of this menace, therefore has attracted the attention of the social

workers, scientists and all concerned authorities alike.

Various workers who studied this problem in different parts of the world have found some common factors responsible for traffic accidents. Some of them, however, have also indicated that at least few factors contributing towards increasing the number of traffic accidents are specific to a particular locality or a region. Such causes are to be identified in order to introduce any preventive measures. This requires extensive research on this aspect and a regular study of the pattern and prevalence of road traffic accidents in every region separately.

In northern part of Bihar state very few studies were made much earlier by some works on this aspect. With perceptible change in the entire topography of the areas and the types of motor vehicles on the roads, it is imperative to assess the extent of loss caused due to traffic accidents on the roads in this part of North Bihar of precious human life. Similar conditions in relation to agent, host and environment exists in other parts of the country. With this end in view, the present work has been undertaken to study

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all aspects of traffic accidents in causing morbidity and mortality in human beings and to suggest ways for preventing and minimising the menace.

MATERIALS AND METHODS

The present work was carried out in the Department of Forensic Medicine, Darbhanga Medical College, Bihar. Seventy-Five subjects for this study were selected from among the victims of road traffic accidents whose dead bodies were received directly in the Department, for a medicolegal autopsy. A second group of cases, were those admitted to different wards of hospital for treatment after having received fatal injuries in a road traffic accidents and had died in course of treatment; was later brought for the medicolegal autopsy, observations were made on the latter cases as regards their nature and site of injuries, antemortem clinical features and period of survival. The results of investigation such as x-ray and the treatment instituted in each case was noted. Their time and date of death were taken down. The postmortem findings in each of these cases were correlated and cause of death assigned. The detailed history in each case was obtained from the police inquest, eyewitness account if available, history given by the relatives or neighbours accompanying the dead body and the accompanying constable.

Methodology

The study has been carried out under three main headings -

A. Study of epidemiological aspects regarding

1. Agent (the vehicle responsible)

- i) Type of vehicle responsible.
- ii) Number of vehicle involved.
- iii) Fate of the responsible vehicle after the accident.
- iv) Site of initial impact in the vehicle.

2. Host (the victim under study)

- i) Sex of the victim.
- ii) Age of the victim.
- iii) Religion.
- iv) Socio-economic status.
- v) Type of road (among the victim).
- vi) Period of survival of the victim after the accident.
- vii) Place of death.
- viii) Safety devices used by the victim at the time of accident.

3. Environment (conditions of the site of the accident and variation of time and season)

- i) Place of accident.
- ii) Condition of site of accident - regarding roads overcrowding, encroachment, lighting, metallic or non metallic, road traffic control system, man holes at the site, ditches and collection of garbage.
- iii) Condition of the vehicle (transport or private) involved in accident overcrowding at the gate, over-loaded roof etc.

- iv) Season and month of the accident.
- v) Time of the accident.

B. Studies related to antemortem examination of the victim-

In all the victims of road traffic accident admitted to the hospital for treatment and rehabilitation the following information were (in addition to the history of each case) obtained -

- i) General condition of the victims at the time of admission.
- ii) Treatment given in the hospital.
- iii) Investigations. e.g. x-ray.
- iv) Type of injury - Minor, Major
- v) Fate of the victim.
- vi) Period of the survival of the victim.

C. Details of Post-mortem findings -

All the victims were subjected to a detailed post-mortem examination and the injuries were noted in the following fashion -

1. Impact injuries - As classified by Camps (1976)
 - i) Primary impact injuries.
 - ii) Secondary impact injuries.
 - iii) Secondary injuries.
2. Run-over injuries.
3. Contrecoup injuries.
4. Areas of the body seriously injured.
5. Distribution of fatal injuries and their types.
6. Cause of death.

In addition to above findings, evidence of any bodily disease or deformity was also taken into consideration, as this might have contributed to the accident or death.

All the information and findings were gathered, tabulated and the data collected have been analysed.

RESULTS

A total of 75 cases of traffic accidents were recorded during the study period. The following facts came into light after completion of this work.

1. Out of total medicolegal autopsies conducted during the period, 23.43% cases were of fatal traffic accidents.
2. Males outnumbered females by a very good margin, males accounted for 88% of total fatalities.
3. Persons of 21 - 30 years age group were found involved in fatal traffic accidents more than other age groups (28% of total cases) followed by the age groups 11-20 years (24%). Lowest incidence was observed in 61-70 years of age (only 4% of total cases).
4. Religion of the victims did not play any significant role in their involvement in the fatal traffic accidents.
5. Socio-economic status played a significant role in predisposing a person for involvement in fatal traffic accidents. Persons of low and low-middle socio-economic status were found at greater risk

accounting for 46.66% and 33.33% respectively of the total fatalities.

