

Original Research Article

Assessment of magnitude and factors affecting outcomes of head injury at Addis Ababa burn emergency and trauma hospital, Ethiopia

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Received: 12 October 2020

Revised: 14 November 2020

Accepted: 02 December 2020

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ABSTRACT

Background: Head injury is the leading cause of death and disability worldwide and has become one of the highest community health problems worldwide including Ethiopia. This study aims to assess the magnitude and factors affecting the outcome of head injury patients at Addis Ababa burn and emergency treatment Hospital from 01 January 2018 to 31 December 2019.

Methods: A retrospective review was conducted on a patient who had a head injury and visited Addis Ababa burn and emergency treatment Hospital, from 01 January 2018 to 31 December 2019.

Results: There were 2163 head injury patients making the incidence of head injury 29.6%. The commonest cause of injury is road traffic accidents accounting for 89 (43.8%) and most patients sustained blunt injury 65 (32%). The commonest computed tomography (CT)-scan finding was intracerebral hemorrhage in 51 (25.1%) patients. Most head injury patients 112 (55.2%) stayed less than 1 week and the commonest complication was meningitis that occurred in 56 (27.6%) of patients. On presentation to hospital 90 (44.3%) had a mild type of traumatic brain injury. There is a significant correlation seen between gender, occupation, and severe traumatic brain injury (TBI) with the outcome of head injury ($p < 0.05$).

Conclusions: Early diagnosis and interventions contributed to the good outcome of the patient. Establishing trauma centers at least in major cities can improve the outcome of head injury patients, by giving early treatment and using ambulances which are used for transportation of laboring mothers also might facilitate early referrals of patients to best centers.

Keywords: Head injury, Magnitude, Outcome

INTRODUCTION

Head injury which often times interchangeably used as traumatic brain injury (TBI) is defined as acquired brain damage which occurs as a result of sudden trauma to the brain and can be either confined or diffuse depending upon the areas of brain affected.¹

Reports of annual incidence of traumatic brain injury in different African countries are scarce but according to

World Health Organization (WHO) there are on average 801 cases of TBI patients per 100,000 patients per year.² In South Africa, The overall annual incidence of TBI is 316 per 100,000 and the mortality rate of TBI was reported to be 80/100,000 per year; with greater than 10% of all case fatality rate.³ High risk groups for TBI include adolescents, young adults and the elderly, with males being affected 2-3 times more often than females. Several studies also showed that the main causes and risk factors

for head injury in Africa are road traffic accident (RTA), falls and violence.²⁻⁵

Though population based studies are rare in Ethiopia, according to the report by Ethiopia non-communicable diseases and injuries (NCDI) Commission (2018), 61% of injuries in Ethiopia account to unintentional injuries and 31.5% of these goes to injuries secondary to RTA.⁶ According to the same report, RTA is the commonest cause of fatal and serious injuries in Ethiopia and 75% of the victims are pedestrians but reports from southern nations and nationalities and peoples region shows there is changing trend in causation of accidents with an increasing pattern by motorcycle and tricycles.^{7,8} Most of the accidents affected men (two third) and mortalities related to injury account 6% and 11.4% respectively in urban and rural part of Ethiopia.⁹ In less resourced settings, the burden of head injury is magnified by the high prevalence of risk factors and by health systems which are often unable to effectively deliver the acute and long-term care the patients require.^{2,10}

Addis Ababa burn emergency and trauma (AaBET) hospital is the largest trauma center in the country and to the authors knowledge there has been no established data on the burden of the problem and associated factors affecting care of such patients therefore this study will try to describe the magnitude of the problem in the hospital and also will explore clinical factors associated with head injury and its outcome. Though difficult to draw conclusions from single institution, findings from this study will help us understand the magnitude of the problem as AaBET is the largest referral Centre in the city and in the country at large where most of the patients are referred.

METHODS

Aabet hospital is an affiliate of St. Paul's hospital millennium medical college which is located in Addis Ababa, Ethiopia. The Addis Ababa burn emergency and trauma hospital is the largest trauma centre in the capital and is also one of the few centers which specialize in trauma care. It gives orthopedic, neurosurgical and burn care services in addition to other adult emergency and critical care with bed capacity of 150 in patient and 100 emergency beds. Hospital based retrospective chart review of patients was carried out from 01 March 2019 to 01 May 2019, G.C.

Randomly selected head injury patients who presented and were admitted to Aabet hospital from 01 January 2018 to 01 January 2019 G.C were included in the study and patients with inadequate data (greater than 20% incomplete data) and those who died upon arrival to the emergency were excluded. Patients who were treated for their acute care but referred to further care were not included in the analysis of the factors affecting patient outcome.

Data were entered directly to statistical package for the social sciences (SPSS) version 20.0 statistical software. After data cleaning descriptive and analytic statistics was done. Frequencies were used to summarize descriptive statistics of the data and tables and graphs were used for data presentation. Bivariate and logistic regression were used to test for statistical significance at 5% significance level.

