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**Original Article**

## **Autopsy-Based Study of Patterns of Head Injuries in Fatal Road Traffic Accidents in Kanpur District**

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### **ABSTRACT**

The traumatic factor head injury due to road traffic accident (RTA) is a very common feature in the cases of fatal injuries, which is a permanent damage to lifetime just like a disease. In our study, the total autopsy conducted is 3730, in which males (58.32%) are out in number than females (41.68%). Total number of fatal head injury due to RTA is 1281 (34.34%). Most vulnerable age is 21–30 years comprising of 365 (28.49%) cases. On sex-wise comparison, 1013 (79.08%) males were injured than females (268 (20.92%)). Most of the incidents occurred between the time 1200 and 1800 hours comprising of 429 (33.49%) cases. Married victims are out in number comprising of 809 (63.15%) cases; 633 (49.42%) of victims died on the way to hospital, which is the highest, followed by 339 (26.46%) victims died in hospital, least number of deaths occur on the spot comprising of 309 (24.12%) cases. Two-wheeler occupants were the commonest group of victims comprising of 830 (64.79%) cases, pedestrian comprising 115 (8.98%) of total cases. Most common offending vehicle is heavy motor vehicle comprising 783 (61.12%) of all types of vehicle cases.

**Keywords:** Fatal injury, Pedestrian, Road traffic accident, Timing, Two-wheeler

### **INTRODUCTION**

The head and the abdomino-pelvic cavity are the most vulnerable region in the human body. In accidental cases, mortalities and morbidities are more common in head injuries for both riders and pillion riders of two wheelers. Since, the head contains brain, a very important vital organ, trauma to this region challenges the individual because of its anatomical position, size and movements in all directions. Despite improvements in safety measures in vehicles and greater availability of emergency measures, head injuries have not declined. Some of the factors that increase risks of road traffic accident (RTA) in India

are lack of traffic laws, drunken and rash driving, traffic accidents due to negligent act, poor conditions of the road, lack of infrastructures, mix traffic, encroachments that restrict safe areas for pedestrian, and lack of valid or fake driving licenses.

India accounts for about 10% of road accident fatalities worldwide<sup>[3]</sup>. World Health Organization defined the accident as, “an unexpected, unplanned occurrence that may involve injury”<sup>[8]</sup>. Moreover, fatalities due to road traffic injuries in India are projected to increase by 150% by the year 2020, with the majority of this increase being among users of motor vehicles<sup>[12]</sup>. A road traffic injury

is a fatal or non-fatal injury that occurred as a result of a collision on a public road involving at least one moving vehicle. India has experienced rapid growth in motorisation in the past decade, with concomitant increases in road traffic injury-related mortality<sup>[10]</sup>. In many countries, motor vehicle accidents rank first among all fatal accidents. Every year almost 1.3 million people die from road accidents in the world<sup>[11]</sup>. In India, the data from Ministry of Home Affairs alone showed that over 105,700 people died and 452,900 were injured due to road traffic injuries with vehicular users accounting for 17.8% of the fatalities.

Head injury associated with traumatic brain injury occurs with an incidence of 20 cases per 100,000 populations per year. It is the common cause of death in young adults (age range, 15–24 years) and is more common in males than females.

## MATERIAL AND METHODS

The present study was carried out in the Department of Forensic Medicine and Toxicology, GSVM Medical College, Kanpur, Uttar Pradesh. During 1-year period, total autopsy conducted in GSVM Medical College mortuary was 3730, out of which fatal RTA cases were 1281.

The information regarding age, sex, residence, marital status, date and time of accident and of death was gathered from police inquest report, relatives, dead body challan and clinical details from hospital records. During autopsy, detailed examination was carried out and data regarding both external and internal injuries and carefully recorded, analysed and presented in this paper.

