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ORIGINAL ARTICLE

EVALUATION OF THE EPIDEMIOLOGICAL AND CLINICAL PROFILE OF PATIENTS WITH TRAUMATIC BRAIN INJURY IN A RURAL MEDICAL INSTITUTION: A RETROSPECTIVE STUDY

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ABSTRACT:

Background: Traumatic brain injury (TBI) is one of the most devastating types of injury. It affects all ages; however majority of road traffic injuries (RTI) occurs in young adults of productive age group. The aim of present study is the evaluation of the epidemiological and clinical profile of patients with traumatic brain injury in a rural medical institution. **Materials and methods**: For the study, a retrospective medical record review of patients admitted to the hospital with head injury was conducted. Assessments of the medical records of those patients were done who reported to the surgery department with head injury and were diagnosed to have TBI when examined. **Results**: The age of the patients ranged from 4 year to 82 years and the mean age was 35.23 years. The maximum number of patients belonged to the age group 21-30 and 31-40 years comprising 151 and 112 patients, respectively. The number of patients belonging to male group was 370 patients out of 520 and female group was 150 out of 520. **Conclusion**: From the present study, it can be concluded that TBI in rural areas is mostly among the young male population. Mortality is 7.8 % with the majority of deaths occurring among persons in the most productive age groups. Recovery with minimal disability was observed in approximately 80% of cases in this sample.

Keywords: Head injury, Rural India, Traumatic brain injury.

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INTRODUCTION:

Traumatic brain injury (TBI) is one of the most devastating types of injury. It affects all ages; however majority of road traffic injuries (RTI) occurs in young adults of productive age group. As per report by the ministry of road transport, Government of India (2007) 1.4 lakhs road accident happened in 2007 with 1.5 lakhs people injured and 40,612 people killed.[1, 2] Hence, India is leading the world in fatalities due to road traffic accidents. TBI is also associated with significant socioeconomic losses in India as well as in other developing countries.[2-4] A worldwide interest in TBI is currently trending as it has been shown that its consequences are not only limited to the acute postinjury phase, but chronic sequelae and severe long-term adverse outcomes, such as cognitive impairment and early onset dementia may develop. Guidelines followed to manage cases of TBI vary according to the severity, with most controversy lying on the proper way to deal with TBI cases.[3-5] The aim of present study is the evaluation of the epidemiological and clinical profile of patients with traumatic brain injury in a rural medical institution.

MATERIALS AND METHODS:

The study was conducted in the Department of Surgery of the Maharaja Agarsen Medical College, Agroha, an institution situated in rural India. For the study, a retrospective medical record review of patients admitted to the hospital with head injury was conducted. The ethical approval for the study was obtained from the ethical committee of the institute. Assessments of the medical records of those patients were done who reported to the surgery department with head injury and were diagnosed to have TBI when examined. For the assessment of medical

records, following variables were entered into an electronic database: age, sex, residential address, Glasgow Coma Scale (GCS), mechanism of injury, severity of injury, duration of hospital stay, CT scan results, type of surgery (if performed), condition at discharge (dead or alive), and Glasgow Outcome Scale (GOS) score. The severity of head injury was identified using GSC scale. The severity of head injury was mild if GCS score was 13-15, moderate if GCS score was 9-12 and severe if GCS score was (3-8).

STATISTICAL ANALYSIS:

The statistical analysis of the data was done using SPSS software for windows. Student's t-test and chi-square test were used to check the statistical significance of the data. P value <0.05 was determined to be statistical significant.

RESULTS:

Throughout the study period, 520 patients with Traumatic brain injury were admitted to the surgery department. The age of the patients ranged from 4 year to 82 years and the mean age was 35.23 years. The maximum number of patients belonged to the age group 21-30 and 31-40 years comprising 151 and 112 of the patients, respectively. The number of patients belonging to male group was 370 patients out of 520 and female group was 150 out of 520.

In the present study, we observed that mild TBI was present in 322 patients, moderate TBI in 95 patients and severe TBI in 103 patients. Death of the patient occurred in 37 cases in total out of which 30 in severe, 7 in moderate and no death in mild cases. Persistent vegetative condition of the patient was seen in 3 patients with severe TBI, and 1 patient with moderate TBI. Severe disability was seen in 2 patients in total, 1 each in severe and moderate conditions. Moderate disability was seen in 42 patients. Good recovery was seen best in mild TBI cases with 319 patients [Table 1 & Figure 1]. As shown in Table 2 & Figure 2, cerebral contusion is the most common CT scan abnormal finding in the TBI patients, followed by acute subdural hematoma, and followed by skull fracture. Least common abnormal finding in CT scan of TBI patients was Superior sagittal sinus thrombosis with cerebral infarct.

