Çankırı Karatekin University
Graduate School of Health Sciences

Master of Science Thesis

DIABETES HEALTH PROMOTION BEHAVIORS FOR CLIENTS WITH TYPE 2 DIABETES MELLITUS AT WASIT GOVERNORATE

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Çankırı 2023

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BY

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The Institute of Health Sciences
The Department of Nursing

The Degree of Master of Science

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2023

ACCEPTANCE AND APPROVAL

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ETHICS STATEMENT

The thesis entitled “Diabetes Health Promotion Behaviors for Clients with Type 2 Diabetes Mellitus at Wasit Governorate” 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 of the used sentences and interpretations within the work belongs to me.

I declare the aforementioned issues to be correct.

Signature

/ /

Akeel Izwaid Zghair AL-OGAILI

ABSTRACT

DIABETES HEALTH PROMOTION BEHAVIORS FOR CLIENTS WITH TYPE 2 DIABETES MELLITUS AT WASIT GOVERNORATE

Akeel Izwaid Zghair AL-OGAILI

Master of Science in Nursing

Advisor: Prof. Azize Serap TUNÇER

2023

Background: Diabetes Mellitus is a metabolic condition that can be brought on by a variety of factors and circumstances. Humans are unable to adequately digest carbohydrates, lipids, or proteins. Elevated blood sugar levels can lead to heart and renal failure. Objective: (1) To identify the association between clients' age, family's socioeconomic status, duration of illness, body mass index, and their health promoting behaviors. (2) Investigate the differences in clients' health promoting behaviors between the groups of gender, level of education, marital status, residency, family history of diabetes mellitus, and type of medication received. Methods: The current study conducted on (200) individuals with type 2 diabetes who visited primary healthcare facilities in Wasit Governorate between 15 March 2022 and 30 November 2022. It is conducted using a descriptive correlational design. T2DHPS which has 28 total items, was one of the study's face to face data collection instruments, along with a sociodemographic sheet for the participants. Results: The vast majority of individuals with type 2 diabetes are overweight, between the ages of 54 and 64, live in urban areas (42% of the sample population), and are predominantly male. Researcher found that most participants maintained a moderate degree of health-promoting actions. Greater levels of education and higher median monthly household incomes were also related with more healthier lifestyle choices among the participants in this study.The study also discovered a negative correlation between BMI, disease duration, and healthy lifestyle choices. Conclusion: There was a statistically significant correlation between the clients' health-promoting behaviors and family's socioeconomic status, duration of illness and body mass index. Clients' health-promoting behaviors vary depending on their gender, level of education,

marital status, place of residence, family history of diabetes, and type of medicine they take.

2023, 84 pages

Keywords: Diabetes mellitus, Health promotion behaviors

ÖZET

WASIT VALILIĞI'NDEKI TIP 2 DIABETES MELLITUS HASTALARI IÇIN DIYABET SAĞLIĞINI GELIŞTIRME DAVRANIŞLARI

Akeel Izwaid Zghair AL-OGAILI
Hemşirelik, Yüksek Lisans
Tez Danışmanı: Prof. Azize Serap TUNÇER
2023

Arka plan: Diyabet, pankreas yeterli insülin üretmediğinde veya vücut ürettiği insülini etkili bir şekilde kullanamadığında ortaya çıkan kronik bir hastalıktır. İnsanlar karbonhidratları, lipidleri veya proteinleri yeterince sindiremezler. Tip 2 diabetes mellitus, kronik olması ve yıllarca tespit edilemeyebilmesi nedeniyle önde gelen küresel bir ölüm nedenidir. Yüksek kan şekeri seviyeleri kalp ve böbrek yetmezliğine yol açabilir. Diyabetin dünya çapındaki prevalansı, onu ciddi bir ekonomik ve halk sağlığı sorunu haline getirdi çünkü hem buna sahip olan insan sayısı hem de buna yakalanan insan sayısı hızla artıyor. Sağlığı Geliştirme Davranışları Hastalar arasında fiziksel aktivite, sağlıklı beslenme, sağlık sorumluluğu, stres yönetimi, risk azaltma ve hayattan zevk almayı içeren sağlıkla ilgili deneyimler ve yaşam tarzı davranışlarıdır. Sağlığı Geliştirme Davranışlarının amacı, kişinin sağlığında ve davranışında olumlu değişiklikleri teşvik etmektir. Tip 2DM'li kişiler için sağlığın teşviki ve geliştirilmesi stratejileri, beslenme ve sağlık eğitimini, kendi kendini yönetmeyi, psikolojik desteği, düzenli egzersizi vurgulayanlar ve sağlık hizmeti sunucularını veya topluluk üyelerini daha fazla meslekler arası ve daha fazla teşvik etme çabasıyla hedef alan girişimler gibi birçok yaklaşımı. Yöntem: Bu araştırma, 15 Mart 2022 ile 30 Kasım 2022 tarihleri arasında Wasit Valiliği'ndeki birinci basamak sağlık kuruluşlarına başvuran (200) tip 2 diyabetli birey üzerinde yapılmıştır. Tanımlayıcı korelasyonel desen kullanılarak yapılmıştır. Çalışma araçları, katılımcıların sosyo-demografik formunu ve Tip 2 Diyabet ve Sağlığı Geliştirme Ölçeği'ni (T2DHPS) içerir. Sosyo-demografik bölüm, katılımcıların yaşını, cinsiyetini, Medeni Durumunu, eğitim durumunu, ailenin sosyoekonomik durumunu (çiftin eğitim durumu, hane mesleği, hane geliri ve İkametgâh), vücut kitle indeksini (VKİ), DM döneminin teşhisi, Aileyi içerir. tip II diyabet öyküsü, Sigara İçme Durumu, Tedavi tipi

ve komorbid durumlar. Tip 2 diyabetli hastalarda sağlıkla ilgili deneyimleri ve yaşam tarzı davranışlarını araştırmak için Tip 2 Diyabet ve Sağlığı Geliştirme Ölçeği (T2DHPS) kullanıldı. T2HPS, yaşam tarzıyla ilgili altı boyutu değerlendiren, 28 maddelik bir kişisel değerlendirme anketidir. Veri toplamak için görüşme tekniği ve anket kullanılmıştır. Ortalama veri toplama süresi 15 dakikadır. Verilerin analizinde Statistical Package for the Social Science (SPSS) for Windows sürüm 26 kullanıldı. Ek olarak, frekans, yüzde, ortalama ve standart sapma tanımlayıcı istatistiksel ölçümler uygulandı. Ek olarak, bağımsız örneklem t testi, tek yönlü varyans analizi ve doğrusal regresyon çıkarımsal istatistiksel ölçümler olarak kullanıldı. Bulgular: Tip 2 diyabetli bireylerin büyük çoğunluğu fazla kilolu, 54-64 yaş arası, kentsel alanlarda yaşıyor (örnek popülasyonun %42'si) ve ağırlıklı olarak erkek. Ailede tip II diyabet öyküsü ile ilgili olarak, yaklaşık (%62,0) evet dedi ve çalışmanın %46,5'i (5-10) yıl arasında acı çekiyor. Sigara içmeyle ilgili olarak, yaklaşık %42'si hiç sigara içmemiştir ve çalışmanın yaklaşık yarısı oral ajanlar tarafından DM ile ilgili ilaç almıştır, Komorbid durumlar %22'sinde Hipertansiyon olduğunu göstermiştir. Araştırmacı, çoğu katılımcının orta derecede sağlığı teşvik edici eylemlerde bulunduğunu buldu. Daha yüksek eğitim seviyeleri ve daha yüksek medyan aylık hane geliri de bu çalışmanın katılımcıları arasında daha sağlıklı yaşam tarzı seçimleri ile ilişkiliydi. Araştırmaya göre sağlığı geliştirici uygulamalar ile yaş, aile sosyoekonomik durumu, hastalık süresi ve vücut kitle indeksi arasında yüksek bir ilişki vardır. Sonuç: Hastaların sağlığı geliştirici davranışları ile ailenin sosyoekonomik durumu, hastalık süresi ve vücut kitle indeksi arasında istatistiksel olarak anlamlı bir ilişki vardı. Danışanların sağlığı geliştirme davranışları cinsiyetlerine, eğitim düzeylerine, medeni durumlarına, ikamet yerlerine, ailelerinde diyabet öyküsüne ve aldıkları ilaç türüne göre değişmektedir. Sağlığı geliştirici davranışların eksikliği, diyabet insidansında artışa yol açan nedenlerden biridir.

2023, 84 sayfa

Anahtar Kelimeler: Diabetes mellitus, Sağlığı geliştirme davranışları.

PREFACE AND ACKNOWLEDGEMENTS

I would like to express my sincere gratitude and thanks to Prof. Azize Serap TUNÇER for his guidance in this study.

I also express my sincere thanks and appreciation to my father, mother, wife and all my family and friends for their support and encouragement during the study.

Akeel Izwaid Zghair AL-OGAILI

Çankırı-2023

CONTENTS

INDEX OF ABBREVIATIONS AND SYMBOLS

n	Number
F	Frequency
%	Percentages
SD	Standard deviation
≤	Less-than or equal to
≥	Greater-than or equal to
Sig	Significance
P	Probability value
S	significant
H.S	high significant
N.S	non-significant

LIST OF ABBREVIATIONS

ADA	American Diabetes Association
B.C	before Christ
BMI	Body Mass Index
CBT	Cognitive Behavioral Therapy
CE	Century
CVDs	Cardiovascular Diseases
DM	Diabetes Mellitus
FPG	Fasting Plasma Glucose
HbA1c	Glycated Hemoglobin
IDF	International Diabetes Federation
IFG	Impaired Fasting Glucose
IGT	Impaired Glucose Tolerance
RPG	Random plasma glucose
IR	Insulin Resistance
LOC	Level Of Conscious
MENA	Middle East and North Africa
NCD	Noncommunicable Diseases
NIDDM	Non-Insulin-Dependent Diabetes
OGTT	Oral Glucose Tolerance Test
OR	Odds Ratio
PA	Physical Activity
SMBG	Self-Monitoring Their Blood Glucose
T2D	Type 2 Diabetes
T2DHPS	Type 2 Diabetes and Health Promotion Scale
T2DM	Type 2 Diabetes Mellitus
US	United States
WHO	World Health Organization

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1. INTRODUCTION

Type 2 Diabetes Mellitus is a metabolic condition that can be brought on by a variety of factors and circumstances. Humans are unable to adequately digest carbohydrates, lipids, or proteins. Elevated blood sugar levels can lead to heart and renal failure. Nearly 90% of diabetes mellitus are type 2 diabetes, which is characterized by low insulin production, insulin resistance (IR), and an inadequate compensatory insulin secretory response. At some point, the body will stop producing enough insulin to keep glucose levels within normal range, which will cause hyperglycemia. Many patients with T2DM are overweight or have a high body fat percentage, especially around the middle. Obesity, lifestyles, calorie-rich diets, and a maturing population are at the root of the type 2 diabetes pandemic (Galicia-Garcia *et al.* 2020).

