



Çankırı Karatekin University
Graduate School of Health Sciences



Master of Science Thesis

**ASSESSMENT OF KNOWLEDGE AND PRACTICES OF
DIABETIC PATIENTS TO DIABETIC FOOT CARE IN IRAQ**

ALI OUDAH SHANI SHANI

Advisor

Asst. Prof. Dr. Nedret TEKİN KAYA

ÇANKIRI 2023

**ASSESSMENT OF KNOWLEDGE AND PRACTICES OF DIABETIC
PATIENTS TO DIABETIC FOOT CARE IN IRAQ**

BY

Ali Oudah Shani SHANI

**The Institute of Health Sciences
The Department of Nursing
Internal Medicine Nursing Master's Program with Thesis**

The Degree of Master of Science

THESIS SUPERVISOR

Asst. Prof. Dr. Nedret TEKİN KAYA

Çankırı 2023

ACCEPTANCE AND APPROVAL

Ali OUDAH SHANI SHANI, graduate student of Çankırı Karatekin University Institute of Health Sciences with the number of 208210240, has successfully presented her thesis entitled " Assessment of Knowledge and Practices of Diabetic Patients to Diabetic Foot Care in Iraq" before the jury whose signatures are below, after fulfilling all of the requirements determined by the relevant regulations for the degree of Master of Science:

Members of discussion committee

Date :
01/02/2023

Chairman: **Asst. Prof. Dr. Nedret TEKİN KAYA**
Çankırı Karatekin University

.....
Signature

Committee Member: **Asst. Prof. Dr. Özlem BULANTEKİN**
DÜZALAN Çankırı Karatekin University

.....
Signature

Committee Member: **Asst. Prof. Dr. Pınar HARMANCI**
İstiklal Üniversitesi

.....
Signature

Approved for the Graduate School of Health Sciences

Assoc. Prof. Dr. Nazan KAYTEZ

Director of Graduate School

ETHICS STATEMENT

The thesis entitled “Assessment of Knowledge and Practices of Diabetic Patients to Diabetic Foot Care in Iraq” which was prepared and presented as a thesis, was written by myself and in accordance with the scientific, academic rules and ethical conduct. The idea/hypothesis of my thesis solely belongs to my supervisor and to me. The research pertaining to the thesis was conducted by myself and therefore, all the used sentences and interpretations within the work belongs to me.

I declare the issues mentioned above to be correct.



Signature

01/ 02/ 2023

Ali Oudah Shani SHANI

ABSTRACT

ASSESSMENT OF KNOWLEDGE AND PRACTICES OF DIABETIC PATIENTS TO DIABETIC FOOT CARE IN IRAQ

Ali Oudah Shani SHANI

Master of Science in Nursing

Advisor: Asst. Prof. Dr. Nedret TEKİN KAYA

February 2023

Diabetic foot is a complication of diabetes and can cause serious foot problems. This study aims to determine the knowledge and practices of diabetic patients regarding diabetic foot care in Iraq. The cross-sectional descriptive study was carried out between April and July 2022. The sample of the study consisted of diabetic patients (n=200). A questionnaire form designed to determine the sociodemographic characteristics of the patients and their knowledge and practices regarding diabetic foot care was used. Data were obtained through face-to-face interviews with patients. SPSS (25) program was used in data entry and analysis. Of the participants (n=200), 79 (39.5%) had a high diabetic foot care knowledge score, and 121 (60.5%) had a low knowledge score. A statistically significant relationship was found between knowledge levels (gender, education level, occupation, income, residence, and whether there is a health center or hospital close to where they live) ($p<0.05$). In the study, it was determined that 75 (37.5%) of the patients had high application and 125 (62.5%) had low application. A statistically significant relationship was found between the level of practice and the level of education, occupation, and residence ($p<0.05$). It is recommended to inform diabetic patients about foot problems and their treatments, to print brochures about diabetic foot care practices, to give these brochures to patients when they apply to health institutions, and to inform diabetic patients about this issue.

2023, 68 pages

Keywords: Diabetes mellitus, diabetic foot care, knowledge, practices, nursing

ÖZET

IRAK'TA DİYABETİK HASTALARIN DİYABETİK AYAK BAKIMINA YÖNELİK BİLGİ VE UYGULAMALARININ DEĞERLENDİRİLMESİ

Ali Oudah Shani SHANI

Hemşirelik, Yüksek Lisans

Tez Danışmanı Dr. Öğr. Üyesi Nedret TEKİN KAYA

Şubat 2023

Diyabetik ayak, diyabetin bir komplikasyonudur ve ciddi ayak sorunlarına neden olabilir. Bu çalışma, Irak'ta diyabetik ayak bakımı ile ilgili diyabet hastalarının bilgi ve uygulamalarını belirlemeyi amaçlamaktadır. Kesitsel tanımlayıcı çalışma Nisan-Kasım 2022 tarih arasında gerçekleştirilmiştir. Araştırmada örneklemini diyabet hastaları oluşturmuştur (n=200). Hastaların sosyodemografik özelliklerini ve diyabetik ayak bakımı ile ilgili bilgi ve uygulamalarını belirlemek için tasarlanmış bir anket formu kullanılmıştır. Veriler hastalarla yüz yüze görüşmelerle elde edilmiştir. Veri girişi ve analizinde SPSS (25) programı kullanılmıştır. Katılımcıların (n=200) 79'unda (%39,5) diyabetik ayak bakımı bilgi puanı yüksek, 121'inde (%60,5) düşük bilgi puanı vardı. Bilgi düzeyleri (cinsiyet, eğitim düzeyi, meslek, gelir, ikamet ve yaşadıkları yere yakın bir sağlık merkezi veya hastane olup olmadığı) arasında istatistiksel olarak anlamlı bir ilişki bulunmuştur ($p<0.05$). Çalışmada hastaların 75'inde (%37,5) yüksek, 125'inde (%62,5) düşük uygulama olduğu belirlenmiştir. Uygulama düzeyi ile eğitim düzeyi, meslek ve ikamet düzeyi arasında istatistiksel olarak anlamlı bir ilişki bulunmuştur ($p<0.05$). Diyabet hastalarının ayak problemleri ve tedavileri hakkında bilgilendirilmesi, diyabetik ayak bakımı ile ilgili uygulamalar hakkında broşür basılması ve sağlık kuruluşlarına başvurduklarında hastalara bu broşürlerin verilmesi, diyabetik hastaların bu konuda bilgilendirilmesi önerilmektedir.

2023, 68 sayfa

Anahtar Kelimeler: Diabetes mellitus, diyabetik ayak bakımı, bilgi, uygulamalar, hemşirelik

PREFACE AND ACKNOWLEDGEMENTS

Thanks first to God who helped me to complete this journey.

My thanks and appreciation to the Institute of Health Sciences at, Çankırı University for facilitating the completion of this study. I am grateful to my supervisor Nedret TEKİN KAYA. For the support and advice he gave me in order to complete my research

I extend my sincere thanks and gratitude to my lovely family, my wife and my son, who have been a bright spot in my life.

I would also like to recognize the support and guidance the staff of Al-Hussein Teaching Hospital that provided a supportive environment to complete my research.

I also thank all the patients who participated in the completion of this research.

Ali Oudah Shani SHANI

Çankırı-2023

LIST OF CONTENTS

ACCEPTANCE AND APPROVAL.....	iii
ETHICS STATEMENT	iv
ABSTRACT	v
ÖZET	vi
PREFACE AND ACKNOWLEDGEMENTS.....	vii
LIST OF CONTENTS.....	viii
LIST OF ABBREVIATIONS	x
LIST OF FIGURES.....	xi
LIST OF TABLES.....	xii
1. INTRODUCTION	1
1.1. Importance of the study.....	3
1.2. Statement of the problem	6
1.3. Aim of the study.....	6
1.4. Research questions	6
2. REVIEW OF LITERATURES	7
2.1. Historical background of Diabetes Mellitus	7
2.2. Conceptual framework	8
2.3. Cells and secretions of the pancreatic islets.....	9
2.4. Pathophysiology of Diabetes Mellitus	100
2.5. Types of Diabetes Mellitus	11
2.5.1. Diabetes Mellitus type 1	11
2.5.2. Diabetes Mellitus type 2.....	11
2.6. Epidemiology of Diabetes Mellitus	12
2.7. Causes and risk factors of Diabetes Mellitus	14
2.7.1. Causes of Diabetes Mellitus	14
2.7.2. Risk factors of Diabetes Mellitus	155
2.8. Symptoms of Diabetes Mellitus	16
2.9. Diagnosis of Diabetes Mellitus disease	17
2.10. Complications of Diabetes Mellitus.....	18
2.11. Management of Diabetes Mellitus	19

2.11.1. Education.....	19
2.11.2. Exercise or physical activity.....	199
2.11.3. Diet and nutritional therapy.....	20
2.11.4. Pharmacotherapy for diabetes	20
2.12. Diabetic foot.....	21
2.13.Epidemiology of diabetic foot.....	244
2.14. Signs and symptoms of foot issues that require attention	25
2.15. Diabetic foot self-care	26
3. MATERIAL AND METHOD	28
3.1. Design of the study	28
3.2. Ethical consideration.....	28
3.3. Place of study	29
3.4. Sample of the study.....	29
3.4.1. Criteria for selection the sample.....	29
3.4.2. Exclusion criteria.....	30
3.5. Steps of the study	30
3.6. The study instrument.....	31
3.6.1. Sociodemographic characteristics	31
3.6.2. Clinical characteristics	31
3.6.3. Questions related to knowledge of foot care	31
3.6.4. Questions related to practice of foot care	31
3.7. Validity of the instrument	32
3.8. Data collection	32
3.9. Statistical data analysis	322
4. STUDY RESULTS	333
5. DISCUSSION OF THE STUDY RESULTS	39
6. CONCLUSIONS AND RECOMMENDATIONS	444
6.1. Conclusions.....	44
6.2. Recommendations	45
REFERENCES	46
APPENDICES.....	Hata! Yer işareti tanımlanmamış.4
CURRICULUM VITAE	67

LIST OF ABBREVIATIONS

ABBREVIATIONS

Meaning

ADA	: American Diabetes Association
ADEA	: American Diabetes Educators Association
AGE	: Advanced Glycation Products
BC	: Beta Cells
BMI	: Body Mass Index
DFU	: Diabetic Foot Ulcer
DL	: Decilitre
DM	: Diabetes Mellitus
HbA1c	: Haemoglobin Glycosylated
HIV	: Human Immunodeficiency Virus
IDF	: International Diabetes Federation
LEA	: Lower Extremity Amputation
ML	: Millilitre
PAD	: Peripheral Arterial Disease
SPSS	: Statistical Package Social Science
T2DM	: Diabetes Mellitus Type 2
T1DM	: Diabetes Mellitus Type 1
US	: United States
%	: Percentage
&	: And
\$	:Dollar

LIST OF FIGURES

Figure 2.1. Symptoms of diabetes mellitus (Dagogo-Jack, 2017).....	177
Figure 2.2. Diagnostic criteria for diabetes (American Diabetes Association,2017) ..	18
Figure 2.3. The pathways to foot ulceration (Nguyen, 2019).....	233
Figure 4.1. Distribution of the level of knowledge about foot care among patients .	355
Figure 4.2. Distribution of the level of practice about foot care among patients	35



LIST OF TABLES

Table 4.1. Distribution of patients according to social demographic features.....	33
Table 4.2. Distribution of patients according to their medical information.....	344
Table 4.3. The relationship the knowledge level of patients and demographic data .	366
Table 4.4. The relationship the practice level of patients and the demographic data...	37



1. INTRODUCTION

Diabetes mellitus is a diverse metabolic condition that is defined by the presence of hyperglycemia owing to reduced insulin production, faulty insulin action, or both. The presence of hyperglycemia is what differentiates diabetes from other metabolic disorders. Diabetes mellitus is a condition that may last for a significant amount of time and might be brought on by a variety of different factors. Chronic hyperglycemia, which is a consequence of diabetes, is linked with relatively long-term microvascular problems that damage the eyes, kidneys, and nerves. (Schleicher et al., 2022)

Diabetes that is not under control has a role in the intricate metabolic pathways that are involved in the development of neuropathy and peripheral vascular disease. Ulcers on the foot could be brought on by a loss of feeling brought on by peripheral neuropathy, ischemia brought on by peripheral artery disease, or a combination of the two conditions. Peripheral neuropathy and peripheral artery disease can cause a loss of feeling in the extremities. The incidence of diabetes-related peripheral neuropathy varies from 0.003 to 2.8%, and the prevalence of diabetes-related peripheral arterial disease ranges from 0.01-0.4%, according to the results of an in-depth study that comprised 78 studies that were carried out on 84 cohorts. demonstrates the myriad of potential causes that might result in foot troubles.(Mishra et al., 2017)

Over time, nerves and blood arteries in the legs and feet may get damaged due to diabetic vascular disease, which consists of three separate subtypes: arteritis and small-vessel thrombosis, neuropathy, and large-vessel atherosclerosis. Additionally, collagen formation is impaired, which slows down the body's natural ability to mend wounds. Patients who suffer from diabetic neuropathy either have a diminished feeling in their feet or none, which makes it difficult for them to detect any injury. In addition to this, because diabetes weakens the immune system, infection of wound ulcers is more prone to occur (Al-Jasim et al., 2020).

