Çankırı Karatekin University
Graduate School of Health Sciences

Master of Science Thesis

THE RELATIONSHIP BETWEEN COPING STRATEGIES AND ANXIETY AND DEPRESSION LEVELS OF DIABETIC PATIENTS

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Çankırı 2023

ÇANKIRI 2023
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ACCEPTANCE AND APPROVAL

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ETHICS STATEMENT

The thesis entitled “The Relationship Between Coping Strategies and Anxiety and Depression Levels of Diabetic Patients” 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.

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ABSTRACT

THE RELATIONSHIP BETWEEN COPING STRATEGIES AND ANXIETY AND DEPRESSION LEVELS OF DIABETIC PATIENTS

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Master of Science in Psychiatric Nursing

Advisor: Assoc. Prof. Dr. Gülendam AKGÜL

January 2023

Background: The study aimed to find out the prevalence of anxiety and depression among diabetic patients and their coping strategies. Also, the relationships between anxiety, depression, coping strategies, socio-demographic and illness-related data were investigated. **Method**: The study was descriptive. The sample consisted of 180 Iraqi adults with type 1 and type 2 diabetes. The anxiety and depression were measured with HADS scale and coping strategies were measured with the COPE scale. Multiple linear regression was used to test the relationship between coping strategies and both anxiety and depression. **Result**: The results showed that the prevalence of mild anxiety was the highest (44.4%), followed by moderate anxiety (24.4%), and severe anxiety (5%). With regard to depression, 35.6% of participants had mild depression, 19.4% had moderate depression, and 4.4% had severe depression. Anxiety and depression were more common among patients with type 1 diabetes, patients between the ages of 18 and 29, patients with long duration of diabetes, and those with a low monthly income. Depression was more common among females and patients who lived in urban areas. Those with lower levels of education also have higher levels of anxiety. There is a negative relationship between positive coping strategies (active coping and seeking support strategies) and both anxiety and depression. In contrast, there is a positive relationship between negative strategies (non-problem-focused coping and substance abuse) and both anxiety and depression. Therefore, there seems to be a need to pay attention to the psychological aspects of diabetic patients and educate them about coping strategies.

2023, 93 pages

Keywords: Anxiety, Depression, Coping strategies, Diabetes mellitus.

ÖZET

DİYABET HASTALARININ BAŞA ÇIKMA STRATEJİLERİ İLE ANKSİYETE VE DEPRESYON DÜZEYLERİ ARASINDAKİ İLİŞKİ

Sarmad Ahmed Khaleel KHALEEL

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Arka plan: Bu çalışmada diyabetik hastalarda anksiyete ve depresyon yaygınlığının ve başa çıkma stratejilerinin araştırılması amaçlanmıştır. Ayrıca anksiyete, depresyon, başa çıkma stratejileri ile sosyo-demografik ve hastalıkla ilgili veriler arasındaki ilişkiler incelenmiştir. **Yöntem**: Araştırma betimsel bir çalışmadır. Örneklem, tip 1 ve tip 2 diyabetli 180 Iraklı yetişkinden oluşmuştur. Anksiyete ve depresyon HADS ölçeği ile, başa çıkma stratejileri ise COPE ölçeği ile ölçülmüştür. Başa çıkma stratejileri ile hem kaygı hem de depresyon arasındaki ilişkiyi test etmek için çoklu doğrusal regresyon kullanılmıştır. **Bulgular**: Sonuçlar, (%44.4) ile hafif kaygı prevalansının en yüksek olduğunu, bunu orta düzeyde kaygı (%24.4) ve şiddetli kaygının (%5) izlediğini göstermiştir. Depresyon ile ilgili olarak, katılımcıların %35.6'sı hafif, %19.4'ü orta ve %4.4'ü şiddetli depresyona sahiptir. Tip 1 diyabetlilerde, 18-29 yaş arası hastalarda, uzun süreli diyabet olanlarda ve aylık geliri düşük olanlarda anksiyete ve depresyon daha sık görülmüştür. Depresyon kadınlarda ve kentsel alanlarda yaşayan hastalarda daha yaygındır. Daha düşük eğitim düzeyine sahip olanların kaygı düzeyleri de daha yüksektir. Olumlu başa çıkma stratejileri (aktif başa çıkma ve destek arama stratejileri) ile hem kaygı hem de depresyon arasında negatif bir ilişki vardır. Buna karşılık, olumsuz stratejiler (problem odaklı olmayan başa çıkma ve madde kötüye kullanımı) ile hem kaygı hem de depresyon arasında pozitif bir ilişki vardır. Bu nedenle diyabet hastalarının psikolojik yönlerine dikkat edilmesi ve başa çıkma stratejileri konusunda eğitim verilmesine ihtiyaç olduğu görülmektedir.

