Pattern and Aetiology of foot injuries treated At Muhimbili Orthopaedic Institute (Moi)

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MMed (Orthopedics and Traumatology) Dissertation
Muhimbili University of Health and Allied Sciences
October, 2018

Muhimbili University of Health and Allied Sciences

Department of Orthopedic and Traumatology

PATTERN AND AETIOLOGY OF FOOT INJURIES TREATED AT MUHIMBILI ORTHOPAEDIC INSTITUTE (MOI)

By

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A Dissertation Submitted in (Partial) Fulfillment of the Requirements for the Degree of Master of Medicine (Orthopedics and Traumatology) of

Muhimbili University of Health and Allied Sciences
October, 2018

CERTIFICATION

The undersigned certify that he have read and hereby recommend for acceptance by Muhimbili University of Health and Allied Sciences a dissertation entitled**, ''Pattern and Aetiology of foot injuries Treated at Muhimbili Orthopaedic Institute (MOI)'',** in (partial) fulfillment of the requirement for the degree of Master of Medicine (Orthopaedic and Traumatology) of Muhimbili University of Health and Allied Sciences.

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(Supervisor)

_____

Date

DECLARATION

AND

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I, **Dr. Mbaruku Mlinga**, declare that this **dissertation** is my own original work and that it has not been presented and will not be presented to any other university for similar or any other degree award.

Signature…… **Date**……

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ACKNOWLEDGEMENT

I wish to express sincere gratitude to my supervisor, Dr Kitugi.S.Nungu, for his advice and intellectual guidance at all stages of this research. My sincere thanks to Dr Billy Haonga (The head of department), Dr .Robert Mhina, Dr. Rabi Ndeserua for their inputs in this study. I also gratefully recognize and acknowledge Dr Sabasaba (MUHAS) and Dr Ally Nyanga; the epidemiologists, for their tireless technical support. I would like to convey my appreciation to all members of staff in the Department of Orthopaedic and Traumatology MUHAS and MOI and post graduate students –OT for their input during development, patients data collection and analysis of this research. I am particularly grateful to my mother Halima, Brothers Kitta and Athumani, sisters Mwantumu and Aisha for the full support and courage.

Special thanks to almighty Allah Subhaana Wataala for the protection and good health he granted, both to me and all my family members throughout my study period.

DEDICATION

This dissertation is dedicated to my beloved wife, Hadija Inzari Senzia, my children Halima (daughter) and sons Kidia and Inzari for their love, courage, support and commitments to make sure our family is running smoothly.

ABSTRACT

Background: Foot injuries are among the common injuries sustained by trauma patients, they occur in various patterns and due to different causes such as motor traffic crash, falling from height, occupational related injuries, and sports.

They may occur as isolated foot injuries or may occur with multiple associated injuries.

Foot injuries are commonly missed especially on the event of a multiply injured patient.

MOI as the leading trauma care centre in the country attends a lot of patients with foot injuries; however there is lack of collective information with regard to either isolated foot injuries or in combination with other injuries that may commonly occur.

Objective: This study was conducted with the objective of finding the prevalence of foot injuries and associated injuries in patients attended at MOI which is a tertiary hospital for the duration of 6 months from July 2017 to December 2017.

Methodology: This is a descriptive cross sectional study, in which 90 patients with foot injuries were enrolled from a total of trauma patients who were attended during the 6 months of study duration.

A structured questionnaire was filled in by the investigator on the first encounter with the patient to capture all the important data such as age, sex, mechanism of injury and a detailed pattern of the injury.

Any other accompanying injuries on other parts of the body but in the same patient were regarded as associated injuries.

Results

The prevalence of traumatic foot injuries was 5.5% among 1642 trauma patients attended at the Muhimbili Orthopaedic Institute.

The male: female ratio was 4:1.

The mean age of the patients was 32 years +/- 2 (range 11 – 64 years). The most affected age group was 30- 39 years.

Motorcycle crash (44.4%) was the commonest mechanisms of injury followed by motor vehicle crash (17.8%) . There were 56 patients with fractures of foot bones and a majority of them (71.4%) had open fractures.

Also 55.6% of the patients had fractures of metatarsal bones.

In addition to the foot injuries 35.5% of patients had concomitant injuries to other parts of the body, these concomitant injuries involved the limbs (49.4%) while injuries to the head or chest or abdomen was found in 32 patients as a concomitant/associated injury.

Conclusion and recommendations

Road traffic accidents especially those due to motorcycle crash continue to be a common cause of foot injury. Foot injuries may be isolated or may occur in association with injuries to the long bones of the lower or upper limbs, chest and abdomen.

The productive work force age groups are the majority among injured patients.

Open metatarsal fracture is the commonest type of foot injury.

Further research with regard to the factors predisposing motorcycle crash victims to sustain foot injuries is necessary as well as studies assessing treatment modalities and outcome of foot injuries should be done at the institute.