Diabetic foot affects 15 to 25% of individuals at some point in their lives. Increased plantar pressure and a systemic component such as poor cellular wound healing, foot

deformities, dry skin, or skin cracking are all risks for diabetic polyneuropathy or angiopathy patients. These are the most prevalent causes of diabetes-related hospitalization, with neuropathy being the most common (Volmer-Thole & Lobmann, 2016)

Diabetic foot infection is a primary health concern that has resulted in significant economic and social burdens and may lead to amputations and even death in extreme cases. Inadequate information and inappropriate self-care behaviors associated with foot care may increase the chance of serious foot problems and lower limb amputations. For this reason, it is essential to identify risk factors for the disease and to educate patients at risk.(Karadağ et al., 2019)

A multidisciplinary strategy is required to prevent and treat diabetic foot ulcer (DFU)s if they do occur. It is important to work quickly to put in place effective preventive measures and appropriate treatment interventions once they are developed. There is an urgent need for strong collaboration between the healthcare system and the general population, as well as collaboration with many other members of the healthcare team. It is also essential to provide diabetics and their families with quality medical treatment.(Doğruel et al., 2022)

Diabetic foot ulceration and lower extremity amputation are twice as common in diabetics as they are in those who do not have diabetes. Additionally, diabetic foot ulceration affects 30% of diabetics who are over the age of forty. It is so unsurprising that diabetes causes emotional, physical, productivity, and economic losses to those who suffer from it. As a result, effective measures that can lessen and avoid issues regarding the diabetic foot should be taken. Controlling hyperglycemia and hypertension, as well as identifying those at high risk of diabetic foot problems, are all part of this. Self-management of foot care is the most fundamental approach in preventing diabetes complications. Apart from blood glucose monitoring, a good diet, frequent exercise, and medication adherence, foot care is an important element of diabetic self-care. In general, diabetes self-management of foot care necessitates the diabetic paying extra attention to their feet by practicing daily foot care. This daily

foot care routine involves checking for sores and irritations on the feet every day, washing and gently drying the feet, moisturizing dry skin, and cracked heels, nail care, and wearing sensible footwear. Apart from being simple and requiring no special equipment, it is an important and cost-effective diabetic foot treatment procedure (Prem Belwin, 2017)

Improving knowledge of foot care or proper foot care practices is important to prevent or delay complications in diabetic patients susceptible to DFU. Therefore, promoting proper knowledge and practice is essential for the prevention of DFU (Ahmad Sharoni et al., 2016).

1.1. Importance of the study

About 463 million people worldwide have a diabetes in 2019 compared with 108 million in 1980, It is foreseeable to rise to 700 million by 2045. Diabetes mellitus (DM) is one of the more 10 diseases that cause death in worldwide (Saeedi et al., 2019).

Diabetes-related foot problems, in particular DFUs, are a major contributor to significant morbidity and death rates around the world. This is due to the increased risk of amputations and the increased likelihood of frequent hospitalizations, both of which result in enormous costs for the healthcare system. The price of therapy is expected to increase proportionately if diabetic foot issues become more widespread and difficult to manage. It is believed that those who have diabetes have a risk of up to 40% of requiring an amputation of a lower leg, whereas the likelihood of having a DFU is around 25%. Diabetes is the largest cause of amputations carried out each year, accounting for around 67 percent of those carried out in the United States (US) and 90 percent of those carried out in the United Kingdom. Amputations may be prevented by managing diabetes . According to the results of a meta-analysis, the prevalence of DFU varies across the various areas of the globe, with Belgium having the highest prevalence rate in the world at 16% and Australia having the lowest prevalence rate in the world at 1.2%, respectively. (Jodheea-Jutton et al., 2022)

If diabetic patients get high-quality medical treatment, they will not only live longer but also have fewer chronic complications. It is impossible to emphasize the significance of education in terms of the treatment of diabetes. The Healthy People 2020 project has as one of its aims increasing the number of diabetic patients who get comprehensive diabetes education from 56.8 percent to 62.5 percent. The International Diabetes Federation (IDF) and the International Working Group on Diabetic Foot stress the importance of podiatry education for the purpose of preventing foot problems such as ulcers and common infections, the occurrence of which has significantly increased over the course of the previous ten years due to the rise in the prevalence of diabetes. (Dimitriadou & Lavdaniti, 2017).

The fact that appropriate treatment and education may prevent 85 percent of diabetic foot amputations is now the most important problem. The following is an example of preventative and therapeutic measures for diabetic foot complications: Proper conception of foot, identification of risk foot, education of patient and health personnel, wearing right footwear, and early treatment of foot issues are all important aspects of foot health. (Williams et al., 2020)

As more and more individuals are diagnosed with diabetes, diabetic retinopathy is becoming an increasingly prevalent ailment. In the United States of America, more than 46 million individuals were diagnosed with diabetes in 2017, and scientists expect that figure will rise to 62 million by the year 2045. More than 58 million individuals in Europe were given a diagnosis of diabetes in 2017, and scientists project that figure will rise to 67 million by the year 2045. (Carracher et al., 2018).

Diabetic foot disease is a huge national burden in Australia, with 300,000 persons at risk of getting it. 50,000 persons living with DM 12,500 people who have had amputations due to diabetes. A total of 1000 persons have been admitted to hospitals as a result of diabetic foot problems (Van Netten et al., 2017). There are 38 million persons with diabetes in the Middle East and North Africa region and expected to 82 million in 2045. in Arab countries the Egypt has 17.3%, Jordan 11.8%, Kuwait 15.8%,

Saudi Arabia 17.7%, Syrian Arab Republic 8.2%, United Arab Emirates 17.3%, Qatar 6.5%, Oman 12.6% and Bahrain 16.5% (Carracher et al., 2018).

Iraq is a part of the countries of the Middle East and North Africa region and there are about 1.411,500 (8.8%) in 2017 a person suffering from diabetes (Pandey & Sharma, 2018).

In developed countries, the cost of treating DFUs ranges from US \$ 7,000 to US \$ 10,000, and when they become more complex and need amputation, this cost will increase by US \$ 65,000. While developing countries not only have introduced diabetes and their complications are most common, they sometimes reach 40% of health care resource (Hochlenert et al., 2018).

It is common to walk barefoot in many places. This is an issue for those who already have DFUs, since walking barefoot exacerbates foot ulcers. Prevention has been shown to be the most effective method for decreasing diabetic foot issues and its repercussions. This involves a multidisciplinary team of specialists in DFUs and podiatry identifying and educating those at high risk. The absence of proper information and best practices is one of the key factors impacting the quality of diabetic foot care. Patients are more likely to develop diabetic foot issues if they lack basic knowledge and suggested practices, according to studies. Diabetics should learn basic foot care, especially to minimize complications that can result in amputation. Multiple variables, including age, educational background, weight, type of diabetes, cleanliness or foot care routines, and the presence of complicated neurological illnesses, have been demonstrated in studies to impact the development of DFUs (Tuglo et al., 2022).

Most of the amputations of the lower extremities of diabetic patients are caused by foot ulcers. Foot ulcers are caused by risk factors such as walking barefoot, wearing unsuitable shoes, poor foot hygiene, and delaying medical treatment. These risk factors can be reduced if they are detected early, and patients have an adequate understanding of foot care and put it into practice. As a result, all people with diabetes

should have access to adequate foot care assistance and education in order to greatly enhance foot care (Chiwanga & Njelekela, 2015)

1.2. Statement of the problem

Foot problems are a main cause of lower limb amputation (LLA), which happens (10-30) times more often in diabetics than in healthy people and causes significant physical and mental distress (Goweda et al., 2017). Diabetic foot relates to serious sickness, decreased quality of life, disability, severe social and economic problems, and frequently demands long-term therapy. It is also the source of serious infections such as gangrene, amputation, and death if proper care is not provided, which is often accompanied by lengthy hospitalization and rehabilitation (Morey-Vargas & Smith, 2015).

1.3. Aim of the study

The aim is to determine the knowledge and practices of diabetic patients on diabetic foot care in Iraq. It was aimed to determine the sociodemographic information and medical information about Diabetic Foot Care of Diabetic Patients in AL- Al-Hüseyin Training Hospital and to determine the relationship between diabetic practices.

1.4. Research questions

1. What is the amount of knowledge of diabetic patients to diabetic foot care in Iraq?
2. What is the number of practices of diabetic patients to diabetic foot care in Iraq?
3. Are there the relationships between the knowledge and practices of diabetic patients and the main demographic information and medical information of diabetic patients to diabetic foot care in Iraq?

2. REVIEW OF LITERATURES

2.1. Historical background of diabetes mellitus

A collection of metabolic illnesses including protein metabolism, lipid metabolism, and carbohydrate metabolism is known as diabetes mellitus. It is defined by chronic hyperglycemia, which may arise as a consequence of errors in insulin secretion, insulin action, or a combination of both, deficient secretion and wrong action. The origins of the illness may be traced back to ancient times. But doctors back then had a hard time making sense of the illness since they didn't have a firm grasp on anatomy, pathophysiology, or diagnostic tests. Nevertheless, ancient doctors were aware of diabetes's unique characteristics and offered a variety of treatments. The Ebers papyrus was written about 1500 B.C. and contains references to individuals with symptoms patients with symptoms such as increased thirst and frequent urination may benefit from treatment with plant extracts. This is something that Paul Ghalioungui, an Egyptian endocrinologist, medical historian, and the translator of the Ebers papyrus, disagrees with. (1908-1987). It is believed that Ebers' diagnosis of diabetes is inaccurate and insufficient . The title of a recipe for "Treatment of a thirsty lady" appears on a Kahun papyrus (about 2000 BC), but the content is lost. So, it's safe to presume that ancient Egyptians didn't understand the significance of diabetes's broader symptoms. In his treatise Samhita, written about 500 B.C.E., the eminent Indian physician Sushruta recognized diabetes using the name madhumeha (honey-like pee). He noted not only the urine's sweet taste but also its sticky feel to the touch and its capacity to attract ants. Sushruta also notes that the excessive eating of foods like rice, cereals, and sweets is linked to the development of diabetes .Polyuria, polydipsia, and weight loss were all documented by Chang Chung-Ching, often known as the "Chinese Hippocrates," who lived from around 160 to approximately 219 BCE. He was the first person to explain the symptoms of a particular illness. Chen Chuan, who lived in the 7th century AD, was the first person to document the presence of urine sugar levels and sweetness in diabetes. Hsiao kho ping was the name he gave the ailment, and he went on to explain its hallmark symptoms, which included severe thirst, frequent drinking, and copious streams of pleasant urine. In order to treat the

ailment, Li Hsuan recommended cutting down on alcoholic beverages, reducing salt intake, and avoiding sexual activity. According to medical records, diabetic individuals started to suffer from furuncles, rodent ulcers, and eye problems as early as the 8th century. Avicenna was an Arabo-Islamic physician who lived during the 11th century and produced a treatise titled *El-Kanun (Canon of Medicine)*, in which he discussed diabetes and the challenges that are involved with having the condition. . Moises Maimonides went into much detail on diabetes and acidity. Egyptians, Indians, Chinese, and even ancient Arabs were able to explain the symptoms of diabetes. Few are the primary characters in the history of diabetes mellitus who made significant contributions to the diagnosis, treatment, and contemporary understanding of the condition. These contributions paved the way for subsequent research and led to the development of a new medical subspecialty known as diabetology.(Karamanou et al., 2016)

2.2. Conceptual framework

The illness known as diabetes mellitus is characterized by a collection of metabolic issues. The metabolisms of glucose, lipids, and proteins are all included in these metabolic diseases. Diabetes may also present itself during pregnancy and under other situations, such as medication or chemical toxicity, endocrine illness, genetic abnormalities, disorders of insulin receptors, and pancreatic exocrine disease. Type 1 diabetes and type 2 diabetes are the most common kinds of the disease. Diabetes-related long-term complications are classified into two types: macro-vascular complications, which are caused by damage to large blood vessels and include strokes, heart attacks, and insufficiency of blood flow in the legs, and micro-vascular complications, which are caused by damage to small blood vessels and include nephropathy, retinopathy, impotence, and diabetic foot disorder. Both types of complications can be fatal. Intensive glycemic management lowers the risk of developing the microvascular problem and slows its course, but the morbidity rate that is linked with this complication is continuously rising. The early detection and effective therapy of diabetic neuropathy is highly essential since it will relieve the symptoms, decrease the consequences, and enhance the quality of life among diabetes patients. Individuals who have diabetic neuropathy may not experience any symptoms,

and because of the lack of feeling in their feet, patients with diabetic neuropathy are at increased risk of foot injuries. The diabetic foot syndrome may, in the long run, result in a long-term complication that is linked to an elevated risk of morbidity and premature mortality. According to the guidelines of the American Diabetes Association (ADA), persons with diabetes should get a thorough foot examination at least once per year. Most of these issues may be avoided by practicing proper foot care on a consistent basis. Building up a solid foot care may take some time and work, but it is necessary for patients to take responsibility for their own care.(Akila et al., 2021)

2.3. Cells and secretions of the pancreatic islets

The pancreas is a tiny gland that spans 12–15 centimetre in length and weighs less than 110 g and is placed at the rear of the human stomach. There are tiny clusters of glandular epithelial cells in the pancreas. Approximately 99 percent of the clusters are acini, whereas the remaining 1 percent are pancreatic islets. It is a lengthy gland that contains both exocrine and endocrine tissue. The exocrine portion of the pancreas is composed of clusters of secretory cells like grapes, whereas the endocrine portion is composed of islets of endocrine tissue. Daily, the exocrine pancreas secretes 1200–1500 cc of pancreatic fluids into tiny channels. The islets of Langerhans also form the endocrine pancreas, which are dispersed throughout the exocrine tissue and situated throughout the pancreas. Each islet in the pancreas includes between 2,000 and 3,000 epithelial cells. A network of capillaries penetrates the thick organization of the epithelial cells. Exocrine tissue and islets are separated by a thin layer of reticular fibers. As a result of the presence of the pancreatic artery, the islets are very bloody. The pancreatic artery empties directly into the portal vein, which transports all secreted pancreatic hormone to the liver. (Sen et al., 2016)

Glucose provides most of the human energy. The permeability of cell plasma membranes to glucose varies with tissue type. Glucose transporters regulate glucose distribution in cells. Each type of tissue has its own set of vectors. Blood sugar levels are controlled by the hormonal and nervous systems, and there are two types of hormones that regulate glucose in the body. The main regulator of glucose is insulin

