



## FREQUENCY OF LOWER LIMB AMPUTATION AMONG DIABETICS AND RELATED FACTORS AT SELECTED HOSPITALS IN MOGADISHU –SOMALIA

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### Abstract: -

**Introduction:** Diabetes mellitus is a significant global health concern, with an increasing prevalence worldwide. One of the most severe complications of diabetes is lower limb amputation, which has devastating physical, psychological, and socioeconomic consequences for patients. Understanding the frequency and associated factors of lower limb amputation among diabetic patients is crucial for developing targeted prevention and management strategies.

**Methods:** A quantitative observational cross-sectional study was conducted to determine the frequency of lower limb amputation and associated factors among 300 diabetic patients in three selected hospitals in Mogadishu, Somalia from July 2022–November 2023. Demographic characteristics, clinical data, and amputation-related information were collected through patient interviews and medical record reviews.

**Results:** The study found that 57% of the participants were male, and the majority (50%) were aged 41-65 years. The main reasons for amputation were diabetic foot ulcers (67%) and peripheral arterial disease (33%). The overall frequency of lower limb amputation was 35%. Factors associated with amputation included older age, male gender, longer duration of diabetes, poor glycemic control, and the presence of diabetic complications like neuropathy and peripheral arterial disease.

**Discussion:** The high frequency of lower limb amputation among diabetic patients in this study highlights the need for a multifaceted approach to diabetes management, including early detection and prevention of complications, prompt wound care, and a multidisciplinary team-based approach. Rehabilitation and psychosocial support are also crucial to improve the quality of life for amputees.

**Keywords:** Diabetes mellitus, lower limb amputation, diabetic foot ulcers, peripheral arterial disease, risk factor.

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### Introduction

Amputation of the lower limb represents the ultimate therapeutic intervention for cases of critical limb ischemia that have not responded to either vascular or endovascular interventions in the affected area (Spoden et al., 2019). Major lower limb amputation is frequently conducted for ischemia resulting from advanced peripheral arterial disease when alternative therapeutic interventions have proven unsuccessful or impractical (Scott et al., 2014). Amputation of the lower limb is only performed when no alternative course of treatment is likely to save the patient's life. Amputations of the legs are performed for a variety of causes, including congenital deformities, vascular disorders, significant infections, tumours, and injuries (AlMehman et al., 2022).

Ulcers occurring in the diabetic foot leading to subsequent lower limb amputations represent prevalent, intricate, and debilitating complications associated with diabetes. The global prevalence rates are on the rise, with diabetic foot ulcers showing a more

pronounced increase in incidence compared to other diabetes-related complications (Santos et al., 2015). One of the main causes of LEA, which is associated with high death and medical expense, is peripheral artery disease (PAD) (Caruso et al., 2021).

Lower extremity amputations of the lower limb are commonly conducted to remove necrotic tissue and can stem from various factors including diabetes mellitus (DM), peripheral arterial disease (PAD), bone and joint infections, peripheral neuropathy, trauma, or malignancy. Notably, the primary cause of non-traumatic lower limb amputations is complications arising from diabetic foot conditions (Walter et al., 2022). Amputation is among the most ancient forms of surgery. It entails removing the extremity entirely or in part.

Usually, the goals are to preserve life and/or restore function in an affected extremity. Amputation has a significant morbidity rate regardless of prosthetic substitution; the possibility of losing a limb

or its actual loss causes serious psychological and physical issues (Obalum & Okeke, 2009).

Diabetes mellitus represents a significant escalation in the realm of public health apprehensions. The frequency of diabetes has demonstrated a notable surge within the past few eras, spanning across a multitude of both industrialized and emerging nations (Walicka et al., 2021). Individuals diagnosed with type 2 diabetes mellitus (T2DM) often encounter a multitude of micro- and macrovascular complications. The manifestation of these complications has the potential to result in the occurrence of lower extremity amputation, which stands as a significant outcome of progressed diabetes (Yuan et al., 2018). Two primary factors contributing to the development of diabetic complications include macrovascular and microvascular issues. Macrovascular complications encompass conditions such as stroke, ischemic heart disease, and peripheral vascular disorders, which can progress to ulcers, and gangrene, and ultimately necessitate amputation. Conversely, microvascular complications manifest as eye disorders like retinopathy, glaucoma, cataracts, corneal disease, kidney disease known as nephropathy, and nerve damage referred to as neuropathy (Akhtar et al., 2017). Diabetes is becoming more commonplace globally as a result of population expansion, aging, physical inactivity, westernized eating habits, and obesity; as a result, diabetic foot cases are rising. It is estimated that individuals with diabetes have a 25% chance of developing at least one diabetic foot ulcer in their lifetime. Additionally, a lower limb amputation due to a diabetic foot is performed every 30 seconds globally, and the rates of these procedures are 30 to 40 times greater for patients with diabetes than for those without the condition (Lee et al., 2020).

Diabetes Mellitus (DM) is on the rise globally, which is concerning. The estimated total number of DM patients will rise further. The incidence of diabetes mellitus is predicted to increase to 578 million (10.2%) by 2030 and 700 million (10.9%) by 2045. DM, which is the fourth most common cause of NCD death at around 1.6 million, also adds to NCD fatalities worldwide (Rosedi et al., 2022). One of the most dreaded bad health outcomes for diabetics is amputation of the lower leg. It usually has disastrous effects on mood and social functioning (Holman et al., 2012).

