COMPUTED TOMOGRAPHY PATTERN OF BONE FRACTURE AND OUTCOME OF ROAD TRAFFIC ACCIDENT IN TIKUR ANBESSA SPECIALIZED HOSPITAL, ADDIS ABABA UNIVERSITY, ADDIS ABABA, ETHIOPIA.

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A RESEARCH REPORT TO BE SUBMITTED TO RADIOLOGY DEPARTMENT, COLLEGE OF HEALTH SCIENCES, ADDIS ABABA UNIVERSITY IN PREPARATION FOR PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE POST GRADUATE STUDY IN RADIOLOGY.

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ADDIS ABABA, ETHIOPIA

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List of Abbreviations and Acronyms

CT- computed tomography

ED- emergency department

GNP- Gross National product

IRB- institutional review board

LMICS- Low and Middle income countries

OPD- out patient department

RTA- Road traffic accident

RTC- Road traffic Collision

TASH- Tikur Anbessa Specialized Hospital

USD- united state dollar

WHO- world health organization

Abstract

Back ground

Road traffic accident (RTA) is defined as a collision between two or more, between vehicle and pedestrians, between vehicles and fixed animals obstacles. Of all the transportation systems that people use, road transport is the most widely used, complex and dangerous because it is highly associated with the rise in road traffic collisions. Road traffic accidents have become a huge global public health and development problem with highest burden in developing country, especially highest cause of mortality and disability in Africa. Ethiopia, one of developing country in Africa suffering one the most frequent car accidents and mortality.

Aim:

Aimed at determining the pattern of bone fractures in TASH and assess outcome of RTA.

Methods

The study is a retrospective cross sectional study involves all patients sustained road traffic accident coming to department of radiology and having CT from February to August. The CT scan will be examine by senior radiology residents and revised by radiologist. The chart of the patient will be revised for pertinent clinical information and to assess the outcome the accident.

Results

A total of 131RTA victims were included in the study of which 95 (72.5%) were male and majority of them are from urban 81(61.8%). The most affected people were passengers (45%) followed by pedestrians (35.1%) and those found in between 20-29 years of age (33.6%). The fracture occurred were in lower limb (22.3%), spine (21.8%), upper limb (19%), pelvic bone(16.6) and head (15.2%) and the most fractured body region was head and neck(23.2%). Over all fracture of vertebral bone, skull and pelvic bone was the top leading frequently fractures. Majority of patients have either neurologic or movement impairment (61.1%) and others cured (22.1%) and died (7.6%)

Conclusions

In this study, RTA commonly affects males and those productive age groups (20-49yr). Of all fracture of lower limb was the leading followed by fracture of spine and pelvic bone fractures respectively. With specific bone fracture vertebral bone fracture is the commonest. The outcome of the patient at the time of their discharge or on their follow up, most of them had some degree of neurologic or movement impairments.

1. INTRODUCTION

1.1 BACKGROUND

Bone fracture has been described as the break in continuity of a bone [1]. Accident is an incident, occurring suddenly, unpredictably and unintentionally under unforeseen conditions [2].
Road traffic accident (RTA) is defined as a collision between two or more, between vehicle and pedestrians, between vehicles and fixed animals obstacles [3]. Of all the transportation systems that people use, road transport is the most widely used, complex and dangerous because it is highly associated with the rise in road traffic collisions (RTC) [4].

Road traffic accidents have become a huge global public health and development problem killing nearly 1.2 million people a year and injuring or disabling between 20–50 million people worldwide; thus making the loss of 518 billion US $ globally [5]. The report written by WHO in 2013 showed that more than 1.24 million people die every year as a result of road traffic injuries, making it "the eighth leading cause of death globally, and the leading cause of death for young people aged 15–29". Based on current trends, it is projected to be the fifth leading cause of death globally by 2030 [4].

World report on road traffic injury showed that the number of road traffic injuries has continued to rise in the whole world, but there has been an overall downward trend in road traffic deaths in high-income countries since the 1970s and an increase in many of the low-income and middle income countries. Deaths related to RTI are predicted to increase by 83% in low-income and middle-income countries and to decrease by 27% in high-income countries. Ninety percent of road traffic deaths occurred in low-income and middle income countries, where 81% of the world's population live and own about 20%of the world's vehicles [5].

Low and middle income countries (LMICs) in particular experience a disproportionate burden of RTA-related injuries bearing over 90% of the world's traffic related-fatalities even though they have less than 50% of the world's registered vehicles [6]. As vehicle ownership in LMICs continues to raise, the public health problem of RTA only gain momentum. It is estimated that RTAs cost LMICs more than $100 billion USD every year, or 1–2% of their gross national product (GNP) due to premature death, disability, medical expenses, loss of productivity, and

material damages [7]. Despite these major impacts upon global health and economic development, RTA and related injuries tend to be under-prioritized in LMICs [6].

In addition, in the developing world, the improved life expectancy together with industrialization and urbanization are putting heavy pressure on the transport system in general and on road system in particular [8]. When compared to the developed nations, causes for high burden in road traffic-related deaths and injuries in developing countries are primarily due to an increase in motor vehicle numbers, poor enforcement of traffic safety regulations, inadequacy of public health infrastructure, and poor access to health services [9].

African countries, one of the developing continents had the highest mortality rate, with 28.3 deaths per 100 000 populations [4].The problem is increasing at a fast rate in African countries due to rapid motorization and other factors. While road traffic accidents account for about one-quarter of injury-related deaths in the continent overall, in Egypt 64%, in Tunisia 58%, and in Morocco 51% were injury-related deaths in 2008. In Libya 43%, in Djibouti 42%, in Mauritius 37%, in Namibia 36%, and in Niger 34% have road traffic accident related deaths. The most economically active people (aged 15–59) are at the greatest risk of dying as a result of RTI. For this age group, road traffic accidents affected more than three times as many males as females. Overall, 5% of deaths among males aged 15–59 are attributable to road traffic accidents, but this percentage rises to 6.5% for males in the 15–59 age group in Sub-Saharan Africa. Deaths due to road traffic accidents among males aged 15–59 far exceed those due to malaria, diabetes mellitus, and respiratory or digestive diseases [10]. In the African countries deaths from road traffic injuries are 40% higher than in all other low and middle income countries and 50% higher than the world average [11].

Kenya has one of the highest road fatality rates in Africa at 68 deaths per 10 000 registered vehicles and between 45 and 60% of admissions to surgical wards in public hospitals as a result of road traffic injuries [12].

Ethiopia, a developing country in Africa, has witnessed a number of the most risky roads in the world and has followed to overtake a determined road spreading out guiding principle in the past 15 years [13]. The Ethiopian National Road Safety Coordination Office cites a road crash fatality rate of 114 deaths per 10 000 vehicles per year but the actual figure may be higher due to an improper reporting system [13, 14]. This is significantly higher when compared to a mortality

rate of one death per 10000 vehicles per year in the United Kingdom and an average mortality rate of 60 per 10 000 vehicles across 39 sub-Saharan African countries [13]. Officially, 81% of crashes in Ethiopia are attributed to driver error. Driver impairment is rarely recorded as a contributory factor and as government officials says that they believe Khat (Cathaedulis) use is a major cause of driver error and crashes [11]

So, the purpose of this study was aiming to assess the anatomic pattern of bone fracture and outcome of the injury in the road traffic accident injuries visiting Tikur Anbessa Specialized Hospital (TASH) and scanned with Computed Tomography (CT).

