



**ADDIS ABABA UNIVERSITY**

**COLLEGE OF HEALTH SCIENCE**

**DEPARTMENT OF EMERGENCY MEDICINE AND CRITICAL CARE**

**CLINICAL PROFILE AND OUTCOME OF TRAUMATIC  
BRAIN INJURY PATIENTS AT EMERGENCY DEPARTMENT  
OF AaBET HOSPITAL, ADDIS ABABA, ETHIOPIA, 2020 G.C.**

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**A THESIS SUBMITTED TO ADDIS ABABA UNIVERSITY,  
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**JUNE 2020.  
ADDIS ABABA, ETHIOPIA**

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**JUNE 2020.  
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## **Declaration of the Thesis**

I, the under-signed, confirmed that this thesis was my original work and had never been presented or published in this or any other university or institution, and therefore all sources of information applied for the study have been completely acknowledged.

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## **Approval of primary Advisors**

This original thesis has been decided to submit with our primary approval as university Advisors for examination.

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## **ACRONYMS AND ABBREVIATIONS**

AaBET – Addis Ababa Burn, Emergency and Trauma

ABM – Abnormal Body Movement

AAU – Addis Ababa University

CDC – Communicable Disease Control

ED – Emergency Department

FMOH – Federal Ministry of Health

FRSA – Federal Road Safety Authority

GCS – Glasgow Coma Scale

GDB – Global Burden of Disease

HMIS – Health Management Information System

JUTH – Jimma University Teaching Hospital

LAMA – Left Against Medical Advice

LMICs – Low and Middle Income Countries

MVA – Motor Vehicle Accident

RTA – Road Traffic Accident

SDH – Subdural Hemorrhage

SPHMMC – St. Paul's Hospital Millennium Medical College

SPSS – Statistical Package for Social Sciences

TBI – Traumatic Brain Injury

UK – United Kingdom

USA – United State of America

WHO – World Health Organization

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## ABSTARCT

**Background:** Traumatic brain injury (TBI) is a major global health and socioeconomic issue. In the middle of low and high-income nations, it is widespread and affects people of all ages. According to Communicable Disease Control (CDC) a traumatic brain injury is describes as a loss of normal brain activity that may be caused by banging on the head, moving from side to side, or whirling to the head, or penetrating injury.

**Objective:** To assess the clinical profile and Outcome of Traumatic Brain Injury patients in emergency department, AaBET Hospital, Addis Ababa, Ethiopia, 2019.

**Methods:** An institution based retrospective study was conducted on 324 TBI patients who had attending the AaBET Hospital of Emergency Department. The study was conducted from November 2019 to June 2020. The calculated sample size was addressed by using systematic random sampling technique. The data was entered in to Epi-Data version 3.1 and analyzed with SPSS version 25.0. A Simple descriptive statistic (frequencies, percentages, mean) was used to analyze the results of the study.

**Result:** Among 324 patient charts 82.4 % were male making the male to female ratio 4.7:1. The most commonly affected age group was (36.4%) between 16 – 25 years. RTA was the leading cause of injury (4.7%). On presentation, the severity of TBI based on GCS were mild (71.3%), moderate (21.9%), and severe (6.8%). Finally, Most (90.7%) TBI patients were survived within the trauma center, while the overall mortality rate was 3.4%.

**Conclusion:** Traumatic brain injury is a threatening condition which leads to one of the most significant reasons for attending the emergency department visits with increasing admission from time to time by imposing a high degree of morbidity and mortality.

**Key Words:** Clinical Profile, Prevalence, Traumatic Brain Injury, Outcome.

# 1. INTRODUCTION

## 1.1. Background

Traumatic brain injury (TBI) is a major global health and socio-economic issue. In the middle of low-and high-income nations, it is widespread and affects people of all ages. TBI is called the soundless outbreak because TBI-related problems are often not evident immediately, and people with TBI are not very vocal. In fact, the word ' soundless ' represents the widespread underestimation of the actual occurrence and that society is often unaware of TBIs effect (1). Such incidents, in addition to causing significant health damage and disruption to patients and their families, also place a strain on the healthcare and communities through a deterioration of productivity and high healthcare costs (2). According to the World Health Organization (WHO), the global incidence of traumatic brain injury will overtake most diseases by 2020 as the leading cause of death and disability (3).

According to Communicable Disease Control (CDC) a traumatic brain injury is describes as a loss of normal brain activity that may be caused by banging on the head, moving from side to side, or whirling to the head, or penetrating injury (4). The severity of traumatic brain injury ranges from mild, moderate, and severe; typically depending on the neurological manifestations of a patient's clinical presentation (5). The clinical manifestations of TBI differs from one person to another, and while some symptoms may resolve fully, others especially as a result of moderate and severe form of injuries, can result in enduring symptoms leading to incomplete or everlasting disability (6).

Globally, 81% account for mild TBI, 11% moderate TBI and 8% registered TBI for extreme TBI (7). The World Health Organization reports that over 10 million people worldwide experience TBIs every year that result in death or substantial hospitalization. Recent data suggest that TBI is responsible for more than 4.5 million deaths a year, which translates into about one in 10 deaths worldwide. This number is expected to rise, mainly the intensity of TBI in developing countries are increasing rapidly (8).

Although high-quality TBI incidence and prevalence statistics globally are difficult to find, high-income Neuro-trauma registries suggest that about 5.3 million people in the U.S. and about 7.7

million people in Europe live with TBI-related impairment (9). A total of nearly 2.5 million emergency department visits, 282,000 hospitalizations and 56,000 deaths due to TBI occurred in the United States in 2013. TBI resulted in approximately 82,000 deaths in Europe and was recorded in 2.1 million hospital discharge in 2012 (10).

The 2016 Global Burden Disease (GBD) study shows that the dominant cause of traumatic brain injury can vary depending on the countries' income, geographical region, and political circumstances, i.e. conflict areas. The proportion of traumatic brain injury resulting from road traffic collisions is greatest in Africa and Southeast Asia (both 56%) and lowest in North America (25%), while South America, the Caribbean and Sub Saharan Africa represent the highest world incidence of traumatic brain injury-related to armed violence and gunshot wounds (11).