2023, 93 pages

Anahtar kelimeler: Kaygı, Depresyon, Başa çıkma stratejileri, Diabetes mellitus.

PREFACE AND ACKNOWLEDGEMENTS

I would like to express my sincere gratitude to my supervisor, Assoc. Prof. Dr. Gülendam AKGÜL, for her marvelous supervision, guidance, and encouragement. Sincere gratitude is extended to her for her generous participation in guiding, constructive feedback, kind support, and advice during my master's degree.

Many thanks to all of the staff in the health sciences institute for their kind support during my master's degree.

Also, I extend my thanks to all my colleagues at Çankırı University for their continuous encouragement and support, as well as to all of my friends and colleagues from for their advice and moral support.

I also extend my heartfelt thanks to the one who gave me his life to achieve success, my dear mother, father, and wife, and to all the members of my family.

Sarmad Ahmed Khaleel KHALEEL

Çankırı-2023

CONTENTS

ACCEPTANCE AND APPROVAL II
ETHICS STATEMENT III
ABSTRACT IV
ÖZET V
PREFACE AND ACKNOWLEDGEMENTS VI
LIST OF ABBREVIATIONS IX
LIST OF FIGURES X
LIST OF TABLES XI
1. INTRODUCTION 1
1.1 Importance of the study 3
1.2 Objectives of the study 5
1.3 Limitations 5
1.4 Definition of diabetes mellitus 5
1.5 Types of DM 6
1.6 Symptoms of DM 8
1.7 Causes of DM 8
1.8 Risk factors 9
1.9 The Burdens of diabetes 10
1.10 The Psychological Correlates of Diabetes Mellitus 11
1.10.1 Anxiety among patients with diabetes 14
1.10.2 Depression among patients with diabetes 16
1.10.3 Anxiety and depression in hospitals and outpatient clinics 18
1.11 Definition of coping strategies 19
1.12 Types of coping strategies 20
1.12.1 Emotion-focused coping strategies 21
1.12.2 Problem-focused coping strategies 22
1.12.3 Appraisal-focused strategies 23
1.13 The relationship between coping strategies, and anxiety and depression 24
1.14 Coping strategies of diabetic patients 26
2. METHODOLOGY 31
2.1 Study design 31

2.2 The sample **31**
2.2.1 Sampling inclusion criteria **31**
2.3 Data collection **31**
2.3.1 Socio-demographic data **32**
2.3.2 Coping orientation to problems experienced inventory (Brief-Cope) **32**
2.3.3 The Hospital anxiety and depression scale (HADS) **33**
2.4 Statistical data analysis **34**
2.5 Ethical principles of research **35**
3. RESULTS **36**
3.1 Descriptive statistics **36**
3.2 Depression and anxiety level of patients **37**
3.3 The Relationship between socio-demographic and anxiety **39**
3.4 The comparison of depression levels according to socio-demographic variables and illness-related data **41**
3.5 The comparison of coping strategies according to socio-demographic data **43**
3.6 The Relationship between anxiety, depression, and coping strategies **49**
4. DISCUSSION **53**
4.1 The relation between anxiety, depression, and socio-demographic data **53**
4.2 The relation between coping strategies and socio-demographic data **56**
4.3 The relation between anxiety, depression, and coping strategies **58**
5. CONCLUSION **60**
Recommendations **60**
REFERENCES **62**
APPENDICES **82**
CURRICULUM VITAE **93**