(which is secreted by the pancreas). The beta cells (BC) in the islets of Langerhans produces insulin. Although increased blood sugar production. Insulin lowers blood sugar levels by delivering glucose to the muscles, liver, and adipose tissue. Insulin activation of insulin receptors is required in muscle, liver, and fat cells to promote glucose transfer into the cell. Once glucose enters the cell, it can either be metabolized for energy (glycolysis) or stored in the muscles or liver (glucose production). The Langerhans islands, on the other hand, secrete alpha cells. When the body requires glucose, the glucagon hormone, which functions differently than insulin, plays a key role in managing blood glucose by raising the quantity of glucose in the blood and speeding up the process of glycogenesis (Bonora & DeFronzo, 2018)

2.4. Pathophysiology of Diabetes Mellitus

Insulin is present in type 2 diabetes, but insulin resistance occurs when the body's response to enough insulin is reduced. Genetics and weight gain are the two most common causes of insulin resistance. This first stage of resistance stimulates β -cells to produce more insulin. β -cells are unable to produce enough insulin to meet the body's anticipated requirements. As a result of hyperglycemia, insulin resistance will develop. β -cell failure due to glucose toxicity or consumption. The autoimmune destruction of β -cells does not occur in type 2 diabetic patients. Although the pathophysiologic process of type 2 is like that of type 1, it is not the same. Polyuria, polydipsia, and polyphagia are the classic triad of polyuria, polydipsia, and polyphagia. Ketoacidosis is uncommon, but it can happen. The presence of insulin in type 2 diabetes limits lipogenesis, which would result in the generation of ketones. Hyperglycemic hyperosmolar syndrome is a potentially fatal complication of type 2 diabetes. This syndrome is distinguished by extreme hyperglycemia and dehydration. This is a rare occurrence, but it may occur in older people with poorly managed diabetes (Davies et al., 2018)

2.5. Types of Diabetes Mellitus

2.5.1. Diabetes Mellitus type 1

Type 1 diabetes is distinguished by a lack of insulin production or insufficient insulin synthesis. This is one of the disease's distinguishing characteristics. Patients with type 1 diabetes must continue to self-administer insulin injections and depend on medicine for the rest of their lives. The onset of type 1 diabetes may be attributed to a combination of inherited and environmental factors. Recent research has identified two forms of type 1 diabetes: (a) immune-mediated diabetes, which is defined by autoimmune destruction of β -cells, and (b) idiopathic diabetes, which has no known cause. Both type 1 diabetes subgroups are distinguished by significant levels of insulin resistance. The immune system's destruction of β -cells is a defining feature of type 1 diabetes in both kinds. It is possible for persons with type 1 diabetes to exhibit indications of pancreatic β -cell loss before being appropriately identified. Hyperglycemia indicates that β -cells have been damaged, preventing insulin from being produced normally. Diabetes is linked to this disorder. (American Diabetes Association, 2017).

2.5.2. Diabetes Mellitus type 2

Type 2 diabetes, often known as adult diabetes or non-insulin-dependent diabetes, affects most diabetics. This is responsible for 90-95 percent of all diabetes cases. People with insulin insufficiency and peripheral insulin resistance fall into this group. These people may not need insulin injections for the rest of their lives, at least not initially. A variety of variables might have a role in type 2 diabetes. Most people with type 2 diabetes are either overweight or obese. Being overweight directly causes insulin resistance. Patients who are neither obese nor overweight based on traditional weight measures may have a greater body fat percentage, with most of it concentrated in the belly. This is because abdominal fat tends to be more visceral than other types of body fat. Diabetic ketoacidosis, often known as DKA, is a disease associated with type 2 diabetes that develops suddenly and without warning. It is common for this to

occur in conjunction with the stress that is brought on by another condition, such as an infection, or the use of certain medications, such as corticosteroids, atypical antipsychotics, and glucose and sodium transporter inhibitors. In addition, it may occur as a side effect of the use of certain drugs. Because high blood sugar levels rise slowly and are often not severe enough for a patient to detect the indicators of normal diabetes in the early stages, type 2 diabetes goes untreated for many years at a time. On the other hand, patients who have not been diagnosed are at an increased risk of developing vascular and microvascular disorders. It is possible for people who have type 2 diabetes to have insulin levels that seem normal or even elevated, even though these people are expected to have higher blood sugar levels. Because of this, these people are at a disadvantage when it comes to the secretion of insulin, and they are unable to adjust compensate for their insulin resistance. Insulin resistance could be improved by dropping excess weight or by taking diabetes medication, but it is seldom returned to normal (Buse et al., 2020).

Type 2 diabetes is most common in people over the age of 30 and is more common in low- and middle-income countries worldwide. Economic and social changes, aging of the population, malnutrition (too much processed food and sugary drinks consumption), obesity, lack of physical activity, unhealthy lifestyle can cause diabetes. It is a common public health problem that can be dangerous. A significant proportion of type 2 diabetes patients may initially have low insulin levels; however, as insulin resistance develops, insulin levels begin to rise in these people and continue to rise as the disease progresses (World Health Organization, 2019)

2.6. Epidemiology of Diabetes Mellitus

The number of people living with diabetes mellitus around the world has been steadily increasing, which presents a significant risk to public health and places unmanageable demands not only on those who are afflicted but also on those who care for them, health systems, and society as a whole. According to the most current estimates, there will be 537 million people living with diabetes throughout the globe in the year 2021. It is expected that this figure will rise to 783 million by the year 2045. This expense is

unequally divided since people with diabetes are more likely to reside in countries with low or moderate incomes. Three quarters of diabetics live in countries where the median income is less than \$30,000. The burden of diabetes is being exacerbated by population ageing as well as the worldwide rise in the prevalence of obesity and suboptimal health behaviors such as low quality diets and physical inactivity. These factors have contributed to an increase in the global prevalence of diabetes. These poor health practices are being pushed by larger socioeconomic variables such as urbanization. More than 90 percent of all cases of diabetes mellitus are classified as type 2, making it the most common form of the disease. According to the aetiological classification of diabetes, diabetes mellitus may be broken down into two basic categories: types 1 and 2. These typical forms of diabetes may have repercussions in a variety of organ systems, including microvascular endpoints (such as retinopathy, nephropathy, and neuropathy) and macrovascular endpoints (e.g. ischaemic heart disease, stroke, peripheral vascular disease). The reasons that contributed to the development of type 1 diabetes are not completely understood. Now that the role of modifiable factors in the development of type 2 diabetes has been better understood, the prevention of the illness has become a more achievable public health goal.(Forouhi & Wareham, 2022)

Despite the fact that the risk of developing type 1 diabetes is greatest between the ages of 10 and 14, people of any age might be affected by the illness. On average, the likelihood of a Boys getting the disease is higher in men than it is in females. in countries where the disease is more common, while the opposite may be true in places where the disease is less common (countries with low incidence). Even in countries like China, which have a relatively low overall incidence of diabetes, males have a higher chance of developing type 1 diabetes after puberty than girls do. This is especially true for those who have a family history of the condition. This is particularly the case in less developed nations. The vast majority of standardised long-term incidence data concentrate on children younger than 15 years old, with an incidence that ranges from 1 to 3 per 100000 per year in China and other Asian and South American countries^{5,6}, approximately 10–20 per 100000 in South European countries⁷ and in the USA, and 30–60 per 100000 in Scandinavia. Incidence rates range from 1 to 3 per 100000 per In China and other Asian and South American

nations, the incidence rate varies from 1 to 3 cases per 100,000 people per year. This also holds true for other countries in South America. The number of persons being diagnosed with type 1 diabetes all over the globe has been gradually increasing since the 1950s, with an average annual growth rate of 3–4% during the past three decades. (Norris et al., 2020)

Diabetes is increasing at an alarming rate all over the globe. Around 90 percent of all instances of diabetes globally are seen in people with type 2 diabetes. In every nation, an increasing number of individuals are being diagnosed with the condition, and eighty percent of those who are afflicted live in low- and middle-income nations. It is estimated that almost half of those who have diabetes are unaware that they have the condition. Diabetes must be diagnosed as quickly as possible so that treatment may begin sooner rather than later. Type 2 diabetes is connected to becoming older, being overweight, and not getting enough exercise. There has been a rapid increase in the number of persons diagnosed with type 2 diabetes, which is projected to reach 552 million by the year 2030. Diabetes is a condition that affects individuals all over the globe, but it is far more prevalent in industrialized nations, particularly type 2, where the majority of patients are between the ages of 45 and 64. By the year 2030, it is anticipated that Asia and Africa would be home to the greatest number of sufferers, and it is also anticipated that the illness will spread the farthest in these two regions. It is anticipated that the number of illnesses would reach parity with or perhaps exceed the number of communicable diseases in emerging nations. (Baynes, 2015).

2.7. Causes and Risk Factors of Diabetes Mellitus

2.7.1. Causes of diabetes mellitus

Both BC and alpha cells, which are responsible for the secretion of glucagon, may be found in the islets of Langerhans, which are in the pancreas. BC are responsible for the generation of insulin, while alpha cells are responsible for the secretion of glucagon. A disruption in the balance that normally exists between insulin and glucagon will result in an imbalance in glucose levels. Hyperglycemia is a complication of diabetes that

may either be caused by a shortage of insulin in the body or by resistance to the effects of insulin in the body (insulin resistance). When β cells are destroyed, the amount of insulin in the body either becomes undetectable or drops considerably. Insulin levels and sensitivity may become imbalanced over time, leading to a functional deficit that leads to the formation of type 2 diabetes. This shortfall plays a role in the progression of the disease. Insulin resistance may be caused by several factors, but two of the most frequent are being overweight and being older. A more complex combination between genetic predisposition and environmental influences is what distinguishes type 2 diabetes from type 1. According to the statistics, type 2 diabetes seems to have a genetic profile that is more favorable than type 1 diabetes. The majority of people who are diagnosed with type 2 diabetes have a history of the illness in their family. (Rajaei et al., 2019)

2.7.2. Risk factors of diabetes mellitus

Age is only one of several potential risk factors that might play a role in the development of diabetes. Every individual must begin undergoing screenings once they reach the age of 45. Examining is necessary for individuals of any age who are either overweight or obese and have one or more diabetes risk factors. (American Diabetes Association, 2019).

The prevalence of type 2 diabetes was shown to grow in a way that was dose-dependent with increasing levels of obesity, highlighting the extraordinarily strong link that exists between obesity and the disease. People who are obese have a higher glucose tolerance because of an increased release of cytokines from fat storage. This increased release of cytokines leads to insulin resistance. In addition, a high body mass index (BMI), advanced age, and the presence of several comorbid conditions are all major shared risk factors. (Opara & Dagogo-Jack, 2019).

The normal range for BMI is 18.5–24.9 kg/m², overweight is defined as 25–29.9 kg/m², and obesity is defined as 30–34.9 kg/m²; each of these BMI ranges is linked with an increasingly high risk of developing diabetes. Obesity is a key contributor to

the development of type 2 diabetes since it is associated with a yearly increase of 14% in the risk of acquiring the condition. Those who acquired weight throughout their teenage years had a much-increased chance of acquiring diabetes compared to those who gained weight later in life. This was the most relevant finding (between the ages of 40 and 55). There is some evidence that several meals and drinks contribute to the development of type 2 diabetes. A lower risk of developing diabetes has been associated with a diet that emphasizes the consumption of vegetables and whole grains. White rice and red meat consumption have both been linked to an increased likelihood of developing type 2 diabetes. A higher risk of developing diabetes has not been shown to be associated with drinking whole milk or eating fish or shellfish. There is a correlation between drinking sugary beverages and having an elevated risk of developing type 2 diabetes. (Bonora & DeFronzo, 2018)

Active smokers are more likely to get type 2 diabetes than people who don't smoke, while people who don't smoke or who used to smoke are less likely. Diabetes risk is also higher for people who are exposed to secondhand smoke at work or at home. (Bonora & DeFronzo, 2018)

Physical inactivity, race (Asian and Coloured) first-degree family with diabetes, history of cardiovascular disease, hypertension 140/90 (mmHg), dyslipidaemia, and gestational diabetes or having had a baby > 4 kg are also risk factors. Furthermore, several drugs, such as (glucocorticoids, thiazide diuretics, HIV medicines, and atypical antipsychotics), raise the risk of diabetes (American Diabetes Association, 2019).

2.8. Symptoms of diabetes mellitus

Most people experience the classic trio of polydipsia, polyuria, and weight loss, but polyphagia and hazy vision can also happen. People with type 1 diabetes may have enuresis and/or constipation. Diabetes mellitus can cause polyuria, which can be accompanied by symptoms like loss of appetite, weakness, rapid fatigue, dry mouth, and nighttime urination. Also, less common symptoms like blurred vision,

unexplained weight loss, persistent infections, and itching that isn't always the same place can happen. (American Diabetes Association, 2022)



Figure 2.1. Symptoms of diabetes mellitus (Dagogo-Jack, 2017)

2.9. Diagnosis of diabetes mellitus disease

It is feasible to determine whether a person has diabetes. Diagnosis of diabetes can be accomplished by a variety of tests. All these tests evaluate glucose levels in the blood, either directly or indirectly. People with diabetes may exhibit symptoms, but their blood glucose levels may be discovered unexpectedly during a normal blood test. There are some tests in need for the diagnosis of diabetes. People with diabetes are diagnosed if any of the following tests are abnormal. If there is any suspicion or symptoms related to diabetes, fasting plasma glucose, random plasma glucose (PG), 2nd hour plasma glucose (2nd hr PG) level during 75 g oral glucose tolerance test (OGTT) and/or A1C examination is performed. Diagnosis can be made based on the results. The fasting plasma glucose (FGG) test is easy. This test may be performed after at least 8 hours of not eating anything by mouth other than water. A single drop of blood is taken and examined. Blood glucose levels of 126 mg/dl or higher after fasting are called diabetes mellitus. Random plasma glucose test can be done regardless of when the last meal was eaten. 140 mg/dl to 200 mg/dl blood sugar after a meal is unusual. Oral glucose tolerance test checks glucose levels five times within three hours. The blood sugar levels of diabetics climb above normal and do not return

to normal as rapidly as those of healthy individuals. After the fasting plasma glucose test, 75 grams of glucose dissolved in water is administered to each participant. A blood sample is taken at regular intervals and the glucose level is measured. (American Diabetes Association, 2022)

Haemoglobin Glycosylated (HbA1c) test is particularly valuable since it is unaffected by short-term changes in diet, activity, or other factors. The hemoglobin glycosylated test, which is usually done every three to six months, gives the most accurate estimate of overall glycemic management. Sugar that doesn't give energy stays in the bloodstream and binds to hemoglobin. The A1c test determines the quantity of sugar in red blood cells that is connected to hemoglobin. Red blood cells have a two to three-month lifespan (Kalyani et al., 2018)

Test*	Threshold	Qualifier
Hemoglobin A _{1c} or	≥ 6.5%	Lab NGSP-certified, standardized DCCT assay
Fasting glucose or	≥ 126 mg/dL (7.0 mmol/L)	No caloric intake for at least 8 hours
2-hour glucose or	≥ 200 mg/dL (11.1 mmol/L)	After 75 g of anhydrous glucose
Random glucose	≥ 200 mg/dL (11.1 mmol/L)	Plus classic hyperglycemia symptoms or crisis
NGSP, National Glycohemoglobin Standardization Program; DCCT, Diabetes Control and Complications Trial. * Results must be confirmed by repeated testing.		

