

Pattern of injuries and death sustained by the occupants of the two-wheeler during road traffic accidents

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Abstract: *Aims:* To highlight the various causative factors and to suggest preventive measures so as to save precious human lives from the man – made calamities. *Materials & Methods:* In the present study, total 150 road traffic accident cases were admitted at Al Ameen Medical College Hospital & Civil Hospital, Bijapur, from Nov 2005 to May 2007. Out of 150 RTA victims, 132 were male & 18 were females. *Results:* Of the 150 RTA males were in majority and in the age group of 20-40 years, were either students or businessmen. Of the 18 females, all were students in the age group of 5-20 years. All the RTA were from two wheelers of which majority were using motorcycles of Yamaha RX 100 bike followed by Pulsar bike. In this study of 150 victims 57 died on the spot, rest 93 survived for awhile after the accident and all of them died either in the hospital (50%) or while shifting to the hospital (6%) The survival time ranged from 15 minutes to 16 days. *Conclusions:* Incidence was more common among the two-wheeler vehicle driver. Head was the commonest site to be injured in road traffic accident. Skull bone fracture was the commonest fracture in road traffic accident cases followed by femur. Among skull bone fracture, temporal bone commonly involved. Subdural hemorrhage was the commonest hemorrhage and laceration of brain tissue was highest among all brain tissue injury. Liver and lung involvement was highest among internal organ injuries. Overall fatality was 27.11% and it was more in female cases. Head injury was commonest cause of death in road traffic accident. In this study the skull injuries were common and more fatal. In 135 cases the skull was damaged, in all 100 % RTA victims. It is observed in the study that majority 74% of the RTA victims were not wearing helmets and only 6% of the RTA victims were wearing helmets. Thus from the above study it is evident that, if a person wears helmet damage to the skull, brain and membrane can be minimized and fatality can be reduced.

Keywords: Road traffic accident; autopsy; injuries; Hemorrhage.

Introduction

Birth and death are two extremes of the life and death is the ultimate truth. But unnatural death is known for its immense striking power and is always a surprise. Deaths due to road traffic accidents are one of the common forms of unnatural death and its history is as old as the invention of the wheel [1]. The head and other vital organs when injured leads to fatal involving blunt trauma which may be accidental, suicidal or homicidal. Extensive and indiscriminate use of vehicles for different purposes have increased the nature of assaults and accidental fatalities [2].

Injuries and fatalities occur in all forms of transportation, but road traffic accidents accounts highest throughout the world, in both developed and developing countries, accidents are common cause of death in various age group but trend is more common among younger generation, may

be lack of traffic laws, drunken drive, rash and negligent act, poor condition of the road and lack of infrastructure. Road traffic accidents involving two wheeler contribute 70% of the total vehicle population of Bijapur city. Mortalities and morbidity are more due to head injuries in riders and pillion riders of the two wheelers [3].

Head is a major site of trauma in road accidents, even with improvements in safety measures, the mortality rate in head injuries has not declined, unfortunately, we are missing helmet rule compulsory in Karnataka both mortality and morbidity rate shows increasing trend. Injuries to the head is not always isolated but often associated with neck, spine, chest and abdomen and pelvic cavity. Early recognition of the injury and immediate treatment are mandatory in saving

the lives of many patients, repeated clinical, radiological examinations and observations for the appearance of clinical signs and symptoms in the persons with head injury are more important than any other investigation [4]. Majority of the deaths of trauma victims have medico-legal complications. It is therefore necessary to establish the cause of the death to get compensations from the state or from insurance companies.

The investigations of RTA cases involves following purposes;

1. To identify the causes of accidents.
2. To allow adequate compensation to the victims if he is alive or the next of kin, if the victim is dead.
3. To punish the offender, if any offence is involved.
4. To search guidelines toward prevention of future accidents.

For above purposes, RTA should be investigated by Forensic expert along with Police Officer and automobiles expert

The investigations include;

- a. Collection of the history
- b. Examination of the deceased / injured
- c. Examination of the vehicle, which involved in the accidents
- d. Examination of place in occurrence.

Causes of vehicular accidents may be due to: fault of victim driver's vehicle, bad road conditions and wrong signaling.