Type 2 diabetes mellitus is a prominent global cause of death since it is chronic and can go undetected for years. Although type 2 diabetes is more prevalent, it is not the only type of the illness. Diabetes type 2 affects the vast majority of patients. Diabetes and other so-called "diseases of affluence," such as obesity and cardiovascular diseases (CVDs), pose a serious threat to human health in the twenty-first century (Rosiek *et al.* 2016). Adults are disproportionately affected by the kind of diabetes known as non-insulin dependent diabetic mellitus (NIDDM). Poor food habits and a lack of physical activity are leading to an increase in cases of type 2 diabetes (McMillan *et al.* 2017).

Diabetes affects the lives of 415 million people around the world, and it is estimated that another 193 million individuals have the disease but are unaware they have it. Complications of microvascular and macrovascular diabetes, which are caused by T2DM, are a major source of emotional and physical discomfort for patients as well as caregivers, and they place a significant strain on healthcare delivery systems. Even while more is being learned about the variables that put people at risk for T2D and there is more evidence that successful preventative programs exist, the incidence and prevalence of the illness are still on the rise all over the world. Early detection can reduce morbidity and mortality by preventing or delaying the onset of problems. This can be accomplished

through screening programs as well as the availability of medicines that are both safe and effective (Chatterjee *et al.* 2017).

IDF estimates that there will be 700 million people with diabetes worldwide by 2045. As of 2019, diabetes had already been responsible for the deaths of 4.2 million people aged 20-79 over the world. The worldwide cost to healthcare due to diabetes in 2019 is estimated to reach at least $720 billion. One-third of persons with diabetes have undiagnosed cases, which amounts to 232 million people around the world. Diabetes affects a disproportionately high number of adults between the ages of 40 and 59. Over 80% of people with T2D live in low- and middle-income countries, which poses extra therapeutic obstacles (Galicia-Garcia *et al.* 2020).

The worldwide prevalence of diabetes has made it a serious economic and public health concern because the number of people who have it and the number of people who get it are both rising quickly. Diabetes is no longer just a problem in rich, industrialized countries. It is becoming more common everywhere (Collaboration 2016).

The science of assisting people in making the connections between their main interests and their optimal health and supporting lifestyle modifications to get there are known as health-promoting behavior. When a person's physical, mental, emotional, social, spiritual, and intellectual health are all in good order, that person is said to be in optimal health (O'Donnell 2009).

When it comes to fixing public health problems, health promotion is more crucial than ever. Diabetes is one of the noncommunicable diseases (NCDs) that has contributed to a rise in global mortality and morbidity. Health promotion is gaining traction as a viable, low-cost option for reducing the prevalence of diabetes. At the individual and community levels, there are programs that help people change their lifestyles to control their weight and encourage physical activity through community involvement and the use of strategies that are appropriate for their culture (Kumar and Preetha 2012). Therefore, a person's healthy habits include everything they do or believe with the goal of boosting their health and decreasing their likelihood of getting sick. A healthy lifestyle is one in which an

individual takes responsibility for his or her health and organizes his or her daily activities in such a way that they engage in healthful behaviors consistent with his or her current health status (Şenol *et al.* 2014).

Health promotion strategies for people with T2DM may involve many number of approaches, such as those that emphasize nutrition and health education, self-management, psychological support, or initiatives that target healthcare providers or community members in an effort to foster greater interprofessional and intersectoral cooperation. health promotion strategies should prioritize patient autonomy as one of their primary focuses (Sørensen *et al.* 2015).

Both patients with diabetes and healthcare providers who practice evidence-based medicine should recognize the importance of focusing on behavior when managing the disease. Self-monitoring of blood sugar levels, eating well, getting regular exercise, taking prescribed medications, and making regular trips to the doctor for checkups (including those of the eyes and feet) are all important habits to adopt when living with diabetes (McSharry *et al.* 2020).

In order to reduce costs associated with treatment and care, it is crucial to employ efficient methods of prevention. However, diabetes can be reversed via careful self-care. When you take care of yourself, you reduce your risk of developing diabetes's short- and long-term consequences, which in turn improves your quality of life. Patients who choose for self-care are responsible for managing their condition (Laxy *et al.* 2014).

Also, Self-care is required for the regulation of blood sugar, cholesterol, and blood pressure. Several studies have found that self-care strategies improve not only patients' health and happiness but also reduce healthcare expenses, symptom control, and survival rates (Vazini and Barati 2014).

Gerontological nurses assume a variety of roles in their activities with elderly diabetics to enable them to adapt with diabetes and live without complication, most of which fall under the categories. Caregiver uses gerontological theory in the application of the

nursing process to the care of elderly diabetics and promotion of highest degree independence and of self-care in elderly (Kalangadan *et al.* 2020).

Patients suffering from diabetes who receive nursing interventions may experience better outcomes and have an easier time managing their illness. Persons who have diabetes are cared for by nurses in a manner that takes into account the patient's complete biopsychosocial and bioenvironmental setting. This is called person-centered care (Hunt 2013).

1.1 Importance of study

T2DM is widely recognized as a major social and economic burden. Rising urbanization and rapid economic development are contributing to diabetes' global epidemic proportions. A person's productivity in the workplace and overall quality of life can suffer from diabetes, which increases the risk of developing major complications and dying prematurely. More than a third of diabetes-related deaths involve adults younger than 60, and this fact has recently sparked concern. These shifts have been associated with increase in the prevalence of insufficient dietary intake and insufficient physical activity, both of these factors contribute to the increased of fasting plasma glucose and overweight As BMI rises, so the incidence of T2D. Also concerning is the fact that diabetes is increasingly prevalent in an aging population. The expense of diabetes care exceeds the average per capita healthcare spending by at least 3.2 times (Khan *et al.* 2020).

More than 330 million individuals, or around 6.5% of the global population, will have diabetes by 2025, More than 600 million by the year 2035 (Rosiek *et al.* 2016). About 9.4 percent or 33 million people, were estimated to have diabetes in US in 2015. It was estimated that 415 million adults all around the world were diabetic that same year. By the year 2040, this number is anticipated to reach 642 million (Xu *et al.* 2018).

Having diabetes is a major contributor to mortality rates nowadays. There are a variety of issues that could arise from this that could put life in jeopardy. About 10% of European

males and 9.6% of European women over the age of 25 have diabetes. According to WHO, there are currently 347 million people with diabetes globally, and this figure is anticipated to double between 2005 and 2030 (Fadhil and Wang 2019).

Increases the prevalence of T2DM have been observed in several regions. It affects about one in four adults over the age of 65 in the US and about one in four in Korea. According to a second estimate, the number of diabetics would triple by 2030 (M. M. Putra *et al.* 2019).

T2D is also widely incidence in the Arab area. MENF has the second fastest projected growth rate of any region in the globe for the prevalence of diabetes, at 96.2%. The enormous expense of caring for diabetes, including complications, incapacity, and lost work time, is a major concern for Arab governments (Abuyassin and Laher 2016).

Prevalence of diabetes in Iraq has skyrocketed over the past 40 years, with 20% of the population now affected. Diabetes consider a killer in many countries, also ranks high on in Iraq. Hyperglycemia, if left untreated, can cause serious health issues like heart disease and kidney failure (Mikhael *et al.* 2019).

T2DM was diagnosed in about two million Iraqis in 2007, or 7.43% of the nation's entire population, making it a national epidemic. Over time, those living with any kind of diabetes are at a great risk for developing complications. It is possible for the emergence of these symptoms to be delayed by ten to twenty years, or they may present themselves for the first time in the absence of a prior diagnosis (Ali *et al.* 2019).

The number of people with diabetes rose from 108 million in 1980 to 422 million in 2014. Prevalence has been rising more rapidly in low- and middle-income countries than in high-income countries. Diabetes is a major cause of blindness, kidney failure, heart attacks, stroke and lower limb amputation. Between 2000 and 2019, there was a 3% increase in diabetes mortality rates by age. In 2019, diabetes and kidney disease due to diabetes caused an estimated 2 million deaths. A healthy diet, regular physical activity,

maintaining a normal body weight and avoiding tobacco use are ways to prevent or delay the onset of type 2 diabetes. Diabetes can be treated and its consequences avoided or delayed with diet, physical activity, medication and regular screening and treatment for complications (WHO 2022).

Although they contribute significantly to world mortality, illness and infirmity are largely preventable. People who are overweight and don't exercise frequently are far more likely to develop T2D and associated complications. In randomized studies, those with impaired glucose tolerance who changed their lifestyle had a lower risk of acquiring T2D. For people with type 2 diabetes, the benefits of lifestyle therapy included weight loss, better glucose control (Linmans *et al.* 2011).

It is possible to lower HbA1c levels and make it easier to maintain appropriate glucose levels by making adjustments to one's way of life. Those who embraced a healthier way of life were shown to have fewer health issues than a control group that made no adjustments to their way of lif (Kirkman *et al.* 2012).

1.2 Statement of the problem

Assessment of T2DM Clients' Health Promotional Behaviors in the Wasit Governorate.

1.3 Objectives of the study

1. To identify the association between clients age, family socioeconomic status, duration of illness, body mass index, and their health promoting behaviors.

2. Investigate the differences in clients health promoting behaviors between the groups of gender, level of education, marital status, residency, family history of diabetes mellitus, and type of medication received.

1.4 Hypothesis

There are relationship between health promotion behaviors of T2D patients in Wasit Governorate and their demographic characteristics.

1.5 Limitations

- The difficulty of obtaining a sufficient number of people who meet the demographic criteria of the thesis in order to obtain information from them.
- Difficulty persuading some clients, especially the elderly, to conduct a sample and take information related to the thesis.
- Difficulty in navigating to collect information from customers in light of the spread of COVID-19.

1.6 Definition of terms

Diabetes is a chronic disease that occurs either when the pancreas does not produce enough insulin or when the body cannot effectively use the insulin it produces.

Health-promoting behaviors They are health related experiences and lifestyle behaviors among patients that include physical activity, healthy diet, health responsibility, stress management, risk reduction, and enjoyment of life.

