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ABSTRACT

Introduction: The annual incidence of traumatic brain injury is around 28-70 million in the world which causes morbidity and mortality. In India, around 1 million suffer from severe head injury and the mortality rate is around 1 lakh per year. As time progresses there is an observable increase in rates of Head injuries. This study focuses on the epidemiology of traumatic head injury in a tertiary care centre (Madras Medical College, Chennai- India)

Materials and methods: This study is a prospective study covering all head injury cases admitted from January 2022 – December 2022 in our tertiary care centre. These patients are treated according to the protocol of the Institute of Neurosurgery. This study covers the management, discharge and follow-up of these patients.

Results: The total number of patients admitted with head injuries from January 2022 to December 2022 was 2061. Among them, RTA tops head injury mortality and morbidity. Among RTA, Two-wheeler-associated injuries were most common. Drunken driving, and not wearing helmets and protective gear played a vital role in head injuries.

Conclusion: Primary prevention can be the key to reducing the national burden of head injuries.

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. 28 to 70 million individuals worldwide suffered from head injury in 2018². Every year October 17 is celebrated as world trauma day. It highlights the increasing rate of accidents and the need to prevent it. The major cause of these deaths were traffic accident (43.9%) followed by accidental fall (5.1%). The majority of deaths were in the age of 30-45⁴. 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 others⁵. It is estimated that the total costs of road traffic injuries alone is about 3% of GDP in India⁶.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.The total number of vehicles in

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FISCAL year 2019 is around 295.8 million. The Indian automobile manufacturers produced a whopping 26.36 million motor vehicles in 2019-2020⁷.

AIM

To study the Epidemiology of Head Injury in our tertiary care centre, Madras Medical College and hospital, Chennai.

MATERIALS AND METHODS

This is a prospective study covering all head injury cases admitted from January 2022 - December 2022 in a tertiary care centre, Madras Medical College and hospital, Chennai. 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 emergency team. These patients are treated according to the protocol of Institute 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, 2061 cases of head injury were admitted in our tertiary care center. 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 1426 cases, Assault 334 cases, fall 257 cases and other causes were 44.

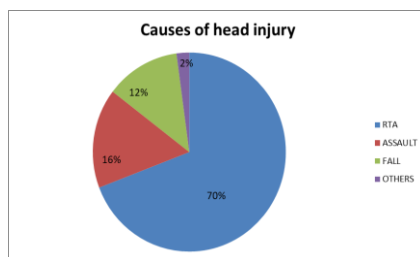


Figure 1, Table 1. Causes of head injury.

Head injury cause	Total	Percentage
RTA	1426	70%
Assault	334	16%
Fall	257	12%
Others	44	2%

Table 2. Mode of RTA

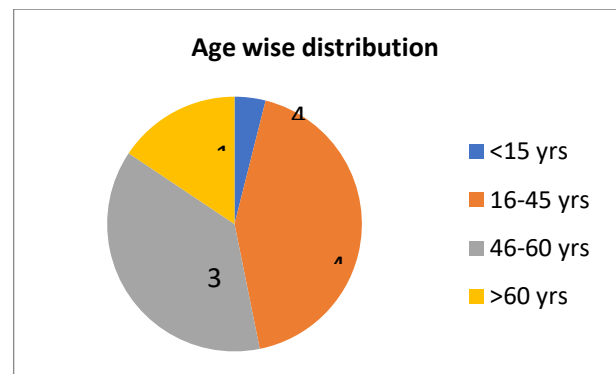
Mode of travel	Number	Percentage
Two wheeler	1155	81%
3 and 4 wheeler , heavy vehicle	185	13%
Pedestrian	86	6%

80% of victims of head injury due to assault under the influence of alcohol. Further in 95% of cases, injuries were caused by known persons to the victims.

Fall from height was the cause of injury in 213 (83%) followed by self fall at ground level in 44 (17%). Of the 2061 cases admitted 1786 cases are male and 275 were female. 81 cases were less than 15 yrs of age, 884 cases was between 16-45 years of age, 774 cases was between 46-60 years of age and 322 cases was more than 60 years of age.

