



EPIDEMIOLOGY OF HEAD INJURY- LEVEL 1 TAEI CENTRE STUDY

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ABSTRACT **Introduction:** Head injury affects over 60 million people every year which causes mortality and morbidity. Of all the injuries, head injury accounts for most cases of death and disability. Sixty-nine million individuals worldwide suffered from head injury in 2018. As the time progresses there is observable increase in rates of Head injuries. Hence this study focuses on this aspect of injuries in a level 1 TAEI centre. Research studies from TAEI centre are sparse as of now and this study will be a helpful tool for illumination of further research and development which will be useful in reducing public health burden.

TAEI (Tamilnadu Accident and Emergency Care Initiative): Tamilnadu Government have initiated TAEI centres along the National and major State highways. This is in co-ordination with 108 free ambulance service, Government hospitals and CMCHIS schemed private hospitals. It provides immediate and free treatment to the trauma patients.

Aim: To study the Epidemiology of Head Injury in level 1 TAEI centre, Coimbatore medical college and hospital, Coimbatore.

Materials And Methods: This study is a prospective study covering all head injury cases admitted from November 2020 - January 2021 in level 1 TAEI centre, Coimbatore medical college and hospital, Coimbatore. The treatment is initiated upon arrival in Zero delay ward and they are triaged by TAEI team. These patients are treated according to the protocol of Department of Neurosurgery. This study covers the management, discharge and follow up of these patients.

Results: The admitted head injury patients in TAEI ward are 1319 cases out of 1750 trauma cases. Among them RTA tops head injury mortality and morbidity. Among RTA, Two wheeler associated injuries were most common. Drunken drive, not wearing helmets and protective gears played a vital role in head injuries.

Conclusion: The primary prevention can be the key to reduce the national burden of head injuries.

KEYWORDS: Traumatic Brain Injury, Epidemiology, TAEI ward, Level 1 Trauma centre, Morbidity, Mortality, Coimbatore, Road Traffic Accidents

INTRODUCTION

Head injuries are defined as: 'An alteration in brain function, or other evidence of brain pathology, caused by an external force'.(1)

Of all the injuries, head injury accounts for most cases of death and disability. Sixty-nine million individuals worldwide suffered from head injury in 2018.(2) Every year October 17 is celebrated as world trauma day. It highlights the increasing rate of accidents and the need to prevent it.

Population of India is expected to increase from 121.1 crores to 151.8 crores during the period from 2011 - 2036(3), based on the last census in 2011. A total 701,324 accident cases were reported in 2019 in which 412,959 persons died and 446,284 injured. The major cause of these deaths were traffic accident (43.9%) followed by accidental fall (5.1%). A total of 4,67,171 traffic accidents, were reported during the year out of which 4,37,396 were road accidents, 29775 were train accidents. Traffic accidents caused injuries to 4,42,996 persons and 1,81,113 deaths. The majority of deaths were in the age of 30-45(4). A total of 10,50,945 assault cases were registered during 2019 which accounted for 32.6% of total ipc crimes, out of which hurt (5,45,061 cases) accounted for maximum number of cases i.e. 51.9%, followed by cases of causing death by negligence and others(5). Information on economic burden of injuries is not available for the country as a whole or for any selected cities. It is estimated that the total costs of road traffic injuries alone is about 3% of GDP in India (6).

Road travel seem to be the preferred choice with over 60% using personal vehicles to commute. The Industrial movements of goods through Roadways are also on the rise with over 2 billion metric tons of freight being transported every year. There are around 250 million registered motor vehicles in India as on 2017. The total number of vehicles in FISCAL year 2019 is around 295.8 million. The Indian automobile manufacturers produced a whopping 26.36 million motor vehicles in 2019-2020(7). Our country has second largest road network in the world(8).

Coimbatore is one of the major metropolitan cities in the India. It is surrounded by western ghats. Coimbatore is the second largest city

next to Chennai in Tamilnadu. Coimbatore has urban population around 71.37% and literary rates around 84%(9). It caters the need of nearby districts - Nilgris, Tirupur, Erode and Palakkad for head injuries.

Three national highways - NH 544, NH 181, NH 83 are passing through coimbatore(10, 11).