Worldwide, the incidence of TBI is growing, largely due to injuries associated with increased motor vehicle accidents (MVA), particularly in middle and low – income countries. Road traffic accidents (RTA) are responsible for around 60% of the world's brain injury. Globally, road traffic accidents are responsible for more than 50 million incidents each year, with nearly 1.2 million fatalities. Other causes are falls, accounting about 25%, and other non-motor vehicle-related accidents and acts of violence that collectively account for about 15% of TBIs (12).

Although TBI's burden is found worldwide, it is especially prevalent in low and middle – income countries. Sub-Saharan African countries are among the most commonly affected by TBIs. To tackle the health outcomes associated with TBI, these countries lack an adequately trained health system. The global TBI rate is estimated at 106 per 100,000 and the incidence rate is estimated at 150 to 170 per 100,000 in sub-Saharan Africa (13).

The burden of traumatic head injury poses a significant health risk in Ethiopia according to a study at Ayder referral hospital, Mekelle there were 750 head injury patients over four years period of study. The leading cause of traumatic head injury was found to be falling down accidents around 313 (41.7 %), followed by road traffic accident 187 (24.9 %) and interpersonal violence 186 (24.8). sixty two (8.3 %) patients died from a traumatic head injury (14).

## **1.2. Statement of Problem**

Traumatic brain injury is a health problem that damages the brain which is caused by a combination of force and rapid acceleration/deceleration. Worldwide, 10 million people are estimated to be affected annually by which a significant burden of mortality and morbidity is imposed on society. This makes TBI an important public health and medical problem. Furthermore, severe TBIs can result in mortality rates as high as 30–40 %. Survivors experience a substantial burden of physical, psychiatric, emotional and cognitive disabilities which disrupt the lives of individuals and their families. Such disabilities are not restricted to severe cases, but also occur frequently after moderate or mild TBI (15).

In United State of America (USA), the incidence of TBI at the emergency department was reported to be 394/100,000 people with a mortality rate of 19.3 per 100,000. In the United Kingdom (UK), the attendance rate of TBI at an emergency department showed that TBI constituted 3.4% and the total attendance, and incidence was 453/100,000. An epidemiological study in Bangalore reveals that an incidence, mortality, and case fatality rates have been 150/100,000, 20/100,000, and 10%, respectively. Nigeria alone registered an incidence rate of 2710/ 100,000 per year at Accident and emergency department (16).

In low and middle-income countries, the incidence of TBI due to road traffic incidents is increasing from time to time due to increased use of motor vehicles in combination with an inadequate infrastructure and insufficient adoption of safety measures (15). Road traffic accidents and falling associated mortality is projected to rise in stages for the seventh and seventeen leading causes of mortality by 2030, respectively (17).

A study in Uganda indicates that a lack of high-quality statistics on traumatic brain injury interferes with awareness towards the severity of the burden and presents a challenge in recognizing contributing factors, vulnerable groups and the effects of management. In a one year study, there were 120 severe traumatic brain injury patients of which 89 (74.2%) discharged while 31 (25.8 %) patients died in the hospital. The primary cause of injuries was a road traffic crash followed by a fall down incident (18).

Despite there are improvements in the health care system in Ethiopia from time to time there is still increasing incidence of traumatic head injury with highly utilization of motorization and poor safety of road and traffic regulations. According a study conducted at Dilla University Referral Hospital the proportion of the severe head injury was estimated to be 32.1%. Road traffic accident was the main cause of traumatic head injury. Mainly young male populations were the highest risk groups (19).

Traumatic brain injury poses a serious health risk in the world. The incidence of TBI is rising as motor vehicles are being more widely used in developing countries. Furthermore it's one of the most common and dangerous outcomes of accidents, there are still a number of key information discrepancies that need to be resolved in order to overcome the increasing burden of traumatic brain injury. Despite the valuable efforts made in the past few years to determine the clinical profile of traumatic head injury and their outcomes in Ethiopia, available data still seems insufficient to show the full picture of the phenomenon. Therefore, this study will be intended to assess the clinical profile and outcome of traumatic brain injury patients attending the AaBET Hospital of Emergency Department, Addis Ababa, Ethiopia.

### **1.3. Significance of the Study**

TBIs are a vast nationwide health problem. The finding of the study will be insightful to Ministry of health, hospital society, health care professionals and other stake holders by focusing their policies and strategies aimed at reducing the burden and impact of TBI, through better prevention, improved access to care, and promotion of clinical research to improve treatment standards.

Exploring such information relevant to the clinical profile and outcome of TBIs will help to draw possible baseline data for epidemiological monitoring and improve health care for TBI at individual and population levels. Furthermore, this can boost the outcomes of the patient and shorten the length of stay in the hospital. It could also create a focus and inspiration for further research in this area.

## **2. LITERATURE REVIEW**

Traumatic brain injury (TBI) contributes to the overall health and socioeconomic instability all the way through the globe (1).

### **2.1. Clinical Profile of TBI**

A study conducted at Jai Prakash Narayan Apex Trauma Center in India shows there were 1527 TBI patients in which 1323 (86.64%) were male while 204 (13.36 %) were female and making male to female ratio 6.5:1. The mean age was  $32.15 \pm 16.76$ . Around 1281 (83.89 %) patients had severe TBI. Many (50.24 %) incidents occurred between 21–40 year age group. The most prevalent mechanism of injury was road traffic accidents constituting about 992 (64.96 %) of TBI patients, followed by falls 405 (26.52%), assaults 43 (2.82%), and others mechanism of injury accounting 87 (5.70%) (3).

Based on a study carried out in Aseer Central Hospital indicating that among 353 TBI patients the mean age were  $27.01 \pm 13.9$ . About 87.3 % of the patients were male, while 12.7 % were female. Based on GCS score severe TBI were 165 (46.7 %), moderate 149 (42.2 %), and Mild 39 (11.1 %). Road Traffic accident (89.3 %) were the most leading cause of TBI (20).