Ethical clearance was obtained from institutional review board (IRB) of St. Paul's hospital millennium medical college. Confidentiality of patient's records was kept and no patient information was transferred to any other organ.

Sample size and sampling techniques

Based on the formula for a single population proportion and correction factor by assuming a prevalence of head injury 13% (from the research done in Nigeria), confidence level 95%, margin of error 5 and 20% with non-response rate sample size was determined and 203 patients were randomly selected by systematic random sampling method out of 2163 patients who were admitted in the study period.

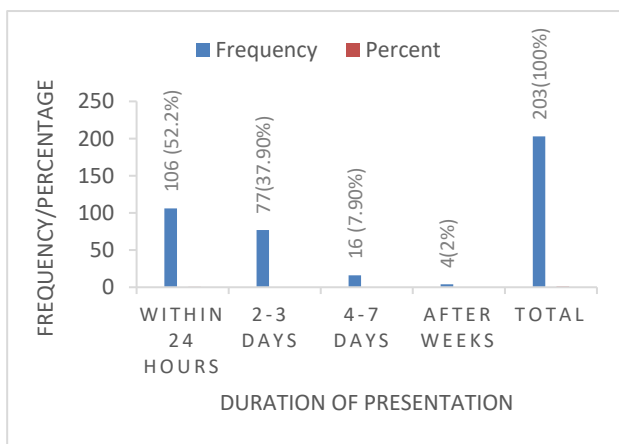
RESULTS

From total of 7309 patients who visited emergency of Aabet hospital from 01 January 2018 to 01 January 2019, there were 2163 head injury patients accounting 29.6% of all patients' visits to emergency department. By simple random selection, 203 head injury patients were included in this study. Among these, 149 (73.4%) were males. Most of the patient were unemployed 76 (37.4%) and daily laborers were 55 (27.1%). Road traffic accident was the leading cause of head injury 89 (43.8%) followed by assault or fighting injuries 60 (29.6%). Most of the patient were brought to emergency department with private and public transportation 117 (57.6%) and 86 (42.4%) were via ambulance (Table 1). Regarding mechanism of injury, 118 (58.1%) sustained blunt head injury and 65 (32%) patients sustained penetrated types of head injury. About 52% of patients presented within 24 hours but significant number (37.9%) brought to hospital after 2-3 days (Figure 1).

Regarding associated other injuries in addition to head injury, 16 (7.9%) patients had neck injury and 34 (16.7%) and 20 (9.9%) of patients had associated chest and abdominal injury respectively. Computed tomography (CT) scan finding of a patient who sustained head injury during the study period showed 51 (25.1%) patients to have intracerebral hemorrhage, 48 (23.6%) subdural hematoma, 40 (19.7%) epidural hematoma. Large number of head injury patients 112 (55.2%) Stayed less than 1 week, and 10 (4.9%) did stay more than 01 months. Along their stay in the hospital, the majority of the patients 56 (27.6%) developed meningitis, 55(27.1%) developed neurological deficit.

Table 1: Socio-demographic data of a patient who presented to Aabet Hospital from January 1, 2018 to January 1, 2019, G.C.

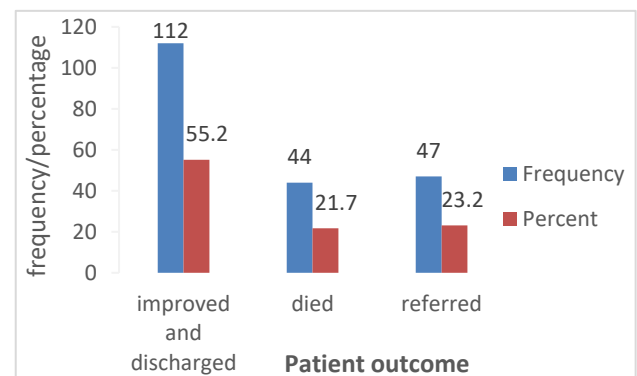
Characteristics	Frequency (n=206)	Percent (%)
Gender		
Male	149	73.4
Female	54	26.6
Age (year)		
0-9	14	6.9
10-19	21	10.3
20-29	68	33.5
30-39	52	25.6
40-49	20	9.9
50-59	16	7.9
>60	12	5.9
Address		
Urban	124	61.1
Rural	79	38.9
Occupation		
Unemployed	76	37.4
Daily laborer	55	27.1
Employed	30	14.8
Self employed	24	11.8
Professionals	18	8.9

**Figure 1: Duration of presentation of patients after head injury at Aabet hospital from 01 January, 2018 to 01 January, 2019, G.C.****Table 2: Bivariate and multivariate analysis of head injury patients' outcome at Aabet hospital from 01 January 2018 to 01 January 2019 G.C.**

Variables		Outcome		OR (95% CI)			
		Discharged improved	Died	P value	COR (95% CI)	P value	AOR (95% CI)
Gender	Male	78	40	0.005	4.359 (1.45-13.15)	0.013	4.26 (1.35-13.45)
	Female	34	4		1		
	Hypotensive	52	30	0.004	1.73 (0.32-9.12)	0.690	1.42 (0.24-8.32)
	Hypoxic	18	10				

Continued.