Table 1: Numbers of patients with traumatic brain injury by glasgow coma scale and their outcome.

	Severe (3-8)	Moderate (9-12)	Mild (13-15)	Total
Death	30	7	0	37
Persistent vegetative	3	1	0	4
Severe disability	1	1	0	2
Moderate disability	25	14	3	42
Good recovery	44	72	319	435
Total	**103**	**95**	**322**	**520**

Figure 1: Severity of head injury and outcome

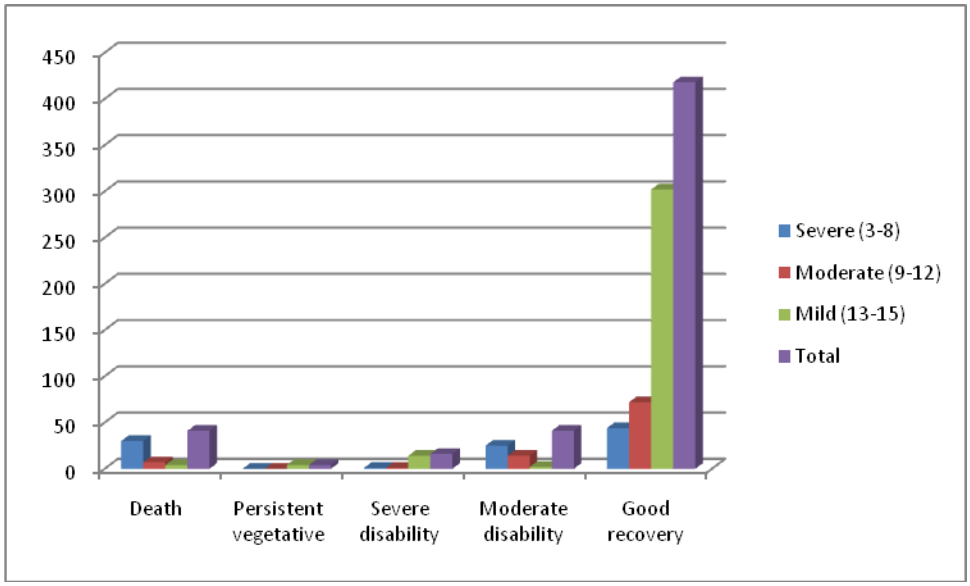
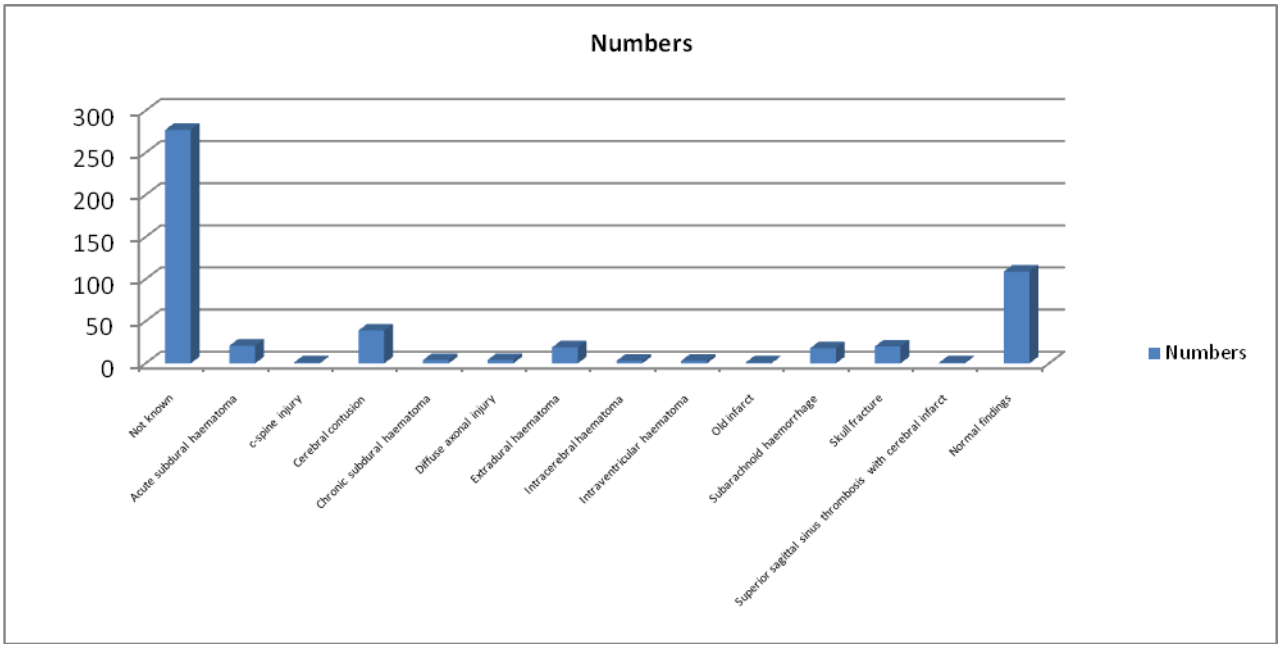


