

# Demographic profile of accidental deaths due to craniocerebral injuries an autopsy study

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## Abstract

**Background:** Trauma is one of the leading causes of disability and death all over world and also in the Indian population. According to United State's Centre for Disease Control and Prevention (CDC), 74 per cent of deaths in USA, is due to trauma and it occurs in the age group of 10 to 24 years. A comparative data reported by National Crime Record Bureau (NRCB) in India is 62 per cent of all deaths and it occurred in the age group of 15 to 44 years<sup>11</sup>. Craniocerebral injury is any trauma that leads to injury of the skull and/or brain. Traumatic Brain Injury (TBI) is one of the most devastating types of injury. It affects all age groups and associated with significant socio-economic loss to India and other developing countries. Road Traffic accidents remain the main cause of TBI followed by falls, assault and collapse of heavy objects. **Aim:** To estimate various demographic variables among the individuals who died due to head injuries. To estimate the pattern of distribution in the factors associated with incident viz., time of accident, place of accident, manner of accident, type of accident in deaths due to head injuries. **Material and methods:** Descriptive (Observational) study - Quantitative analysis. Study period one year from 01<sup>st</sup> January 2018 to 31<sup>st</sup> December 2018. Deaths due to Cranio-cerebral injuries in Visakhapatnam, for which post mortem is conducted in Modern Mortuary, King George hospital Visakhapatnam. **Results:** A total of 1702 medico legal autopsies were conducted during the study period (2018). Of that Head injury cases alone accounted for 35.66% (n=605) of all autopsied cases. Among them 163 case autopsies performed by Dr. V. Chandra Sekhar, were taken up for the study, so as to eliminate any variations in autopsy technique. Male preponderance observed in our study with ratio of 9:1 compared to female. This gender bias could be due to more males being involved in outdoor works and commonly exposed to accidents. All age groups are equally prone to Head injuries; however, majority of victims are between 41-50 years age group accounting for 19.63% followed by 21-30 age group 19.01%, and 51-60 age group 17.79% remaining are rest of the age groups. Maximum cases are reported during rainy season accounting for 34%, the reason could be slippery nature of road for both pedestrians and vehicles. Most of the accidents occurred between 12 Noon and 6 PM leading to 39% (n=64) cases followed by 6 PM to 12 Mid night, 6 AM to 12 Noon and least is seen from 12 Mid night to 6 AM. Place of death: Majority of cases were found dead in KGH (Government Hospital) 48% (n=78) followed by other hospitals 20% (n=33) both combinedly accounting for 68%, rest of the cases died during transport to hospital or spot dead. Manner of death most of the cases are of accidental accounting for 96% and only 4% cases are homicidal and there are no suicidal cases. Head injuries are more common in Road Traffic Accidents and among RTAs making about 67% of cases, pedestrian 24% rest of the cases are other than RTA.

**Keywords:** Craniocerebral Injuries, age, sex, time of incident, manner of accident, seasonal variation.

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## INTRODUCTION

According to WHO, Injury is defined as “the physical damage that results when a human body is suddenly subjected to energy in amounts that exceed the threshold of physiological tolerance or due to lack of one or more vital elements like oxygen.”<sup>1</sup> Trauma is one of the leading causes of disability and death in the Indian population. Craniocerebral injury is any trauma that leads to injury of the skull and/or brain. Traumatic Brain Injury (TBI) is one of the most devastating types of injury. It affects all age

