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Original Article

Traumatic Brain Injury Deaths in Bauchi, Nigeria: A Single Center One-year Experience

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Abstract

Introduction: Traumatic brain injury is one of the leading causes of hospital admissions with resulting morbidity and mortality. It has become a major health problem in our environment. Mortalities from TBI vary from 10-36 per 100,000 populations and 2% death rate has been reported. The aim of this study was to study the trend of traumatic brain injury deaths within one year in our hospital.

Methodology: This was a retrospective study included all deaths from traumatic brain injuries recorded within a year (December 2021 –November 2022) at our facility. The exclusion criteria were deaths from TBI occurred outside our facility but were brought in dead.

Results: Forty–two deaths were recorded over a year period following traumatic brain injury (TBI) where 1,045 patients were attended to on account of TBI. The mean age of those that died from TBI was 45±15 and male had more mortality than female with 3:1. Mortality was pronounced more in 4th and 5th decades of life representing 55% of all deaths.

Conclusion: TBI related deaths occurred across all age groups and the maximum number of deaths occurred in 41-50 years with Road traffic accident as the leading causes of TBI related deaths. Road safety enforcement, provision of social infrastructure like good road and provision of well-equipped health facilities with neurosurgical services closer to rural communities will reduce the mortality rate from TBI.

***Keywords:** Trauma. Brain injury, Death*

Introduction

Traumatic brain injury (TBI) is a complex caused by sudden trauma or impact to the brain with varying spectrum of symptoms and disabilities. Traumatic brain injury is one of the leading causes of hospital admissions in the world, significant morbidity, disability and mortality has been associated to TBI. It is has now become a major health problem both globally and locally in our setting.[1, 2]

Traumatic brain injury is the leading cause of traumatic deaths in United States.[3] One and half millions of Americans suffer traumatic brain injury each year and about 50,000 die from these injuries.[1, 4] Also in US about 80,000 suffer morbidity yearly from TBI.[4]

In developing nations, trauma rates have increased likewise the TBI rates, these increase is due to industrialization, increases traffic, ballistic injuries from wars and conflicts. One quarter to one third of all accidental deaths are due to TBI while two third of all hospital trauma deaths are still due to TBI.[5]

TBI is majorly presents as closed or penetrating head injury. Closed head injury usually follows motor vehicle and motorcycle accidents, falls into depth, falls from height, assaults or vehicular-pedestrian accident. Penetrating head injury is due to gunshots, ballistic injury but sometimes blunt injury could violate the skull. TBI commonly occur with additional injury in other region of the body but often occur in isolation as well.[4]

Complications from TBI are the largest cause of morbidity and mortality inpatients who reached hospital alive. Those patients that require long term rehabilitation following trauma, TBI is usually the primary injury. Even in childhood, TBI is the major cause of morbidity and mortality across all trauma accidents, with annual mortality rate of 1 per 1000 in childhood age groups.[6]

TBI deaths and its frequency in our practice has shown and gave credence to the fact that TBI is an important emerging public health problem. TBI occurs every 15 seconds while a patient dies every 12 minutes from TBI. Traumatic brain injured patients are encountered daily.[7]

Mortalities from TBI vary from 10-36 per 100,000 populations. 2% of death and 26% of all injury deaths are still due to traumatic brain injury. Severity of TBI is the hallmark of high mortality or morbidity. Fifteen to twenty percent of head injuries prove fatal irrespective of the best management. The majority of all patients with TBI require non-operative management while about 10-20% require surgical intervention.[7]

The objective of this study is to study the trends of death in TBI patients over a year in our center.

Materials and Methods

This study was carried out in Neurosurgery unit in Department of Surgery of Abubakar Tafawa Balewa University Teaching Hospital Bauchi for a period one year (December 2021 to November 2022). This was a retrospective study included all deaths from traumatic brain injuries recorded within the study period at our facility. The exclusion criteria were deaths from TBI that occurred outside our facility but were brought in dead. The ethical approval was obtained from our institution research and ethical committee.

The information regarding the patients that died from traumatic brain injury was obtained from the medical records of the patients and was inputted into a semi-structured questionnaire. The data collected include; age, gender, occupation, etiology, severity, nature of injury, radiological findings, treatment and time of death. The analysis of the data was done using SPSS version 12 package and the results were expressed in proportions and percentage.

Results

One thousand and forty-five patents with traumatic brain injury were admitted in Accident and Emergency over a period of one year with 42 deaths recorded.

Table 1: Age of the patients that died from TBI (n=42).

Age in years	Total No. of patients	Percentage
0-10	1	2.3
11-20	2	4.8
21-30	5	12
31-40	10	23.7
41-50	13	31
51-60	5	12
61-70	3	7
71-80	2	4.8
81-90	1	2.3
Total	**42**	**100%**

The age of the patients died varied from 3 months to 85 years with the mean age and standard deviation of 45±15. Male constituted 82% of the death. Death was seen majorly among patients in 4th and 5th decades of life (57%). One death recorded in first decade of life from TBI and the same death rate recorded in 9th decade of life (2.3%) as seen in Table 1.

Table 2: Occupation and Location distribution.