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LIST OF ABREVIATIONS

MOI	Muhimbili Orthopaedic Institute
DGU	Deustchen Gesselschaft fur Unfallchirurgie (German Association of Surgeons)
SICOT	International Society for Orthopaedic and Traumatology
MD	Doctor of Medicine
OT	Orthopaedic and Traumatology
EMD	Emergency Department
TBI	Traumatic Brain injury
IRB	Institutional Review Board
Vs	Against

CHAPTER ONE

1.0 INTRODUCTION

The foot is an important part of the human lower limb, its role in the gait cycle and overall mobility is unquestionable and therefore injuries to it are significant in terms of morbidity and deranged socio economical activities[1].

However, mortality due to isolated foot injury is not so common but in the presence of other injuries like fractures of tibia, femur and pelvis the mortality data are statistically significant.[1]

Despite being the principal weight bearing organ of the body, the amount of attention which the foot receives from the registrars, residents, junior orthopedic surgeon on call is often negligible. This is often seen in the management of polytrauma patients with life/limb threatening injuries and foot injuries are often less cared for.

With modern management and patient care options many such patients survive/ recover and go back to normal life.

Inadequately treated foot injuries significantly affect the overall outcomes in these patients.

This is well documented in international studies, as foot fractures are recorded to be the most commonly missed extremity fractures in polytrauma patients, which may have important clinical and medico legal implications.[2]

Foot injuries are on the increase in the developing countries due to several reasons; these include the use of cars and motor bikes as means of transport, involvement in sports as well as the effort of industrialization[2].

These reasons are further supported by the low standards of road and transport safety in having an impact to the rise in foot injuries among individuals[27].

At Muhimbili Orthopaedic Institute (MOI) most foot injuries are attended by registrars/residents before specialized orthopaedic surgeons.

Due to all the above reasons it is clear that a study aimed at providing base line information on the epidemiology of foot injuries at MOI is necessary at the moment since the Institution is the leading trauma care facility in the country and also serves as a teaching facility for trauma care personnel such as orthopedic surgeons, neurosurgeons and critical care nurses.

1.1 Anatomy and Biomechanics

The foot has four ranges of motion. It moves upward during dorsiflexion and downward during plantar flexion. Inward movement is known as inversion; outward movement is eversion.[3]

The foot has 26 major bones, which are split into three regions: the forefoot, midfoot and hind foot. The forefoot consists of the phalanges, or toe bones, and five metatarsal bones, numbered 1 through 5 medial to lateral. Comprising the midfoot are the cuneiform, navicular and cuboid bones. The bones of the midfoot are also known as tarsal bones. The calcaneus (heel bone), which is the foot's largest bone, and the talus make up the hind foot.

Tendons control foot movement by connecting the muscles in the lower leg to bones in the foot. The Achilles tendon, the largest tendon in the foot, controls plantar flexion, or the ability to stand on our toes. It runs from the calf muscle to the base of the calcaneus.

Three tendons run through the tarsal tunnel which is found on the inner leg posterior to the medial malleolus. The flexor hallicus longus, which flexes the great toe, is the most posterolateral tendon and inserts at the great toe. Immediately next to it is the flexor digitorum longus, which inserts into and flexes the other four digits of the foot. The final tendon in the tarsal tunnel is the tibialis posterior tendon, which inserts into the navicular and cuneiform bones, as well as the middle metatarsals. It is responsible for foot inversion and adduction.

Peroneus longus and peroneus brevis tendons run behind and around the lateral malleolus. The peroneus longus plantar flexes the first metatarsal and ankle and abducts the foot. The peroneus brevis flexes the ankle and everts the foot.[2]

The plantar fascia is a large band of connective tissue that links the base of the calcaneus to the base of the phalanges. This extremely thick band provides a majority of support for the arch and allows the foot to stretch. Each time when a person steps or stands on toes while shifting weight, the plantar fascia supports the entire body's mass.

There are 109 ligaments in the foot and ankle connecting bone to bone. Ligaments give integrity to the foot structure.

It also has 2 arches (longitudinal and transverse) which are formed by the structure and arrangement of the bones and maintained by ligaments and tendons. These arches "give" when bearing weight and spring back when weight is removed.

All these individual components of the foot combined provides the flexibility which is important for propulsion, and stability which is important in support function of the foot.[14]

Blood Supply

The arterial supply to the whole foot is mainly derived from branches of the

Peroneal (fibular), posterior tibial and anterior tibial arteries

Venous drainage is from the dorsal venous arch which drains into the greater and lesser saphenous venous systems.

Nerve Supply

The foot receives innervations from the following sources

1. Branches of the Tibial nerve

These include **-a**) Medial calcaneal nerve which innervates the plantar medial heel

-b) Medial plantar nerve which supply the abductor hallucis, flexor hallucis brevis, flexor digitorum brevis and the lumbricals to the second and third toes.

-c)Lateral planter nerve which innervates the adductor hallucis, quadrates plantae, all interossei muscles, lateral two lumbricals and abductor digiti minimi.

It also provides sensation to the plantar lateral foot, lateral fourth toe and fifth toe

2. Sural nerve

Provides sensation to the fourth web space

3. Deep peroneal nerve

Provides innervation to the extensor digitorum brevis and extensor hallucis brevis

It also provides sensation to the 1st dorsal web space.

