

## Original Research Article

**Aetiological Pattern of Fatal Head Injuries in Medicolegal Autopsies****Dr. Hitesh Chawla<sup>1</sup>, Dr. Ranjana Malhotra<sup>2</sup>, Dr. Ashish Tyagi<sup>3</sup>, Dr. Abhishek Singh<sup>4</sup>, Dr. P. K. Paliwal<sup>5</sup>**<sup>1</sup>Assistant Professor, Dept of Forensic Medicine, SHKM Govt. Medical College, Mewat, Haryana<sup>2</sup>Resident, Dept of Microbiology, Pt. B. D. Sharma PGIMS Rohtak, Haryana<sup>3</sup>Assistant Professor, Dept of Forensic Medicine, SHKM Govt. Medical College, Mewat, Haryana<sup>4</sup>Assistant Professor, Dept of Community Medicine, SHKM Govt. Medical College, Mewat, Haryana<sup>5</sup>Professor & Head, Dept of Forensic Medicine, SHKM Govt. Medical College, Mewat, Haryana**\*Corresponding author**

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**Abstract:** Earlier studies from the developing countries as well as from other terrains of India showed various aetiologies of head injuries. However, there is no substantive government data's are available regarding the cause and manner of head injury. Objective: The current study was conducted with an objective to determine the aetiological pattern of head injury in the region. The study was conducted in a tertiary care hospital of Northern India. Cases of fatal head injuries irrespective of their aetiology that were brought for medico-legal autopsies over a period of two years were included in this study. The data with regard to their age, sex, mode of injury in detail was collected and interpreted. Out of total 60 cases of fatal head injury who succumb to death, 90% were males. Maximum numbers of cases (28.33%) were in age group of 21-30 followed by 31-40 year (21.67%). Roadside accident was the leading cause of head injury (63%) while only 9 cases were as a result of assault. Two wheeler riders comprises of 35.31% followed by pedestrians (24.3%). Maximum number of fatalities due to head injury was due to roadside accident and that too in a productive age group of 21- 40 years. Rider two wheelers and pedestrian were involved in majority. To minimize the morbidity and mortality resulting from head injury consequent to road accidents there is a need for better maintenance of roads, strict enforcement of traffic rules, compulsory wearing of crash helmets by two wheelers along with imparting of compulsory road safety education to school children from primary education level.

**Keywords:** Aetiology, Head Injury, Medicolegal, Autopsy

**INTRODUCTION**

Head injury is defined by the national advisory neurological diseases and stroke council as "a morbid state resulting from gross or subtle structural changes in the scalp, skull and/or the contents of the skull, produced by the mechanical forces" [1]. Head is one of the most accessible and vital part of the body that is why frequently involved in unintentional (accidents) and intentional (physical assault) trauma. Even a single blow to head can be fatal, taking as an example of recent time where tragic death of sports person by unintentional blow to head has shocked the whole world. Head injuries are the most dreadful trauma in terms of morbidity and mortality. They are often caused by road traffic accidents, assaults, falls, industrial and domestic accidents, sports accidents etc. [2]. Nine percent of global mortality is due to injuries, which causes about five million deaths every year worldwide [3]. Vehicular accidents accounts for nearly fifty

percent of injuries and at least 40% of deaths results from head injury, a percentage that is increasing day by day [4].

Surge in motorization, expansion in the road network and the rising population in the country contribute toward the growing numbers of road accidents. During the decade 2001 to 2011, the road network in India have increased at a compound annual growth rate (CAGR) of 3.4%, the numbers of registered motor vehicles in the country have amplified at a compound annual growth rate of 9.9% while the country's population have increased at CAGR of 1.6%. The number of road accidents in the country increased at a CAGR of 2.1% during the same period and the fatalities due to road accident increased by 5.8% [5].

Earlier studies from the developing countries as well as from other terrains of India showed various aetiologies of head injuries, which includes trauma, vehicular accidents, pedestrian injuries, fall from height etc. However, there is no substantiative government datas are available regarding the cause and manner of head injury. Therefore, the study was conducted to determine the various aetiological patterns of fatal head injuries in the region.