## OBSERVATION

Of the 3730 autopsy conducted in the GSVM Medical College mortuary, the fatal RTA cases were 1281. In the study, 365 (28.49%) cases were in the 21–30 years of age group, followed by 321 (22.46%) cases in the 31–40 years of age group. In the present study, males are more sufferer than females. It showed male to female ratio was 3.78:1 and the most vulnerable time was between

1201 and 1800 hours with 429 (33.49%) cases, followed by 394 (30.76%) cases between 1801 and 2400 hours. In our study, married individuals are out in number with 809 (63.15%) cases than unmarried 354 (27.63%) cases. A total of 663 (49.42%) victims died on the way to hospital, followed by 339 (26.46%) cases in the hospital. In our study, two-wheeler occupants were the commonest group of victims comprising of 830 (64.79%) cases. In this study, most common offending vehicle is heavy motor vehicle with 783 (61.12%) cases among all vehicles.

## DISCUSSION

The traumatic factor head injury due to RTA is a very common feature in the cases of fatal injuries, which is permanent damage for lifetime just like a disease.

The Table 1 shows total autopsy conducted in the mortuary of GSVM Medical College, Kanpur, is 3730, in which 1281 were fatal RTA. Cases in which males (58.32%) are out in number than females (41.68%). Similar results were observed in the study by Kumar *et al.*<sup>[3]</sup> where 88.22% of males and 11.77% of females and by Tandle and Keoliya<sup>[13]</sup>. 86.96% of males and 13.04% of females meet with RTA.

It is natural because females have less number of outing on road and peak period of traffic. But, when she is trapped in a causative factor then chance of her escape from serious injuries become remote due to her bearing apparels, such as Sari, dupatta and long hair. In our study in Kanpur city, total number of fatal head injury due to RTA is 1281 (34.34%). The reason of high incidences of RTA in Kanpur is due to the presence of many industries with having more vehicle transportations, which is the cause of RTA.

**Table 1: Study of Male and Female fatal head Injury**

Autopsy	No. of autopsy	Percentage
Total	3730	
Male	2175	58.32
Female	1524	41.68
Fatal head injury cases in RTA	1281	34.34

The Table 2 shows that the most common age group involved in RTA is 21–30 years comprising of 365 (28.49%) cases, followed by 321 (22.46%) incidences in the 31–40 years of age group.

The results of present study correlate with the study by Tirpude *et al.* [4], in which, 31.37% of cases in the 20–30 years of age group, followed by 28.65% in the 31–40 years of age group. In the study by Sonawane and Jambure [6], 31% of cases in the 20–30 years, 27% in the 31–40 years of age group, Tandle and Keoliya [13] showed 28.34% of cases in the 20–30 years and 25.13% in the 31–40 years of age group. In all, 20–30 years of age group is most active group in the society as they have high percentage of outing, they have high chance of involvement in mishap. In all, 0–10 years and >70-year group have less frequent outing, so less incidences of involvement in RTA.

**Table 2: Study of Age Wise Autopsy Percentage**

Age (years)	No. of autopsy	Percentage
0–10	34	2.65
11–20	105	8.20
21–30	365	28.49
31–40	321	25.06
41–50	259	20.22
51–60	117	9.13
61–70	47	3.67
>70	33	2.68

The Table 3 shows sex-wise distribution where 1013 (79.08%) males are involved in RTA than females (268 (20.92%)), which is similar to other studies. In the study by Sonawane and Jambure [6], 89% were males and 11% were females who were involved in RTA. In the study by Kumar *et al.* [3], males are 88.22% and female are 11.77% and in the study by Harnam and Dhatarwal [7] male to female ratio is 9:1.

The Table 4 shows that most of incidents occurred in time 1200 to 1800 hours comprising of 429 (33.49%)

**Table 3: Study of Age Wise Autopsy Percentage**

Sex	No. of autopsy	Percentage
Male	1013	79.08
Female	268	20.92
Total	1281	100

**Table 4: Study of Number of Autopsy in Percentage**

Time (hours)	No. of autopsy	Percentage
0001–0600	121	9.44
0601–1200	337	26.31
1201–1800	429	33.49
1801–2400	394	30.76

cases, followed by 1801 to 2400 hours comprising of 394 (30.76%) cases. Similarly, in the study by Sangeet and Sekhon [14], 34.88% cases between 1200 and 1800 hours and 28.21% cases in time 1801 to 0000 hours. 121 (9.44%) of cases found in time 0001 to 0600 hours.

Most of the people leave their office in evening time to reach home, creates rush on the roads, also most of the people prefer for outing in evening time. Some people also take alcohol or other addiction in evening time that also increases mishap on the road. The RTAs are least in 0001 to 0600 hours because most of the people sleep in this period at their home.