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groups and associated with significant socio-economic loss to India and other developing countries. Road Traffic accidents remain the main cause of TBI followed by falls, assault and collapse of heavy objects. Due to rapid surge in urbanization, motorization and economic liberation, many Asian countries have an increased risk for TBI.<sup>2</sup> The rapid and unprecedented motorization in India combined with the lack of a safety environment has been a noticeable feature. Despite, the stringent laws being made to decrease the incidence of head injuries secondary to road traffic accidents there is tremendous increase in traumatic brain injuries due to motor vehicle accidents. It is one of the leading causes of morbidity and mortality in young adults in developed as well as developing world.<sup>3</sup> According to NCRB, in India, deaths due to road traffic accidents increased from 80,262 in 2001 to 1,77,904 in 2016, which accounted for 43.4% of all deaths due to accidental cause other than forces of nature (4,09,537). Deaths due to falls and collapse of heavy objects are 17,278 and 1,984.<sup>4</sup> These accidents due to ‘other causes’ are preventable and can be reduced by effective safety measures and safety consciousness. There are numerous factors that determine the outcome in head injury patients namely age, sex, severity of injury, intracranial pathology, intra-cranial pressure and associated injuries. Early transportation to the hospital, the quality of pre-hospital and emergency room care is an extremely important determinant of outcome in trauma patients. Even in brain stem injury, which as a rule carries a high mortality rate, recovery is possible with an efficient health care system.<sup>5</sup> Therefore, knowledge of the epidemiological profile of TBI and development of preventive measures to alleviate this burden are vital, particularly in the limited resources setting.

**AIMS AND OBJECTIVES**

The present study is made on the deaths due to Head injuries, which are subjected to post mortem examination in the mortuary of King George Hospital, Andhra Medical College, Visakhapatnam, during the period January 2018 to December 2018.

The aims of the present study include:

1. To estimate various demographic variables among the individuals who died due to head injuries.
2. To estimate the pattern of distribution in the factors associated with incident viz., time of accident, place of accident, manner of accident, type of accident in deaths due to head injuries.
3. To estimate the seasonal variation in deaths due to head injuries.

**MATERIALS AND METHODS**

1. **Type of study:** Longitudinal Descriptive (Observational) study - Quantitative analysis.

2. **Study area:** Deaths due to Cranio-cerebral injuries in King George Hospital (KGH), Visakhapatnam, for which post mortem is conducted in Modern Mortuary, King George hospital (Government Hospital) Visakhapatnam.
3. **Sample size:** 163, All cases of death due to Cranio-cerebral injuries and autopsy is conducted by Dr. V Chandra Sekhar, Associate Professor and HOD, Department of Forensic Medicine and Toxicology, Andhra Medical College (AMC) /KGH, Visakhapatnam.
4. **Study Duration:** One year from 01<sup>st</sup> January 2018 to 31<sup>st</sup> December 2018.
5. **Data collection methods:** From the requisition, inquest given by police, Crime scene evidences (Photographs, videos, and visits), clinical record findings and Post Mortem Findings.

**INCLUSION CRITERIA:** All cases of death due to Cranio-cerebral injuries and autopsy is conducted by Dr. V Chandra Sekhar, Associate Professor, and HOD, Department of Forensic Medicine and Toxicology, AMC/KGH, Visakhapatnam.

**EXCLUSION CRITERIA:** Associated other visceral injuries, Decomposed, Mutilated, Skeletal remains and with improper History.

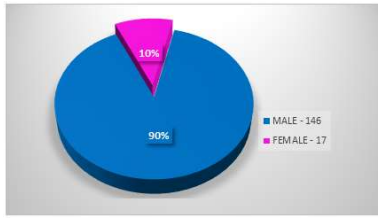
**RESULTS AND DISCUSSION**

A total of 1702 medico legal autopsies were conducted during the study period (2018). Of that Head injury cases alone accounted for 35.66% (n=605) of all autopsied cases. Among them 163 case autopsies performed by Dr. V. Chandra Sekhar, were taken up for the study, so as to eliminate any variations in autopsy technique.