Figure 2.2. Diagnostic criteria for diabetes (American Diabetes Association, 2017)

2.10. Complications of Diabetes Mellitus

Diabetes complications are classified as acute and chronic. Acute complications; diabetic ketoacidosis, hyperglycemic hyperosmolar condition/hyperglycemic

nonketotic coma, lactic acidosis, and hypoglycemia. Hyperglycemia and its long-term effects on organ systems inflammatory processes in the body are triggered due to complications occur. Chronic complications of diabetes are examined in two groups as microvascular (retinopathy, nephropathy, neuropathy) and macrovascular (coronary artery disease, cerebrovascular disease and peripheral artery disease). (TEMD 2022).

2.11. Management of Diabetes Mellitus

2.11.1. Education

Diabetic foot examination is effect in determining the level of risk of ulceration of the foot of patients with diabetes. Several studies evaluated the role of foot education in diabetics. Studies, where patients agreed to "personal behavioral contracts", for a year of follow-up there was important reduction in serious ulcers. Another study found that rigorous learning may be useful in preventing amputation and recurring ulceration, since programs combining education and podiatry appear to have a good effect on foot issues with relatively short follow-up visits to a podiatrist. Recent studies examining the impact of structured education programs for diabetic foot disease patients at high risk indicated an improvement in general awareness and foot care routines (Scotland, 2017). To detect lesions early, all persons with peripheral neuropathy should wear appropriate footwear and often check their feet. Anyone with a foot injury or an open wound should refrain from weight-bearing activities (Razana, 2017).

2.11.2. Exercise or physical activity

Exercise having two different effects on carbohydrate metabolic the effect of seizure effect training. The effect of control indicates the direct effect of the exercise loop on glucose metabolic that lasts for 12-48 hours after completing the exercise. Exercise has been shown to improve glucose metabolism. Regular exercise for a week increases insulin elimination in patients with DM (EB Reusch, 2018).

Exercise initially decreases insulin levels and improves glucagon secretion, which leads to higher levels of blood glucose. The activity muscle has enhanced insulin sensitivity after many minutes, which promotes the absorption of glucose over in a prolonged period, thus reducing glucose levels (American Diabetes Association, 2017).

2.11.3. Diet and nutritional therapy

A healthy diet is essential for managing diabetes for many reasons. the foods consumed can have a significant impact on blood glucose levels. in addition, people with diabetes often need to lose weight to help improve the body's response to insulin and to reduce the risks of complications. A diet low in calories, consistent in carbohydrates (or moderate in carbohydrates), and a regular exercise routine are vital to managing diabetes. a healthy diet usually consists of eating fewer calories and processed foods and controlling portions of the daily intake from all the food groups, with an emphasis on eating more vegetables (Kalyani et al., 2018).

2.11.4. Pharmacotherapy for diabetes

Insulin is a very important drug for type 1 diabetes patients. Insulin therapy is started for patients with type 1 diabetes as soon as the diagnosis is made. This will need beginning the education process. Patients must be trained about insulin usage, hypoglycemia prevention, diagnosis, and treatment, sick-day management, dietary, and physical activity changes, and blood glucose self-monitoring. In addition to adjusting, one's way of life, IDF, ADA, and the European Diabetes Study Association all recommended beginning pharmacological therapy at the time of diagnosis. This recommendation was followed by ADA. It was understood that making changes to one's lifestyle alone does not often succeed in meeting treatment objectives, and that the initiation of pharmaceutical treatments should not be delayed. At the time of diagnosis, macro vascular issues are present in a significant number of people who have type 2 diabetes. In the field of diabetes, it was shown that hyperglycemia, insulin resistance, dyslipidemia, and obesity are all associated with one another (DM In light

of all these aspects, it is likely that a diagnosis of diabetes type 2 (DM) will be arrived at. Diabetes treatment strategies for type 2 diabetes mellitus have been developed to improve control of blood sugar levels, as well as to lower the risk of diabetes-related complications such as retinopathy, neuropathy, and nephropathy, as well as the risk of death from diabetes-related causes. The quality of life for diabetics is also being improved because to the implementation of these techniques. Diabetes type 2 is treated with a wide variety of medications, including the following: Metformin, Sulfonylureas "e.g., gliclazide, glimepiride, meglitinides (Papatheodorou et al., 2018).

Insulin may be used to assist people with type 2 diabetes regulate their blood sugar when lifestyle modifications are required. To maintain normal blood sugar levels in the early stages of this condition, an oral antihyperglycemic is recommended. Insulin's efficacy is very reliant on correct administration, patient selection and training, dosage modifications in response to changes in food, exercise, or weight, and calibration to safe glucose levels (Davies et al., 2018).

Most people with Type 2 diabetes need insulin replacement therapy. There are three ways to replace insulin: basal insulin alone, twice-daily biphasic insulin with a mix of fast-acting and long-acting insulins, and a long-acting insulin basal bolus regimen with extra doses of short-acting insulin given at mealtimes. Starting insulin treatment can be hard because people are afraid of needles, think the treatment plans are too complicated, or worry that they won't be able to take care of their disease on their own (Southern et al., 2019)

2.12. Diabetic Foot

Some people with diabetes have trouble with the feeling in their feet and hands and experience strange burning or tingling sensations in their feet and hands. This results from damage to the long nerves that extend from the spinal cord to various parts of the body. damage to these long nerves, known as peripheral neuropathy, is the most commonly reported type of nerve damage among persons with diabetes damaged nerves can cause debilitating pain, particularly in the hands or feet .the numbness in

the feet can prevent someone from feeling sores or blisters that develop sores on the feet can become infected an untreated and severe foot infection may lead to an amputation (Kalyani et al., 2018)

Foot ulcers are caused by a loss of prophylactic feeling caused by peripheral arterial disease (PAD) and trauma. The main causes of diabetic neuropathy and foot ulceration are pain and loss of prophylactic sensation, which accounts for nearly 90% of DFUs. Trauma causes mild injuries at first, but they are not the same as those suffered by the prophylaxis-loss patient. The infection is minor, but it may be exacerbated by the illness while the patient goes about his or her daily activities. Foot problems are caused by a combination of such factors and injuries. The infection is minor, but it may be exacerbated by the illness while the patient goes about his or her daily activities. After loss of protective sensation, peripheral neuropathy causes muscle weakness, foot deformity, and gait disturbance. Peripheral autonomic neuropathy affects the lower limbs' distal regions, causing reduced sweating, dry skin, fissures, and callous formation. Ulcers are more likely to form when there is less perspiration and dry skin on the foot. Internal (from bone, toenails, and foot abnormalities) or external (from unsuitable socks, slippers, burns, and foreign things) trauma, on the other hand, is sufficient to cause the skin to collapse (John et al., 2019)

Foot ulcers are a common and serious health issue for diabetes. Various surveys have revealed that a high percentage of diabetics develop various ulcers. About 15% of diabetics during their lifetime are affected by foot ulcers and the morbidity rate associated with DFUs is significant. Diabetes mellitus in the lower limb, which can lead to foot ulcers, the peripheral arterial disease and neuropathy can cause shortened oxygen supply, nervous weakness and diabetes infection are the main causes of foot ulcers. Foot ulcers in diabetes can arise as a result of repeated ischemia; also, once the ulcer occurs and there is insufficient arterial supply, the foot ulcers are sluggish to heal and are at danger of amputation if blood sugar levels are not well maintained (Sen et al., 2016)

Diabetes is a risk factor for peripheral artery disease because it increases the probability of developing atherosclerosis in the lower limbs by a factor of two, making diabetes a risk factor for PAD. A partial or total blockage of atherosclerosis in an artery that supplies blood to the lower limbs is what is known as PAD. It is estimated that more than 200 million individuals throughout the globe suffer from severe ischemia. Pedal ischemia in diabetics is a difficult condition, with numerous interfering conditions that may lead to a diminished synergy aspirate the remote, and diabetics with PAD have a five times greater incidence of amputation. Alterations in blood supply have been related to both diabetes and atherosclerotic occlusive disease, which affects blood vessels and arteries of medium size. It is thought that these alterations impact the blood flow in the levels of arteries and capillaries, and that weakening of the tiny vessels in diabetics might lead to impaired perfusion of tissues, which leads to greater exposure to mild degrees of ischemia. (Zheng et al., 2018)

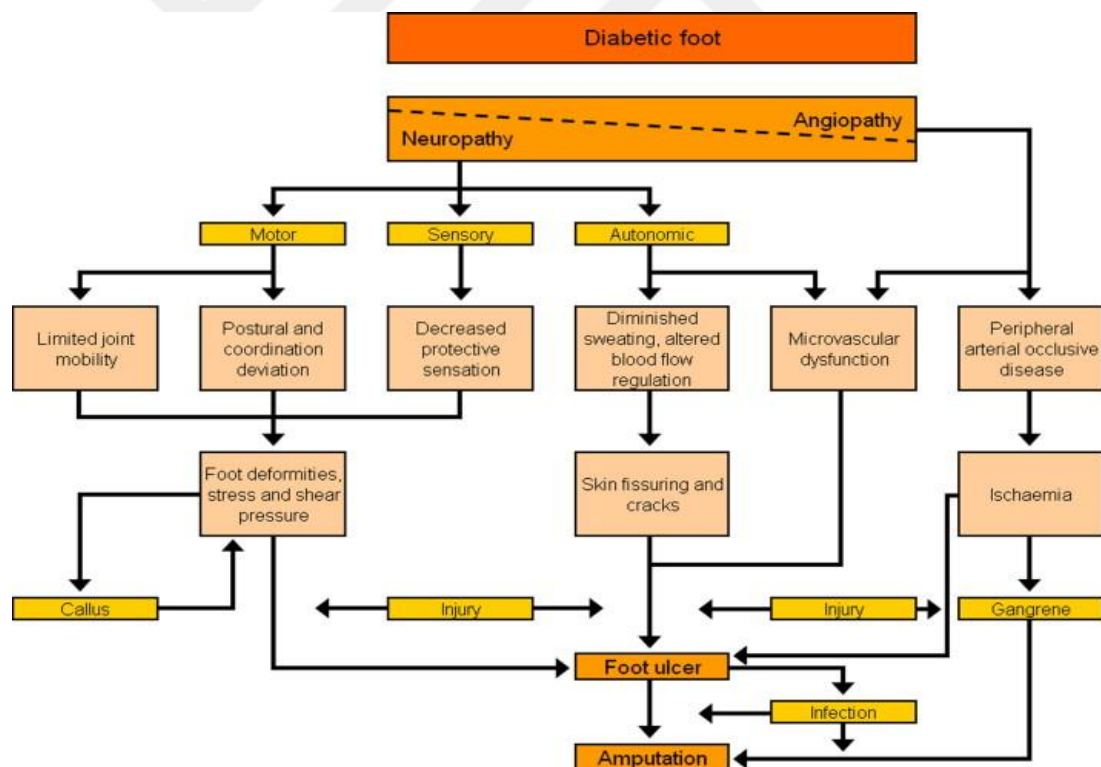


Figure 2.3. The pathways to foot ulceration (Nguyen, 2019)

Chronic sensory distal neuropathy affects more than half of all diabetics over 60. Peripheral neuropathy must be severe before it causes individuals who are prone to trauma to lose prophylactic sensibility; exhaustion caused by physical or thermal trauma increases the risk of foot ulcers sevenfold. Excessive plantar pressure is another cause that contributes to foot ulcers. Limited joint mobility (at ankle joints, under the thigh) and foot abnormalities are associated to this. In one study of the peripheral neuropathy patients, during a follow-up period of (2-5) years, 28 % of people with plantar pressure had foot ulcer compared with non-normal pressure in addition to trauma, especially when repeated (Razana, 2017).