In our study period, married victims are out in number comprising of 809 (63.15%) cases and unmarried are 354 (27.63%) of total cases due to fatal head injury (Table 5).

The present study results correlate with the study by Sonawane and Jambure [6], in which married victims were

**Table 5: Status of Number of Autopsy in Percentage**

Status	No. of autopsy	Percentage
Married	809	63.15
Unmarried	354	27.63
Not known	118	9.22

64% and unmarried victims were 26% and unknown were 10%. Individuals have responsibilities towards their family, they want to maintain bread and butter of their family, and want to earn more money to maintain their social status and for future planning of their children's. So, they spend most of the time outside the home and have more chance to trap in mishap.

In the present study, 633 (49.42%) victims died on the way to hospital, which is the highest, followed by 339 (26.46%) victims died in the hospital, least number of deaths occur on the spot comprising of 309 (24.12%) cases.

The present study correlates with the study of other researchers. In the study by Tandle and Keoliya<sup>[13]</sup>, 39.57% died on the way to hospital, 34.76% in the hospital and 25.67% on the spot. In the study by Sharma *et al.*<sup>[5]</sup>, 141.21% died on the way to hospital, 36.46% in the hospital and 22.33% on the spot. In the study by Menon and Nagesh<sup>[2]</sup>, 38.20% died on the way to hospital. In Chandra *et al.*<sup>[9]</sup>, 36.92% died on the way to hospital. In the present study, maximum deaths occurred on the way to hospital is due to inadequate medical facilities in Kanpur as per norm. Specialty and super specialty hospitals and doctors in government and private sector are far away from remote area that's why victims died on the way to hospital, also crowd on the road of Kanpur, most of the time spend on rush on the road after trauma.

In the present study, two-wheeler occupants were the commonest group of victims comprising of 830 (64.79%) cases of total fatal RTA, followed by light motor vehicle occupants comprising of 336 (26.23%) of total cases.

Similar results seen in the study by Kumar *et al.*<sup>[3]</sup> showed 41.36% of two-wheeler occupants and 38.22% of light motor vehicle occupants; and by Tandle and Keoliya<sup>[13]</sup> showed 36.90% of two-wheeler occupants and 26.60% of light motor vehicle. But, in the study of Harnam and Dhatarwal<sup>[7]</sup>, pedestrian are commonest group of victims involved comprising of 28.7%, followed by 26.80% of light motor vehicle occupants. In our study, least number of victims are pedestrian comprising 115

(8.98%) of total cases. In the two-wheeler occupants, head is freely moveable on direct impact to the offending object got injured even with minor collision.

In the present study, most common offending vehicle is heavy motor vehicle as shown in the Table 6, 7 and 8 comprising of 783 (61.12%) cases, followed by 320 (24.98%) cases from light motor vehicle, 178 (13.90%) cases comprising other vehicles.

**Table 6: Study of Number of Autopsy in Percentage with Place of Death**

Place of death	No. of autopsy	Percentage
On the spot	309	24.12
On the way to hospital	663	49.42
In the hospital	349	26.46

**Table 7: Study of Number of Autopsy in Percentage**

Victim	No. of autopsy	Percentage
Two wheeler	830	64.79
Light motor vehicle	336	26.23
Pedestrian	115	8.98

**Table 8: Study of Offending Vehicle (Heavy, Light and Others)**

Offending vehicle	No. of autopsy	Percentage
Heavy motor vehicle	783	61.12
Light motor vehicle	320	24.98
Other	178	13.90

Similar trends were observed by other researchers. In the study by Tandle and Keoliya<sup>[13]</sup>, 59.81% of offending vehicles were trucks, 15.89% were light motor vehicles and 9.3% were buses. In the study by Chandra *et al.*<sup>[9]</sup> 60.31% were trucks and 18.32% were light motor vehicles. In the study by Yadav *et al.*<sup>[1]</sup>, 58.12% were trucks and 26.32% were light motor vehicles.

Involvement of heavy motor vehicle is higher in number because heavy motor vehicles have higher momentum due to their heavier mass as their speed increases their momentum also increases and control on the motor vehicle

decreases that's why their involvement in larger number of mishap.

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