



ANALYTICAL POST MORTEM STUDY OF CAUSE OF DEATH IN HEAD INJURY IN ROAD TRAFFIC ACCIDENT IN THE CITY OF LUCKNOW

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Abstract

Background: India is undergoing a major economic and demographic transition with increased urbanization, industrialization, construction projects and motorization. Head injury is the result of a variety of mechanisms including motor vehicle and motorcycle accidents, pedestrians being struck by motor vehicles, falls from heights, occupational hazards, assaults, riots and bomb blasts. The objective of the study was an analytical post-mortem study of the cause of death in head injury in road traffic accident in city Lucknow

Methods: This study was conducted at Department of Forensic Medicine, King George Medical University, Lucknow. A total of 200 fatal head injury case autopsies were included. The criteria for exclusion were decomposed bodies, unknown, natural diseases, admitted cases and fatality due to other body parts.

Results: Out of 200 cases, the predominance of males was seen (88.0%). The commonest age group affected was 21-40 years of age (75.5%). Contusions on scalp, membrane and brain were 97.2%, 90.2% and 100.0% and lacerations were 36.0%, 27.0% and 37.0% respectively. 70.7% of the patients had injury at base of skull which was commonest part of head involved, followed by involvement of temporal bone in 60.2% patients. Most patients (91.0%) had subdural hemorrhage while 79.0% had subarachnoid membrane hemorrhage. Head injury was major cause of death in majority cases of RTAs, mostly due to Traumatic shock (46.0%), Exsanguinations (28.0%), Haemorrhages (17.0%).

Conclusion: The results showed that most of the people who died due to RTAs were mostly due to scalp injuries, skull fractures, and Subdural and Subarachnoid Haemorrhages associated with head injuries. Proper education to people, the importance of speed limits and following traffic regulations, wearing helmets for two wheelers and seat belts for 4 wheelers have to be emphasized.

Keywords: Road traffic accidents, head injury, Post Mortem, Subdural hemorrhage

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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

India reports highest number of accident fatalities (1,37,423 in year 2013) in the world. More alarming than the sheer number of accidents is their severity (persons killed per 100 accidents). It steadily rose from 21.2 to 28.3 from 2003 to 2013. National figures report 377 deaths per day and 1287 injuries per day due to Road Accidents. 66 Deaths per day are by Truck/Lorry and 94 deaths by Two-wheeler. Uttar Pradesh shared 11.3% in 2010,

15.1% in 2011, 11.7 % in 2012 and 11.6 % in 2013 of total national road traffic deaths.⁵ Accidental deaths in Varanasi are 40.3 %, higher than its parent State's average of 15.8 %. Other cities from Uttar Pradesh in the list above are: Kanpur, Agra, Meerut, Allahabad and Lucknow which have higher accident rate than the State's average.⁵ Every 4 minutes, a person killed or injured in India due to RTA. Head injuries account for one quarter to one third of all accidental deaths, and for two thirds of trauma deaths in hospitals. Road traffic injuries account for 2.1% of global mortality. India accounts for about 10% of road accident fatalities worldwide.⁶ The most vulnerable part of the body which is affected by the road accidents is the head.⁷ 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.⁸ In India, since the two wheelers contribute to the major portion of the traffic, these are the more common causes of accidents.⁹

Severe head injury, with or without peripheral trauma, is the most common cause of death or prolonged disability in the victims of road traffic accidents and in the people of up to the age of 45 years in developed countries.¹⁰ This necessitated an in-depth analysis of the pattern of fatal head injury in road traffic accidents. Therefore, we assess analytical post mortem study of cause of death in head injury in road traffic accident in city Lucknow.

Methods

This prospective observational study was done on the cases selected from the dead bodies brought into the mortuary of the Department of Forensic Medicine, King George Medical University, Lucknow, for medico-legal postmortem examination from the various police stations of Lucknow region. The data of the materials were

sourced from 200 fatal Road Traffic Injury cases over a period of 2 years. Condition of the scalp, cranial bones, meninges, intra-cranial haemorrhages and brain parenchymal involvement were noted at the time of autopsy.

Those cases, where the cause of death was directly or indirectly related to road traffic accidents were included in the study and other deaths following injuries sustained in any other manner were excluded.

The profile and general particulars of the patient, clinical and laboratory investigations, procedures done if any, survival period of the patient, time and cause of death were ascertained from the Post-mortem report, hospital records, panchnamma and requisition for post mortem. The information regarding to the time and manner of road traffic accident was taken from the police investigating officer. The research procedure followed was in accordance with the approved ethical standards of Department of Forensic Medicine, XYZ College and Hospital, Lucknow, UP, India Ethics Committee (Human).