Client a customer or someone who receives services

Type 2 diabetes mellitus is a metabolic condition that can be brought on by a variety of factors and circumstances. Humans are unable to adequately digest carbohydrates, lipids, or proteins. Elevated blood sugar levels can lead to heart and renal failure.

2. GENERAL INFORMATION

2.1 The history of diabetes mellitus

In egypt texts dating back to 1500 B.C., a sickness characterized by "excessive urination" is first mentioned. It was called madhumeha ('honey urine') by Indian physicians because it attracted ants. In 230 BC, The word was originally used by a Greek Apollonius of Memphis"diabetes" to describe the disease. Galen, a famous Roman physician, said he had only seen two cases of the sickness in his whole career. This could be because the clinical signs were seen at a late stage of the disease in the ancients' diet or because of the lifestyle of the ancients. A mixture of seeds (lupin, fenugreek, zedoary) was formulated by the great Persian physician Avicenna and used to treat aberrant appetite and diabetic gangrene, all of which were mentioned in his medical treatise The Canon of Medicine (Lakhtakia 2013). John Rollo, a British surgeon, came up with the term mellitus in 1798 (Paramaribo 2013).

Paul Langerhans discovered and identified cells known as the "islets of Langerhans" in 1869. The dogs were employed by von Mering and Minkowski in their experiment to determine that removing the pancreas causes diabetes. In 1980, Graham Bell developed the first insulin that could be given to individuals. The discovery of insulin in 1982 marked the beginning of insulin production in the laboratory (Lakhtakia 2013).

2.2 Global burden of diabetes

Clinically and publicly, diabetes is becoming increasingly problematic. By 2040, there will be (642) million people with diabetes, according to IDF. In 2015, there were predicted to be (415) million people. People's financial condition has also been severely affected by diabetes. According to IDF in 2015, Most nations spent 5–20% of health care on diabetes. Estimates suggested that diabetes and its consequences would cost the global economy $673 billion in 2015.they anticipate a growth of $802 billion by 2040. People need to make adjustments to their lifestyles in order to rid themselves of the conditions

that contribute to obesity and diabetes. Diabetes can also be managed with medication. Treatments for preventing type 2 diabetes, treating people who already have it, and dealing with its long-term repercussions and other diseases should have their costs and benefits compared on a global, national, and local scale (Herman 2017).

Worldwide, diabetes is the leading cause of early death, high healthcare costs, disability, and economic hardship. Spending on diabetes management, prevention, and treatment is expected to reach more than 302 billion dollars by 2025. In 2007, around 232 billion US dollars were spent on diabetes and its consequences worldwide. The vast majority of diabetics, who are mostly found in developing and middle-income nations, have very little access to this funding (Susan van *et al.* 2010).

2.3 Overview of type 2 diabetes mellitus

The prevalence of the chronic metabolic condition known as T2DM is rising in every region of the world. This pattern is one of the factors that is leading to its quick spread in a variety of countries. Over the course of the following ten years, it is anticipated that the number of persons living with this condition would multiply by two due to the rise in the average age of the global population. This will place an even greater strain on healthcare infrastructure, particularly in less developed countries (Olokoba *et al.* 2012).

Short-term and long-term complications become increasingly among those with T2DM, and these complications often prove fatal. T2DM is more prevalent, progresses more slowly, and is diagnosed later in life, increasing the risk of serious illness and death for patients with the condition. This is especially true in resource-poor regions like Africa, where development is lagging behind (Azevedo and Alla 2008).

The hallmark of the group of metabolic illnesses known as diabetes mellitus is hyperglycemia, which is caused by inadequate insulin secretion, action, or both. A variety of organs have been associated to long-term injury, malfunction, and failure when blood sugar levels are consistently high (American Diabetes Association 2013).

Type 1, also known as insulin-dependent diabetes, is somewhat common, but type 2 diabetes, also known as non-insulin-dependent diabetes, is far more common. Type 1 diabetes develops when the body's immune system mistakenly attacks and destroys beta cells in the pancreatic islets. Insulin resistance and a decrease in the body's ability to produce insulin are two factors that development of type 2 diabetes (Karamanou *et al.* 2016).

Numerous health issues, such as hypertension, cardiovascular disease, renal disease, eye disease, and nerve damage are brought on by diabetes. There is a correlation between inadequate management of one's well-being and inadequate management of one's blood pressure, blood sugar, and cholesterol levels (Chew *et al.* 2018).

Control blood sugar is an essential component for the purpose of minimizing the risk of developing microvascular problems. Because it takes some time for lowering glycemia to make a difference in these conditions, researchers need to keep looking for medications that not only help manage glycemia but also limit the impact on the body's blood vessels (Dandona and Chaudhuri 2017).

Male sex may play a role in the recent rise in type 2 diabetes prevalence, according to a growing body of studies. Why men are more likely to contract this illness than women remains a mystery. It's possible that the rising rate of obesity as a whole plays a role. although men with a similar body mass index appear to be at a higher risk of developing T2D. Due to BMI's impreciseness as a measure of fatness, it may be responsible for some of these discrepancies (Nordström* *et al.* 2016).

Type 2 diabetes is caused by diminished pancreatic insulin secretion and insulin sensitivity. Insulin resistance increases the quantity of glucose generated by the liver while limiting the quantity that may enter muscle cells (Al-Goblan *et al.* 2014).

2.4 Prevalence of diabetes

People with T2DM are expected to rise in number. Diabetes mellitus affects an estimated 11.3% of adults in the US who are at least 20 years old (DM). About one-third of all adults (20+) have prediabetes, according to estimates. Minority groups are disproportionately affected by T2DM, and for a variety of reasons, they are less able to maintain their blood sugar levels and more prone to acquire diabetic complications. Minority communities are also more likely to suffer from diabetes-related problems. One's likelihood of having type 2 diabetes, which requires treatment by a medical professional, can be raised by a number of different variables. Acculturation, health perspectives, dietary choices, fears, the use of complementary and alternative medicine, socioeconomic position, religious beliefs, health literacy, and the cultural competence of the medical practitioner are all extremely important factors to take into account. Greater attention paid in diabetes clinics to issues of ethnicity and cultural sensitivity is likely to reduce the number of complications that occur in patient populations who are underrepresented in the disease's patient population (Caballero 2007).

Concerningly, this growth is particularly apparent in younger age groups, with type 2 diabetes being diagnosed at alarming rates among children, teenagers, and young adults. The number of cases of diabetes has more than doubled in the previous 20 years. Although classic risk factors including genetics, lifestyle, and behavior have already been studied, recent studies have concentrated on epigenetic mechanisms and the environment in the womb in an effort to better identify the origins of type 2 diabetes. According to epidemiological studies, the costs of caring for people with diabetes are increasing and will soon become unaffordable. Given this, disease prevention has to receive a lot of attention. A comprehensive approach that addresses all of type 2 diabetes' contributing variables is necessary for reversal (Zimmet *et al.* 2014)

A astounding 537 million person around the world are afflicted with diabetes. When the results of the National Health Interview Survey were analyzed, it was discovered that 8.5% of the population had been identified as having type 2 diabetes (2016 and 2017). 11.3 percent of American adults will have diabetes by the year 2022, according to the

Diabetes Surveillance System of the CDC (that's 37.3 million people: 28.7 million with diabetes, 8.5 million with undiagnosed diabetes, and 95% with type 2 diabetes) (Robertson 2021).

Among people aged 20-79, there are 206 million people in the Western Pacific who are diabetic, making it the region with the highest prevalence of the in the world. (Figure 1).

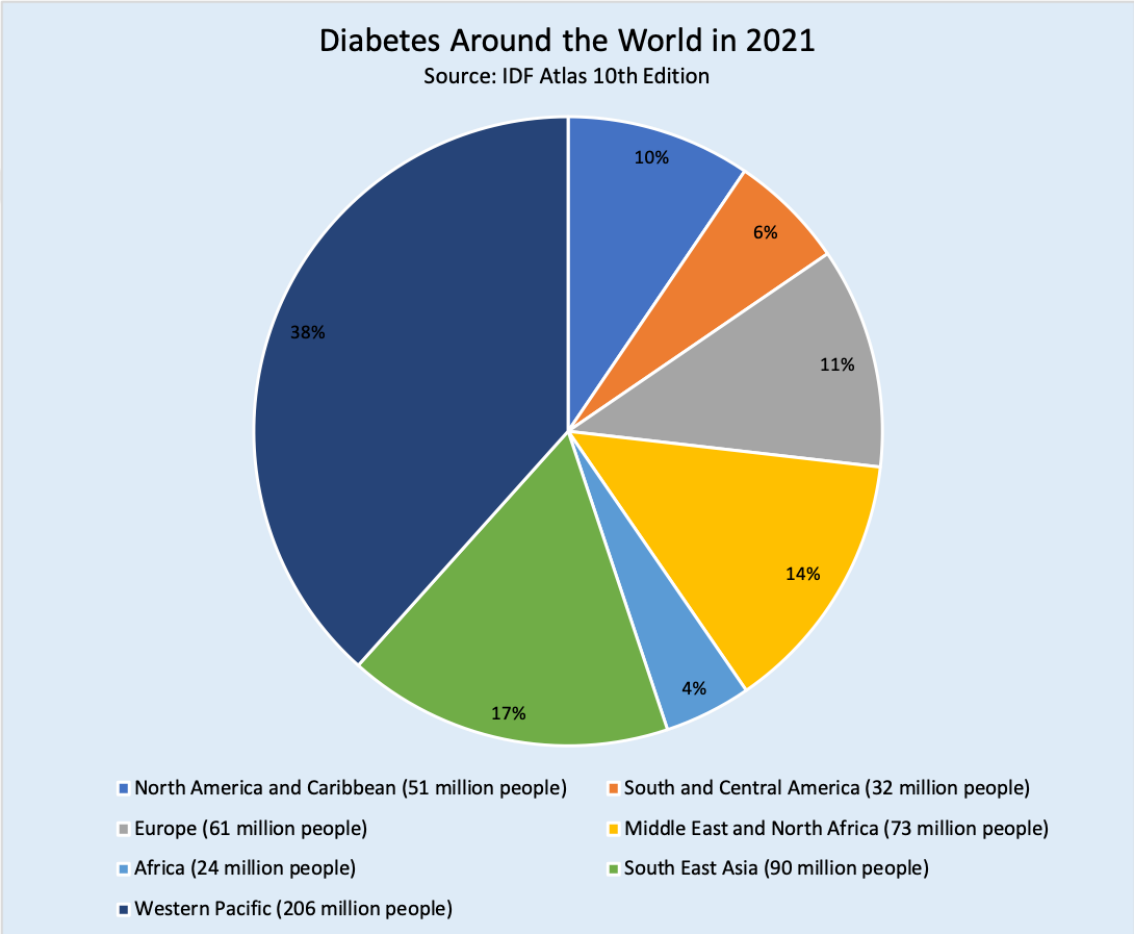

Figure 2.1 Number of diabetics worldwide in 2021, by region (in millions)

2.5 Epidemiology of diabetes

Diabetes affected 425 million people in 2017, and 629 million by 2045. Poor diets and inactivity are to fault. One socioeconomic factor is worldwide dietary changes (the so-called “nutrition transition”). Type 1 and type 2 diabetes are the most frequent diseases.

