ADDIS ABABA UNIVERSITY

COLLEGE OF HEALTH SCIENCES

DEPARTMENT OF EMERGENCY MEDICINE

MASTER OF EMERGENCY MEDICINE AND CRITICAL CARE NURSING

RESEARCH PROJECT SUBMISSION FORM

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Department of Emergency medicine and critical care

Advisor's Approval Sheet

This is to certify that the thesis entitled "Assessment of prevalence and pattern of extremities injury following motorcycle accident in Dilla University referral Hospital, Gedeo zone , Dilla Town in 2020 G.C.'' is submitted in partial fulfillment of the Msc with specialization in "Emergency medicine and Critical care nursing" to the Graduate Program of the College of Health Sciences of Addis Ababa University and has done by Abel tesfaye, ID No: GSR/3434/11 under my supervision. Therefore, I recommend that the student has fulfilled the requirements and hence hereby can submit the thesis to the Department.

_____ _____ _____

Name of Major Advisor Signature Date

_____ _____ _____

Name of Co advisor Signature Date

Declaration

I hereby declare that this Msc thesis is my original work and has not been presented for a degree in any other university and all sources of material used for this thesis have been duly acknowledged.

Name: _____

Signature: _____

Date: _____

Acknowledgments

First of all I would like to give thanks to Almighty GOD because of; “All things were made by him; and without him was not anything made that was made”.

Secondly I would like to thank Addis Ababa University College of health science Department of Emergency Medicine for giving me this invaluable chance.

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Abstract

Background: Now a day's road transport system is one of the sign of modernization and it has a large economic and social impact**.** In global reports motorcycle is representing high number of road users and has high number of crash statistics. Globally Accidents involving motorcycle riders have varied consequences. Motorcycle riders had increased frequency and severity of extremities injury. Most injuries among motorcycle riders are diagnosed in the extremities. Motorcycles injuries (MCIs) are underreported from developing countries. In Ethiopia Prevalence of motorcycle accident in southern Ethiopia injuries was more than half of all traffic related injury.

Objective: To assess prevalence and pattern of extremities injury following motorcycle accident in Dilla university referral Hospital, Gedeo Zone Dilla Town in 2020 G.C.

Methodology: Institutional based cross sectional study design with retrospective data collection was applied. Censes sampling technique is used. The data was collected by chart reviewing of motorcycle injury patient from from Sep/11/2017 to Aug /7 /2019 by using checklist. The data analysis was done by SPSS version 25 software.

Result and conclusion: - The prevalence of extremities injury was 452 extremities injury per 1000 motorcycle accident population. Lower extremities injury was higher in percentages than upper extremities, which were 56.9 % and 28.9% respectively. Soft tissue injuries were the commonest injury of all, it took 80.3%. Laceration took 28%. From all extremities injury fracture was 45.2%. The percentage of fracture of Tibia, Fibula and femur were 21.8%, 20.1% and 8.4% respectively. Also Ulna, radius and humorous were 5.4%, 5.4%, and 3.3% respectively. The highest type of fracture was transverse fracture, which was 29.7%. The second type of fracture was oblique, which was10.9%. Motorcycle accident is the most devastating injuries that could lead to morbidity even death. Dilla university referral hospital has higher burden of motorcycle accident. Extremities injury was the worrying case of motorcycle accident.

Key words: - extremities injury, motorcycle, pattern, accident.

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Abbreviation and Acronyms

DURH: Dilla university referral hospital

SNNPR: south nation nationality and people.

SPSS: Statistical Package for Social Sciences

STI: soft tissue injuries

GC: Gregorian calendar

MCA: Motorcycle accident

MRN : Medical registration number

1 Introduction

1.1 Background

Injury is any traumatic occurrence which results body malfunction. It will be caused by fall, road traffic accident (RTA), fighting and so on. The mechanisms of injuries will be blunt and penetrating. These results vascular Injuries, compartment syndrome, contusions and lacerations, joint and ligament Injuries and fractures.

Now a day's road transport system is one of the sign of modernization and it has a large economic and social impact (1)**.** In global reports motorcycle is representing high number of road users and has high number of crash statistics. The most common injury is soft tissue injury in motorcyclist (2).

Motorcycle accident is one of RTA. The accident will be caused by driving skill, malfunction of the system, high speed and so on. It causes many distractions in properties, and life. The most frequent trauma mechanisms were accidents involving motorcycle riders (3).

Globally Accidents involving motorcycle riders have varied consequences. Motorcycle riders had increased frequency and severity of extremities injury. Most injuries among motorcycle riders are diagnosed in the extremities. Around one fifth of injuries are Serious injuries occurred mainly in the extremities (3).

Road traffic accidents involving motorcycle riders often result in severe morbidity and mortality. Motorcyclists make up 13% and 16% of all annual traffic-related fatalities and inpatient injuries, respectively, despite being a small fraction of the travel (4).

Extremity injuries are common following motorcycle accident (MCAs). Femur fractures were the most prevalent extremity fractures among the younger patients. The most devastating extremity injuries are traumatic limb amputations following MCAs and are known to be associated with significant morbidity and mortality (5).

Motorcycles injuries (MCIs) are underreported from developing countries. A situation seen in other developing countries, an apparent increase in MCIs has been noted;

previous studies have shown that limb and head injuries are the commonest causes of morbidity and mortality in MCIs (6).

In southern Ethiopia the MCA causes many distraction in life and properties. Prevalence of motorcycle accident in southern Ethiopia injuries was more than half of all traffic related injury, Which is consistent with Sub Saharan Africa and it is larger than Addis Ababa (7).

1.2 Statement of problem

Trauma caused by motorcycle-related injuries is highly increasing. American literature reported that in 2004 the chance of a motorcyclist dying was 34 times greater than that for someone using any other motor vehicle for every mile travelled.

In the United Kingdom a motorcyclist is killed or seriously injured every 665 894 km, compared with 18 661 626 km for cars. If this pattern is repeated in Canada, then this information should be in the public domain to support initiatives for injury prevention (8).

Other report in United States says lower extremity injuries were the most common among motorcyclists, with passengers and drivers having similar risk. Overall, A comparable incidence for lower extremity fractures between drivers and passengers, however passengers with scapular fractures had more femur, tibia and foot–ankle fractures. Both drivers and passengers who sustained a scapular fracture had a greater incidence of clavicle, rib, pelvis, and fibula fractures (9).

Study at srilanka describes Motor bike (71%) accidents are common as are head (69%) and limb injuries (72%). Closed fractures (42%) and long bone displaced fractures (75%) are common among limb fractures. Lower limb injuries (69%) are commoner than upper limb injuries (57%) (10).

Most of the research studies have been focused on head injuries associated with motorbike accidents, however, high burden of injuries and disabilities resulting from lower limb trauma is a hidden catastrophe. Tibia and fibula are frequently injured in motorbike accidents due to their superficiality. Many victims of motorbike accidents also suffer from other disabilities principally owing to the lower limbs involvement. On literature search from our part of the world, it was found that very few studies have addressed this particular issue of lower limb injuries associated with motorbike accidents. (11)

Significantly, more than 90%of motor vehicle crashes occur in the developing world. Injury-related deaths are expected to rise dramatically by 2020. Motorcycle riders have

especially high rates of injury in developing countries (12). Study done in Nigeria states; Motorcycle accidents contribute significantly to the number of road traffic accidents (RTAs) in many cities in southern Nigeria (13). While study in Cameron says Most road traffic crashes involve mainly motorized two wheelers with the most vulnerable road users being pedestrians and passengers on motor bikes. (14)

Study in Ethiopia found that from total 423 road traffic injury, motorcycles were involved in 213 (50.4%). The presence of poor road conditions like loose gravel, steep descent, and rough road was responsible for 44.6% of motorcycle accident injury. (7)

1.3 Significance of the study

However there is an increment in motorcycle accident, the focus is on head injury. There is little study on extremities injury. Because of Extremities injury also causes morbidity and mortality like that of head injury, Attention should be given.

When we know the pattern of injury, we will become ready for the treatment and prevention. So this study aims to show the type of extremities injury of motorcycle accident

This study also explains the prevalence of extremities injury which leads us to understand and anticipate the occurrence. In developing country, the occurrence of motorcycle accident is very high. As the number of accident and injures persons are increasing, attention is needed to find the solution.

This study will provide the data for further researcher. It also lead the hospitals to be ready for the treatment of extremities injury. So this study will focus on the pattern of extremities injury and prevalence.

2 Literature review

Many studies state the prevalence and pattern of extremities injury following RTA. Among RTA motorcycle is stated as major cause of lower extremities injury.

2.1 Prevalence of extremities injury

Experimental study done in Sydney Newcastle and Australia found there was a total of 92 motorcycle riders involved in the study. Almost all were male (93.5%) and the mean age of the riders was 37 years. Most of the crashes occurred on roads with relatively low speed limits, with 77% of crashes occurring on roads with a speed limit of 60 km/h or less. The estimated impact speed was also relatively low, with a mean of 50 km/h. The mean ISS for the riders was 11.4, with 25% of riders sustaining minor injury (ISS b 15) and 75% sustaining major trauma (ISS ≥ 15). According to this study Soft tissue injuries were the most frequently occurring injury, accounting for almost 60% of all injuries. The extremities were the most frequently injured body regions, with more than 30% of injuries occurring in both the lower and upper extremities (2).

A retrospective review was performed of a Level I Trauma Institute Registry in US reported that, lower extremity injuries were the most common among motorcyclists, with passengers and drivers having similar risk. Passengers with scapular fractures had more femur, tibia and foot–ankle fractures. Both drivers and passengers who sustained a scapular fracture had a greater incidence of clavicle, rib, pelvis, and fibula fractures (9).

Study done at National Taiwan Crash by using Database and the National Health Insurance Research describes, Extremity were the most common injury regions which is about 31.37%, followed by the head and face 8.98%. Motorcyclists had a higher percentage of spine and lower extremity injuries (16).