6. Pedestrians were found to be most vulnerable accounting for 44% of total fatalities, followed by pedal cyclists 16% of total cases.
7. Heavy vehicles like buses and trucks claimed maximum lives (37.33% cases) followed by motor jeeps (20% cases).
8. In majority of cases (64%), only one vehicle was involved in the accidents and in remaining case two vehicles were found to be involved. No case was found involving more than two vehicles.
9. Majority of the accidents (56%) occurred on main roads followed by turning of main roads (13.33%).
10. Maximum cases were recorded in summer season (46.66%) followed closely in winter season (37.33%).
11. Maximum number of cases were recorded between 8 AM to 11 AM (28%) followed by the period between 5 PM to 8 PM and 3PM to 5PM (18.66% and 14.66% respectively).
12. In majority of cases (76%) no significant and immobilising damage took place to the responsible vehicles as a result of accidents.
13. In majority of cases, the site of initial impacts of the responsible vehicle was front portion (52%) followed closely by impacts by the side of the vehicles (44% of cases).
14. 57.33% of the victims died in the hospital and 30.66% died on the spot at the place of the accidents. In about 50% cases the victims died either instantaneously or within 3 hours of the accidents while 28% of the victims died after 24 hours of the accidents.
15. Head injury either alone or associated with abdominal injury, thoracic injury or thoraco-abdominal injury was the cause of death in 67.99% of cases. Thoracic injury was the cause of death in 8% cases while abdominal injury in 5.33% of cases.
16. Incidence of primary impact injuries were noted in 50.66% cases on lower extremities.
17. Incidence of secondary impact injuries were noted in 37.87% of cases on head and neck.
18. On an average secondary injuries were found on 2.72 body areas in each victim. Highest incidence was noted on lower extremities (22.05%) followed closely by back, head and neck (20.58%).
19. Run-over injuries were found in 49.33% of cases. Highest incidence was found on lower extremities (32.43%).
20. Contrecoup injuries were observed in 22.66% of cases. Highest incidence was observed in motorcyclists (44.44%).
21. Out of 8 cases observed antemortem and then postmortemly, most of them were unconscious, semi-conscious and irritable during treatment. The period of survival varied from 1 hour to 7 days according to severity. The postmortem findings supported the expected cause of death.

DISCUSSION

Table 1: Incidence of sex of the victims.

Sl. No.	Sex	Number of cases	Percentage
1.	Male	66	88
2.	Female	9	12

Table 2: Incidence of age of the victims.

Sl. No.	Age group in years	No. of cases	Percentage
1.	1-1/2 to 10	12	16.00
2.	11 to 20	18	24.00
3.	21 to 30	21	28.00
4.	31 to 40	9	12.00
5.	41 to 50	7	9.33
6.	51 to 60	5	6.66
7.	61 to 70	3	4.00

The cases were grouped into 7 different age ranges, varying from 1-1/2 years to 70 years for better appreciation of age incidence among the victims. Highest incidence of fatalities was found in the age group 21 - 30 years accounting for 28% of total fatalities and lowest incidence was observed in the age group 61 - 70 years accounting for only 4% of total fatalities.

Table 3: Incidence of religion of the victims.

Sl. No.	Religion	Number of cases			Percentage
		Male	Female	Total	
1.	Hindus	50	6	56	73.33
2.	Muslims	14	3	17	24.00
3.	Christians	2	-	2	2.66
4.	Sikhs	-	-	-	0.00

Table 4: Incidence of Socio-economic status of the victims.

Sl. No.	Socio-economic status	No. of cases	Percentage
1.	Low	35	46.66
2.	Low middle	25	33.33
3.	Upper middle	10	13.33
4.	High	5	6.66

Table 5: Incidence of type of road users (victims).

Sl. No.	Type of road users	No. of cases	Percentage
1.	Pedestrians	33	44.00
2.	Pedal cyclists	12	16.00
3.	Motorcyclists	9	12.00
4.	Driver of fast moving 4 wheelers	3	4.00
5.	Occupant of slow moving vehicles like bullockcart, tonga, rickshaw etc.	3	4.00
6.	Miscellaneous (while boarding a moving vehicle or moving on foot board or roof of a vehicle etc.	7	9.33
7.	Occupant of fast moving four wheeler	2	2.66
8.	Occupant of Tempo.	6	8.00

Table 6: Incidence of type of the vehicle responsible.

Sl. No.	Type of vehicle	No. of cases	Percentage
1.	Motor truck	12	16.00
2.	Motor bus	16	21.33
3.	Motor jeep	15	20.00
4.	Motor car	5	6.66
5.	Tractor	5	6.66
6.	Tempo (three wheeler autorickshaw)	7	9.33
7.	Motorcycle	9	12.00
8.	Train	3	4.00
9.	Slow moving vehicles (like bullock cart, tonga, rickshaw etc.)	3	4.00

Table 7: Number of vehicles involved in each accident.