1.2 STATMENT OF THE PROBLEM

According to the World Health Organization (WHO) (2004), globally, more than 1.23 million people die due to RTC every year, while the number of injured people is as high as 50 million. If trends in RTCs continue as they are now, it is estimated that road traffic deaths and injuries could rise 65% by 2020. Further, most of the deaths and injuries (80%) will occur in low- and middle income countries [4, 15].

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 [4]. Injury is more common among men and among persons aged 15–44 years [4]. In Africa, 28.3 per 100,000 die in collisions. In Ethiopia, a country with a small vehicle population ratio, 95 deaths per 10, 000 vehicles were registered between 2007 and 2008 [16].

Ninety percent of the world's fatalities on the roads occur in low- and middle-income countries, even though these countries have approximately 54% of the world's vehicles [17].

In Ethiopia, road traffic accident has been one of the top ten causes of death. For example, in 2013, the number of people killed by road traffic accident was equivalent to those who died due to malarial (which is 9th cause of death) throughout the country. Road traffic deaths and injuries have therefore been the key public health and development challenges of the country and will continue to adversely affect the livelihood of community and the economy of the country unless effective measures are taken to control the problem [18].

The intention of this study was to assess CT pattern of bone fractures and outcome of road traffic injuries coming to department of radiology in TASH. To the level of my knowledge there is no such a study assessing CT pattern of bone fracture and outcome of the accident of RTA conducted in Tikur Anbessa Specialized Hospital, Addis Ababa and in other site of the country. This study give the over whole patterns of bone fracture in skeletal system, body regions and out comes the accident to be used as baseline information for further research done in the future. So that it can be subsequently used by national road safety coordination office to take road safety measures and stake holders and health service provider to identify priorities.

1.3 Significance of the study

Road traffic accident is extremely common in developing countries and commonest cause of disability and mortality. The burden is also high in Ethiopia and one of the leading cause mortality of trauma from sub-Saharan countries. Data on pattern of bone fractures and commonly affected skeletal system will help for focused orthopedic and other surgical management of patients; eventually minimize the morbidity, disability and mortality of the victims. The outcome of the study will help to anticipate possible pattern of fracture and enhance management as well as it will help for policy makers to draft regulations and policies to minimize possible cause of road traffic accidents.

1.4 Scope of the study

This study focused on patients who sustained road traffic injuries. From those who sustained road traffic accidents and came to the Tikur Anbessa Specialized Hospital from every corner of the country were the sources of study population. Patients who included in the study are those who sustained road traffic injury and had bone fracture and also send to department of radiology to be scanned with CT as investigation modality. All included population in the study has bone fractures.

2. LITERATURE REVIEW

Motorization has enhanced the lives of many individuals and societies, but the benefits have come with a price. Although the number of lives lost in road accidents in high-income countries indicates a downward trend in recent decades, for most of the world's population, the burden of road-traffic injury in terms of societal and economic costs is rising substantially. [19]

Globally around 5.1 million people died following injury [14]. From this deaths 1.2 million people die in road crashes annually and 20 to 50 million more survive with injuries worldwide. It is a major but neglected public health challenge that requires concerted efforts for effective and sustainable prevention. For every death occur from trauma, three victims suffer permanent disability. [4].

WHO projects 8.4 million people will die annually following injury by 2020. Furthermore, according to the World Health Organization, the number of road traffic deaths is expected to increase by 80% up to 2020. A Road traffic accident is being third to ischemic heart disease and the commonest causes of mortality and morbidity world-wide. It is the fifth cause of mortality in the developed countries and second in the developing countries [14, 20, 21].

WHO in 2013 showed that more than 1.24 million people die every year as a result of road traffic injuries, making it "the eighth leading cause of death globally, and the leading cause of death for young people aged 15–29". Based on current trends, it is projected to be the fifth leading cause of death globally by 2030 [7].

Those who are affected by injury or killed are mostly people in their productive age. The highest burden of injuries and fatalities is borne disproportionately by poor people, as they are mostly pedestrians, cyclists, and passengers of buses and minibuses. [9]

The road accidents are happening most often due to the reckless and speedy driving of the vehicles, not obeying or following traffic rules, the attitudes of the "right of the mighty" bigger vehicles toward the smaller vehicles, overburdened or overcapacity hauling of public and transport vehicles, poor maintenance of the vehicles, drunk and driving, driver fatigue, and above all the appalling condition of the already chocked roads with every inch encroached by unauthorized persons and properties . According to study done in India, the commonest cause of

road traffic injury was fault of driver which accounts for 78.5%. The second cause of injury identified in this study shows fault of pedestrian (2.2%) followed by defect of motor and defect of road each constituting 1.8% and 1.3% respectively. [22]

RTAs have been the principal causes of fatality and disability in African countries mainly among those aged 5–29 years. Every day in Africa, about 2,400 individuals die from injuries of which is the leading cause of injury, occurs due to road traffic crash. In the African countries deaths from road traffic injuries are 40% higher than in all other low and middle income countries and 50% higher than the world average [10, 23].

In descriptive study, conducted in Dibrugarh district which is situated in upper Zone Assam, one of the seven north-eastern states of India; conducted from September 1998 to August 1999 showed the prevalence of RTAs 39.04 per 100000 populations, injury rate 55.60 per 100000 populations and mortality rate 5.48 per 100000 populations. In this study, a total of 463 RTAs occurred which caused 659 (91%) injury and 65 (9%) death. The mean age of affected persons is 31 years with male: female ratio of 7.13:1 (male 88%). More than two third (73%) of victims are in the age group of 15-44 years. Only 10% victims are under 15 years of age group. Most common injury patterns are head and neck with extremities (45%) followed by extremities (15%) and head and neck + chest + abdomen (12%). The single vehicle accident (self accident or non-collision type) comprises 42% of all the RTAs. Thirty four percent of accidents are collision type and almost one quarter (24%) of accidents involves the pedestrian. The single vehicle accident is mostly caused by M.Cycle (19%) and M.Car (17%). Three-fourth of the pedestrian accident is caused by M.Car (18%), followed by M.Cycle (4.5%). The study has shown that head and neck (66%) is commonly involved in an accident, followed by upper and lower limb (44% and 41% respectively). The least affected sites are chest (14%), abdomen (3%) and perineum (1.5%). [24]

In retrospective study done between July 2013 and July 2014 in Nigeria of which two hundred and sixteen bone fracture cases were reviewed, and the fractures were observed to have occurred more in males than in females, and the most commonly affected patients are in the range of 21-40yrs. Majority of the fractures were observed in the femur, and least in the patella. Road traffic accident (RTA) was observed to be the leading cause of bone fractures. Fractures were observed

to occur more in the lower extremity with the femur being the most fractured bone accounting for 49 (22.69%) followed by the tibia/fibula 37 (17.13%). The most fractured bone in the upper extremity was the humerus 28 (12.96%) followed by the clavicle with 20 (9.26%) of the fractures. Skull fractures accounted for 8 (3.70%), mandible 2 (0.83%). The radius constituted 6 (2.78%), while 2 (0.93%) of the fractures occurred in the ulna. The study also showed that 4 (1.85%) phalangeal fractures, 2 (0.93%) spinal, 25 (11.57%) tibial and 8 (3.70%) fibula fractures were observed during the period. The foot comprised 4 (1.85%), the pelvis 3 (1.39%) and the ribs 9 (4.17%) of the entire fractures respectively. The least fractured bone was the patella with a single case recorded, accounting for (0.46%) of the total fractures studied [17]. Two hundred and five (205) bone fractures were classified as either simple or compound. Simple fractures accounted for 116 (56.59%) while compound comprised 89 (43.41%). The study also revealed that of 116 simple fractures recorded, 42 (36.21%) were transverse, 7 (6.03%) malunited, 22 (18.97%) oblique, 36 (31.03%) communited and 9 (7.75%) unspecified type of fractures respectively, while the compound fractures accounted for 24 (26.97%) transverse, 6 (6.74%) malunited, 19 (21.35%) oblique, 35 (39.32%) communited and 5 (5.62%) unspecified fracture types respectively[25].