The risk of amputation post-revascularization interventions displayed a positive correlation with the specific procedure type, black ethnicity, lack of insurance/Medicaid coverage, and diabetic condition. Furthermore, the likelihood of mortality was elevated after undergoing bypass surgery, possibly indicating the severity of

the underlying ailment. It is crucial to underscore the importance of patient education, regular screening, and providing optimal care for the lower extremities to individuals diagnosed with peripheral vascular disease (PVD) in the early stages of the disease progression (Wilasrusmee, 2012). One of the main factors contributing to nontraumatic lower-extremity amputations (NLEA) is diabetes. Numerous components of comprehensive diabetes care, such as early detection of complications connected to diabetes, glycemic control, cardiovascular risk factor management, and diabetes self-care management, all have an impact on NLEA rates (Harding et al., 2020). Leg amputation is a worry that many who have peripheral vascular disease or diabetes have in common. Peripheral neuropathy and vascular insufficiency often work in concert to put patients at risk for infection, tissue loss, and foot ulcers (Hussain et al., 2019). Patients' age, gender, supporting social network, coping mechanisms, phantom feelings, pain perception, amputation cause, and amount of time since the intervention all affect their psychological reactions. These elements affect how well patients adjust to their new living circumstances while undergoing rehabilitation (Makai et al., 2019).

The establishment of multidisciplinary foot clinics and streamlined care pathways in local secondary and tertiary health care settings has been linked to a considerable decrease in the prevalence of lower extremity amputation (LEA) (Baba et al., 2015). Amputation causes a person to become permanently disabled and significantly changes their performance and quality of life. Amputations of the lower and upper extremities have been linked to varying degrees of physical disability as well as psychological issues [1]. A lower limb amputation (LLA) not only results in permanent physical alterations but also has an impact on an individual's social, psychological, and overall well-being (Alessa et al., 2022).

**Methods**

Quantitative observational – cross-sectional study was used to determine the frequency of lower limb amputation among diabetics and related factors, the sample size was 300 patients. The total number of patients who participated in this study of diabetes lower limb amputation was 300 individuals, their demographic characteristics included gender, age, marital status, educational level, socioeconomic status, jobs and living area, type of amputation, and reason of amputation. Data were collected by using a structured and pretested questionnaire via face-to-face interview, a record review, and direct observation of patients and data analysis was analyzed by using SPSS 23.

**4.1 Gender Distribution:**

The figure below shows that 57% of the study participants were males while 43% of the study participants were female.

Gender distribution	Frequency	percentage
Male	171	57%
Female	129	43%
Total	300	100%

Table 1: gender distribution

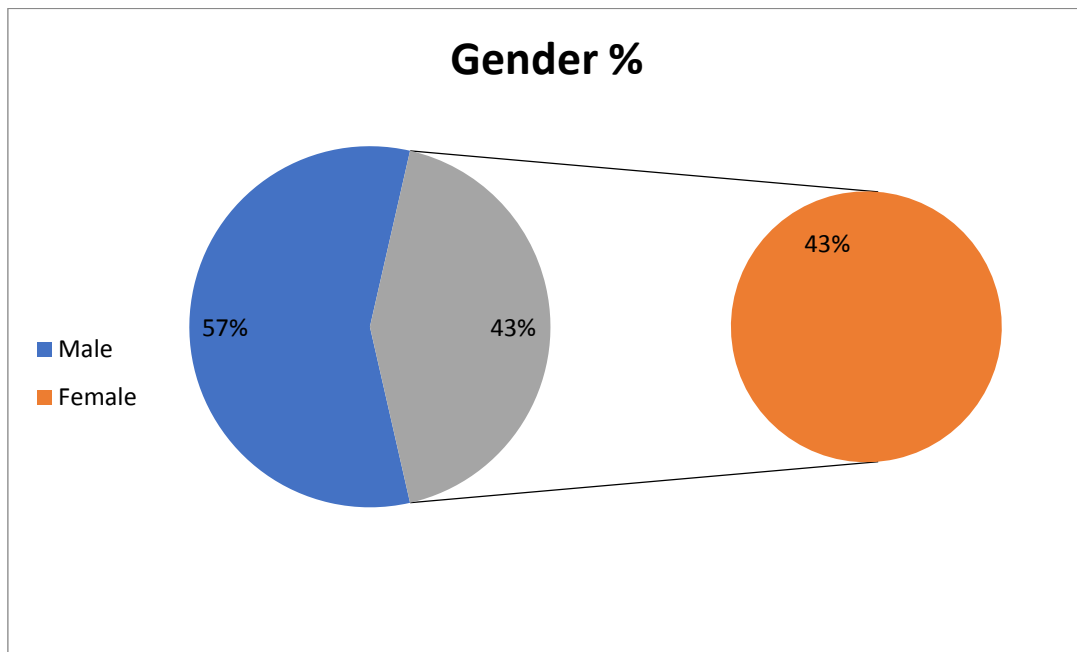


Figure 1: Gender distribution among diabetic patients at three selected hospitals in Mogadishu- Somalia. July 2022–November 2023

**2 Age Distribution:**

As shown figure below, it represents the percentage of ages of patients with diabetes, the minimum age was 15yrs and the maximum age was 90 yrs.

Age distribution	Frequency	Percentage
15-40	60	20%
41-65	150	50%
66-90	90	30%
Total	300	100%

