

Original Research Paper

Pattern and Distribution of Head Injuries in Fatal Road Traffic Accidents in Bhopal Region of Central India

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Abstract

Accidents are not due to external factors all the time but often they occur due to failure of control of self -conscience and free thoughts. Road Traffic Accidents is still the major cause of death worldwide including India. A prospective study has been conducted in Gandhi Medical College Bhopal, in the year 2010 to study the pattern and distribution of Head Injuries of fatal road traffic accidents and to prepare the demographic profile of it. Out of total 282 cases, male to female ratio was 10:1, and commonest age group affected was 21-30 years (30.5%). Among total victims, Hindus were 255 (90%) and rests were Muslims (9%) and other religions. Total hospitalized cases were 172 (61%). Head injury was the most common injury, present alone in 130 cases (46%) and in 220(78%) cases along with other injuries. Skull fractures were found in 195(69%), in which linear/fissure fracture (32.9%) was most common. Most common bone fractured was temporal bone (n=122, 43.26%).The commonest variety of intracranial hemorrhage was subdural hemorrhage (n=214, 75.88%) and craniotomy was done in 20 (7.09%) cases.

Key Words: Road traffic accident, Fatal, Head injuries, Fracture, Skull

Introduction:

Road traffic accidents, since years claim the highest number of life worldwide. As per Institution of Road Traffic Education, India accounts for about 10% of RTA fatalities worldwide (2008). [1] Road accidents have earned India a dubious distinction, with over 130,000 deaths annually; in 2009 itself the country has overtaken China and now has the worst road traffic accident rate worldwide, with the death toll rose to 14 per hour in 2009 as opposed to 13 the previous year. [2]

In 2013, The Global status report on road safety estimates that more than 231000 people are killed in road traffic crashes in India every year. Approximately half of all deaths are among vulnerable road users - motorcyclists, pedestrians and cyclists. [3]

The present study is therefore conducted in the Department of Forensic Medicine in Bhopal to emphasize the increasing incidence of the fatal RTA and to study the pattern of Head Injuries present in these RTA victims in this central region of India in order to establish a demographic profile of the Victims.

Material and Methods:

The present study was conducted at Gandhi Medical College and Associated Hamidia Hospital, Bhopal (M.P.) from June 2010 to November 2010. Material included all dead bodies (n = 282 cases) of fatal RTA brought to the Department of Forensic Medicine Gandhi Medical College for autopsy.

A proforma, for recording the pattern of injuries and demographic profile was prepared and data was collected from Police, relatives, doctors, Hospital records and also from post-mortem findings. The relevant history about the injuries to the victims was also collected.

All RTA victims dying on spot and hospitalized from the time of accident were included in the study.

Observations and Results:

It was observed in the study that most affected age group was between 21-30 years having total 86 cases (30.5%), followed by 31-40 years (24.1%). All age groups are dominated by males with maximum sex differentiation in 21-30 years age group. (Table 1)

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Females were affected maximum in age group of 31-40 years, whereas males were affected maximum in 21-30 years age group. In the present study males (n=258, 91.5%) outnumbered females (n=24, 8.5%) significantly with male to female ratio of nearly 10:1. (Table 2) In this study total 255 victims were Hindus (90.5%) and 27 were Muslim (9.5%). (Table 3)

Total numbers of hospitalized cases were 172 (61%) and rest was non hospitalized 110 (39%), which showed that either the victims died on spot or on the way to the hospital. (Table 4) Head injury alone was most common injury (excluding minor abrasions, laceration and ecchymosis) and was present in 130 cases (46.09%). Other injuries were present in different regions in different combination in 97 victims. (Table 5)

Injury to the face was seen in 64 deceased (22.69%), with facial fractures in 8 victims. Scalp was ecchymosed in 239 cases (84.75%), lacerated in 121 (42.90%).

In present study Skull fractures were seen in 195 cases (69.14%). Intracranial hemorrhages were seen in 220 cases (78%), cerebral contusion and laceration in 149 cases (52.83%) and cerebral necrosis in 116 cases (41.13%). Surgical intervention was done in 35 patients (12.41%) in which 20 (7.09%) had undergone craniotomy. (Table 6)

Among the Skull Fractures, Frontal bone was fractured in total 102 cases (36.17%), Temporal bone in total 122 cases (43.26%), Parietal bone in 108 cases (38.29%) and Occipital bone was fractured in total 77 cases (27.30%). Base of the skull bone (including all cranial fossa) was fractured in total 114 cases.