85% of diabetics have type 2. Diabetic problems affect many body systems. This includes ischemic heart disease, stroke, peripheral vascular disease, and microvascular illnesses such retinopathy, nephropathy, and neuropathy. Type 1 diabetes is uncaused. Since type 2 diabetes involves modifiable risk factors, reducing its prevalence has become a public health priority (Forouhi and Wareham 2019).

For every 100,000 people in 2017, there were 6,059 new cases of type 2 diabetes. 62.8 percent of the world's population, or 462 million individuals, were impacted. One million people die each year from complications related to diabetes, which is the ninth leading cause of death worldwide. T2D is becoming more prevalent worldwide and is on the rise in Western Europe and other developed regions. Beyond the age of 55, the risk increases and is essentially the same for both sexes. By 2030, it is expected that there will be 7.079 new cases of T2D for every 100,000 people. This illustrates a general upward trend. Alarming patterns are becoming more prevalent in low-income countries. Preventive clinical and public health initiatives must be implemented quickly (Khan *et al.* 2020)

In the past three decades, the death toll from this kind of diabetes has quadrupled, making it the ninth greatest cause of death in thr worled. One in eleven people today have type 2 diabetes, yet it affects 90% of the worlds population. The global epidemic of Type 2 Diabetes is being fueled by rapid growth in China and India (Zheng *et al.* 2018).

The incidence of diseases affecting the endocrine system places diabetes mellitus the top of the list. Roughly six percent of the global population has it. By the year 2025, 300 million people will have developed diabetes, almost 97% of these individuals will have T2DM. There are environmental and genetic factors that can contribute to developing diabetes. Environmental factors contribute to the emergence of diabetes mellitus through inactivity, drug or substance abuse, excess body weight and geographical location. Type II diabetes is very common today The largest rates of Type II diabetes were found in Africa (17.9 percent), Asia (14.6 percent), Europe (11.2 percent), the Middle East (40 percent), North America (28.2 percent), and South America (17.4 percent) *(*Adeghate *et al.* 2006).

With 9.2 percent, the MENA region according to IDF has the second-highest prevalence of diabetes. According to projections, there will be 629 million people living with diabetes in the MENA region by 2045, up from 236 million in 2017. Diabetes can, in the worst situations, be lethal. In 2017, the death rate was 10.7% higher for adults with diabetes (between ages 20 and 79). Diabetes is the top cause of death for those under 60 in the MENA area, which includes Iraq. The IDF raised the area to its second-highest rank as a result. In Iraq, there are about 1.4 million persons who have diabetes. According to the IDF, type 2 diabetes affects between 8.5% and 13.9% of the population in Iraq. According to the results of a survey that included almost 5400 participants, 19.7% of participants has diabetus in Basra, which is located in southern Iraq (Abusaib *et al.* 2020).

2.6 Causes and risk factor

There is widespread consensus that we can make educated guesses about what raises one's risk for developing type 2 diabetes. Although genetics have a significant influence, age, obesity, inactivity, Smoking, and sedentary lifestyle account for the great majority of cases. but weight gain is by far the most significant risk factor (Roglic 2016).

2.6.1 Unhealthy diet

Nutritional status plays a role in the development of type 2 diabetes. High lipids and carbs were discovered to have a major impact on diabetes risk. Diabetes risk is reduced with diets high in cereal fiber and polyunsaturated fat. Every additional two daily servings of whole grains decreased the risk of diabetes by 21%(Hu 2011).

Diabetes can be traced back to its primary cause, which is unhealthy eating (poor in fiber, fruits, and vegetables, heavy in salt, sugar, and fat). People may reduce their risk of acquiring noncommunicable diseases like diabetes by leading a healthy lifestyle that includes frequent physical activity, moderate alcohol use, quitting smoking, and a healthy diet (Caperon *et al.* 2019).

There is a correlation between eating late at night, particularly late-night snacks, and weight gain. This is likely due to the fact that the body's metabolism slows during sleep, resulting in less fat being burned. Those who followed this diet had a larger post-meal increase as well as a higher 24-hour mean glucose level than those who did not (Gouda *et al.* 2018).

2.6.2 Physical inactivity

Inactivity have altered body composition, which has led to a shift in the ratio of insulin receptors in muscle cells to those in fat cells. Adipocytes are less responsive to insulin's effects on their receptors, resulting in lower glucose absorption, than are myocytes. As a result, every given glucose load in individuals with an abnormal muscle/fat composition necessitates greater-than-normal pancreatic insulin secretion for appropriate disposal. As insulin-sensitive tissues become desensitized, hyperinsulinemia takes over as the primary cause of type 2 diabetes (T2DM) (Eaton and Eaton 2017).

Diabetes risk increases with decreased physical activity, but the opposite is true for increased physical activity, according to epidemiological studies. Every additional two hours per day of television consumption was related with a 14% increased risk of developing diabetes. The risk of developing the disease dropped by 12% for every additional two hours spent standing or moving around in the home. The risk was reduced by 34% for every additional hour of vigorous walking per day. These findings provide further evidence linking physical activity to an increased risk of developing DM (Hu 2011).

The association between lifestyle and type 2 diabetes has been extensively investigated. Inactivity raises the danger of acquiring type 2 diabetes and makes the disease harder to control. Regular exercise has been found to minimize the chance of acquiring type 2 diabetes (T2DM) and enhance the effectiveness of anti-diabetic drug therapy, both of which eventually result in better control of blood sugar levels (Anjana and Mohan 2016).

2.6.3 Smoking

Smoking was causes to 5.4% of T2 D diagnoses in women and 18.8% of cases in men. A person's risk of developing type 2 diabetes (T2DM) is higher after quitting smoking for five years than it is in the ten years that follow. The chance of getting type 2 diabetes is lower than it is for those who have never smoked (Aeschbacher *et al.* 2014).

Cigarette smoking not only raises the likelihood of getting diabetes but also exacerbates both the microvascular and macrovascular aspects of the condition. It is unknown what effects smoking has on diabetes despite the fact that it is linked to insulin resistance, inflammation, and dyslipidemia. Quitting smoking is one of the most beneficial things a person with diabetes can do to improve their health and lower their chance of developing complications (Chang 2012).

2.6.4 Obesity

Both obesity and diabetes have developed into global epidemics, and the consequences of both are extremely serious. According to the findings of epidemiological research, both obesity and diabetes are on the rise. The fact that they both have the same term, "diabesity," gives the impression that they are similar forms of metabolic disease. This is not a coincidence. Both diabetes and obesity can be traced back to the same underlying problem: the body's inability to make effective use of insulin. Insulin resistance and insulin deficiency are two symptoms that are shared by both obesity and diabetes as a single pathophysiological process (Verma and Hussain 2017).

The World Health Organization reports that despite its global prevalence, obesity-related public health care is often overlooked (WHO). There is strong evidence linking obesity to numerous chronic conditions, including T2DM, high blood pressure, dyslipidemia, cardiovascular disease (CVD), and even some forms of cancer. Obesity greatly exacerbates the already serious issue of type 2 diabetes, which affects roughly 88% of all adults who are overweight (Vasanthakumar and Kambar 2020).

Obesity is a most risk factor for both type 2 diabetes and insulin resistance, so knowing how the two are related is crucial. Obesity is a common challenge for those who have type 2 diabetes. Patients who are obese have muscle and fat cells that are placed closer to the body's periphery that are less sensitive to the hormone insulin (insulin resistance). Patients who are obese and have diabetes frequently experience an improvement in their condition if they begin a weight loss program. Being overweight it increases the likelihood of having a shorter life expectancy (Parmar 2018).

It is believed that the chance of acquiring diabetes increases by around 9 percent for every kilogram that is added in body weight. More than 80% of diabetics are overweight, with obesity affecting more than 64% of men and 74% of women with the condition. It's possible that beta cells and insulin won't work as well when someone is obese (Raman 2016).

2.6.5 Stress

Both diabetes and stress can be linked to their respective causes and effects at some point in their histories. As a result, diabetes might be seen not just as a consequence of stress but also as a potential cause of it. Similar to how stress can cause an increase in blood sugar and glycated hemoglobin levels (HbA1c), type 2 diabetes can cause an increase in stress levels, which can then lead to additional physical, behavioral, and emotional problems (Zamani-Alavijeh *et al.* 2018).

Stress not only has the ability to cause or exacerbate diabetes, but it also has a detrimental impact on treatment outcomes by reducing adherence to diabetic medication, which in turn leads to poorer health outcomes. Therefore, medical professionals who treat type 2 diabetes require knowledge regarding the connection between stress and the condition (Vasanth *et al.* 2017).

Diabetes patients have a higher levels of psychosocial stress and have more difficult time keeping their blood sugar levels constant. In addition, there is strong evidence that links

psychological stress factors with diabetes-related symptoms and conditions, including hyperinsulinemia, hyperglycemia, dyslipidemia, hypertension, and increased belly fat (Adeniyi *et al.* 2015).

There is mounting evidence linking stress to an increased risk of T2D, especially in women. There is evidence to suggest that stress can both directly and indirectly affect a person's susceptibility to sickness in either a positive or negative manner. A stressful event might lead to the development of unhealthy habits in certain people. Examples of such behaviors include disregarding one's own physical health and, in extreme circumstances, turning to disordered eating as a means of "self-medicating" one's mental pain through one's own actions (Falco *et al.* 2015).

Depression may make people less conscious of their own vulnerability to the risk factors for acquiring type 2 diabetes, which may raise their likelihood of having the condition. A recent meta-analysis studying the association between the two disorders reveals that both may have common origins in biochemical abnormalities within the hormone system as well as the emotional toll of living with a chronic condition. Another study found that type 2 diabetic individuals were more likely to experience depression symptoms overall (19.1% compared to 10% of the general population) (Alonso-Morán *et al.* 2014).

2.6.6 Environmental factors

The etiopathogenesis of DM is a difficult process, however factors related to the environment do play a part in it. This category includes having poor diet, experiencing high levels of stress, not getting enough exercise, breathing in contaminated air, water, or soil, and having a compromised immune system (Raman 2016).