**4.1**

Table 2: Age Distribution

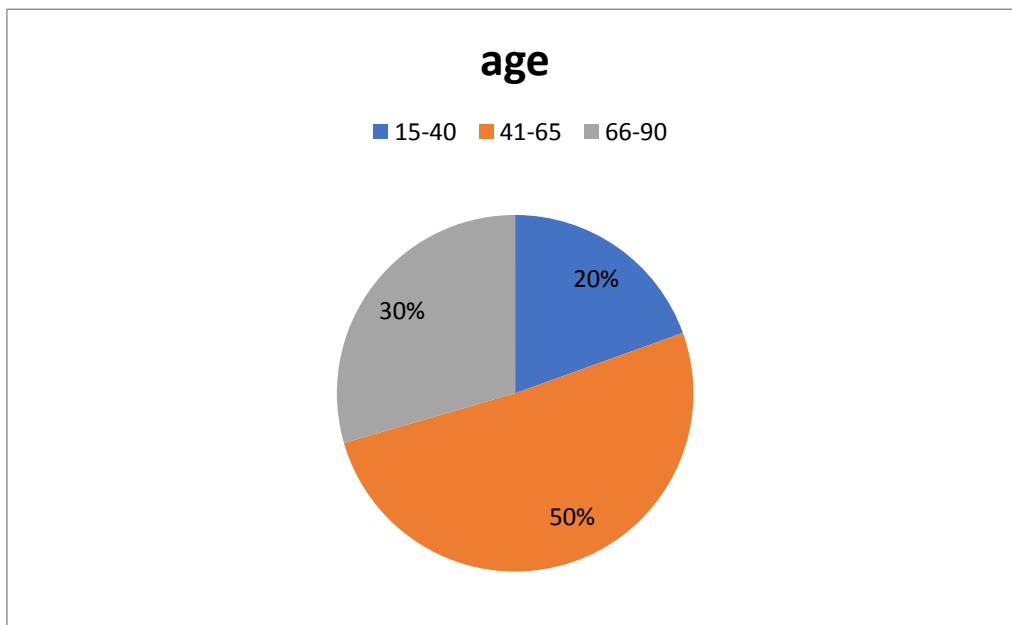


Figure 2: Age Distribution among diabetic patients at three selected hospitals in Mogadishu- Somalia. July 2022–November 2023

### 3 Marital status.

The following figure depicts the marital status of the patients taking part in the study of lower limb amputations among diabetics so that marital status of the individuals 67% were married, 13% were divorced 11% single and 9% were widowed.

Marital status	frequency	percentage
Married	201	67%
Divorced	39	13%
Single	33	11%
Widowed	27	9%
Total	300	100%

Table 3: marital status.

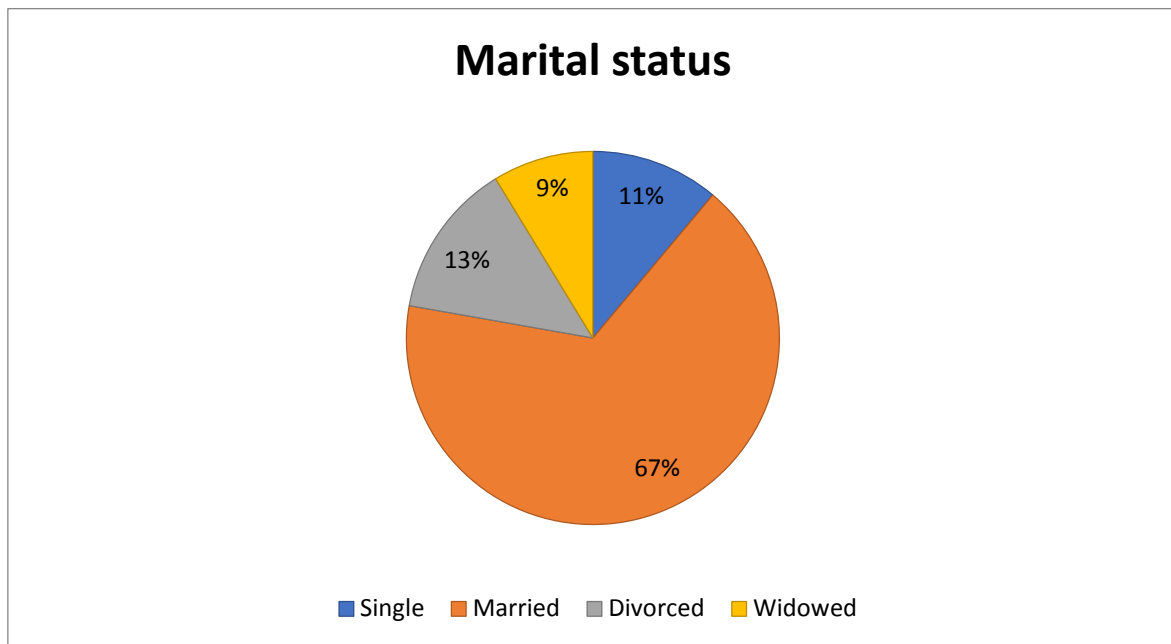


Figure 3: Marital status among diabetic patients at three selected hospitals in Mogadishu- Somalia. July 2022–November 2023

### 4 Educational level:

The figure below indicates the educational level of the patients with diabetes, that 25% were illiterate, 28% Quran, 11% were primary, 22% were secondary and 14% were university level.

Educational level	Frequency	Percentage
illiterate	75	25%
Quran	84	28%
Primary	33	11%
Secondary	66	22%
University	42	14%
Total	300	100%

4. 2

Table 4.4: educational level.

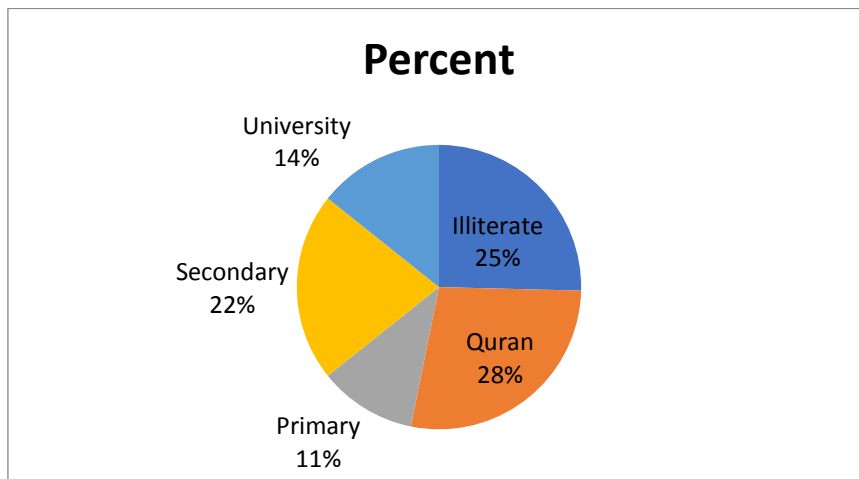


Figure 4: Educational levels among diabetic patients at three selected hospitals in Mogadishu- Somalia July 2022–November 2023

**5 Job distribution.**

The following figure shows those who either having jobs or are jobless. There most 59.5% of patients with diabetes were jobless while 40.5 % had jobs.