4. Superficial peroneal nerve

The medial branch innervates the dorsomedial aspect of the hallux

1. Saphenous nerve innervates the medial side of the foot.

1.2 Literature Review

1.2.1 Prevalence

The foot is one of the common sites to be injured

In a study by Jeffers et al there were 4.3% foot injuries among 1239 patients[5].

In the same study 49 cases were men with a mean age of 31.7 years.similar results were observed in the Gaurav et al study in which 65.3% of the cases were in the age group between 18-45 years with a mean age of 34.8 years[6].

In another study by Maarten .P.van der Worp et al, it was concluded that women were at a lower risk to get foot injuries due to running compared to men, however the risk was increased in the same group of women due to age. Also a previous leg injury increased the risk significantly[2].

In another study by Uli Schmucker et al where by injury patterns to tricycle users and pedestrians hit by tricycles were studied it was found that 4 out of the 88 occupants had injuries to their feet[3].Again in the Gaurav Kumar Sharma study 10% of the patients with trauma(2919)had injuries to their feet and ankle regions[6].

In unpublished study, kighoma simplice found the prevalence of foot injuries was 10.8%,and men were more affected than females in the ratio of 2.7:1,also in the same study the age group mostly affected was between 20-29 years[7].

Males were also shown to have more injuries to their feet as evidenced by the Nabil.A.Ebraheim et al study where 13 out of 19 patients with talus fractures were males, and the mean age was 31 with a range of 21-68 years and in the same study the right talus was more affected than the left 12vs7 respectively[8].Identical results were found in another study by Gaurav Kumar Sharma et al in which out 294 patients 82.7%were males compared to 17.3%females[6].

In their study Mandeep.S.Dhillon et al found the incidence of foot injuries was around 7.59% with 82.9%being males while females were 17.09%, within these patients the average age at presentation was 30.8 (range 10-81) years[9].

1.2.2 Aetiology

The foot is injured especially in victims of motor traffic crash, sports and recreational activities, also it is a common site of injury in industrial/work place accidents.

The above statement was verified in a study done by Gaurav Kumar Sharma et al in which most of the cases of foot injury were due to Road traffic accidents(RTA) followed by industrial accidents[6].

In a study by Jeffers et al 52 cases were all involved in motor traffic crash as motorcycle driver,1 was a passenger[5].

Causes of foot injuries were also identified in another study by Nabil.A.Ebraheim whereby among 19 patients with fracture of talus,7 were due to a fall,9due to motor vehicle accidents,2 after motorcycle accident, and 1as a pedestrian in motor vehicle crash[8].

Motor traffic accidents were the commonest cause of foot injury in 99 (73.8%) cases in the study done by Mandeep.S.Dhillon et al, followed by fall 27(20.15%) cases9.

Similar results were also obtained in the study done by D.Bohlet al in which the majority (92%) of calcaneus fractures were associated with road traffic accidents (49%) or falls 43 percent[10].

In the same study, the location of injury occurrence was found to be most commonly the street (48%), followed by the home (24%) and an industrial location (7%).

Motor cycle crash was also found to cause majority of the foot injuries 34.2 % followed closely by motor vehicle crash 32.9 % in the study done by Kighoma Simplice[7].

1.2.3 Pattern

Injuries to the foot occurs in many patterns, there may only exist a soft tissue injury with varying degree of severity, or it may be a closed or open fracture of the osseous structures, the involvement of the bones vary from 1 to several either unilateral or bilateral.[20]

The Gaurav Kumar study found that 217 metatarsal fractures were present in 82 patients,33 cuneiforms were injured in 20 out of which 20 feet had medial cuneiform fracture,9 had middle cuneiform fracture &3 feet had lateral cuneiform fracture , and 70 calcaneal fractures were seen in 63 patients[6]. Furthermore 90 patients had ankle fractures out of which 61 feet had single malleolar fractures,33 feet had bi malleolar fractures,5 feet had tri malleolar fracture.
Jeffers et al found that there were 26(49.1%) metatarsal fractures, 14 talar fractures (26.4), 7 calcaneal fractures (13.3%) and 6 toe fractures (11.3%) of all cases[5].

Open fractures are among the common type of foot injuries seen at tertiary facility like MOI

This was evidenced in the Mandeep.S.Dhillon et al study in which 97(72.39%) cases out of 134 had open fractures, 31 (23.13%) patients had closed fractures and there were six(4.48%)patients with bilateral foot injury who had one side open and oneside closed injury[9].

In the same study it was found that out of 134 patients with foot injury, 177 had injuries to different regions of foot and among them 60 were hind foot injuries, 23 mid foot injuries and 94 cases sustained injuries to forefoot.

These injuries included 11 cases (8.21%) with multiple injuries involving different three regions of foot[9].

Specific diagnostic labeling revealed 45 calcaneal fractures, eight talar fractures, three subtalar joint fracture dislocations and four heel pad avulsions in the hind foot.

In the midfoot there were 12 Lisfranc injuries, five Chopart’s dislocations, three navicular fractures, one cuboid fracture and two medial cuneiform fractures.

Forefoot fractures were the commonest, with 66 cases of metatarsals fractures, 20 phalangeal fractures and eight combined metatarsal and phalangeal fractures[9].