There is a direct correlation between environmental impacts on healthcare expenditures and mortality rates. People who suffer from diabetes are more susceptible to the adverse effects that pollution can have on their health in the long run than those who do not have the disease. There is a correlation between high levels of air pollution and an increase in

the risk of death or hospitalization for people with diabetes who already have cardiovascular disease (K Papazafiropoulou *et al.* 2011).

Studies conducted in recent years link type 2 diabetes to pollution as an environmental factor. Exposure to organic land pollutants, such as pesticides and herbicides, over a long period of time is associated with altered glucose utilization and, ultimately, insulin resistance, as shown by epidemiological studies. Individuals with pesticide levels in the highest percentile compared to those with undetectable levels had an odds ratio (OR) of 11.5, indicating a substantial and dose-dependent link between serum concentrations of organic pesticides and the risk of diabetes (Murea *et al.* 2012).

2.6.7 Genetic susceptibility

Family and genetic studies have shown that T2D has a strong inherited component. The lifetime risk of type 2 diabetes in children with one affected parent is 40%, and in those with both parents affected, it rises to about 70%. Heritability, as defined by twin studies, is the proportion of a trait's variance that can be attributed to additive genetic variables. Heritability estimates for type 2 diabetes from twin studies range from 30 to 70 percent, while estimates for low glucose tolerance are approximately 60 percent. (IGT). Quantitative variables crucial to glucose homeostasis, such as insulin secretion in vivo, peripheral insulin sensitivity, and glucose metabolism, are estimated to have a heritability of between 50% and 85% (Abdullah *et al.* 2014).

2.7 Diagnosis

The levels of glucose and HbA1c in the blood should only be measured using methods that have been approved and quality-controlled in the laboratory. The measurement of glucose levels in the venous plasma of a person is currently regarded as the diagnostic gold standard for diabetes. The results will be unreliable if glycolysis continues after a blood sample has been drawn from a patient. There are essentially two different paths that can be taken here. Either the blood tube needs to be treated with the appropriate chemicals

to inhibit additional glycolysis, or it needs to be placed on ice and spun for thirty minutes. The glucose concentration in the plasma drawn from the veins should be at the amount recommended by the doctors.

- HbA1c $\geq$ 6.5%
- RPG $\geq$ 200 mg/dl
- FPG $\geq$ 126 mg/dl
- OGTT 2-hour glucose in venous plasma $\geq$2 00 mg/dl

HbA1c has been recommended for use in diagnosing diabetes by guidelines since 2010. This was made possible through the harmonization of measurement procedures in different countries all over the world. A HbA1c of 5.7% can be used to rule out diabetes; however, recent epidemiological studies have shown that a HbA1c of 6.5% can be as determining whether or not someone has diabetes. if the patient's HbA1c level is between (5.7% - 6.4%) It is considered prediabetes patient's (Kerner and Brückel 2014).

2.8 Health promotion behaviors for type 2 diabetes mellitus

Self-management of diabetes is becoming an increasingly important part of treatment as patients and their families in diabetes care. The goal of self-management is to promote positive changes in one's health and behavior. Self-management tactics include things like meal planning, regular exercise, taking prescribed medications, monitoring blood sugar levels, dealing with illness symptoms, and handling blood sugar extremes. Self-management treatment plans are created following in-depth discussions with many healthcare providers, such as physicians, nurses, dietitians, and pharmacists (Powers *et al.* 2015).

If diabetics are able to keep a close eye on their glucose levels, they can significantly lower the risk that they will experience complications from their condition. On the other hand, self-managing diabetes and keeping glucose control under tight rein is difficult, and noncompliance with treatment plans can make problems worse. According to the most findings of studies, a significant number of diabetes patients do not engage in adequate

self-care. Complications might emerge for diabetics if they do not take proper care of themselves (Carpenter *et al.* 2019).

It appears that making some changes to one's lifestyle is required for diabetes management. It is generally agreed upon that this is an important step to take in order to reduce one's risk of developing diseases such as diabetes. According to meta-analyses, those who were at a high risk for acquiring diabetes but who made improvements to their lifestyle (such as their eating and exercise routines), had a 63% lower likelihood of developing diabetes. Even while there is evidence to suggest that programs that encourage behavioral change can reduce diabetes risk factors, the influence that these programs have on the prevalence of the illness is yet unknown (Piero *et al.* 2015).

90 percent cases of T2DM can be avoided if people made better decisions regarding their lifestyles, such as partaking in consistent physical activity, consuming a diet that is balanced, and losing a few pounds of weight. It has been shown that pre-diabetics who make changes to their lifestyle that are healthier are more successful in preventing diabetes than those who use medication (Adeleke and Ayenigbara 2019).

2.8.1 A healthy diet

It is essential to encourage people to adopt eating patterns that are healthy and low in calories if we want to lower the risk that people will develop T2DM. there is evidence from a number of studies that some foods, such as whole grains, nuts, berries, yogurt, coffee, and tea, they reduce the risk of diabetes and some foods make the condition more likely (red meats and sugar-sweetened beverages) (Siegel *et al.* 2018).

The American Diabetes Association recently published updated guidelines for what constitutes a healthy diet. According to the suggestions, all diabetics should adhere to a diet that takes into consideration their unique preferences, cultural histories, religious principles, dietary practices, and metabolic goals. This diet should be individualized. Small portions of different types of nutrient-dense meals are an essential part of this

strategy. A variety of diets, including the Mediterranean diet, vegetarian diets, and low-carbohydrate diets are discussed in the new section. When formulating a meal strategy for a diabetic patient, it is important to take the patient's individual metabolic goals into account. These goals may include glucose, cholesterol, and blood pressure levels (Coughlin *et al.* 2017).

The most crucial part of managing T2D is eating healthily consistently. Some of its numerous positive advantages include lowering sick symptoms and restoring normal blood sugar levels. Recent research has shown how crucial it is to provide individuals with diabetes with dietary guidance that places an emphasis on maintaining stable blood sugar levels (Mohamed 2014).

In many ways, our level of health and contentment are directly related to the quality of the food we eat. In both the industrialized and the developing world, many people's diets consist largely of "unhealthy" foods, and many others don't get the activity they need. The chance of developing T2D has been shown to decrease when one consumes a diet rich in fruits, vegetables, and seafood while cutting less on red meat (Kałucka *et al.* 2019).

2.8.2 Physical activity

Reducing one's level of physical activity (PA) has been linked in multiple studies to an increased chance of acquiring diabetes . The benefits of physical activity (PA) WAS health maintenance, avoiding or delaying T2DM, maintaining healthy blood sugar levels, and reducing mortality risk. In order to effectively manage many other types of chronic diseases, including type 2 diabetes, it is crucial to maintain a healthy level of physical activity (Abramczyk 2018).

It is possible to exaggerate the value of exercise in preventing and controlling type 2 diabetes. According to researchs, weight loss and regular exercise are good for people of all ages. The World Health Organization advises healthy people get at least 75 minutes of moderate aerobic activity per week, or 150 minutes of vigorous aerobic activity per

week. The risk of developing type 2 diabetes is lowered by engaging in regular physical activity (Klimek *et al.* 2019).

2.8.3 Smoking cessation

By giving up smoking, a person might lessen the likelihood that they will develop T2D in the future. Quitting smoking is emphasized as a crucial step for diabetics in the clinical guidelines developed by a number of organizations for the management of diabetes (Cho *et al.* 2018).

Smoking cessation is the most factor in reducing the risk of diabetes-related heart disease, as stated in the recommendations of the Korean Diabetes Association. Studies by other researchers have shown that smoking has harmful effects on people with diabetes in other ways as well, in addition to increasing the risk of developing the macrovascular complications of diabetes (Chang 2012).

2.8.4 A healthy weight

Obesity can't be beaten with a change in diet and an increase in physical activity alone. Changing caloric intake and exercise frequency and intensity will have the most impact on energy levels. The effective strategy for weight loss is to take a more diverse and all-encompassing approach to healthy eating (such as increasing the amount of fruits and vegetables consumed in one's diet) and physical activity (such as spending less time sitting). Research into the types of diets that help people achieve and maintain a healthy weight is crucial since being overweight increases a person's risk of developing serious diseases like diabetes, cardiovascular disease, and cancer (Heerman *et al.* 2017).

Important changes in lifestyle, including improved nutrition and increased physical activity (PA), are required for the successful treatment of diabetes. The American Dietetic Association (ADA) offers dietary guidance for a variety of nutrients, each of which is addressed in a separate set of guidelines. Losing weight is the primary focus of this

program. People who T2D and they are overweight or obese should, according to recommendations made by the American Diabetes Association, consume 500 to 1000 less calories per day than they would need to in order to keep their weight stable (Oster 2018).

2.8.5 Stress management

Shown that stress management training made diabetics feel better emotionally and physically while making it easier for them to maintain healthy blood sugar levels. Diabetics can prevent foot ulcers, blindness, and other consequences by keeping their blood sugar levels under control (Hamid 2011).

According to studies in social psychology, having good friends and family around you might encourage you to make positive choices. People with chronic illnesses benefit greatly from having strong social networks, since it has been demonstrated to lessen their levels of stress and sadness (Gao *et al.* 2013).

According to the findings of a number of studies, those who suffer from type 2 diabetes may benefit from taking steps to reduce their levels of stress. All of the evidence that we have collected up to this point points to the fact that biofeedback, meditation, and cognitive behavioral therapy (CBT) are helpful strategies for stress management. Responses from individuals to increased glycemic control have been rather variable. There are some people who have not had a favorable experience with it (Koloverou *et al.* 2014).

2.8.6 Foot care

When diabetic foot problems are addressed in an appropriate manner and on a consistent basis, the incidence of amputations drops. The American Diabetes Association (ADA) suggests that persons who have diabetes get checked once a year to see how well they understand their illness, how well they are able to manage it, and how well they are doing overall (Pourkazemi *et al.* 2020).

One study found that diabetic patients who were educated about how to properly care for their feet had a lower risk of getting foot ulcers and performed better in the long term. In addition to educating patients on how to properly care for their feet and encouraging them to do so on a consistent basis, it is essential to provide patients with a deeper understanding of the topic (Fatima *et al.* 2020).

Foot problems that related to Diabetes are more common in people of advanced age, which can lower one's quality of life. Health promoting behaviours such as inspecting your feet daily, getting expert care when it's necessary, keeping your feet clean, and wearing footwear that's appropriate for your feet will help reduce the number of times you experience foot diseases (Matricciani and Jones 2015).