Job distribution	Frequency	Percentage
Job	121	40.5%
Jobless	179	59.5%
Total	300	100%

Table 5: job distribution

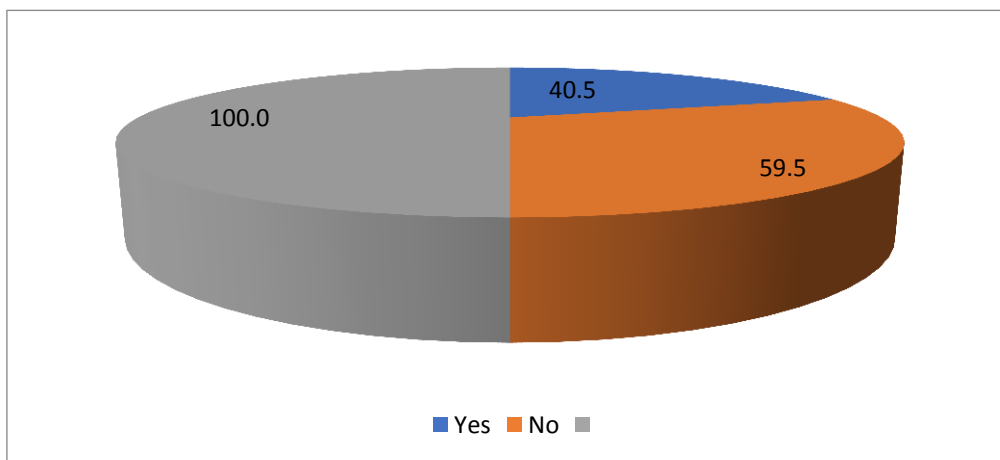


Figure 5: Job distribution among diabetic patients attending at three selected hospitals in Mogadishu- Somalia. July 2022–November 2023

**6 Living area.**

This pie chart shows the settlements of patients taking part in this study, as it indicates how far different between these patients living in Mogadishu region and outside Mogadishu region. Urbanization has a great impact on the health of people. Most patients living in the city had diabetes accounting for 75% while a little 25% of patients were living in outside Mogadishu.

Living area	Frequency	Percentage
Mogadishu	225	75%
Out of Mogadishu	75	25%
Total	300	100%

Table 4.6: living area

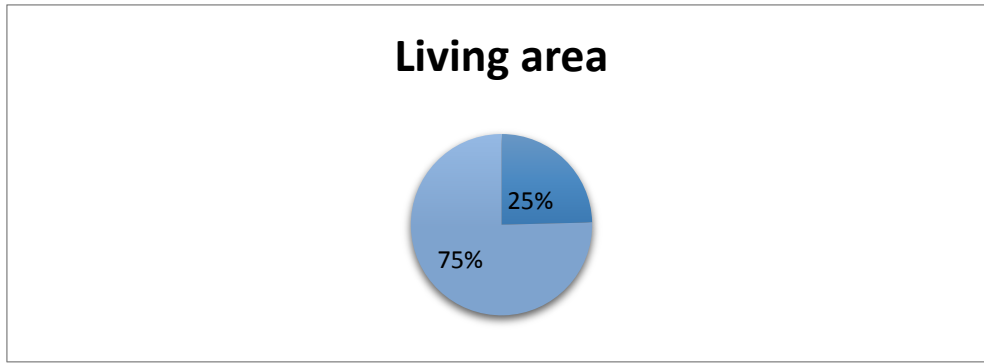


Figure:4.6: Living area among diabetic patients at three selected hospitals in Mogadishu- Somalia. July 2022–November 2023

**7 Diabetes duration.**

The following figure shows the time duration of diabetes in patients with diabetes, starting from the time of diagnosis and up to now. They have different time intervals for diabetes. Most patients were having diabetes less than 10years,As shown in this figure, 40% of the patients had diabetes less than 10 years, 32% 10-20 years, 16% for 21-30years while 12% for more than 30 years.

Diabetic duration	Frequency	Percentage
<10 years	120	40%
10-20 years	96	32%
21-30 years	48	16%
>30 years	36	12%
Total	300	100%

Table 7: diabetic duration.

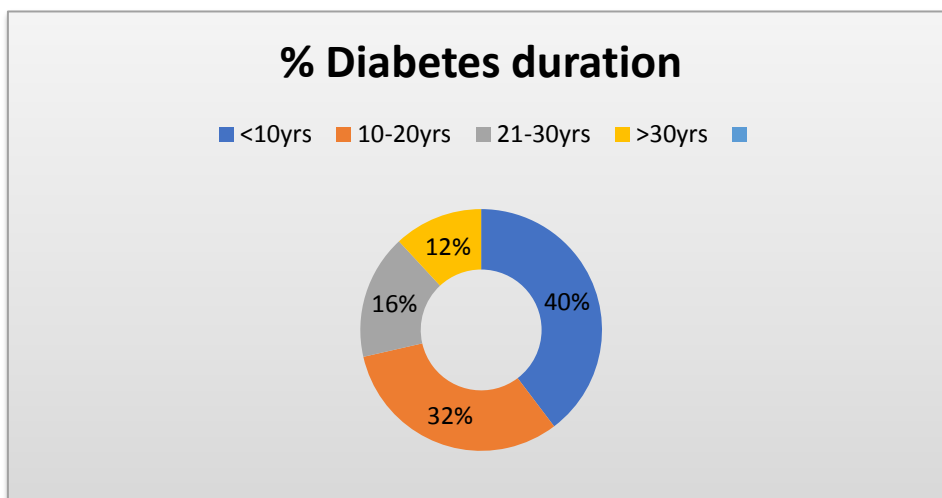


Figure 4.7: Diabetes duration among diabetics at three selected hospitals in Mogadishu- Somalia . July 2022–November 2023.