TAEI - Tamilnadu Accident & Emergency care Initiative was initiated by Government of Tamilnadu., a life saving innovation and mission. This is in co-ordination with 108 free ambulance service, Government hospitals and CMCHIS schemed private hospitals. TAEI is initiating centres over the National and State highways. It provides immediate and free treatment to the trauma patients on site. Tamilnadu Accident & Emergency care Initiative rests on following six pillars namely, 1) Trauma care, 2) Management of Acute Myocardial Infarction (STEMI & NSTEMI), 3) Management of Stroke with SCRIPT, 4) Management of Burns, 5) Management of Poisoning and 6) Management of Paediatric emergencies with PREM. Code blue brain team of the hospital will respond to all calls for the team. Its purpose is to save as many neurons as possible following brain injury.

Level I Trauma Care Facility will provide the highest level of definitive and comprehensive care for patient with complex injuries. Emergency physicians, nurses and surgeons would be in-house and available to the trauma patient immediately on their arrival. The services of all major super specialties associated with trauma care would be available 24 X 7.

Level II Trauma Care Facility provides definitive care for severe trauma patients. Emergency physicians, surgeons, Orthopaedicians and Anaesthetists are in-house and available to the trauma patients immediately on arrival. It would also have on-call facility for Neurosurgeons.

Level III Trauma Care Facility provides initial evaluation and stabilisation (surgically if appropriate) to the trauma patient. Comprehensive medical and surgical inpatient services would be made available to those patients who can be maintained in a stable or improving condition without specialised care. Emergency doctors and

nurses are available round the clock. Physicians, surgeons, Orthopaedic surgeon and Anaesthetist would be available round the clock to assess, resuscitate, stabilise and initiate transfer as necessary to a higher-level Trauma Care Service.

Level IV trauma care: This would be provided by appropriately equipped and manned mobile hospital / ambulances. These shall be provided by Ministry of Road Transport and Highways (MoRTH) / National Highways Authority of India (NHAI) / National Rural Health Mission (NRHM) / State Govts., etc as the case maybe⁽¹²⁾.

AIM

To study the Epidemiology of Head Injury in level 1 TAEI centre, Coimbatore medical college and hospital, Coimbatore.

MATERIALS AND METHODS

This study is a prospective study covering all head injury cases admitted from November 2020 - January 2021 in level 1 TAEI centre, Coimbatore medical college and hospital, Coimbatore. IEC clearance was taken, as also consent from study subjects. The treatment is initiated upon arrival in Zero delay ward and they are triaged by TAEI team. These patients are treated according to the protocol of Department of Neurosurgery. This study covers the management, discharge and follow up of these patients at 1 month, 3 months and 6 months. During the study period we had 1319 head injury cases out of 1750 admitted trauma cases and in this study we recorded 1274 cases. Those patients who were brought dead following injury and Head injury cases wherein the patients/attenders didn't give consent for the study were excluded. Socio economic status, mechanism of injury, treatment and follow up information were recorded using a structured questionnaire. Data was entered in Excel sheets and appropriate analysis done using SPSS software.

RESULTS

RTA cases were the most common cause of Head Injury with 866 cases, Assault 229 cases, fall 153 cases and other causes were 26.

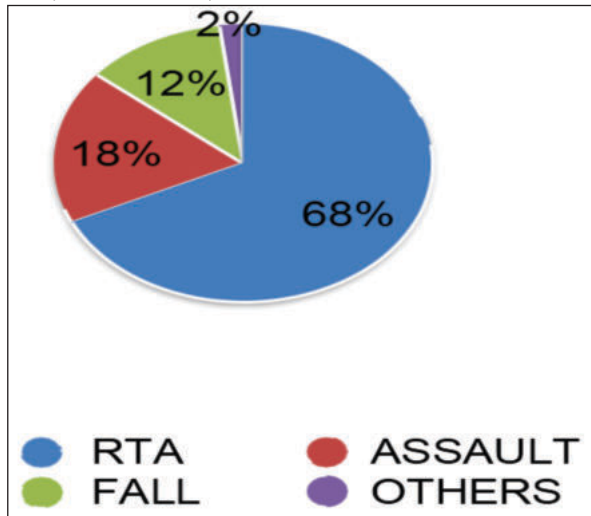


Fig 1: Causes Of Head Injury

Table 1: Head Injury - Causes

RTA	866 CASES
ASSAULT	229 CASES
FALL	153 CASES
OTHERS	26 CASES

RTA

Table 2: Mode Of Travel For Patients

Cases/injured	Number	Percentage
Two wheeler	697	80.5%
Pedestrian	46	5.3%
3 and 4 wheeler, Heavy vehicle	116	13.4%
Non motorised	7	0.8%

Assault

60% of victims of head injury due to assault consumed alcohol. Further in 90% of cases, injuries were caused by known persons to the victims.

