PATTERN OF HEAD INJURY AMONG PATIENTS PRESENTED TO ADULT EMERGENCY DEPARTMENT OF JIMMA UNIVERSITY TEACHING HOSPITAL, JIMMA, SOUTH WEST ETHIOPIA

BY: INDESHAW KETEMA (MSc Student in EM & CC)

A RESEARCH PAPER TO BE SUBMITTED TO ADDIS ABABA UNIVERSITY COLLEGE OF HEALTH SCIENCES, DEPARTMENT OF EMERGENCY MEDICINE AS A PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR MASTER DEGREE IN EMERGENCY MEDICINE AND CRITICAL CARE NURSING.

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List of Abbreviations/Acronyms

CCN- Critical Care Nurse

CDC- Center of Disease Control

CSA- Central Statistical Agency

DALY- Disability- Adjusted Life Year

ED- Emergency Department

EM- Emergency Medicine

GCS- Glasgow Coma Scale

GOS- Glasgow Outcome Scale

HRQL- Health Related Quality Of Life

ICP- Intracranial Pressure

IRB- Institutional Review Board

JUTH- Jimma University Teaching Hospital

MD- Medical Doctor

MTBI- Mild Traumatic Brain Injury

MVA- Motor Vehicle Accident

RTA- Road Traffic Accident

SDH- Subdural Hemorrhage

TBI- Traumatic Brain Injury

UK- United Kingdom

USA- United State of America

USD- United State Dollar

WHO- World Health Organization

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Abstract

***Background**: Trauma, especially head trauma, is an expanding major public health problem and the leading cause of death of the young and productive part of the world's population. Globally, head injury is a substantial cause of mortality and morbidity across all age groups, with a disproportionately greater burden borne by low- and middle-income countries (1).*

***Objective**: To assess the pattern of head injury among patients presented to adult ED of JUTH, Jimma, South West Ethiopia, from January 01, 2014 to December 30, 2014.*

***Methods**: Institutional based retrospective, cross sectional study was conducted at JUTH, Jimma town, South West Ethiopia, from January 01, 2014 to December 30, 2014.*

All head injury patients who fulfills inclusion criteria and visited JUTH during the period from January 01, 2014 to December 30, 2014 were selected for the study. Data was collected using pretested structured check lists through reviewing of patient chart retrospectively. The collected data was encoded to Microsoft Excel and was analyzed using SPSS Version 20.0. The obtained result was displayed by using frequency tables, graphs and charts.

***Results**: Out of 135 patients, 121 (89.6%) were males and the remaining 14 (10.4%) were females. The mean age was 30.34 years (SD=14.01). Interpersonal violence 73 (54.1%) and road traffic accidents 42 (31.1%) were the most common causes of head injury. More than half of the patients sustained mild head injury which accounts 87 (64.4%) and 20 (14.8%) sustained severe head injury. The initial GCS had a significant correlation with the outcome and of all patients 98 (73%) were managed conservatively.*

***Conclusion:** Prevention of road traffic accidents and improvement of conservative care were identified as major methods to reduce the burden of head injury in a set-up similar to Jimma.*

***Key words-** head injury, pattern, Jimma University teaching hospital, Southwest Ethiopia.*

CHAPTER ONE
INTRODUCTION

1.1 Background

Trauma, especially head trauma, is an expanding major public health problem and the leading cause of death of the young and productive part of the world‟s population. Depending on severity using GCS, head injury classified into mild, moderate and severe. Research is mainly done in high-income countries where only a small proportion of the worldwide fatalities occur (1).

Globally, head injury is a substantial cause of mortality and morbidity across all age groups, with a disproportionately greater burden borne by low- and middle-income countries. 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 (3).

A recent review of the global impact of traumatic brain injury (TBI) identified that opportunities to adequately address this burden are compromised by limited epidemiological data on the causes and characteristics of these injuries. This gap is particularly apparent in Pacific Island countries and territories which are infrequently the focus of global public health attention (4).

A Centers for Disease Control and Prevention analysis of hospital, emergency department (ED), and vital statistics databases estimated that about 1.4 million people presented for medical care for a traumatic brain injury each year in the United States from 1995 through 2001. The analysis also found that approximately **50,000** (3.6%) of them died from their injuries, 235,000 (17%) were hospitalized, and 1.1 million (80%) were treated and released from the ED (5).

Reviews of head injury epidemiology conclude that comparison of incidence rates from different studies is difficult because of variations in definitions and inclusion criteria, admission policies and health care systems within and between countries (6).

The number of patients presented to a hospital after head trauma is most likely the best measurement for the incidence of head injury (5). In a recent review by Tagliaferri et al., annual incidence rates of hospital admitted head injuries varied between 91 and 546 per 100,000 populations per year in European countries (6).

1.2. Statement of the Problem

Head Injury has been defined as, "morbid state, resulting from gross or subtle structural changes in the scalp, skull, and/ or the contents of the skull, produced by mechanical forces (2), where as traumatic brain injury (TBI) is an alteration in brain function, or other evidence of brain pathology manifest as altered level of consciousness, or focal sensory or motor neurologic deficit caused by an external cause resulting from blunt or penetrating is a leading cause of morbidity, disability, and mortality worldwide. In Europe, the annual incidence rate of hospitalized and fatal TBI is about 235 per 100,000 people per years (5).

Injury is more common among men and among persons aged 15–44 years (4). Injury deaths attributable to RTA was the highest in Egypt (41%) followed by Ethiopia (30%) (8). Head injury accounts for the majority of trauma deaths and contributes strongly to costs in the health care system (6). In addition to the often long-term impact of TBI on a person's life, the economic consequences of TBI for both individuals and society are substantial. TBI patients require specialized pre-hospital care, transport, in-hospital (emergency) care and often long-term rehabilitation (7).

Traumatic brain injury (TBI) is one of the most common reasons for emergency department (ED) care (2). Head injuries which are generally unintended and preventable are the common risk health problem to every life that can happen almost to everyone, anywhere (5). The alarming increase in morbidity and mortality owing to head injury over the past few decades is a matter of great concern globally (5). Cases of TBI account for over 1 million visits per year in both the USA and UK and are responsible for 2/3 of all trauma deaths. Only a small proportion of these are considered as severe head injury, with a Glasgow Coma Scale (GCS) score of 3 to 8 (7).

The World Health Organization (WHO) global burden of injury estimate ranks injury among the top ten leading causes of death, with an estimated **5** million deaths annually of which men in Africa have the highest injury-related mortality rates in the world. Among African nations the rate of injury mortality in 2004 was the highest in Nigeria and the lowest in Egypt. South Africa and Ethiopia were second and third, respectively (8).

The incidence of TBI worldwide is rising, mainly owing to injuries associated with the increased use of motor vehicles, particularly in middle-income and low-income countries. Estimates of TBI incidence show substantial variation between countries. Data from the CDC indicate that each year in the USA, 1.7 million people sustain a TBI. A 1.4 million of these injured individuals are treated in emergency departments, with around 275,000 hospitalizations and 52,000 fatalities. A meta-analysis of reports from 23 European countries revealed a hospital admission incidence of 235 per 100,000 people (9).

The annual incidence of traumatic brain injury in different African countries ranges from 150-500/100,000 per year depending on the individual country. It is estimated that 1-2% of high income populations live with a TBI disability and the incidence is high in some countries in Africa. In South Africa, the mortality rate of TBI was reported to be 81/100,000 per year; with greater than 10% of all case fatality rate. High risk groups for TBI include adolescents, young adults and the elderly, with males being affected 2-3 times more often than females. The study also showed that the main causes and risk factors for head injury in Africa are road traffic accident (RTA), falls and violence (10).