**8 Sugar check-up**

The following figure shows the percentage of patients making regular blood sugar check up which was essential for preventive measures of diabetes limb amputation. It shows that 82% of patients with diabetes were not doing regular blood sugar while that 18% of the patients were doing regular blood sugar checks.

Sugar check-up	Frequency	Percentage
No	246	82%
Yes	54	12%
Total	300	100%

4.3

Table 8: sugar check-up

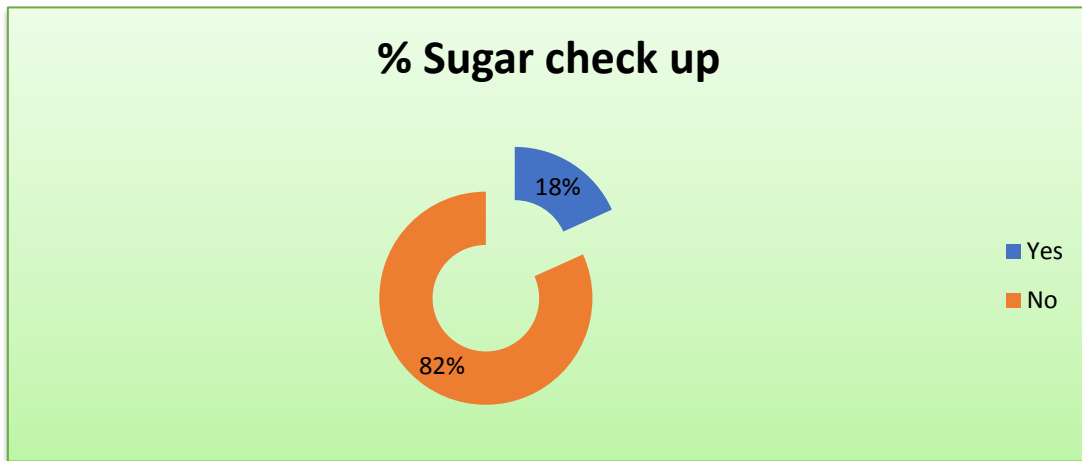


Figure 8: Sugar check up. among diabetic lower limb amputation at three selected hospitals in Mogadishu- Somalia. July 2022– November 2023

#### 4.9 Body Mass Index

The following figure displays the % BMI among diabetic patients. The BMI of patients was divided into four categories according to the standard levels of BMI. 45% accounts a BMI of 26-35, 36% of the patient have a BMI 18-25, 13% with less than 18, and 6% have more than 35

BMI	Frequency	Percentage
<18	39	13%
18-25	108	36%
26-35	135	45%
>36	18	6%
total	300	100%

Table 9: body mass index

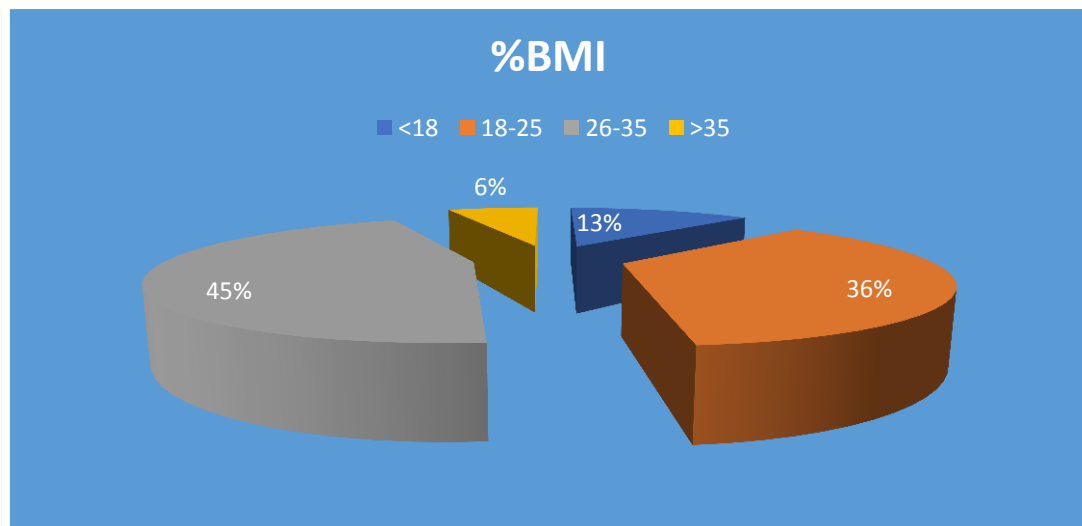


Figure 9: Body Mass Index among diabetic patients attending three selected hospitals in Mogadishu- Somalia. July 2022–November 2023

#### 10 Level of HbA1C.

As the following figure indicates the different levels of HbA1C among diabetic patients. The HbA1C is most indicative of the control of diabetes in the past 3 months, so the patients were totally having diversity of standard levels of HbA1C of in their past three months, so as the most of patient were not doing sensitive check up and regulation in the past three months. only 2.4% of the patients were less than 6 of HbA1C of patients, 27% were having highest HbA1C level while 70.6% of the patients were having some of higher HbA1C according to the standard normal levels of HbA1C.

LEVEL OF HBA1C	Frequency	Percentage
<6	7	2.4%
7-9	212	70.6
>9	81	27%
Total	300	100%

Table 10: level of HBA1C

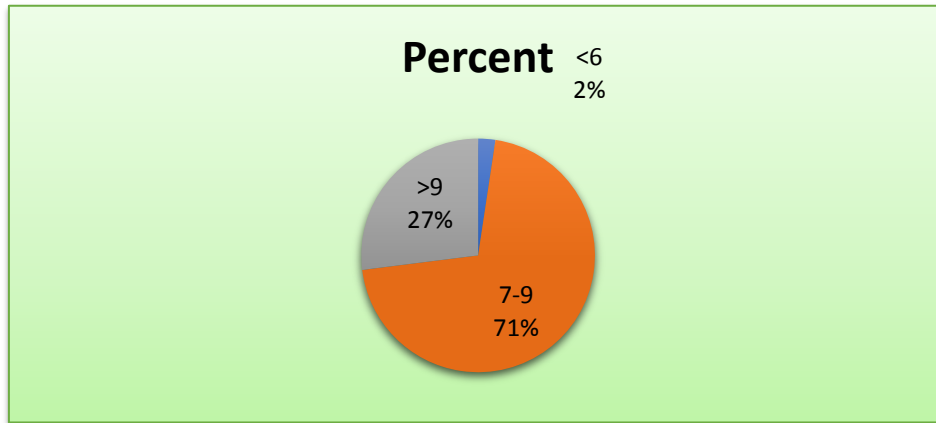


Figure 4.10: Level of HbA1C among diabetic patients at three selected hospitals in Mogadishu- Somalia. July 2022–November 2023.