2.13.Epidemiology of Diabetic Foot

The reported incidence of DFU varies significantly since the research technique, demographics, and time period all play important roles. Since 2010, the yearly incidence has ranged from (0.2% to 11%) in diabetes-specific clinical settings and from less than (0.1% to 8%) in community and population cohorts. Recent estimates on the relative incidence of type 1 and type 2 diabetes are contradictory, and differences in DFU risk between groups with type 1 and type 2 diabetes will be driven mostly by age and duration of diabetes. IDF now believes that DFU affects between (40 and 60) million individuals globally, up from 9 million to 26 million in 2015. This is a significant increase above prior figures. Diabetes prevalence and incidence numbers are notoriously difficult to obtain with precision. This is due to the fact that DFU definitions, monitoring methods, levels of follow-up completeness, and the definition of diabetes itself (the denominator) all have a role in the wide range of possible outcomes. A recent meta-analysis found that the worldwide prevalence of DFU in diabetics is 6.3%. This equates to around 33 million persons impacted by DFU. Historically, the highest rates of DFU were seen in North America, but new cohort studies estimate rates as high as 15% in diabetic populations in Africa and South America. Adults with type 1 diabetes have a lower prevalence of DFU than those with type 2 diabetes. This discrepancy may be due to younger age and cumulative duration, differences in study design and data collection, or a lack of representative cohorts of type 1 diabetes patients. Despite changes in incidence, there

has been no discernible shift in the patterns of DFU prevalence. Despite advances in wound care and revascularization procedures, long healing durations and one-year recurrence rates of more than 20% have not reduced in the previous 15-20 years. According to a recent study, the lifetime risk of DFU has risen by between 19 and 34% as life expectancy has grown. This data suggests that the lifetime risk of DFU is higher than the previously stated range of (12% to 25%). There aren't a lot of high-quality population-based research that look at the incidence or prevalence of DFU. More community-based, large-scale epidemiologic studies are needed to better describe the occurrence of DFU, its clinical course, and risk factors for the condition.(McDermott et al., 2023)

2.14. Signs and Symptoms of Foot Issues that Require Attention

Even if a person with diabetes takes very excellent care of their feet, ulcers may still form and go unnoticed until it is too late. It is essential to detect the indicators and symptoms to start treatment as quickly as is practically practicable. The presence of pain is typically one of the first indicators that anything may be wrong with the feet. On the other hand, neuropathy might make it harder to recognize the symptoms of an injury. This suggests that by the time symptoms occur, the foot disease may have already become worse and may have caused damage that is irreversible. If one is unable to feel pain because to neuropathy in the feet, there are a variety of indications and symptoms that indicate there is a problem. In addition to fever and symptoms like the flu, you may also have lethargy, swelling, redness, and skin that is warm to the touch in the region around the infected area. It is of the utmost importance that you see your physician if you are experiencing flu-like symptoms along with a fever. When a foot injury occurs, being aware of the signs and symptoms may be helpful in the recovery process. People who have diabetes, particularly those who also have neuropathy, need to take special care of their feet by keeping them clean, wearing shoes and socks that are appropriate for their feet, and completing daily foot checks. It is the only method to determine whether anything has changed other than to check your feet every day. Make an appointment with your primary care physician as soon as you can if you notice any changes in the appearance of your feet. (Reardon et al., 2020)

Diabetes mellitus is the primary non-traumatic cause of major and minor amputations around the globe. Because diabetes is a known contributor to lower-extremity amputations, its prevalence is predicted to climb to 10.2% of the world's population by the year 2030. This will result in a significant increase in the global health and financial burdens associated with diabetes. When peripheral neuropathy is joined with vascular disease, the result is DFU, which in turn contribute to an increased risk of lower extremity amputation (LEA). LEA is a surgical procedure that involves the removal of bones and soft tissue by transecting at any level of the lower limb. This procedure may be categorized as either a minor or a large amputation. A minor amputation is defined as occurring below the ankle joint, which includes the forefoot and toes, while a large amputation occurs at or proximal to the ankle joint, such as an amputation that occurs below or above the knee. This classification is universally recognized. Because of the related immunosuppression as well as the reduced blood supply to the DFU, conservative therapy with antibiotics is difficult and will often need severe debridement on a recurring basis or will eventually lead to amputation. Patients who have diabetes have a significantly higher risk of LEA, which may range anywhere from 50 to 500 cases per 100,000 people. Because individuals with diabetes often have several co-morbidities and varied socioeconomic backgrounds, the short-term and long-term repercussions of LEA are severe. The short-term results of LEA are dismal, with early post-operative mortality reaching up to 22% in certain cases. (Rathnayake et al., 2020)

2.15. Diabetic foot self-care

DFU often starts small but can quickly become infected. Ulceration may take several weeks or months. Self-care will need to check the depth of the wound to determine whether the ulcer extends to the bone and remove unhealthy tissues using sterile tools. Specialized wound dressing and antibiotics may be required to promote healing. It is necessary to eliminate activities that lead to weight gain on the affected foot and pressure relief on the wound to allow her to heal. Cast or a pair of crutches, or a wheelchair may be needed to relieve pressure from ulcers diabetics should take special

care of their feet. They can follow their feet on their own daily with (Kalyani et al., 2018)

- Warm water should be used to wash your feet each day. You should check the temperature of the water with your elbow to make sure it is not too hot, and you should make sure that your feet are completely dry, especially in the spaces between your toes. Use a moisturizing solution to keep your skin smooth but avoid applying it between your toes.
- Check your feet every day looking for wounds, ulcers, redness, calluses, or tissue. Also, people who are overweight and have diabetes, the patient should ask a family member or a caretaker to help in checking the condition or alternatively, you can place a small unbreakable mirror on the floor is hovering over your foot to see the underside. You should take care of your nails and trim them straight.
- Choose comfortable shoes. Avoid flip-flops, high heels, and open-toed shoes.
- To avoid blistering, always wear soft and comfortable socks. Do not wear stockings above of knee or very tight, socks must below your knee.
- You should always make sure your shoes are the right size. never go about barefoot, whether you're inside or outside. Before putting on your shoes, feel the sharp edges and cracks with your inside inserts.
- Do not smoke as it causes less blood flow to both feet (Kalyani et al., 2018)

3. MATERIAL AND METHOD

This section presented the methodological procedures, which were applied in this study to reach the objectives and deals with statistical results in scientific methods.

3.1. Design of the Study

This is a descriptive cross-sectional study, this study was conducted to assess diabetes patients' knowledge and practices about foot care at Al-Hussein Teaching Hospital in Al-Samawah City, Iraq. The study was carried out between April 2022 and July 2022.

3.2. Ethical Consideration

Permission was obtained from the ethics committee of Çankırı Karatekin University to conduct the study (Appendix 1). A permit was obtained from the Ministry of Health and Environment/ Muthanna Health Directorate/ Training and Development Center (Appendix 2).

Permission to use questionnaire was obtained from the Arab researcher from the Kingdom of Saudi Arabia (Abdulsalam Hassan Alshehri) by sending him an email and approval was obtained (Appendix 6). Alshehri et al., (2019).

These were done before starting work: The names of the patients were not obtained. Holding a special meeting with patients in the wards, as scheduled, to remind them of the research and its objectives. All patients in this study received complete knowledge of their task. Patients are informed that the results of this questionnaire will only be used for study purposes only. Inform all patients that everyone here is an independent person and has the right to refuse to participate.

In the thesis defense, the abbreviation in the title of the thesis was approved with the suggestion of the jury members. The thesis title of "Assessment of knowledge and

practices of diabetic patients towards diabetic foot care at Al -Hussein teaching hospital in Al- Samawah City, Iraq'' is ''Assessment of Knowledge and Practices of Diabetic Patients to Diabetic Foot Care In Iraq'' abbreviated as.

3.3. Place of study

The study was conducted in Al-Hussein Teaching Hospital in Al-Muthanna City, where these wards are provided for the care of diabetic patients. In the city of Samawah, the center of Muthanna Governorate, it contains one main hospital in the city center. The hospital was chosen for the following reasons :This hospital receives all diabetic patients. This hospital provides many services for diabetics, such as giving medications (tablets and insulin), in addition to providing advice and guidance to diabetics regarding lifestyle. This hospital contains an endocrine and diabetes center. It contains many internal and surgical wards and fracture wards that receive diabetic patients. This facility employs many employees.

3.4. Sample of the Study

In the study, which is in descriptive design, the sample was selected from 200 patients. The target group consisted of patients who applied to Al-Hussein Teaching Hospital in Samawah, Iraq. Samples were collected from diabetic patients participating in the study . The response rate was (95%).

3.4.1. Criteria for selection the sample

- 1- Diabetic patients who come to Al-Hussein Teaching Hospital for examination, treatment, and follow-up.
- 2- Patients with or without diabetic foot problems.
- 3- The samples include both sexes (males and females)

4- Diabetic patients who received or did not receive any prior education about feet and diabetic foot care.

5- Patients aged 30 years and over.

3.4.2. Exclusion criteria

1- Participants who have been diagnosed with mental health problem.

2- Diabetic patients under 30 years old.

3.5. Steps of the study

1. Official approvals were obtained from the concerned authorities in order to facilitate the collection of samples.
2. Approvals were taken from the place where the sample was collected at Al-Hussein Teaching Hospital in Samawah. Iraq
3. The researcher explained the objectives of the research and obtained the consent of the patients to participate in the study.
4. After the researcher obtained the consent of diabetic patients to participate in the study, each patient separately.
5. The researcher distributed the questionnaire paper to patients who are able to answer or by face-to-face interview with patients who are unable to answer.
6. Study samples were collected from April 1, 2022, to July 1, 2022, from patients who come to Al-Hussein Teaching Hospital in Samawah City.

3.6. The Study Instrument

To measure knowledge (confidence) and practices of diabetic foot care, used three scales. The first is called the general information, the second is the foot care knowledge scale, and the third is the diabetic foot care practices scale. The study tool consisted of four main areas, including: Appendix 3,4,5.

3.6.1. Sociodemographic characteristics

This part relates to demographic data for patients consisting of (7) items including (gender, age group, marital status, education level, occupation, residence, and monthly income).

3.6.2. Clinical characteristics

This part includes the clinical characteristics of patients with (DM) and it consists of (8) items such as (the duration of the disease, the type of treatment, the patient's past history, receive education or guidance on the disease, smoking, the patient with or without a diabetic foot, the presence of a health center close to the residence the patient and the duration of the patient's review of the doctor).

3.6.3. Questions related to knowledge of foot care

This part consists of (13) questions related to measuring diabetes knowledge towards foot care, which are categorized as True (2), False (1).

3.6.4. Questions related to practice of foot care

This part consists of (11) questions with a related to diabetic foot care practices, which are categorized as Yes (2) and No (1).

3.7. Validity of the Instrument

This questionnaire was prepared using the recommendations of the American College of Foot, Ankle and Diabetic Surgeons, United King, which have been used in previous studies by Pollock et al., (2004) conducted in the United King and ADA, (1991 This questionnaire was developed by the Arab researcher (Abdulsalam Hassan Alshehri), which was translated into Arabic and used in the study conducted in Saudi Arabia (2019). Three scales were used in the questionnaire. The first is called General Information, the second is the Foot Care Knowledge Scale , and the third is the Diabetic Foot Care Practice Scale, it was found that the Cronbach's alpha coefficient to measure the reliability of the variables in the research tool in the Arabic version Cronbach's coefficient alpha = .71

3.8. Data Collection

Data were collected with a questionnaire (Arabic version) and through an interview with all diabetic patients included in the current study. The researcher conducted interviews with the patients and obtained their consent to participate in the study and clarify the study form. The interviews were conducted in Arabic, the official language of Iraq. Data were collected through a face-to-face interview, as well as by distributing the questionnaire to patients. The interview took about (15-20) minutes. Data were collected from April 1, 2022, to July 1, 2022.

3.9. Statistical Data Analysis

SPSS was used (version 25) for data analysis. The following statistical data analysis approaches were used in analyzing and assessing results to achieve the goals of this study. Descriptive data analysis (Frequency , percentage, the mean, mean of score) Inferential Analysis (Independent sample T-test, One-Way ANOVA).

4. STUDY RESULTS

This section presents the finding of the data analysis in tables and their correspondence with the objectives of the study has shown below:

Table 4.1. Distribution of patients according to social demographic features

Demographic data		Fre	%	Median
Age/years	30 to 40	43	21.5	3.00
	40 to 50	45	22.5	
	50 to 60	69	34.5	
	60 and over	43	21.5	
Gender	Male	128	7.5	1.00
	Female	72	62.0	
Marital Status	Single	26	13.0	2.00
	Married	174	87.0	
Education Level	Don't read & don't write	93	46.5	2.00
	Primary	16	8.0	
	Medium	22	11.0	
	Secondary	19	9.5	
	Diploma degree	32	16.0	
	College and above	18	9.0	
Occupation	Daily wage worker	53	26.5	3.00
	Peasant or farmer	24	12.0	
	government employee	43	21.5	
	Retired	16	8.0	
	Housewife	55	27.5	
	does not work	9	4.5	
Income	Enough	29	14.5	3.00
	Enough to some extent	50	25.0	
	not enough	121	60.5	
Residence	Urban	84	42.0	2.00
	Rural	116	58.0	
Total		200	100.0	

In the study, 34.5% of the patients were between the ages of 50-60; male patients 64 %; married patients 87%; illiterate 46.5%; those who are housewives 27.5%; insufficient income 60.5%; the rate of people living in rural areas was found to be 58.0% (Table 4.1).

Table 4.2. Distribution of patients according to their medical information

Medical information		Fre.	%	Median
Duration of DM	Less than 3 years	25	12.5	3.00
	3 to 5 years	66	33.0	
	6 to 10 years	69	34.5	
	More than 10 years	40	20.0	
Type of treatment	Diet	15	7.5	2.00
	Pills	124	62.0	
	Insulin	61	30.5	
Chronic diseases	Heart disease	35	17.5	2.00
	Hypertension	77	38.5	
	I don't have any diseases other than diabetes	88	44.0	
Smoker	No	142	71.0	0.00
	Yes	58	29.0	
Foot ulcer	No	136	68.0	0.00
	Yes, less than 6 months	30	15.0	
	One year	24	12.0	
	More than a year	10	5.0	
Receive education	No	107	53.5	0.00
	Yes By	doctor	71	
		Nurse	12	
		other	10	
Health centres, hospital close to where you live	No	101	50.5	0.00
	Yes	99	49.5	
Your reviews of the doctor	Never back down	1	.5	4.00
	Weekly	7	3.5	
	Per monthly	50	25.0	
	Every 3 months	55	27.5	
	Every 6 months	40	20.0	
	Almost every year	47	23.5	
Total		200	100.0	

In the study, 34.5% of the patients (6 to 10) years had DM; 62% of them used tablets for treatment; 44% did not have any disease other than diabetes; 71% did not smoke; 68% did not have foot ulcers; It was determined that 53.5% of them did not have knowledge about foot care. 50.5% of the patients stated that there was no health center or hospital close to their place of residence, 27.5% of them stated that they went to the doctor every 3 months (Table 4.2). The result of the table showed that there was no significant relationship between age, Marital Status, diagnosis age, type treatment, chronic disease, smoker, foot ulcer, guidance on the disease, reviews of the doctor and knowledge about diabetic foot care among diabetic patients ($p > 0.05$); but there are high significant between gender, the level of education, occupation, income, residence, and knowledge ($p < 0.01$); and significant between live close health center and knowledge ($p < 0.05$) (Table 4.3).