In Ethiopia, a prospective study which was conducted at JUTH on 52 head injury patients indicated that the main risk factors are interpersonal fight 20 (38.5%) followed by RTA 19 (36.5%) and of all injuries 8 (15.4%) were due to falling accidents. According to this study, the most affected age groups are < 15 years 17 (33%), 15- 24 years 17 (33%), 25- 34 years 9 (17%), 35- 44 years 4 (9%) and greater than 45 years accounts 5 (10%) (1).

According to different researches which were done worldwide, head injuries are common health problems of the world which affects mainly productive age groups of the world and contributes strongly to costs in the health care system. And in Africa the head injuries are the common health problems and are substantial causes for morbidity and mortality which mostly affects productive age group of the population and brings economic consequences for both individuals and society of the continent.

In Ethiopia, even though there was no enough research conducted on head injury in the country‟s context, the prevalence of head injury is a common health problem that causes morbidity and mortality in the productive age group of population which directly affects the development of the country. Study which was conducted in Ethiopia at JUTH in 2010 indicated that head injury is common public health problem of all traumas. So, since the problem affects the productive age group of the country, I am interested to carry out my study on this topic which assesses the pattern of head injury.

1.3. Significance of the study

The study would add knowledge on understanding the pattern, prevalence and burden of head injury accidents in the country at large which helps concerned body for planning how to prevent the occurrence of the incident.

In addition, the study would provide base line information on prevalence and associated outcomes of head injury cases.

The data obtained in this study, was used by concerned bodies for planning and evaluating how to prevent the head injury.

The recommendation which was given after data analysis and interpretation could benefit the public at large in preventing head injury accidents if due consideration is given.

CHAPTER TWO
LITERATURE REVIEW

Head Injury has been defined as, “morbid state, resulting from gross or subtle structural changes in the scalp, skull, and/ or the contents of the skull, produced by mechanical forces.” It has also been defined as physical damage to the scalp, skull or brain produced by an external force (2). Head injury interchangeably used with TBI which is defined as acquired brain injury or simply head injury, occurs when a sudden trauma causes damage to the brain. The damage can be focal confined to one area of the brain or diffuse involving more than one area of the brain. TBI can result from a closed head injury or a penetrating head injury (10).

Traumatic brain injury (TBI) is an important global public health problem as a major cause of traumatic death and disability. The spectrum of severity of TBI varies, but most TBI is classified as mild traumatic brain injury (MTBI) followed by moderate and severe head injury, based on clinical and surveillance definitions. From a public health perspective, it is important to know the incidence of a condition in order appropriately to plan healthcare policy and provision. Furthermore, determining what factors increase the risk of MTBI is necessary to develop public health programs to prevent the problem and lessen the likelihood of disability (11).

According to a study which was conducted in Korea, a total of 349621 people were injured per year in which 9057 people died within 72 hrs after accident and the mortality rate due to MVA is 28 per 100,000 people and from total injury, 68414 victims were head injuries. The mortality rate of the head injury was 9.5% and the total number of death due to head injury was calculated to be 8976 per year and the annual death rate due to head injury was to be 19 per 100,000 populations. According to this study, skull fracture was found in 43% in which operative intervention was required in 28% and the operative mortality rate was 6%. The severity of head injury based on GCS was mild in 73.4%, moderate in 11.4%, and severe in 16.3% (13).

According to study which was conducted in Norway, of 585 head injury patients which were included in the study after evaluation in emergency room, 446(76%) were admitted for hospitalization giving an admission rate of 157 per 100,000 population. This study classifies the distribution of head injury based on GCS and presence or absence of consciousness at time of examination to 492 (84%) mild, 16 (3%) moderate and 77 (13%) severe head injury. Sex specific incidence rates were 258 per 100,000 for males and 156 per 100,000 for females and high age specific incidence rates for men were found in the age group 10-24 years with the peak (428 per 100,000 among teenagers between 15- 19 years). According to this study the causes of head injury were falls in 299 (51%), RTA in 126 (21%), assaults in 81(14%) and other in 79 (14%) cases and male to female ratio was highest for head injury caused by assaults (2.9:1) and lowest for by RTA (1.4:1) (6).

A Study which was conducted on hospitalized and fatal head injuries in Viti Levu, Fiji, during the 12-month injury surveillance period indicated that Out of 2,233 individuals admitted to hospital as a result of injury, 276 cases (12.4%) had a primary diagnosis of head injury. The overall rate of head injuries was 42.4/100,000 and over three quarters of cases were male and the age- standardized rate for males for all head injuries (60.5/100,000 (95% CI 52.1, 68.8)) was more than three times of the female rate (18.4/100,000 (95% CI 13.7, 23.1); p! 0.001). Head injuries are most commonly occurred among those aged 15–29 years, followed by children aged 0–14 years and least common among older adults (45 years and older). Of the three leading causes of injury, road traffic crashes had the highest rate of head injury (16.1/100,000 (95% CI 13.1, 19.2)), followed by falls (12.0/100,000 (95% CI 9.3, 14.6)) and „hit by person or object" (10.6/100,000 (95% CI 8.1, 13.1)) (4).

A prospective study which was conducted at Tertiary Care Hospital in India during period between 2011- 2013 on 500 head injury patients indicated that the majority of head injuries are due to Road Traffic Accident 298 (59.60%) cases followed by fall from Height 101 (20.20%) cases. Assault 21 (4.20%) and occupational head injury 79 (15.80%) cases, whereas other like gunshot comprised of 1 (0.20%) cases. The peak incidence of head injury was observed in the age group 21-30 years comprising 45% of the cases and it was also observed that 21% belonged to the age group 31-40 years. Out of 500 cases 383 (76.6%) were males while 117 (23.4%) were females, thus a male to female ratio of 3.27:1 was observed and head injury commonest lesion

was Scalp laceration which accounts 251 (50.2%) cases, followed by fractures of skull 83 (16.6%) cases, contusion 53 (10.6%) which is commonest in intra-cranial lesions. SDH 61 (12.2%) was commonest intra- cranial hemorrhage followed by SAH 52 (10.4%) cases. This study also showed that most commonly involved skull fracture in head injury cases were temporal bone 22 cases (26.51%) followed by frontal bone which was 21 cases (25.30%), multiple bone 24 cases (28.92%), parietal bone 12 cases (14.46%) and occipital bone 4 cases (4.82%) (14).

According to another study which was conducted in India on 2850 head injury in which age of the victims varied from 15 – 80 years indicated that the peak incidence was observed in the age group 15 - 24 years comprising 34.46 % of the cases, 22.15 % belonged to the age group 25- 34 years, 56.61 % of cases comprised of age group of 15 - 34 years. Individuals in the age group 65 years and above were the least affected that is 4.21 % of total cases. Out of total cases 2442 (85.68%) were males while 408 (14.31%) were females which shows a male to female ratio of 6:1 and the majority of victims are of road traffic accident 1568 (55.02%) cases followed by assault 646 (22.67%) cases. Fall from height 361 (12.67%) and gunshot were 245 (8.59%) cases, whereas occupational comprised of 30 (1.05%) cases. Skull fracture was seen in 969 (34.0%) individuals out of total 2850 cases and among the intracranial injuries, epidural hemorrhage was the commonest, present in 495 (17.36%) cases and subdural hemorrhage present in 217 (7.6%) cases, followed by subarachnoid hemorrhage in 102 (3.50%) cases and Contusions of the brain parenchyma were present in 325 (11.4%) cases (16).

A Study which was conducted in Egypt at Assiut University indicated that, total number of head injured cases were 1331 out of 43,310 total number of trauma patients with an incidence of 3.07%. Head injuries due to road traffic accidents represents 60.9% (810 cases) and 35.8% of cases (290) were in age group between 20- 30 years, followed by the age group between 10-20 (22.2%) and 30- 40 (18.52%), the least affected age group was age greater than 60 (4.9%) and less than 10 (2.5%). Males affected more than females which accounts 85.7% of males and 14.3% of females with a ratio of 6:1 (17).