The cross-sectional, observational study was conducted at Jinnah Postgraduate Medical Centre describes 39% patients were with tibia bone injury, who were injured in significantly higher proportion as compared to bone injuries of the other body parts. Out of those, in 26% patients, fibula and tibia injury is occurred. Other lower limb injuries included femur in 16%, metatarsal in 3%, medial and lateral malleolus in 2%, and ankle

and patella accounts 1% of injury. Overall, 66% of injuries in motorbike involved lower limb fractures, which was significantly higher than upper limb injuries (11).

While similar study says, in upper limb injuries, radius bone was injured in 9.2% which was in significantly higher proportion as compared to other upper limb bone injury. Radius along with ulna was fractured in 4%of patients. Other injured bones included humorous 8.3%, clavicle 4%, and metacarpal accounts 1% .Of these 68% were riding motorbike at the time of accident (11).

Descriptive cross-sectional study in São Paulo describes According to the distribution of injuries considering the body segment, 53.9% of the patient has injury on the lower limbs, 41.1% on the upper limbs. From the lower limb 19.1% located on the knee,9.7% on the ankle, and 8.5% and on the leg,7.4% on the foot. In the upper limb injury, 9.6% are on the hand, 8.4% on the shoulder, and 8.2% on the elbow (17).

While Retrospective cross-sectional study done on United Arab Emirates results, 78% of patients had multiple injuries. 79% had injuries of the extremities. Upper limbs were most frequently involved, followed by lower limbs, head and face (15).

2.2 Pattern of extremities injury

Across sectional prospective study done in Yorkshire Region of England Associated injuries included 41.5% ankle fractures, 28.3% are tibia fractures, and 11.3% of them have femoral fractures. 43.4% of injuries are upper limb (18).

The same study at UK describes that13.2% sustained an isolated foot injury. Overall the most common foot injury was a metatarsal fracture, with a total of 49.1% followed by fracture of the talus. 13.2% with fracture of the oscalcis and 11.3% with toe fracture.5.6% of patients had partial foot amputation, and a Lisfranc fracture-dislocation was present in 7.5% of cases. 5.6% of patients have foot compartment syndrome. 26.41% of them are with talar fractures (18).

A retrospective review was performed of a Level I Trauma Institute Registry in US also reported that, 14.3% of drivers had Arm–forearm–wrist–hand injury but passengers are 33.3%. Driver Femur injury is 14.3% while passenger is 19%. 14.3% driver had Tibia

injury whereas passengers are 23.8%. 23.8% of drivers had Fibula injury and 14.3% are passengers. Four drivers 19% had Foot–ankle injury, but 23.8% of injury is the passengers (9).

According to study done in German reported, more than half of (58.6%) injured patients had a significant extremity injury. On average patients with relevant extremity injuries sustained on average 2.1 fractures per case and 4.9% even sustained five or more extremity injuries. Fractures of the femur (16.5%), the tibia (12.6%) and the clavicle (10.4%) were the most common fractures. Open fractures and amputations were more common on the lower extremity while dislocations occurred slightly more often in the upper extremity. The calculation of relationships between trauma mechanism and injury pattern showed that patients who sustained traffic associated accidents had a significantly higher prevalence of extremity injuries than those who had a non-traffic mechanism (20)

A cross-sectional study conducted in Brazil regional reference emergency center of a university hospital that treats motorcycle accident victims reported, 47.3% of motorcycle accident suffered some type of fracture, 24% of which were open fractures. Of the open fractures, 93% occurred in the lower extremities. Concerning the accident circumstances, 31% accidents were characterized as work-related (1).

Descriptive cross-sectional study in São Paulo describes As regards the types of injury, 39.8% wounds, 31.8% bruises, 15.8% closed fractures, and 5.7% exposed fractures, 3.0% dislocations, 1.7% vascular injuries, 1.7% sprains, 0.9% ligament injuries, 0.7% tendon injuries and 0.5% nerve injuries. The fractures location is 16% on the bones of the foot, 15.1% on the femur, 12.7% on the ankle, 11.8% on the bones of the hand, 9.4% on the wrist, 7.5% on the clavicle and 16% distributed around the remaining bones (17).

While Retrospective cross sectional study done on United Arab Emirates describes lower limb injuries, soft tissue damage without bone fracture occurred in 50% of patients. Fractures of both tibia and fibula were seen in 17% of patients followed by femur in 15%, and ankle in 9% (15).

Study done in Pakistan reported, majority 23.25% fractures located on the knee, 21.31% on the ankle, 10.07% on the hand, 37.60% are wounds, 31.00% bruises,15.90% closed

fractures, and 6.20% open fractures. In 47.28% cases fracture was on the bones of the foot, 25.19% on the ankle, 17.05% on the femur, 05.03% fibula/tibia, 03.10% on the bones of the hand, 01.16% on the wrist, 00.77% on the clavicle and 00.38% on the other bones (19).

Cross sectional study in Kenya describes, Tibia /Fibula injury accounts (50.7%),(23.5%) of them have open fracture, and (76.4%) have close fracture. (34.3%) have Femur fracture from those fracture (8.6%) have open fracture, (91.3%) have closed fracture. (3.0%) have Ankle dislocation. (6.0%) of them have Tarsal /Metatarsal fracture and all are closed fracture. (3.0%) Radio ulnar injury, half of them have closed fracture and half of them have dislocation. 1.5% of injury is Knee (Patella), they are half like that of radio ulnar injury (21).

2.2 Age related prevalence

According to a study in UK, York Hospital report,38.6% of patients are young, 46.6% middle aged, and 14.8% elderly riders. Riders were predominantly male; only 11.3% of riders were female. Elderly riders were nearly 2.5 times as likely to sustain fractures as young riders. which indicates that older patients are more likely to sustain fractures than younger patients (23)

A cross-sectional study was conducted in a Brazil regional reference emergency center of a university hospital survey showed that most of the 114 accident victims were young, having a mean age of 28 years and ranging from 13 to 69 years (1).

A cross-sectional study in São Paulo says Considering the distribution of accident victims according to age, study observed 19.0% individuals between 16-20 years of age, (45.0%) between 21-24, (15.0%) between 25-28, (9.0%) between 29-32, (7.0%) between 33-36, (4.0%) between 37-40 and (1.0%) between 41-44 years of age (17).

A cross-sectional study in Iran reported the age distribution of drivers and motorcyclists was different in males and females. While with the increase of age, female drivers experienced a nearly steady decline in RTIs occurrence, males showed visible decreases in injury occurrence during the 35–45 years old age groups. The age groups of the RTIs

were between 18 and more than 45 years old. Drivers are allowed to drive at 18 years old age in Iran. The highest numbers on injuries were found in the 18–24 years old age groups between March 2005 and March 2008. (22)

Cross sectional study in Kenya reported, males accounted for (86.2%) of the victims. The male to female sex ratio was 6.25: 1. The patients' ages ranged from 2 to 79 years, with the majority (61.2%) in the 20-29 year age group (21).

The descriptive cross- sectional study in Tanzania reported, patients' ages ranged from 4 to 87 years with a mean of 30.7 years and a peak incidence of 21-30 years (24).

2.3 gender related prevalence

A cross-sectional study was conducted in Brazil regional reference emergency center of a university hospital The survey showed 103 (90.3%) were male, 11 were female, and the average time for having a driver's license was 4.5 years (1).

A cross-sectional study conducted in a regional reference emergency center of a university hospital that treats motorcycle accident victims also describes: The survey showed that most of the 114 accident victims were young, having a mean age of 28 years and ranging from 13 to 69 years; 103 (90.3%) were male, 11 were female. (1)

Prospective data analysis study done in Sao Paulo on trauma patient older than 13 years reported the age that the male sex was significantly more frequent 87.9% (3). The research in Pakistan demonstrate that majority of injured are males 96.51% and 03.48% were females 19.37% were between 11-20 years of age, 47.28% between 21-30. Majority injuries 53.87% were on the lower limbs, 40.69% on the upper limbs (19).

A cross-sectional study in Iran reported that males comprised 85% and females 15% of injuries (22). And also Cross-sectional observational study at pakistan describes, Male to female ratio of the injured victims was 9:1. Age between 16 and 30 years (41%) was found in the majority of accident cases, 27% in the age group of 30-45 years, 15% in 45-60 years and 5 % in >60 years. Those of age under 15 years accounted for 12% of cases. The age representation included both motorbike riders and passengers on motorbike (11)

Acording to Kerman, Iran studies report in the motorcyclists, the highest numbers of male injuries were 7.8% and 7.7% with the age groups 18–24 and 25–34, respectively. (22)

The descriptive cross- sectional study in Tanzania reportedmotorcycle traffic injuries, 69.5% were males and 30.5% were females (M:F ratio = 2.3:1) (24).

3 Objectives

3.1 General objective

- To assess prevalence and pattern of extremities injury following motorcycle accident in Dilla university referral hospital, SNNPR, Ethiopia in 2020 G.C.

3.2 Specific objectives

- To assess the prevalence of extremities injury following motorcycle accident.
- To describe the type of extremities injury following motorcycle accident.
- To identify the mechanism of extremities injury following motorcycle accident.

4 Methodologies

4.1 Study area and period

The study area is Dilla (DURH), SNNPRS, and Ethiopia. Dilla town is the administrative city of Gedeo zone, bordered on east, south and west by Oromia region, and on the north by Sidama zone .According to 2007E.C census, the total number of Dilla town population was 59,150. It is located360km from Addis Ababa and 90 km from Hawassa (the capital city of SNNPR). The hospital is established in 1976E. Former Dilla zonal hospital but now called Dilla university referral hospital. DURTH is the only one Zonal referral teaching hospital; it provides curative and rehabilitative services for about 2 million populations living in SNNPR & Oromia Regional state. More than 10 health institutions were referring patients for further & better care from inside and outside of the catchment area. This hospital staffed by different specialist disciplines like general surgery, orthopedics surgery , obstetrics & gynecology, pediatrics, internal medicine, dermatology and other types health professional in different level of qualities. This hospital has total of 186 inpatient beds. Emergency care area provides services 24 hours a day, 7 days a week. The hospital is tertiary level teaching hospital giving medical education for varies category of health professionals. The study will be conduct from March 30 – April 14 / 2020 G.C

4.2 Study design

Institutional based cross sectional study design with retrospective data collection is applied.