In the study done by Kighoma Simplice found that out of 167 injured feet majority of them (63.3%) were open and involved the whole foot. Also 76.7% of the feet had osseous involvement mainly affecting the tarsal and metatarsal bones[7].

1.2.4 Associated injuries

These may range from injuries to the ipsilateral lower limb or any other body sites/systems, however the ipsilateral Lower limb is more likely to be injured largely depending on the site of impact and direction of the deforming forces[2].

In a study by Jeffers et al it was found that there were 22 ankle fractures(41.5%), tibia fractures were found in 15 patients(28.3%),also there were 6 patients with femoral fractures(11.3%)as well as 5 pelvic ring fractures(9.4%), injuries to the upper limb (both fractures, dislocations and soft tissue injuries) were found among 22(43.4%)of all patients and lastly 3 cases had sustained chest trauma(5.7%)[5].

In the other study by Mandeep.S.Dhillonet al it was found that Sixty-three (47.01%) patients had associated fractures (labeled as polytrauma), with lower extremity involvement being the most common (46 patients) followed by upper limb involvement in 13 patients, head and face involvement in seven patients, spine involvement in 6 patients and pelvic and abdominal involvement in three patients each. Isolated foot injuries were found in 71 patients representing 53% of all patients[9].

In the study done by D.Bohlet al study upon stratification of concomitant injuries revealed that 10 749 patients (74%) had additional orthopaedic-related injuries and 4273 patients (29%) had additional non orthopaedic-related injuries.

In the same study of particular note were the ipsilateral fractures to the ipsilateral Tibia/Fibula bones (40%) which was the commonest associated injury found[10].

K.Simplice found that in addition to the foot injuries 56% of patients had concomitant injuries mostly to the limbs and head represented by (49.4%) and (20.1%) respectively[7].

1.4 Problem Statement

Foot injuries are among the common trauma injuries that patients present with at MOI outpatient and casualty sections; however there is lack of collective information with regard to the common patterns, severity and aetiologies of foot injuries as well as the associated injuries that may occur to other parts of the body on the same event.[11]

1.5 Rationale

This study aimed at bringing to light the various patterns and etiologies of foot injuries attended at MOI and provide a link between foot injuries and certain common associated injuries.

This essential basic information will lay ground for other studies for example on management and outcome of foot injuries.

1.6 Objectives

1.6.1 Broad objective

To determine patterns and etiologies in patients with foot injuries treated at MOI from July-December 2017.

1.6.2 Specific objectives

1. To determine the sociodemographic distribution of foot injuries at MOI from July-December 2017.
2. To determine the types of foot injuries treated at MOI from July-December 2017.
3. To determine the underlying cause(s) of foot injuries treated at MOI from July-December 2017.
4. To identify common associated injuries in patients with foot injuries treated at MOI from July-December 2017.

CHAPTER TWO

2.0 METHODOLOGY

2.1 Design- Descriptive cross sectional study

Participants meeting the inclusion criteria were interviewed once by the investigator until the required sample size was obtained, there was no follow up.

2.2 Area

The proposed study was conducted at Muhimbili Orthopaedic Institute (MOI) in Dar es Salaam, Tanzania for a period of six months as from June to December 2017 where patients were enrolled into the study.

Muhimbili Orthopaedic Institute (MOI) is the largest Orthopaedic and trauma referral center in Tanzania, which offer both Orthopaedic and Neurosurgery services, with a capacity of 270 beds (30 privates and 240 general).

In the department of Orthopaedic and Traumatology, there are three firms (A and B), and Paediatrics Orthopaedic firm which carryout clinical activities.

In Orthopaedic and Traumatology, the admitting firm has a team of one consultant, one specialist, two residents, one registrar who is a medical officer, one intern doctor and a nurse at the emergency department.

The registrar on duty notified the researcher by a phone call or a text message (SMS) after identifying a patient with foot injury.

2.3 Duration

The study was conducted at Muhimbili Orthopaedic Institute (MOI) in Dar es Salaam, Tanzania for a period of six months as from July to December 2017 where patients meeting the inclusion criteria were consecutively enrolled into the study**.**

During this period each participant fitting in the inclusion criteria was consecutively enrolled and interviewed on the first contact with the investigator to collect all required information and there was no follow up.

2.4 Population

All patients attending MOI through the Emergency/casualty department for the months between July-December 2017

2.5 Sampling technique

All patients meeting the inclusion criteria were enrolled using convenient method until the required sample size was obtained

2.6 Sample size estimation

Sample size was estimated by using the following formula

$$n = \frac{z^2 p(100 - p)}{\varepsilon^2}$$

95% confidence interval (Z) =1.96

Error rate=ε =5%.

From a pilot survey conducted by the researcher at MOI during the period of mid May-Mid September 2016, Prevalence (P) of foot injuries was found to be 6.2% among all patients attended at MOI Emergency and Casualty dept.

Therefore substituting the values, then (n) becomes approximately 90 patients

2.7 Inclusion criteria

All male and female individuals presenting at MOI-Emergency and casualty sections with foot injuries and have consented to participate in the study.