In the study done south west Ethiopia, wolaita sodo 240 road traffic accidents were evaluated and 75 (31.2%) were due to motor cycle crash followed by 52 (21.7%) due to Isuzu and 34 (14.2%) due to Bajaj related accident. Out of 240 victims of road traffic injury, 110 (45.8%) were passengers, 81 (33.8%) were pedestrians and 45 (18.8%) were drivers. Of all victims reaching hospital, 23 (6%) died, 48 (12.5%) survived with long term disability on discharge and 313 (81.5%) survived without long term disability on discharge [26].

In institutional based cross-sectional study conducted at the Emergency Department of Tikur Anbessa Specialized Teaching Hospital, Addis Ababa, Ethiopia from April 30, 2013, to August 30, 2013 a total of 356 injury victims were involved in the study. The study showed Males outnumbered females by a sex ratio of 3:0.7. More than 76% of these patients were found to be between the age of 20 and 59. In this study, the incidence of road traffic injuries was 36.8%. The majority of these victims were pedestrians which accounts for 94 people (71.7%), followed by passengers who consist of 17 people (13%) and drivers which constitute 16 people (12.2%), and the rest were assistants of the drivers. People living in urban areas accounted for 74% of the road

traffic injury. [19].The majority of RTI cases 46 (35.1%) used minibus as a mode of transportation to come to the ED of the hospital after the event of the injury.

The most frequent locations of the injury were head, neck, and face; 57 (43.5%) of patients had injuries in these areas. On top of that 34 (25.9%) and 17 (12.9%) of the patients had injuries involving the lower extremity and the upper limbs, respectively. For the remaining RTI victims, the injury involves the pelvic, the chest, and the spinal cord in 15 (11.4%), 6 (4.5%) and 2 (1.5%) of the cases correspondingly. [27].

In other study done at "Tikur Anbessa", teaching Hospital in the assessment of adult limb fracture , x-ray proven bone fracture of a total of 422 patients who attended the surgical and orthopedic outpatient emergency (OPD) were studied over six months period from March to August, 2007. Multiple causes are responsible as to the etiology of trauma were identified. Road traffic injury constitutes the largest proportion, 202 (47.9%) of injured patients. Most of the study subjects involved in RTA was males, 151 (74.8%). Among these 202 patients with RTA, the highest age group mostly affected was between 15-25years (35.1%). Injuries to the upper limb alone accounted for 41.1% whereas the proportion of injury for the lower limbs was 57.4% and both upper and lower extremities were involved in 1.5%. The highest frequency of fractures occurred in the femur 32 (15.8%) followed by tibio-fibular 29 (14.4%) and humerus 26 (12.9%). Isolated patellar fracture occurred in 22 (10%), Ankle fractures accounted for 9 (4.5%) patients; Pelvic fracture was seen in 6 (3%) patients. There were 5 combined femur and tibiofibular fractures. The majority of fractures were closed fractures, accounting 166 (82.2%). Open fractures were smaller in number and proportions only responsible for 36 (17.8%) [28].

3 OBJECTIVES

3.1 General objective

Aimed at determining the CT pattern of bone fractures and outcomes of the accident in patients sustaining RTA and coming to department of radiology in TASH

3.2 Specific objectives

1. To determine patterns of fractures in body regions and skeletal systems
2. Describe bone fractures in frequency
3. Assess the outcome road traffic injury
4. Assess correlation of each variables

4. METHODS AND MATERIALS

4.1 Study area and period

The study was conducted at TASH, College of health science, Addis Ababa University, Addis Ababa Ethiopia. TASH is located in the Ethiopian capital city, Addis Ababa, and is the largest referral as well as the main teaching hospital in the country. The study was conducted from January-August, 2017 G.C.

4.2 Study design

Institutional based retrospective cross-sectional study was conducted at department of radiology, Tikur Anbessa Specialized Hospital, Addis Ababa, Ethiopia too meet the study objectives.

4.3 Population

4.3.1 Source population

The source population was all patients who sustained road traffic accident and evaluated in TASH.

4.3.2 Study population

The study populations were all patients who sustained road traffic accident, evaluated in TASH and who have been sent to department of radiology for CT scan and had bone fracture on CT scan evaluation.

4.3.3 Inclusion and exclusion criteria

4.3.3.1 Inclusion criteria

All patients who sustained car accident during the study period; had CT scan for bone fracture evaluation and bone fracture.

4.3.3.2 Exclusion criteria

Patients who sustained other causes of trauma apart from RTA and those sustained RTA but who had no CT scan. Those patients who sustained RTA but had no bone fracture are also excluded from the study. Patients who had CT scan but no documentation of the CT report by radiology resident or consultant radiologist or available image for assessing for fracture was also excluded from the study.

4.4 Sampling technique and sample size

The study was retrospective cross sectional study which involves all patients who sustained road traffic accident and came to department of radiology for CT scan during the study period from January, 2017 to August 2017.

4.5 Data collection procedure

Relevant clinical information such as socio- demographic data, mechanism of road traffic injury, vehicles causing the accidents, patterns of bone fracture, outcomes of the accidents and other clinical information had been filled on questionnaire paper with reading finding of the CT by senior radiology resident and consultant radiologist. Data were collected retrospectively by the principal investigator from patient record chart and reports of CT in the card room for the purpose of legal issues.

4.6 Data analysis and interpretation

The collected data on prepared questionnaire was entered, after being encoded and analyzed using SSPS version 22 statistical package. Data cleaning was performed to check accuracy, consistency and missed values. Any logical and consistency error identified during data entry was corrected after revision of the original completed questionnaire. The cleaned and edited data was analyzed by the SPSS version 22 to generate results in frequencies, tables and figures of different variables.

4.7 Ethical considerations

Data collection was taken after getting permission from ethical committee of the department of radiology and Addis Ababa University. Approval from IRB was obtained and formal letter were written from radiology department to the Card archive before commencing the data collection process. Then, for legal purpose data collection of individual record had taken place in the chart room. After completion of data collection, medical records (charts) were returned back to their original place properly

5. RESULT

5.1 Demographic status of victims RTA:

In this study, a total of 131 cases of road traffic trauma victims were reviewed. From all of the victims evaluated in the study 95 (72.5%) were male and 36 (27.5%) were female with male to female ratio of 2.64:1. The mean age of affected individuals was 34.1 years with SD of 14.6. As it is reported in figure1, the commonest age group affected by road traffic accidents was those lie between 20-29 years (33.6%), followed by 30-39 years (23.7%). The minimum age seen in the study was 13years and those below the age of 20years were found to be the least (11.5%). Those of patients who were between the age 40-49 years and above 50 years were 16% and 15.3% respectively. Mostly the victims of the RTA are from the urban 81(61.8%) and those from the rural were 50(38.2%). Most of the RTA victims were those coming from Oromia region (32.8%) followed by those coming from Addis Ababa (28.2%). The least of the RTA victims were those coming from the Tigray and Gambella each of them constitutes 1cases (0.8%) each. The next lower cases were seen in Afar and Benishangul Gumuz each of them constitutes of 2 cases (1.5%). (See table 2 and 3)