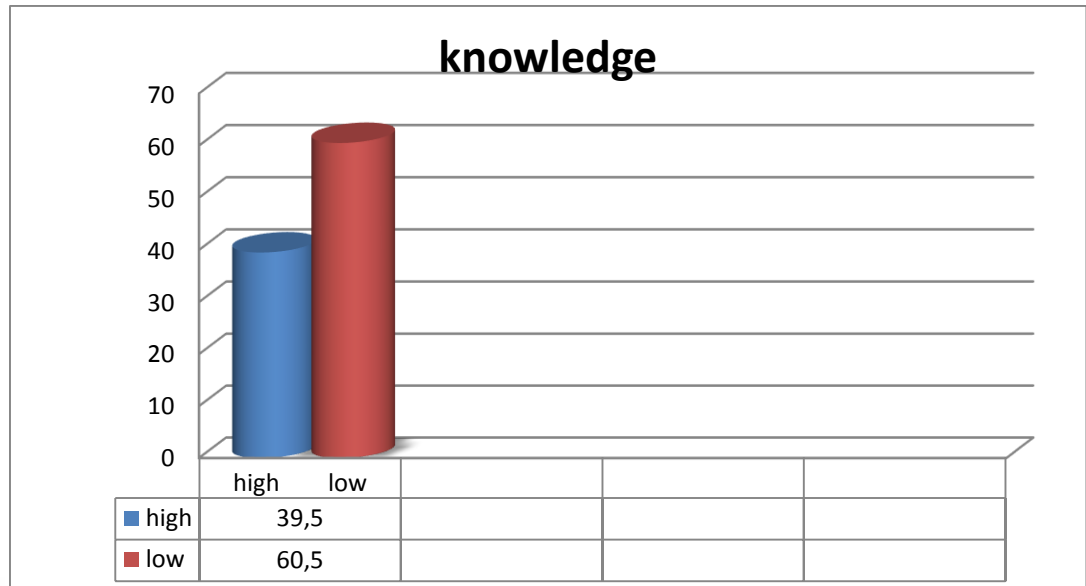


Figure 4.1. Distribution of the level of knowledge about foot care among patients

The result showed majority of knowledge was 60,5 % are (low)

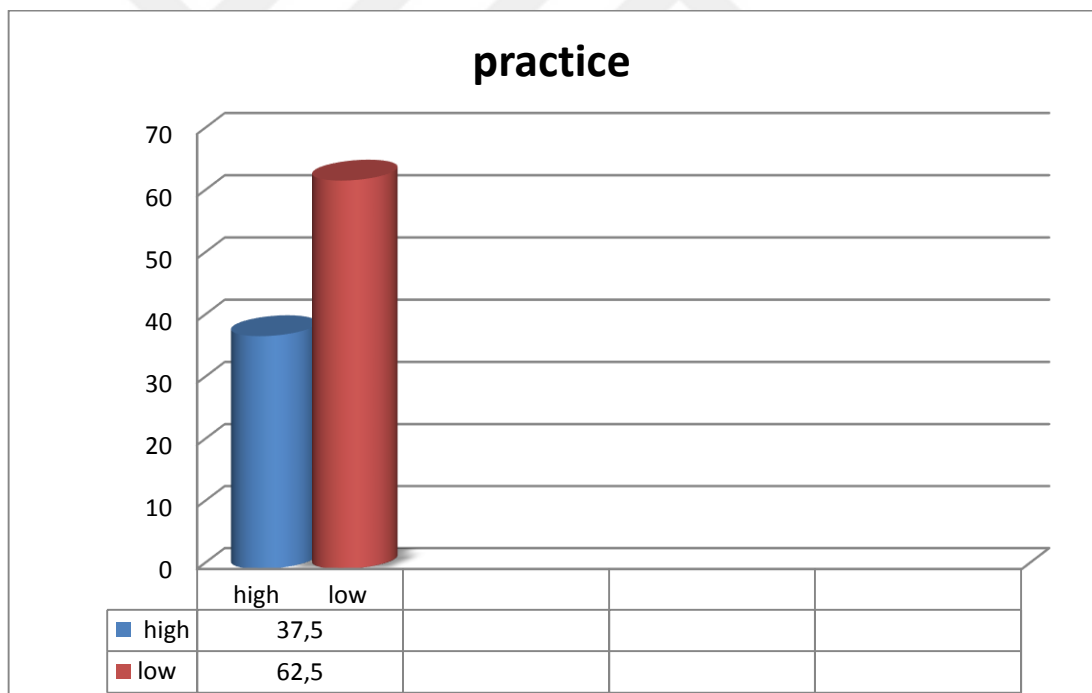


Figure 4.2. Distribution of the level of practice about foot care among patients

The result showed majority of practice 62.5 % are (low)

Table 4.3. The relationship the knowledge level of patients and demographic data

Demographic data	Subgroup	Knowledge				F	p
		Low		High			
		Fre	%	Fre	%		
Age	30 to 40	28	21.9	15	20.8	.437	.727*
	40 to 50	31	24.2	14	19.4		
	50 to 60	39	30.5	30	41.7		
	60 and over	30	23.4	13	18.1		
Gender	Male	70	54.7	58	80.6	40.656	.001**
	Female	58	45.3	14	19.4		
Marital Status ^a	Single	20	15.6	6	8.3	6.506	.321**
	Married	108	84.4	66	91.7		
Education Level ^a	Don't read &don't write	84	65.6	9	12.5	28.022	.000*
	Primary	12	9.4	4	5.6		
	Medium	10	7.8	12	16.7		
	Secondary	12	9.4	7	9.7		
	Diploma degree	9	7.0	23	31.9		
	College and above	1	0.8	17	23.6		
Occupation ^a	daily wage worker	36	28.1	17	23.6	13.305	.000*
	peasant or farmer	20	15.6	4	5.6		
	Government employee	16	12.5	27	37.5		
	Retired	2	1.6	14	19.4		
	Housewife	46	35.9	9	12.5		
	Does not work	8	6.3	1	1.4		
Income ^a	Enough	10	7.8	19	26.4	19.128	.000*
	Enough to some extent	23	18.0	27	37.5		
	Not enough	95	74.2	26	36.1		
Residence ^a	Urban	46	35.9	38	52.8	14.889	.002*
	Rural	82	64.1	34	47.2		
Diabetes diagnosis date ^a	Less than3 years	16	12.5	9	12.5	.720	.541*
	3 to 5 years	45	35.2	21	29.2		
	6 to 10 years	42	32.8	27	37.5		
	More than 10 years	25	19.5	15	20.8		
Type of treatment ^a	Diet	10	7.8	5	6.9	.175	.839*
	Pills	78	60.9	46	63.9		
	Insulin	40	31.3	21	29.2		
Do you suffer from other chronic diseases (other than DM)? Like ^a	Heart disease	24	18.8	11	15.3	.726	.485*
	Hypertension	49	38.3	28	38.9		
	I don't have any diseases other than diabetes	55	43.0	33	45.8		
Do you smoke? ^a	No	93	72.7	49	68.1	.003	.977**
	Yes	35	27.3	23	31.9		
Do you have a foot ulcer? ^a	No	85	66.4	51	70.8	1.155	.328*
	Yes, less than 6 months	22	17.2	8	11.1		
	One year	16	12.5	8	11.1		
	More than a year	5	3.9	5	6.9		
Do you receive education or guidance on the disease? ^a	No	69	53.9	38	52.8	.226	.878*
	Yes, by doctor	45	35.2	26	36.1		
	Nurse	7	5.5	5	6.9		
	Other	7	5.5	3	4.2		

Table 4.3. (Countined)The relationship the knowledge level of patients and demographic data

Demographic data	Subgroup	Knowledge				F	p
		Low		High			
		Fre	%	Fre	%		
Is there a health center, hospital or close to where you live? ^a	No	71	55.5	30	41.7	11.743	.046**
	Yes	57	44.5	42	58.3		
Your reviews of the doctor ^a	Never back down	0	0.0	1	1.4	1.376	.235*
	Weekly	6	4.7	1	1.4		
	Per monthly	33	25.8	17	23.6		
	Every 3 months	36	28.1	19	26.4		
	Every 6 months	21	16.4	19	26.4		
	Almost every year	32	25.0	15	20.8		
Total		128	100.0	72	100.0		

* ANOVA, ** Independent t-test; Fre: frequency, %: percent, F= distribution, p-value= probability, significant at 0.05, high significant at 0.01

The result of the table showed that there was no significant relationship between age, gender, marital status, income, diagnosis age, type treatment, chronic disease, smoker, foot ulcer, guidance on the disease, health center, hospital close to where you live, reviews of the doctor and practice about diabetic foot care among diabetic patients ($p>0.05$); but there are high significant ($p<0.01$) between the level of education and practice, significant between occupation, residence, and practice ($p<0.05$), (Table 4.4).

Table 4.4. The relationship the practice level of patients and the demographic data.

Demographic data	Subgroup	Practice				F	p
		Low		High			
		Fre	%	Fre	%		
Age	30 to 40	25	20.0	18	24.0	.550	.649*
	40 to 50	29	23.2	16	21.3		
	50 to 60	41	32.8	28	37.3		
	60 and over	30	24.0	13	17.3		
Gender ^a	Male	77	61.6	51	68.0	3.657	.364**
	Female	48	38.4	24	32.0		
Marital Status ^a	Single	18	14.4	8	10.7	3.378	.450**
	Married	107	85.6	67	89.3		
Education Level ^a	Don't read & don't write	69	55.2	24	32.0	4.113	.001*
	primary	11	8.8	5	6.7		
	medium	10	8.0	12	16.0		
	Secondary	14	11.2	5	6.7		
	Diploma degree	12	9.6	20	26.7		
	College and above	9	7.2	9	12.0		

Table 4.4. (Countined) The relationship the practice level of patients and the demographic data.

Demographic data	Subgroup	Practice				F	p	
		Low		High				
		Fre	%	Fre	%			
Occupation ^a	Daily wage worker	28	22.4	25	33.3	2.799	.018*	
	Peasant or farmer	20	16.0	4	5.3			
	Government employee	22	17.6	21	28.0			
	Retired	8	6.4	8	10.7			
	Housewife	41	32.8	14	18.7			
	does not work	6	4.8	3	4.0			
Income ^a	Enough	15	12.0	14	18.7	.836	.435*	
	Enough to some extent	32	25.6	18	24.0			
	Not enough	78	62.4	43	57.3			
Residence ^a	Urban	45	36.0	39	52.0	12.62 5	.029**	
	Rural	80	64.0	36	48.0			
Diabetes diagnosis date ^a	less than3 years	13	10.4	12	16.0	1.106	.348*	
	3 to 5 years	38	30.4	28	37.3			
	6 to 10 years	46	36.8	23	30.7			
	More than 10 years	28	22.4	12	16.0			
Type of treatment ^a	Diet	9	7.2	6	8.0	2.422	.091*	
	Pills	71	56.8	53	70.7			
	Insulin	45	36.0	16	21.3			
Do you suffer from other chronic diseases Like ^a	Heart disease	26	20.8	9	12.0	1.424	.243*	
	Hypertension	48	38.4	29	38.7			
	I don't have any diseases other than DM	51	40.8	37	49.3			
Do you smoke? ^a	No	88	70.4	54	72.0	.244	.810**	
	Yes	37	29.6	21	28.0			
Do you have a foot ulcer? ^a	No	80	64.0	56	74.7	.991	.398*	
	Yes,less than 6 months	21	16.8	9	12.0			
	One year	16	12.8	8	10.7			
	More than a year	8	6.4	2	2.7			
Do you receive education or guidance on the disease? ^a	No	68	54.4	39	52.0	.750	.523*	
	Yes, by doctor	43	34.4	28	37.3			
	Nurse	6	4.8	6	8.0			
	Other	8	6.4	2	2.7			
Is there health center, hospital or close to where you live? ^a	No	65	52.0	36	48.0	1.167	.586**	
	Yes	60	48.0	39	52.0			
Your reviews of the doctor ^a	Never back down	1	.8	0	0.0	1.598	.162*	
	Weekly	7	5.6	0	0.0			
	per monthly	29	23.2	21	28.0			
	Every 3 months	30	24.0	25	33.3			
	every 6 months	25	20.0	15	20.0			
	Almost every year	33	26.4	14	18.7			
Total		125	100	75	100.0			

* ANOVA, ** Independent t-test; Fre: frequency, F= distribution, p-value= probability, significant at 0.05, high significant at 0.01

5. DISCUSSION OF THE STUDY RESULTS

Part I: Discussion-Distribution of Samples According to Demographic Information for The Total Diabetic Patients Participating to The Study

The results of this study indicate, the age of the participants in the study group is between (50 to 60) years (34.5%), and this is in line with previous studies that revealed that Ahmed et al., (2019); Alhaik et al., (2019); Bago, (2017); Mustafa et al., (2017). Where these studies found that (37%) of them are over the age of 60 years because diabetes affects all age groups, but the age group (40 to 60) is more susceptible, especially in patients with type 2 diabetes. In the study, the age of the sample was determined from 30 years and above. Regarding of gender, most of the participants in the study group were male (64%). Similarly, Alatawi et al., (2018) 's study found that men accounted for 65% and Al-Jasim et al., (2020). it was reported that men are 58.4%. It was determined that most of the participants in the study were married at the rate of 87%. This result is compatible with the study of Gökdeniz & Akgün Şahin, (2022), in which the rate of married people (97.5%). People with diabetes usually suffer from diabetes after the age of 40 years, especially in Type 2 diabetics and most people of this age are married Baynes, (2015). In the study, 46.5% of the patients were illiterate. This situation causes them to have difficulty in getting information and instructions about personal care. Similarly, S Ewais et al., (2021) reported this rate as 48.6%. And they do not write, and this shows that people in Samawah did not send their children to schools in the previous periods. It was determined that 27.5% of the patients were housewives. This result is consistent with the study they conducted to determine the knowledge and practices of diabetic patients, of whom 38% are housewives Solan et al., (2017). Many of the women in this city have not completed their education and their work is not considered appropriate. Most of the patients in this study came from rural areas (58%). Similarly, in the study of S Ewais et al., (2021), the proportion of patients living in rural areas was found to be high (74.3%). Approximately (60.5%) of the participants' monthly income is not enough. According to the annual indicator of the Ministry of Planning, where the poverty rate in Muthanna is 49%, it is the poorest city in Iraq due to the lack

of job opportunities of the governorate and the lack of economic resources AL-Kozaay, (2016)