**11 Usage anti-diabetes medicine.**

As the following figure hints the percentage of diabetic patients taking anti-diabetes medicine to control the level of blood sugar which is essential to lower the risk of diabetes-related lower limb amputation, as shown in this pie chart, that 73% of the patients were not taking anti-diabetes medicine while only 27% of the patients were irregular taking anti-diabetes medicines.

Use diabetic treatment	frequency	Percentage
Yes	81	27%
No	219	73%
Total	300	100%

Table 11: use diabetic treatment.

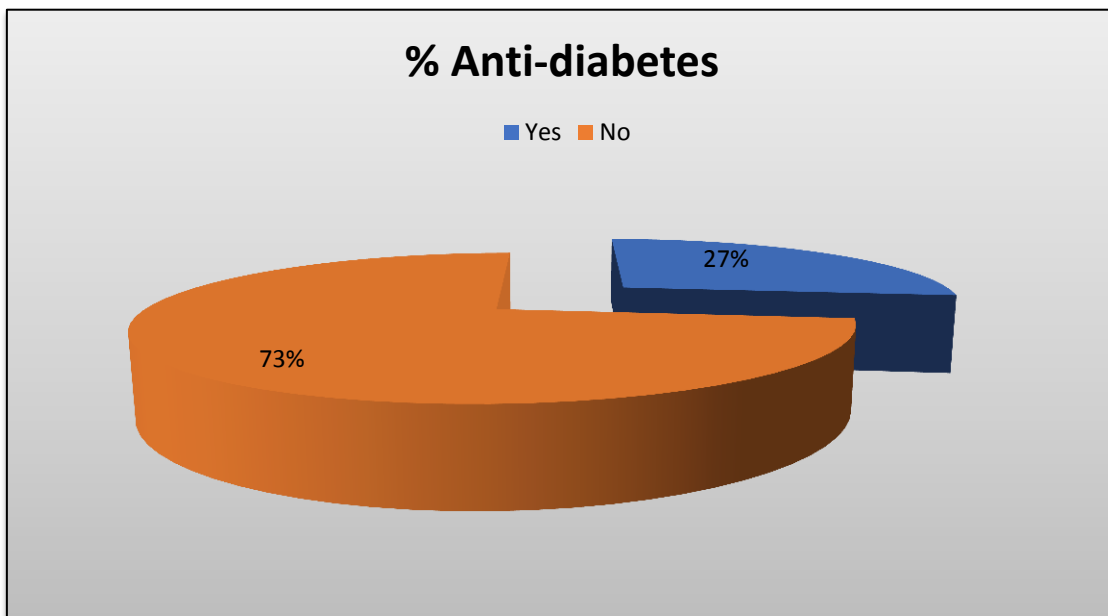


Figure 11: Use anti-diabetes medicine among diabetic patients at three selected hospitals in Mogadishu- Somalia. July 2022–November 2023



**12 Wearing protective shoes.**

As mentioned in the figure below, using protective shoes by patients having diabetes who are susceptible to minor trauma during their daily walking and activity,- to protect against repeated minor trauma- makes significant importance of reduction of diabetes lower limb trauma and prevent the risk of developing diabetes-related lower limb amputation, nevertheless, most patients were not using protective shoes, due to lack awareness of its importance, so that 77.8% of the patients were not wearing foot protective shoe as 22.2% of patients were using foot protective shoes.

Wearing protective	Frequency	percentage
Yes	67	22.2%
No	233	77.8%
Total	300	100%

Table 12: wearing protective.

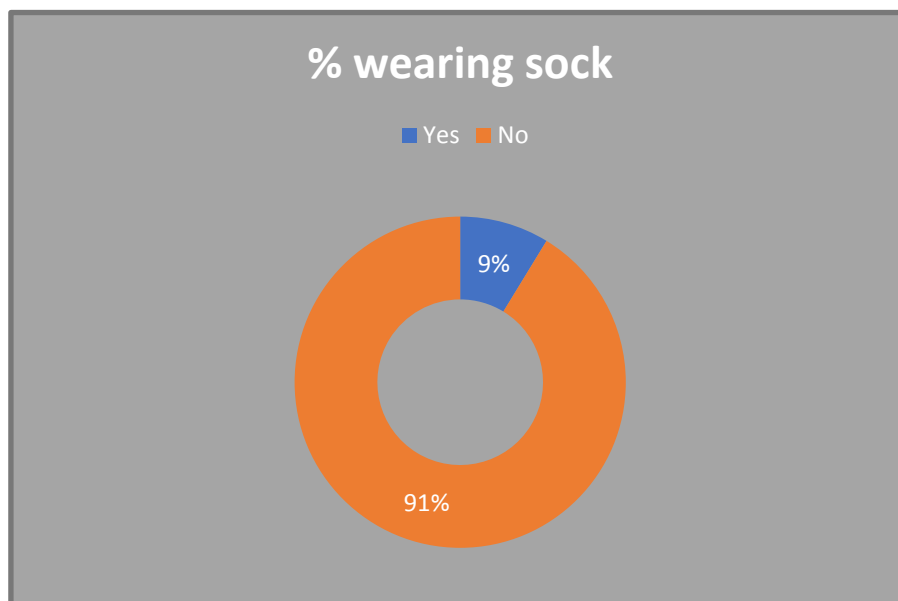
**Figure: 12 Wearing protective shoes among diabetic patients at three selected hospitals in Mogadishu- Somalia. July 2022–November 2023**

**13 Using a sock with the shoe.**

The following figure shows how many patients were using socks with their shoes, so 91% of the patients were not taking sock with their shoes while 9% were wearing socks with their shoes.

