

Clinical Characteristics of Traumatic Brain Injury Participants: A Hospital-Based Cross-Sectional Study

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ABSTRACT

INTRODUCTION

Head injury is a major health problem and adults are vulnerable to injuries. This study was undertaken to know about clinical characteristics, causes, and patterns of head injury in an institute based hospital.

METHODS

A Six-month cross-sectional descriptive study was conducted among 110 head injury subjects admitted to Saveetha Medical College, Chennai from August 2019-February 2020. Data were analyzed by using Sigma Stat Version 4.0 and depicted in tables and graphs. Data recorded include socio-demographic characteristics, clinical, and Computed Tomography variables.

RESULTS

A total of 110 head injury participants were reviewed and 20 were excluded and 90 were analyzed for the study. Males (64.4 %) outnumbered females (35.5 %). Road traffic accidents (58.8 %) were the commonest cause of head injury followed by fall (18.8 %). Loss of consciousness and vomiting was the most common clinical variable reported after injury. Computed Tomography Scan revealed different types of intracranial hemorrhage and the location of skull fracture.

CONCLUSION

This study contributes data on clinical characteristics of participants with head injuries from institute based hospital.

KEYWORDS

Head injury, Road traffic accident, Computed tomography

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INTRODUCTION

Traumatic brain injury (TBI) has evolved as one of the major epidemics worldwide and is regarded as a major public health problem in India.¹ It is one of the devastating condition which leads to death and disability in India. Presently at the Global level, it has been estimated that the annual incidence and mortality from TBI are 200 and 20 / 100000 / year, respectively.² The incidence, mortality, and case-fatality rates were 150 / 100000, 20 / 100000, and 10 % respectively in India,^{3,4} based on an epidemiological study. The Centers for Disease Control and Prevention (CDC) defines TBI as craniocerebral trauma associated with neurological or neuropsychological abnormalities, skull fracture, intracranial lesions, or death.⁵ Injuries from Road Traffic Accidents (RTA) 60 % are the leading cause of TBIs followed by falls (20 % - 25 %) and violence (10 %). The role of a physiotherapist as a health care professional in the multidisciplinary neurorehabilitation of head injury participants plays a vital part. Hence, the study aimed at providing knowledge about the clinical characteristics of head injury participants. A clear understanding of the causes and pattern of injuries of these participants will help to bridge the gap among physiotherapists and thereby help in the planning of effective treatment protocols. The study is aimed to evaluate the clinical characteristics such as causes of head injury, the pattern of head injury, and Computed Tomography (CT) findings like skull fracture, intracranial hemorrhages, etc.

MATERIALS AND METHODS

Sampling method and sample size determination: The study duration was for six months from August 2019 - February 2020. The study population consisted of a total of 110 head injury participants. The participants needed for the study were identified by reviewing our physiotherapy department nominal register records by the diagnosis as a head injury.

Data Collection Procedure

Sociodemographic characteristics: age, gender, place of injury, time of injury, mechanism of injury, mode of transport, the severity of head injury through Glasgow Coma Scale, CT findings, location of skull fracture, and signs and symptoms through head injury were recorded. In the case of, road traffic injury, the type of vehicle involved at the time of injury and use of safety measures were recorded. Glasgow Coma Scale is the most widely utilized scale for assessing the level of consciousness.⁶

Data analysis: Data were tabulated in Microsoft Excel and exported to Sigma Stat version 4.0 for data interpretation and analysis. Descriptive statistics were utilized for interpretation of clinical variables in the study.

Study design and Study setting: An Institute based cross-sectional-descriptive study was conducted at Saveetha Institute of Technical and Medical Sciences (Chennai, India).

Eligibility Criteria

Inclusion criteria: 1. Head injury participant's age 20 - 60 years screened through the Ranchos Los Amigos Scale. 2. Participant medical information report along with neuroimaging records.

Exclusion criteria: 1. Participants with polytrauma and incomplete medical records. 2. Head injury participants with a previous history of neurological disorder, bleeding disorder & history of head injury, neuroimaging done outside before admission.

Ethical considerations: The study was approved by the Institutional review board panel. The informed consent form was obtained from the participants' healthcare giver.

RESULTS AND DISCUSSION

Smoking is one of the leading causes of halitosis. From 110 head injury participants admitted, 20 participants were excluded. The reasons were being, 5 with a preexisting neurological problem, 6 had sustained polytrauma. About, 5 participants had incomplete medical records. Information related to 4 participants could not be traced. Hence, 90 participants were studied and results were analyzed.