According to a study conducted at University of Port Harcourt Teaching Hospital, Nigeria shows a total of 1344 cases of which TBIs occurred in 415 (30.9 %) of the cases and 3.6 % of all admissions to the emergency department (11,393). Of the TBI cases, 319 were males (76.9%) and 96 (23.1%) were females. The average age was 27 years. The highest rate of 133 (32.0%) was between 21–30 years of age, followed by 98 (23.6%) between 31–40 years of age. RTA 260 (62.6%) was the most common etiological factor. 162 (39.0%) patients were Mild TBI (16).

A study conducted in the central hospital in Malawi kamzu reveals 280 TBI patients constituting 80.5 % male and 19.5 % female and  $28.8 + 16.3$  was the mean age. The most prevalent cause of TBI was road traffic collisions 162 (60.7 percent), followed by assault 66 (24.7 percent), falls 27 (10.1 percent) and all other etiologies 11 (4.1 percent). The majority of patients had mild TBI 116 (43.5%) while moderate TBI 65 (24.3%) and 88 (33.0 %) patients with severe TBI (21).

A study performed to assess the management and outcome of traumatic brain injury at Tanzania's Muhimbili Orthopedic Institute indicates that there were 627 TBI patients. Around 86 % TBI patient were males. The leading cause of injuries was road traffic collisions (59.3 %), followed by Assault (24 %), falls (12.7 %) and others (4 %). Based on clinical presentation of neurological scale 401 (64%) patients had mild TBIs, 114 (18.2%) moderate TBIs and 112 (17.8%) severe TBIs (8).

A study conducted to assess a demographic characteristics of traumatic brain injury at Zagazig University Egypt shows 1756 (82.7%) patients were male; patients ' mean age was  $26.57 \pm 18.4$  years. In 73.7 percent of patients, road traffic collision was the most common cause of injury. 62.1% of patients experienced mild TBI, 17.5% had moderate TBI, while the remaining 20.3% had severe TBI. 63.6% of the patients had associated injuries rather than TBI (22).

According a study performed at Tikur Anbessa Specialized Hospital reveals that out of 348 patients, male patient were involved in 79 percent of cases, resulting in a ratio of 3.8:1 between male and female. The most often affected group was between the age ranges of 20-39 years (44.7 percent). In 117 (55 percent), 63 (29.7 percent) and 31 (14.6 percent) TBI for the road traffic accident, assault, and fall down, respectively were the major causes (23).

According to a study conducted at Dilla University referral Hospital, Gedeo Zone, out of a total of 643 trauma patients, there were 106 eligible traumatic head injury patients and 76 (71.7%) males and 30 (28.3 %) females were included in this study. Of the 106 TBI cases, severity of TBI's was classified according to GCS score and 34 (32.1 %) severe, 16 (15.1 %) moderate and 56 (52.8 %) mild. A RTA was the leading cause of TBI's 59 (44.1 %) followed by a interpersonal violence 35 (33 %) and fall down injury 21 (19.8 %) and 8 (7.6 %) of TBI patients were other incidence (19).

A one-year institutional analysis was conducted at Jimma University Teaching Hospital indicates that out of 135 patients, 121 (89.6%) were males and the remaining 14 (10.4%) were females. The most common causes of traumatic brain injury were interpersonal violence 73 (54.1 %) and road traffic accident 42 (31.1 %). Over half of the patients experienced a minor TBIs, accounting for 87 (64.4%) and 20 (14.8%) sustained a serious TBIs (24).

## 2.2. Outcome of TBI

A three-year study was conducted at the University Teaching Hospital in Ireland, showing that the overall mortality was 37 %. Of those who survived, 62 % had a complete recovery with the rest suffering varying degrees of neurological disability (25).

According a study conducted at India's Jai Prakash Narayan Apex Trauma Centre indicates that 240 (15.72 %) patients with traumatic head injury had good recovery and there were 528 (34.58 %) of patients died within their hospital stay (3).

A study conducted in Poorsina Hospital, Iran reveals that out of 1000 traumatic brain injury patients admitted 745 (74.5%) recovered completely and discharged while 233 (23.3%) patients were died (26).

Based on a study carried out in Aseer Central Hospital indicates that 227 (64.3 %) had good recovery while 9 (2.5 %) traumatic brain injury patients were died. And 34 % of TBI patients went to rehabilitation centers, 63.2 % were discharged and 2.8 % have been referred to other Hospital during the acute phase based on either family/patient's request (20).

According to a study conducted at the University of Port Harcourt Teaching Hospital, Nigeria indicates out of the 415 TBI patients there were 321 patients had good recovery of which 244 were males and 77 females. There were 94 deaths from TBI in the Accident and Emergency Department including 74 males and 20 females resulting in a case fatality rate of 22.6% (16).

Based on a two year study done in Nnamdi Azikiwe University Teaching Hospital, Nigeria indicates the number of cases discharged home was 30 (11.4%) and those transferred to the wards for definitive care were 223 (83.9 %). About 1.2% was referred to other Hospitals. The mortality rate was 13 (4.7 %) (27).

According to a study conducted at Malawi Kamzu Central Hospital using prospectively collected data indicated that out of 280 TBI patients there was a total mortality of 82 (30.9 %) while 148 (80.1 %) had a complete recovery from patients who survived. About 24 (13.1%) patients had a moderate disability, 9 (4.9 %) had severe disability which they need support with daily life activity and 2 (1.1 %) were in a vegetative state (21).

According a study performed at Tanzania's Muhimbili Orthopedic Institute shows a good recovery for all mild TBI patients. Among patients with moderate to severe traumatic brain injury complete recovery was 19.1% while 50.2 % recovered with disabilities. The mortality was approximately 30.7 % (8).

According to study conducted at Mulago National Referral Hospital, Uganda reveals that out of 3749 TBI patients about 1622 (43.2 %) were admitted while 1309 (34.9 %) sent home and 165 (4.4 %) patients leave against medical advice. The mortality were 103 (2.7 %) while 550 (14.7 %) patients disposed from emergency department for other reasons (28).

A study conducted at Zagazig University Egypt indicating that a complete recovery was seen in 62.7 % of traumatic head injury patients, moderate impairment in 12.1 % of patients while the mortality rate was 14.3 % (22).

Based on a study done at Tikur Anbessa Specialized Hospital indicating that out of the total (204) TBI patients admitted about 149 (73.0%) were discharged, 34 (16.7%) have been referred to another health institution and 21 (10.3%) patients died (29).