In 1100 (83%) patients out of 1331, head injury was associated with major bone fracture in other body regions and 231 (17%) were pure head injuries. 182 (79%) of patients with pure head injuries were due to road traffic accidents, 43 (24%) of them had lacerated wounds in the scalp and the radiological examination revealed nothing. The remaining patients 139 (64%), the radiological findings varied from skull fracture (36.7%), brain contusion (28.7%), and hematoma (23%) and diffuse brain injury (33.1%). Patients with radiological findings (139) were classified according to Glasgow Coma Scale (GCS) into: severe (GCS $\leq$ 8) which accounts (32%), moderate (GCS 9-12) accounts 22% and mild (GCS 13-15) accounts 46%. Complete recovery occurred in 93.7% of cases with GCS 13-15 while recovery was not recorded among patients with GCS $\leq$8. Death occurred in 66.6% of patients with GCS $\leq$8 and 3.3% in GCS 9-12 (17).

According to a study conducted in Nigeria, A total of 3282 patients were admitted during the study period of whom 428 (13.0%) had head injuries. There were 342 (79.9%) males and 86 (20.1%) females with males to females ratio of 3.9:1 and incidence was common in age between 21- 30 years (n=145, 33.8%), while the least were those between 71-80 years (n=3, 0.7%). Road traffic accidents (RTAs) were the most common cause of injury accounting for 307 (71.7%) patient. 244 (57.0%) had associated injuries along with head injury of which fractures were the majority (n=93, 21.7%) and with skull fracture being the most common (n=27, 26.5%). Lacerations, abrasions and other blunt injuries also made up a significant portion of injuries (n=52, 12.1%), followed by intracerebral/ subdural hemorrhages (n=13, 3.0%) (18).
According to this study, severity of head injury on Glasgow coma scale indicated that majority of patients suffered mild head injury (277, 64.7%), 58 (13.6%) suffered moderate head injury, while 93 (21.7%) sustained severe head injury. A total of 194 (45.3%) patients presented with history of loss of consciousness (LOC) with duration of less than 1 hour in 46 (23.6%) patients, 1 hour to 24 hours in 62 (31.8%) patients and greater than 24 hours in 87 (44.6%) (18).

According to the study which was conducted at JUSH which is Four (4) month Prospective study, on 52 head injury patients indicated, female to male ratio was 1:9 and Interpersonal fight (n=20, 38.5%) and traffic Accidents (n=19, 36.5%) accounted for most of the injuries. Of all injuries, 15.4% (n=8) were due to falling accidents mainly in children and distribution of the severity of injury measured with the initial Glasgow Coma Score (GCS) indicates that 37 (71%) of all patients were discharged with a good recovery Glasgow Outcome Scale (GOS) 5, 7.7%

with a disability and 21.2% died and All patients with initial GCS greater than 6 survived where as almost all patients with initial GCS 6 and less were died and Patients with both non-reactive pupils at the initial examination died in 87.5% of cases (1).

This study also showed patients who sustained injury from fight or fall were more likely to have an outcome with good recovery (GOS 5) compared to patients with road traffic injury (RTI) or other causes. Only 10% of the patients who sustained injury from interpersonal fight had an initial GCS below 9 compared to 52.6% in RTI patients. In this study, 40 (77%) of all patients were managed conservatively. Twenty-seven (27) patients had a skull x-ray which showed a fracture in 15 cases and nineteen (19) patients had no skull x-ray done. Median initial GCS of the patients that had visible skull fractures on the x-rays was 13 and patients who underwent no skull x-ray had a median initial GCS of 10 (1).

CHAPTER THREE
OBJECTIVES

3.1 General Objective

- To assess the pattern of head injury among patients presented to adult ED of JUTH, Jimma, South west Ethiopia, from January 01, 2014 to December 30, 2014.

3.2 Specific Objectives

- To determine the prevalence of head injury among patients presented to adult ED of JUTH, Jimma, South West Ethiopia, from January 01, 2014 to December 30, 2014.

- To identify mechanism of injury associated with head injury among patients presented to adult ED of JUTH, Jimma, South west Ethiopia, from January 01, 2014 to December 30, 2014.

- To assess the severity of head injury using GCS among patients presented to adult ED of JUTH, Jimma, South West Ethiopia, from January 01, 2014 to December 30, 2014.

- To assess the outcomes of head injury among patients presented to adult ED of JUTH, Jimma, South West Ethiopia, from January 01, 2014 to December 30, 2014.

CHAPTER FOUR
RESEARCH METHODOLOGY

4.1 Study area and Period

The study was conducted at JUTH found in Jimma Town, Jimma Zone, Oromia Regional state from January 01, 2014 to December 30, 2014.

Jimma zone is one of the 17 zones of the Oromia Regional State found at 352 kms from Addis Ababa, the capital city of Ethiopia, in the South western part of the country. Based on the 2007 Census conducted by the CSA, this Zone has a total population of 2,486,155, an increase of 26.76% over the 1994 census, of whom 1,250,527 are men and 1,235,628 women; with an area of 15,568.58 square kilometers (19).

In this zone there are three public hospitals namely, Jimma University Teaching hospital (JUTH), Shenen Gibe hospital and Limu Genet hospital. The first two are situated in Jimma town where as the later one is at Limu town, which is 72 kms far from Jimma town. Except JUTH both are at district level. JUTH, which is my research study area plays a pivotal role in this zone and it is the only teaching and referral hospital in the southwestern part of the country, and provides specialized clinical services to about 15 million people (20).

It provides generalized service to in-patients and out-patients ideally on a referral from the two hospitals, community health centers, private clinics and patients referred from SNNRS hospitals.

4.2 Study Design

Institutional based retrospective, , cross sectional study were conducted from January 01, 2014 to December 30, 2014.

4.3. Population

4.3.1. Source population

- ✓ All patients presented to adult ED of Jimma University teaching hospital, from January 01, 2014 to December 30, 2014.

4.3.2. Study population

- ✓ All head injury patients presented to adult ED of JUTH that fulfill inclusion criteria, from January 01, 2014 to December 30, 2014.

4.4. Inclusion and exclusion criteria

4.4.1. Inclusion criteria

- All selected head injury records of patients visited adult ED of JUTH whose age is above 12 years were included in the study.

4.4.2 Exclusion criteria

- Head injury Patients chart that has inadequate data (greater than 20% incomplete) were excluded.
- Head injury patient‟s charts which are lost from record office due to consultation, transfer or any other medical reason at the time of data collection were excluded.
- Head injury patients who are died at arrival were excluded.

4.5. Samlple size and sampling techniques

All head injury patient who fulfills inclusion criteria and visited JUTH during the period under study were included in the study as sample size which is 135 head injury patients.

4.6. Variables

4.6.1 Dependent variables

- ✓ Pattern of head injury
- ✓ Outcomes of the head injury
- ✓ Type of head injury
- ✓ Severity of head injury

4.6.2 Independent variable

- ✓ Socio demographic variables
  - ➢ Age
  - ➢ Sex
- ✓ Mechanism of head injury
- ✓ Type of skull fracture

4.7. Data collection tools and procedures

For data collection, standard check lists which developed after review of similar literatures were used and data was recorded on structured check lists through reviewing of patient chart retrospectively.

Three BSc nurses from JUTH were recruited for data collection after they had given one day training on data collection tools and techniques.

4.8. Data processing and Analysis

After the collected data checked for completeness and consistency, data was encoded to Microsoft Excel and was manually transported and analyzed using SPSS Version 20.0. Finally obtained results were displayed by using frequency tables, graphs and charts.