Table 2: Number and percent of CT scan findings among traumatic brain injury patients

CT scan findings	Numbers	Percent
Not known	277	53.5
Acute subdural haematoma	21	4
c-spine injury	1	0.2
Cerebral contusion	39	7.5
Chronic subdural haematoma	4	0.7
Diffuse axonal injury	4	0.7
Extradural haematoma	19	3.6
Intracerebral haematoma	3	0.6
Intraventricular haematoma	3	0.6
Old infarct	1	0.2
Subarachnoid haemorrhage	18	3.5
Skull fracture	20	3.8
Superior sagittal sinus thrombosis with cerebral infarct	1	0.2
Normal findings	109	20.9
Total	**520**	**100**

Figure 2: Number of CT scan findings among traumatic brain injury patients



DISCUSSION:

Traumatic brain injuries (TBI) are among the worst consequences and are the major causes of death in patients under the age of 25 years. It is also the leading cause of trauma related coma and disabilities.[4] In developed countries the rate of deaths induced by head injury has been about 21% (in the first month) and this rate goes up to 50% in developing countries.[6- 8] In the present study we observed that in rural area young men are the most commonly affected by TBI. A statistical significant association was observed in low Glasgow coma score and mortality as an outcome. These findings are consistent with other studies. This study found that in rural India head injury mostly affects young men, mostly due to vehicular accidents. These injuries resulted in a spectrum of imaging features and expected pathology. Low Glasgow Coma Score at admission was significantly associated with mortality as an outcome. This report is similar to many other reports from urban India, and other parts of the world, as there is a disproportionate burden of motor vehicle-related injury morbidity and mortality.[10- 12] Shekhar C et al performed a study to correlate various variables like epidemiology, clinical status, severity of TBI & associated co-morbid conditions and its outcome. This study involved retrospective collection, prospective management and follow up of 796 cases of TBI admitted to the neurosurgery department of a tertiary care hospital in New Delhi during one year study duration. Fall from height was the main

cause of TBI (56%) followed by road traffic injury (RTI) (36%). Majority (61%) patients reached the hospital within 6 hours of injury out of which 27% patients were unconscious. As per Glasgow coma scale mild, moderate & severe grade of TBI was seen in 62%, 22% &16% cases respectively. Radiological examination of other body parts revealed injuries in 11% cases. Only 11% cases required surgical management, rest was managed conservatively. Good outcome noted in 80% cases and 20% cases expired. Average duration of hospital stay was 5 days. According to multivariate analysis, the factors which correlated with poor prognosis are presence of radiological injuries to other body parts, GCS, abnormal cranial nerve examination, abnormal plantar and abnormal pupillary reflex. ($P < 0.05$). It was concluded that TBI predominantly affects young male population and most of these are preventable. Early transportation to the hospital and first aid results in good outcome. Mortality increases with the severity of TBI and associated injuries therefore multimodality approach in polytrauma is essential.[13]