According to a study conducted at Dilla University referral Hospital reveals that 41 (38.7 %) patients had penetrating type of head injury and the rest 65 (61.3 %) were blunt type of head injury. Of the total cases the majority of patients 94 (88.7 %) were improved and discharged, 12 (11.3 %) were died in the hospital (19).

### **3. OBJECTIVES**

#### **3.1. General Objectives**

- To assess the Clinical Profile and Outcome of Traumatic Brain Injury patients in of AaBET Hospital of Emergency Department, Addis Ababa, Ethiopia from Nov 2019 to Jun 2020 G.C.

#### **3.2. Specific Objectives**

- To assess the mechanism of patients with TBI in AaBET Hospital, Emergency Department.
- To assess the severity of patients with TBI in AaBET Hospital, Emergency Department.
- To assess the clinical manifestations of patients with TBI in AaBET Hospital, ED.
- To assess the Outcome of patients with TBI in AaBET Hospital, Emergency Department.

## **4. METHODOLOGY**

### **4.1. Study Area**

The study was conducted in Addis Ababa Burn, Emergency and Trauma Hospital (AaBET). AaBET Hospital is the largest trauma center in Addis Ababa, Ethiopia, affiliated by St. Paul's Hospital Millennium Medical College (SPHMMC) which is found in Arada Sub-city. It was opened by the Federal Ministry of Health (FMoH) on August 2015, with the objective to give coverage of 24/7 throughout the year focusing burn services, emergency response and trauma care. The hospital has 14 departments and a total of 250 beds serving for about 36,096 patients annually. It has a total of 407 health care professionals of which 285 of them are nurses, and the rest are medical doctors. Furthermore, the hospital is served by 83 other health professionals.

### **4.2. Study Period**

The study was conducted in emergency department of AaBET Hospital Addis Ababa, Ethiopia from November 2019 to June 2020 G.C.

### **4.3. Study design**

An institution based retrospective study was employed to assess the clinical profile and outcome of TBI patients at emergency department of AaBET hospital.

### **4.4. Population**

#### **4.4.1. Source Population**

All trauma patients who had visited the Emergency Department of AaBET Hospital were the source of population for this study.

#### **4.4.2. Study Population**

All TBI patients who presented to emergency department of AaBET Hospital from September 01, 2018 to August 31, 2019 were the study population.

## 4.5. Inclusion and Exclusion Criteria

### 4.5.1. Inclusion Criteria

All complete TBI patients' medical charts in this study period were included.

### 4.5.2. Exclusion Criteria

Incomplete and lost medical charts were excluded in the study.

## 4.6. Sample size Determination

The sample size required was calculated by means of the single population proportion formula taking into consideration proportional assumptions of **33.2 %** (30) used for the sample size needed, Confidence interval 95 %, Margin of error 5 %, and Non – response rate 5 %.

$$nf = \frac{(Z_{\frac{\alpha}{2}})^2 P (1 - p)}{d^2} \quad \text{where,}$$

nf = minimum sample size,

$$\begin{aligned} Z_{\frac{\alpha}{2}} &= \text{it's the standard normal value corresponding to the desired level of confidence 95 \%} \\ &= (1.96) \end{aligned}$$

p = it's the estimated proportion of an attribute 33.2 % (30) used for the sample size needed.  
= prevalence of TBI within the specified time

$$q = (1 - p),$$

d = Margin of Error 5 % (0.05), then

$$nf = \frac{(1.96)^2 0.332 (1 - 0.332)}{0.05^2}$$

$$nf = 341$$

The calculated final sample size plus a non – response rate of 5 % which is 17  
= **358**

With regard to the sampling procedure the calculated sample size was addressed by using systematic random sampling technique. Using the formula:  $K = \frac{N}{n}$ ; Where

N = total TBI (N = 1779)

n = the calculated sample size (n = 358) and

K = the sampling interval (K = 5)

From the list of HMIS records the sampling was started at the number 37 randomly and then every 5<sup>th</sup> element in the frame was selected.

## **4.7. Study Variables**

### **4.7.1. Dependent variables**

- Outcome of traumatic brain injury

### **4.7.2. Independent variables**

- Socio-demographic data (Age, Sex, and Residence), Pre hospital care, Mechanism of TBI, GCS on Admission, Severity of TBI, Time of presentation to ED after injury, Associated injuries, mental status at the scene, and initial symptom of TBI.

## **4.8. Data collection tool and procedure**

Data collection checklist was adopted (14,19,26,31) and modified according the objectives of study and then the data was collected from the patient's medical record charts. Health professionals specifically BSc nurses were hired for data collection and they were given training on the process of data collection tools and procedures. The principal investigator was providing orientation before the data collection begins to the data collectors on the objectives of the study and the overall stepwise retrieving of data collection. Moreover, the principal investigator explained and clarifies vague points and other problems encounter about the structured checklist prior to the data collection.

## **4.9. Data Quality Assurance**

To avoid redundancy, unique marks were put on all charts. The validity and completeness of the data was checked by the trained supervisor daily and in order to achieve good data quality, the data collecting tool were standardized by testing it in 5% of the sample size in Alert hospital before the study to make sure that the data collecting sheet is capable of yielding the required data for the study and some modifications was done according to the results found. Finally the collected data were checked for completeness, consistency and clarity.

#### **4.10. Data analysis**

After checking for completeness and consistency of the information extracted from patient's medical charts and the HMIS registry, the data was cleaned, coded and entered in to Epi-Data version 3.1 and the Data was analyzed using the software Statistical Package for Social Sciences for Windows version 25.0 (SPSS Inc; Chicago, Illinois). A Simple descriptive statistics such as frequencies, percentages, mean were used to describe the data related to patient demographic characteristics.

#### **4.11. Operational Definition**

- **TBI:** is an external injury to the brain caused by a blow or jolt to the head from blunt or penetrating trauma.
- **Mild TBI:** is a term used when a person had brain injury resulting in GCS of 13 – 15.
- **Moderate TBI:** is a term used when a person had brain injury resulting in GCS of 9 – 12.
- **Severe TBI:** is a term used when a person had a brain injury resulting in GCS of 3 to 8.
- **Outcome:** it's interpreted as the status of Traumatic brain injury Patients after hospital admission whether they are survived, referred or died.