4.9. Data quality assurance

Pre test was done on **5**% of study sample patient chart who excluded from final study to check the validity and reliability of data collection tools and necessary modifications were made based on the findings. Prior to data collection period, one day training was given for data collectors. Onsite supervision was given to solve any ambiguity with data collection tools and techniques and the filled check lists were cross checked at the end of each data collection day for completeness and consistency.

4.10. Ethical consideration

The proposal was presented to Addis Ababa University, Emergency department and ethical clearance was obtained from Addis Ababa University, College of health sciences and IRB. In order to obtain permission to proceed with data collection, the official letter was brought to JUTH administrations. During patient chart review confidentiality was kept and any patient information was not transferred to any other organ.

4.11. Operational definitions and definition of terms

Incidence- a measure of the risk that a person develops a new condition within a specified period of time.

Prevalence- the total number of cases of a disease in the given statistical population at a given time.

Head injury- physical damage/ structural change to the scalp or skull due to any type of external force to the head.

Traumatic brain injury (TBI) - alteration in brain function which is manifest as confusion, altered level of consciousness, coma, seizure, and etc.

GCS- Glasgow coma scale used for assessing the neurological status of the patient.

Trauma- any serious injury to the body often resulting from violence or an accident.

Mild head injury- an injury to the head when Glasgow coma scale is between 13 and 15.

Moderate head injury- an injury to the head when Glasgow coma scales between 9 and 13.

Severe head injury- an injury to the head when Glasgow coma scale is less than or equal to 8.

4.12. Dissemination plan

After the completion of the study, the results were defended to Addis Ababa University, College of health science, department of Emergency medicine, and the finding was disseminated to concerned bodies such as service providers, policy makers and other concerned stake holders.

CHAPTER FIVE

RESULTS

Socio-demographic data: From total of 3650 patients admitted to adult ED of JUTH in period from January 01, 2014 to December 30, 2014, 135 are head injury patients with prevalence rate of 3.69%. From total, 135 head injury patients were included in this study of which 114 (84.4%) were males and 21 (15.6%) were females. The mean age in years was 30.34 and standard deviation was 14.005). Male to female ratio was 8.6:1 and higher in age interval of 13-25 years which comprises 59 (43.7%) followed by 26-38 years which comprises 41 (30.4%), 39-51 years comprises 23 (17%), 52-65 years comprises 11 (8.1%) and above 65 years comprises only **1** (0.7%) head injury patients. Most of the head injury patients were from Oromia region which accounts 124 (91.9%) followed by SNNRP which accounts 7 (5.2%) patients and from the total number of patients 92 (68.1%) were from rural area and the remaining 43 (31.9%) patients were from urban area.

Table 1: Socio-demographic data of head injury patients for study of pattern of head injury among patients presented to adult ED of JUTH from January 01, 2014 to December 30, 2014.

Variables		Number	Percentage
Age	13-25	59	43.7
	26-38	41	30.4
	39-51	23	17.0
	52-65	11	8.1
	Above 65	1	0.7
Sex	Male	114	84.4
	Female	21	15.6
Residence	Urban	43	31.9
	Rural	92	68.1
Region	Oromia	124	91.9
	SNNRP	7	5.2
	Gambela	2	1.5
	Others	2	1.5

From the total of 135 head injury patients, 71 (52.6%) were referred from public health center followed by 47 (34.8%) patients were came by themselves, 10 (7.4%) were from another public hospital and only 5 (3.7%) were from private center.

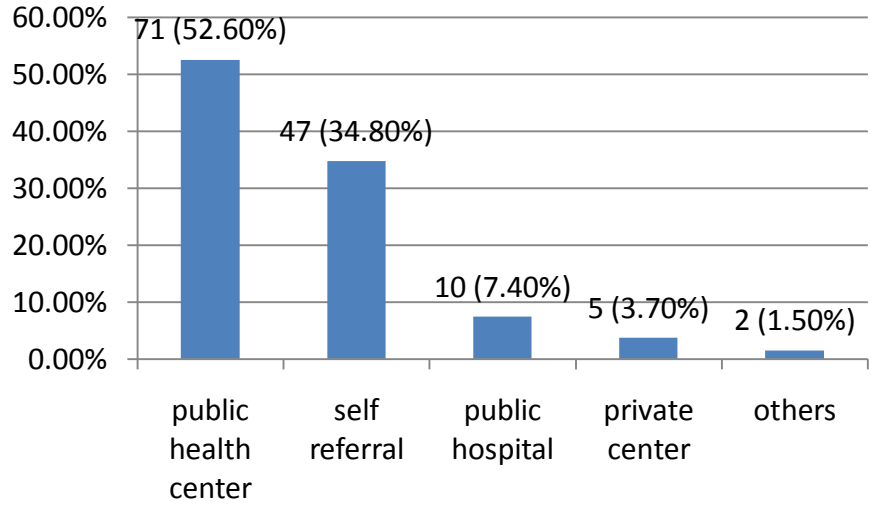

Figure 1: source of referral of head injury among patients presented to adult ED of JUTH from January 01, 2014 to December 30, 2014.

Mechanism of head injury

Regarding mechanism of injury, most of the patients were sustained head injury from interpersonal violence comprising 73 (54.1%) of which 56 (76.7%) were mild, 11 (15.1%) were moderate, and 6 (8.2%) were severe head injury followed by RTA comprising 42 (31.1%) of which 21 (50%) were mild, 8 (19%) were moderate and 13 (31%) were severe head injury and fall down comprising 18 (13.3%) of which 9 (50%) were mild, 8 (44.4%) were moderate and only 1 (5.6%) was severe head injury and only 2 (1.5%) patients were sustaining head injury from other mechanism i.e. kicked by horse and hitted by the wood.

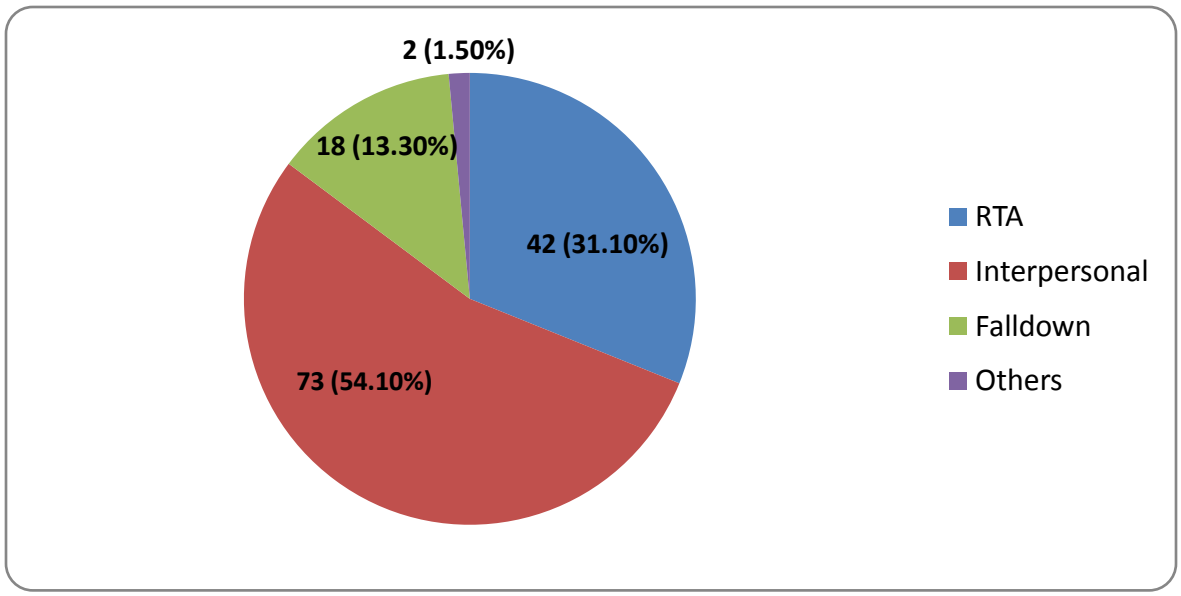

Figure 2:- Mechanism of injury for study of pattern of head injury among patients presented to adult ED of JUTH from January 01, 2014 to December 30, 2014.