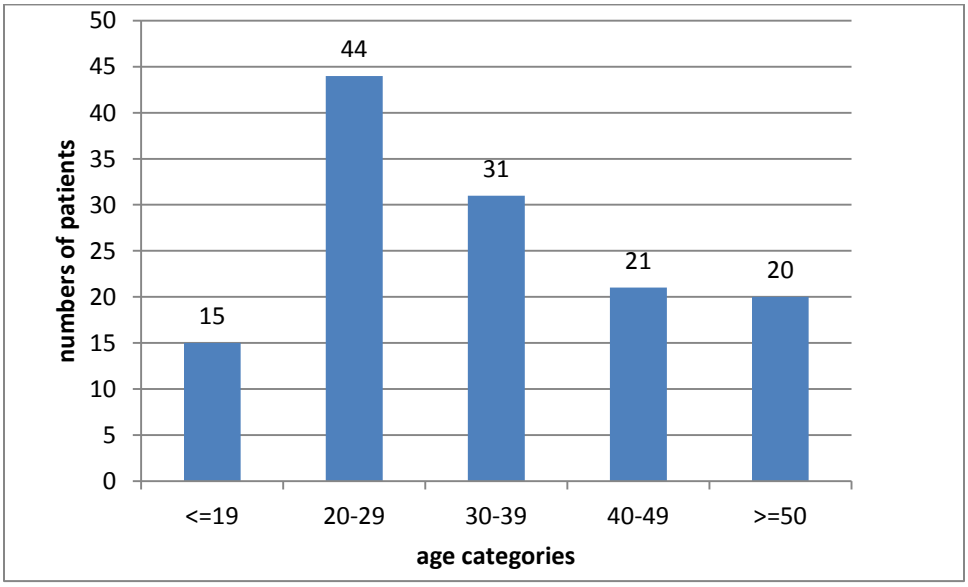

Figure 1 Age category distribution of RTA victims in Tikur Anbessa Specialized Hospital, Addis Ababa, Ethiopia, from January –August 2017 (N = 131)

Table 1 Residency of patients who sustain RTA injury in regions in Tikur Anbessa Specialized Hospital, Addis Ababa, Ethiopia, from January –August 2017 (N = 131)

S.no	Regions	Frequency	Percentage
1	Tigray	1	0.8
2	Afar	2	1.5
3	Amhara	31	23.7
4	Oromia	43	32.8
5	SNNPR	14	10.7
6	Benishangul	2	1.5
7	Gambella	1	0.8
8	Addis Abeba	37	28.2
9	Total	131	100.0

Table 2 Percentage of gender and mean age of traumas victims in Tikur Anbessa Specialized Hospital, Addis Ababa, Ethiopia, from January –August 2017 (N = 131)

Gender		Frequency	%	Mean Age	STDV.
1	Male	95	72.52	33.86	13.44
2	Female	36	27.48	34.83	17.59
3	Total	131	100.00	34.13	14.63

5.2 Types of vehicles causing trauma and role of patient during the accident

Minibus was found to be the leading cause of road traffic accident accounting 40 (30.5%) and followed by heavy truck 12(9.2%) patients. The vehicles included in the category of others causing trauma includes: ambulance, pick up, unidentified and heavy cars (machinery like dozers) at work field. The other cause of road traffic comprises bus, Bajaj, motor cycle, private automobile, Isuzu and others. The accidents caused by bus and Bajaj constitutes the third commonest cause of injury accounts 8.4% each. The other cause of vehicles causing trauma in the category of other constitutes 17.6%. Taxi is also the one of the vehicle causing accidents which constitutes the 5.3% of the cases. (See table 4). Most of the victims of the accident were passengers accounting for 59(45%) followed by pedestrian which accounts for 46(35.1%) of the cases. The others victims were drivers and driver assistants which accounts 16.8% and 3.1% of the cases respectively. (See table 4 and 5)

Table 3 Type of vehicle that cause road traffic accidents in Tikur Anbessa Specialized Hospital, Addis Ababa, Ethiopia, from January –August 2017 (N = 131)

S.no	Vehicles	Frequency	Percentage
1	Minibus	40	30.5
2	Bus	11	8.4
3	Private Automobiles	9	6.9
4	Motor cycle	10	7.6
5	Bajaj	11	8.4
6	Heavy Trucks	12	9.2
7	Taxi	7	5.3
8	Isuzu	8	6.1
9	Others	23	17.6
10	Total	131	100.0

Table 4 Role of the victims during the accident in Tikur Anbessa Specialized Hospital, Addis Ababa, Ethiopia, from January –August 2017 (N = 131)

S.no	Role of the patients	Frequency	Percentage
1	Passenger	59	45.0
2	Pedestrians	46	35.1
3	Driver	22	16.8
4	Driver Assistance	4	3.1
5	Total	131	100.0

Concerning the mode of trauma, the accidents were occurred by single vehicle or as a result of collisions between vehicles. According to our study most of the accidents were occurred following of collisions between vehicles and pedestrians which accounts for 46 (35.1%) of the accidents. The second commonest cause of the RTA was collisions between vehicles which contribute for 44(33.6%) of accidents, followed by accidents occurred as a result of rolled over vehicles (24.4%). Collisions of vehicles with geographic obstacles and those fallen from a

moving car constitutes 3.8% and 3.1% respectively. Most of the accidents were occurred as a result of single vehicle accidents which account for 85(64.9%) of victims of the RTA. From the mode of trauma falling from a moving car was the least cause of accidents causing 4 (3.1%) of injuries. (See the table 6).

Table 5 Mode of road traffic accident in Tikur Anbessa Specialized Hospital, Addis Ababa, Ethiopia, from January –August 2017 (N = 131)

S. no	Mode of trauma	Frequency	Percent
1	Collision between Vehicle	44	33.6
2	Collision between vehicle and pedestrian	46	35.1
3	Collision between vehicle and obstacles	5	3.8
4	Rollover	32	24.4
5	fall down from moving car	4	3.1
6	Total	131	100.0

5.3 Pre hospital stay of the patient

Since these hospital is tertiary hospital and the biggest hospital in the country patients are coming from each corner of the country. In addition most of patients were coming to the hospital after they were treated in other hospital as referral cases. So in our cases patients reach the hospital as fast as within few minutes (less than 1hour) and as high as more than a month. Most of the patient reach hospital within the 1st two weeks (2day to 2 weeks) constituting 71(54.2%) patients and followed by those coming within the first 24hrs 55(42%) after trauma. More than 96% of the cases reach the hospital with in the first two weeks. Patients reached the hospital after one month was the least and constitute 2(1.5%) cases. The others were reached the hospital with in 3rd and 4th weeks of post trauma. See table 7 below.

Table 6 Pre hospital stay after the RTA accident in Tikur Anbessa Specialized Hospital, Addis Ababa, Ethiopia, from January –August 2017 (N = 131)

S.no	Pre hospital stay	Frequency	Percentage
1	less than 24hrs	55	42.0
2	1 week up to 2weeks	71	54.2
3	3weeks up to 4 weeks	3	2.3
4	Greater than one month	2	1.5
5	Total	131	100.0

5.4 patterns of bone fracture

All of the patients included in the study had either single or multiple bone fracture. The types of fractures were also either simple or compound bone fractures. From those evaluated in the study most of them had multiple bone fracture which accounts for 71 (54.2%). Those who had single bone fracture contribute for 60 (45.8%). The commonest bone fractures encountered were simple fracture which constitutes 110 (84%) and followed by compound bone fracture 21(16%) of the cases. (Looks table 8).