Sl. No.	Number of vehicles	No. of cases	Percentage
1.	One	48	64.00
2.	Two	27	36.00
3.	More than two	-	0.00

Not a single case was reported having more than two vehicles responsible in the accidents.

Table 8: Incidence in relation to the site (place) of accident.

Sl. No.	Site of the accidents	No. of cases	Percentage
1.	Main road	42	56.00
2.	Lane	9	12.00
3.	Turning of main road	10	13.33
4.	Turning of lanes	2	2.66
5.	Junction of main roads	5	6.66
6.	Junction of lanes	-	-
7.	Junction of main roads & lane	3	4.00
8.	Rail tracks	4	5.33

Table 9: Seasonal variation in occurrence of the accidents.

Sl. No.	Season	No. of cases	Percentage
1.	Summer (March to June)	35	46.66
2.	Rainy(July to October)	12	16.00
3.	Winter (November to February)	28	37.33

Table 10: Time-wise variation in the occurrence of accidents.

Sl. No.	Time	No. of cases	Percentage
1.	6 AM to 8 AM	7	9.33
2.	8 AM to 11 AM	21	28.00
3.	11 AM to 1 PM	3	4.00
4.	1 PM to 3 PM	9	12.00
5.	3 PM to 5 PM	11	14.66
6.	5 PM to 8 PM	14	18.66
7.	8 PM to 11PM	4	5.33
8.	11 PM to 6 AM	6	8.00

Table 11: Incidence of fate of the responsible vehicles.

Sl. No.	Fate of responsible vehicles	No. of cases	Percentage
1.	No significant and immobilising damage to the vehicles.	57	76.00
2.	Dashed against some object and was immobilised.	6	8.00
3.	Overturned	8	10.66
4.	Skidded / went off the road	4	5.33

Table 12: Incidence of site of initial impact in the responsible vehicle.

Sl. No.	Site of initial impact	No. of cases	Percentage
1.	Front	39	52.00
2.	Side	33	44.00
3.	Rear	3	4.00

Table 13: Incidence of place of death of the victims.

Sl. No.	Place of death	No. of cases	Percentage
1.	On the spot	23	30.66
2.	On way to the hospital	9	12.00
3.	In the hospital	43	57.33

Table 14: Incidence of period of survival of the victims after the accidents.

Sl. No.	Period of survival	No. of cases	Percentage
1.	Died instantaneously	18	24.00
2.	Died within 3 hours	19	25.33
3.	Died between 3-12 hours	9	12.00
4.	Died between 12-24 hours	8	10.66
5.	Died after 24 hours (upto 7 days)	21	28.00

Table 15: Incidence of cause of death of the victims.

Sl. No.	Cause of death	No. of cases	Percentage
1.	Head injury	38	50.66
2.	Thoracic injury	6	8.00
3.	Abdominal injury	4	5.33
4.	Thoraco-abdominal injury	6	8.00
5.	Head injury and thoracic injury	6	8.00
6.	Head injury and abdominal injury	3	4.00
7.	Head injury and thoraco-abdominal injury	4	5.33
8.	Injury to non-vital parts (causes not directly related to the accidents.	8	10.66

Table 16: Site of primary impact injuries on different parts of body of the victims and their percentage.

Sl. No.	Parts of the body	No. of cases	Percentage
1.	Head and neck	9	12.00
2.	Chest	3	4.00
3.	Abdomen	2	2.66
4.	Back	4	5.33
5.	Pubes and buttock	6	8.00
6.	Lower extremities	38	50.66
7.	Upper extremities	12	16.00
Total		74	98.66

Primary impact injuries were seen in 74 body areas only (98.66% of fatal cases) of these, highest incidence was observed in lower extremities (50.66% cases) and the lowest incidence on abdomen (2.66% of cases).

Table 17: Site of secondary impact injuries on different parts of body of the victims and their percentage.

Sl. No.	Parts of the body	No. of cases	Percentage
1.	Head and neck	25	37.87
2.	Chest	12	18.18
3.	Abdomen	3	4.54
4.	Back	8	12.12
5.	Pubes and buttock	3	4.54
6.	Lower extremities	5	7.57
7.	Upper extremities	10	15.15
Total		66	88%

Secondary impact injuries were observed in 66 cases (88% of total cases). Highest incidence was observed in head and neck (37.87%) and lowest in abdomen, pubes and buttock (4.54% each).

Table 18: Incidence of distribution of Secondary injuries on different parts of the body of victims.

