

## Pattern and distribution of head injuries in victims of fatal road traffic accidents-an autopsy based study

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### Abstract

Road traffic accident (RTA) is a major epidemiological and medicolegal problem. Among the injuries caused in road traffic accidents, head injuries are the most serious injuries in terms of morbidity and mortality. Hence the present study was conducted to know the pattern and distribution of head injuries in fatal road traffic accidents. This study was undertaken on 106 victims of vehicular accidents, brought to JJM Medical College, and Chigateri general hospital, Davangere, Karnataka for medico-legal autopsy. This study entirely focuses on the patterns of head injuries in fatal road traffic accidents. RTAs were more common in the younger age groups and in male sex. The commonest type of scalp injury was contusion as observed in 66% of the cases. Most common type of fracture in the skull was linear fracture as observed in 62% of the cases. Most common injury to the brain was subarachnoid haemorrhage which was seen in 84.9% of the cases followed by subdural haemorrhage, in 74.5% of the cases. Head injury was the major cause of death in majority cases of RTAs, mostly due to scalp injuries, skull fractures, Subdural and Subarachnoid Haemorrhages. This further shows the need of strict implementations of traffic rules.

**Keywords:** Road Traffic Accident (RTA), Head Injury, Scalp injuries, Skull fractures, Craniocerebral haemorrhage.

### Introduction

An Accident has been defined as “an unexpected, unplanned occurrence which may involve injury”. An Accident that takes place on the road involving a vehicle is termed as road traffic accident. Road traffic injuries alone are ranked as the primary cause of illness in children in the age group of 5-14 years and the third leading cause in the age of 15-19 years in year 2000.<sup>(1)</sup>

RTA can be considered as a disease affecting young individuals especially males. RTA is on the rise globally and India is no exception. According to an estimate, one RTA occurs in every four minutes in India, claiming atleast 25,000 lives every year. RTA not only affects primary victims but it has got innumerable secondary victims in the form of family and relatives who suffer financially, psychologically and socially though morbidity does not reckon with these social aspects of this problem.<sup>(2)</sup>

Davangere is a city in the heart of the southern Indian state of Karnataka. It is the sixth largest city in the state and the headquarters of davangere district. It has been selected as on the hundred Indian cities to be developed as a smart city under smart cities mission. But the road traffic accidents and resulting fatalities were on the rise in davangere, comparable to the situation in India and also globally. The causes for high casualties in road crashes in davangere are numerous. But it is significant to note that most of the fatalities associated with RTA's are due to head injuries. So our study aims to elaborate the pattern and distribution of head injuries in fatal road accidents in davangere to enlighten the medical fraternity on the types of injuries they might encounter in their profession, especially in trauma care centers.

### Material and Methods

The present study is a prospective study conducted from 1<sup>st</sup> October 2010 to 31<sup>st</sup> March 2012 on the cases selected from the dead bodies in the mortuary of the Department of Forensic Medicine, JJM Medical College, and Chigateri General Hospital, Davangere, for medicolegal post-mortem examination from the various police stations of Davangere region.

The data of the materials were sourced from 106 fatal Road Traffic Accident Cases. Approval has been taken by institutional ethical committee of JJM Medical College. All the cases of vehicular accidents with multiple injuries sustained to the body would be taken for the study. Decomposed bodies and accidents with no definite history were excluded from the study. Thorough perusal of case papers including investigation, medico-legal register and police records like panchanama was carried out to collect relevant information. Detailed history related to time, manner and hospitalization taken from relatives. Proforma specially designed for this purpose was used for collection of data. Data was analysed using Microsoft excel 2010.

### Observation and Results

In our study, most of the victims were males (98 cases-92.5%). The number of female victims were 8 only (7.5%). This finding clearly indicates the male preponderance in road traffic accidents.(Table 1)

Most of the victims in the present study were in the 30-40 age group (23.6%).Victims in the 70-80 age bracket were affected only minimally (1.9%). Victims in the age group 1-10 years and 61-70 years constituted

9.4% only. Among the victims the lowest age was one year and the highest was 80 years.(Table 2)

Injuries of the scalp were noted in 99 victims. There were no scalp injuries in 7 cases. Out of 99 victims, 70.7% individuals had contusions. Lacerations were seen in 60.7% cases followed by abrasions which were seen in 54.5% individuals only. The frontal region of scalp was most affected (98 injuries), followed by temporal region (64 injuries), parietal region (48 injuries) and occipital region (20 injuries) respectively.(Table 3)

A fracture of the skull was noted in 80 (75%) victims. In most of the cases a fracture of both vault and base of the skull was seen (39 cases-36.79%).Fractures in the skull vault alone was noticed in 37 cases(34.92%). Fractures only in the base of skull was noted in 4(3.77%) victims only. There were no fractures in 26 cases(24.52%). Considering the fractures in the vault of skull the most common type of fracture was linear fracture (62%) as compared to comminuted fracture (28%) and depressed fracture (8%).(Table 4)

In our study in the base of skull the commonest type of fracture was linear fracture(77%). The second commonest type of fracture was comminuted fracture(23%). Considering the involvement of fossa in the base of skull, middle cranial fossa was most affected (51%). The least affected fossa was anterior cranial fossa(17%). (Table 5).