Need for the study: Road traffic accident is a product of the rapid growth process of industrialization, urbanization, motorization and changing socio-economic pattern, and thus we pay the penalty for the modern civilization. This "MAN MADE EPIDEMIC" is to become more and more severe with the increasing number of vehicles, population and inadequate traffic planning. In olden days, slow moving vehicles and their meager number accounted for fewer cases of traffic accidents. In recent times, exponential increase in the number of vehicles, high speed technology, and with other contributing factors likes;

- Rash & negligent driving, violation of traffic rules, inadequate road traffic planning and traffic signals.
- Bad condition of road likes potholes, no proper indication of humps, blind curves and vehicle.
- Congestion of roads and road side dhabas and bars.
- Non use of helmet.
- No proper pedestrian pathway,
- Intoxicating influence of alcohols and drugs.
- Late night driving due to job requirement.
- The euphoria of living tendency to impress the opposite sex and the society as a whole.
- Distracting hoarding / advertisement and use of mobile phones while driving lead to road traffic accidents.

In this study an attempt has been made to highlight the various causative factors and to suggest preventive measures so as to save precious human lives from these man made calamities.

Material and Methods

This study was conducted on the injured and deceased who were brought to the hospital and mortuary of the Civil and Al-Ameen Medical College and Hospital Bijapur during the period 2005-2008.

In this chapter we have given the material and method used in the data collection, study design, statistical analysis done, scope and limitations of study.

Source of Material: Cases included in the present study were brought by the police to the department of Forensic Medicine of Al-Ameen Medical College Hospital and Civil Hospital Bijapur for post –mortem examination from the period of December 2005 to May 2007.

Method: For this study, 100 cases with history of road traffic accidents in and around Bijapur city that have fulfilled the inclusion and exclusion criteria were selected on a non – randomized purposive sampling basis.

Study Design: Cross – sectional, descriptive, and non-randomized study.

Study Period: December 2005 to May 2007.

Statistical Analysis: In the present study the data collected is analyzed statistical by computing the descriptive statistics viz; percentages, mean and standard deviation where ever is necessary. The data in the graphical form besides being presented in the form of table. The chi-square test is applied for obtaining the statistical inference and is considered statistically significant if $p < 0.05$.

Results

In this chapter we present the observation and results of this study age distribution of RTA victims. It is observed from the preponderance of victims in the age group 30-40 years, followed by 20-30 years, present study that of the 150 RTA victims studied there is a there are few cases which aged less than 10 years and more than 70 years. However, it may be observed that the age distribution of victims almost follow normal.

The following are the few conclusions and suggestion evolved from the present study:

- 150 cases who died due to fatal road traffic were studied at the mortuary study.
- Male comprised majority and constituted 126 (83.3%) compared to females who were only 24 (16.7%). the male to female ration in the study was 5:1 (male =15, female=30).
- The age of the victim from 1-80 years. The peak incidence was observed in the age group of 21-30 years comprising 29.5 of the cases. Next commonest was 25% belonging to the age group 31-40 years. The lowest age of the victim was 3 years and the highest age observed was 80 years.
- Most of the incidents irrespective of the cause occurred between 3 pm to 6 pm comprising 20% of the total cases, while in two case the time was not known.
- Maximum number of the victims died on the spot.
- In this study conducted, there were 97 individuals with injuries to face, namely abrasion, contusion and laceration. There were 83 cases with no external injuries to face. The commonest type of facial injury

- was abrasion 61(33.9%) in alone or in combination with contusion and laceration
- In this injury to scalp was found in 149 cases, contusion is most common which constituted 137 (76.1%) whether along or in combination with other injuries.
- Skull fracture was seen in 166 (92.2%). The combination of both vault and skull base was seen in 121 (67.2%) which was commonest. Base alone was seen in 31 (17.2%) cases and vault alone was seen 14(7.8%) cases.
- Commonest type of fracture present in the skull was comminuted fracture 112 (170.0%) followed by fissured fracture in 34(21.2%) cases.
- There were 180 victims of with one of the other form intracranial hemorrhage. Combination of subdural, subarachnoid hemorrhage was the commonest 95 (52.8%) cases, followed by combination of subdural, subarachnoid and intracerebral hemorrhage in 25 (13.9%) cases. Least common being extradural hemorrhages 5(2.8%) cases.
- It is observed that only 6 (4%) cases were under the influence of alcohol at the time of death and all of them were males.

From this study it is definite that head is one of the most accessible, vital and vulnerable part of the body in road traffic accidents and so good things to avoid accident or to protect from accident. Wear Helmet and avoid alcohol during driving. The objective of this study is to identify the pattern of injuries in victims with road traffic accidents, with or without helmet, involving two wheelers.

This non-randomized non-comparative purposive samplings studies comprising of 150 road traffic accidents were chosen during November 2005 to May 2007. The accidents in two wheelers, ranging from 50 cc TVS 50 to 100 cc and 250 cc Yezdi. The age group was 5 years to 72 years. Youngest who sustained fatal injures is a female girl aged 5 years and oldest was 72 years.