Results:

The majority 88.0% of cases were males; mostly 51.0% of cases belonged to 21-30 years of age and the mean age of all cases was 36.7 ± 10.2 years (Table 1). All cases had contusions on brain, 95.0% of cases had contusions on scalp, 87.0% of cases had contusions on membrane. Details of type of injury in patients was in Table 2. Bone involved and type of haemorrhage were in Table 3. In 46.0% of cases, traumatic shock was the leading factor in mortality, followed by head injury/ exsangunations in 28.0% of cases, head injury complications, pneumothorax, and subsequent bleeding in 17.0% of cases, and deep vein thrombosis, pulmonary embolism, and septicemia in 9.0% of cases (Table 4).

Figure 1: Distribution of cases on the basis of gender

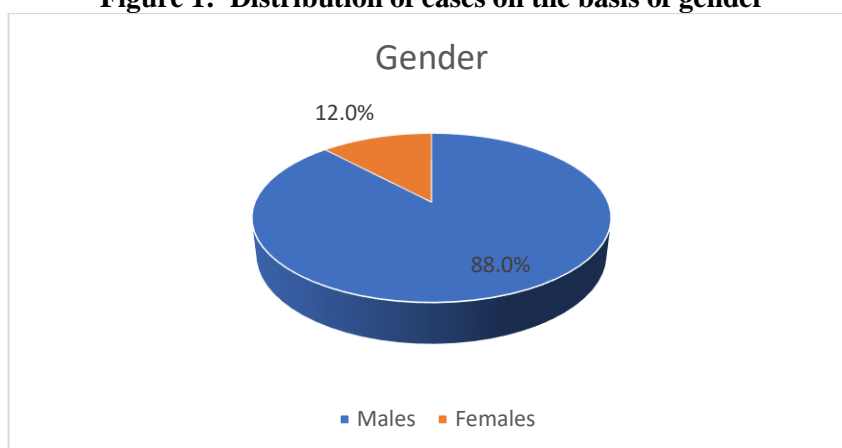


Table 1: Demographic profile of cases

Parameters		No. of patients (n=200)	Percentage
Age in years	≤20	22	11.0
	21-30	102	51.0
	31-40	49	24.5
	41-50	17	8.5
	>50	10	5.0
Mean Age		36.7±10.2 years	
Type of Vehicle	Pedestrian	66	33.0
	Two-wheeler	84	42.0
	Car	30	15.0
	Bus/Truck	20	10.0

Table 2: Type of injury

Type of Injury	No. of patients (n=200)	Percentage
Contusions on scalp	190	95.0
Contusions on membrane	174	87.0
Contusions on brain	200	100.0
Lacerations on scalp	72	36.0
Lacerations on membrane	54	27.0
Lacerations on brain	74	37.0

Table 3: Incidence and pattern of cranial vault fractures

Pattern		No. of patients (n=200)	percentage
Bones involved	Temporal	144	72.0
	Occipital	122	61.0
	Frontal	84	42.0
	Parietal	116	58.0
	Sphenoid	72	36.0
	Base of skull	174	87.0
Type of haemorrhage	Subdural hemorrhage	182	91.0
	Subarachnoid hemorrhage	158	79.0
	Intracerebral	44	22.0
Extradural hemorrhage		34	17.0
Intraventricular		27	13.5

Table 4: Causes of death

Causes of death	No. of patients (n=200)	Percentage
Traumatic Shock	82	46.0
Head injury/Exsanguinations	56	28.0
Head Injury complications, Pneumothorax & Secondary Hemorrhage	34	17.0
Deep Vein Thrombosis, Pulmonary Embolism and Septicemia	18	9.0

Discussion

India is a south Asian developing country. Here poverty and unemployment push the people towards urban areas. This rapid and unplanned urbanization associated with incompetent traffic system, unplanned roads and highways, violation of traffic laws by the drivers and pedestrians, overcrowding, unlicensed rickshaws, reckless driving etc are responsible for this highest figure of road traffic accidents. The essential factors involved in

RTA's include the person, the machine and the road.¹¹

In this study males were predominantly affected with RTA than females and the mean age of the studied samples was 36.7±10.2 years with majority of accidents taking place in the age group ranging from 21 to 40 years. Two-wheeler accidents in 42.0% followed by pedestrians (33.0%). Our findings were in accordance with **Ahmad M et al**¹²

who reported male and female ratio observed among the victims was 64:36. This ratio is in conformity with previous studies in other countries.^{13,14} In this country, males are predominantly the earning member of the family. Moreover, they are at higher risk of injuries than women because of their greater exposure to traffic and more risky behavior like hanging on the side of bus or rush to get in a running bus. Road conditions are important aetiologic factors in RTA worldwide. Rural roads tend to pose special and additional hazards. Many roads have become death traps with potholes are dotted along the length and breadth of the roads. Most accidents in this country take place in the highways and caused by buses. Aggressive driving, impatience, lack of attention and drinking alcohol (in case of drivers) prior to driving are responsible for this.¹⁵ **Awasthi A et al¹⁶** also reported the comparable result and reported that of 121 cases 88.42% were male and 11.57% were female. The highest incidence of RTA was observed in the age group of 21-30 years. The highest number of victims were of two wheelers. (46.34%). **Rao RB et al¹⁷** reported that the most vulnerable age group was those in 31-50 years followed by the age group of 21-30 years. The reason being that they form the most active group of the society and hence are prone to road traffic accidents. (83.0%) Were males and (17.0%) were females.

