International Journal of Research in Health and Allied Sciences

Journal home page: www.ijrhas.com

Official Publication of "*Society for Scientific Research and Studies*" [Regd.]

ISSN 2455-7803 Index Copernicus value 2016 = 68.10

# Original Article

# Assessment of Pattern Head Injury, Skull Fractures in Road Traffic Accidents Cases

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***ABSTRACT:***

**Background:** The rate of incidence of head injury is higher in India because of its traffic patterns and possibly the lack of preventive measures such as helmets in motor cyclists and seatbelts in automobiles, poorly controlled traffic conditions and road conditions. Hence, this study was planned to analyse and evaluate in detail, pattern of head injury and skull fractures in victims of road traffic accidents undergoing autopsy. **Materials & methods:** Consecutive 200 victims using non-probability purposive sampling that died in road traffic accidents. In all these cases detailed personal information was recorded from relatives/accompanies of victim, inquest papers, and hospital records. The history regarding the circumstances of the accidents and other relevant data about injuries to the victims, the site of impact was obtained from inquest papers. All cases were thoroughly analysed considering parameters like age and sex, time and manner of accident, profile of victims, offending vehicles, survival period of victims, area of the body injured, fatal injuries and cause of death. Pattern of skull fracture, intra-cranial haemorrhage and their distribution was recorded during post-mortem examination. A pretested Performa was used for the purpose to collect data. **Results:** Most commonly seen was extradural hemorrhage in 84 (42%) followed by subdural hemorrhage in 56 (28%), sub arachnoid hemorrhage in 40 (20%) and intra cerebral hemorrhage in 20 (10%). The difference was significant (P< 0.05). The most common cause was head injury seen in 130 (65%) followed by Injury to vital organ in 40 (20%) and shock & hemorrhage in 30 (15%). The difference was significant (P< 0.05). **Conclusion:** Head injury due to RTA is a recognized public health problem causing death and disability. It is required from concerned government authority to take appropriate and immediate measures for reducing the incidence of head injury. At the same time, people should be educated for taking good preventive actions to avoid head injury.

**Key words:** Head injury, Skull fractures.

Received: 8 December2018 Revised: 22 December 2018 Accepted: 24 December 2018

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**This article may be cited as:** Singh G, Joshi R, Kumar A. Attitude Assessment of pattern head injury, skull fractures in road traffic accidents cases. Int J Res Health Allied Sci 2019; 5(1):28-31.

## INTRODUCTION

Motorization has enhanced the lives of many individuals and societies, but the benefits have come with a price. Although the number of lives lost in road accidents in high-income countries indicate a downward trend in recent decades, for most of the world's population, the burden of road-traffic injury—in terms of societal and economic costs—is rising substantially.[1]

The rate of incidence of head injury is higher in India because of its traffic patterns and possibly the lack of preventive measures such as helmets in motor cyclists and seatbelts in automobiles, poorly controlled traffic conditions and road conditions. The injuries to bicyclist caused by an automobile injury may be similar to those sustained by a pedestrian except that the impact will be lower on the body or only against to some part of bicycle itself.[2- 4]

Human, vehicular and environmental factors play roles before; during and after a trauma event therefore accidents have to be studied in terms of an epidemiological model (agent, host and environmental factors. The deaths in road traffic accidents are mostly preventable through intensive efforts of government institutions and civil society activists. Early and proper treatment is essential to save the life of the victims, especially in cases of head injury.[5- 8]

Hence, this study was planned in the department of forensic medicine, G.G.S.M.C.H., Faridkot to analyse and evaluate in detail, pattern of head injury and skull

fractures in victims of road traffic accidents undergoing autopsy.

## MATERIAL & METHODS

The present study was conducted in the department of Forensic medicine and Toxicology of GGS medical and hospital, Faridkot and it included assessment of consecutive 200 victims using non-probability purposive sampling who died in road traffic accidents and underwent post-mortem examination in department of Forensic Medicine and Toxicology G.G.S.M.C.H., Faridkot. Taking into consideration of previous years i.e. autopsy rates of victims of road traffic accidents, a sample of 200 victims was taken up for the study. Data were collected for duration of one year. The material in the present study included the cases of road traffic accidents brought for medico-legal post-mortem examination.

**Inclusion Criteria:**

- Victims who died in road traffic accidents

**Exclusion criteria:**

- Decomposed bodies and bodies with no specific histories of head injury.