4.3 population

4.3.1 Source population

The source population of the study was all motorcycle accident who visited DURH emergency room.

4.3.2 Study population

The study population was all charts of motorcycle accident who visited DURH emergency room from Sep/11/2017 to Aug /7 /2019 G.C.

4.4 Sample size determination

All charts of motorcycle accidents who were registered at DURH from Sep/11/2017 to Aug /7 /2019 G.C will be selected.

4.5. Sampling technique

A censes sampling method was used to obtain the study unit.

4.6 Sampling procedure

All MCI charts from HMIS data were selected by refereeing their MRN . From that selected MCI carts, all extremities injury were selected again to study the pattern.

4.7 Eligibility criteria

4.7.1 Inclusion criteria

All motorcycle accidents who visited DURH from Sep/11/2017 to Aug /7 /2019 G.C

4.7.2 Exclusion criteria

incomplete charts and missed charts

4.8 Measurement variable

4.8.1 Dependent variable:

- prevalence of extremities injury following motorcycle accidents
- Pattern of extremities injury following motorcycle accident.

4.8.2 Independent variables:

1. Age
2. Gender
3. Residence

4. Traveler
5. Driver
6. Pedestrian
7. Fall from motorcycle
8. Collision with other vehicle
9. Hit by motorcycle

4.9 Data collection procedure

Data was collect using checklist. The checklist was developed by using the other research result and modified it to meet the objectives of my study. First the MRN were record from HMIS record to get the main files of the patient from card room. Next using medical record number (MRN) of the patient chart, I collected the main chart of the patient for the data collection. Finally, based on inclusion and criteria of study, a card which had all variables of the study were used. Then all variables were collected from main card information. Two BSc nurses were collected the data and one supervisor had evaluate. Timely supervision was done by investigator during the data collection period.

4.10 Data analysis and presentation

The data was checked for completeness and unclear responses then coded and entered into the computer for easy access. It was analyzed by using SPSS v 24 software. Descriptive statistics is used to summarize quantitative data. Then the results are presented in terms of tables and graphs and in percentages for qualitative data.

4.11Ethical consideration

Permission to carry out the research was sought from the Addis Ababa University Collage of health science research standards and ethics committee. The research purpose, its benefits and the procedures was explained for each data collectors and chart room employer. The patient cards were collected from chart room by using request form. Confidentiality and privacy strictly maintained. Only the principal investigator and the research assistants were accessed the data.

4.12 Operational definition

Pattern of extremities injury: the type and mechanism of injury on extremities.
Prevalence of extremities injury: Number of extremities ijury from all motorcycle accident with in the study time.

5 Result

5.1, Prevalence and Socio demographic data

From September/11/2017 to Augusts /7 /2019 G.C, there were 529 motorcycle accidents. From those accidents, 239(45.17%) of them had extremities injury. The prevalence of extremities injury following motorcycle accident is 452 extremities injury per 1000 motorcycle accident population. 81(33.9%) of patients were with the range of age 21 up to 30 years old. Almost half of injured person were with the age range of 19 up to 40. In addition to that, the mean age of injured person was 26.92, while standard deviation was 15.738. Among extremities injury, male accounted 67.4%.male to female ratio is 2.1:1. From male who were injured, 43.48% of them were motorcyclist. Also from injured extremities, females accounted 32.6%, female pedestrian took 62.8%. In this study, 43.9% of victims were pedestrian who hit by motorcycle while they cross the road, Motorcyclist accounted 30.5 %. Most injured persons were from rural areas, it accounted 64%. The highest injury which is 59.4% was seen in the rough roads or stony ground.

Table 1: Socio demographic table among all motorcycle accident occurred in DURH at the time of accident, Gedeo Zone, 2020.

S/n	Socio demographic data		Frequency	Percentage
1	Age	0-10	20	8.4
		11-20	58	24.3
		21-30	81	33.9
		31-40	34	14.2
		41-50	20	8.4
		51-60	13	5.4
		61-70	8	3.3
		71-80	2	0.8
		81-90	2	0.8
		91-99	1	0.4
2	Gender	Male	161	67.4
		Female	78	32.6
3	Residence	Rural	153	64.0
		Urban	86	36.0
4	Road condition	Asphalt	97	40.6
		Stony ground	142	59.4
5	Status of injured person	Motor cyclist	73	30.5
		Traveler	61	25.5
		Pedestrian	105	43.9

6	Mechanism of injury	Fall	100	41.8
		Hit by motorcycle	105	43.9
		Collision with other vehicle	34	14.2

Table 2: Gender and status of injured person, Cross tabulation occurred in DURH at the time of accident, Gedeo Zone, 2020

		Status of injured person			
		Motorcyclist	Traveler	pedestrian	Total
Gender	Male	70	35	56	161
	Female	3	26	49	78
	Total	73	61	105	239

5.2 pattern of upper extremities injury

In my study; lower limb, upper limb and both limb injuries were 56.9 %, 28.9% and 14.2% respectively. Right extremities were predominantly injured; it accounted 47.7% and both right and left extremities were affected in 9.6%.

From affected upper extremities injury, 73(30.5%) of them had soft-tissue injury. 34(45.9%) of patients were injured at left hand and 9(12.2%) were injured at both hands. In terms of types STI 49(20.5%) of them had abrasion, 22(9.2%) them had laceration and the least STI were degloved wound, which were 1(0.4%). In this study, upper limb fracture accounted 26(10.9%). Anatomic part of fractured limb were ulna, radius, humorous, phalanges and metacarpal accounted, 13(5.4%), 13(5.4%), 8(3.3%), 3(1.3%) and 1(0.4%) respectively. In terms of types of upper extremities fracture, transverse fracture took the highest percentage, which was 21(8.8%) and compound fracture was 3(1.3%). There was no arterial injury, but biracial plexus was injured in one injured person who falls on the ditch while on traveler side. 3.3% of injured person had dislocation.

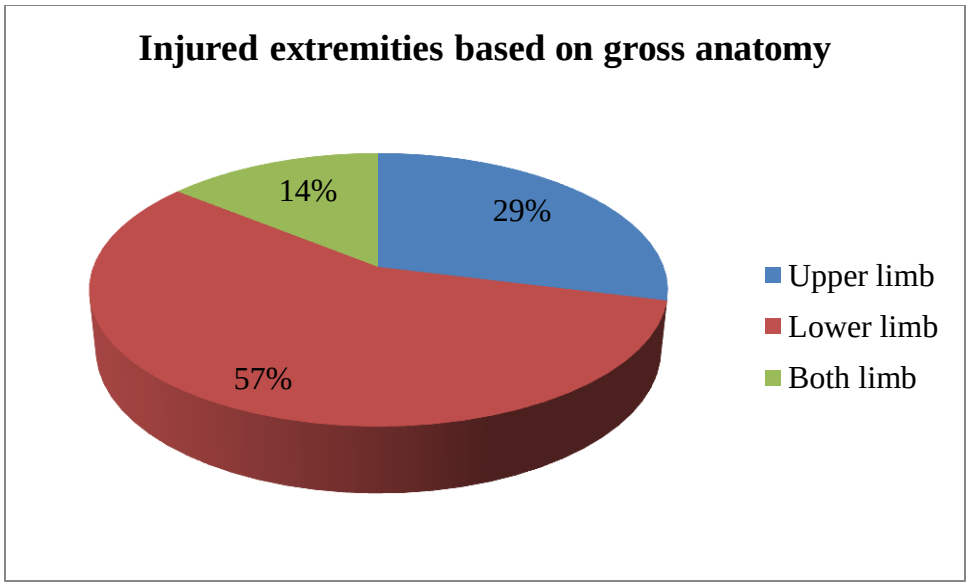

Figure 2: pattern of extremity injures based on gross anatomy occurred in DURH at the time of accident, Gedeo Zone, 2020

Table 3: pattern of upper of extremities injury occurred at a time of motorcycle accident at the time of accident in DURH, Gedeo Zone, 2020

S/n	Upper limb	Yes	No	Total
1	Soft tissue injury	73(30.5)	166(69.5)	239
2	Fracture	26(10.9%)	213(89.1%)	
3	Dislocation	8(3.3%)	231(96.7)	
4	Nerve injury	1(0.4%)	238(99.6%)	
5	Artery	0	0	

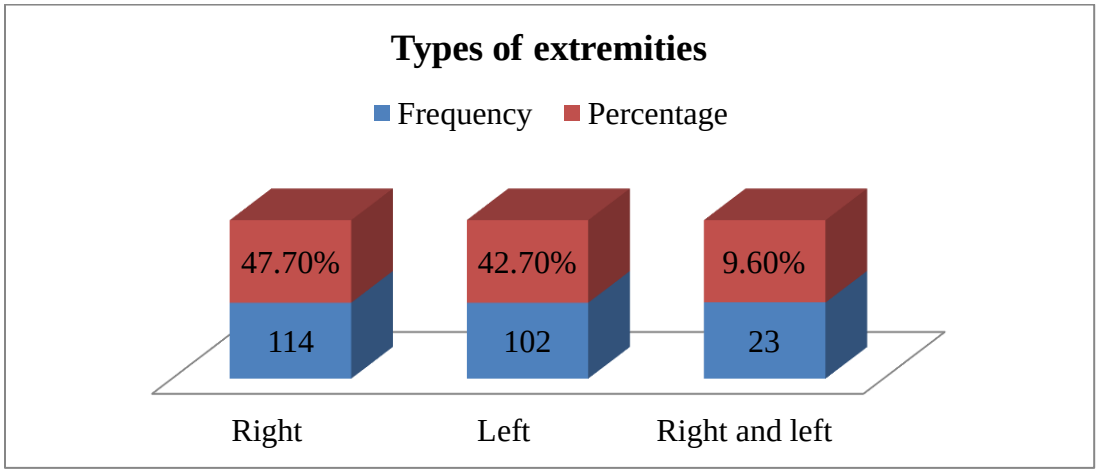

Figure 3: Types of extremities injury occurred in DURH at the time of accident, Gedeo Zone, 2020