Sociodemographic characteristics: The majority of the participants were of the age group less than 40 years and the mean age was 34.6 years (range 20 - 60 years. Most of the study participants were males (64.4 %), educated (87.7 %), employed in semiskilled type (46.6 %), and belonged to middle socioeconomic class (53.35 %). The majority of the injury has taken place in an urban location (64.4 %) (Table 1).

VARIABLES	CATEGORIES	N
Age	20-30	22
	30-40	38
	40-50	19
	50-60	11
Gender	Male	58
	Female	32
Education	Illiterate	11
	Primary /high school	48
	Graduate/Postgraduate	31
Occupation	Unskilled	15
	Semiskilled	42
	Skilled	33
Socioeconomic class	Lower	12
	Middle	48
	Upper	30
Location of injury	Urban	58
	Rural	32
Severity of injury (GCS)	Mild	32
	Moderate	42
	Severe	16

Table 1. Socio - Demographic Characteristics Of Study Participants (n = 90)

Mechanism of injury and attribute of road traffic accidents: In the present study, RTA (58.8 %) was observed as common mode of injury closely followed by fall (18.8 %), assault (10 %) and others (12.2 %) as shown in Table 2. Among RTA injury driver/pillion riders were common victims traveling in motorcycle/two-wheeler (47.1 %) followed by car/four-wheeler (35.8 %) and least involved was pedestrians (16.9 %). However, only 9 in two-wheeler and 9 in four-wheeler participants were using personal protective measures at the time of the accident. Another, 52.6 % of motorcycle riders and 64 % in car riders were using mobile phones or consumed alcohol at the time of the accident. Most of the RTAs were reported during the evening period (30.1 %), in the early morning period (28.3 %).

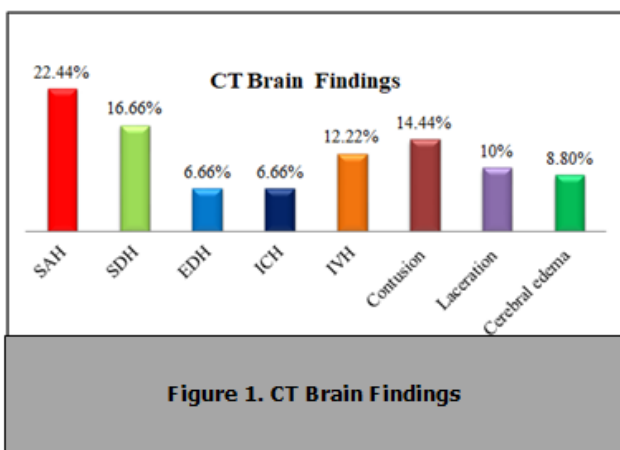
Clinical findings of study participants: Loss of consciousness

(75.5 %) was the most common clinical presentation followed by vomiting (42.2 %), vertigo (21.1 %), and pupil asymmetry (16.6 %). Some of them depicted the battle sign (12.2 %) and raccoon's eye (11.1 %) as in Table 3. The highest proportion of skull fracture was found in the temporal region (43.3 %) followed by the parietal region (24.4 %). The Occipital region, the base of the skull was least involved among skull fracture locations. Among participants with altered mentation, 35.5 % had GCS of 13-15, 46.6 % GCS of 9 - 12, and 17.7 % had GCS of 3 – 8 (Table 2).

ATTRIBUTES OF ACCIDENT	CATEGORIES	N
Mechanism of injury	Road traffic accident	53
	Fall from ground/height	17
	Assault	9
Mechanism of injury among RTA victims	Others	11
	Motorcycle / two-wheeler	25
	Car / four-wheeler	19
Usage of safety measures	Pedestrian / bicycle	9
	Use of seat belts	9
	Car /four-wheeler(n=19)	
Motor	Mobile phones/ alcohol consumption	10
	Use of helmets	9
Vehicle/Two-wheeler (n=25)	Mobile phones / alcohol consumption	16
	Time of accident	
Time of accident	Early morning (4 am-8 am)	15
	Day (8 am-4 pm)	12
	Evening (4 pm- 8pm)	16
	Night(8 pm-4 am)	10

Table 2. Mechanism Of Injury And Attributes Of Road Traffic Accidents

Cranial Computer tomography findings: The most common CT characteristic was Subarachnoid hemorrhage (22.44 %). This was closely followed by Subdural hemorrhage (16.66 %), Contusion (14.44 %), Intraventricular hemorrhage (12.22 %). Intracerebral and, Extradural Hemorrhage (6.66 %), each. Cerebral edema (8.8 %) and Laceration (10 %) were reported as depicted in Figure 1.