Ethical approval was obtained from institutional ethical committee in written after explaining in detail the entire research protocol. In all these cases detailed personal information was recorded from relatives/accompanies of victim, inquest papers, and hospital records. The history regarding the circumstances of the accidents and other relevant data about injuries to the victims, the site of impact was obtained from inquest papers. Dead bodies were examined in detail during post-mortem for the presence of external injuries, internal injuries including bone and joints. All cases were thoroughly analysed considering parameters like age and sex, time and manner of accident, profile of victims, offending vehicles, survival period of victims, area of the body injured, fatal injuries and cause of death. Pattern of skull fracture, intra-cranial haemorrhage and their distribution was recorded during post-mortem examination. A pretested Performa was used for the purpose to collect data. All the results were recorded in Microsoft excel sheet and were analysed by SPSS software version 17.0. Chi- square test and one way ANOVA was used for assessment of level of significance. A p value of <0.05 was considered as significant.

## RESULTS

Out of 200, males were 120 (605) and females were 80 (40%). Maximum deaths were seen in age group 30-40 years (76) followed by 40-50 years (44), 20-30 years (40), 50-60 years (20), >60 years (14) and 10-20 years (6). The difference was significant (P< 0.05). Maximum deaths occurred between 6 PM- 12 mid night (82) followed by 12 Noon- 6 PM (60), 6 AM- 12 Noon (34) and 12 Mid night- 6 AM (24). The difference was significant (P< 0.05). In 76 (39%) it was rural and in 124 (61%) urban. The difference was significant (P< 0.05). Maximum deaths occurred in <24 hours (36%) followed by 24 hours – 1 week (28%), 1 week- 2 weeks (20%), 2 weeks- 4 weeks (10%) and 4 weeks- 5 weeks (6%). The difference was significant (P< 0.05). In 112 (56%) it was occupants, in 46 (23%) pedestrian and in 42 (21%) drivers. The difference was significant (P< 0.05). Most common pattern of skull fracture was depressed vertex fracture seen in 62 (31%) followed by basal fracture in 50 (25%). The difference was significant (P< 0.05). Most commonly seen was extradural hemorrhage in 84 (42%) followed by subdural hemorrhage in 56 (28%), sub arachnoid hemorrhage in 40 (20%) and intra cerebral hemorrhage in 20 (10%). The difference was significant (P< 0.05). The most common cause was head injury seen in 130 (65%) followed by Injury to vital organ in 40 (20%) and shock & hemorrhage in 30 (15%). The difference was significant (P< 0.05).

**Table I:** Distribution of victims

| Male | Percentage | Female | Percentage |
|---|---|---|---|
| **120** | 60 | 80 | 40 |

**Table 2:** Age group wise distribution

| Age group (Years) | Number | Percentage | P value |
|---|---|---|---|
| **10- 20** | 6 | 3 | 0.01 |
| **20-30** | 40 | 20 | |
| **30-40** | 76 | 38 | |
| **40-50** | 44 | 22 | |
| **50-60** | 20 | 10 | |
| **>60** | 14 | 7 | |
| **Total** | 200 | 100 | |

**Table 3:**Survival period of victims

| Survival period | Number | Percentage | P value |
|---|---|---|---|
| **<24 hours** | 72 | 36 | 0.001 |
| **24 hrs- 1 week** | 56 | 28 | |
| **1 week- 2 weeks** | 40 | 20 | |
| **2 weeks- 4 weeks** | 20 | 10 | |
| **4 weeks- 5 weeks** | 12 | 6 | |
| **Total** | 200 | 100 | |

**Table 4:** Profile of victims

| Profile | Number | Percentage | P value |
|---|---|---|---|
| **Driver** | 42 | 21 | |
| **Occupants** | 112 | 56 | 0.01 |
| **Pedestrian** | 46 | 23 | |
| **Total** | 200 | 100 | |

**Table 5:** Area of the body injured

| Area of the body injured | Number | Percentage | P value |
|---|---|---|---|
| **Head** | 100 | 50 | |
| **Head+ Chest** | 46 | 23 | |
| **Head+ limbs** | 36 | 18 | 0.05 |
| **Abdomen** | 10 | 5 | |
| **Head+Chest+abdomen** | 8 | 4 | |

**Table 6:** Pattern of skull fracture

| Pattern of skull fracture | Number | Percentage | P value |
|---|---|---|---|
| **Linear fracture of vertex** | 28 | 14 | 0.01 |
| **Communated fracture** | 32 | 16 | |
| **Depressed vertex fracture** | 62 | 31 | |
| **Basal fracture** | 50 | 25 | |
| **Crush fracture of skull** | 28 | 14 | |
| **Total** | 200 | 100 | |

**Table 7:** Intra-cranial hemorrhage

| Intra-cranial hemorrhage | Number | Percentage | P value |
|---|---|---|---|
| **Extradural hemorrhage** | 84 | 42 | 0.01 |
| **Subdural hemorrhage** | 56 | 28 | |
| **Sub arachnoid hemorrhage** | 40 | 20 | |
| **Intra cerebral hemorrhage** | 20 | 10 | |

**Table 8:** Cause of death

| Cause of death | Number | Percentage | P value |
|---|---|---|---|
| **Head injury** | 130 | 65 | 0.01 |
| **Injury to vital organ** | 40 | 20 | |
| **Shock & Hemorrhage** | 30 | 15 | |