#### **4.12. Ethical Consideration**

Ethical clearance was obtained from AAU College of Health Science department of Emergency Medicine and critical care. Official permission was requested from AaBET Hospital Administration. Anonymity and confidentiality of the medical charts was kept at all times. The patients' personal information like name and/or others were not collected.

#### **4.13. Plan for dissemination of findings**

The final result of this study was presented to AAU College of Health Science to the Department of Emergency Medicine and critical care, submitted to postgraduate AAU College of Health Science and disseminated to AAU library, AaBET Hospital, Addis Ababa Health Bureau and other concerned governmental and non – governmental organization; in addition effort will be made to publish on a local or international journal.

## 5. RESULTS

There were 11,705 emergency department (ED) visits, while TBIs contributed to 1789 of ED visits during the study period. The overall prevalence of TBI was estimated to be 15.28%. Among the total TBI records a calculated sample size of 358 patient charts were retrieved from HMIS records. The study was conducted on 324 patient charts that fulfill the inclusion criteria while 34 charts were excluded from the study due to incomplete information and lost charts.

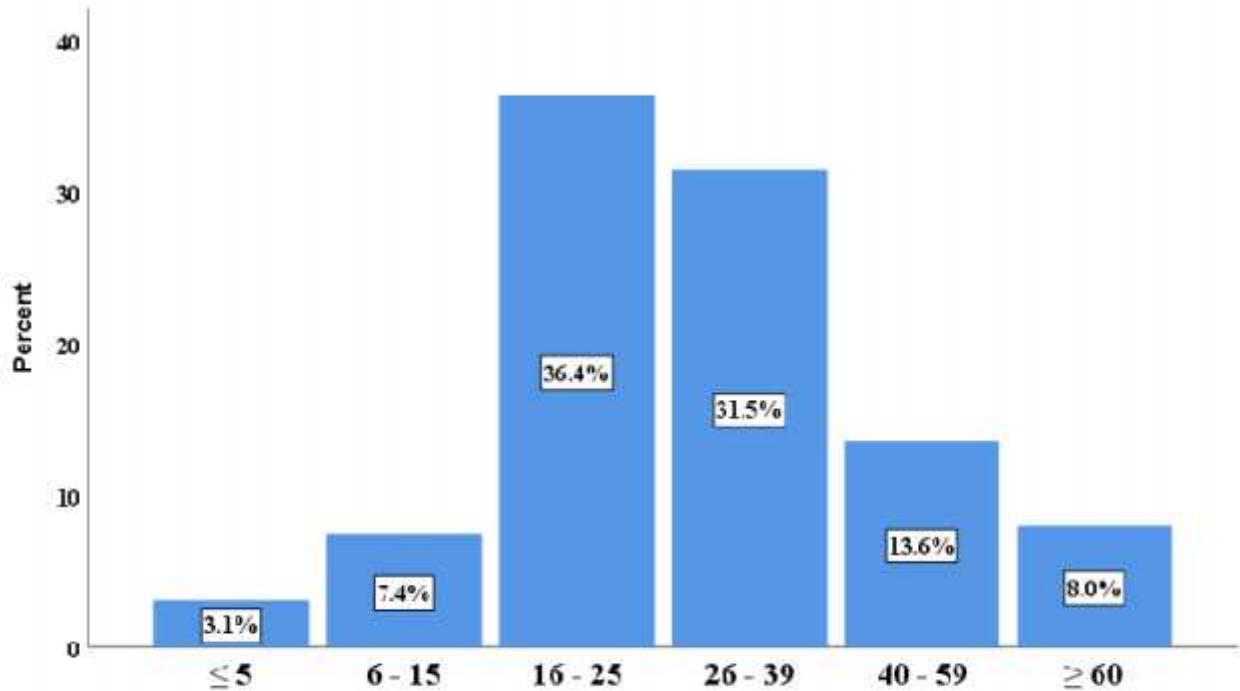
### 5.1. Socio-demographic characteristics of TBI Patients:

From the total 324 eligible patient charts 267 (82.4 %) were male while 57 (17.6 %) were female, making the male to female ratio (4.7:1). The most commonly affected age group was 118 (36.4%) between 16 – 25 years with a mean  $\pm$  SD age of  $30.27 \pm 15.44$  years (range: 1 – 83)

. Regarding residency, about 213 (65.7 %) TBI patients were from outside Addis Ababa.

**Table - 1: Socio – demographic data of TBI patients, ED of AaBET Hospital (2020 G.C.)**

Variable	Category	Frequency	Percent (%)
Sex	Male	267	82.4
	Female	57	17.6
Place of Residence	Addis Ababa	111	34.3
	Outside Addis Ababa	213	65.7



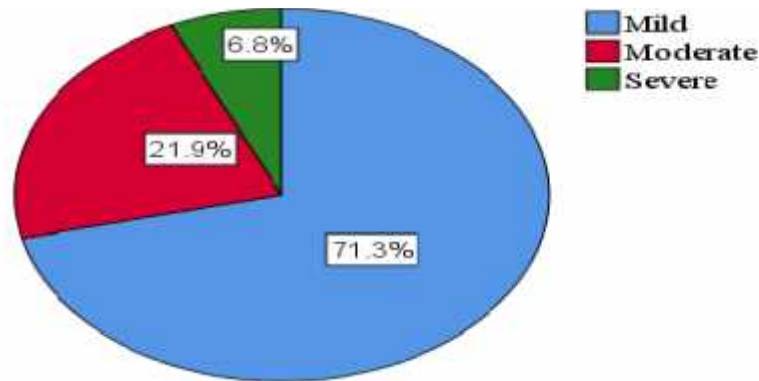
**Figure 1: Age distribution of TBI patients, ED of AaBET Hospital (2020 G.C.)**

## **5.2. Clinical Profile of TBI Patients**

Based on the time of ED presentation after injury where the majority 257 (79.3 %) of the TBI patients arrived within 24 hours duration, while 39 (12 %) had arrived between 25 – 72 hours, and 28 (8.6 %) had arrived after 72 hours duration. Majority 289 (89.2 %) of the TBI patients were hospitalized for about 1 – 10 days while 6 (1.9%) of the TBI patients were hospitalized for more than 40 days. About 198 (61.1 %) patients had an inter-facility communication. The most common cause of injury was RTAs, which accounted for 148 (45.7 %), followed by assaults 103 (31.8 %), and falls 66 (20.4 %). Out of the total TBI patients, 55 (17 %) of them had poly trauma. About 197 (60.8%) TBI patients were unconscious at scene. Majority 231 (71.3%) of the patients did not experience any initial symptom after sustaining TBI, while 39 (12%) had vomiting, followed by headache 14 (4.3%). The severity of TBI's based on GCS score at admission showed that about 231 (71.3%) patients sustained mild injury, followed by moderate 70 (21.6%) and severe 23 (7.1%).