Table 7 Numbers and patterns of bone fracture in Tikur Anbessa Specialized Hospital, Addis Ababa, Ethiopia, from January –August 2017 (N = 131)

	No and pattern of fracture	Frequency	Percentage	Cumulative Percent
Number	Single	60	45.8	45.8
	Multiple	71	54.2	100.0
	Total	131	100.0	
Pattern	Simple	110	84.0	84.0
	Compound	21	16.0	100.0
	Total	131	100.0	

From the bone fractures, lower limb fracture accounts for the majority of the cases with the frequency of 47(22.3%) of individuals followed by spine which constitute the 46 (21.8%) and upper limbs (19%) respectively. The next commonly fractured bones were pelvic bone and head constitutes 16.6% and 15.2% of the cases respectively. Fracture of the ribs seen as the least (5.2%) region of all skeletal system. When we evaluated as region of the body fractured as head and neck, rib, vertebrae, upper limb and lower limb the commonest fractured body region was head and neck(23.2%) followed by lower limb(22.3%) of the cases. Rib fracture was found to be the least when compared with other body regions. Pelvic bone fracture was also seen commonly fracture which constitute 16.6%. From fracture of the pelvic bone fracture of ramus was the commonest of all site followed by iliac and acetabullar region. (See figure 2and 3)

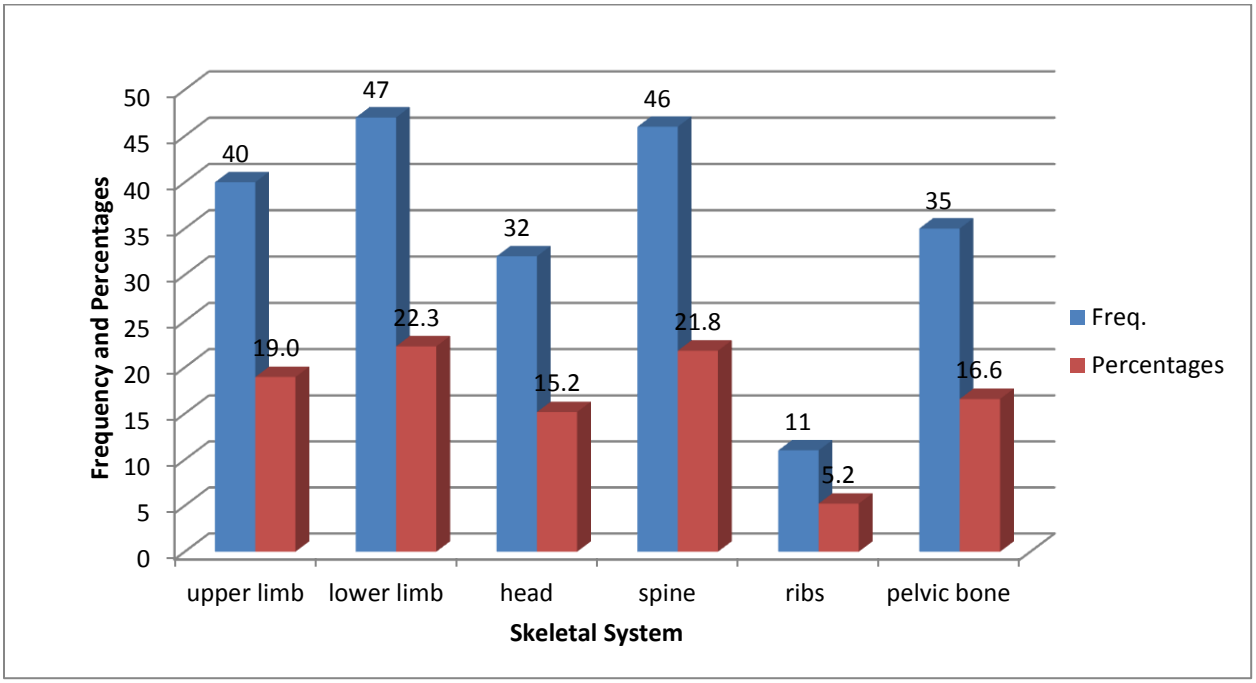

Figure 2 Frequency of bone fractures in skeletal system in Tikur Anbessa Specialized Hospital, Addis Ababa, Ethiopia, from January –August 2017 (N = 131)

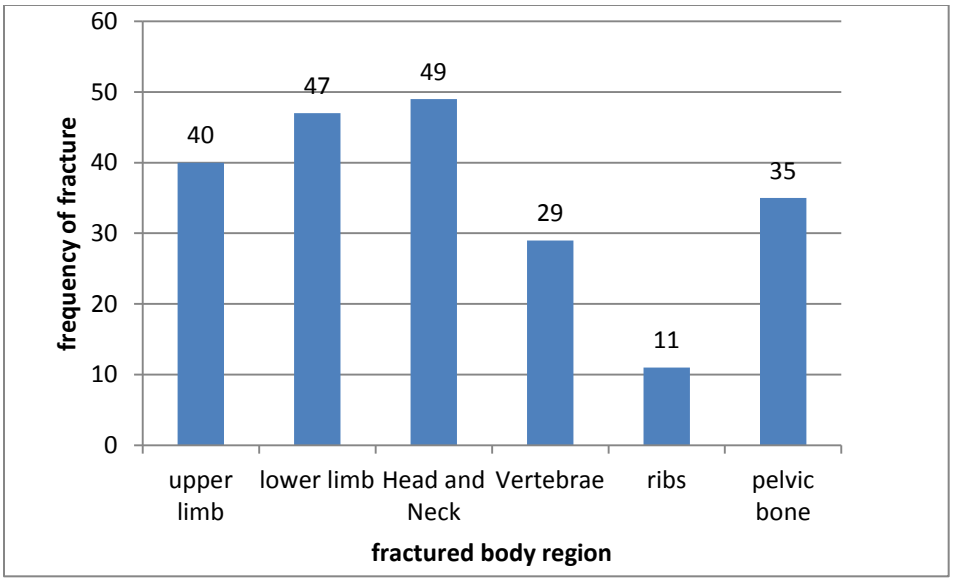

Figure 3 Frequency of bone fracture in body regions in Tikur Anbessa Specialized Hospital, Addis Ababa, Ethiopia, from January –August 2017 (N = 131)

A fracture of upper limb was the commonest fractured bone following lower limb and spine. The most commonly fractured bone in the upper limb was the clavicle followed by radial bone which constitutes frequency of 10 and 7 respectively. The least fractured bone in this limb was metacarpal and phalengeal bone. (See figure 4.)

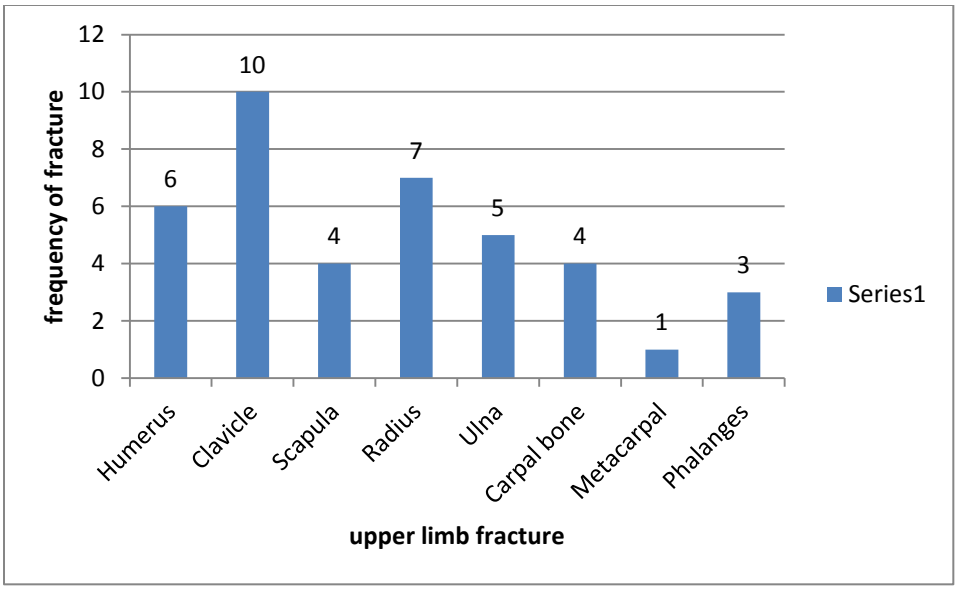

Figure 4 Frequency of bone fracture in upper limb in Tikur Anbessa Specialized Hospital, Addis Ababa, Ethiopia, from January –August 2017 (N = 131)