**MATERIAL & METHODS**

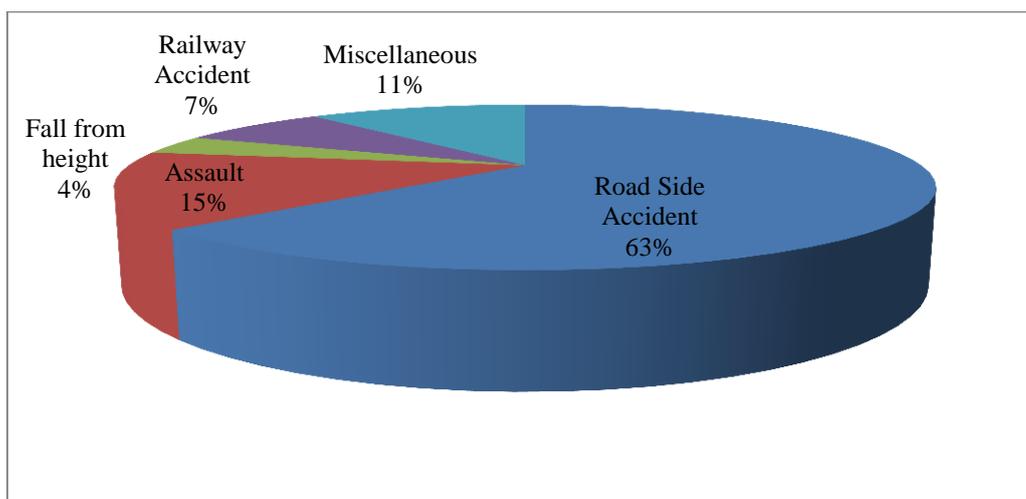
This prospective study was planned and conducted in a tertiary care hospital of Northern India. All the cases of fatal head injuries irrespective of their aetiology that were brought for medicolegal autopsies over a period of two years (2010 to 2012) were included in this study. All the cases were admitted and primarily treated for head injury. The data with regard to their age, sex, mode of injury in detail was collected from inquest papers/ police proceedings and first information report of the police (FIR).

A semi-structured questionnaire served as study tool. All the questionnaires were manually

checked and edited for completeness and were then coded for computer entry. After compilation of collected data, analysis was done using Statistical Package for Social Sciences (SPSS), version 20 (IBM, Chicago, USA). The results were expressed using appropriate statistical methods. When the data follow a normal distribution then it was presented in mean ± SD, otherwise median ± IQR (Inter Quartile Range) was applied.

**RESULTS**

Of the 60 cases of head injuries, which were brought for medicolegal autopsy, 90% were males and only 10% were females. The age ranges from 5 years to 80 years with mean 37.53 and standard deviation of 17.616, median was found to be 33.5 with standard error of mean 2.274 (Table 1). Roadside accident was the most common cause of head injury (61.67%), followed by the injury sustained due to assault (15%). Head injury as a result from fall from height seen only in two cases while railway accident was the genesis in 10 cases. Miscellaneous cause such as fall from stairs or fall of heavy object over the head comprises of 11% of total cases. (Figure 1)



**Fig 1: Mode of injury**

**Table 1: Age and sex distribution of study subjects**

Age in years	Male	Female	Total
<10 years	02 (3.7%)	-	02 (3.33%)
11-20 years	07 (12.96%)	-	07 (11.67%)
21-30 years	15 (27.78%)	02 (33.33%)	17 (28.33%)
31-40 years	11 (20.37%)	02 (33.33%)	13 (21.67%)
41-50 years	08 (14.81%)	01 (16.67%)	09 (15%)
51-60 years	05 (9.26%)	-	05 (8.33%)
61-70 years	04 (7.41%)	-	04 (6.67%)
>71 years	02 (3.7%)	01 (16.67%)	03 (5%)
Total	54 (100%)	06 (100%)	60 (100%)

Two wheelers were involved in majority of roadside accidents (37.83%) of which 35.13% were the rider. 24.3% of cases were pedestrians and 29.72% were occupants of four wheeler. None of the two wheeler occupants were wearing helmets. Similarly, no seat belt was in use by the driver or passenger of four wheeler at the time of accident.

## DISCUSSION

Males being more involved in outdoor activities therefore exhibit preponderance over females in terms of incidence of head injury. 90% males were involved in head injuries as compared to 10% females. Goyal *et al.*; also observed more involvement of males (87.7%) in head injuries in their study [8]. Male to female ratio was observed to be 4.2:1 by Kumar *et al.*; [7] Crandon *et al.*; noticed in their study that out of 857 patients admitted with head injury, 629 (73.5%) were males [8].