2.8 Exclusion criteria

1. 1.Patients with severe TBI
2. Individuals who did not give consent.

2.9 Patients enrollment and data collection)

- ✓ All patients who met the inclusion criteria were recruited.
- ✓ Preliminary data was obtained on the first visit, these include;-
  -Age, sex, duration since injury, cause of injury, the involved side.
- ✓ Pre treatment radiographs were taken to assess the integrity of foot bones and fracture pattern if there is a fracture(s)
- ✓ Clinical and radiological examination findings were documented during the first contact, this information was captured using a structured questionnaire.

2.10 Data analysis

Data collected after thorough quality check, and coding was entered into a computer and analyzed using Statistical Package for Social Sciences (SPSS) from IBM SPSS statistical version 17 computer program.

Frequency distribution was used to describe categorical variables, and means and standard deviation for continuous variables.

Chi-square was used to test for association of categorical variables.

P-value of 0.05 considered statistically significant.

3.11 Ethical consideration and Consent

Ethical clearance was sought from the IRB of MUHAS, prior to enrollment into the study, all patients were informed about the study and asked for consent. The procedures followed with observation of the principles as described by MUHAS Institutional Review Board. These include telling the patients the right and freedom to participate or not and, the protection of the patient's data and privacy. They were allowed to have a confidant in case they need assistance

Also patients were free to withdraw from the study whenever they decide not to continue with their participation.

CHAPTER THREE

3.0 RESULTS

During the study period a total of 1642 trauma patients were attended, out of them 97 had foot injuries. However among the 90 patients with foot injury 5 of them had severe TBI and therefore did not meet the inclusion criteria, also 2 of them had refused to be included in the study and therefore 90 patients meeting inclusion criteria were enrolled for the study.

3.1 Socio-demographic characteristics

Table 1: Patient sociodemographic characteristics.(n=90)

Variables	Frequency	%
Age groups in years		
1-19	10	11.1
20-29	24	26.7
30-39	31	34.4
40-49	13	14.4
50-59	6	6.7
60>	6	6.7
Sex		
Male	72	80
Female	18	20
Injured foot		
Left	40	44.4
Right	50	55.6

3.2 Nature of injury

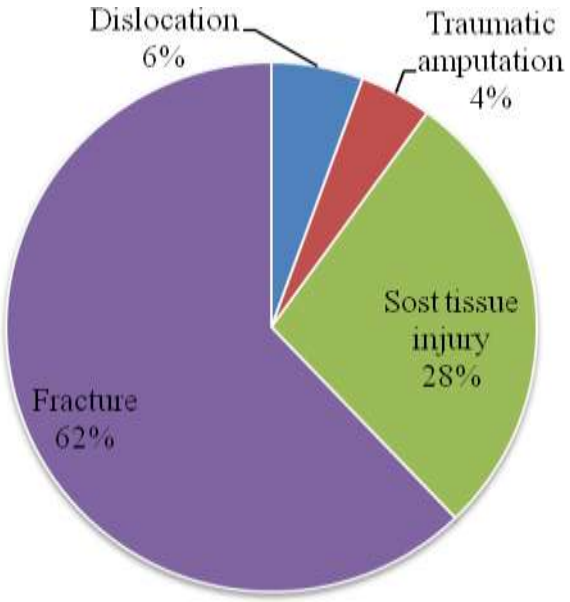


Figure 1: Nature of injury (n=90)

Table 2: Showing distribution of fractured bones (n=56)

Bones fractured	Frequency	%
1st and 2nd metatarsals	17	30.3
3rd,4th and 5th metatarsals	8	14.3
2nd, 3rd and 4th metatarsals	7	12.5
4th and 5th metatarsals	7	12.5
2nd metatarsal	6	10.7
4th metatarsal	3	5.4
5th metatarsal	2	3.6
Calcaneus	4	7.1
Phalanges	2	3.6

Among 90 study participants 56 of them had fractures involving a single or combination of multiple bones of the foot with the distribution as shown in the table above.

Nature of soft tissue injury (n=25)