Regarding fracture of lower limb the commonly fractured bone was femur (17cases), followed by tibia (14cases). The next commonly fractured bones in the upper limb were ulna, scapula and carpal bones. Fracture of tarsal bone and phalanges were the least. Patellar fracture was seen in three cases of RTA victims. (See figure 5.)

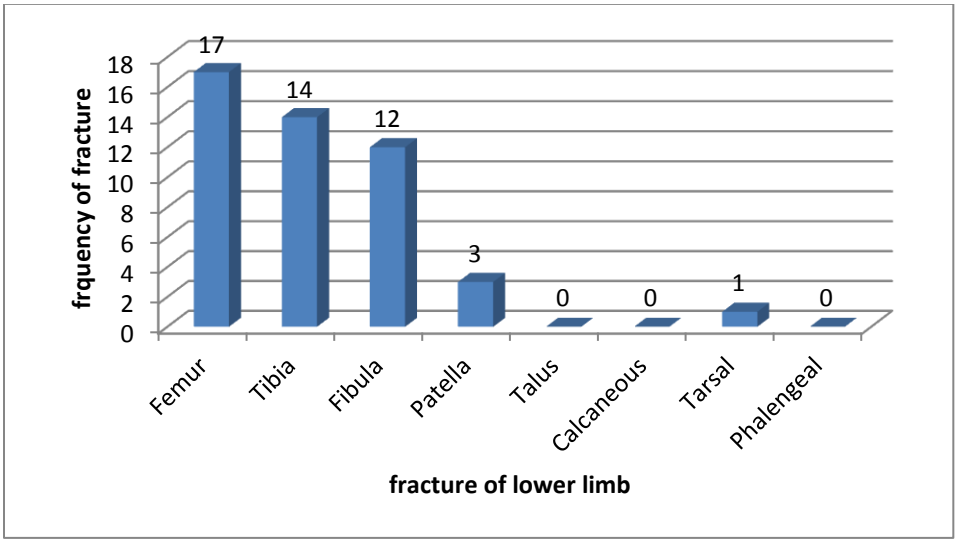

Figure 5 Frequency of bone fracture in the lower limb in Tikur Anbessa Specialized Hospital, Addis Ababa, Ethiopia, from January –August 2017 (N = 131)

Fracture of the spine (cervical, thoracic, lumbar and sacrococygeal bone) was the second most common fracture following the lower limb. From the spine fracture, fracture involving the

cervical spine (17 cases) was the commonest fracture followed by sacrococygeal bone (13 cases). The next fractured vertebra bone seen was thoracic vertebrae (10 cases). The least fractured vertebra bone seen was lumbar vertebrae (6 cases). (See figure 6).

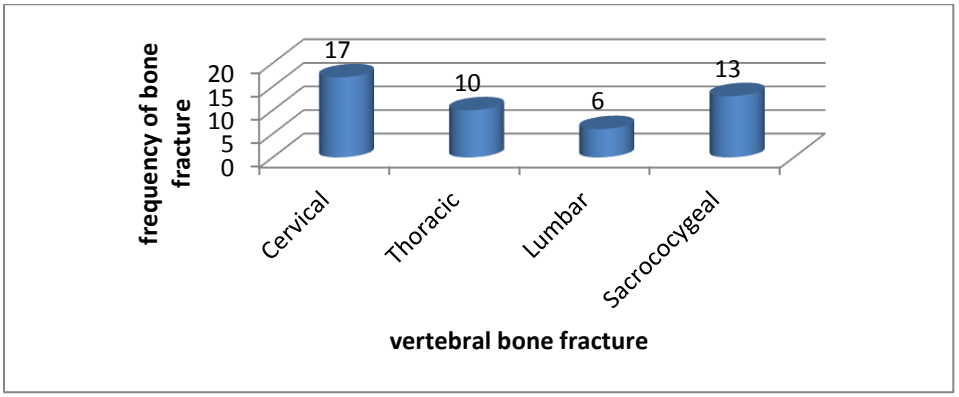

Figure 6 Frequency of vertebral bone fracture in Tikur Anbessa Specialized Hospital, Addis Ababa, Ethiopia, from January –August 2017 (N = 131)

Concerning specific bone fracture seen in the study vertebral bone fracture (21.8%) were the leading followed by pelvic bone fracture 35(17%), fracture of skull bone 21 (10%) and femur and cervical bone each constitute 17 (8%) of the cases. The less frequently fractured bone are patella and upper limb phalange fracture which constitute each 3 (1.4%) and followed by tarsal and metacarpal bone each constitute 1(0.5%) of the fractures. (See table 8 below).

From those patients who had multiple bone fracture involving head+ vertebral + extremity account ± ribs accounts 9(6.9%), both extremity upper and lower limb fracture constitutes 8(6.1%), vertebral bone + pelvic bone fracture constitues18(13.7%) and pelvic bone + lower limb fracture accounts 8(6.1%).

Table 8 frequency of bone fracture in each bone in Tikur Anbessa Specialized Hospital, Addis Ababa, Ethiopia, from January –August 2017 (N = 131)

Bone Fracture	Frequency	Percentage
Pelvic Bone	35	16.6%
Skull	21	10.0%
Femur	17	8.1%
Cervical	17	8.1%
Tibia	14	6.6%
Sacrococygeal	13	6.2%
Fibula	12	5.7%
Facial	11	5.2%
Ribs	11	5.2%
Clavicle	10	4.7%
Thoracic	10	4.7%
Radius	7	3.3%
Humerus	6	2.8%
Lumbar	6	2.8%
Ulna	5	2.4%
Scapula	4	1.9%
Carpal Bone	4	1.9%
Upper Limb Phalanges	3	1.4%
Patella	3	1.4%
Metacarpal	1	0.5%
Tarsal	1	0.5%
Total	211	100.0%

5.5 Outcome of the patient and hospital stay

Patients who sustained RTA injury and who were come to Tikur Anbessa Teaching Hospital were completed their management, transferred to other hospital, on follow up or discontinue their management by themselves. From 131 Patients who sustained road traffic accidents most of them are on follow up which accounts for 55(42%) followed by those completed their course 51(38.9%), transferred to other hospital for management and follow up 21(18.3%) and those discontinue their follow up constitute 1(0.8%).