2.8.7 Self-monitoring blood glucose

Indicators of glycemic control and health outcomes for diabetics have been shown to improve with self-monitoring of glucose levels. In this way, checking one's own blood glucose levels is an integral part of intense glycemic therapy for diabetics. People with T2D who use insulin or other medicines that may cause hypoglycemia need to monitor their blood sugar levels regularly. Also helpful for diabetics whose condition is controlled primarily through dietary modifications or medicines that do not drop blood sugar levels. If you have questions about how often you should check your blood sugar, consult a medical professional (Weinstock 2019).

Self-checking blood sugar levels is beneficial for diabetics because it helps them maintain healthy blood sugar levels, identify episodes of hypoglycemia or hyperglycemia, and assess how well their nutritional and exercise choices are serving them (SMBG) (Hortensius *et al.* 2012).

2.8.8 Adherence to medication

Compliance of patients with their prescribed drug regimens is one of the most important worldwide determinants that influences the outcomes of their health care while dealing with chronic illnesses like diabetes. It is possible that not taking diabetes medicine as advised will result in therapeutic failure, a low quality life, an increase in the expense of healthcare, and diabetes-related problems such as retinopathy, neuropathy, and nephropathy, amongst others. Finding and addressing the underlying causes of patients' noncompliance with drug regimens is essential for reducing noncompliance rates (Jackson *et al.* 2015).

Medication adherence is an important indicator of the success of healthcare interventions. Adherence is defined by the WHO as the degree to which a person follows the agreed-upon advice of a healthcare professional, such as the use of prescribed medication, the maintenance of a prescribed diet, and the adoption of recommended behavioral changes. However, there is a higher rate of noncompliance with diabetes medication regimens among patients with type 2 diabetes. This poses risks to their health and safety, causes more people to become ill or die, and forces the healthcare system to use more resources than necessary. A recent WHO study found that improving adherence will have a greater impact on global health than the creation of ground-breaking medical solutions. This is because non-adherence is such a pervasive problem with far-reaching consequences (Tiv *et al.* 2012).

2.9 Nursing care plans for diabetes mellitus

The primary focus of nursing care for people with diabetes should be on restoring normal blood sugar levels and decreasing the likelihood of complications. You can reach your goal by following some basic health and wellness guidelines, such as eating well, getting plenty of exercise, and taking any prescribed medications as directed. When educating patients, nurses should stress the significance of adhering to the prescribed course of action without deviation.

2.9.1 Nursing assessment and rationale

- 1. Check for hyperglycemia symptoms.

Lack of adequate insulin levels leads to hyperglycemia. High blood glucose levels trigger an osmotic reaction that makes you thirstier, hungrier, and more frequent with increase your urination. As well as these more specific symptoms, the patient may experience more general ones, such as fatigue or difficulty seeing.

- 2. Test blood sugar levels before meals and before going to bed.

The normal range for a random blood glucose test is between 140 and 180 mg/dL. Pre-meal levels should be kept below 140 mg/dL.

- 3. Track the patient's HbA1c-glycosylated hemoglobin levels.

The average of HbA1c from during the past 2-3 months ranging between 6.7–7.5% is considered optimal.

- 4. Maintaining a Daily Weighing.

To aid in determining if dietary consumption levels are sufficient.

- 5. Check for trembling, anxiousness, and speech slurring.

These are some of the symptoms of hypoglycemia.

- 6. Examine the temperature, pulses, color, and sensation in the patient's feet.

As a means of checking on peripheral nerves and perfusion pressure.

- 7. check urine albumin and serum creatinine for signs of renal failure.

When the creatinine level in the blood rises above 1.5 mg/dL, it indicates renal failure. The onset of diabetic nephropathy is first marked by microalbuminuria.

- 8. Assess physical activity.

As a result of exercise, blood glucose levels are lowered. Exercising frequently is an integral aspect of managing diabetes and lowering the risk of cardiovascular disease.

- 9. Watch out for symptoms of hypoglycemia.

People with type 2 diabetes who take insulin as part of their treatment plan are more likely to experience hypoglycemia. Hypoglycemia can manifest in a variety of ways. An increase in adrenergic activity and a decrease in glucose transport to the brain are both responsible for the symptoms of hypoglycemia. Symptoms may include a shift in LOC, increased heart rate, sweating, headaches, exhaustion, cold and clammy skin, hunger, tremors, and impaired vision.

- 10. Ask the patient about their current health beliefs in regards to the benefits of exercise, and discuss the recommended exercise routine with them.

Remind the patient that they need to maintain a regular exercise routine. If you have diabetes, you should only work out when your blood sugar is normal. In order to maximize the benefits of their fitness regimen, patients should ease into their routine gradually.

- 11. Evaluate the patient's ability to self-monitor blood glucose levels.
- 12.Determine the patient's grasp and knowledge of the specified diet.

Hyperglycemia or Hypoglycemia can occur when dietary recommendations are disregarded. It's best to tailor your diet to your specific needs (Vera 2022).

2.9.2 Nursing management

The most prevalent condition that poses a threat to a Diabetics life, hypoglycemia which requires immediate nursing management. Quite infrequently, hyperglycemia can progress into a state that is extremely severe. In order for nurses to be able to include blood glucose monitoring into the care plan for their patients, they need to be familiar with the clinical signs and symptoms that patients experience when their blood glucose levels change. When caring for a patient who has type 2 diabetes mellitus, nurses are required to keep an eye out for complications and educate the patient on their treatment plan. This includes educating the patient on what foods to consume, how often they should exercise, and what drugs they should take (Goyal *et al.* 2021).

2.10 Health teaching and health promotion

Educating the public about diabetes and how to reduce their risk of developing the disease and its consequences is crucial. Because of the impact of diet, exercise, and medication on glucose levels, nurses need to assess their patients' knowledge of diabetes management. The nurse should be on the lookout for potential issues during patient education, such as a lack of access to healthy food in the neighborhood, difficulty communicating, or a poor income. Patients with diabetes rely on their nurses not just for insulin injections but also for instruction in blood sugar monitoring. Nurses should encourage their diabetic patients to maintain accurate vaccination records because of the increased mortality risk from pneumonia and influenza. The patient should also be instructed to self-monitor their blood sugar, have their eyes checked on a regular basis, and check their feet frequently. To avoid difficulties, one of the best decisions you can make is to finally kick the nicotine habit (Goyal *et al.* 2021).

3. METHODOLOGY

3.1 Design of the study

A descriptive correlational design is used to guide this study in Wasit Governorate, southern to Iraq, from 15 March 2022 to 30 November 2022.

3.2 Setting of the study

The study was carried out at primary care centers in the southern Iraqi province of Wasit.

3.3 The sample of the study

200 sample of type 2 diabetes patients who visited Wasit Governorate primary care facilities were chosen as an appropriate non-probability sample.

Sampling criteria: The sample is assigned to the study according to the following criteria:

1. Patients with Type 2 Diabetes Mellitus for more than one year.
2. Male and female clients.
3. Clients who are mentally well.

Exclusion criteria: patients who do not agree to fill out the questionnaire and Clients who have a psychiatric disorder.

3.4 Tools of the study

The study tools include the participants' socio-demographic sheet and the Type 2 Diabetes and Health Promotion Scale (T2DHPS) (Appendix 1).

3.4.1 Socio-demographic data

The socio-demographic part includes participants' age, gender, marital status, educational qualification, family's socioeconomic status which encompasses (couple's educational qualification, household occupation, household income and residency), body mass index (BMI), diagnosis of DM period, family history of type II diabetes, smoking status, treatment type and comorbid conditions.

The health profile includes client's body mass index which is calculated by dividing the body weight (kilogram) by the height (meter) squared. The score of this formula of less than 16.5 is considered severely underweight, (18,5) is considered underweight, (18.5-24.9) is within normal, (25-29.9) is overweight, (30-34.9) is obesity class I, (35-39.9) is obesity class II obesity, and greater than or equal to (40) is Obesity class III (Jan and Weir 2021).

3.4.2 Type 2 diabetes and health promotion scale

The type 2 diabetes and health promotion scale (T2DHPS) (Saffari *et al.* 2015) was used to investigate healthrelated experiences and lifestyle behaviours among patients with type 2 diabetes. The T2HPS is a 28-item self-rated questionnaire that assesses six dimensions related to lifestyle. These are physical activity (seven items), risk reduction (seven items), stress management (five items), enjoyment of life (three items), health responsibility (three items) and healthy diet (three items). Each item has five response options that are rated on a Likert-type scale: 1 (never), 2 (sometimes), 3 (half the time), 4 (often) and 5 (always). A total score is computed by summing scores of all items. Each dimension also produces a score that is calculated by summing the item scores in that dimension and dividing by the number of items. The total score ranges from 28 to 140, and each dimension score ranges from 1 to 5. Higher scores indicate a healthier lifestyle.

3.5 Data collection method

An interview technique and a questionnaire were used to collect data. The average time for data collection was 15 minutes.

3.6 Data analysis

The Statistical Package for the Social Science (SPSS) for Windows version 26 was used to analyze the data. Additionally, the frequency, percent, mean, and standard deviation descriptive statistical measures were applied. Additionally, the independent-sample t-test, one-way analysis of variance, and linear regression were used as inferential statistical measures.

3.7 Validity of instrument

(Chen *et al.* 2013) developed the Type 2 Diabetes and Health Promotion Scale (T2DHPS). (Saffari *et al.* 2015) conducted a study on the scale's validity and reliability. The T2DHPS is a tool for researching the daily life of people with type 2 diabetes and could be able to foretell how effectively diabetes will be managed. To help type 2 diabetics improve their health by altering unhealthy habits and behaviors, this scale is a useful screening tool in primary healthcare facilities.

3.8 Reliability of the instrument

The reliability of the research instrument had been evaluated through the SPSS program by applying Cronbach's Alpha, also taken 10 sample and test (28) items of scale and were (0.91) according Cronbach's Alpha values.

Table 3.1 Cronbach's alpha values of study instrument

Methods of reliability	Type of scale	Actual values	No. of Items	Assessment
Cronbach's Alpha	Type 2 Diabetes and Health Promotion Scale	0.91	28	Acceptable

3.9 The ethical dimension

In 11/03/2022 ethical approval was obtained from Çankırı Karatekin University (Appendix 2). The research was conducted in Wasit Health Department in Iraq where ethical permission No.: 126 dated 01/03/2022 (Appendix 3,4) was obtained from Wasit Health Department to facilitate data collection from its health centers. and in 29/03/2022, 24/04/2022 ethical approval was obtained from ethics committee No.189, 226 in Wasit Health Department in Iraq (Appendix 5,6), where the researcher gave a thorough explanation of the study's objectives and methods. To maintain participant confidentiality, no names were written throughout data collection and reporting. Participants were verbally told of the study's goals and requested to participate voluntarily. They were also told that they could stop participating in the study whenever they wanted.