Agrawal A et al conducted a retrospective study to evaluate and describe the epidemiological and clinical characteristics of patients with traumatic brain injury and their clinical outcomes following admission to a rural, tertiary care teaching hospital in India. Epidemiological and clinical data from all patients with traumatic brain injury (TBI) admitted to the neurosurgery service of a rural hospital in district Wardha, Maharashtra, India, from 2007 to 2009 were analyzed. The medical records of all eligible patients were reviewed and data collected on age, sex, place of residence, Glasgow Coma Scale (GCS) score, mechanism of injury, severity of injury, concurrent injuries, length of hospital stay, computed tomography (CT) scan results, type of management, indication and type of surgical intervention, and outcome. The medical records of 1,926 eligible patients with TBI were analyzed. The median age of the study population was 31 years (range <1 year to 98 years). The majority of TBI cases occurred in persons aged 21 - 30 years (535 or 27.7%), and in males (1,363 or 70.76%). Most patients resided in nearby rural areas and the most frequent external cause of injury was motor vehicle crash (56.3%). The overall TBI-related mortality during the study period was 6.4%. From 2007 to 2009, TBI-related mortality significantly decreased ($P < 0.01$) during each year (2007: 8.9%, 2008: 8.5%, and 2009: 4.9%). This decrease in mortality could be due to access and availability of better health care facilities. It was concluded that Road traffic crashes are the leading cause of TBI in rural Maharashtra affecting mainly young adult males. At least 10% of survivors had moderate or more severe TBI-related disabilities. Future research should include prospective, population based studies to better elucidate the incidence, prevalence, and economic impact of TBI in rural India.[14]

Wu X et al. conducted a study to investigate the epidemiologic data of TBI in eastern China, based on a prospective multicenter trial. Data were collected from the 77 hospitals by standardized structured questionnaires in this region during the 1-year period (2004). A total of 14,948 of cases of traumatic brain injury were identified from 77 hospitals in eastern China. There were 11,446 men (76.6%) and 3,502 women (25.4%). Male adolescents and young adults were affected more often by brain injury. Traffic accidents (60.9%), knock on head (13.4%), and falls (13.1%) were the leading causes of patients with TBI. Approximately one-thirds of the traffic-related TBI were motorcyclists, 31% were pedestrians, and 21.9% were cyclists, whereas motor vehicle occupants only counted for 14% of the cases. The distribution of head injury severity, on the basis of Glasgow Coma Scale scores, was mild in 62%, moderate in 18.1%, and severe in 20% for all cases. The traffic accidents caused the most of severe injuries, which accounted for about 70.4%. Based on Glasgow Outcome Scale assessment, 10.8% of the patients died, 2.6% were in vegetation status, 2.2% had severe disability, 7.2% had moderate disability, and 77.3% had good recovery. And, the outcome depended on age, injury mechanism and initial Glasgow Coma Scale score. The prospective cohort study shows an alteration of TBI during the past decade in eastern China. It is essential to establish a standardized surveillance system of TBI incidence, risk factors, causes, and outcomes for development of new, more effective, targeted strategies to prevent TBI.[15] Monsef Kasmaei V et al did a research to examine the epidemiologic pattern of TBI in emergency department. In this cross-sectional study, the profiles of 1000 patients affected by TBI were selected using simple random sampling. The examined variables in this study included demographic, season, mechanism of injury, accompanying injuries, level of consciousness, hospitalization duration, computed tomography (CT) scan results, needing surgery, admission to intensive care unit, and outcome of the patient. In the end, independent risk factors for the death of patients were determined. 1000 patients suffering from were studied (81.8% male; mean age 38.5±21.7 years). The frequency of their referral to hospital in spring (31.4%) was more ($p<0.01$). 45.9% of the patients had a level of consciousness less than 9 based on the Glasgow Coma Scale (GCS). Subdural (45.9%) and epidural bleeding (23.7%) were the most common findings in CT scans in this study ($p<0.001$). Finally, 233 (23.3%) of the patients were dead. Over 60 years of age, falling and motorcycle accidents, intracranial hemorrhage accompanied by brain contusion, subdural bleeding, a GCS of less than 9, and the need to be admitted to intensive care unit were independent risk factors of death in TBI. Its conclusion was that age Over 60 years, falling and motorcycle accidents, intracranial hemorrhage accompanied by brain contusion, subdural bleeding, a GCS of less than 9, and need to be admitted to intensive care unit were independent risk factors for the death in TBI patients.[16]

CONCLUSION:

From the present study, it can be concluded that TBI in rural areas is mostly among the young male population. Mortality is 7.8 % with the majority of deaths occurring among persons in the most productive age groups. Recovery with minimal disability was observed in approximately 80% of cases in this sample.

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