

Death Due to Road Traffic Accidents: A Forensic Study

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Abstract

Introduction: One of the most common non communicable epidemic of the world are accidents, which are a major cause for morbidity and mortality. The most vulnerable part of the body which is affected by the road accidents is the head. This study was done to observe the incidence of vehicular trauma and the pattern of injuries which lead to fatal outcome. **Materials and methods:** This study was done on 256 patients of all ages, who had a history of Road Traffic accident and death occurred due to head injury within 15 days of admission. The age, sex, time of death, history and type of the accident were noted. Type of head injury, site of injury and other organs involved, were also observed. **Results:** A predominance of males was seen over the females in 73%. The most common age group to be affected was between 21-40 years of age with 63.5% people affected. Contusions on the scalp, membrane and brain were 97.2%, 90.2% and 100% and lacerations were 36.3%, 28.9% and 35% respectively. 70.7% of the patients had injury at the base of the skull which was the most common part of the head to be involved, followed by the involvement of the temporal bone in 60.2% of the patients. Most of the patients (92.6%) had a subdural hemorrhage while 82.4% had a subarachnoid membrane hemorrhage also. **Conclusion:** Improper roads and traffic discipline not to mention high traffic and vehicles are the main reason. Proper education to the people, importance of the speed limits and following the traffic regulation, wearing helmets for two wheelers and seat belts for the 4 wheelers have to be emphasized.

Keywords: Road traffic accidents, death, head injury

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Introduction

One of the most common non communicable epidemic of the world are accidents, which are a major cause for morbidity and mortality. This is the price we pay for the progress in technology [1]. As there is an increase in urbanization and

modernization, there is an increase in motorization also [2]. Broad roads, with heavy traffic, high speed vehicles and low traffic discipline. There has been tremendous increase in the urbanization and motorization in India as well. Four wheelers, three wheelers and Two wheelers are very economical as well as easily available [3]. This increase in the motorization has shown a boom in the rural development as well as adverse effects such as RTA [4].

Injuries due to road traffic accidents rank 4th among the leading causes of death in the world [5]. It is estimated that 2.1% of the global mortality are caused by Road Traffic Accidents. A larger share of this is borne by the developing countries where in 85% of the deaths are due to RTA [2]. India accounts for around 10% of the fatalities due to RTA worldwide. 30.2% of natural and unnatural deaths were due to RTA in India [6]. This number may not be exact and may increase because most of

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the times, the deaths die to RTA are not recorded⁷. Some of the important factors for fatalities in RTA is the increase in motor vehicles, increase in population and poor access to health care.

The most vulnerable part of the body which is affected by the road accidents is the head [8]. A head injury is defined as a morbid state resulting from the gross or subtle changes in the scalp and/or the contents of the skull, produced by mechanical sources [9]. In India, since the two wheelers contribute to the major portion of the traffic, these are the more common causes of accidents.

There have not been many studies which have correlated the head trauma with the road traffic accidents. This study was therefore done to observe the incidence of vehicular trauma and the pattern of injuries which lead to fatal outcome.

Materials and Methods

This descriptive study was performed by the Department of Forensic Medicine at Kakatiya medical college over a period of two years. This study was done on 256 patients of all ages, brought to our hospital, who had a history of Road Traffic accident. In all these patients, death occurred due to head injury within 15 days of admission. All the bodies were sent to the mortuary for postmortem and head injury as the cause of death was confirmed.

Non fatal cases of RTA, patients who died with causes other than head injuries, those not involved in RTA were excluded from the study. The inquest reports were analyzed in detail and the age, sex, time of death, history and type of the accident were noted. Type of head injury, site of injury and other organs involved, were also observed and duly noted. In case of details which could not be identified on the body, they were obtained from interviewing the eye witnesses, friends and relatives, as well as from the cooperation of the police.

Results

Out of the 256 patients, 201 were males (78.5%) and 55 (21.5%). A predominance of males was seen over the females (Fig. 1).

The most common age group to be affected was between 21-30 years of age with 91 people affected accounting for 35.5%. This was followed by 72 patients in the 31-40 years age group (28.1%). 39 (15.2%) were in the 41-50 years age group, 21 (8.2%) were between 11-20 years (Fig. 2).