Of the 150 RTA victims most of them were students and next were professionals like business, employees, etc. Majorities were head impact and extremities. Fractures were

most common injuries among all injuries. Skull fractures and injuries to other bones and vital organs were also detected. Brain is susceptible vital organ to get injured and next one is skull. In all 100 RTA victims brain damage were detected and SDH and SAH were common ICH and in 3 victims who wore helmet, the fracture of the skull and brain damage also detected.

The speed of the vehicle, type of impact fault of vehicle, wrong signaling, bad road conditions are important in predicting severity of injury and outcome of prognosis.

Discussion

The study is undertaken on 150 fatal road traffic accidents which were brought by the police to the mortuary of Al-Ameen Medical College and District Hospital, Bijapur for medico-legal autopsy during November 2005-May 2007.

Sex distribution: In the present study male comprised a majority and constituted 83.3% of 150 cases compared to females 16.7% (30) cases. The male to female ratio in the present study is 5:1. A male preponderance almost in consistence with the study reported [5-6].

The male preponderance may be due to the effect that males are more exposed to out door activities travelling between the home and place of work to earn bread for the family. While woman remains mainly indoor involved in house hold work.

Age distribution: In the present work the age of the victims varies from 1-80 years, maximum victims 53(29.5%) are seen in the age group of 21-30 years, followed by 25.5% in the age group of 31-40 years (Table-1). Individuals in the age group of 71-80 years is the least affected 4 cases (2.2%), maximum number of males 45 is seen in the age group of 21-30 years and 2 cases of male 54 cases of females is seen.

This is in accordance with the studies done [7]. Reports that age group between 20-30 years, were commonest [8]. Beird and Sundaram who absorbed that age group of 0-9 years were more commly involved. It does not agree with the study done by Agarwal and Agarwal [9].

Age (yrs)	No of RTA Victims	Percentages
<10	3	2
10 -20	18	12
20-30	36	24
30-40	42	28
40-50	24	16
50-60	15	10
60-70	9	6
>70	3	2
Total	150	100

Individuals in the first (2.2. %) and seventh decade (1.1%) are the least effected, the lowest age being 3 years and highest is 80 years. The reason for the above is the young adults are the prime bread earners of the family remains outdoors during most of the day and have a tendency to take undue work. While persons in the extremes of age usually remain indoor where as children are confined to the residential premises (Table-2).

Gender	No of RTA Victims	Percentages
Male	132	88
Female	18	12
Total	150	100

Time of accidents: In the present study most of the accidents occurred between 3pm to 6pm compromising 20% of total cases, followed by 9am to 12noon and 6pm-9pm each having 15% and 15% cases respectively. The least number of accidents occurred between 12am to 6am having 10.6% cases. The present study is agreeable with N.S.Patel who stated that accidents between 6pm to 6am hours to be commonest i.e., 31.9% and Shrivastava et al reported that the peak accidents 25% was seen between 8am to 10am followed by 6pm to 8pm 15%. The reason for the peak incidence of the accidents at these hours is multifold after hectic work to reach home early. Rash and jam traffic hours, rash driving, inadequate traffic control and fatigue to drive.

The period of survival: 137 (91.3%) victims died on the spot.13 (8.7%) died after 6 hours of the accident. Reports are almost 66% and 48.9% died on the spot and these findings co- relates with the present study [10].

The period of survival has not shown an increase despite the advances of medical facilities, this may be due the severity of injuries sustained, lack of knowledge of first aid among the people at the scene of accident, delay in shifting the patient to trauma center and no change in the attitude of people due to fear of getting into legal hassles.

Offending vehicles: Amongst the offending vehicles lorry and buses are the most common offending vehicles seen in 68(37.98%) cases followed by buses 47(26.1%) of the 7(3.9%) unknown cases. Similar observations were reported by Shrivatsava and Gupta who reported that heavy vehicles like buses and trucks 59.96% were frequent source of traffic accidents. This study is also comparable with the study of Beird and Sundaram, Chandra et al and Agarwal et al [11], reported that trucks and buses were the commonest vehicle causing accident.

It can thus be deduced that trucks or lorries, heavy traffic vehicles remain the most offending vehicles causing accidents. Buses are in the second number and this may be due to increase in the number of buses on the route due to increased population but road being the same old ones. The drivers of these buses drive recklessly without caring for the lives of other road users.