4. RESULTS

Table 4.1 Distribution of study sample according to socio- demographic related to their health promoting behaviors (n= 200).

Variables	Groups	Deceptive statistic	
		F.	%
Age (Years)	32-42	8	4.0
	43-53	48	24.0
	54-64	68	34.0
	65-75	52	26.0
	76 and above	24	12.0
	Total	**200**	**100**
	Mean± S.D 3.16±1.048		
Gender	Male	112	56.0
	Female	88	44.0
	Total	**200**	**100**
Marital status	Unmarried	20	10.0
	Married	180	90.0
	Total	**200**	**100**
Level of education for husband	Unable to read and write	12	6.0
	Read and write	38	19.0
	Elementary school graduate	6	3.0
	Middle school graduate	20	10.0
	High school graduate	43	21.5
	Diploma	13	6.5
	Bachelor's degree	48	24.0
	High diploma	0	0
	Master's degree	16	8.0
	Doctorate degree	4	2.0
	Total	**200**	**100**

Table 4.1. (continued) Distribution of study sample according to socio- demographic related to their health promoting behaviors (n= 200).

Level of education for wife	Unable to read and write	20	11.0
	Read and write	85	47.0
	Elementary school graduate	20	11.0
	Middle school graduate	15	8.0
	High school graduate	12	7.0
	Diploma	28	16.0
	Total	**180**	**100**
Household's occupation	Professional	12	6.0
	Semi-professional	32	16.0
	Clerical shop owner, farmer	36	18.0
	Skilled worker	8	4.0
	Semi-skilled worker	56	28.0
	Unskilled worker	36	18.0
	Unemployed	20	10.0
	Total	**200**	**100**
Family's Monthly Income (Iraqi Dinar)	300,000- 600,000	60	30.0
	601,000- 900,000	76	38.0
	901,000- 1,200,000	28	14.0
	1,201,000- 1,500,00	24	12.0
	≥ 1.501.000	12	6.0
	Total	**200**	**100**
Residency	Urban	84	42.0
	Suburban	64	32.0
	Rural	52	26.0
	Total	**200**	**100**

Table 4.1, shows that the age group for the study sample is between (54-64) years old (34.0%), and (56.0%) of patients were male. Additionally, marital status the results indicate that (90%), were married. Regarding to level of education for husband, the findings show that 24.0 % that have bachelor's degree, however, level of education of wife shown that 47% of them read and write only. Concerning to Household's occupation the study indicated that 28% have a semi-skilled worker and family's monthly income about (38.0 %) taken of samples 601,000- 900,000 (Iraqi Dinar). Also, 42% of sample patient lived in Urban area.

Table 4.1. (continued**)** distribution of study sample according to socio- demographic related to their health promoting behaviors (n= 200).

Variables	Groups	Deceptive statistic	
		F.	%
Family history of type II diabetes	yes	124	62.0
	no	76	38.0
Diabetes duration(year)	5-10	93	46.5
	11-16	32	16.0
	17-22	39	19.5
	23-28	20	10.0
	29 and above	16	8.0
	Total	**200**	**100**
Smoking Status	Never	84	42.0
	Ex-smoker	60	30.0
	Current smoker	56	28.0
Treatment	Oral agents	112	56.0
	Insulin and oral agents	52	26.0
	Insulin only	36	18.0
	Total	**200**	**100**
Comorbid Conditions	No	56	28.0
	Hypertension	44	22.0
	Hyperlipidemia	12	6.0
	Hypertension + Hyperlipidemia	28	14.0
	Hypertension + Hyperlipidemia + Retinopathy	8	4.0
	Hypertension + Hyperlipidemia + Diabetic Foot	16	8.0
	Hypertension + Hyperlipidemia + Diabetic Foot + Retinopathy	16	8.0
	Hypertension + Diabetic Foot	4	2.0
	Hyperlipidemia + Retinopathy + Diabetic Foot	4	2.0
	Hypertension + Hyperlipidemia + Retinopathy + Nephropathy	4	2.0
	Hypertension + Retinopathy	4	2.0
	Hypertension + Nephropathy	4	2.0
	Total	**200**	**100**

Regarding to family history of type II diabetes about (62.0%) said yes, and 46.5% of study suffering from between (5-10) years. Concerning to smoking about 42% never smoker and about half of study taken medication related to D.M by oral agents, finally the comorbid conditions indicated that 28% no have.

Table 4.2 Evaluating the obesity according to body mass ındex related to health promoting behaviors. (n= 200).

Variables	Groups	Deceptive statistic	
		F.	%
BMI	Under weight	4	2.0
	Normal weight	66	33.0
	Over weight	85	42.5
	Obese	39	19.5
	Extremely Obese	6	3.0
	Mean± S.D	26.761 ±4.2136	

The table 4.2 indicated that 42.5 % of the study were overweight and mean at (26.761)

Table 4.3 Assessment of study samples related to health promoting behaviors

Domains of scale	N	Minimum	Maximum	Mean	Std. Deviation
Physical activity	200	9.00	28.00	14.740	4.0688
Risk Reduction	200	15.00	33.00	24.180	4.2894
Stress management	200	14.00	23.00	17.160	2.1905
Enjoyment of life	200	9.00	14.00	11.320	1.5716
Health response	200	5.00	15.00	7.820	2.2389
Health diet	200	5.00	13.00	7.435	2.0264
Total score	200	63.00	123.00	82.655	13.3053

The table 4.3 show mean distribution for health promoting behaviors and their domains of scale.

Table 4.4 Distribution the levels of health promoting behaviors among patients.

health promoting behaviors	n	%	Mean	Stander deviation
Low health promoting behaviors	12	6.0	82.655	13.3053
Moderate health promoting behaviors	172	86.0		
High health promoting behaviors	16	8.0		

Scoring: Low=28-65, moderate=66-103, high=104-140

Table 4.4 displays the mean of was health promoting behaviors (82.655), the majority of the study sample (86.6%) a moderate level of health promoting behaviors

Table 4.5 Association between health promoting behaviors and (age, family socioeconomic status, duration of illness and BMI. (n= 200).

Variables	n	Chi-Square Tests	p. value	Sig.
Age	200	186.970[a]	0.000	H.S
Diabetes duration	200	61.933[a]	0.02	H.S
BMI	200	43.128[a]	.000	H.S
Level of education for husband	200	185.118[a]	.000	H.S
Level of education for wife	180	95.164[a]	.000	H.S
Household's occupation	200	184.187[a]	.000	H.S
Family's Monthly Income (Iraqi Dinar)	200	170.107[a]	.000	H.S

Sig: Significance, p: Probability value, H.S: high significant, N.S: non-significant

The table 4.5 display there are association between health promoting behaviors and (age, family socioeconomic status, duration of illness and BMI). at $P \leq 0.05$

Table 4.6 Correlation between health promoting behaviors and (age, family socioeconomic status, duration of illness, BMI, and body mass index). (n= 200).

Variables	n	Pearson Correlation	p. value	Sig.
Age	200	.006-	.930	N.S
Diabetes duration	200	.253-**	.000	H.S
BMI	200	.300-**	.000	H.S
Level of education for husband	200	.445**	.000	H.S
Level of education for wife	180	.378**	.000	H.S
Household's occupation	200	.595-**	.000	H.S
Family's Monthly Income (Iraqi Dinar)	200	.406**	.000	H.S

P: Probability, N.S: Not significant, S: significant, H.S: high significant, Correlation is significant at the 0.01 level.

The table 4.6 display there are correlation between health promoting behaviors and (family socioeconomic status, duration of illness and BMI). While, there was not significant correlation between health promoting behaviors and age at $P \leq 0.01$.

Table 4.7 Differences between health promoting behaviors and demographic characteristics of gender, education levels, residency, marital status family history of D.M and medication received. (n= 200).

Variables	n	Statistical test	p. value	Sig.
Gender	200	t-test	0.000	H.S
Level of education for husband	200	ANOVA	0.000	H.S
Level of education for wife	180	ANOVA	0.000	H.S
Marital status	200	t-test	0.000	H.S
Residency	200	ANOVA	0.000	H.S
Family history of D.M	200	t-test	0.000	H.S
Medication received	200	ANOVA	0.000	H.S

Sig: Significance, p: Probability value, H.S: high significant

Table 4.7 demonstration there are the differences between health promoting behaviors and demographic characteristics of study gender, education levels, residency, marital status family history of D.M and medication received. at $P \leq 0.05$

5. DISCUSSION

Part 1: Discussing the socio- demographic characteristics of the study sample, table 4.1:

The findings show that the bulk of the study's patients were between the ages of 54-64. These results corroborated those of Putra *et al*. (2019), who studied 177 patients with diabetes mellitus. They stated that the majority of participants were between the ages of 56 and 65. The findings revealed that 65.0% of the patients in the study sample—112 in total—were men. These findings are corroborated by Chao *et al.* (2019), who noted that more than half of the participants in the study sample were men.

As for the marital status, the study showed that 90% are married. This result agreed with El Mahalli (2015), where it was found that the number of married couples is 236 out of a total of 260 samples. Marital status has a positive effect in diabetic patients, as it leads to a decrease in the diabetes incidence and an improvement in adherence to diabetes treatment in partner patients. Regarding the educational level, the results were that the educational level of the husband is a bachelor's degree by (24%). This result agreed with Kim *et al.* (2017), (n = 7284; 37.7%) are of university level. As for the wife, the educational level was read and write at a rate of (47.0%). This study agreed with conducted by Belsti *et al.* (2020), where it was found that (30.8%), which is the highest percentage that they read and write.

Concerning to household's occupation the study indicated that 28% have a semi-skilled worker. A study done by Odusan *et al.* (2017), supports this result. their results were 339 (55.4%) semi-skilled occupation. In terms of the family's monthly income, 38.0% of the samples were had low monthly income. These findings confirmed a study by Vaughan *et al.* (2019), which discovered that the majority of patients have low incomes. People with low incomes are less committed to maintaining a healthy weight, engaging in physical activity, and managing their stress. Furthermore, those with higher income status have greater access to healthcare services. According to the study, 42% of the samples come from urban regions, which is relevant to residency. These results are in line with those of

Gerontoukou *et al.* (2015), who discovered that 52.9% of their samples (N=108) came from metropolitan areas. The higher prevalence of DM in urban areas may be attributed to increasing calorie and fat intake as well as a decline in physical activity.