Multiple fractures were most common (60.28%) followed by temporal bone fracture alone (43.26%) and parietal bone fracture alone (38.29%) respectively. (Table 7)

Out of 282 cases, Linear/Fissure type of skull fracture was most common (n=92, 32.97%) followed by Radiating fracture in 72 cases (25.53%), But Multiple fractures (more than one type) being most common seen in 142 cases (50.35%). (Table 8)

In our study 73 victims had Extradural haemorrhage, 214 (75.88%) had Subdural haemorrhage, whereas subarachnoid haemorrhage was present in 198 cases (70.21%). Intra-cerebral haemorrhage was seen in 27 cases (9.57%).

Combined haemorrhage (more than one type) was seen in 192 victims (68.085%). Most common type of individual Intracranial Haemorrhage was subdural followed by subarachnoid haemorrhage. (Table 9)

Discussion:

In the present study young people of age group 20-30 years (30.5%) were the most common victims, which is similar to findings of multiple authors from various geographical regions of India. [4-7] Pramod Kumar Verma et al [8] showed high incidence of traffic injuries in age group 15-55 years. H. Singh and Dhatarwal [9] found two third of cases are in age group 11-40 years. According to the NCRB Report for the year 2012 and 2013, the most common age group involved in RTA was 30-44 years followed by 15-29 years. [10, 11]

A large number of cases in the young age group can be justified by the fact that young persons in this age group are at the peak of enthusiasm, energy and creativity.

They lead active life and have the tendency to take undue risk like speed driving, overtake wrongly, triple riding of bike, boarding over running vehicle etc. which expose them to the hazards of accidents and injuries.

In present study it was observed that male outnumbered females with a significant male to female ratio of nearly 10:1. Almost all the studies over RTA have conclusively pointed out male dominance. Arvind Kumar et al, [4]

R. Ravikumar, [7] Dhaval Patel et al, [12] B. C. Shivkumar et al, [13] and Behera et al [14] also got the same findings. In NCRB report of 2013 out of all RTA fatalities 76.7% are male and 23.3% are female. [11] The predominance of male can be explained by the fact that males lead a more active life, travel more, drive more and so expose to the hazards of traffic, accidents and trauma.

Females generally stay at home, but now there is increasing trend of RTA among females too due to their awareness regarding career and their active participation in socio-economic activities. Our findings regarding sex ratio did not match with Akhilesh Pathak et al, [15] Harman singh et al, [9] Chandra et al, [16] and Agnihotri et al [17], who found lesser sex ratio in the range of 2:1 to 5:1.

Hindus (n=282) outnumbered Muslims in the ratio of 9:1 which is simply due to more numbers of Hindus in and around Bhopal region. Other religions are quite less populated in and around Bhopal region.

In our study 61.2% (172) cases sought Medical aid. Dhaval et al [14] reported 67% cases died on spot. This reflects the severity of injuries produced by the accidents as well lack of proper medical aids soon after the accidents. Large number of studies supports our findings. [9, 12, 16, 18] In our study Head Injury was the

most common type of injury sustained with total 239 cases (including superficial and serious injuries). A total of 195 cases had skull fractures and 220 cases had shown intracranial hemorrhages.

The reason might be that head is the most vulnerable part because of its top location in the body and immovability of brain tissue.

According to the Brain Injury Association Traumatic Brain injuries, mainly due to RTA is the leading cause of death in young people and Motor vehicle crash accounts for 50% of total fatal and non - fatal injuries. [19]

Majority of other studies are supporting our findings. [4, 14-16] According to B. R. Sharma et al [20] head injury accounted for 75% of all fatal road traffic accidents. Pamod Kumar Verma [8] et al and E. Ravikiran et al [18] contradicted our findings by concluding limb injuries and abdominal injuries respectively, are the major injuries in RTA. Like our study Cerebral contusion and laceration (n=149, 52.83%) was found in majority of other studies. [4, 13, 16]

We reported 69.14% (195) cases of skull fractures, which other studies also supported. [4, 9, 16, 20] Temporal bone was most commonly involved followed by parietal.

This finding tallied with the most other studies. [4, 6] but multiple skull bones fracture was most common type. Few studies like Dhaval et al [12] found Parietal bone fracture as most common whereas Arvind Kumar et al [4] stated base of skull as most common bone fractured.

More involvement of temporal bone in RTA might be due to inclination to fall towards one side in RTA. The lateral location of bone exposes it to the hazards of RTA.