Victims: Out of 150 vehicular accidents most common victims 88(58.7%) were two wheelers riders and pedestrians 62 (41.3%) were the second commonest victims (Table-3). Similar observation was seen by Lee et al, who reported that motorcyclist (53.6%) were the commonest victim followed by pedestrian (29.5%) ,present study doesn't agree with the study conducted [12-13], most commonly involved were the motor cyclists.[14]. The reason may be due to the college students and office workers preferring two wheelers for their movements due to inconvenience of time and comfort and two wheeler being easily purchasable off the shelves at reasonable prices. This has increased the number of two wheelers on the road resulting in more number of deaths.

Table-3: Occupation of victims

Occupation	No of RTA Victims	Percentages
Student	54	36
Businessman	48	32
Carpenter	21	14
Retired person	9	6
Watchman	6	4
Police Constable	3	2
Priest	3	2
Advocate	3	2
Mechanic	3	2
Total	150	100

Facial injuries: In present study 93(62%) of victims showed facial injuries like abrasion, contusion and laceration, in 83(55.3%) victims no injuries are seen at all. Commonest injury is abrasion 43(28.6%) seen along face region as seen in 24(16.3) is alone of 97 cases of facial injuries 61(40.6%) cases had facial bone fracture.

Scalp injuries: In the present study 149(99.3%) cases with scalp injuries abrasion, contusion and laceration is seen. Contusion is present in 137(91.3%) cases either alone or in combination with other injuries. Laceration either alone or in combination with other injuries is seen in 24(16%) victims case with only abrasion is not seen, but seen in combination with contusion diseases (2.2%).Reports that injury to scalp and ear was seen in 25.8% and this it does not agree with the present study [15].

Types of skull fracture: In this study, skull fracture is seen in 135(90%) victims, of which 28 have crush injury of the skull. The combination of vault and base of skull fracture is the commonest observed in 39(26%) victims, Fissured fracture of Vault and Base 2(81%) (Table-4).

Table-4: Site of death of RTA victims

Site of death	No of RTA Victims	Percentages
Hospital	75	50
Spot	57	38
On the way to Hospital	18	12
Total	150	100

Amongst the basal fracture, middle cranial fossa is the commonest 34(21.2%) cases, where as posterior cranial fossa and anterior cranial fossa fracture is seen in 6. (3.7%) and 2(1.3%) cases [16]. Fracture of temporal bone is seen in 5(3.1). occipital in 1(0.7%) and in parietal and frontal bone there was on fracture is seen [17]. In majority of victim, comminuted fracture is the commonest in 39.(26%) followed by fissure fracture 27(18%) cases. In 6 cases (4%) sutural fracture is seen and depressed fracture in 4(2.6%) [18]. The high incidence of comminuted fracture may be due to heavy motor vehicles causing the accidents with greater force and compact. These figures were consistent with the finding [19-20]. Solheim, Sevitt and Chandra et al who reported that vault of skull was more commonly fractured [21].

Intra- cranial injuries: Among intracranial hemorrhage, subdural and sudrachnoid hemorrhage are the commonest present in 95(63.3%) cases followed by combination of subdural+sudarachnoid intracerebral hemorrhages 25(16%) [22].

Alcohol: In only 6(4%) cases presence of alcohol was detected. These findings are not similar with Ghosh, who reported that out of 230 cases only in 6(2.6%) cases the alcohol played the role in causing accidents. Solheim et al, detected in 52.7% cases. This difference may be due to the fact that alcohol intake in Indian population is not much high degree as seen in Western countries. In this present study, an attempt has been made to study the nature and pattern of injuries to the head and injuries to other parts of the body due to road traffic accidents by comparing with or without use of helmets [23]. Of the 150 RTA victims studied 132 were male and 18 were female. Of these males, majority of them were in the age group of 20-40 years who were either students or

businessmen [24]. Of the 18 females 12 were students between the age group of 5-20 years.

Manner of injuries sustained: The manner in which the injuries to the skull, membranes and brain were caused by road traffic accidents were the following;

- ❖ Direct impact,
- ❖ Penetration by sharp objects,
- ❖ Acceleration and Deceleration and
- ❖ Compression of the head.

Conclusion

It is observed from this study that;

- Majority 132 of the RTA victims were males.
- Only 9 of the victims were wearing helmets.
- Scooter and Yamaha and Pulsar riders were the commonest victims of the road traffic accidents
- Most of the victims sustained fatal head injures and this was most common among those who were not wearing helmets.
- 62 of the RTA victims survived varying period of time before succumbing as a result of the injuries sustained due RTA.
- Majority of the RTA victims who died on the spot had died due to primary head impact. Among the fatalities occurred on the spot, the force of impact played an important role as is has been observed from this study that the fatalities occurred in all 100 % RTA victims irrespective of the force of impact. This study reveals that males aged between 20-40 years formed the large chunk of the victims of RTA. This could be due to work of carelessness commonly associated with this age group.

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