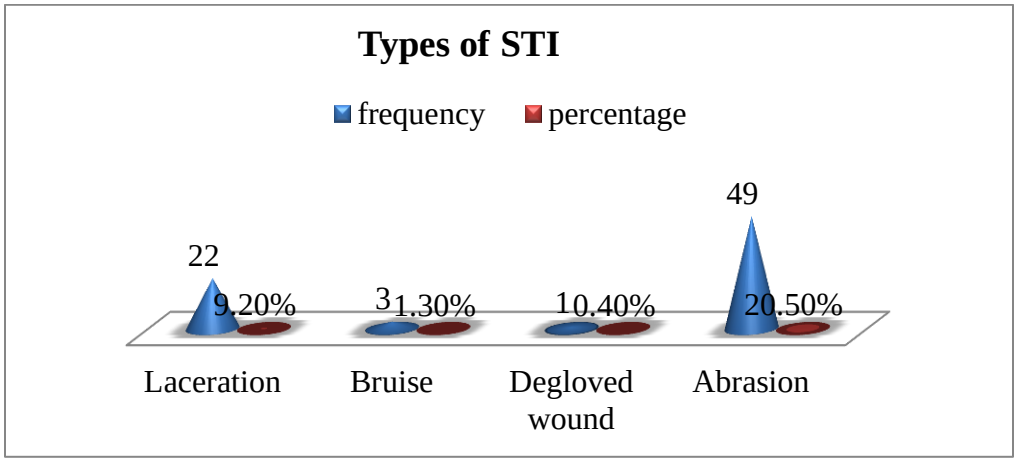

Figure 4: patterns of patients who had upper limb soft tissue injury at a time of motorcycle accident in DURH, Gedeo Zone, 2020.

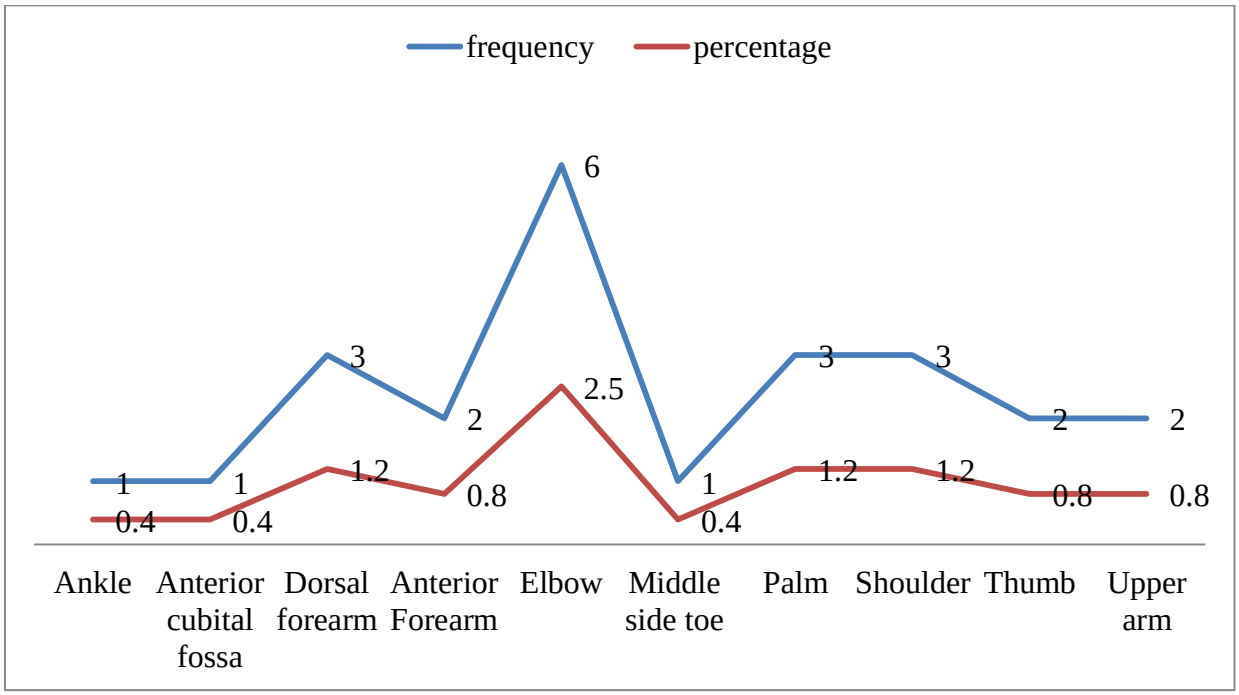

Figure 5: patterns of Anatomic part of upper extremities laceration occurred in DURH at the time of accident, Gedeo Zone, 2020

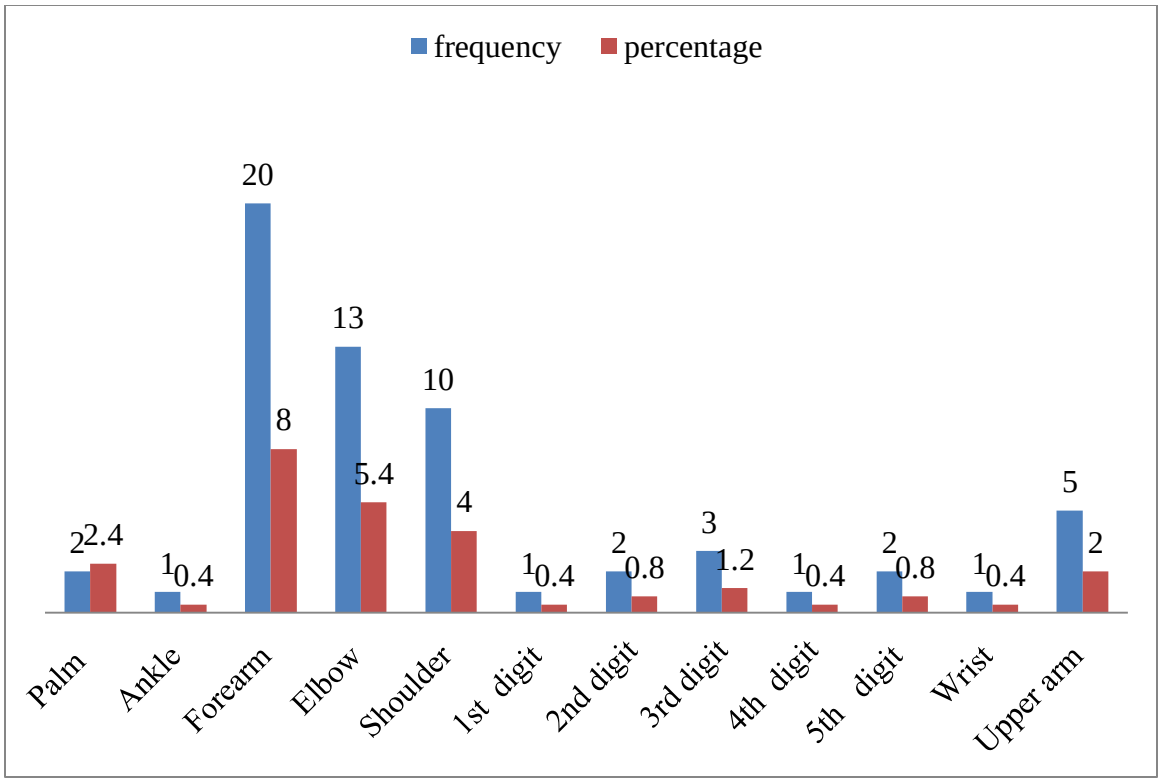

Figure 6: patterns of Anatomic part of upper extremities abrasion occurred in DURH at the time of accident, Gedeo Zone, 2020

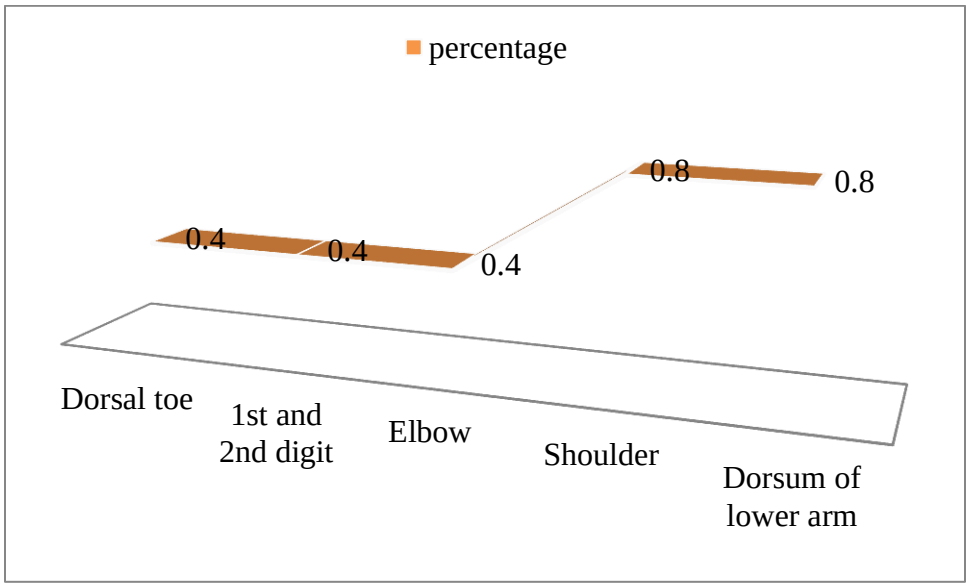

Figure 7: patterns of Anatomic part of upper extremities bruise occurred in DURH at the time of accident, Gedeo Zone, 2020