LIST OF ABBREVIATIONS

ADA	American diabetes association
ANOVA	Analysis of variance
APA	American psychological association
CVB	Coxsackie virus
COPE	Coping orientation to problems experienced
DM	Diabetes mellitus
DSM V	Diagnostic and statistical manual of mental disorders
GDM	Gestational diabetes mellitus
HADS	Hospital anxiety and depression scale
M	Mean
N	Number
PTSD	Post-traumatic stress disorder
SD	Standard deviation
T2DM	Type 2 diabetes mellitus
WHO	World health organization

LIST OF FIGURES

Figure 1.1 Common psychological factors and patients' reactions towards negative outcomes (Kalra *et al*. 2018) 13

Figure 1.2 Strategies seen in depression and anxiety (Kasi *et al*. 2012)..... 23

LIST OF TABLES

Table 2.1 Cronbach's alpha of COPE (Jaber 2012) 33

Table 2.2 Cronbach's alpha of current study (COPE)..... 33

Table 2.3 Cronbach's alpha of HADS (Jaber 2012)..... 34

Table 2.4 Cronbach's alpha of current study (HADS) 34

Table 3.1 Frequencies and percentages of the sample according to the variables (n=180) 36

Table 3.2 Descriptive statistics of anxiety..... 38

Table 3.3 Frequency and relative distributions of the patients according to the level of anxiety 38

Table 3.4 Descriptive statistics of depression 38

Table 3.5 Frequency and relative distributions of the patients according to the level of depression 38

Table 3.6 The anxiety level of participants according to socio-demographic data ... 39

Table 3.7 The comparison of depression level according to socio-demographic data 41

Table 3.8 The comparison of active coping strategies according to socio-demographic factors..... 43

Table 3.9 The comparison of seeking support strategies according to socio-demographic factors 45

Table 3.10 The comparison of non-problem focused coping strategies according to socio-demographic factors..... 47

Table 3.11 The comparison of substance use according to socio-demographic factors 48

Table 3.12 The Pearson Correlations between anxiety and coping strategies 50

Table 3.13 Multiple linear regression for anxiety 50

Table 3.14 The Pearson Correlations between depression and coping strategies 51

Table 3.15 Multiple linear regression for depression..... 52

1. INTRODUCTION

Diabetes is a metabolic condition and is considered a chronic disease characterized by an abnormally high level of glucose in the blood (Sapra and Wilhite 2021). According to information provided by the International Diabetes Federation (IDF), 1 in 11 adults between the ages of 20 and 79 had diabetes in 2015 globally. 90% of them having type 2 diabetes (Zheng *et al*. 2018). Experts predict that the number of people living with diabetes is expected to rise from 415 million to 642 million by the year 2040 (Atlas 2015).

Given that the diabetes is a chronic disease, it may cause anxiety, especially when life's circumstances are already stressful (Hajseyed *et al*. 2017). Within the general population, the percentage of people who suffer from anxiety is anywhere from 12 to 21%, and therefore it is one of the most prevalent psychological disorders (Leray *et al*. 2011, McEvoy *et al*. 2011).). Among the most prevalent anxiety disorders linked to medical conditions are panic disorder and generalized anxiety disorder (Wiltink *et al*. 2011, Lin *et al*. 2008). It is very important to examine or assess the level of anxiety when examining diabetes as a combined disease since the anxiety is linked to increasing complications of diabetes, worsening levels of blood glucose, a decline in quality of life, and a rise in body mass index, in addition to an increase in pain and an increase in depression (Smith *et al*. 2013).

Depression is another common mental health problem among patients who have diabetes of either type 1 or type 2 and it is associated with an increased mortality rate as well as an increase in complications associated with diabetes (McGrath *et al*. 2021). It negatively affects the quality of life, can reduce the expectancy of life and increase functional disability of patients with diabetes (O'Connor *et al*. 2009).

People who have diabetes face a greater likelihood of experiencing depression due to a number of risk factors (Roy and Lloyd 2012), such as low socioeconomic status (Collins *et al*. 2009), loneloneliness (Pouwer *et al*. 2010), and poor social support (Baek *et al*. 2014). In addition, there are diabetes-related factors such as the occurrence of diabetes complications, the use of insulin in type 2 diabetes, in

addition to poor control of glucose levels in the blood. It's possible that diabetes and depression have a bidirectional relationship (Roy and Lloyd 2012). For example, people who suffer from depression may have a higher potential for getting diabetes.