In the present study all the individuals presented with a type of intracranial injury. Subarachnoid

haemorrhage was noted in 90(84.9%) cases. Subdural haemorrhage was seen in 79(74.5%)cases. 35 cases(33.01%) showed intravertebral haemorrhage. Intraventricular haemorrhage was seen in 19(17.92%) cases followed by extradural haemorrhage in 18 (16.98%) cases. Frontal lobe was the most affected region of the brain. Injuries were seen least in the occipital region of the brain. In only four individuals cerebellum was found injured.(Table 6)

**Table 1: Sex wise distribution of RTA victims**

Sex	Number of Cases	Percent
Male	98	92.5
Female	08	7.5
Total	106	100

**Table 2: Age wise distribution of RTA victims**

Age Group (Years)	Number of Cases	Percentage
1 – 10	05	4.7
11 – 20	16	15.2
21 – 30	24	22.6
31 – 40	25	23.6
41 – 50	19	17.9
51 – 60	10	9.4
61 – 70	05	4.7
71 – 80	02	1.9
Total	106	100

**Table 3: Scalp injuries of RTA Victims**

	Site	Contusion	Abrasion	Laceration
Frontal	R	13	17	16
	L	14	21	17
Parietal	R	9	6	13
	L	7	5	13
Temporal	R	10	10	9
	L	15	10	10
Occipital	R	2	3	5
	L	2	4	4

**Table 4: Distribution of the fractures of the vault of the skull of RTA victims**

Type of fracture	Frontal		Parietal		Temporal		Total
	U/L	B/L	U/L	B/L	U/L	B/L	
Depressed	3	-	4	-	2	1	10
Linear	11	1	26	2	30	3	73
Comminuted	2	3	10	2	15	1	33
Total	16	4	40	4	47	5	116

**Table 5: Distribution of the fractures of the base of the skull of RTA victims**

Type of fracture	Anterior cranial fossa		Middle cranial fossa		Posterior cranial fossa		Total
	U/L	B/L	U/L	B/L	U/L	B/L	
Linear	5	2	15	5	11	3	41
Comminuted	2	-	5	2	2	1	12

Total	7	2	20	7	13	4	53
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**Table 6: Intracranial injuries in the victims of RTA**

Intracranial Injury	Number of Victims	%
Extradural haemorrhage	18	16.98%
Subdural haemorrhage	79	74.5%
Subarachnoid haemorrhage	90	84.9%
Intracerebral haemorrhage	35	33.01%
Contusions	70	66.03%
Lacerations	6	5.7%

### Discussion

Sex or gender in the road traffic accident cases was dominated by males in the present study and out of 106 study subjects 98 (92.5%) were males and 8 (7.5%) were females. It is because males are usually involved in outdoor activities and they were usually the earning member of the family, whereas females are usually confined to the home. These findings are consistent with studies done by Ngo Anh et al<sup>(3)</sup> and Dovom et al.<sup>(4)</sup>

In our study, most of the victims belongs to the age group 31-40 years(23.6%).Victims in the age group 1-10 years and 61-70 years constituted 9.4% only. This is due to the fact that the individuals in the age group 31-40 years are usually working members of the family. Elderly individuals and kids usually tend to stay in home. These findings are consistent with studies done by Sinha and Sengupta<sup>(5)</sup> and Salgado.<sup>(6)</sup>

In the present study 99 victims suffered injuries to the scalp. Scalp injuries were not seen in 7 individuals. Lacerations of the scalp were seen in 60.6% cases followed by abrasions which were seen in 54.5% individuals only. Scalp contusions were seen in 70.7% individuals. The frontal region of the scalp was most affected (98 injuries), followed by temporal region (64 injuries), parital region (48 injuries) and occipital region (20 injuries) respectively. These findings were according with the studies done by Kakaeri SR et al,<sup>(7)</sup> Shivakumar BC et al<sup>(8)</sup> and Pothireddy S et al.<sup>(9)</sup>

In this study a fracture of the skull was noted in 80 (75%) victims. Fractures in the base of skull were noted in 4(3.77%) victims only. Fractures in the skull vault alone was noticed in 37 caes(34.92%). Most cases shown a fracture of both vault and base of the skull(39 cases-36.79%). These findings are similar to the findings in studies done by Fimate<sup>(10)</sup> and Dikshit.<sup>(11)</sup>

The commonest type of fracture in the base of skull was linear fracture(77%). Comminuted fracture of the base of skull was seen on 23% only. Considering the involvement of fossa in the base of skull, middle cranial fossa was most affected (51%). The least affected fossa was anterior cranial fossa(17%). These findings are

correlating with the findings in study done by Gaurav.<sup>(12)</sup>

In the present study a intracranial injury was seen in all individuals. Subarachnoid haemorrhage was noted in 90(84.9%) cases. Subdural haemorrhage was seen in 79(74.5%) cases.35 cases(33.01%) showed intravertebral haemorrhage. Intraventricular haemorrhage was seen in 19(17.92%) cases followed by extradural haemorrhage in 18 (16.98%) cases. Frontal lobe was the most affected region of the brain. Injuries were seen least in the occipital region of the brain. In only four individuals cerebellum was found injured. These findings are consistent with the studies done by Tyagi.<sup>(13)</sup>

### Conclusion

Road traffic accident is an unfortunate economical burden for a developing country like India. Head injury due to RTA is a recognised major health problem causing death and disability among the populations of this country. It is the high time for the concerned authority to take appropriate and immediate measures for reducing the incidences of head injury associated with RTA and thereby protecting this vulnerable group of people.

### Acknowledgement

The author is thankful to all the participants for giving their cooperation and valuable time.

**Conflict of Interest:** None

**Source of Funding:** Self funding

**Ethical Clearance:** Yes

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