Sl. No.	Parts of the body	Number of body areas	Percentage
1.	Head and neck	42	20.58
2.	Chest	18	8.82
3.	Abdomen	12	5.88
4.	Back	42	20.58
5.	Pubes and buttock	15	7.35
6.	Lower extremities	45	22.05
7.	Upper extremities	30	14.70
Total		204	

Secondary injuries were observed in 204 body areas out of total 75 cases studied. Per victim body areas involved thus showed average of 2.72 areas in the victim's body having secondary injuries. Maximum incidence was observed on lower extremities (22.05%) and minimum on the abdomen (5.88%).

Table 19: Incidence of run-over injuries on different parts of body of the victims.

Sl. No.	Part of the body	No. of body areas	Percentage
1.	Head and neck	9	12.11
2.	Chest	15	20.27
3.	Abdomen	8	10.81
4.	Back	2	2.70
5.	Pubes and buttock	13	17.56
6.	Lower extremities	24	32.43
7.	Upper extremities	3	4.05
Total		74	
Total number of cases with run-over injuries.		37	49.33

Out of 75 cases under study, 37 had run-over injury showing an incidence of 49.33% of total cases. Total number of body areas involved in run-over injuries were 74, on an average 2 different body areas in each case. Highest incidence of run-over injuries was on lower extremities (32.43%), followed by chest (20.27%), pubes and buttock (17.56%). Lowest incidence was observed on back (2.70%).

Table 20: Incidence of Contrecoup injuries among different types of road users.

Sl. No.	Type of road users	No. of cases studied	No. of cases with contrecoup injuries.	Percentage
1.	Pedestrian	33	8	24.24
2.	Pedal cyclists	12	2	16.16
3.	Motorcyclists	9	4	44.44
4.	Occupant & driver of fast moving vehicle.	3	-	-
5.	Occupant & driver of slow moving vehicle.	3	-	-
6.	Miscellaneous (while boarding a moving vehicle, moving on a foot board or roof of a vehicle etc.)	15	3	20.00
Total		75	17	22.66

In the present study, 22.66% cases were found with contrecoup injury. Highest incidence was seen among motorcyclists (44.44% of the cases), followed by Pedestrians (24.24% of cases) and lowest incidence among pedal cyclists (16.16% of cases). None of the occupants and drivers of fast moving and slow moving vehicles had contrecoup injuries in the present series.

CONCLUSION

To conclude, following control measures are being suggested to overcome this problem.

A. Prevention of Traffic Accidents :

This is the most important and effective step to overcome this problem. For this purpose following steps should be considered.

1. Development of traffic sense among the people through media of mass communication like newspapers, radio, television, posters and documentary films etc.
2. Provision of double space roads with footpath, speed limits, separate lanes or tracks for pedal-cyclists. Vendors and other commercial installation should be eliminated from road sides and all encroachments removed with frequent inspections by authorities.
3. Provision of separate and bypass roads for heavy vehicles.
4. Strict enforcement of the traffic rules particularly during the peak periods of traffic and punishment to those disobeying the rules including cyclists and pedestrians.
5. Construction of parks and playgrounds for children away from main roads.
6. To check overcrowding, sufficient number of buses, taxi cabs, school buses and trains for passengers should be provided.

7. Before licensing to drivers there should be strict checking of age, driving tests, and addictions such as alcohol etc. Regular evaluation of driving ability, sight and other health problems e.g. epilepsy, night blindness and colour blindness.
 8. Prevention of overloading especially in auto rickshaws in the urban areas and speed limits and age of the drivers.
 9. Good quality pitching of the roads to prevent pot holes, ditches on roads. Margins of roads slopping with sufficiently wide unmetalled areas on both sides of the roads.
 10. Street light should be provided.
 11. Periodic check up of all vehicles for lighting, signals and exhaust should be done.
- B. Measures to Minimise Injuries :**
1. Speed limits on main roads particularly in towns should be strictly followed by fast moving vehicles. Those found guilty should be punished.
 2. Strict enforcement of the rules regarding compulsory wearing crash helmets by motorcyclists and scooterists including pillion riders. Those found not wearing crash helmets should be warned and fined.
 3. There should be provision of safety devices in cars, jeeps and other fast moving four wheelers like safety belt, collapsible steering assemblies, padding of dash boards etc.
 4. Research projects for experimental studies should be established to evolve safer and better designs of the fast moving vehicles.
- C. Minimising the Immediate and Long Term Results of Injuries :**
1. There should be provision of ambulance ready with properly trained medical and paramedical staff and all facilities for emergency care ready to attend the injured at accident sites within shortest notice.
 2. All the injured whether having major or minor external injuries should be properly examined by the attending doctor and observed for 24-48 hours especially for presence of obscure internal injuries.
 3. Properly equipped accident and casualty service in hospitals to treat the injured at a short notice should be established.
 4. There should be proper rehabilitation of those persons who have become handicapped as a result of such accidents.
 5. Formation of separate emergency accident services / voluntary organisations with all facilities to deal the injured and study various aspects of the problem.

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