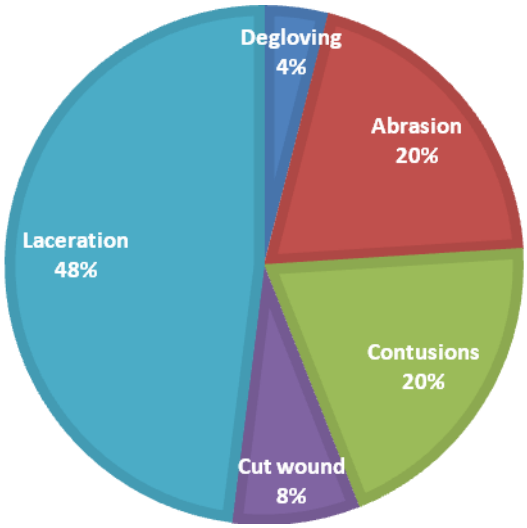


Figure 2: Showing nature of soft tissue injury

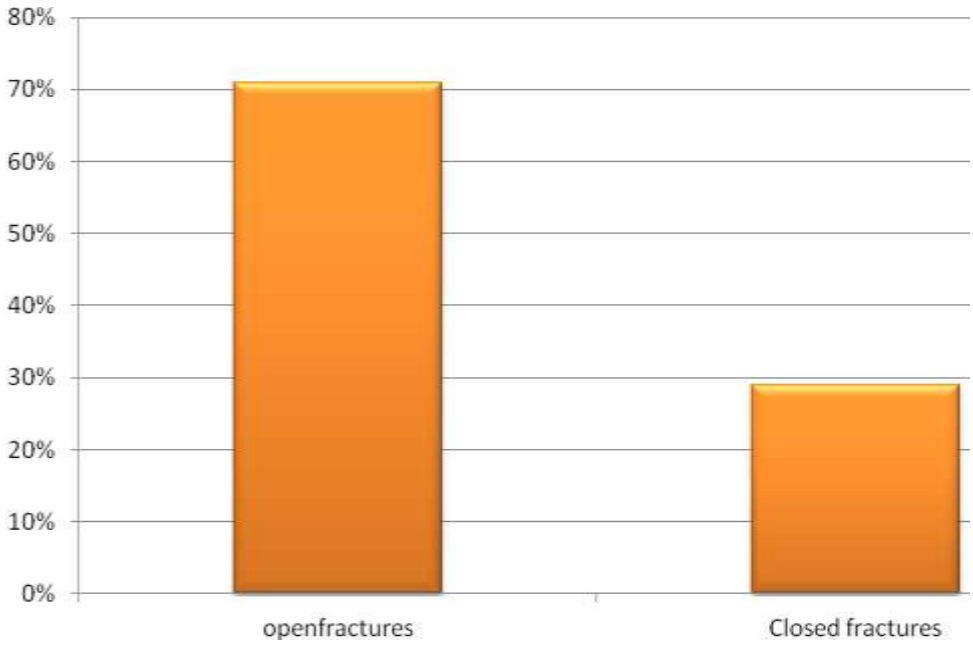


Figure 3: Showing Open and closed fracture. (n=56)

Out of the 56 cases who had fracture of foot bones, 40 of them (71%) had open fractures whereas 16 (29%) had closed fractures.

3.3 Mechanism of injury

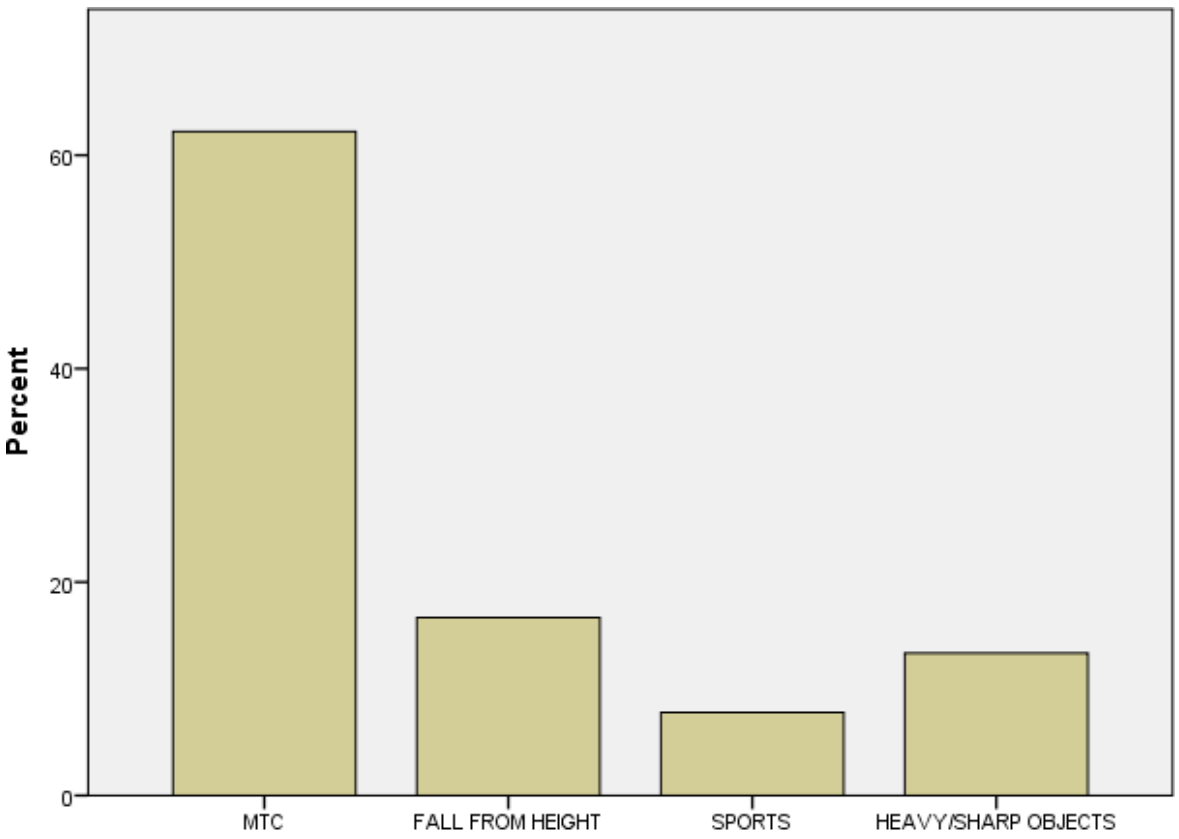


Figure 4: Bar chart showing mechanism of injury

Table 3: Showing role of injured person during crash

	Driver	Passenger	Pedestrian	Total
Motorcycle	15 (24.4%)	16 (39%)	10 (36.6%)	41 (100%)
Motor vehicle	O (0%)	2 (12.5%)	14 (87.5%)	16 (100%)
Total	15 (26.3%)	18 (31.6%)	24 (42.1%)	57 (100%)