In developing countries, the productive age group of 15-44 years is commonly affected in road traffic injuries [9]. 21-30 year age group was commonly affected in our study (28.33%) with 50% of total cases were young adults that is age group of 21-40 years. Our results were consistent with the observations of Kumar *et al.*; which conclude that 51.7% cases of head injury were in 21-40 year age group [7]. Study of another developing country also indicates that age groups with the greatest incidence of head injury were aged 16-20 years, 21-25 years, and 25-30 years [10]. Crandon *et al.*; stated that in head injury median (IQR) age for the entire group was 28 years with a range of less than one year to 98 years.<sup>8</sup> Frequent involvement of younger adults in head injury and that too due to an accident may be because of their risk taking behavior with tendency towards high speeding and ignorance towards rules and regulations.

Roadside accident was found to be major contributor in total no. of tolls from head injury (61.67%) followed by injury due to assault (15%). The rising numbers of motor vehicles and poor enforcement of traffic safety rules are major contributing factor in the alarming toll of fatalities from road traffic crashes in developing countries [9]. The ascending trend in injuries and death due to road traffic accidents (RTA) has become an important health issue in India [11]. India witnessed one road accident every minute in year 2011, which claimed one life every 3.7 minutes, one of the highest in the world [12]. According to latest data of National Crime Records Bureau (NCRB) of India, the total number of deaths every year due to road accidents has now passed the 1,35,000 mark [13]. Congestions on the roads, poor illumination during night, faulty speed breakers, and ignorance towards the safety precautions

while driving such as use of helmets or safety belts are main reasons behind accentuating incidents of deaths due to road accidents. In comparison to developed countries where lane driving is followed and speed limit is strictly adhered to, such regulations are not made or being followed strictly in developing countries. Kumar *et al.*; studied that head injury with skull fracture was found to be associated with road traffic accident in 92.8% of their total subjects [7]. Crandon *et al.*; in their prospective study over a period of three years observed that head injury in admitted patients is mainly due to road traffic accidents, falls and interpersonal violence. Intentional injuries accounted for 26.7% of those admitted [8]. Yattoo and Tabish in their two phase study; both prospective and retrospective in regard to profile of head injuries and traumatic brain injury deaths; concluded that maximum no. of cases (44.4%) of traumatic head injury were due to RTA [14]. Bhateja *et al.*; in their retrospective study of 298 patients with head injury found RTA as commoner (53%), followed by fall from height (28.9%) and assault (10.4%) [15].

In our observations, rider two-wheeler was involved in 35.13% of cases and pedestrians in 24.3%. None of the occupants of two wheelers were wearing helmets during the incident. In India, two wheelers were the offending vehicle in the majority of the fatal crashes (39.9%) [16]. The result of this study is in agreement with previous study from rural Haryana [17-19]. Lee *et al.*; in their study over a period of 10 years observed that the most common causes of head injury were motorcycle accidents (56.3%) and pedestrian injury (29.47%) [10]. Kumar *et al.*; in their study observed that, 51.3% cases of RTA were two wheeler occupants. The next major group of victims was the pedestrian i.e. 37.2% [7]. Not all the times the occupants of motor vehicles are at fault. Pedestrians also do not follow the rules such as not using the zebra crossing or subways when available.

This study has several strengths. To our knowledge, assessment of aetiological pattern of fatal head injury in medicolegal autopsies has not been much investigated in this region. Very few similar studies are available in the literature. Findings of this study may assist in planning preventive aspects of road traffic accidents which is a very important aspect now days. The study has some limitations as well. First, some may argue that findings of this study may not be generalised. I agree because such aetiological pattern tends to vary from place to place. Second, sample size of this study is small. Data of sixty subjects was analysed in this study. Studies with bigger sample size are warranted.

## CONCLUSION

Maximum number of fatalities due to head injury was subsequent to roadside accident and that too in a productive age group of 21- 40 years. Rider two wheelers and pedestrian were involved in majority. To minimize the morbidity and mortality resulting from head injury consequent to road accidents there is a need for better maintenance of roads, strict enforcement of traffic rules, compulsory wearing of crash helmets by two wheelers and shoulder belt in cars along with imparting of compulsory road safety education right from primary education level. Injury surveillance and trauma registry should be done at every hospital so that preventive strategies can be formulated.

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