Out of the total head injury patients, 83 (61.5%) patients got pre hospital care and the remaining 52 (38.5%) patients were not get any type of pre hospital care. From those who got pre hospital care, the type of care given were analgesics for 75 (90.3%) patients followed by wound dressing for 70 (84.3%) head injury patients.

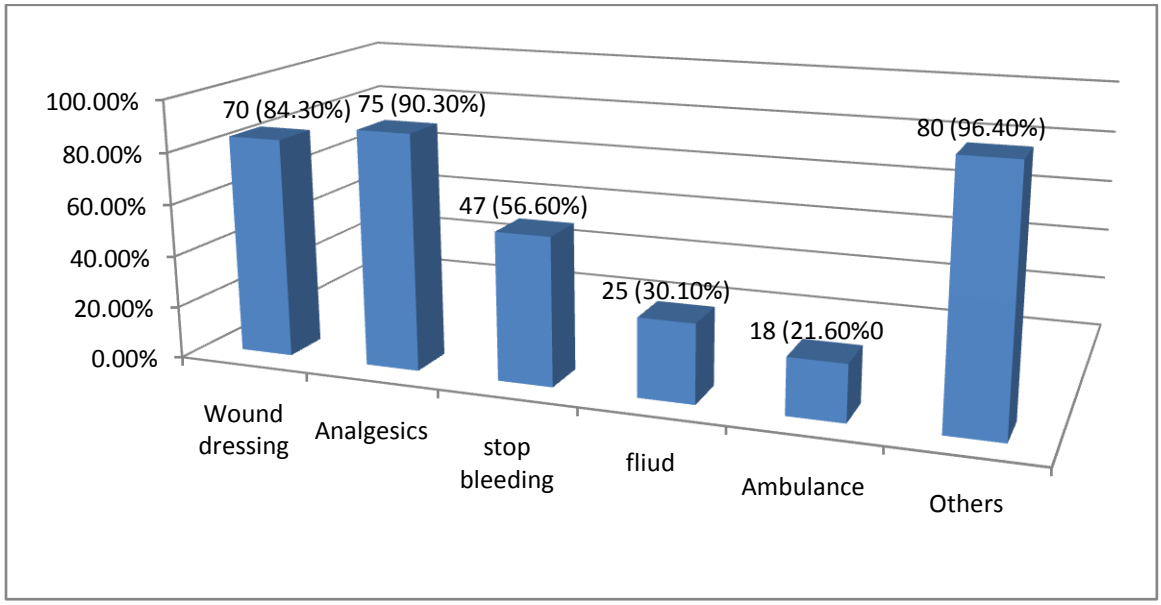

Figure 3: Type of pre hospital care given for head injury patients among patients presented to adult ED of JUTH, from January 01, 2014 to December 30, 2014.

Diagnosis at presentation

At presentation to the ED, head injury patients were diagnosed as follows: 35 (25.9%) were diagnosed with mild head injury plus depressed skull fracture, 24 (17.8%) with basal skull fracture followed by severe head injury plus depressed skull fracture which accounts for 15 (11.1%) patients.

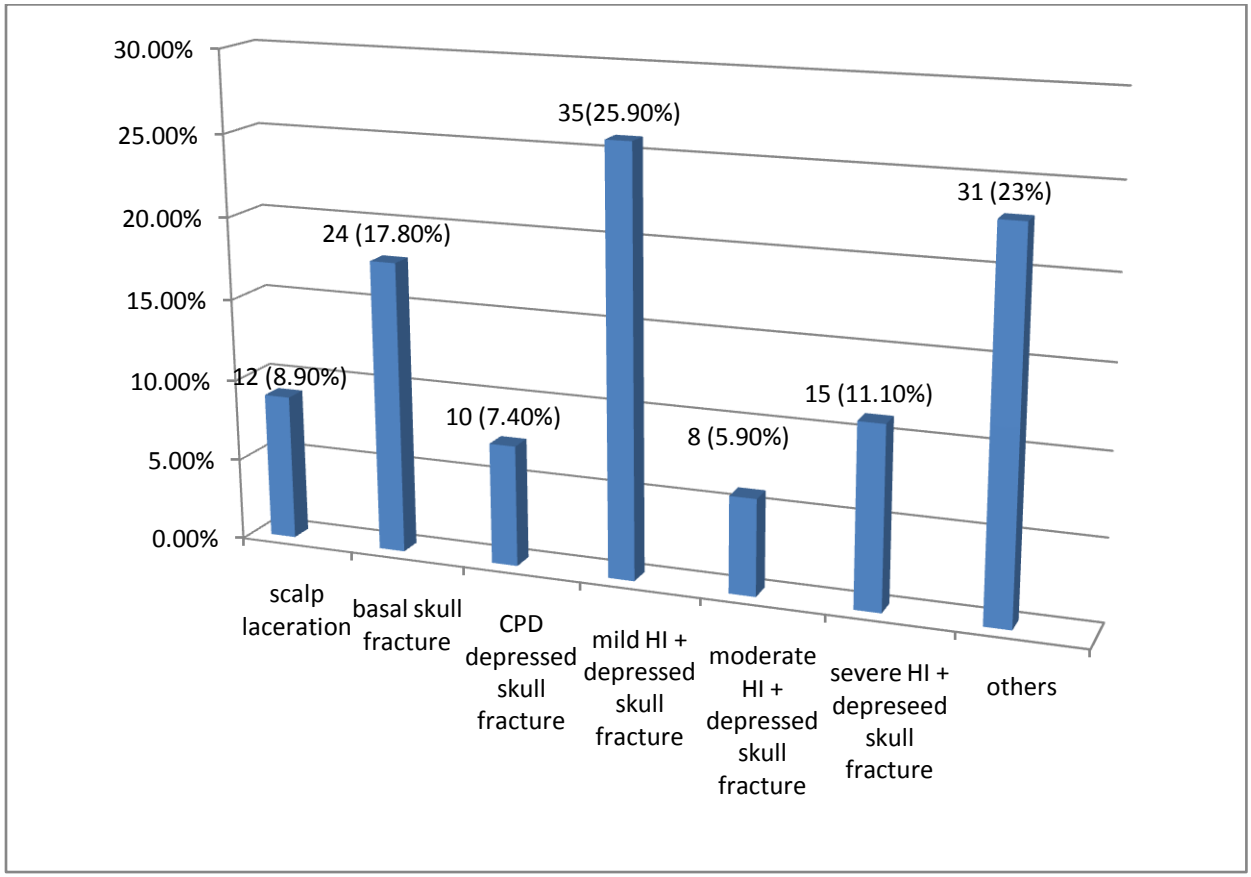

Figure 4:- Showing diagnosis at presentation of head injury among patients presented to adult ED of JUTH from January 01, 2014 to December 30, 2014.

As Regards to sign and symptom of head injury at presentation to ED (72.6%) were presented with confusion, (57.8%) were presented with headache and followed by nausea and vomiting which accounts for (52.6%), (51.1%) were with unequal pupils and only (25.2%) were presented with loss of sensation and few patients were presented with different sign and symptom which accounts (28.1%) of head injury patients.