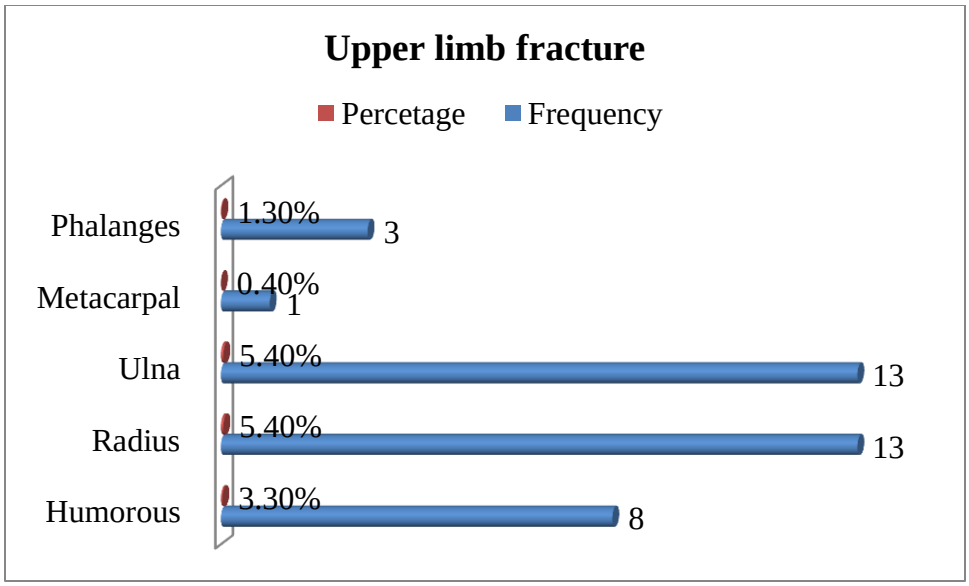

Figure 8: patterns of Anatomic part of upper extremities fracture occurred in DURH at the time of accident, Gedeo Zone, 2020.

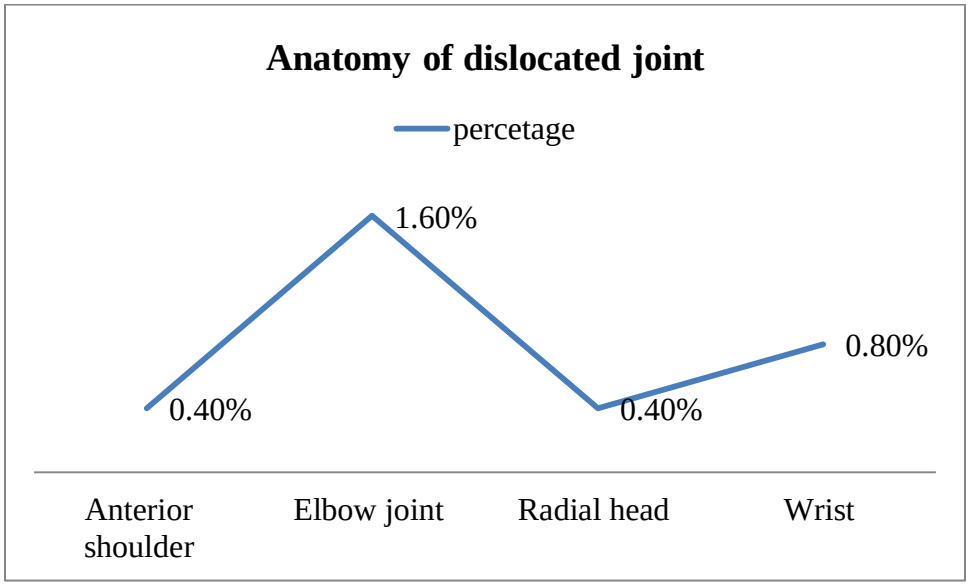

Figure 9: patterns of Anatomic part of upper extremities dislocated joint occurred in DURH at the time of accident, Gedeo Zone, 2020

5.3 patterns of lower extremities injury

In this study, patient who had soft tissue injury accounted, 119(49.8%). Right leg took 51% and both legs were injured in 9%. The highest type of lower extremities soft tissue injury was abrasion which accounted, 56(23.4%). Laceration accounted 45(18.8%) and

the list was bruise, which accounted 5(2.1%). Lower limb fracture took 82(34.3%). Right leg had highest injuries, which accounted 56%. Tibia bone fracture was 52(21.8%) which had the highest percentage. Fibula and femur had 48(20.1%) and 20 (8.4%) respectively. Transverse fracture was accounted 50(20.9%). The lowest percentages of type of lower extremities fracture was green stick fracture, which accounted 3(1.3%). Compound fracture was about 23(9.6%). Dislocations of lower extremities were 4(1.7%), all dislocations were knee joint dislocation. Only a popliteal artery was injured from all extremities injury.

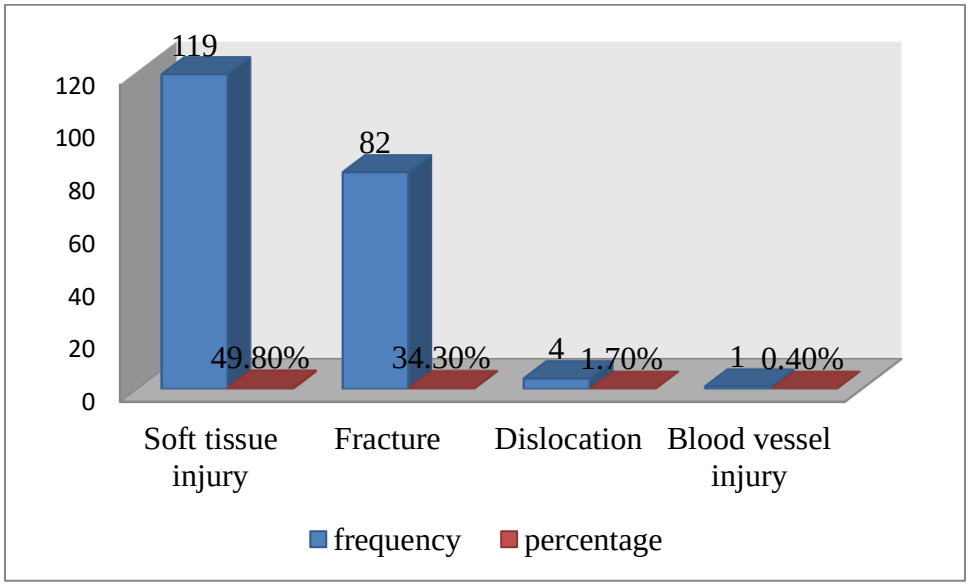

Figure 10: patterns of types of lower extremities injury occurred at a time of motorcycle accident in DURH, Gedeo Zone, 2020

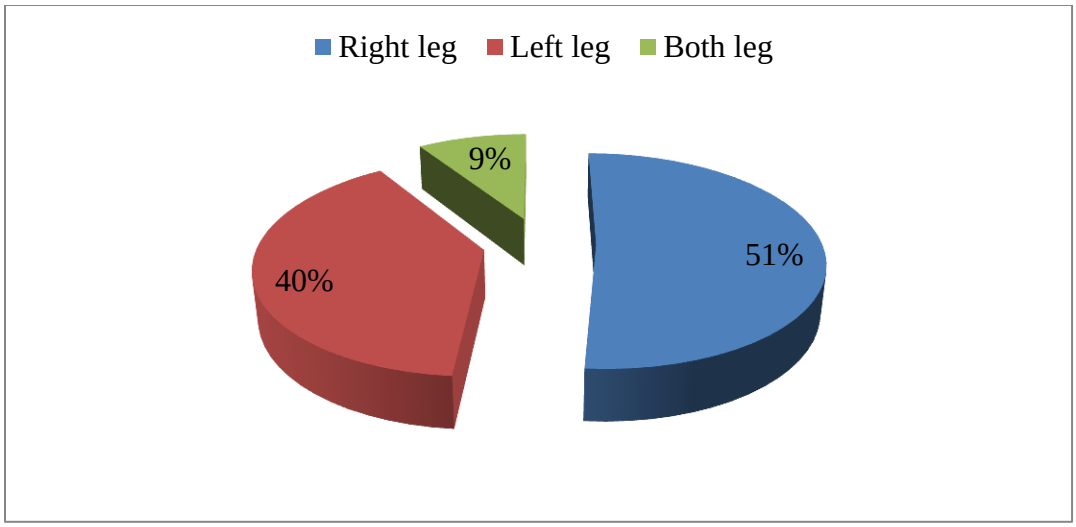

Figure 11: patterns of types of lower extremities soft tissue injury occurred in DURH at the time of accident, Gedeo Zone, 2020

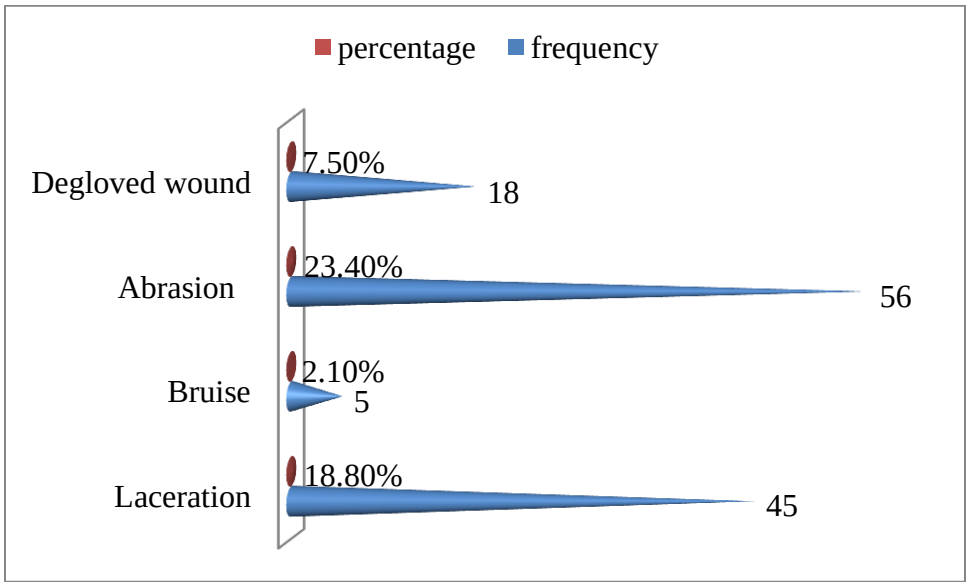

Figure 12: patterns of a patient had soft tissue injury at a time of motorcycle accident in DURH, Gedeo Zone, 2020.