Part II: Discussion - Distribution of Samples According to Medical Information for The Total Diabetic Patients Participating to The Study

The age of diagnosis of the patients was 34.5% (6-10). Tuglo et al. (2022) found 52.2% (5-10) of diabetic patients. The regarding of type the treatment was (62%) of the participants in the study uses tablet therapy, this result was similar to other previous studies such as Nguyen et al., (2019). also about (72%) of patients take of antihyperglycemic oral drugs in study of Magbanua & Lim-Alba, (2017), all of the previous studies mentioned above indicate that most of the patients participating in these studies are using tablets to treat diabetes. The explanation is that this study identified the age group 30 years and older. Since most people with diabetes are type 2, this type is usually treated with tablets. The results also showed that the diseases associated with diabetes were (38.5%) accompanied by high blood pressure and (17.5%) with heart disease. While (44%) I do not have any diseases other than diabetes. The researcher explained that diabetes often affects the age group of 40 years and above, and this age group is more susceptible to high blood pressure and heart disease. The majority of participants during the study were non-smokers (71%) and this is in agreement with the results of the study Sallam & Edison, (2019) that showed their results. Studies related to smoking are like the results of our study, Also, the finding showed of a diabetic patient about (32%) had a diabetic foot. while (68%) do not had a diabetic foot. The study results was agreement with the study Al-Hariri et al., (2017) where (26%) of diabetics have observed diabetic foot ulcers. My opinion believes that a possible explanation for this is that the weather in Samawah is usually dry and hot all year round, which makes it difficult to wear shoes, in addition to the fact that most participants in our study are non-working and do not wear them. Shoes to protect their feet and even wear sandals, which puts them at risk of developing diabetic foot. Also, People with DM have peripheral neuropathy which lead to lose the ability to feel pressure, pain or foreign objects which cause diabetic foot. Regarding receiving information about foot care, about half of the participants in this study did

not receive information about foot care (53.5%), these results are supported by Chiwanga & Njelekela, (2015) The result was that the highest percentage of participants in this study did not receive prior information about foot care, in my opinion a possible explanation for this is that the majority of the participants are from rural areas and there are no health centers in their areas and they do not have access to health centers in urban areas in order to obtain the information. Because it is far from their residence. About (50.5%) of the samples, there is no health care center close to their residence. my opinion This lack of health centers or hospitals is due to the economic situation in Iraq and the lack of construction of hospitals and health centers According to population expansion, Therefore, there are no health centers in all regions, but only (27,5 %) of the participants visit the doctor or health institutions from (3 months to a year). Where the results of this study differ with the study Solan et al., (2017) conducted to evaluate diabetic foot care knowledge and practices in Saudi Arabia. This is since approximately 60% of the patients visit doctors and health institutions and the monthly income of the Saudi individual is higher than the per capita income in Iraq. The risk of developing diabetes complications is high in patients who do not have enough money to go to the doctor.

Part III: Discussion-Distribution of The Level of Knowledge and Practice About Foot Care Among Diabetic Patients

In the study, 60.5% of patients had low knowledge of diabetic foot care. In a study conducted in Gilan Province (Northern Iran), this rate was reported as 84.8% Pourkazemi et al., (2020) In a study conducted in Malaysia, it was found to be 98.1% Muhammad-Lutfi et al., (2014). Similarly, The current study is also in agreement with previous studies, Qadi & Al Zahrani, (2011) and (Hasnain & Sheikh, 2009) conducted in Saudi Arabia and Pakistan, the results indicated poor knowledge about diabetic foot care among the patients participating in the study. Differently, there are studies showing that there is a high level of knowledge about foot care among diabetic patients Alshammari et al., (2019) and Verma et al., (2021), Moh'd Al-Qaddah et al., (2016). We think that the reasons for the patients' lack of knowledge about diabetic foot care in the study are due to the inadequacy of the economic status and education

level of the patients, and the inadequacy of health services. The study showed that 62.5% of the patients had bad foot care practices. Similarly, Pourkazemi et al., (2020) found this rate to be 91.2%, and Muhammad-Lutfi et al., (2014) found this rate to be 61.8%. Differently, Ahmed et al., (2019) and Alshammari et al., (2019) found that patients had good practices for diabetic foot care in their studies. Reasons such as low education level of the patients, low health awareness, inadequate access to health services, and lack of health counseling may have caused this.

Part IV: Discussion of the Correlation of Demographic and Medical Information with Knowledge About Foot Care Among Diabetic Patients

The results showed that there was a statistically significant correlation between gender and knowledge ($p < 0.01$), and men were more knowledgeable than women. Pourkazemi et al., (2020) similarly found a significant relationship between gender and knowledge. Also, between the level of education and knowledge statistically high significant relationship ($p < 0.01$). The results indicate that patients who have a low level of education have poor knowledge, while patients who have a high level of education have good knowledge of diabetic foot care. Alshammari et al., (2019) and Goweda et al., (2017) also found similar results. There is a statistically significant relationship ($p < 0.01$) between occupation and knowledge; it has been determined that the level of knowledge of civil servants and retirees is higher. This result is similar to the study of Verma et al., (2021). In addition to the relationship between income and knowledge, there is a statistically significant relationship ($p < 0.01$). Patients with a good income have good information, and those with a low income have little information. Verma et al., (2021) also found similar results. There is a relationship between residence and knowledge, significant ($p < 0.01$). Patients living in cities have more information than those living in rural areas. S Ewais et al., (2021) found similar results in their study. There is a relationship between a health center or hospital near the place where live in it and knowledge, there is a significant ($p < 0.05$). It was found that patients who have a health center or hospital nearby have more information than those who do not. There was no statistically significant relationship between age, duration of DM diagnosis, type of treatment, having another chronic disease, receiving education or guidance about the disease, doctor's evaluations, marital status, and

smoking status ($p>0.05$). Similar results were obtained in the study of Pourkazemi et al., (2020).

Part V: Discussion of the Correlation of Demographic and Medical Information with practices about foot care among diabetic patients

The results showed a statistically high significant relationship between the level of education and practice ($p<0.01$). The results indicated that illiterate patients and patients with low educational level have poor practices towards diabetic foot care, in contrast to patients with higher education level have good and average practices towards foot care. It agrees with the previous study Noaman, (2017). Between occupation and practice ($p<0.05$). A significant relationship was found between profession and practice ($p<0.05$). Working patients have better practices than non-working patients. Similar results were reported in the study of Qadi & Al Zahrani, (2011) .The results show that patients residing in urban areas have better practices for diabetic foot care than patients residing in rural areas. S Ewais et al., (2021) reported similar results in their study. As for the rest of the demographic and clinical characteristics, (Gender, Marital Status, Age, Income, diagnosis duration of DM, type of treatment, suffer from other chronic diseases (different from diabetes) , receive education or guidance on the disease, Your reviews of the doctor, marital status, smoke ,Is there a health center, hospital or close to where you live) there is no statistically significant association ($p>0.05$). These are similar to the work of Pourkazemi et al., (2020) .

6. CONCLUSIONS AND RECOMMENDATIONS

6.1. Conclusions

In view of the findings that were gathered, the study came to the following conclusions:

1. Many diabetics are between the ages of (50-60) years, and most of them are married and males. Also, most of the study participants (neither reading nor writing) and most participants have low monthly income, and most patients have diabetes with (1-10) years and half of the participants are not educated about foot care.
2. The results showed that there is a decrease in the level of knowledge and practices towards diabetic foot care among the patients participating in the study.
3. The findings of the study demonstrated that there were statistically significant variations between the patients who took part in the study about their knowledge and practices about diabetic foot care.
4. There is a statistically significant relationship between (gender, educational level, profession, monthly income, residence) and knowledge of foot care.
5. There is a statistically significant relationship between (educational level, occupation, residence) and practices towards diabetic foot care.
6. The levels of knowledge and practices among diabetes patients may be enhanced by the implementation of community awareness and training programs.
7. Assistance from family and community to improve lifestyle and practices and implement long-lasting adjustments to better manage their diabetes disease. Additionally, educating people about diabetes and risk factors must be made public via the media in order to successfully manage it.

6.2. Recommendations

Based on the study's findings, the researcher recommended the following:

1. The study recommended conducting a new survey for diabetics in the city of Samawah and making regular home visits by health teams to follow up and reduce complications of diabetes because not all diabetics can come to health institutions.
2. Patient education is necessary to complement and reinforce the patient's practice regarding foot care and reducing the incidence of diabetic foot.
3. There should be a booklet containing a brief explanation of the steps related to foot care with text and pictures and should be distributed to patients during their visits to health institutions.
4. Nurses should receive detailed training on diabetic foot care before graduating.
5. Periodic trainings on diabetic foot care should be given to professional nurses.

REFERENCES

- Ahmad Sharoni, S. K., Minhat, H. S., Mohd Zulkefli, N. A., & Baharom, A. (2016). Health education programmes to improve foot self-care practices and foot problems among older people with diabetes: a systematic review. *International Journal of Older People Nursing*, 11(3), 214–239.
- Ahmed, S. A., Badi, S., Tahir, H., Ahmed, M. H., & Almobarak, A. O. (2019). Knowledge and practice of diabetic foot care in Sudan: A cross sectional survey. *Diabetes & Metabolic Syndrome: Clinical Research & Reviews*, 13(4), 2431–2435.
- Akila, M., Ramesh, R. S., & Kumari, M. J. (2021). Assessment of diabetic foot risk among diabetic patients in a tertiary care hospital, South India. *Journal of Education and Health Promotion*, 10.
- Alatawi, A. A., Alrashedi, M. H., Alqarni, A. M., Almotiri, A. H., Albalawi, S. S., Alshamrani, M. A., & Alasmari, A. F. (2018). Assessment of Self-Awareness and Perception of Diabetic Foot Disease among People with Type 2 Diabetes Mellitus in Tabuk. *The Egyptian Journal of Hospital Medicine*, 70(6), 1025–1029.
- Al-Hariri, M. T., Al-Enazi, A. S., Alshammari, D. M., Bahamdan, A. S., Al-Khtani, S. M., & Al-Abdulwahab, A. A. (2017). Descriptive study on the knowledge, attitudes and practices regarding the diabetic foot. *Journal of Taibah University Medical Sciences*, 12(6), 492–496.
- Al-Jasim, A., Khalil, O. A., Al-Khafaji, A. O., & Al-Diwan, J. (2020). *Knowledge, Attitude and Practices of Diabetic Foot Patients Admitted to the Surgical Wards at Baghdad Teaching Hospital: A Cross-Sectional Study*. Al-Jasim. *World Journal of Medical Education and Research*, 23(1).
- AL-Kozaay, M. J. (2016). The Poverty In Iraq Between The Reality And The Poor Planning. *Alustath Journal for Human and Social Sciences*, 217(2), 9–24.
- Alhaik, S., Anshasi, H. A., Alkhawaldeh, J., Soh, K. L., & Naji, A. M. (2019). An assessment of self-care knowledge among patients with diabetes mellitus. *Diabetes & Metabolic Syndrome: Clinical Research & Reviews*, 13(1), 390–394.

- Alshammari, Z. J., Alsaid, L. A., Parameaswari, P. J., & Alzahrani, A. A. (2019). Attitude and knowledge about foot care among diabetic patients in Riyadh, Saudi Arabia. *Journal of Family Medicine and Primary Care*, 8(6), 2089.
- Alshehri, A. H., Bashir, M. A., Almutairi, A. M., & Turkstani, W. M. (2019). Diabetic patients' knowledge and practices about diabetic foot care in Makkah city, Saudi Arabia. *Indo American Journal Of Pharmaceutical Sciences*, 6(1), 2748–2753.
- American Diabetes Association. (2017). 13. Management of diabetes in pregnancy. *Diabetes Care*, 40(Supplement_1), S114–S119.
- American Diabetes Association. (2019). 2. Classification and diagnosis of diabetes: standards of medical care in diabetes—2019. *Diabetes Care*, 42(Supplement_1), S13–S28.
- American Diabetes Association. (2022). Standards of medical care in diabetes. Classification and diagnosis of diabetes. *Diabetes Care*; 45(Suppl. 1):S17-S38.
- Bago, B. J. (2017). *Knowledge, Practice and Barriers of Diabetic Foot Ulcer Among Diabetic Patients in Hawassa University Comprehensive Specialized Hospital, Southern Ethiopia, 2017*.
- Baynes, H. W. (2015). Classification, pathophysiology, diagnosis and management of diabetes mellitus. *J Diabetes Metab*, 6(5), 1–9.
- Bonora, E., & DeFronzo, R. A. (2018). *Diabetes Epidemiology, Genetics, Pathogenesis, Diagnosis, Prevention, and Treatment*. (No. 180581). Springer.
- Buse, J. B., Wexler, D. J., Tsapas, A., Rossing, P., Mingrone, G., Mathieu, C., D'Alessio, D. A., & Davies, M. J. (2020). 2019 update to: management of hyperglycemia in type 2 diabetes, 2018. A consensus report by the American Diabetes Association (ADA) and the European Association for the Study of Diabetes (EASD). *Diabetes Care*, 43(2), 487–493.
- Carracher, A. M., Marathe, P. H., & Close, K. L. (2018). *International diabetes federation 2017*. Wiley Online Library.