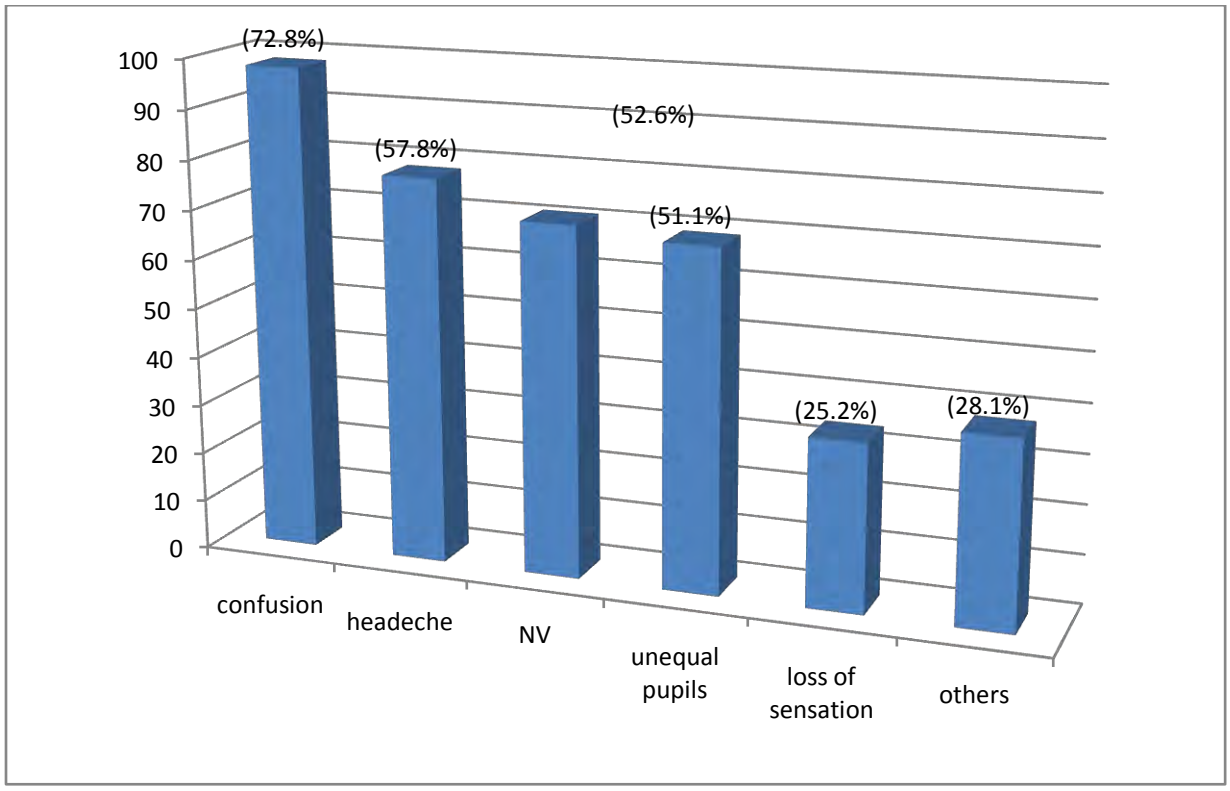

Figure 5: Sign and symptom at presentation to ED of head injury among patients presented to adult ED of JUTH from January 01, 2014 to December 30, 2014.

Out of 135 total head injury patients, 71 (52.6%) were sustained skull fracture of which 62 (87.3%) were males and 9 (12.7%) were females and the remaining 64 (47.4%) were not sustained skull fracture of which 52 (81.3%) were males and 12 (18.7%) were females.

Out of 71 head injury patients who sustained skull fracture, 27 (38%) were mild, 26 (36.6%) were moderate and 18 (25.4%) were severe head injury and 34 (47.9%) were developed open skull fracture of which 20 (58.8%) were depressed skull fracture and 14 (41.2%) were non depressed skull fracture and the remaining 37 (52.1%) were closed skull fracture of which 18 (48.6%) were depressed skull fracture and 19 (51.4%) were non depressed skull fracture.

Prevalence of symptom of skull fracture

Out of 71 skull fractured head injury patients, 64 (90.1%) patients were developed unequal pupils followed by 50 (70.4%) were developed raccoon eye, 33 (46.5%) were developed battle sign and other 45 (63.4%) have different sign and symptom of skull fracture like nausea and vomiting.

Out of total 135 head injury patients, 111 (82.2%) were sustained blunt types of head injury of which 86 (77.5%) were due to low velocity and 25 (22.5%) were due to high velocity mechanism and the remaining 24 (17.8%) were sustained penetrating type of head injury based on morphology and based on anatomical site of head injury, the bone involved were 43 (31.9%) to frontal bone followed by temporal bone which comprises 40 (29.6%), and the parietal bone constitutes 33 (24.4%) and the remaining 19 (14.1%) were to occipital bone.

Severity of head injury

The severity of head injury were classified based on GCS score, Out of total 135 head injury patients 87 (64.4%) were mild head injury with GCS score of 13-15 of which 71 (81.6%) were males and 16 (18.4%) were females, 28 (20.7%) were moderate head injury with GCS score of 9-12 of which 25 (89.3%) were males and 3 (10.7%) were females and the remaining 20 (14.8%) were severe head injury with GCS of 8 and less of which 18 (90%) were males and 2 (10%) were females.

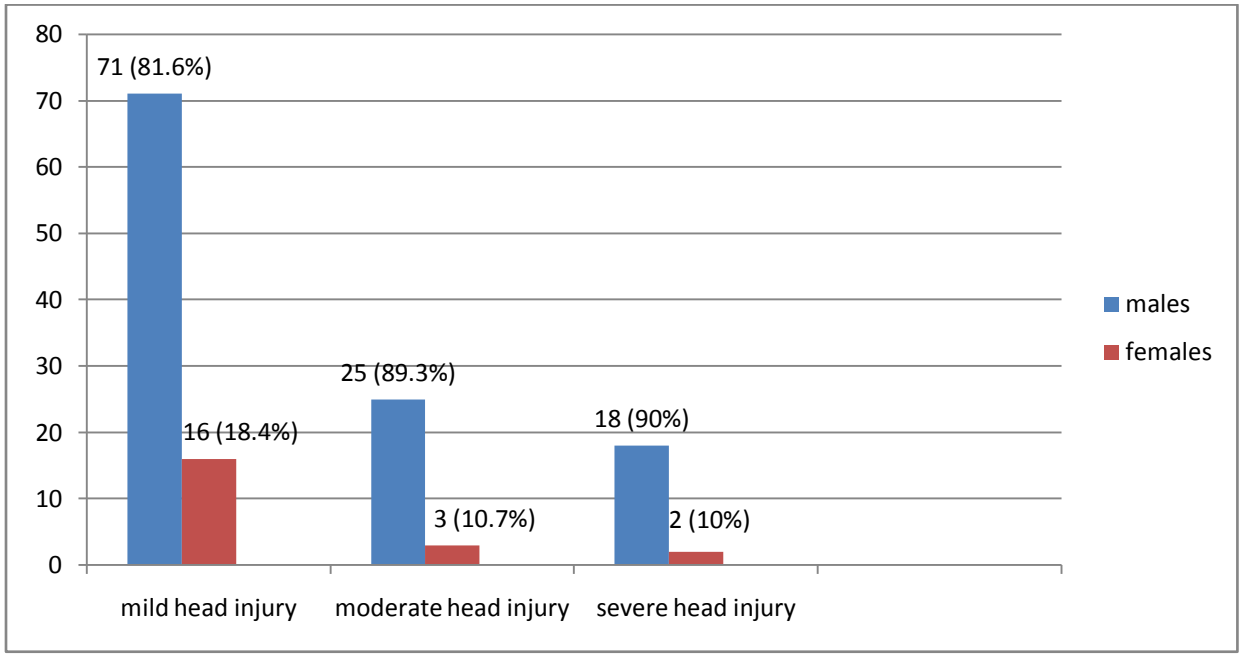

Figure 6: Severity of head injury based on GCS score for study of pattern of head injury among patients presented to adult ED of JUTH from January 01, 2014 to December 30, 2014.