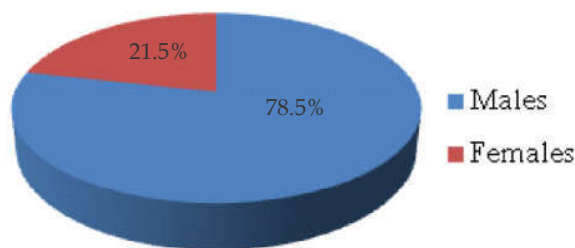


Fig. 1: Sexwise distribution of patients

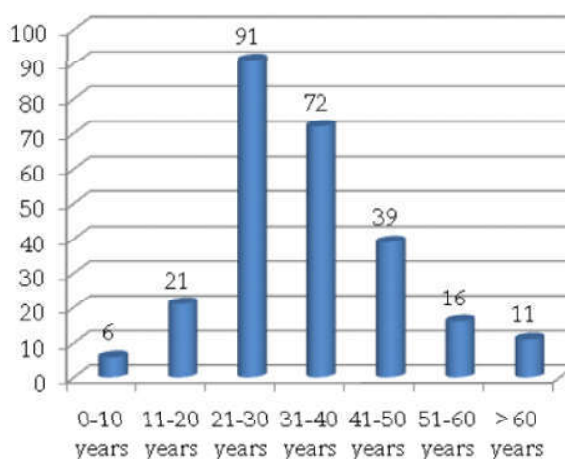


Fig. 2: Agewise distribution of patients

Out of the 256 patients 249 (97.2%) had contusions on their scalp, 231 (90.2%) on the membrane and all of them (100%) had contusions in their brain. 93 (36.3%) of them had laceration on their scalp, 74 (28.9%) had on membrane also and 87 (35%) had lacerations on the brain (Table 1).

Table 1: Contusion and lacerations in the patients

Type of injury	Scalp	Membrane	Brain
Contusion	249 (97.2%)	231 (90.2%)	256 (100%)
Laceration	93 (36.3%)	74 (28.9%)	87 (34%)

One Hundred eightyone (181) (70.7%) of the patients had injury at the base of the skull which was the most common part of the head to be involved, followed by the involvement of the temporal bone in 154 (60.2%) of the patients. 129 (50.4%) of them had occipital bone injury while 111 (43.4%) had a frontal bone involvement (Table 2).

Table 2: Bone involved

Bone Involved	Number	Percentage
Temporal	154	60.2%
Occipital	129	50.4%
Frontal	92	35.9%
Parietal	111	43.4%
Sphenoid	76	29.7%
Base of skull	181	70.7%

Most of the patients i.e. 237 (92.6%) had a subdural hemorrhage while 211 (82.4%) had a subarachnoid membrane hemorrhage also. Intracerebral hemorrhage was seen in 62 (24.2%) of the patients while 43 (16.8%) had extradural hemorrhage (Table 3).

Table 3: Intracranial damage

Type of haemorrhage	Number	Percentage
Subdural	237	92.6%
Subarachnoid	211	82.4%
Intracerebral	62	24.2%
Extradural	43	16.8%
Intraventricular	37	14.5%

Lungs were the most common soft tissue to be affected with 79 (29.9%) followed by liver in 64 (25%) of the patients. Ruptured spleen was seen in 45 (17.6%) of the patients while kidneys were affected in 39 (15.2%) of them. Out of the bones other than the skull, 106 (41.4%) patients had fractures in one or both of the upper limbs. Fractured ribs were seen in 98 (38.3%), lower limbs were effected in 92 (35.9%), facial bones in 66 (25.8%), clavicle was effected in 62 (24.2%) of the patients (Table 4).

Table 4: Other associated injuries

Injuries	Number	Percentage
<i>Soft tissue injuries</i>		
Lungs	79	29.9%
Heart	22	8.6%
Spleen	45	17.6%
Liver	64	25%
Gastrointestinal system	36	14.1%
Kidney	39	15.2%
<i>Bony Injuries</i>		
Ribs	98	38.3%
Clavicle	62	24.2%
Sternum	43	16.8%
Facial Bones	66	25.8%
Spine	31	12.1%
Pelvis	48	18.8%
Upper limbs	106	41.4%
Lower Limbs	92	35.9%

Thirty nine (39) patients (15.2%) died on the spot of the accident, while 51 (19.9%) were brought dead on arrival. 48 (18.8%) patients died in less than an hour of hospitalization while the predominant time of death was in less than 24 hours of hospitalization with 69 (27%). 22 patients (8.6%) of the patients survived for more than 1 week (Table 5).

Table 5: Survival period

Time	Number	Percentage
Death on spot	39	15.2%
Death on arrival	51	19.9%

<1 hour of admission	48	18.8%
1-24 hours of admission	69	27%
1 day to 1 week of admission	27	10.5%
>1 week	22	8.6%

Discussion

India is a developing country. Some of the cities of our country has shown tremendous development while many other cities are also in the process of urbanization. One of the result of this urbanization is underdeveloped traffic system, unplanned roads, and overpopulation of people and vehicles. Irregular and reckless driving has resulted in danger on roads [10].