- Chiwanga, F. S., & Njelekela, M. A. (2015). Diabetic foot: prevalence, knowledge, and foot self-care practices among diabetic patients in Dar es Salaam, Tanzania—a cross-sectional study. *Journal of Foot and Ankle Research*, 8(1), 1–7.
- Dagogo-Jack, S. (2017). *Diabetes mellitus in developing countries and underserved communities*. Springer. <https://link.springer.com/book/10.1007/978-3-319-41559-8> Date of access:11.01.2023
- Davies, M. J., D'Alessio, D. A., Fradkin, J., Kernan, W. N., Mathieu, C., Mingrone, G., Rossing, P., Tsapas, A., Wexler, D. J., & Buse, J. B. (2018). Management of hyperglycaemia in type 2 diabetes, 2018. A consensus report by the American Diabetes Association (ADA) and the European Association for the Study of Diabetes (EASD). *Diabetologia*, 61(12), 2461–2498.
- Dimitriadou, A., & Lavdaniti, M. (2017). Foot Care Education for Diabetes Mellitus Patients. *American Association for Science and Technology*.
- Doğruel, H., Aydemir, M., & Balci, M. K. (2022). Management of diabetic foot ulcers and the challenging points: An endocrine view. *World Journal of Diabetes*, 13(1), 27.
- EB Reusch, J. (2018). *Diabetes and exercise: from pathophysiology to clinical implementation Second Edition*. Springer International Publishing AG.
- Forouhi, N. G., & Wareham, N. J. (2022). Epidemiology of diabetes. *Medicine*.
- Gökdeniz, D., & Akgün Şahin, Z. (2022). Evaluation of knowledge levels about diabetes foot care and self-care activities in diabetic individuals. *The International Journal of Lower Extremity Wounds*, 21(1), 65–74.
- Goweda, R., Shatla, M., Alzaidi, A., Alzaidi, A., Aldhawani, B., Alharbi, H., Sultan, N., Alnemari, D., & Rawa, B. (2017). Assessment of knowledge and practices of diabetic patients regarding diabetic foot care, in Makkah, Saudi Arabia. *Journal of Family Medicine and Health Care*, 3(1), 17.
- Hasnain, S., & Sheikh, N. H. (2009). Knowledge and practices regarding foot care in diabetic patients visiting diabetic clinic in Jinnah Hospital, Lahore. *JPMA. The Journal of the Pakistan Medical Association*, 59(10), 687.

- Hochlenert, D., Engels, G., Morbach, S., Schliwa, S., & Game, F. L. (2018). *Diabetic Foot Syndrome: From Entity to Therapy*. Springer.
- Jodheea-Jutton, A., Hindocha, S., & Bhaw-Luximon, A. (2022). Health economics of diabetic foot ulcer and recent trends to accelerate treatment. *The Foot*, 101909.
- John, D. M., John, J., Raj, M. R., & Fathima, F. N. (2019). Knowledge, practices, and risk of diabetic foot syndrome among diabetic patients in a tertiary care hospital in Bengaluru, India. *EMJ Diabet*. 7(1):82-90.
- Kalyani, R. R., Corriere, M. D., Donner, T. W., & Quartuccio, M. W. (2018). *Diabetes head to toe: Everything you need to know about diagnosis, treatment, and living with diabetes*. Johns Hopkins University Press.
- Karadağ, F. Y., Saltoğlu, N., Ak, Ö., Aydın, G. Ç., Şenbayrak, S., Erol, S., Özatağ, D. M., Kadanalı, A., Küçükardalı, Y., & Çomoğlu, Ş. (2019). Foot self-care in diabetes mellitus: evaluation of patient awareness. *Primary Care Diabetes*, 13(6), 515–520.
- Karamanou, M., Protogerou, A., Tsoucalas, G., Androutsos, G., & Poulakou-Rebelakou, E. (2016). Milestones in the history of diabetes mellitus: The main contributors. *World Journal of Diabetes*, 7(1), 1.
- Magbanua, E., & Lim-Alba, R. (2017). Knowledge and practice of diabetic foot care in patients with diabetes at Chinese general hospital and medical center. *Journal of the ASEAN Federation of Endocrine Societies*, 32(2), 123.
- McDermott, K., Fang, M., Boulton, A. J. M., Selvin, E., & Hicks, C. W. (2023). Etiology, Epidemiology, and Disparities in the Burden of Diabetic Foot Ulcers. *Diabetes Care*, 46(1), 209–221.
- Mishra, S. C., Chhatbar, K. C., Kashikar, A., & Mehndiratta, A. (2017). Diabetic foot. *Bmj*, 359.
- Moh'd Al-Qaddah, R., Abdallah Al Eyadeh, M. D., Ma'en Zaid Abu-Qamar, D. N., Younes, N., Al-Ryalat, D., & Haddad, F. (2016). Knowledge and practice of foot care among diabetics at King Hussein Medical Center, Jordan. *JRMS*, 23(3), 55–63.

- Morey-Vargas, O. L., & Smith, S. A. (2015). BE SMART: strategies for foot care and prevention of foot complications in patients with diabetes. *Prosthetics and Orthotics International*, 39(1), 48–60.
- Muhammad-Lutfi, A. R., Zaraihah, M. R., & Anuar-Ramdhan, I. M. (2014). Knowledge and practice of diabetic foot care in an in-patient setting at a tertiary medical center. *Malaysian Orthopaedic Journal*, 8(3), 22.
- Mustafa, A., Iqbal, M., & Parvez, M. A. (2017). Assessment of knowledge, attitude and practices of diabetics regarding their foot care. *Annals of Punjab Medical College (APMC)*, 11(1), 43–47.
- Nguyen, T. P. L. (2019). *Foot self-care among patients with diabetes in Vietnam: The effectiveness of an education program to fill the self-care gap*. Queensland University of Technology.
- Nguyen, T. P. L., Edwards, H., Do, T. N. D., & Finlayson, K. (2019). Effectiveness of a theory-based foot care education program (3STEPFUN) in improving foot self-care behaviours and foot risk factors for ulceration in people with type 2 diabetes. *Diabetes Research and Clinical Practice*, 152, 29–38.
- Noaman, A. A. (2017). Assessment of preventive foot care practices among patients with diabetes mellitus type II. *Journal of the Faculty of Medicine Baghdad*, 59(3), 244–248.
- Norris, J. M., Johnson, R. K., & Stene, L. C. (2020). Type 1 diabetes—early life origins and changing epidemiology. *The Lancet Diabetes & Endocrinology*, 8(3), 226–238.
- Opara, E. C., & Dagogo-Jack, S. (2019). *Nutrition and diabetes: Pathophysiology and management*. CRC Press.
- World Health Organization (2019). *Classification of diabetes mellitus*.
- Pandey, S. K., & Sharma, V. (2018). World diabetes day 2018: battling the emerging epidemic of diabetic retinopathy. *Indian Journal of Ophthalmology*, 66(11), 1652.

- Papatheodorou, K., Banach, M., Bekiari, E., Rizzo, M., & Edmonds, M. (2018). Complications of diabetes 2017. In *Journal of diabetes research* (Vol. 2018), 1-4
- Pollock, R. D., Unwin, N. C., & Connolly, V. (2004). Knowledge and practice of foot care in people with diabetes. *Diabetes Research and Clinical Practice*, 64(2), 117–122.
- Pourkazemi, A., Ghanbari, A., Khojamli, M., Balo, H., Hemmati, H., Jafaryparvar, Z., & Motamed, B. (2020). Diabetic foot care: knowledge and practice. *BMC Endocrine Disorders*, 20(1), 1–8.
- Prem Belwin, K. (2017). *Effectiveness of povidone iodine dressing Versus normal saline dressing on wound healing among patient with diabetic foot ulcer at Government Rajaji Hospital, Madurai*. College of Nursing, Madurai Medical College, Madurai.
- Qadi, M. A., & Al Zahrani, H. A. (2011). Foot care knowledge and practice among diabetic patients attending primary health care centers in Jeddah City. *J King Abdulaziz Univ Med Sci*, 98, 1–34.
- Rajaei, E., Jalali, M. T., Shahrabi, S., Asnafi, A. A., & Pezeshki, S. (2019). HLAs in autoimmune diseases: dependable diagnostic biomarkers? *Current Rheumatology Reviews*, 15(4), 269–276.
- Rathnayake, A., Saboo, A., Malabu, U. H., & Falhammar, H. (2020). Lower extremity amputations and long-term outcomes in diabetic foot ulcers: A systematic review. *World Journal of Diabetes*, 11(9), 391.
- Razana, A. (2017). Guidelines for the Management of Type 2 diabetes mellitus. *Journal of Endocrinology, Metabolism and Diabetes of South Africa*, 22(1), S1–S196.
- Reardon, R., Simring, D., Kim, B., Mortensen, J., Williams, D., & Leslie, A. (2020). The diabetic foot ulcer. *Australian Journal of General Practice*, 49(5), 250–255.
- S Ewais, E., A Ahamed, M., & H Farahat, N. (2021). Diabetic Foot-related Knowledge, Health Beliefs and Practices among Diabetic Elderly. *Egyptian Journal of Health Care*, 12(4), 302–317.

- Saeedi, P., Petersohn, I., Salpea, P., Malanda, B., Karuranga, S., Unwin, N., Colagiuri, S., Guariguata, L., Motala, A. A., & Ogurtsova, K. (2019). Global and regional diabetes prevalence estimates for 2019 and projections for 2030 and 2045: Results from the International Diabetes Federation Diabetes Atlas. *Diabetes Research and Clinical Practice*, 157, 107843.
- Sallam, S. A. E. G., & Edison, J. S. (2019). Effect of nursing instructions on diabetic patients' knowledge about peripheral neuropathy and foot care. *American Journal of Nursing*, 7(4), 626–632.
- Schleicher, E., Gerdes, C., Petersmann, A., Müller-Wieland, D., Müller, U. A., Freckmann, G., Heinemann, L., Nauck, M., & Landgraf, R. (2022). Definition, classification and diagnosis of diabetes mellitus. *Experimental and Clinical Endocrinology & Diabetes*, 130(S 01), S1–S8.
- Scotland, H. I. (2017). Guideline 154 Pharmacological management of glycaemic control in people with type 2 diabetes. *A National Clinical Guideline*.
- Sen, S., Chakraborty, R., & De, B. (2016). *Diabetes mellitus in 21st century*. (pp. 55-67). New York, NY, USA:: Springer.
- Solan, Y. M., Kheir, H. M., Mahfouz, M. S., Al-Faify, A. A., Hakami, D. T., Al Faifi, M. A., Hakami, A. W., Hakami, A. H., & Sharif, H. H. (2017). Diabetic foot care: knowledge and practice. *Journal of Endocrinology and Metabolism*, 6(6), 172–177.
- Southern, H. Y. K. P. G., Area, A., & Shubrook-ADM, J. H. (2019). Insulin Therapy for Type 2 Diabetes: Social, Psychological, and Clinical Factors. *Primary Care Reports*, 25(1).
- Tuglo, L. S., Nyande, F. K., Agordoh, P. D., Nartey, E. B., Pan, Z., Logosu, L., Dei-Hlorlewu, A. E., Haligah, D. K., Osafo, L., & Taful, S. (2022). Knowledge and practice of diabetic foot care and the prevalence of diabetic foot ulcers among diabetic patients of selected hospitals in the Volta Region, Ghana. *International Wound Journal*, 19(3), 601–614.

- Türkiye Endokrinoloji ve Metabolizma Derneği (TEMĐ). Diabetes Mellitus ve Komplikasyonlarının Tanı, Tedavi ve İzlem Kılavuzu 2020. Ankara:TEMĐ Yayınları.https://file.temd.org.tr/Uploads/publications/guides/documents/diabetes-mellitus_2022.pdf Date of access:11.01.2023
- Van Netten, J., Lazzarini, P., Fitridge, R., Kinnear, E., Griffiths, I., Malone, M., Perrin, B., Prentice, J., Sethi, S., & Wraight, P. (2017). *Australian diabetes-related foot disease strategy 2018-2022: the first step towards ending avoidable amputations within a generation.*
- Verma, M., Sharma, N., Rashi, V. A., Bashar, M. A., Nath, B., & Kalra, S. (2021). Diabetic Foot Care Knowledge and Practices in Rural North India: Insights for Preventive Podiatry. *J Assoc Physicians India [Internet]*, 69(2), 30–34.
- Volmer-Thole, M., & Lobmann, R. (2016). Neuropathy and diabetic foot syndrome. *International Journal of Molecular Sciences*, 17(6), 917.
- Williams, R., Karuranga, S., Malanda, B., Saeedi, P., Basit, A., Besançon, S., Bommer, C., Esteghamati, A., Ogurtsova, K., & Zhang, P. (2020). Global and regional estimates and projections of diabetes-related health expenditure: Results from the International Diabetes Federation Diabetes Atlas. *Diabetes Research and Clinical Practice*, 162, 108072.
- Zheng, Y., Shu, B., Fu, J., Kafanas, A., & Veves, A. (2018). Structural and Functional Changes in Skin of the Diabetic Foot. *The Diabetic Foot Medical and Surgical Management*, 189–198.

APPENDICES

APPENDIX 1. Ethics Committee approval at the of Çankiri Karatekin University



APPENDIX 2:Approval of the ethics committee and facilitating the task of research in Iraq



APPENDIX 3. The demographic data questionnaire (in English)



APPENDIX 3. (Continued) The demographic data questionnaire (in English)



APPENDIX 3. (Continued) The demographic data questionnaire (in English)



APPENDIX 4. The demographic data questionnaire (in Turkish)



APPENDIX 4. (Continued) The demographic data questionnaire (in Turkish)



APPENDIX 4. (Continued) The demographic data questionnaire (in Turkish)



APPENDIX 5. The demographic data questionnaire (in Arabic)



APPENDIX 5. (Continued) The demographic data questionnaire (in Arabic)



APPENDIX 5. (Continued) The demographic data questionnaire (in Arabic)



APPENDIX 5. (Continued) The demographic data questionnaire (in Arabic)



APPENDIX 6 Permission to use the questionnaire



APPENDIX 7 :Similarity Report



CURRICULUM VITAE

Surname: Ali Oudah Shani Shani