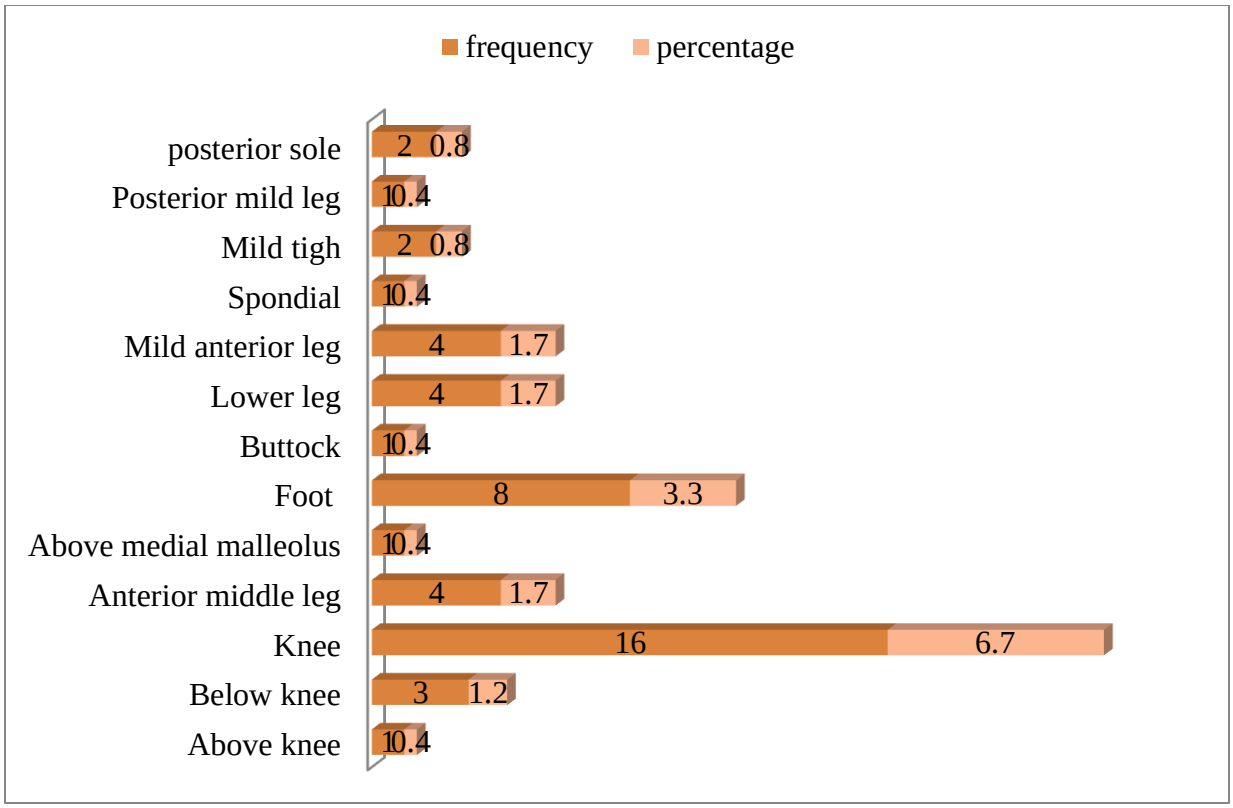

Figure 13: patterns of types of lower extremities laceration occurred at a time of motorcycle accident in DURH, Gedeo Zone, 2020

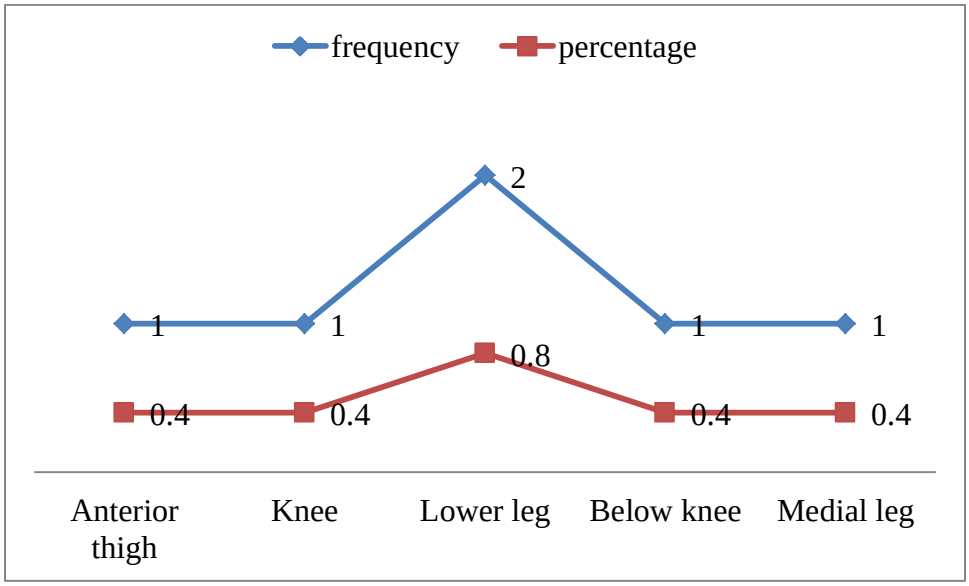

Figure 14: patterns of lower extremities bruise occurred at a time of motorcycle accident in DURH, Gedeo Zone, 2020.

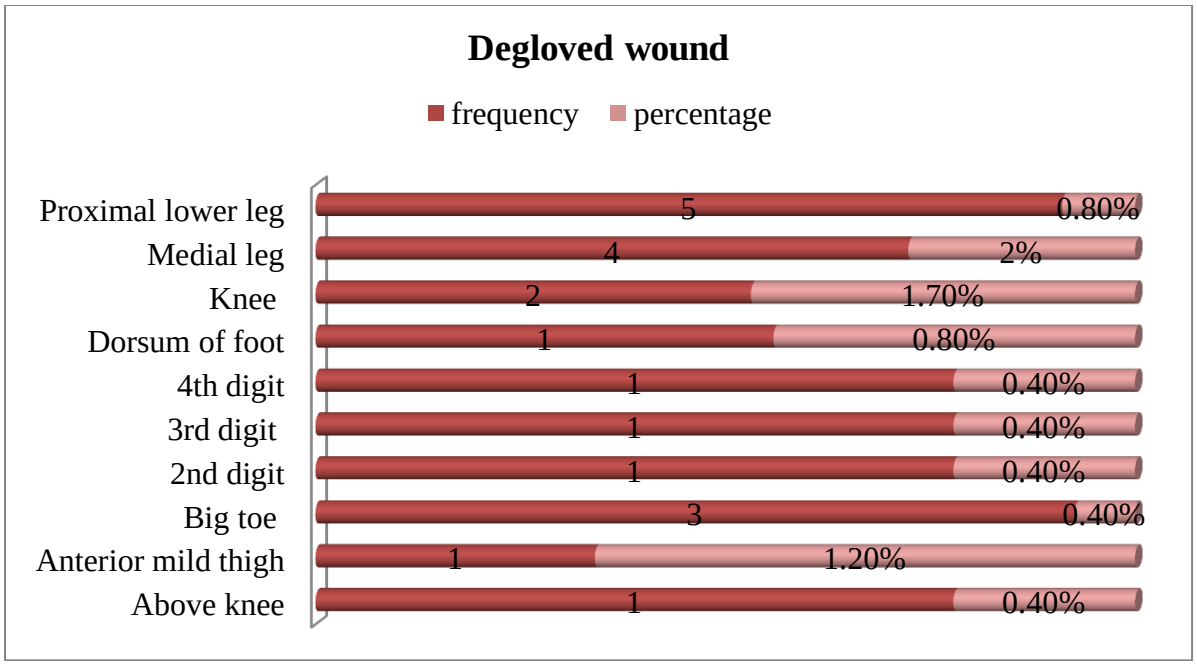

Figure 15: patterns of lower extremities degloved wound occurred at a time of motorcycle accident in DURH, Gedeo Zone, 2020.