Among 57 patients who sustained foot injury due to motor traffic crash,16 (39%) of them were passengers on a motorcycle.

Also 14 (87.5%) of them were pedestrians knocked by a car.

Percentages calculated in rows.

3.4 Associated injuries

Table 4: Associated injury types (n=32)

College	Frequency	Percentage
Fracture long bones upper limbs	2	6.2
Fractures long bone lower limbs	14	43.8
Ankle fracture dislocation	8	25
Injury to head/chest/abdomen	8	25

Among the 90 individuals involved in the study, 32(35.5%) had concomitant injury to other body parts with distribution as shown in the table above.

Table 5: Cross table showing mechanism of injury Against Nature of injury

		Nature of injury				
		Soft Tissue Injury Only	Fracture	Dislocation	Traumatic Amputation	Total
Mechanism	MTC	18	34	1	3	56
	Fall from Height	4	10	1	0	15
	Sports	1	3	3	0	7
	Heavy/Sharp Objects	2	9	0	1	12
Total		25	56	5	4	90

CHAPTER FOUR

4.0 DISCUSSION

During the study period a total of 1642 trauma patients were attended, out of them 97 had foot injuries. However among the 90 patients with foot injury 5 of them had severe TBI and therefore did not meet the inclusion criteria, also 2 of them had refused to be included in the study and therefore 90 patients meeting inclusion criteria were enrolled for the study.

Prevalence of foot injuries at MOI was found to be 5.5 with males being more affected than females (80% vs 4%). Also all age groups have been found to be affected by foot injuries with the mean age of 32±1.5, however majority of the cases were from the age group between(30-39=34%) followed by those aged between 20-29 years(26%) in (Table 1)

These findings can be attributed to the facts that males are more involved in out door activities that predisposes them to road traffic accidents and falling from heights.

Also the most affected age groups represent the most productive age groups and therefore any disability resulting from foot injuries would affect the work force and dependent families.

The results of this study are corresponding with other previous studies, such as the one done by Gaurav et al in which the prevalence of foot injuries was found to be 7.59 and males were more affected relative to females (82.9%-17.1%)[6]. Also in the same study the mean age was found to be 34 years. Other relatively similar results were reported in other studies [2,3,5,7,8,9]

Motor traffic crash has been found to be the leading cause of foot injuries with motorcycle passengers affected most,57patients representing (62%) of all the 90 foot injuries enrolled were a result of being involved in motor traffic crash and among them 76.8% were passengers and 26.7% were pedestrians(Figure4),(Table 3).

Other causes of foot injuries were found to be falling from height (16.7%), heavy/sharp objects falling on to foot (13.3%) and sports related causes (7.8%)(Figure4).

These results explain the explain the fact that traffic conditions and road safety regulations are still not to the best of the standards and therefore the risk of injury to unprotected motorcycle user especially passengers as well as pedestrians is significantly increased.

Studies done in the past revealed relatively similar results, in his unpublished study, Kighoma Simplice found that motorcycle accidents resulted into 34.2% of foot injuries followed by 32% resulting from motor vehicle accidents[7].

Another study done by Jeffers et al revealed that 52 out of 52 patients were motorcycle riders, and there was 1 patient who sustained injury while driving a car, the difference in the findings between these two studies can be explained by the fact that the two studies were conducted in countries with different levels of socioeconomical backgrounds in terms of technology, infrastructure, road safety measures and economical development[5].

In Tanzania the use of motorcycle as a means of public transport has recently spiked and therefore the number of individuals sustaining accidents has also been increased as reported by B. Mcharo study[27].Other studies also revealed relatively similar results [6,8,9,10]

Metatarsals have been found to fracture the most after a foot injury, where by 55.5% of the patients had fractures involving the metatarsal, with majority of the fractures involving multiple metatarsal and significantly the first &second metatarsal being involved in most of the cases.

This can be explained by the anatomically superficial location of the metatarsal bones in the foot and therefore being prone to injuries (Table 2).

Also Majority of the fractures were open (71.4%) against (29%) closed fractures, these findings can be related to the severity of injuries resulting from high energy mechanisms such as road traffic crush which appeared to be the commonest etiology in this study(figure 3)

These results are comparable to findings obtained by Jeffers et al in which 50% of the foot injuries involved fractures of metatarsal[5]. And in the study by Mandeep.S. Dhillon open foot fractures were found to occur in 72.4% of all the patients with foot injuries[9].