From total of **135** head injury patients, 59 (43.7%) were developed contusion followed by epidural hematoma which accounts 45 (33.3%) head injury patients and the remaining 25 (18.5%) were developed subdural hematoma and only 6 (4.4%) were developed subarachnoid hematoma and out of 135 head injury patients only 39 (28.9%) patients developed diffuse type of brain injury of which 22 (56.4%) were concussion, 14 (35.9%) were multiple contusion and only 3 (7.7%) were ischemic head injury.

Complication of head injury

Of total of 135 head injury patients, 68 (50.4%) were developed complications of which 23 (33.8%) were mild, 25 (36.8%) were moderate and 20 (29.4%) were severe head injury based on severity. Out of 68 those developed complication, 53 (77.8%) were developed hypotension, 44 (64.7%) were hypoxia, 29 (42.6%) were hypothermia, 24 (35.3%) were increased ICP and only 3 (4.4%) were developed other complication and all head injury patients had radiologic skull X-ray and only 33 (24.4%) patients had radiologic cervical X-ray.

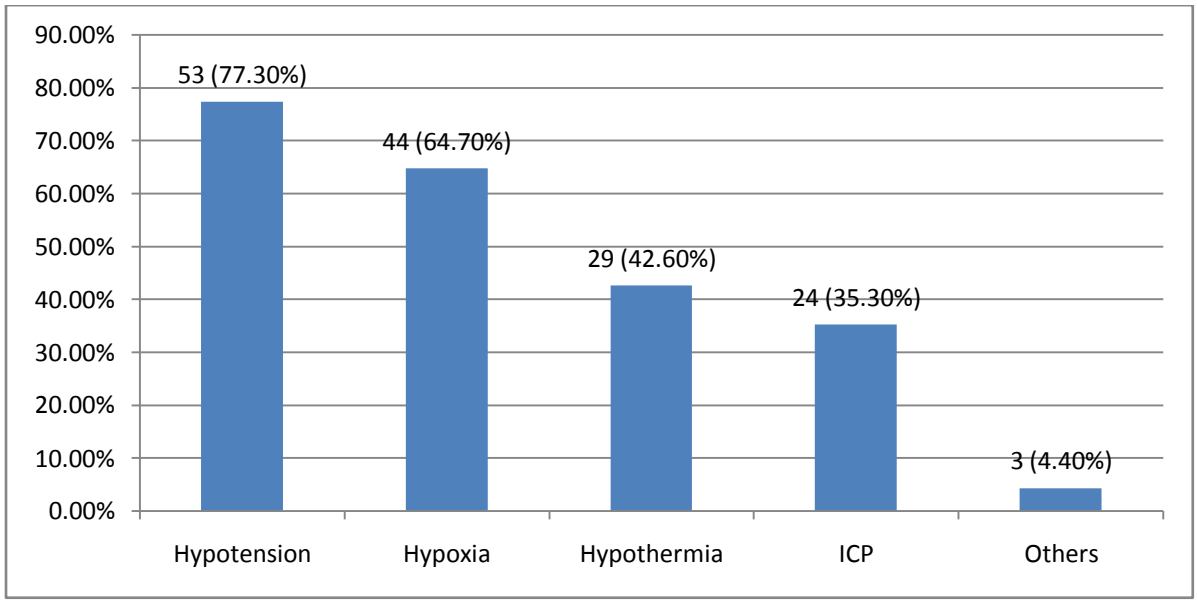

Figure 7: Complication of head injury in the study of pattern of head injury among patients presented to adult ED of JUTH from January 01, 2014 to December 30, 2014.

Management of head injury

In this study most of head injury patients, 98 (73%) were managed conservatively with IV fluid/crystalloid, analgesics and antibiotics for resuscitation followed by mannitol which was only given for 24 (17.8%) head injury patients and only 13 (9.6%) head injury patients were transfused with blood.

ED Outcomes of head injury

The outcome at ED were 68 (50.4%) head injury patients were improved and discharged from ED of which 55 (80.9%) were males and 13 (19.1%) were females and almost all are mild head injury which accounts 67 (98.5%) followed by 31 (23%) were admitted to general ward of which 27 (87.1%) were males and 4 (12.9%) were females with 20 (64.5%) were mild and 11 (35.5%) were moderate head injury, 20 (14.8%) were transferred to ICU of which 18 (90%) were males and **2** (10%) were females with 13 (65%) were moderate and **7** (35%) were severe head injury, 8 (5.9%) were died in ED of which **7** (87.5%) were males and 1 (12.5%) was female and all were severe head injury, 6 (4.4%) were referred to another hospital for further investigations and treatments of which 5 (83.3%) were males and 1 (16.7%) was females of which 2 (33.3%) were moderate and 4 (66.7%) were severe head injury and only 2 (1.5%) had no records.

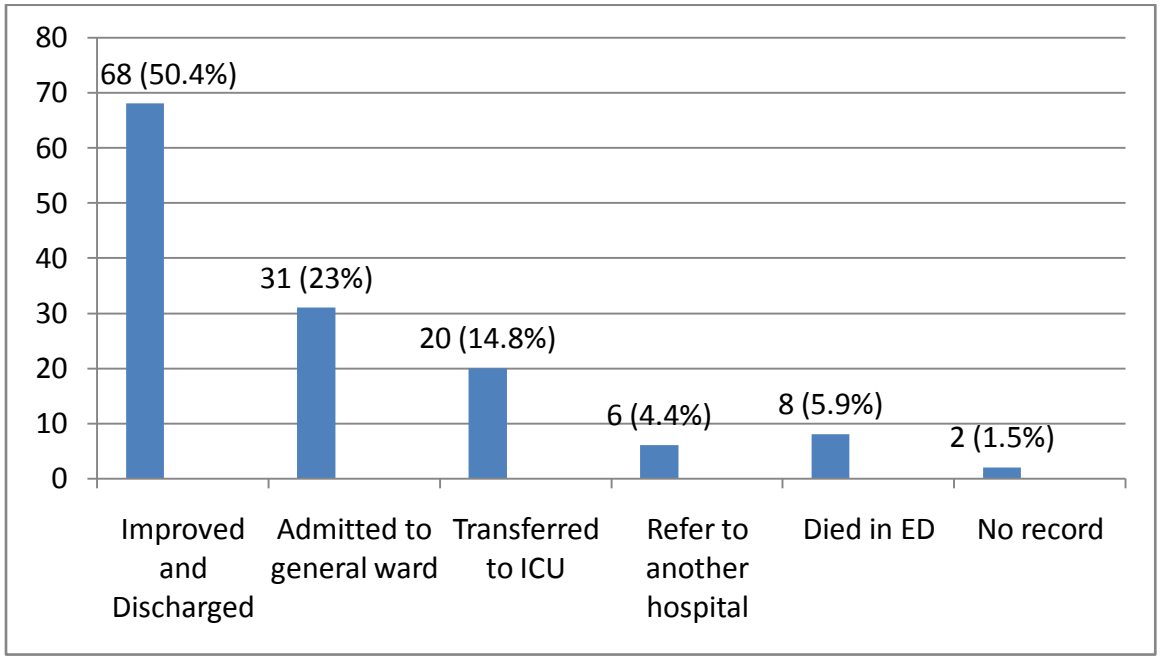

Figure 8: Outcomes of head injury in the study of pattern of head injury among patients presented to adult ED of JUTH from January 01, 2014 to December 30, 2014.