Regarding severity of head injury based on Glasgow coma scale (GCS), 90 (44.3%) of the patients sustained mild head injury, 81 (39.9%) moderate head injury and the remaining 32 (15.8%) were diagnosed to have severe head injury with GCS of 8 and less. One third of patients 76 (35.9%) were treated operatively and 63 (31%) were treated non-operatively and 47 (23.2%) patients were referred to other hospitals for additional care because of different reasons and their outcome was not known (Figure 2).

**Figure 2: shows outcome of head injury patient at Aabet Hospital from 01 January 2018 to 01 January 2019 G.C.**

Concerning the outcomes of head injury patients, 112 (55.2%) were discharged improved from hospital with good recovery and 44 (21.7%) of them died in the hospital.

Factors affecting patient's outcome

Dependent and independent variables were cross tabulated and bivariate analysis was done to test for statistical significance with patient outcome (survival or death). Only gender, patients condition at presentation and GCS at presentation were found to be statistically significant at 95% confidence interval (CI) but when these variables were tested hierarchically at multiple regression only gender was found to be statistically significant. The odds of death for male was found to be 4.26 (1.35- 13.45) times the odds of death for females .The odds of death for patients with severe TBI at presentation according to GCS was 3.73 (1.4-9.9) times the odds of death for those with mild TBI but becomes non-significant at multiple regression model (Table 2).

Variables		Outcome		OR (95% CI)			
		Discharged improved	Died	P value	COR (95% CI)	P value	AOR (95% CI)
Patients condition at presentation	Neither	36	2				
	Both	6	2				
Glasgow coma scale at presentation	Severe (3-8)	18	14	0.025	3.73 (1.41-9.90)	0.058	2.96 (0.96-9.12)
	Moderate (9-12)	46	20				
	Mild (13-15)	48	10		1		

DISCUSSION

The burden head injury in this study is about 29.9%. Males and younger age groups (20-29) were more affected by head injury. This is similar to other studies in most of the literatures' mentioned.^{7,8,10-13} This difference is related to different factors like involvement the young population in risky recreational activities like alcohol consumption. Males also have high risk activities especially in trying to achieve economic stability. A high number of the patients were single.

Similar to the other studies in the country (e.g. Jimma and Dilla) and other countries, road traffic accident is major cause of head injury.^{7,8,13} This tells that we need to work more in creating awareness and reinforcing implementation of driving rules and regulations. Private and public transportation were main means of delivering patients to hospital, which is similar to studies done in Africa but literatures from developed countries show ambulance is main transportation and this has changed the outcome of head injury patients significantly.^{7,14-18} We have to work in establishing trauma centers at least in major cities and ambulances should be available so that we can decrease time and risk of complications. Availing Ambulances might not be easy in our set up but proper use of the already available ambulances that we are using to transport laboring mothers in our country might help in decreasing delays seen in transporting trauma patients.

In our study most patients sustained mild head injury (44.3%), the severity of head injury based on GCS, which is lower than studies in Nigerian (64.7%) study.¹⁸ Also most have associated skull fracture, which is related to mechanism of injury, blunt being the major cause. The proper use of GCS score and availability of CT scan in diagnosing the severity and also helping in following the change in management of such patients greatly helps and as our study tried to show most of our patients were managed conservatively. Male gender, patient clinical conditions like hypotension and hypoxia and GCS at presentation were associated with poor outcome (death). Similar results were also seen in other studies.^{7,17} Males involve in high risk activities, like fights and brawls, and the injury is also severe. Hypotension and hypoxia are a well-known causes of secondary brain injury further contributing for grave outcomes.^{7,11,25} Timely diagnosis and aggressive resuscitation of patients at earlier golden hours of arrival greatly helps to improve patient's survival.

Limitations

Limitation of this study is its being single institutional even though it is the largest centre and the sample sizes are also small.

CONCLUSION

In conclusion, head injury is taking the life of economically active age groups. So, creating awareness about exercising safe driving practice is important, because prevention is the best way of preventing head injury. Establishing trauma centers at least in major cities can improve the outcome of head injury patients, by giving early treatment and using ambulances which are used for transportation of laboring mothers also might facilitate early referrals of patients to best centers.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the institutional ethics committee

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Cite this article as: Suga Y, Shimelis W, Yesuf A, Dendena F, Teklewold B. Assessment of magnitude and factors affecting outcomes of head injury at Addis Ababa burn emergency and trauma hospital, Ethiopia. *Int J Sci Rep* 2021;7(1):28-32.