Most of the patients admitted to emergency department or wards stay in the hospital for less than a week which accounts for 86(64.9%) of the cases. This is followed by one to two week hospital stay contributes for accounts 24(18.3 %), two to three week accounts for 8(6.1%), three to one month accounts for 5(3.8%) and those stay in the hospital for more than one month constitute 8(6.1%) of cases. (See figure 7)

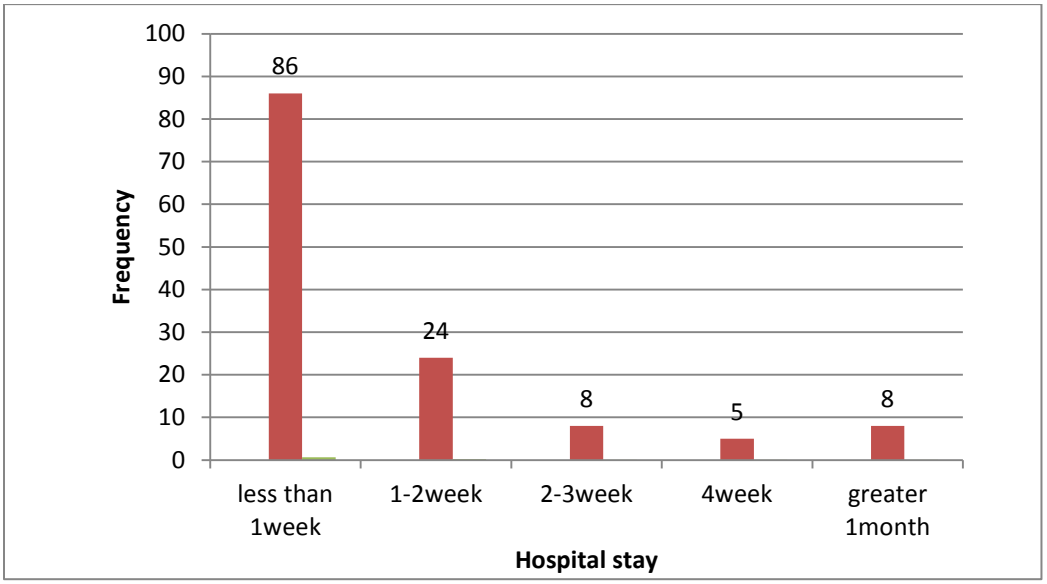

Figure 7 Duration of hospital stays of patients sustain RTA injury in Tikur Anbessa Specialized Hospital, Addis Ababa, Ethiopia, from January –August 2017 (N = 131)

Most of the patients who sustained road traffic accidents had impairments during discharge or those who have follow up accounting for 80 (61.1%) of the cases. The commonest outcome of the patients following the accidents had movement impairment which accounts for 47(35.9%). The second commonest outcome of the patients was end with neurologic impairment account for

33(25.2%) of the cases. Death was one of the outcome the accidents accounting for 10(7.6%) of the patients. The other condition of the patients constitute those whose patients condition is not clearly recorded and on the same condition when they were transferred to others hospitals. (See figure 8.)

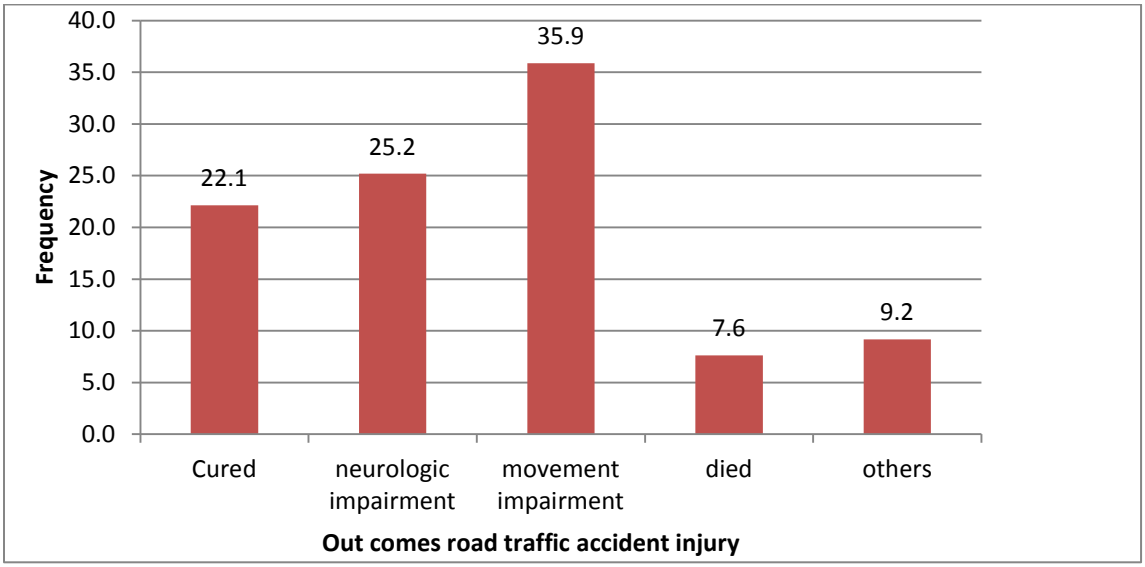

Figure 8 Outcomes of patient sustaining RTA in hospital or at the time discharge in Tikur Anbessa Specialized Hospital, Addis Ababa, Ethiopia, from January –August 2017 (N = 131)

5.6 Correlation of Variables

This study also showed, outcomes of patients are significantly correlated with numbers of fracture occurred at p- value of 0.039. Types of fractures are strongly correlated with patient role and number of fracture at p- value of 0.001 and 0.007 respectively. In the study gender, age, types of vehicles and other variables didn't shows statistically significant correlation with type fracture, number fracture and outcomes of the patient. (See table 9.)

Table 9 Correlation of outcomes of the patient, type of vehicle, patient role, number of fracture and types of fracture in Tikur Anbessa Specialized Hospital, Addis Ababa, Ethiopia, from January –August 2017 (N = 131)

S.no	Correlations	1	2	3	4	5
		Types of Vehicles	Outcomes	Number of Fructures	Types of Fructures	Patient Role
1	Types of Vehicles		-0.01	0.07	0.08	-0.10
2	Outcomes			0.180*	0.11	0.03
3	Number of Fructures				0.235**	0.11
4	Types of Fructures					0.291**
5	Patient Role					

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

6. DISCUSSION

This study reviewed one hundred thirty one cases with bone fracture. Out of those who sustained road traffic injury during the study period shows fracture were more occurred in male (72.5%). This result is relatively comparable with similar study done in India (88%), walaita hospitals (77.6%) and TASH (74.8%). This could be due working habit, as more male works in the fields and more mobile than females [24, 26, 28]. The study also showed the commonest age range involved by RTA was in between 20-29 years 33.6% of the cases. Most of the accidents occurred in the productive age groups (20-49years) accounting for 73% of the total trauma. This result is consistent with similar study done in India (73%) and Tikur Anbessa (69.7%). This result shows most of affected patients are in the productive age groups which is burden for the family and the country. The study was also comparable with other study done in wollaita which shows (65%). [24, 26, 27].

The study also shows the commonest people sustaining RTA were those from the urban areas which constitute 61.8% of the accident. This result is similar with study done in wollaita (61%) and comparable with study done in Tikur Anbessa (74%). In addition, the commonest regions affected by the accidents were those from Oromia region followed by Addis Ababa and Amhara region. This could be due to the population size of the regions and relatively these areas are closer to the capital city of the country where the hospital is located [26, 27].

The commonest cause of the accident in the study was minibus (30.5%), followed by heavy truck (9.2%) and bajaj and buses each account for 8.4%. This is relatively comparable with study done in Tikur Anbessa Teaching Hospital (35.1%) of the cause of the trauma was due to minibus. The other study done wollaita hospital show minibus (10.8%) is much lower than our study rather motor cycle injury is the commonest of injury there. This difference may be associated with widely used motor cycles in the region with adolescents and other communities as a means of main transport in the community and financial income or difference in environmental setup [26, 27].