**Table - 2:** Clinical Profile of TBI patients admitted at ED of AaBET Hospital (2020 G.C.)

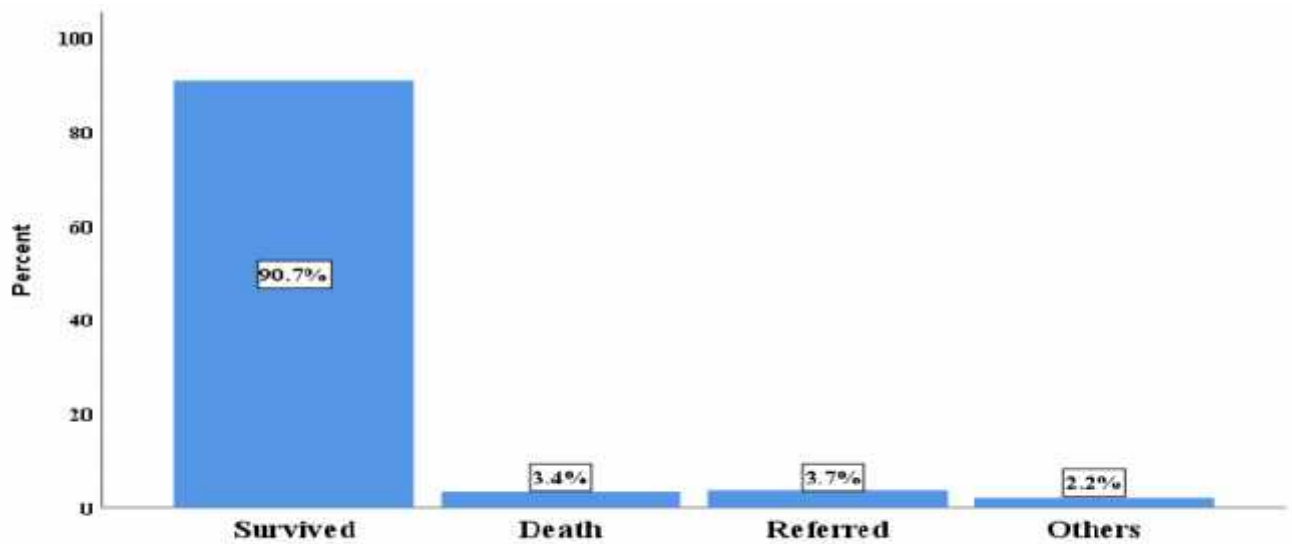
<b>Variable</b>	<b>Category</b>	<b>Frequency (%)</b>
Time of ED presentation after injury	24	257 (79.3 %)
	25 – 72	39 (12.0 %)
	Above 72	28 (8.6 %)
Length of Hospital stay (days)	1 – 10	289 (89.2 %)
	11 – 20	22 (6.8 %)
	21 – 30	7 (2.2 %)
	Above 40	6 (1.9 %)
Inter-facility communication	Yes	198 (61.1 %)
	No	126 (38.9 %)
Mechanism of Injury	Blunt	320 (98.8 %)
	Penetrating	4 (1.2 %)
Cause of TBIs	Road traffic accident	148 (45.7 %)
	Fall down accident	66 (20.4 %)
	Assault	103 (31.8 %)
	Others	6 (1.9 %)
	Unknown	1 (0.3 %)
Associated Injuries	Spinal	2 (0.6 %)
	Chest	5 (1.5 %)
	Abdominal	1 (0.3 %)
	Limb	14 (4.3 %)
	Poly-trauma	55 (17 %)
	Others	8 (2.5 %)
	None	239 (73.8 %)
Mental status at scene (Witness)	Conscious	114 (35.2 %)
	Unconscious	197 (60.8 %)
	Unknown	13 (4 %)
Initial symptoms of TBIs	Headache	14 (4.3 %)
	Vomiting	39 (12 %)
	Abnormal Body Movement (ABM)	5 (1.5 %)
	Headache & Vomiting	21 (6.5 %)
	Headache & ABM	1 (0.3 %)
	Vomiting & ABM	13 (4 %)
	None	231 (71.3)
CSF leakage	Yes	7 (2.1 %)
	No	317 (97.8 %)
Battle's Sign	Yes	9 (2.8 %)
	No	315 (97.2 %)
GCS Score at admission	13 – 15	231 (71.3 %)
	9 – 12	71 (21.9 %)
	8	22 (6.8 %)



**Figure 2: Severity of TBI at admission, ED of AaBET Hospital (2020 G.C.)**

### 5.3. Outcome of TBI Patients

More than half (90.7 %; n = 294) of TBI patients were survived within the trauma center, 12 (3.7%) were transferred to another hospital, 7 (2.2%) left against medical advice (LAMA), and 11 (3.4%) patients died in the hospital.



\* Others - Left Against Medical Advice

**Figure - 3: Outcome of TBI patients, ED of AaBET Hospital (2020 G.C.)**

### 5.4. Associated factor for outcome of TBI patients

A Multinomial logistic regression analysis was used to identify the associated factor for the outcome of traumatic brain injuries and there was no significant relationship found.

## 6. DISCUSSION

The study indicated that there is a profoundly high burden of traumatic brain injury in the study area. The overall prevalence of TBI was 15.28 %. So the profound load of TBI cases together with everyday increased visit of patients with minor injuries as well may overwhelm the resources of AaBET Hospital.