Fall

Fall from height was the cause of injury in 112 (73%) followed by self-fall at ground level in 41 (27%). Among the persons injured by alcohol consumption was seen in 90 (59%), only 3 (3%) used protective gears in persons suspected injury due to fall.

Head Injury

Table 3: Age Distribution

AGE	NO. OF CASES
< 14 YRS	57 (4%)
14- 60	1016 (80%)
> 60 YRS	201 (16%)

Considering the marital status, 1044 (82%) were married, 230 (18%) were unmarried. Males 1044 (82%) outnumber females 230 (18%) who sustained Head injury. Literate were 1067 (84%) and 207 (16%) were illiterate. 370 (29%) persons involved in skilled profession were head injury victims in our study and the rest 904 (71%) were unskilled labourers. Over 790 (62%) of accidents occurred in Urban area, 484 (38%) occurred in rural area.

GCS At Admission

There are various methods of classifying the severity of head injury, to highlight the amount of brain parenchymal disruption. These are the Glasgow Coma Scale (GCS), the Abbreviated Injury Severity Score (AIS), and so on.

The aim of categorisation is to predict the outcome⁽¹³⁾. GCS scale is commonly followed.

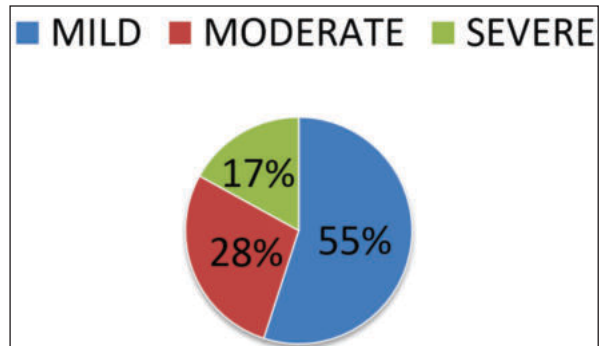


Figure 2: GCS At Admission

Table 4: GCS At Admission

MILD GCS 13 TO 15)	701 (55%)
MODERATE (GCS 9 TO 12)	357 (28%)
SEVERE (GCS 8 AND BELOW)	216 (17%)

Mortality Statistics

Table 5: Causes Of Mortality

RTA	108 (58.7%)
FALL	47 (25.5%)
ASSAULT	2 (1%)
OTHERS	27 (14.7%)

Table 6: CT Findings

CT FINDING	NUMBER OF CASES
EXTRADURAL HAEMATOMA	14
SUBDURAL HAEMATOMA	62
CONTUSION	52
SUBARACHNOID HEMORRHAGE	54
INTRAVAENTRICULAR HEMORRHAGE	20
PNEUMOCEPHALUS	2
DIFFUSE CEREBRAL EDEMA	26
DIFFUSE AXONAL INJURY	10
INFARCT	2
INTRACEREBRAL HEMORRHAGE	18

Table 7: Associated Injuries

ASSOCIATED INJURIES	NUMBER OF CASES
POLYTRAUMA	12
PNEUMO/HAEMO THORAX	10
DIABETIC KETOACIDOSIS	2

RENAL FAILURE	12
SEPTICEMIA	2

Table 8: Time Of Death

TIME	CASES
>6 HRS	13 (7%)
6-24 HRS	31 (16.8%)
24-72 HRS	57 (31%)
3-7 DAYS	61 (33.1%)
>7 DAYS	22 (12 %)

Table 9: GOS - Discharge & Follow-up

MONTHS \ GOS	1	2	3	4	5
DISCHARGE	14.44% (184 patients)	1% (13 patients)	13% (166 patients)	15.54% (198 patients)	56% (713 patients)
1 MONTH	2 % (22 patients)	0	8% (87 patients)	12% (131 patients)	78% (850 patients)
3 MONTH	0	0	6% (64 patients)	8% (85 patients)	86% (919 patients)
6 MONTH	0	0	5% (53 patients)	7% (75 patients)	88% (940 patients)

1. GOS 1-Death
2. GOS 2-Persistent vegetative state- unresponsive, speechless, may open eyes
3. GOS 3-Severe disability-(conscious but disabled)-dependent for daily support.
4. GOS 4-MODERATE DISABILITY-(disabled but independent)
5. GOS 5-Good recovery-resumption of normal life despite minor deficits.