**Table 1:** Post mortem case statistics in Andhra medical college, KGH Visakhapatnam

Cause of Death	No. Of Cases
HEAD INJURY	607
HANGING	185
POISONING INCLUDING SNAKE BITES	178
MULTIPLE INJURIES	176
BURNS	138
NATURAL DEATHS	114
OTHERS	91
BLUNT INJURY CHEST AND ABDOMEN	89
DROWNING	47
SPINAL INJURIES	46
ELECTROCUTION	24
NO CAUSE OF DEATH	5
FOETAL AUTOPSY	2

**Obsevation-1**



**Figure 1: Sex Distribution**

1. **Pie diagram 1:** On perusal of above table, Male preponderance observed in our study with ratio of 9:1 compared to female. This gender bias could be due to more males being involved in outdoor works and commonly exposed to accidents. Another aspect which renders male more vulnerable is their pursuit of obtaining livelihood. The studies conducted by Onwuchekwa RC, Echem RC *et al.*<sup>6</sup>, Puttaswamy *et al.*<sup>7</sup> and Andreea Alexandra Velnic *et al.*<sup>8</sup> have similar statistics.

**Observation-2**

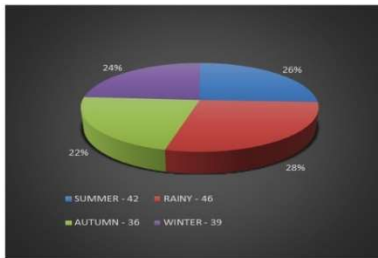


**Figure 2: Age Distribution**

**Line diagram-1**

2. **Line Diagram 1:** For convenience of distribution the age groups were divided at 10 years interval such as 1-10 years, 11-20 years and so on. The outcome of division highlights, shows that almost all age groups are equally prone to Head injuries, however majority of victims are between 41-50 years age group accounting for 32 cases followed by 21-30, 51-60, 61-70 and 31-40 years age group and least between 1-10 years and 11-20 years age groups.

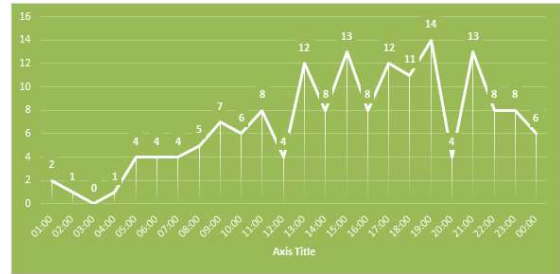
**Observation-3**



**Figure 3: SEASON**

3. **Pie diagram 2:** There is not much seasonal variations but majority of reported cases are during rainy season accounting for 34%, the reason could be slippery nature of road for both pedestrians and vehicles.

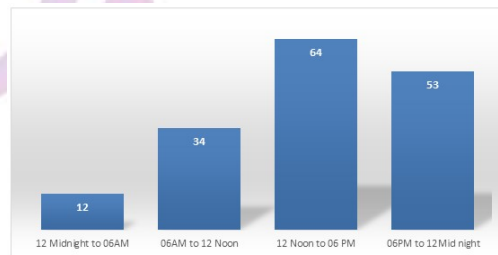
**Observation-4**



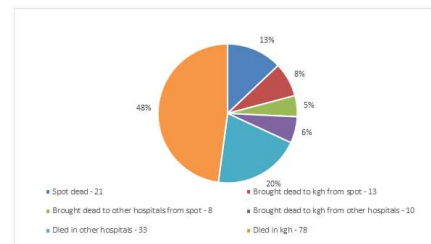
**Figure 4: Time of Accident**

**Line diagram-2**

4. **Line diagram 2 and Bar diagram 1:** Most of the accidents occurred between 12Noon and 6PM leading to 39% (n=64) cases followed by 6PM to 12 Mid night, 6AM to 12Noon and least is seen from 12Mid night to 6AM. This comparable with study conducted by Onwuchekwa R C, Echem R C *et al.*<sup>6</sup> Ranjit M. Tandle *et al.*<sup>9</sup>



**Figure 5: Chart Title**



**Figure 6: Place of Death**

**Pie diagram-3**

5. **Pie diagram 3:** Majority of cases were found dead in KGH 48% (n=78) followed by other hospitals 20% (n=33) both combinedly accounting for 68% of cases. Another 6% of cases are brought dead to KGH from other Hospitals after First Aid. As there is effective emergency response service in and around our city, considerable number of cases

were brought to Hospitals. But some cases died during transport comprising of 8% and 5% who are on the way to KGH and other Hospitals respectively. 13% of cases died at the spot of accident.