In the present study the studied cases were distributed on the basis of type of injury and it was found that of 200 patients 190 (95.0%) had contusions on scalp, 174 (87.0%) on membrane and all of them (100.0%) had contusions in brain. 72 (36.0%) had laceration on scalp, 54 (27.0%) had on membrane and 74 (37.0%) had lacerations on brain. Our findings were in accordance with the findings of **Hasini BRC⁹** who reported that out of 256 patients 97.2% had contusions on their scalp, 90.2% on the membrane, and all of them (100.0%) had contusions in their brain. 36.3% of them had laceration on their scalp, (28.9%) had on membrane also, and (35.0%) had lacerations on brain. Skull fractures were detected in 88.1% of the cases in a study by **Sharma B et al¹⁸**, and cerebral contusions and lacerations were seen in 23.7% cases. In yet another similar study by **Shivakuamr BC et al¹⁹**, a contusion of 98.0% 94.0% and 100.0% in the scalp, membrane and brain was reported which was in accordance to the present study. The laceration in this study was also reported to be 38.0%, 32.0% and 26.0% respectively. In contrast to this study, studies by **Khajuria B et al²⁰** and **Chaudhary BL**

et al²¹ reported a higher laceration incidence in the brain compared to the contusions.

In our study 87.0% patients had injury at base of skull which was commonest part of head to be involved, followed by involvement of temporal bone in 72.0% patients. 61.0% had occipital bone injury while 42.0% had frontal bone involvement. Most of the patients i.e., 182 (91.0%) had subdural hemorrhage while 158 (79.0%) had subarachnoid membrane hemorrhage. Intra-cerebral hemorrhage was in 22.0% patients while 17.0% had the extradural hemorrhage. Our findings were consistent with the findings of **Hasini BRC⁹** who reported that, 181(70.7%) patients had injury at base of skull which was most common part of head to, followed by involvement of temporal bone in 154(60.2%) patients. 129(50.4%) had occipital bone injury, 111(43.4%) had frontal bone involvement. Most patients i.e., 237(92.6%) had subdural hemorrhage whereas 211(82.4%) had subarachnoid membrane hemorrhage. Intra-cerebral hemorrhage in 62(24.2%) patients whereas 43(16.8%) had the extradural hemorrhage.

In a study by **Menon A et al²²**, fractures of the vault were observed in 88% of the cases, while the base of the skull was involved in 35.9% of the cases. Of them fissured fractures were seen in 23.0% of the cases. Subdural hemorrhage was reported to be the most common type of intra cranial hemorrhage in a study by **Sharma B et al¹⁸**, 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 present study. Subdural and subarachnoid hemorrhage was found in 61.6% of the cases in a study by **Chattopadhyay S and Tripathi T.²³**

In this study the commonest cause of death was due to traumatic shock (46.0%) followed by Head injury/Exsanguinations (28.0%), Head Injury complications, Pneumothorax & Secondary Hemorrhage (17.0%) and Deep Vein Thrombosis, Pulmonary Embolism and Septicemia (9.0%). Our findings were supported by **Rao D²⁴** who did a study on fatal road traffic collisions and reported that the major causes of death were due to traumatic Shock in individuals who died on Spot or were Brought Dead to Hospital in 35.4% cases. This was followed by Those Death due to Head injury/ Exsanguinations reported within 12hours, in 25.3% cases. Death within 24 hours were due to Head Injury complications, Pneumothorax and Secondary Hemorrhage in 13.4% cases. Complications duet Head injury, Septicemia and

Embolism were major causes of Death reported in 2 to 3 days in 7.6% of the Victims. Deep Vein Thrombosis, Pulmonary Embolism and Septicemia were the major causes of Death reported within 5 to 7 days after the Accident in 6.3% cases. Renal Failure/Damage, Septicemia Shock, Lung Infection, Peritonitis, Coma, were major causes of death reported in persons treated beyond 7 days in 11.90% Victims.

Conclusion

Subdural hemorrhage was the Main Contributors to Fatality in majority of the of Accidents. Majority of

Deaths were due to Traumatic Shocks because of Multiple injuries involved. Road traffic accident is an unfortunate economic 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. The Importance of Emergency Care to reduce the fatality is well understood. Infections played an important Role in Fatality for Accident Victims treated for more than 07 days.

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