## DISCUSSION

In present study, out of 200 victims, males were 120 (605) and females were 80 (40%). Jha et al[9] in their study assessed 77 people who died in road traffic accidents. Farooqui et al (2007)[10] in their study on 98 victims found that men died in road traffic accidents more than women. Kumar A et al (2008)[1] found that out of total 7008 medico legal autopsies conducted during the study period, the male/female ratio was 7.49:1. Jha et al[9] in their study assessed 77 people who died in road traffic accidents. They found a marked male preponderance (78%). Moharamzad Y et al (2008)[11] in their study found that there were 202 males (80.5%) and 49 females (19.5%). The mean (±SD) age of fatalities was 34.1 (±21.5) years. Hanumantha et al (2012)[12] found that most of the victims were males 104 (92.0%).

In present study, maximum deaths occurred between 6 PM- 12 mid night (82) followed by 12 Noon- 6 PM (60), 6 AM- 12 Noon (34) and 12 mid night- 6 AM (24). This is probably due to heavy and unequal distribution of the traffic at these closing hours of the people and the rider is generally exhausted after day's work. Hanumantha et al (2012)[12] found that more than fifty per cent of the accidents were found to occur during the weekend evenings from 6:00PM to 12:00PM. Gloyns PF et al (1994)[13] found that all the occupants in the frontal impacts were restrained drivers in accidents with a direction of force between 11 and 1 $^{O}$ ' clock. Ravi Kumar[14] found that most of the accidents have occurred during 6PM–12 midnight for Riders (43.52%) & Pillion riders (44.55%) and least during 12 midnight– 6 AM for Riders (18.06%) & Pillion riders (16.83%).

In present study, in 76 (39%), the place of accident was rural and in 124 (61%) urban. Ravi Kumar[14] found that the place of occurrence of RTA was more in the urban areas (74.29%) as compared to rural areas (25.71%). In present study, maximum deaths occurred in <24 hours (36%) followed by 24 hours – 1 week (28%), 1 week- 2 weeks (20%), 2 weeks- 4 weeks (10%) and 4 weeks- 5 weeks (6%). Hanumantha et al (2012)[12] found that twenty-five of 303 (8.3%) patients reached center within 1 h (golden hour) of trauma. A majority of patients numbering 159 (52.5%) reached center within 2–6 h after injury. Of the 303 fatal head injuries, 153 (50.5%) died within 24 h of reaching center. Ninety-five died within first 12 h. Ninety-two of the remaining (30.4%) died 2–7 days after reaching to hospital. Bharathi MO (2017)[15] found that 36% died within 24 hours after the accident. 33% victims survived beyond 24 hours but died within one week. The number of cases decreased with increase in survival period. Only 4% victims survived for more than 4 weeks. The victim who survived for shortest period of 1 hour had fracture of skull, clavicle, patella and leg bones. The victim who survived for maximum period i.e. 34 days after the accident died due septicemia (intestinal perforation).

We found that the manner of accident was motor cycle-car seen in 112 (56%), motor cycle- bus in 60 (30%) and car- truck in 28 (14%). Jha et al[9] found that in most of the cases (61%), there was scooter and car accident. In present study, there was head involvement in 100 (50%), in 46 (23%) Head+ Chest, in 36 (18%) Head+ limbs, in 10 (5%) abdomen and in 8 (4%) Head+ Chest+ abdomen was involved. Pathak et al[16] found combination of Head+ Chest fractures in 59% of victims. Saleem et al[317] found Head+ upper limbs fracture in 62% of cases.

In present study we found that most common pattern of skull fracture was depressed vertex fracture seen in 62 (31%) followed by basal fracture in 50 (25%). Jha et al[9] found depressed and linear fractures (38%) in almost the same numbers of cases. Pathak A[16] found that the dominant type of skull fracture found was the linear (fissured) fracture in 40% cases followed by basilar fracture counting 29.17% and being the 2nd common type. The depressed, comminuted and crush fracture shared a percentage of' among all showing their lesser and uncommon existence. Kumar A et al[1] found that out of total 7008 medico legal autopsies, skull fractures were found in 1183 (69.63%) cases of head injury. In present study, the most common cause of death was head injury seen in 130 (65%) followed by Injury to vital organ in 40 (20%) and shock & hemorrhage in 30 (15%). Jha et al[9] observed head injury as most common cause of death followed by injury to visceral organs and shock. Pathak A[16] found that in 54% of cases direct head injury led to the death of victim followed by internal organ injury.

**CONCLUSION**

Head injury due to RTA is a recognized public health problem causing death and disability. It is required from concerned government authority to take appropriate and immediate measures for reducing the incidence of head injury. At the same time, people should be educated for taking good preventive actions to avoid head injury.

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