Table 3, Figure 2. Age wise distribution

Age	Number	Percentage
< 15 years	81	4%
16 - 45 years	884	43%
45 - 60 years	774	38%
> 60 years	322	15%



There are various methods of classifying the severity of head injury, to highlight the amount of disruption of brain parenchyma. These are the Glasgow Coma Scale (GCS), the Abbreviated Injury Severity Score (AIS), and so on. The aim of categorisation is to predict the outcome¹³. In our study, GCS scale is followed to classify the head injury.

Table 4, Figure 3. Severity of head injury

GCS at admission	Severity of head injury	Number of cases	Percentage
13-15	Mild	1071	52%
9-12	Moderate	639	31%

8 and <8	Severe	351	17%
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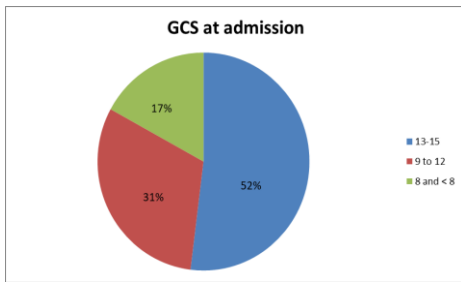


Table 5. CT findings

CT Finding	Number of cases	Percentage
Extradural hematoma	91	4%
Subdural hematoma	542	26%
Contusions and intracerebral hemorrhage	569	27%
Subarachnoid hemorrhage	268	14%
Diffuse axonal injury (CT showing IVH, brainstem contusions)	116	6%
Cranial bone fractures	435	21%
Diffuse cerebral edema	40	2%

Among the head injuries- acute subdural hemorrhage, subarachnoid hemorrhage, cerebral contusions and calvarial fractures were predominantly encountered.

Out of 2061 cases admitted, 1648 cases were managed conservatively and 413 cases were operated. Of the 413 cases, decompressive craniectomy was done in 194 cases of acute SDH and in 60 cases of basifrontal contusions and in 52 cases of ICH, craniotomy and evacuation of hematoma done in 44 cases of EDH, wound debridement and excision of fracture fragment done in 63 cases of calvarial depressed fractures.

Table 6: Management of head injury

Management	Number of cases
Conservative	1648
Surgery	413

Table 7: Surgical management

Injury	Surgical management	Number of cases
SDH	Decompressive craniectomy	194
Basifrontal contusion	Decompressive craniectomy	60

Intracerebral hemorrhage	Decompressive craniectomy	52
Extra dural hemorrhage	Craniotomy and evacuation of EDH	44
Calvarial depressed fractures	Wound debridement and excision of fracture fragment	63

Mortality statistics: There was 352 (17%) in hospital deaths in patients admitted with head injury.

Table 8: Causes of mortality

Cause of mortality	Number of cases	Percentage
RTA	211	60%
Fall	88	25%
Assault	4	1%
Others	49	14%

Table 9: GOS - Discharge & Follow-up

Time	GOS-1	GOS-2	GOS-3	GOS-4	GOS-5
During hospital stay	352(17%)	19 (1%)	247 (12%)	309 (15%)	1134 (55%)
1 month later	14 (0.6%)	-	142 (8.4%)	208 (12%)	1345 (79%)
3 months later	-	-	101 (6%)	154 (9%)	1440 (85%)
6 months later	-	-	67 (4%)	118 (7%)	1510 (89%)

GOS 1 - Death

GOS 2 - Persistent vegetative state- unresponsive, speechless, may open eyes

GOS 3 - Severe disability (conscious but disabled)-dependent for daily support.

GOS 4 - Moderate disability (disabled but independent)

GOS 5 - Good recovery-resumption of normal life despite minor deficits.

DISCUSSION

Traumatic brain injury is 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."¹⁴

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 methods¹⁵.