CHAPTER SIX

DISCUSSION

A Study which was conducted in Egypt at Assiut University indicated that, the total number of head injured cases were 1331 out of 43,310 total number of trauma patients with an prevalence rate of 3.07%. This is nearly similar to this study that the total numbers of head injury cases were 135 out of 3650 total number of patients admitted to adult ED of JUTH with prevalence rate of 3.69%.

According to study done in Egypt at Assiut University on 1331 head injury patients, Males were more affected than females which accounts 85.7% of males and 14.3% of females with a ratio of 6:1 (14). This is nearly similar to this study which was done on 135 head injury patients in which males were more affected than females, i.e. male accounts 84.4% and female accounts 15.6% with ratio of 8.6:1. This is also similar to the finding of India on 2850 head injury cases, 2442 (85.68%) were males while 408 (14.31%) were females with a male to female ratio of 6:1 (16).

Different study also shows young part of the population were mostly sustained head injury which are productive age groups. According to study done in Norway on 585 head injury patients, high age specific incidence rates were found in the age group 10-24 years with the peak incidence among teenagers between 15- 19 years.

This is nearly similar to this study in which high age specific incidence rates were found in the age group of 13-25 years which accounts 43.7% head injury patients followed by 26-38 years which accounts 30.4% head injury patients which are productive age group of the country and this is also nearly similar with other study conducted in tertiary care Hospital in India in which the peak incidence of head injury was observed in the age group 21-30 years comprising 45% of the cases and it was also observed that 21% belonged to the age group 31-40 years (15).

In this study the least affected age group is age above 65 which accounts only 1 (0.7%). But fewer than finding of the study in India in which individuals in the age group 65 years and above were the least affected that is 4.21 % of total cases (17).

According to the study conducted in Norway on 585 head injury patients, the causes of head injury were mostly by falls in 299 (51%), RTA in 126 (21%), interpersonal violence in 81 (14%) and other in 79 (14%) (6).

In contrast to the above study, in this study which was conducted on 135 head injury patients, the cause of head injury were mostly from interpersonal violence which accounts 73 (54.1%) followed by RTA which accounts 42 (31.1%), 18 (13.3%) were from fall down which is nearly similar to study conducted in Ethiopia, JUTH, in which Interpersonal violence accounts (n=20, 38.5%) followed by road traffic Accidents (n=19, 36.5%) and of all injuries, 15.4% (n=8) were due to falling accidents (1).

According to the study done in India, Skull fracture was seen in 969 (34.00%) individuals out of total 2850 head injury cases and among the intracranial injuries, epidural hemorrhage was the commonest, present in 495 (17.36%) cases (16). This is fewer than the finding of this study, skull fractures were seen in 71 (52.6%) individuals out of total 135 head injury cases and among intracranial injuries, contusion was the commonest, present in 59 (43.7%) followed by epidural hematoma present in 45 (33.3%) head injury patients and but nearly similar to other study conducted in India in which skull fracture was seen 69.63% patients.

According to study conducted in Nigeria on 428 head injury patients, based on Glasgow coma scale majority of the patients suffered mild head injury (277, 64.7%), 58 (13.6%) suffered moderate head injury, while 93 (21.7%) sustained severe head injury (18). This is nearly similar to the finding of this study which was conducted on 135 head injury patients, the severity of head injury based on Glasgow coma scale, majority of the patients were sustained mild head injury 87 (64.4%) with GCS score of 13-15, moderate head injury 28 (20.7%) with GCS score of 9-12 and the remaining 20 (14.8%) were severe head injury with GCS of 8 and less but nearly different from study conducted in Korea on 68414 head injury patients, the severity of head injury were classified based on GCS score was mild in 73.4%, moderate in 11.4%, and severe in 16.3% (13).

The finding of this study showed that the commonest intracranial lesion was contusion which is present in 59 (43.7%) followed by epidural hematoma which is present in 45 (33.3%), subdural hematoma present in 25 (18.5%) and subarachnoid hematoma which is present only in 6 (4.4%) head injury patients which is higher than the study conducted in India in which commonest

intracranial lesion was epidural hemorrhage which accounts 495 (17.36%) cases and next common was subdural hemorrhage present in 217 (7.6%) cases, followed by subarachnoid hemorrhage in 102 (3.50%) cases and Contusions of the brain parenchyma were present in 325 (11.4%) cases (16) and other study conducted in Egypt, on 1331 head injury patients showed brain contusion was found in 28.7%, hematoma was found in 23% (17).

Different study indicates that most of head injury patients were managed conservatively as study conducted in JUTH on 52 head injury patients, 77% of all patients were managed conservatively with fluid resuscitation and antibiotics administration (1) which is nearly similar to this study in which almost all head injury patients, 73% of all patients were managed conservatively with IV fluid/crystalloid resuscitation, analgesics and antibiotics administration and mannitol was given for 24 (17.8%) head injury patients and only 13 (9.6%) head injury patients were transfused with blood.

In this study, concerning the outcomes at ED, almost all mild head injury patients 67 (98.5%) with GCS score of 13-15 were improved and discharged from ED with good recovery and 8 (5.9%) of all severe head injury patients with GCS score of 8 & less were died in ED and 6 (4.4%) were referred to another hospital for further investigations and treatments of which 2 (33.3%) were moderate with GCS score of 9-12 and 4 (66.7%) were severe head injury patients. This is nearly similar to the study conducted in Egypt, Assuit University on 1331 head injury patients in which complete recovery occurred in 93.7% of mild head injury cases with GCS 13-15 while recovery was not recorded among patients with GCS $\leq$ 8 and Death occurred in 66.6% of patients with GCS $\leq$ 8 and 3.3% in GCS 9-12 head injury patients (17).

Another study which was done in JUTH on 52 head injury patients revealed that severity of head injury measured with the initial Glasgow Coma Score (GCS) indicates that 71% of all patients were improved & discharged with a good recovery and 21.2% of all patients were died and all patients with initial GCS greater than 6 were survived where as almost all patients with initial GCS 6 and less were died (1) which is almost similar to this study.

CONCLUSION

In conclusion, this paper showed the following:

In this study, from over all trauma admission a significant number is accounted for interpersonal violence followed by road traffic accident victims indicating the public health importance. In this study economically active age group of the population was main victims of the accident and males are eight (8) times affected than females. Though old ages (> 50) are least affected parts of the population in number but the mortality is high in this population. Most of the populations that sustained accident are those from rural part of the country. And in this study for almost half of the patient, pre hospital care was given and due to the consequence of fatal injury to patients most of the patients with severe head injury were died in the ED after they got initial resuscitation measure.

CHALLENGES AND LIMITATIONS OF THE STUDY

- ✓ The study was conducted in a short period of time and there is shortage of time in writing this research paper.
- ✓ Shortage of knowledge in analyzing data and limitation of using SPSS since we are not offered with advanced biostatistics course by the department.
- ✓ Since all information was taken from patient"s profile, there is incompleteness of data to have full information.
- ✓ In general the poor documentation and attachment of the results of investigation of victims was the other major challenge in which around 35 patient"s chart was incomplete data.

RECOMMENDATION

From this study results, I have the following recommendations:

- In this study, since interpersonal violence is the major mechanism for head injury occurrences, I would like to recommend Jimma zone administration to give awareness for the community and individual about consequence of this injury on individual and community.
- Next major mechanism is road traffic accident to passengers and those who are crossing and walking on the road side showing poor awareness of road traffic rules both by drivers and passengers, so I want recommend road traffic authority to give awareness to the community and giving training for the drivers about road traffic rules to reduce effect of this problems.
- Since there is shortage of time for analyzing data and writing a research paper, so AAU, department of emergency medicine and critical care should provide time for analyzing data and writing research paper in the future for the students.
- I would like to recommend AAU, department of Emergency medicine and Critical care to include advanced biostatistics in the curriculum in the future just to aid the students in data analysis and interpretation.

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