The majority 36.4% (n = 118) of study participants were in the age group between 16 – 25 years and male predominantly accounted for 82.4 % (n = 267). This study is nearly similar with other studies done in India, Nigeria, Addis Ababa, Dilla, and Mekelle where male victims accounted for the 86.6%, 77.4%, 86.8%, 71.7%, and 79.7%, respectively (3,14,19,27,29). This may be due to the curiosity and reckless nature of the youth as well as the subsisting way of life that male predominantly occupied most of the time in outside their premises activity including traveling a lot and participating in aggressive manner may let them end up involving in RTA and assaults.

The majority (61.9%) of TBI patients receive pre-hospital care before reaching the study area while 38. 1% did not receive. This finding was similar with previous study done in Jimma indicating 61.5% TBI patients receive any type of pre-hospital care and the remaining did not receive before reaching the hospital (24). This finding shows that there is a gap in the provision of pre-hospital care for trauma patients.

In other study conducted in Dilla where majority (82.1%) of the TBI patients reach the hospital within 24 hours, and the remaining 17.9% reach after 24 hours (19). This is higher than from this study where the majority (79.3) of TBI patients reaches the hospital within 24 hours, the remaining reach after 24 hours. The fact that AaBET hospital is referral hospital so there may be some delay till the patients to arrive Addis Ababa from the country side.

A study conducted in Nigeria, Dilla, kingdom of Saudi Arabia, Malawi, and Egypt indicated that RTA was the most common leading cause of TBI accounting about 39.6%, 62.6%, 89.3 %, 60.7%, 73.7%, and respectively (16,19–22). And this is mostly in agreement with this study where RTA represents the most leading cause (45.7%, n = 148), followed by assaults (31.8%, n = 103). This may be due to high utilization of motorization, recklessness and poor safety of road and traffic regulations. So this highlights the need for preventive measures, road safety, and road

traffic rules to be enforced by the government, as well as Federal Road Safety Authority (FRSA). In other study reported by Amdeslasie F. witnessed that fall down accident was the major (41.7%) contributor for traumatic brain injury followed by RTA (24.9%) (14). This may be due to the fact that the two extreme age groups ( 15 and 60 years) were commonly affected in their study.

In the current study where most (71.3%) of the participants had mild TBI, followed by moderate (21.9%), and severe (6.8%) based on GCS score at admission. According to Mekelle's study, most participants (62.1%) experience mild TBI, followed by moderate (24.3%), and severe (13.6%) (14). A study in Malawi shows that for mild TBI (43.5%), moderate (24.3%), and severe (33%) (21). This may be due to accessibility and different level of pre-hospital and trauma services as well as the time of presentation after they encounter injury.

From the total TBI cases about 26.2% (n = 85) had associated injuries (spinal, chest, abdominal, limb, and poly-trauma) in this study. This is lower than the previous study carried out in Iran by Kasmaei et al. were associated injuries accounted about 40.9% (26).

A study conducted in Nigeria revealed that about 95.3% of the TBI patients survived, while 4.7% died within the hospital (27). This is almost similar to this study in which 90.7% of the TBI patients survived within the trauma center, while 3.4 % had died. The findings of low mortality might be explained due to most of the injuries inflicted were mild TBI. But a study was done in Iran where the mortality rate was 23.3% (n = 233) which is significantly higher than this study (26). In addition, there is also a significant difference from previous study done in Ireland where the overall mortality was 37 %. This may be due to the study was a three year based reporting and most (56%) of the study participants had severe TBI (25).

In this study, Multinomial logistic regression analyses were used to check the associated factor for the outcome of traumatic brain injuries and there was no significant relationship found. In previous study reported at Mekelle in which the male population, road traffic accident, and severe head injury were significantly associated with mortality (14). This may be due to majority of the study participants had severe head injury and sample size variation.

## **7. CONCLUSION AND RECOMMENDATION**

### **Conclusion:**

The current study has shown that traumatic brain injury is a threatening condition which leads to one of the most significant reasons for attending the emergency department visits with increasing admission from time to time by imposing a high degree of morbidity and mortality. The overall prevalence of traumatic brain injury was 15.7 %. The majority of patients were male and young age groups of the society.

In the current study, Road traffic accident, assaults, and falling down accidents were the most frequently recognized causes for traumatic brain injuries. Primarily RTA contributes the highest number and this could be a result of high utilization of motorization, poor safety of road, and traffic regulations. So this highlights the need for preventive measures, road safety, and road traffic rules to be enforced by the government, as well as the Federal Road Safety Authority.

Mild traumatic brain injury was highly responsible for seeking emergency care services and hospitalization followed by moderate and severe injury.

Regarding the outcome of traumatic brain injury where the majority of the patients survived and discharged from the hospital. The mortality rate was 3.4%. This may create an opportunity to revise and plan a standardized prevention and management measures which improve the overall outcome of traumatic brain injury in the study area.

## **Recommendation:**

Based on the findings of the study as well as the conclusion specified; there are few recommendations to consider:

- Combined efforts should focus on policies aimed at reducing the burden and impact of TBI, through better prevention, improved access to care, and promotion of clinical research to improve treatment standards.
- Coordinated multidisciplinary efforts should focus on preventing secondary insult as well as further complication.
- Especially, as Road traffic accident is the most common leading cause of TBI; it is critical to build a culture of safe behaviors in drivers, motorcyclists, pedestrians and to press for laws which mandate seat belt usage for drivers, passengers, and helmet wear for motorcyclists.
- The policymakers and other stakeholders should focus their effort at safety measures, building and maintenance of roads, implementation, and enforcement of the road traffic rules especially in school and university terminal as well as highway roads when the number of drivers and motorists on the roads and a certain level of recklessness are expected to be on the increase.
- The need for sensitization of our youth on the traffic rules and awareness programs should be incorporated into the school educational curriculum to adjust risk-taking activities among the young age group.
- The results in this study may only represent the tip of the iceberg due to its retrospective nature and single hospital-based coverage. So it is essential to establish a nationwide range of standardized prospective studies of TBI incidence, risk factors, causes, and outcomes for development of new, more effective, targeted strategies to prevent TBI. This may be creating a focus and inspirations for future researchers to consider and explore it.