DISCUSSION

Head trauma is one of the factors for disability and death in young people and it can be prevented health care systems.⁴ Trauma is being defined as blunt, penetrating injury / damage to body organs occurring intentionally / unintentionally because of any external factors such as accident ,falls, poisoning, drowning, and any other means of mechanisms.^{7,8} Head trauma can be loss of consciousness for more than ten minutes, broken bones, and convulsions after hit and about 15 % - 20 % of TBI patients seem to have the habit of alcohol consumption at the time of injury.^{4,9} The present study shows that the majority of study participants were from the age group of 20-40 years and similar sorts of age groups has been reported from various cross-sectional studies across diverse settings.^{10,11} A study conducted by Mushhkudiani and M.K. Goyal has reported in their study that 21 - 40 years of age group are most commonly affected due to head trauma; it reflects the vulnerability of this group and productive working group.^{12,13} In our study, male victims outnumbered female victims. The working forces mainly composed of men are engaged in activities that predispose them to motor vehicle operation and climbing of heights.¹⁴⁻¹⁶ A study from tertiary care institute has reported that the occurrence of head injury is approximately 42.5 % in rural and 57.5 % in the urban area and relatively a higher incidence of head injury in an urban location (64.4 %) was observed in this study.¹⁷ Some of the studies have reported incidence of injuries from RTAs (55 %-72 %), falls (20 %- 30 %), and assaults (1 % - 10 %) respectively which is in concordance with this study.^{18, 19} Akine Eshete et al have reported RTA (44.1 %) as a common cause of severe head injury and the present study reported 58.8 % of participants being affected by RTA.²⁰ A study conducted by Isabel Aenderl has reported interpersonal fights (38.5%) and RTA (36.5%) as a major cause of head injury in their study.²¹⁻²² With the rapid economic transformation, increasing industrialization, reduction in farming, rapid migrations of people to urban areas, poor public transport systems, and rapid motorization along poor road safety measures have increased the incidence of RTA.²³ Fall injury could be due to the work nature of participants who are indulged in falling from an electric poll, terrace, or height. It was observed that two-wheelers were common victims than four-wheelers in our study, which is supported by different studies and emphasizes the need for the motorcyclist to be cautious while driving^{10 - 20} It was observed that few participants have utilized helmets and fastened their seat belts and the rest of the vehicle users have neglected safety measures due to their ignorance and negligence. A similar explanation stands for those commuters who were using either mobile phones or had consumed alcohol while driving their vehicles.^{24, 25} The current study and other epidemiological studies have reported that the majority of the RTAs have taken place during the night time.²⁶ A study conducted by Kafle P et.al had revealed the distribution of head injury severity based on the Glasgow Coma Scale score as 56.9 % in mild, 21.1 % in moderate and severe in 21.86 % participants respectively.²⁷ In the present study distribution of head injury severity based on Glasgow coma scale scores was 35.5 % in mild, 46.6 % in moderate, and 17.7 % in severe head injuries and reported in their study that 64.4 % sustained a mild head injury and 14.4 % had sustained a severe head injury.The most common clinical variable at presentation included loss of consciousness, vomiting, vertigo, and pupil asymmetry. The incidence of subarachnoid hemorrhage, reported by different authors, ranged from 12 % to 44 % and a similar result has been reported in our study.^{28,29} Seeling et al. had reported the incidence of subdural hemorrhage in their study ranging from 5 % -22 % and in the present study; it was 16.6 %.³⁰ Other characteristics depicted by CT findings were Intraventricular & intracerebral hemorrhage, extradural hemorrhage, contusion, laceration, and cerebral edema. In the present study, the majority of skull fracture was found in temporal (43.3 %) and

parietal (24.4 %) region. The present study had its limitations as it was a single hospital-based study and future recommendations for further study can be done in a district with more population level.

CONCLUSION

Our study revealed that males were predominantly affected and RTA accounted for 58 % of head injuries followed by fall and assault. The incidence of head injuries was higher in urban locations than in rural. Two - wheelers were the common vehicle involved in RTA injuries and motorcycle riders were the commonest victims. Loss of consciousness and vomiting were common clinical presentations. On CT findings, subarachnoid hemorrhage was the most common, followed by subdural hemorrhage and other intracranial hemorrhages, etc.

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