According to the current study, (N = 124; 62.0%) had a history of type 2 diabetes in their families. In their study of 1,069 patients, Loomba et al. (2012), discovered that 596 (56%) of them had a history of diabetes in their family. Additionally, Moosazadeh *et al.* (2017), and Wagner *et al.* (2013), supported this finding. The researcher explains this finding by stating that a family history of diabetes is one of the most significant risk factors for developing diabetes. Regarding the duration of diabetes the study discovered that 46.5% of the patients had diabetes for a period of five to ten years. Herrington *et al.* (2018), provided support for this study in their study, which revealed that the average duration of diabetes was between 5 and 10 years (n=7713). It is the highest percentage. Another study by Zoungas *et al.* (2014), found that the duration of diabetes was 7.9 ± 6.4 years.

Results showed that nearly half (42%) are never smokers. Numerous research have supported this finding; for example, Banerjee *et al.* (2012), reported that (46.9%) of their participants never smoked. For the study's author, this finding explain the fact that smoking is not directly responsible for causing diabetes, it is a major contributor to an elevated risk of the condition. The results showed that over half of the samples (56%) were treated with oral medication for type 2 diabetes. Backed a 2014 study by Castillo *et al*. (2014), which found that 58% of patients (n=5873) were with oral therapy according to same the study, glyburide use increased from 7.4% in 2000 to 64.5% in 2011, and it became the most common treatment from 2007 onward.

The current finding was found that (28%) of patients do not suffer from comorbidities, on the other hand, many people in the group suffer from other health problems, high blood pressure tops this group. The researchers Abd Elaziz *et al.* (2014) discovered 45.3 percent of individuals had hypertension also Megahed *et al.* (2018) discovered that more than two thirds of the samples had high blood pressure.

Part 2: Discussing the distribution of participants according to their BMI as shown in table (4.2):

Less than half of the people in the study group (42.5%) were overweight, whereas one third (30.0%) had a healthy body mass index. Amer et al. (2018), corroborate these results by reporting that 63.8% of the sample size (N= 250) had a BMI that was either obese or overweight. Another Iranian study, by Didarloo *et al.* (2014), on a total of 352 people, found that around half of them were overweight based on their body mass index.

Part 3: Discussion of the participants levels of health promoting behaviors as shown in table (4.3):

As for the patient's physical activity, the study results indicate that the commitment of most participants to physical activities was low. These results are agree with the results obtained by Shafeea & Naji (2021) in their study where that most of the patients reported poor level of physical activity (74.3%), and also agreed with Mukanoheli *et al.* (2020) in their study where it was conducted on 223 participants. Theirs results indicated that patients adherence to physical activities was low. This may be because people with T2DM were more likely to have problems with their physical abilities.

The majority of patients in this study had a good level of risk reduction (mean = 24.180), which was a positive outcome for the risk reduction clause. According to De Roxas and Nicodemus Jr (2013), 55.6% of the participants demonstrated a fair commitment to risk reduction, which was supported by this finding. This result disagreed with that of Santos *et al.* (2018), who reported that patients with diabetes were considerably less capable of performing all self-care chores. The study's findings revealed that the majority of participants had positive reactions to the fields of stress management and enjoyment of life, with respective means of (17.160 and 11.320). This conclusion was reinforced by a study by Shafeea and Naji (2021), who discovered that more than a third of participants (n = 134; 37.4%) reported having a good degree of stress management. According to the study, social connections between people account for a large portion of the positive

percentages in the areas of stress management and happiness of life. This is mostly because there are so many different cultures and traditions.

The study's participants outcomes in terms of health responsibility were Moderate, with a mean of (7.820). Tenforde *et al.* (2012), reported that out of 10,746 diabetic patients, 4,036 (37.5%) had signed up for a Personal Health Record by July 2008 in an effort to improve their health. This result did not line up with the findings of Mohammed-Ali and Hamza, (2016) study, which revealed that impoverished people make up 173, 86.5 percent of this field. According to the current results, the majority of the sample has a moderate dedication to eating well, with a mean of (7.435). Mohammed and Hamza (2016), validated this conclusion in their study of 200 participants, which showed that patients responded moderately to the healthy diet domain (n=142; 71%). Shafeea and Naji (2021), also support this finding where more than a third claimed fair to excellent adherence to a healthy eating (36.7%).

In general, the levels of health-promoting behavior among patients were moderate with a mean (82,655), as shown in the table 4.4. These findings are agreement with Mohammed-Ali and Hamza (2016), they reported that patients have moderate self-care activities. Additionally, these findings are agreement with Shafeea and Naji (2021) Where they found in their finding more than half of the study sample (53.9%) had good responses to health behaviors.

Part 4: Discussion the association between health promoting behaviors and (age, family socioeconomic status, duration of illness and BMI). as shown in table (4.5):

According to the findings of the study, there is a high association between health-promoting behaviors and age, family socioeconomic status, duration of illness and body mass index. The study discovered that age is associated with health-promoting behaviors in terms of its relationship to health habits. This finding is congruent with that of Shafeea & Naji (2021), who discovered that the older the client, the greater their commitment to health-promoting behaviors. As for the socioeconomic position of the family, the study found that the commitment to health-promoting behaviors increased with the educational

level, monthly income, and employment status. The same was true for the length of the sickness, as the results demonstrated a direct correlation between health-promoting habits and disease duration. These outcomes were supported by Mukanoheli *et al.* (2020).'s findings in their research. A substantial association was seen between Self-Care Behaviors and age, gender, marital status, educational level, and duration of diabetes. In addition, these findings are corroborated by (Berhe *et al.* 2013; Freitas *et al.* 2014; Viji and Singh 2014), they discovered a high correlation between patients levels of education and their level of self-care. Moreover, these findings are consistent with those of (K. W. R. Putra *et al.* 2019), who discovered a positive association between educational level, monthly household income, knowledge, eating and health behaviors.

A statistically significant association between the individuals body mass index and their health-promoting behaviors was also found, according to the study. This outcome was consistent with a study by Mohamed (2014) that revealed a statistically significant improvement in body weight following a three-month program.

Part 5: Discussion correlation between health promoting behaviors and (age, family socioeconomic status, duration of illness, and body mass index) as shown in table (4.6):

This study found a statistically significant correlation between health-promoting behaviors and (family socioeconomic status, duration of illness and BMI). The correlation was negative with respect to duration of illness, BMI and occupation. The lower the duration of illness, BMI, and occupation (working period), the more committed the patient will be to health-promoting behaviors. The family's educational level and monthly income were positively correlated. Health-promoting behaviors increase with family education and income. Reisi *et al.* (2021) supported this result, they found self-care practices positively correlated with employment status, another study supported this result by Khodaveisi *et al*. (2017), in the control group, family income and education strongly linked with diet, they also found the experimental group likewise showed a strong negative connection between body mass index and dietary habits. These findings were also supported in 2011 by Arora *et al.* (2011) they found that years since diabetes

diagnosis and formal education were positively correlation with diabetes. The study showed no correlation with respect to age, perhaps the reason for this is that the study sample were elderly people of similar ages. The current results are consistent with those of earlier research by Freitas *et al.* (2014) and Mohebi *et al.* (2014), which concluded that there is no statistically significant correlation between patients' ages and their self-care behaviors.

Part 6: Discussion the differences between health promoting behaviors and demographic characteristics of gender, education levels, residency, marital status family history of D.M and medication received. Table (4.7):

According to the study's findings, there was a statistically significant differences between health promoting behaviors and demographic characteristics of gender, education levels, residency, marital status family history of d.m and medication received. This finding agrees with Shafeea and Naji (2021), where they found there was a statistically significant difference in health responsibility between groups of gender. Also, this finding is corroborated by the work of Hayashi *et al.* (2011), who investigated the correlation between gender and health-promoting behaviors taken by people with diabetes and found a statistically significant link.This result is consistent with what Mohammed-Ali and Hamza (2016) found; they found a strong correlation between patients' self-care and (levels of education, treatment, health education and complications). also, another study supports the result conducted by Eshah (2011) which included 260 patients, The findings revealed statistically significant differences in age group, gender, educational level, marital status, monthly income, employment, residence, history of diabetes and smoking.

6. CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

- The results of the study showed a relationship between health promotion behaviors of T2D patients in Wasit Governorate and their demographic characteristics.
- Type 2 diabetes is on the rise in Wasit Governorate and in Iraq in general because of the living conditions represented by the low of monthly income, unhealthy eating and lack of physical activity.
- Lack of health education is one of the reasons that led to an increase in the incidence of diabetes in Iraq
- The clients age, family's socioeconomic level, duration of illness, and body mass index are all significantly related to their health promoting actions.
- There are differences in how clients take care of their health based on their gender, level of education, marital status, where they live, if they have a family history of diabetes mellitus, and what kind of medication they take.
- Higher levels of education and higher monthly household income were associated with more healthful lifestyle choices.
- Most of the study subjects were physically inactive.
- Most of the patients in the study were on an unhealthy diet.
- The lower the BMI, the better the level of physical activity.
- Patients with better family socioeconomic status, they better in health promotion behaviors.
- Most of the study sample a moderate level of health promoting behaviors.

6.2 Recommendations

- Educating diabetic patients about proper diabetic care and ways they can adopt more health-promoting habits
- Improving physical activity levels for individuals with type 2 diabetics.
- Patients with T2DM should receive comprehensive nutritional guidance from their doctor or a dietician.
- Increase Health education activities that aims to improve healthy weight, stop smoking and maintain checkups of blood sugar.
- Increase health promotion activities targeting clients with type 2 DM that aim to promote physical activity, minimize risk, manage stress, and enjoy life.
- Creating programs tailored to younger clients with type 2 DM to raise their health information knowledge and encourage personal health accountability.
- More research is needed to ascertain the success of health education programs and how to improve the health promotion practices of type 2 diabetic patients.

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APPENDIX

APPENDIX 1. Questionnaire.

APPENDIX 2. Ethics committee in Çankiri Karatekin approval.

APPENDIX 3. Ethical permission and Approval from Wasit Health Department to facilitate data collection from its health centers(In the Turkish language).

APPENDIX 4. Ethical permission and Approval from Wasit Health Department to facilitate data collection from its health centers(In the Arabic language).

APPENDIX 5. Ethics committee approval in Wasit Health Department in Iraq (In the Turkish language).

APPENDIX 6. Ethics committee approval in Wasit Health Department in Iraq (In the Arabic language).

APPENDIX 1. Quesionnaire of the study (in the language of English)

First: **Socio-demographic Characteristics**

Second: Type 2 Diabetes and Health Promotion Scale

APPENDIX 2. Ethics committee in Çankiri Karatekin Üniversitesi approval

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