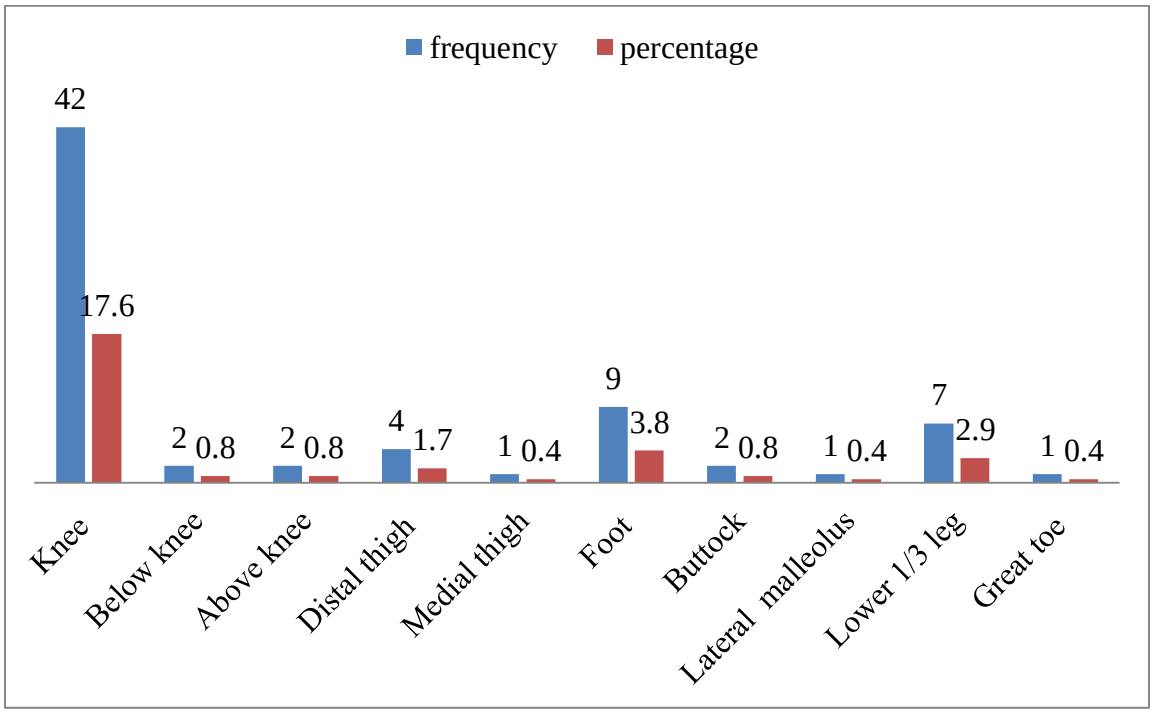

Figure 16: patterns of lower extremities abrasion wound occurred at a time of motorcycle accident in DURH, Gedeo Zone, 2020.

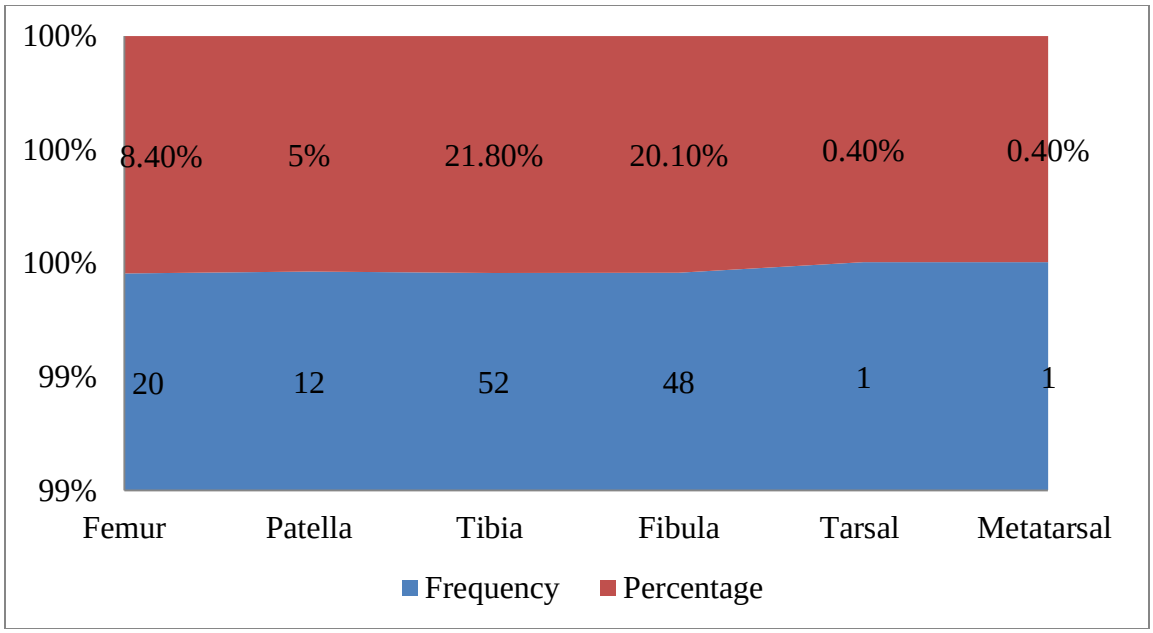

Figure 18: patterns of anatomy of lower extremities fracture occurred at a time of motorcycle accident in DURH, Gedeo Zone, 2020.

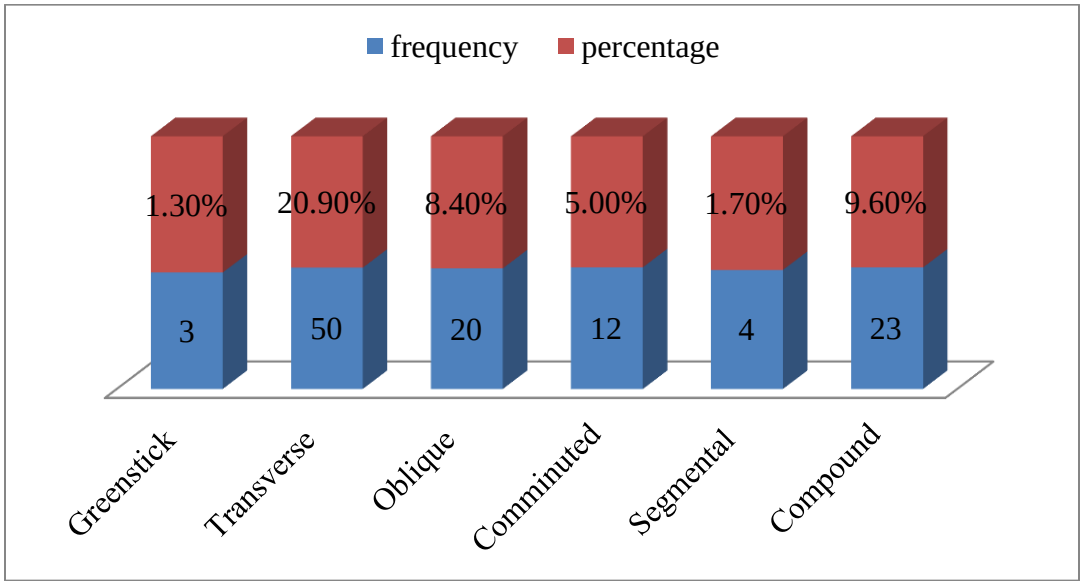

Figure 19: patterns of types of lower extremities fracture occurred at a time of motorcycle accident in DURH, Gedeo Zone, 2020.

Table 5: Frequency distribution table of pattern of all motorcycle accident occurred in DURH at the time of accident, Gedeo Zone, 2020.

S/n	Pattern of Injuries	Yes	No	Total
1	Soft tissue injury	192(80.3%)	47(19.7%)	239
2	Laceration	67(28%)	172(72%)	
3	Bruise	8(3.3%)	231(96.7)	
4	Degloved wound	19(7.9%)	220(92.1%)	
5	Abrasion	105(43.9%)	134(56.1%)	
6	Fracture	108(45.2)	131(54.8)	
7	Dislocation	12(5%)	227(95)	
8	Nerve injury	1(0.4%)	238(99.6%)	
9	Artery	1(0.4%)	238(99.6%)	

N=239 but the no of cases are too much for one victim may encounter injuries over more than two type of injury

Table 6: Soft tissue injury of upper limb occurred in DURH at the time of accident as per the residence of injured person in Gedeo Zone, 2020.

Residence		Having upper limb soft tissue injury		Total
		Yes	No	
Rural	count	39	114	153
	Expected	47.1	105.9	153.0
Urban	count	34	50	84
	Expected	25.9	58.1	84.0
Total	count	73	164	237
	Expected	73.0	164.0	237.0

P value is 0.017; Upper extremities soft tissue injury has association with rural residence

Table 7: Having upper extremities soft tissue injury occurred in DURH at the time of accident as per the Mechanism of injury, Gedeo Zone, 2020.

Mechanism of injury		Having upper extremities soft tissue injury		Total
		Yes	No	
Fall from motorcycle	Count	41	58	99
	Expected count	30.5	68.5	99.0
Hit by motorcycle	Count	24	80	104
	Expected count	32.0	72.0	104.0
Collision with	Count	8	26	34

other vehicle	Expected count	10.5	23.5	34.0
Total	Count	73	164	237
	Expected count	73.0	164.0	237.0

P value is 0.011; so it is <0.05. having upper extremities soft tissue injury has association with mechanism of injury.

Table 8: Having upper extremities soft tissue injury occurred in DURH at the time of accident as per status of injured person, Gedeo Zone, 2020.

Status of injured person		Upper extremities soft tissue injury		Total
		Yes	No	
Motorcyclist	Count	23	49	72
	Expected count	22.2	49.8	72.0
Traveler	Count	26	35	61
	Expected count	18.8	42.2	61.0
Pedestrian	Count	24	80	104
	Expected count	32.0	72.0	104.0
Total	Count	73	164	237
	Expected count	73.0	164.0	237.0

P value is 0.031; it is < 0.05 so upper extremities soft tissue injury has association with status of injured person.

Table 9: lower limb fracture occurred in DURH at the time of accident as per the status off injured person, Gedeo Zone, 2020.

Status of injured person		Having lower limb fracture		Total
		Yes	No	
Motorcyclist	Count	19	54	73
	Expected Count	25.0	48.0	73.0
Traveler	Count	14	47	61
	Expected Count	20.9	40.1	61.0
Pedestrian	Count	49	56	105
	Expected Count	36.0	69.0	105.0
Total	Count	82	157	239
	Expected Count	82.0	157.0	239.0

P value is 0.002 it is < 0.05 so lower limb fracture has association with status of injured person.