There are several challenges facing diabetics. These challenges are related to the requirements of diabetes. The poor health that results from the disease and the daily stresses are sources of constant anxiety and tension (Karlsen *et al*. 2004). The diabetes itself and the complications associated with it or the need for insulin treatment might lead to depression in patients. Coping with these challenges and complications are important for the patient's mental and physical health.

Diabetics use many coping strategies to take care of the complications associated with the illness, including adaptive and maladaptive coping strategies. Active coping is one of the problem-focused strategy that people use to deal with stress (Carver 1989). This strategy was significantly associated with a decrease in psychological stress and could serve as a basic strategy for psychological interventions (Yu *et al*. 2020). Strategies that focus on problem solving are associated with a lower rate of depression in people with diabetes than strategies that focus on emotion (Parildar *et al*. 2015). Both depression and diabetic distress are increased in patients who use maladaptive strategies, and this affects the self-care of patients. For example, self-blame leads to poor self-care (Hapunda 2022). Use of positive distraction strategies was related to fewer depressive symptoms among people who used them and was also associated with other positive results, such as a higher level of well-being (Waugh *et al*. 2020). Diabetics who respond to stressful situations with emotion-focused coping are more inclined to develop depression compared to patients who use problem-focused coping strategies. However, when there is discouragement in managing diabetes, repeatedly using problem-focused strategies may lead to depression (Clarke and Goosen 2009). Seeking social support, another type of coping strategy for diabetics, plays a role in improving common mental problems like anxiety and depression, which usually accompany diabetics (Wu *et al*. 2013a).

The association between coping strategies and mental health problems (like depression and anxiety) might be influenced by culture. For example, in some cultures, the use of traditional medicine and herbs to reduce blood glucose levels is

common. Resilience and social support are strategies that positively impact and allow patients to endure diabetes (Rayanti *et al*. 2018). Thus, examination of coping strategies used by diabetic patients and its relationship with psychological problems like depression and anxiety in a different culture is significant.

People's lives are hindered and their quality of life is significantly (negatively) impacted when they struggle with mental health problem such as depression and anxiety. These disorders have become common in many physical diseases, especially diabetes mellitus, due to the requirements of this disease, such as self-care, continuous follow-up, and lifestyle changes.It is also important to educate the nursing staff about mental disorders, especially nurses who work in diabetes centers, as nurses play an important role in identifying anxiety and depression as a result of direct contact and communication with patients, thus contributing to the reduction of these disorders and also contributing to the early detection of both anxiety and depression. As a result, the aim of this study is to identify the level of anxiety and depression among diabetic patients, the coping strategies they used, and the relationship that existed between these methods of coping and the anxiety and depression symptoms that they experienced.

1.1 Importance of the study

It is well known that there is a significant relationship between diabetes and a variety of psychological problems, including anxiety and depression (Tamang 2020). The anxiety and depression in diabetic patients has severe consequences in terms of the treatment of their ilness, and leads to non-compliance with diabetes self-care recommendations (Ciechanowski *et al*. 2000). Depressed and anxious patients are less likely to adhere to the diet or take prescribed medications, in addition to being less physically active (Mukrim *et al*. 2019). Therefore, finding an association between the psychological problems and coping strategies of patients could help professionals to strengthen the patients with better coping strategies. So that their quality of life could improve and mental problems could be intervened in diabetic patients.

Diabetes requires lifelong self-care from the patient, such as changing their lifestyle and checking their blood glucose level on a daily basis, in addition to changing their diet (Speight *et al*. 2020). These requirements have a role in the occurrence of psychological distress and low self-care, and this means that there is difficulty coping with the disease (Salem 2017).

In people who have diabetes, coping strategies are clearly connected with a variety of psychological disorders, including anxiety and depression (Clarke and Goosen 2009, Wu *et al*. 2013a). In other words, there are strategies that may be protective, while others may increase the risk of psychological problems. For instance, emotion-oriented coping plays a part in the manifestation of symptoms of anxiety and depression in diabetic patients (Burns *et al*. 2016).