;Using socks with shoes	Frequency	Percentage
Yes	27	9%
No	273	91%
Total	300	100%

Table: 13



**Figure 13: Using socks with shoes among diabetic patients at three selected hospitals in Mogadishu- Somalia. July 2022–November 2023**

**14 Doing dietary control and eating balanced food.**

The following figure presents the dietary control of patients with diabetes, as we know control of dietary taking is one of the most important steps of prevention diabetes-related lower limb amputation, despite these steps 80% of the patients were not practicing dietary control while little 20% of patients were performing dietary control.

Diet control	Frequency	Percentage
Yes	60	20%
No	240	80%
Total	300	100%

Table 14: diet control



Figure 14: Doing dietary control and eating balanced food among diabetic patients at three selected hospitals in Mogadishu- Somalia. July 2022–November 2023

**4.15 amputated or not amputated:**

As according to the following figure, a total of 300 diabetic patients (study population), Before we approve how many types of amputees we improve how many need amputees or not. 67% (201) of study population don't need amputation, about 99(33%) of them were developed lower limb amputation during period of the study.

Amputated/non amputated	Frequency	Percentage
Amputated	99	33%
Non amputated	201	67%
Total	300	100%

Table 15: amputated or not amputated

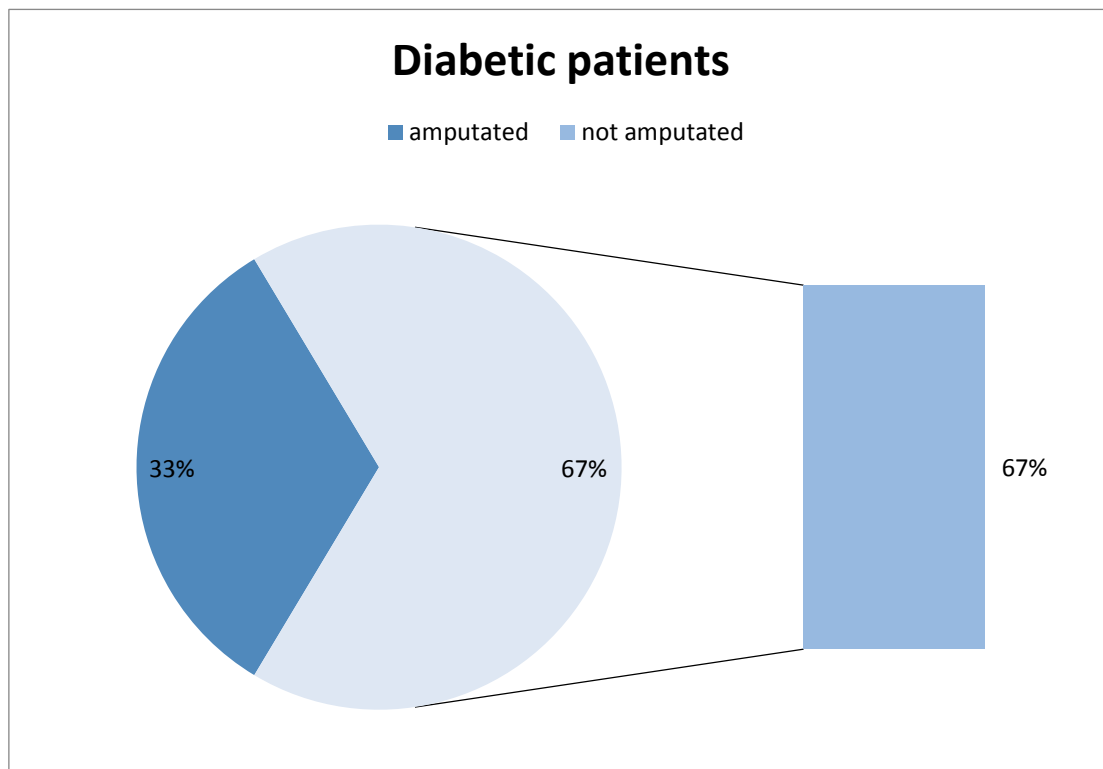


Figure 15: The figures show the percentage of diabetic amputee patients and non amputated at three selected hospitals in Mogadishu- Somalia July 2022–November 2023

**16 type of amputation**

Nevertheless, 21 % (n=63) were done minor amputation while 12% (n=36) were done also major amputation.