Similar results were also found in other studies[10,20]

In this study it has been found that foot injuries commonly occurs with concomitant injuries where by 32 patients(35.5%) had injuries to other body sites in association with the foot injury.

These injuries were mainly affecting the ipsilateral lower limbs whereby there were 43.8% fractures involving the long bones of lower limbs (femur, tibia, fibula), also there were 25% fracture dislocations of the ankle and 25% of patients had injuries to their heads, chest or abdomen (Table 5).

Presence of these associated injuries and their pattern can be attributed to the high energy mechanism, the direction of deforming forces as well as the anatomical proximity/relationship between the foot and the ankle or the long bones of lower limbs etc.

Similar results were obtained in the study done by Ahrberget al where by 39% of patients with foot injuries had concomitant injuries to the ipsilateral lower limbs[2].

Also Mandeep.S.Dhillon et al had results depicting the same as the current study whereby they found 47% of the patients had associated fractures termed as polytrauma with lower limbs involved in 46 percent[9].

Similar results with presence of concomitant injuries were also found in other studies [5,7,10]

Severity of injury was found to be related to the mechanism of injury, where by in this study among the 56 patients whose feet injuries were a result of involvement in motor traffic crash 34 had fractures,18 had soft tissue injury without fractures and 2 had traumatic amputations of single or multiple toes (Table 5).

These results can be attributed to the high energy involved during the crash which resulted in to that particular pattern of injury.

It was also found that sports related injuries resulted in fractures and dislocations with none of the patients having an amputation (Table 5).

Similar results were found in other studies such as the one done by Solagberu.B.A et al in which majority of the patients involved in motor traffic crash had sustained fractures of either single or multiple foot bones[26]. Also Schenk .R.C et al found that sports related injuries were ranging from closed fractures and dislocations with no open fractures or traumatic amputations[22].

Other relatively similar results were found in other studies[11,25].

CHAPTER FIVE

5.0 CONCLUSION AND RECOMMENDATIONS

5.1Conclusion

Foot injuries are common among patients attended at MOI. The majority are a result of motor traffic crashes especially those involving motorcycles.

Severity of injuries vary with the mechanism of injury in such a way that high energy mechanism like motor traffic crash would result into severe injury patterns. The productive work force age groups are the majority among the foot injury patients with males being involved more. Open metatarsal fractures is the most common pattern of injury encountered.

Also a significant percent of the patients with foot injuries will have a concomitant injury of lower limbs or other parts of the body.

5.2 Recommendations

1. A comprehensive history, examination and investigation of patients with foot injury is important so as not to miss presence of injury elsewhere, also the opposite is true that foot injury must be ruled out in almost all motor traffic crash victims especially involving motorcycles or pedestrians.
2. After the burden has been known then other studies especially those assessing treatment modalities and outcome should be conducted at the institute.

5.3 Study Limitations

The number of enrolled patients was limited by the calculated sample size, therefore if that number reached before the end of the study duration there was a challenge of how to deal with the remaining number of patients who came within the study duration but were not enrolled in the study.

Also the study duration is short, however this was pre determined by the University schedule for the course.

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APPENDICES

Appendix I: Questionnaire

PART A: SOCIO-DEMOGRAPHIC DATA

Patient ID……. Date of injury……

Occupation……

1. Age…….. (Years)
2. Sex……. (Male) o.r (Female)

PART B: CAUSES OF INJURY

3. Cause of injury
   (A)Motor traffic crash…….
   (B)Fall from height
   (C)Sports
   (D)Others…….

4. Means of transport
   (A)Motor vehicle
   (B)Motorcycle
   (C)Tricycle
   (D)Other……..

5. Involved as
   (A)Driver
   (B)Passenger
   (C)Pedestrian

PART C: PATTERN OF INJURY

6. Nature of injury

(A)Soft tissue injury only

(B)Fracture

(C)Dislocation

(D)Traumatic amputation

7. Nature of fracture

(A)Open

(B)Closed

8. Dislocated joint(s),(describe)…….

9. Nature of soft tissue injury

(A)Contusion (B) Abrasion (C) Cut wound (D) Laceration (E) Crush wound (F) Degloving

10. Foot injured

(a) Right (b) left (c) both

11. Anatomical distribution of fracture

(A) Tarsal (specify)……

(B) Metatarsal (specify)……..

(C) Phalanges (specify)……..

13. Associated injuries

(A)YES (describe) (B) NO

…….

……

Appendix II: Consent Form (English version and Swahili Version)

I (full name) ---------- of P.O.BOX----------do agree to participate in the study and I am willing to undergo investigations as required by the investigator. I have been explained and I have understood the objective and benefits of the study. Iam informed that I can agree/disagree to participate.

Signature of participant:----------
Date:----------

Swahili version

Mimi (jina kamili)----------, wa S.L.P---------- nakubali kushiriki katika utafiti huu na niko tayari kufanya vipimo vyote kama itakavyoagizwa na mtafiti. Nimeelezwa na nimeelewa madhumuni na umuhimu wa utafiti huu na ninafahamu kuwa niko huru kuamua kushiriki/kutokushiriki kwenye utafiti huu.

Saini ya mgonjwa ----------
Tarehe:----------