Occupation	Number	Percentage
Students	5	12
Farmers	19	45.5
Civil servant	4	9.5
Businessmen/woman	10	23.8
Not gainfully employed	4	9.5
Total	**42**	**100%**
Location	**Number**	**Percentage**
Urban	15	35.7
Rural	27	64.3
Total	**42**	**100%**

Table 2 showed that most of the deaths were seen among farmers (45.5%) followed by businessmen/woman (23.8%), while deaths were more prevalent among rural dwellers.

Table 3: Etiology/Mode of the TBI.

Etiology of the injury	Number of patients	Percentage
Road Traffic Accident	28	67
Fall from height	3	7
Fall into depth	1	2.4
Assault	7	16.7
Gun shot	3	7
Total	**42**	**100%**

Most deaths were associated with Road Traffic Accident (67%) and this was followed by Assault (16,7%), the least deaths were seen in patients whose etiology was fall into depth (2.4%) as shown in Table 3

Table 4: Severity of the patients who died from TBI.

Glasgow Coma Score	Number of patients	Percentage
13- 15	2	4.8
9-12	9	21.4
≤8	31	73.8
Total	**42**	**100%**

The higher the severity of the TBI, the more the deaths associated; severe (73.8%), moderate (21.4%) and 4.8% in mild TBI (Table 4).

Table 5: Brain CT findings of patients who died from TBI.

CT scan Findings	Number of patients
Skull fracture	16
Basal skull fracture	6
Contusion	16
Brain edema	21
Diffuse axonal injury	3
SAH	26
IVH	6
ICH	8
EDH	6
SDH	10

SAH (subarachnoid hemorrhage), IVH (intraventricular hemorrhage), ICH (intracerebral hematoma), EDH (extradural hematoma). SDH (subdural hematoma)

Table 5 shows the pattern of CT brain pathologies responsible for TBI deaths in our facility.

Discussion

Bauchi state is the fifth largest in area and seventh most populous among the states of federation with estimated population of 6, 530,000 (2016 census). Only one tertiary hospital offers full neurosurgical services, which means all traumatic brain injuries from within and nearby states are referred and managed in our hospital.

The annual overall number of admissions in our Emergency department was 1,045 with traumatic brain injury within the study period. There were 42 deaths associated with TBI during the period under review which representing 4% death rate in our practice. The annual incidence rate of traumatic brain injury associated deaths was 16.7/100,000, this incidence rate was similar to study by Yattoo & Tabish.[8]

TBI related deaths were four times higher in makes than females which is similar to some researchers' findings.[8, 9] This is understandable since males were more prone to have traumatic brain injury compared to female gender, the reason being that males travels a lot in the quest for providing for homes and more frequently engage in high risk jobs and tasks.

Our study also showed higher number of deaths among farmers and businessman/woman and this may be explained by their frequent movement in conveying their goods, services and farm produce, however to what extent the literacy contributed to the death cannot be explained by this study. Higher death rates were recorded among rural dwellers compared to urban settlers and this may be the function of higher number of rural dwellers having traumatic brain injury as reported by Gabella at al.[10] The reasons for this observation could be; less awareness, ignorance to seek early medical care, poor transportation facilities-which contributes to higher incidence of road traffic accidents and delay in transporting the injured to the hospital, longer distance to reach health facility, poverty and many more.

Road Traffic Accident causes 67% of the deaths, assaults, gunshot injury and fall from height were the most frequent causes of deaths. In the present study 73.8% of the death had severe TBI while 4,8% of people that died had mild TBI.

Mortality in our study peaked at the age of 41-50 years which was in contrast to report from Yattoo and Tabish where deaths was peaked at age 15-24 years. Nonetheless, the deaths were still among the prime age with attendant economic loss to the family and to the nation at large.

Several studies have reported decrease and increase in TBI deaths across different regions of the world.[8,9] Though our study could not be compared with their findings since our study focused on one-year trend of TBI deaths.

Computerized scanning is very important and it does not only improve the care but also give guidance to the tailored care for individual patient. Thirty-five patients (83%) out of 42 patients had brain computerized tomography (CT). Majority of patients that died from TBI had subarachnoid hemorrhage (SAH), brain edema, brain contusion and skull fracture on CT brain.

Conclusion

Traumatic brain injury is one of the major health problems in our environment. TBI related deaths occurred across all age groups and the maximum number of deaths occurred in patients between 41-50 years who had road traffic accident as the leading causes of TBI related deaths.

Death from traumatic brain injury sometimes are inevitable, especially from primary brain injury but some can as well be prevented through multi-prongs approaches. Coordination among the enforcement agencies on road's safety and safe driving. Conflict resolution mechanisms within the communities. Lastly but not the least, adequate and fully equipped medical care facilities with full compliments of needed specialists. Such facilities should have functioning trauma centers, and its need to be established at each senatorial zones of the state or within the radius of 100km apart from each other, this will help to provide prompt specialized care to salvage and possibly reduce the mortality rate associated with traumatic brain injury in our setting.

Authors' Contribution:

Olabisi O. ogunleye conceived the study, participated in the study design, collected data, literature search, performed statistical analysis and manuscript write up.

Olayere H. Obanife, Oluchukwu B. Ogunleye and Ibrahim Amur participated in the study design, collection of data and coordination of manuscript write up.

All authors read and approved the final manuscript.

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Conflict of Interest

None declared by the authors.

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