The commonly affected individuals were found to be passengers (45%) followed by pedestrians (35.1%) and drivers (16.8%). This result is also consistent with study done in wolliata hospital which accounts passenger (45.8%), pedestrian (33.8%) and drivers (18.8%). But in other study

done in TASH, in emergency depart from April 2013- to August, 2013 by systematic sampling of 356 patients by Bewket et al showed the commonest victim was found to be pedestrian(71.7%) and followed by passenger(13%) and drivers (12.2%).[26,27]. This shows there is inconsistence between the two studies. This could be partly attributed by rapidly increased numbers of vehicles, urbanization and to some extent with number of the study sample and in our study population only those having CT scan was included in the study.

Regarding patterns of bone fracture this study shows most of the fracture were multiple fractures (54.2%) and closed fracture (84%) types. This result consistent with study done in Tikur Anbessa Hospital on adult limb fracture patterns by Daniel Admassie et al shows 82.2% of fractures were closed type [28].

Concerning bone fracture, our result showed the commonest fractured bone was in the lower limb (22.3%), followed by spine (21.8%), upper limb (19%), pelvic bone (16.6%) and head and facial bone (15.2%). When the fracture pattern was evaluated in body region the commonest region affected was head and neck (23.2%), followed by lower limb (22.3%), upper limb (19%), pelvic bone (16.6%) and vertebrae (thoracic, lumbar and sacroccocygeal bone) (13.7%). The least affected bones in region were ribs (5.2%). When compared with previous study done in Tikur Anbessa Teaching Hospital vertebral bone and pelvic bone fractures were common in our cases. The commonest fracture in that study were also those in the head and neck region (43.5%), followed by fracture occurs in the lower limb (25.9%) and upper limb (12.9%) [26].The difference of the result may be explained with the study population because in our cases the source of the population was those who have CT image and so it might increase sensitivity of bone fracture in this region.

Of all fractures involving extremities femur was the most common fracture seen in the study. Fractures involving upper limb was commonest in clavicle (25%), followed by fractures occurring in the radius (17.5%), humerus (15%) and ulna (12.5%). The least bone fractured in the upper limb was metacarpal bone 1(2.5%). Fracture of lower limb was also followed by fracture of tibia and fibula which account for 29.8% and 25.5% respectively. Patellar fracture is account for 3(6.4%) of fracture involving lower limb and fracture of foot bones constitute the least fractured bone(2.1%).This result is comparable in study done in Nigeria with commonest

bone fracture frequency of femur, followed by fracture of tibia- fibula, humerus, and clavicle. This is also comparable with study done in TASH in adult limb fracture patterns showing commonest bone fracture of femur (15.8%), tibio-fibular (14.4%) and humerus (12.9%). In our case, in addition to this the fracture of clavicle was the leading fracture from upper limb fractures [26, 28]. The reason for this difference could be related to high incidence of fracture in the neck region in our cases.

Fractures in the head region commonly involve skull bone (65.6%) and those involving facial bone constitute 34.4%. Similarly the study done in Nigeria shows skull fracture was more common in the skull [25].

Concerning the outcome of the patients sustaining RTA most of the patients have neurologic or movement impairments during discharge or transfer to other hospital followed by those cured of fracture. The death in the hospital following RTA was accounting for 10(7.6%) of the cases. The result of this study was comparable with study done in wollaita which account for 6% of death and other study India which was 9% [24, 27].

7. Limitation of the study

1- Difficulty of getting patient card in card room.

2- Poor recording system of the patient's chart that makes difficulty of getting relevant information.

3- Relatively small number of the studying sample size

4- Conditions of patients transferred to other hospitals and some patients on follow up were not known to redefine their degree of their outcomes.

8. CONCLUSION AND RECOMMENDATION

8.1 Conclusion

According this study the most commonly affected patients with RTA injury was male with M:F of ratio of 2.6:1. In addition to this, most of victims were those form urban areas and those from Oromia region. The commonly affected population seen was in their productive age's groups (20-49yr) which account 73.3% of the injuries. Most of the RTA victims are also passengers followed by pedestrians.

The commonest car causing the road traffic accidents is minibus which is one of the transports public uses. Single vehicle is the most common cause of the accident with 64.4% of the cases. Out of this the collusion between vehicle and pedestrian contribute the major share of single vehicle injury (35.1%). Most of the patients arrives hospital after 24hrs within the first two weeks followed by those reach within the fist 24hrs the accident occurred.

Most of the fracture following RTA are multiple (54.2%) and closed (84%) type in nature. The commonest skeletal system fractured seen were lower limb followed by vertebrae. When seen in relation to body region affected by fracture, the head and neck were the most commonly affected part of the body by the accident followed by the lower limb. Of all bone fracture, vertebral bone was the most frequently fractured bone of all.

Regarding outcomes of the accidents, most of the patients had movement impairment (35.9%) followed by neurologic impairments (25.2%) at the time of discharge, transfer or on follow up period. Most of the patients discharged from the hospital from the hospital in the first week (65.6%).

8.2 Recommendation

Since road traffic accident the commonest cause of trauma as well as the major cause of morbidity and mortality; similar studies and other studies especially focusing on risk factor identification (like fault of driver, defect of motor vehicle, fault of pedestrian and defects in the road) identification should be widely done and promoted to make a base for targeted policy making.

Road traffic accident should get priority in the country in order to decrease the accident, financial consumption for trauma management and preserve productive people since it is one of the top ten causes of mortality and morbidity as well as the accident predominantly affects economically productive population.

In the study complication like sepsis and DVT were observed in admitted patients specially those who died in the hospital. So clinician should work on prevention and anticipation of such complications.

At last I would like to recommend concerned bodies to offer medical equipment required in the management of patients who have bone fracture especially to the orthopedic center to restore physiologic impairment of fracture and expansion of similar service providing centers in other corner of the country in terms of infrastructure and human resources because patients are coming each corner of the country.

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9. Annex

9.1 Questionnaires

Card number _____Exam type_____

1. Socio demographic data
    a. Name _____
    b. Sex: a. Male b. female
    c. Residency: a. urban b. rural
    d. Marital status: a. single b. married c. others
    e. Educational status:
        1. illiterate
        2. read and write
        3. primary(1-8 grade)
        4. secondary(9- 12)
        5. diploma and degrees
2. Duration of pre hospital stay
    a. <24hr
    b. 1-2wks
    c. 3-4wks
    d. >1month
3. Types of vehicle
    a. Public transport
    b. Private car
    c. Heavy truck
    d. Motor cycle
    e. Bajaj
    f. Others(specify)_____

4. Patient role
    a. Passengers
    b. Pedestrians
    c. Driver
    d. Assistant driver
5. Mode of trauma
    a. Collision b/n vehicle
    b. Collision b/n vehicle and pedestrian
    c. Collision b/n vehicle and animals
    d. Collision b/n vehicle and obstacles (geographic)
6. Imaging Diagnosis (CT)
    a. Is there fracture a. yes b. no
    b. If yes a. single b. multiple
    c. Type of fracture a. Simple b. compound
    d. Anatomical site

        1.

Upper limb	Humerus
	clavicle
	scapula
	Radius
	Ulna
	Carpal bones
	Metacarpal and phalange
	Phalanges

2.

Lower limb	Femur
	Tibia
	Fibula
	Patella
	Talus
	Calcaneous
	Tarsal
	Phalengeal

3.

Skull	
Vertebrae	Cervical
	Thoracic
	Lumbar
	Sacrococygeal
Ribs	
Pelvic bone	

7. Outcome of patient
   a. Completely cured
   b. Disabled
   c. Died on arrival
   d. Died on during discharge