## **8. STRENGTH AND LIMITATION OF THE STUDY**

### **8.1. Strength of the study:**

- The current study is more representative because the sample size was addressed using systematic random sampling technique.
- The study is much more representative as most of the traumatic injuries that already occurred will end up being managed in the study area since it is a trauma institution.

### **8.2. Limitation of the study:**

- The fact that data were collected retrospectively made it difficult to get accurate details in all the patient's medical record charts.
- This study was carried out in only one trauma center, and therefore, the results are possibly difficult to generalize to the entire society.
- The entire process has had a very short time span (study period).
- The current study was unable to reveal the outcome of the patients being transferred to another hospital.

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## **ANNEXIS:**

### **ANNEX – I: INFORMATION SHEET**

**Name of the investigator:** Mulubrhan Tesfay (BSc)

**Thesis title:** Clinical Profile and Outcome of Traumatic Brain Injury Patients at AaBET Hospital, Addis Ababa, Ethiopia

**Thesis objective:** To assess Clinical Profile and Outcome of Traumatic Brain Injury Patients at AaBET Hospital Addis Ababa, Ethiopia from Nov 2019 to Jun 2020 G.C.

**Study procedure:** to achieve the objective of the study which includes socio demographic data, time of emergency department presentation after injury, length of hospital stay, Pre-hospital care, mechanism of injury, cause of TBI's, GCS score at admission, severity of TBI's based on GCS, and patient's outcome will be collected from patients' medical record charts.

**Confidentiality:** the information collected will therefore be used for research purpose only; and any private details will therefore be kept strictly confidential throughout the process of the study and unauthorized access to the information will not be permitted

**Contact Person:** If there is any other concerns or suggestion, or if data collectors, supervisors or other hospital administrative personnel ever had any questions about the study, please feel free to contact the principal investigator personally or via the addresses below:

**Mulubrhan Tesfay**

Phone: +251 914014084

Email: [mulnurse@gmail.com](mailto:mulnurse@gmail.com)

## **ANNEX – II: HOSPITAL CONSENT**

This is a study to be carried out at AaBET Hospital's emergency department, which is recognized to become the largest trauma institutions. The main purpose of this study is to assess the clinical profile and outcome of traumatic brain injury patients at AaBET Hospital, Addis Ababa, Ethiopia Nov 2019 to Jun 2020 G.C. Exploring and ensuring such information is relevant for trying to assess national and AaBET Hospital's understanding of the degree and burden of TBI's will help draw up possible recommendations for the purposes of effective prevention and management.

Traumatic brain injury is a major global health and socioeconomic issue. It is widespread and affects people of all ages. It is also a major cause of death and claiming the lives of thousands of Ethiopian. According to the World Health Organization, the global incidence of traumatic brain injury will overtake most diseases by 2020 as the leading cause of death and disability.

However, Clinical Profile and Outcome of Traumatic Brain Injury are not well documented in Ethiopia. Thus, the overall contribution and cooperation of the hospital are valuable and appreciated at generating the information required. In this study, the medical charts of the patients will be used to retrospectively obtain the required data. Any patient's personal information such as the name or others will not be retrieved, and the generated information will be disclosed in full. Moreover, any private details will therefore be kept strictly confidential throughout the process of the study and unauthorized access to the information will not be permitted. Finally, the hospital has all the right to accept or reject the study at any time. Finally, at any time the hospital has every right to accept or refuse the study. If concerns and any further details / explanation are required following the proposed study and clarification from the principal investigator or institution contact the principal investigator in person or use phone number: +251 914014084 (Mulubrhan Tesfay, main investigator). Thus, if you would like to confirm whether the study will be carried out at your institution, please review and confirm it by having signed.

The participant Hospital: \_\_\_\_\_ Principal Investigator: \_\_\_\_\_

## ANNEX – III: A CHECKLIST FOR DATA COLLECTION TOOLS

A checklist was adopted (31) and adjusted according to the study's objectives to perform a retrospective study on Clinical Profile and outcome of Traumatic Brain Injury in emergency department of AaBET Hospital, Addis Ababa, Ethiopia.

### INSTRUCTION

- DONOT WRITE NAMES
- WRITE OR TICK APPROPRIATELY IN THE SPACE PROVIDED
- MEDICAL RECORD NUMBER: \_\_\_\_\_

#### 1. Demographic Data

- Sex:
  - Male:
  - Female:
- Age: \_\_\_\_\_
- Place of Residence:
  - Addis Ababa:
  - Outside Addis Ababa:

2. Time of emergency department presentation after injury: \_\_\_\_\_

3. Length of Hospital stay (days): \_\_\_\_\_

#### 4. Inter-facility communication:

- Yes:
- No:

#### 5. Mechanism of Injury:

- Blunt:
- Penetrating:

#### 6. Cause of TBIs:

- Road traffic Accident:
- Others (specify): \_\_\_\_\_
- Fall Down Accident:
- Unknown:
- Assault:

#### 7. Associated Injuries:

- Spinal:
- Limb:
- Maxillofacial:
- Poly-trauma:
- Chest trauma:
- Others (specify): \_\_\_\_\_
- Abdominal trauma:
- None:

**8. Mental status at scene (eye witness)**

- Conscious:       ➤ Unconscious:       ➤ Unknown:

**9. Initial symptoms resulting from Head Injury**

- Headache:       ➤ Headache & ABM:   
➤ Vomiting:       ➤ Vomiting & ABM:   
➤ Abnormal body movement (ABM):       ➤ None:   
➤ Headache & Vomiting:

**10. Cerebral spinal fluid (CSF) leakage:**

- Yes:       ➤ No:

**11. Battle's sign:**

- Positive:       ➤ Negative:

**12. Glasgow Coma Scale (GCS) score at admission: \_\_\_\_\_**

**13. Severity of TBI's based on GCS (admission):**

- Mild TBI:       ➤ Moderate TBI:       ➤ Severe TBI:

**14. Patient Outcome:**

- Survived:   
➤ Death:   
➤ Referred:   
➤ Others (specify): \_\_\_\_\_