The majority of the persons deceased in our study were males accounting for 78.5% of the cases. This preponderance of males in road traffic accident deaths was reported in a study by Arvind Kumar et al., where a huge number of around 88% involved were males [11]. They reported the cause to be due to the greater presence of the males on the urban roads. A 7.33:1 male to female ration was observed in another study by Shivakumar et al. [12]. A study by Jain et al. reported an 83% of predominance of the males in deaths in RTA in Mangalore [13]. Another study by Pate et al., the male to female ratio was 2.05:1 [14]. Similar results were reported by researchers such as Thumbe and Patil [15,16].

Most of the people affected were between 21-40 years of age accounting to more than 60% of the cases. In a similar study by Pate et al, maximum victims were observed in the 21-30 years age group followed by the 31-40 years age group, corroborating our study [14]. Similar results were observed in other studies also [17-20]. However, Akang et al. and Adeyole et al. reported the 41-50 years age group to be the predominantly affected age group [21,22]. Jain et al reported most of the deaths to be among the 18-44 years age group [13]. The younger age group are most commonly affected as they are normally the earning members of the family and most of the times on roads. Those between 21-30 years are probably more affected as many of these consist of students who are more reckless and adventurous in their driving, leading to accidents.

Contusions and lacerations were present on the scalp, membrane and brain in the cases. Contusions were present on the brain in all the cases, in 97.2% of the scalp and 90.2% of the membranes, while lacerations were present on 36.3% of the scalps, 28.9% of the membranes and 35% of the brains. Skull fractures were detected in 88.1% of the cases

in a study by Sharma et al., and cerebral contusions and lacerations were seen in 23.7% of the cases [23]. In yet another similar study by Shivakuamr et al., a contusion of 98% 94% and 100% in the scalp, membrane and brain was reported which was in accordance to the present study [12]. The laceration in this study was also reported to be 38%, 32% and 26% respectively. In contrast to our study, studies by Khajuria and Chaudhary reported a higher laceration incidence in the brain compared to the contusions [24,25].

The base of the skull was the most affected part in all the head injuries, followed by the temporal bones. 50.4% had occipital bone injury and 43.4% had a frontal bone involvement. In a study by Menon et al., fractures of the vault were observed in 88% of the cases, while the base of the skull was involved in 35.97% of the cases. Of them fissured fractures were seen in 23% of the cases [26].

Most of the patients (92.6%) had a subdural hemorrhage while 82.4% had a subarachnoid membrane hemorrhage. Intracerebral hemorrhage was seen in 24.2% of the patients while 16.8% had extradural hemorrhage. Intracranial hemorrhage was observed in other studies [14]. In this study, subarachnoid was the most common type of hemorrhage reported, followed by subdural, as was observed in another study by Chandra et al. [27]. Subdural hemorrhage was reported to be the most common type of intra cranial hemorrhage in a study by Sharma et al., in 62.4% of the cases, with the second highest being subarachnoid hemorrhage in 23.5% of the cases, although the number were lower than that of our study. Subdural and subarachnoid hemorrhage was found in 61.6% of the cases in a study by Chattopadhyay and Tripathi [28].

Lungs were the most common soft tissue to be affected as in 29.9% of the cases, followed by liver in 25% of the patients. Ruptured spleen was seen in 17.6% of the patients while kidneys were affected in 15.2% of them. Out of the bones other than the skull, 106 (41.4%) patients had fractures in one or both of the upper limbs. Fractured ribs were seen in 98 (38.3%), lower limbs were affected in 92 (35.9%), facial bones in 66 (25.8%), clavicle was affected in 62 (24.2%) of the patients.

Thirty one (39) patients (15.2%) died on the spot of the accident, while 51 (19.9%) were brought dead on arrival. 48 (18.8%) patients died in less than an hour of hospitalization while the predominant time of death was in less than 24 hours of hospitalization with 69 (27%). 22 patients (8.6%) of the patients survived for more than 1 week. In a study by Khadim et al., 70.1% of the people died on spot,

while the others were alive for only 1 hour to 2 weeks [29].

Conclusion

The major causes of mortality in our society is due to Road traffic accidents. Most of the mortalities are due to two wheelers. Improper roads and traffic discipline not to mention high traffic and vehicles are the main reason. It is essential that the proper authorities take up this menace and due the needful to curb such incidents. Proper education to the people, importance of the speed limits and following the traffic regulation, wearing helmets for two wheelers and seat belts for the 4 wheelers have to be emphasized.

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