Type of amputation	Frequency	Percentage
Minor	63	21%
Major	36	12%
Total	99	33%

Table 16: type of amputation

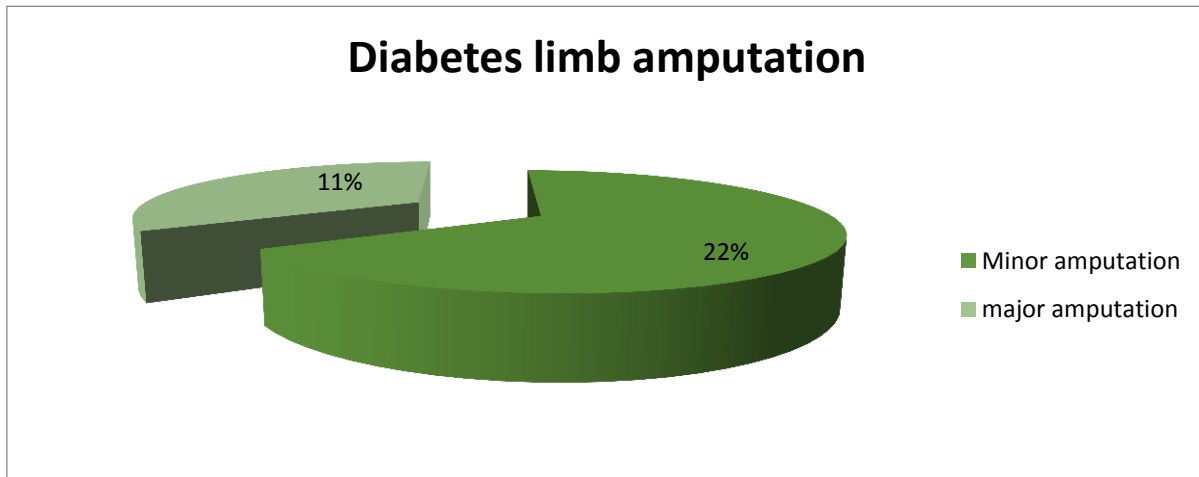


Figure 16: Type of amputation among diabetic lower limb amputation at three selected hospitals in Mogadishu- Somalia. July 2022– November 2023

**17 Reason for foot amputation.**

As there are a variety of reasons to indicate diabetes limb amputation, most patients have different conditions for their amputation. Peripheral arterial disease ( PAD) is one of the most common causes of diabetes amputation, as it causes narrowing of blood vessels and leads to reduction of blood flow to the foot and leg. It may also cause nerve damage known as Peripheral neuropathy (P.N) which also will be the second important etiological factor of limb amputation by preventing the foot and leg from feeling pain, if the limb can't feel pain, do not realize that wound or ulcer formation. If the ulcer developed patient might be tried to get heal the ulcer but not able to go process of healing and recovery due to blood flow and lack nerve sensation. So as the figure indicates how many persons were indicated to be amputated due to different reasons. the is was categorized to four parts according to type of foot and leg problems, nevertheless the figure shows that 44% of the patients were having diabetes dry gangrenes, 18% with diabetes infected gangrenes, 36% diabetes unhealed foot ulcer while another 2% were having different conditions.

Reason of amputation	Frequency	Percentage
Dry gangrene	132	44%
Wet gangrene	54	18%
Unhealed foot ulcer	108	36%
Others	6	2%
Total	300	100%

4.5

Table 17: reason of amputation.

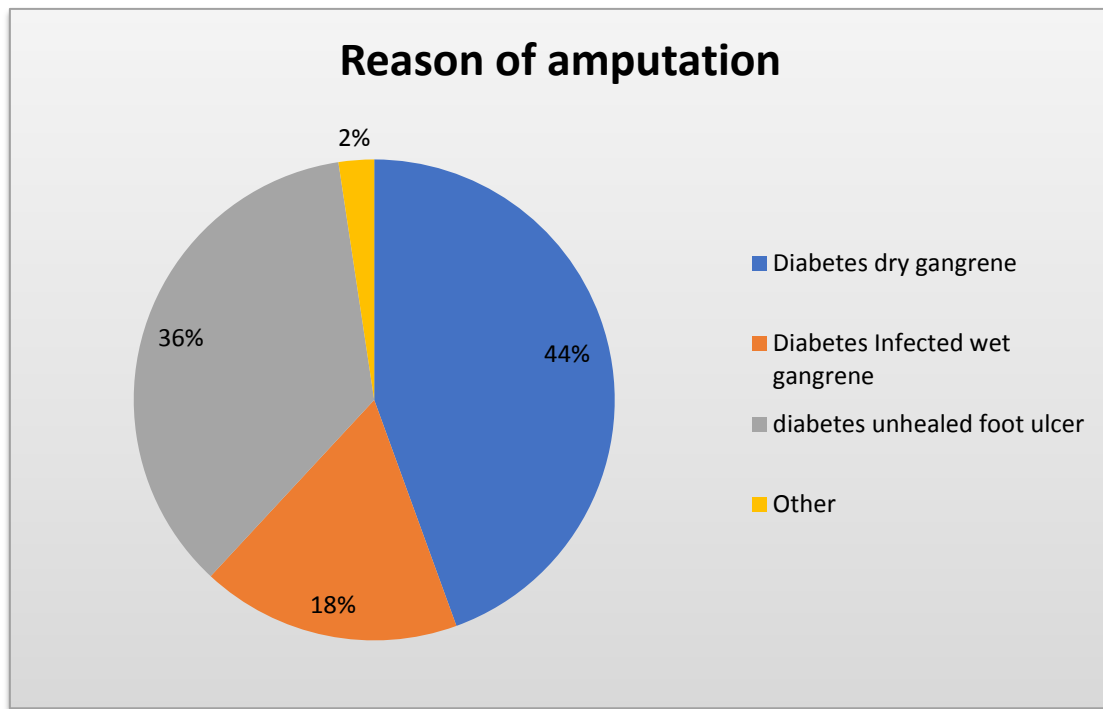


Figure 17: Reason for limb amputation among diabetic lower limb amputation at three selected hospitals in Mogadishu- Somalia. July 2022–November 2023

## Chapter five

### DISCUSSION (FINDINGS), CONCLUSION AND RECOMMENDATION.

#### 5.1.1 Discussion:

A cross-sectional study was conducted from July 2022–November 2023. The aim of the study was to determine frequency of lower limb amputation among diabetics and related factors at selected hospitals in Mogadishu-Somalia. 300 patients were involved - 171 were males and 129 were females who had diabetes- during the study period.

About 33% (n=99) of diabetics have limb amputation according to a total of 300 patients. Almost 22% of these diabetics underwent minor amputation while 11% underwent major amputation. According to the general characteristics of respondents, the mean age of respondents was 54 years with relevant to the mean age of the study.

That 57% were males while 43% were female with the maximum number in ages between 41-65yrs 51%, most patients 67% were married as 75% of them were living in Mogadishu and 25% were outside Mogadishu.

The reasons that led the patients to be amputated were different 44% of the patients had diabetes dry gangrenes, 18% with diabetes infected gangrenes, 36% had diabetes unhealed foot ulcer and another 2% had different conditions.

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