DISCUSSION

A case of traumatic brain injury for the purpose of this study ⁽¹⁴⁾ was defined as "An occurrence of injury to the head (arising from blunt or penetrating trauma or from acceleration- deceleration forces) by an external agent with at least one of the following:

Observed or self-reported alteration of consciousness or amnesia due to head trauma, and/or,

- Neurological or neuropsychological changes (determined from neurologic and neuropsychological examinations) or

- diagnosis of skull fracture or intracranial lesions (determined from radiological examination or other neuro- diagnostic procedures) that could be attributed to head trauma and/or

- Occurrence of death resulting from trauma with head injury or traumatic brain injury listed on the Death Certificate, Autopsy Report, or Medical Examiner's Report in the sequence of conditions that resulted in death."

The causes of head injury were RTA, Assault, Fall, Train accidents, Animal attack, sporting activity, fall of objects. The major cause of head injury causing Mortality and morbidity is RTA. The external causes of injury, pattern and circumstances was made as per ICD- 10 classification methods⁽¹⁵⁾.

We received a total of 1750 injury cases in TAEI. RTA injuries were 1100 and others were 650. Head injury cases were 1319. We excluded brought dead, patients whom didn't give consents and unknown patient. Out of which the present study included 1274 patients.

In the study, males were affected 4.5 times higher than females. This is similar to previous studies. In that study conducted in a level 1 trauma centre in India, the results showed that the male:female ratio was 5:1⁽¹⁶⁾. The age group between 14-60 yrs we had 1016 patients followed by 201 patients in >60 age group and 57 cases in below <14 age group.

The leading cause was observed to be RTA with 866 cases (68%), 229 cases (18%) of assault and 153 cases (12%) of fall. The leading cause in RTA was motorcycle accidents 788 cases (91%). Alcohol consumption and not wearing protective gears were found to be significant contributing factor to Head injury morbidity and mortality. Assaults were caused mostly by personal fights. 209 patients had an altercation with a known person and 138 patients had consumed alcohol.

Fall from height was 112 out of total fall of 153 patients. Only 3

patients were using protective gear. 90 patients was found to have consumed alcohol.

Majority of the head injury patients were literate (1067 patients). 1044 patients (82%) were married. 1223 patients (96%) received first aid before an hour. 303 patients (23.8%) used ambulance services and in this 236 patients (77.9%) used 108 ambulance services. The patients who were on 108 ambulance received both on spot and transit stabilisation.

ENT bleed and scalp injuries were noted in majority of cases. Swelling and abrasions of face was found in 98% of patients in the present study. History of seizures was present in 62 patients. Scalp injuries were found to be common in previous studies which is in accordance to the present study^(17,18,19).

On admission, 216 cases (17%) where of severe head injury, 357 cases (28%) where of moderate head injury and 701 cases (55%) where of mild head injury. On average, patients were admitted for 9 days.

16% (211 patients) of the head injury patients underwent surgery and rest 84% (1153 patients) were treated conservatively.

In the present study, 14.4% died (184 patients). The mortality was seen in patients with severe head injuries and low GCS score. Mortality in the present study was common in the age group of 41-60. It is in contrast to the study ^(17,20) where common age group being 31-40. Here, RTA contributed 58.7% (108 cases) towards mortality. In CT findings, SDH, contusion and SAH dominated the cause for mortality. 33.7% (61 patients) died between 3-7 day of admission.

In follow-up, 22 patients died. At the end of 6 months 88% of cases (940 patients) showed good outcome. This is similar to the previous study⁽²¹⁾.

CONCLUSION

Head injury is one of the leading cause of major public health problem in India. Road accidents are the major cause of morbidity and mortality. Alcohol and not using protective gears contribute to Head injury. Head injury is a significant public health problem world wide. It requires researchers, policy makers and surveillance programs to implement effective evidence based interventions. Prevention and care, follow up of head injury patients are a multidisciplinary area and requires inter-sectoral co-ordination for planning. Major role in prompt treatment is by TAEI facility which is fast and free for the people. By improving our system with better reporting and documentation of head injury cases, we will be able to make decisions in planning and make appropriate multimodality approaches to reduce the morbidity and mortality of head injury cases with available resources.

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