Regarding individual types of fracture, simple/linear or fissure fracture was the most common type encountered in 32.97% cases followed by radiating fractures which is similar to findings of other studies. [12, 13, 15]

Over all Multiple types of fracture were most common comprising 60.28% (n=170) cases and can be explained by the fact that in majority of cases secondary impact is common after primary impact.

Our findings of subdural haemorrhage (75.88%) followed by subarachnoid haemorrhage (70.21%) as most common intracranial haemorrhage is similar to other studies. [4, 9, 12, 13, 15, 20] Combined haemorrhage was seen in 68.8% cases.

Chandra et al [16] in contrast found Subarachnoid haemorrhage most common. Subdural haemorrhage occurs mostly due to

tear of bridging vein during frequent change in the velocity.

Conclusion:

In Present study, RTAs were more common in the younger age groups and in male sex. Majority of victims sought medical help.

Head injury was the major cause of death in majority cases of RTAs mostly due to Subdural and Subarachnoid Haemorrhages.

This further shows the need of strict implementations of rules for controlling the speed of vehicle. As Head injury is the major cause of death in RTA, the Government should make strict rules for implementation of use of safety helmets for bike riders, for prevention of driving under influence of alcohol, and for the proper training of Drivers, Police personnel, Traffic controller etc.

Government must also make arrangements for proper lighting and signaling over roads and install modern vigilance system.

Overall improvement in the Emergency Medical services is a must to decrease the death toll due to RTA.

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Table 1: Age and Sex-Wise Distribution of Cases

Age Grp.(yrs)	Male	Female	Total	Percentage
0-10	7	2	9	3.2
11-20	34	2	36	12.8
21-30	82	4	86	30.5
31-40	61	7	68	24.1
41-50	32	5	37	13.1
51-60	20	2	22	7.8
>60y	22	2	24	8.5
Total	258	24	282	100

Table 2: Sex-Wise Distribution

Sex	Cases	Percentage
Male	258	91.5
Female	24	8.5%
Total	282	100

Table 3: Religion Wise Distribution of Cases

Religion	Cases	Percentage
Hindus	255	90.5%
Muslims	27	9.5%
Others	0	0%
Total	282	100%

Table 4: Hospitalized and Non Hospitalized Cases

	Cases(N=282)	Percentage
Hospitalized	172	61
Non Hospitalized	110	39
Total	282	100

Table 5: Region Wise Distribution of Injuries

Region	Cases (n=282)		(%)
	Alone	Combination	
Head Injury	130	220	46.09
Chest/Thoracic	12	97	4.25
Abdomen	06	71	2.12
Pelvic Injury	18	33	6.38
Chest + Head	25		8.86
Abdomino-Pelvic + Head	23		8.15
Abdomen + Chest	19		6.38
Pelvic + Other Injuries	14		4.96
Head+ Chest+ Abdomino-pelvic	31		11.0
Multiple(>1 Region)	97		34.39

Table 6: Distribution of Head Injuries including Face (n=282)

Area involved	Cases	(%)
Face injuries	64	Simple – 64 (22.69) Fractures- 8(0.03)
Scalp ecchymosis	239	84.75
Scalp laceration	121	42.90
Skull fracture	195	R-165(58.5), L-159(56.3) R+L-102(36.1)
Intracranial hemorrhages	220	78.01
Cerebral Contusion/laceration	149	52.83
Cerebral necrosis	116	41.13
Surgical Intervention	35	12.41
Craniotomy/burr	20	7.09

Table 7: Distribution of Skull Fractures

Region	Right	Left	Right+ Left	Total (%)
Frontal	21	21	61	102(36.17)
Temporal	28	31	63	122(43.26)
Parietal	42	24	42	108(38.29)
Occipital	18	13	46	77(27.3)
Base	26	30	58	114(40.42)
Multiple	34	32	104	170(60.28)

Table 8: Types of Skull Fractures

Types	Cases(n=282)	Percentage (%)
Fissure/Linear	93	32.97
Commuted	67	23.75
Radiating	72	25.53
Sutural	14	04.96
Depressed	10	03.54
Hinge	05	01.77
Multiple(>1 Type)	142	50.35

Table 9: Distribution of Brain Haemorrhages

Types of Haemorrhage	Cases (n=282)	Percentage (%)
Extradural	73	25.88
Subdural	214	75.88
Subarachnoid	198	70.21
Intra Cerebral	27	9.57
Combined(>1 Type)	192	68.08