**Observation-6**

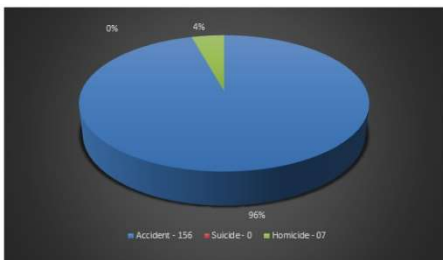


Figure 7: Manner

**Pie diagram-4**

6. **Pie diagram 4:** Most of the cases are of accidental in manner accounting for 96%. Only 4% cases are homicidal and there are no suicidal cases. Even though 26cases of Fall from Height were present, no case of suicide has been reported by investigating authorities. Similar results are seen in Chandra Sekhar *et al.* study.<sup>10</sup>

**Observation-7**

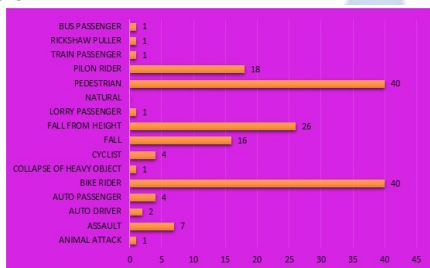


Figure 8: Type of Victims

**Bar diagram-2**

7. **Bar Diagram 2 and Pie diagram 5:** On analysis of type of victims, two-wheeler occupants are more in number accounting for 58cases followed by pedestrians with significant number of cases (n=40), fall from heights and fall from steps (n=40), fall from heights and fall from steps

**Observation-8**

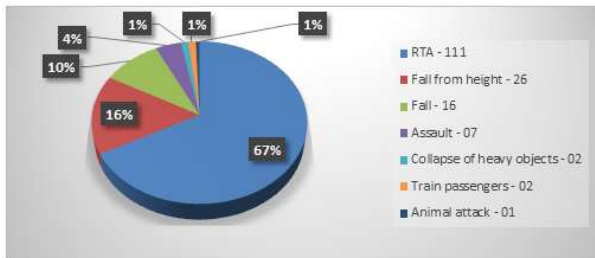


Figure 9: Type of Accident

**Pie diagram-5**

8. Head injuries are more common in Road Traffic Accidents and among RTAs making about 67% of cases, Motorbike accidents are the commonest, which account for 35% of the cases of which 24% are bike operators, 11% are pillion riders, and next commonest type of victims are pedestrians with about 24% of cases, followed by fall from height 16% of cases, falls 10% of cases and assault 4% of cases.

**CONCLUSION**

This present study shows Cranio-cerebral Injury deaths with

- Male preponderance.
- Middle age group are more involved.
- Occur more in rainy season
- Common in evening timings
- Majority cases are accidental in manner.
- RTAs are most common contribution for Traumatic Brain Injury.
- Two-wheeler vehicle victims are commonly involved
- Pedestrians are second largest group involved.

**RECOMMENDATIONS**

As our study reveals most of the cranio-cerebral injuries are due to Road Traffic Accidents. These are few suggestions or recommendation to decrease morbidity and mortality due to RTA. The Government should create awareness about strict traffic rules, drunken drive, heavy penalty violation of traffic rules, and preventive measures by the concern department. The people who are travelling by road should follow strict traffic rules, Road Transport officials or traffic police should monitor the vehicle movements, impose heavy penalty for rash and negligent driving which leads to accidents, wear seat belts all passengers in four wheelers, helmet for two wheelers, don't travel more than two persons in two wheelers, avoid driving in heavy rains or heavy fog conditions those are more prone to accidents, pedestrians should walk on right side of the road so that minimise accidents. While driving a vehicle or walking to cross roads cell phone usage by the people is strictly prohibited. Work place in factories people should use helmet to prevent cranio-cerebral injuries.

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