6, Discussions

In my study the mean age of cases was 26.92, the maximum and minimum age of cases were 99 and 2 respectively. Highest number of injury occurred with the range of 21 up to 30 years, which accounted 33.9%. While the other cross-sectional study was conducted in a Brazil regional reference emergency center of a university hospital survey showed that most of the accident was young, having a mean age of 28 years and ranging from 13 to 69 years (1). This difference happened because of the Brazil study focused on motorcyclist and passengers only, but my study included pedestrian. In my study 67.4% were male and 32.6% are females and male to female ratio is 2.1:1. Similarly the descriptive cross- sectional study in Tanzania, the M: F ratio = 2.3:1 (24).

In this study lower extremities had the highest injury. Similarly in US Level I Trauma Institute Registry review was reported that, lower extremity injuries were the most common among motorcyclists, with passengers and drivers (9). In this study 45.2% of patients had some types of fracture. In this study the highest bone injury was tibia bone like that of Jinnah Postgraduate Medical Centre study. Tibia bone fracture was 21.8% Jinnah Postgraduate Medical Centre at Pakistan showed 39% patients were with tibia bone injury. This difference may be because of the study participant of Jinnah were include only passenger and motorcyclist (11). In this study booth tarsal and metatarsal were 0.4%. Compound fractures were about 9.6%. Dislocations of lower extremities were 1.7%. Only a popliteal artery was injured from all extremities injury.

In this study 30.5% of patients had upper extremities soft-tissue injury. 25% of them had upper limb fracture. Radio ulnar fracture took the highest percentage of upper limb fracture, which was 5.4%. Metacarpal, accounted 0.4%. In terms of types of upper extremities fracture compound fracture was 1.3%. Biracial plexus were 0.4%.While a cross sectional study done at Jinnah Postgraduate Medical had some close results. In radio ulnar fracture in had lower percentage, but percentage of metacarpal fracture was greater; it was 4% and 1% respectively (11).

In this study lower limb soft tissue injuries took 49.8 which is consistent with United Arab Emirates study. From soft tissue injury, abrasion took 43.9% and Laceration was 28%. Similarly Dislocations were 5%, But a São Paulo study was lower in dislocations, which was 3%.This difference is may be because of (15) . Nerve and arterial injuries were the same 0.4%. But it was greater in vascular injuries which was, 1.7%. Nerve injury was 0.5% (17).

7. Strength and limitation

The strength of this study is, it described the types of extremities injury thoroughly and in terms of soft tissue injury, it puts anatomical location of soft tissue injury in detail. And it described the road condition while the accident happened that could be the cause of accident. This could also initiate the researcher to do it for further. It is more specific.

The limitations of this study are, it does not tell the cause and effect analysis. As a retrospective and secondary data the limitations of this study include the use of a retrospective design, lack of available data on the circumstances of the mechanisms of injury, the speed of the motorcycle during accidents, the effect of the type of motorcycle, the type of helmet material, or if any other protective gear such as knee braces were used.

8. Conclusion and recommendation

Motorcycle accident is the most devastating injuries that could lead to morbidity even death. Death is the easiest solution to any accident but other injuries like extremities injuries will bring physical and psychological impact on life. Dilla university referral hospital has higher burden of motorcycle accident. Extremities injury was the worrying case of motorcycle accident. My study reviled the types of injury, the residence of injured person, the road condition when the accident happened and so on.

This result described that lower limb injuries are highest percentages. Soft tissue injuries are commonest than fracture dislocation and nerve injuries.

From the result of this study I recommend to the ministry of health to prepare national trauma assessment and treatment guidelines. This study recommend to gedeo zone to work on the roads. And also this study recommend to DURH to be ready to manage soft tissue injuries, fracture, dislocation and nerve injuries. Orthopedic surgery should have to be in line with the affected patients. Finally this study recommend to the other researchers to study on the cause of motorcycle accident and psychological and physical impacts on pedestrian, traveler and motorcyclist.

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Annex 1: English version information sheet

Title: ASSESSMENT OF PREVALENCE AND PATTERN OF EXTREMITIES INJURY FOLLOWING MOTORCYCLE ACCIDENT IN DILLA UNIVERSITY REFERRAL HOSPITAL, SNNPR ETHIOPIA in 2020.

Principal investigator: ABEL TESFAYE GIRMA

Name of the institution: Department of Emergency and critical care, School of Emergency medicine, College of Health Sciences, Addis Ababa University.

Introduction of investigator

Greetings! My name is Abel Tesfaye. I am a master's student at Addis Ababa University, School of Emergency medicine. Currently, I am researching on assessment of prevalence and pattern of extremities injury following motorcycle accident in DILLA university referral hospital, SNNPR Ethiopia. This information sheet is prepared to assessment of prevalence and pattern of extremities injury following motorcycle accident in DILLA university referral HOSPITAL, SNNPR ETHIOPIA in 2020.

Purpose of study: the purpose of this research is to assessment of prevalence and pattern of extremities injury following motorcycle accident in DILLA university referral hospital, SNNPR ETHIOPIA in 2020.

Study procedure: patient chart will be reviewed. The findings of this study will be shared through the presentation, but the patient's name will not be mentioned in the report.

Possible risks/ discomforts: The study is not associated with any harm.

Possible benefits: At the moment, this study will not be of direct benefit to the study participant, but I hope that the findings from this study may help the policymakers to make decisions in allocating resources, strategies, and policies.

Data confidentiality: All collected data will be handled to protect confidentiality. No names will be mentioned and the information will be coded. I would like to assure you that all information about the patient will be protected from the public and personal identity will not be mentioned in any report of this study.

All details of information will be stored and secured with a password protected files in the researchers' personal computer.

Payment: There will be no payment for study participants since; the research is to be conducted while the participants are attending the Emergency Department.

Contact for additional information

If you need more clarification about this study, you can call or contact the researcher;

ABEL TESFAYE*Mobile: 0916922222,*

Email: Azariyast@gmail.com

Annex 2: Semi structured Questionnaire.

MRN _____ CODE_____

PART I: Socio demographic status of the patient.

101) Sex: 1, male 2, female

102) Age in years_____

103) Road condition: 1, asphalt 2, rough road

104) Residence: 1, rural 2, urban

Part II prevalence of extremities injury

201) Is the patient sustaining motorcycle accident? 1, yes 2. No

202) Is the patient has extremities injury? 1, Yes 2, No

203) Status of the injured person: 1, motorcyclist 2, traveler 3, pedestrian

204) Mechanism of injury: 1, fall 2, collision with other vehicle

Part III pattern of extremities injury following motorcycle accident.

301) Type of injured extremities based on gross anatomical location. 1, upper limb 2, lower limb 3, both limbs

For the question 204, If the answer is No 1 or 3 fill question 205-212.

302) Which types of extremities injury(multiple answer is possible)

1, Soft tissue injury 2, fracture 3, avulsion 4, arterial injury 5, dislocation

303) If there answer is 1 for Q,No 302,which types of injury were there (multiple answer is possible)?

1, laceration 2, bruise 3, degloved wound 4, abrasion 5, other _____

304) If the answer is 1 for Q,No 303, which anatomic area of upper limb was lacerated? (multiple answer is possible)_____

305) If the answer is 2 for Q,No 303, which anatomic area of upper limb had bruise? (multiple answer is possible)_____

306) If the answer is 3 for Q,No 303, which anatomic areas of upper limb had degloved wound? (multiple answer is possible)_____

307) If the answer is 4 for Q,No 303, which anatomic areas of upper limb had abrasion? (multiple answer is possible)_____

308) If the answer is 2 for Q,No 302, which bone (multiple answer is possible)? 1, humorous 2, radius 3, ulna 4, wrist

309) If there is fracture which types? 1, open 2, closed 3, amputation

310) If there is fracture which types(multiple answer is possible)? 1, greenstick 2, Transverse 3, Oblique4, Spiral 5, Comminuted. 6, Segmental. 7, Torus

311) If the answer is 3 for Q,No 302, which anatomic part was amputated? _____

312) If the answer is 3 for Q,No 302, which upper limb artery was injured? _____

313) If the answer is 4 for Q,No 302, which which upper limb joint was affected dislocation (multiple answer is possible)? _____

For the question 204, if the answer is No 2 or 3 fill question

314) Which types of extremities injury(multiple answer is possible)
1, Soft tissue injury 2, fracture 3, avulsion 4, arterial injury 5, dislocation

315) If there answer is 1 for Q,No 314,which types of injury were there (multiple answer is possible)?
1, laceration 2, bruise 3, degloved wound 4, abrasion 5, other _____

316) If the answer is 1 for Q,No 315, which anatomic area of lower limb was lacerated? (multiple answer is possible)_____

317) If the answer is 2 for Q,No 315, which anatomic area of lower limb had bruise? (multiple answer is possible)_____

318) If the answer is 3 for Q,No 315, which anatomic areas of lower limb had degloved wound? (multiple answer is possible)_____

319) If the answer is 4 for Q,No 315, which anatomic areas of lower limb had abrasion? (multiple answer is possible)_____

320) If the answer is 2 for Q,No 314, which bone (multiple answer is possible)? 1, femur 2, patella 3, tibia 4, fibula5, foot/ankle

321) If there is fracture which types? 1, open 2, closed 3, amputation

322) If there is fracture which types (multiple answers is possible)? 1, greenstick 2, Transverse 3, Oblique4, Spiral 5, Comminuted. 6, Segmental. 7, Torus

323) If the answer is 3 for Q,No 314, which lower limb was amputated?

_____

324) If the answer is 4 for Q,No 314, Which lower limb artery was injured?

_____

325) If the answer is 5 for Q,No 314, which lower limb joints was affected?

_____