In our study, we admitted a total of 2061 patients with head injury. RTA was the major cause of head injury accounting for 1426 cases and others were 635. We excluded brought dead, patients whom didn't give consents and unknown patient. In the study, males were affected 6.5 times higher than females. This is more compared to previous studies. In that study conducted in a level 1 trauma centre in India, the results showed that the male:female ratio was 5:1¹⁶. The age group between 15-60 yrs we had 1658 patients followed by 322 patients in >60 age group and 81 cases in below <15 age group. The leading cause was observed to be RTA with 1426 cases (70%), 334 cases (16%) of assault and 257 cases (12%) of fall. The leading cause in RTA was motorcycle accidents 1340 cases (94%). Alcohol consumption and not wearing protective gears were found to be significant contributing factor to Head injury morbidity and mortality.

ENT bleed and scalp injuries were noted in majority of cases. Swelling and abrasions of face was found in 95% of patients in the present study. History of seizures was present in 86 patients. Scalp injuries were found to be common in previous studies which is in accordance to the present study^{17,18,19}.

On admission, 351 cases (17%) were of severe head injury, 639 cases (31%) were of moderate head injury and 1071 cases (52%) were of mild head injury. On average, patients were admitted for 10 days. 20% (413 patients) of the head injury patients underwent surgery and rest 80% (1648 patients) were treated conservatively. In the present study, 17% died (352 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.

In CT findings- SDH, contusion and SAH dominated the cause for mortality. 352 patients died between 3-7 day of admission. In follow-up, 22 patients died. At the end of 6 months 89% of cases (1510 patients) showed good outcome. This is similar to the previous study²¹.

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. 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. 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.

REFERENCES

1. Menon DK, Schwab K, Wright DW, Maas AI, Demographics and Clinical Assessment Working Group of the International and Interagency Initiative toward Common Data Elements for Research on Traumatic Brain Injury and Psychological Health Position statement: definition of traumatic brain injury. *Arch Phys Med Rehabil.* 2010;91:1637-40.
2. Estimating the global incidence of traumatic brain injury. Dewan MC, Rattani A, Gupta S, et al. <https://pubmed.ncbi.nlm.nih.gov/29701556/> *J Neurosurg.* 2018;1-18. – PubMed.
3. Report of technical group on population projection november 2019, by National commission on population, Ministry of health & family welfare, india., based on 2011 census.
4. Accidental deaths and suicides in india - 2019, by National crime records bureau, india. (Empowering Indian Police with information technology).
5. Crime in India-2019. Volume 1 <https://ncrb.gov.in/sites/default/files/CII%202019%20Volume%201.pdf> VI. Planning Commission Report of the working group on prevention of road accidents and injuries, Government of India, 2002.
6. <https://morth.nic.in/road-accident-in-india>

7. Roadways- The world Factbook, www.cia.gov. Archived from the original on 2021-07-12.
8. Report of technical group on population projection november 2019, by National commission
9. population, Ministry of health & family welfare, india., based on 2011 census <https://en.wikipedia.org/wiki/Coimbatore>.
10. The Hindhu, newspaper dated, june 29, 2018.
11. GO (Ms) No 214, dated 05.06.2018, health and family welfare department, tamilnadu, India. XIII. Teasdale G, Jennett B. Assessment of coma and impaired consciousness a practical scale. *Lancet* 1974; 2:81-4. The Hindhu, newspaper dated, june 29, 2018.
12. Centre for Disease Control and World Health Organization. Standards for Surveillance in Neurotrauma, 2000 (unpublished document). Epidemiology of head injuries, National institute of mental health and Neurosciences, Bangalore 1994.
13. World Health Organization. International classification of diseases 10th revision, 1996.
14. Rahman MA, Ramazan. Patterns of head injuries (cranio-cerebral) in road traffic accidents in Riyadh region of KSA. *Dinajpur Med Coll J* 2015;8:195-9.
15. Tandle RM, Keoliya AN. Patterns of head injuries in fatal road traffic accidents in a rural district of Maharashtra autopsy based study. *J Indian Acad Forensic Med* 2011;33:228-31.
16. Munakomi S. A comparative study between Marshall and Rotterdam CT scores in predicting early deaths in patients with traumatic brain injury in a major tertiary care hospital in Nepal. *Chin J Traumatol* 2016;19:25-7.
17. Epidemiological study of Trauma brain injury in Trauma centre, New Delhi, in *Journal of emergency Trauma & shock* 2015 Jul-Sep.