The correlation between different methods of coping with stressful situations and the severity of depression and anxiety among diabetic patients needs to be investigated in Iraq. It is critical that we have an understanding of the occurrence of both anxiety and depression that can be an obstacle in the lives of patients with diabetes, to reveal the type of coping strategies do these patients in Iraq use to deal with the challenges associated with their conditions, and the association between different coping strategies, depression and anxiety. This helps us contribute to support patients' use of more positive strategies that help them to overcome or deal with these disorders, which can increase their quality of life.

In Iraq, psychological disorders, especially anxiety and depression, are increasing as a result of the poor economic, security, and financial conditions and the lack of psychological health services provided (Mansour and Jabir 2007, Yaseen and Dauod 2019, Ulaiwi 2020, Al Zurfi *et al*. 2021). Therefore, the increased awareness of nurses about the elevated levels of both anxiety and depression may help in the early detection of these levels, planning for them, and taking the necessary precautions. Also, they can plan patient training programs in which they can teach coping methods to assisst them cope more effectively with their conditions.

1.2 Objectives of the study

This study aims to investigate the anxiety and depression level among diabetic patients and the coping strategies they used. More specifically;

1. To identify the prevalence of anxiety and depression in diabetic patients.
2. To identify the coping strategies used by diabetic patients.
3. To assess the relationship between the different coping strategies used by diabetic patients and the symptoms of anxiety and depression.

1.3 Limitations

There were some limitations to this study. First, the difficulty of communicating with some patients since there are several factors such as language differences. Some patients did not have consent to participate in the study that limited the generalizability of sample.

1.4 Definition of diabetes mellitus

It is a metabolic disease characterized by high blood glucose (Sneha and Gangil 2019). The primary cause of the high level of glucose is due to a defect that either occurs during the secretion of insulin or during its action. This disease may cause long-term injury or dysfunction and have effects or complications on a variety of organs within the body, including the nerves, the eyes, and the heart, that lead to failure or impairment of these organs (Williams and Hopper 2015).

It affects about 9% of people aged 18 and over, and this, in and of itself, is a significant health problem. Nearly 1.5 million people worldwide died in 2012 from diabetes. According to the estimations provided by the World Health Organization (WHO), that in the year 2030, it will have risen to the position of the seventh largest cause of death all over the world (Karamanou 2016).

1.5 Types of DM

In accordance with the information provided by the American Diabetes Association, diabetes can be classified into a number of subtypes. These include type 1 diabetes, which manifests itself in a person as a consequence of the destruction of beta cells; type 2 diabetes, which happens as a consequence of an inadequate amount of insulin secretion; and gestational diabetes (GDM), which manifests itself during pregnancy. In addition, there are other types that are referred to as other specific types, such as the exocrine pancreas diseases (ADA 2014).

Type 1 diabetes depends on insulin (insulin-dependent diabetes), as the body does not produce insulin completely or produce little amounts of it. It is a direct result of the beta cells destruction (β-cells) in the pancreas, which is the organ that is essential for the creation of insulin. Its prevalence is low, as it represents 5–10% of people with diabetes. It requires insulin injections to control the glucose level as well as to prevent ketoacidosis. This type is also known as juvenile diabetes (Nettina *et al*. 2013).

This type includes several forms. It may be immunological (immune mediated diabetes); this represents the classic form of this kind of diabetes. It takes place as a result of cell-mediated autoimmune destruction of the pancreas, which is the cells responsible for producing insulin, which is a basic and necessary hormone for the body to obtain energy through glucose. Beta cell destruction varies according to age. It happens more quickly in children than in adults, as immune-mediated diabetes may occur at any age. Immunological diseases have an impact on the occurrence and development of type 1 diabetes, such as Graves' disease. Also, a person may suffer from a permanent lack of insulin (permanent insulinopenia) for no reason, and this is called idiopathic diabetes (DeFronzo *et al*. 2015).

The occurrence of type 1 diabetes is caused by a combination of a number of different factors. Consuming certain foods can contribute to an increased risk of developing type 1 diabetes, just as a diet that contains low amounts of gluten during pregnancy contributes to reducing the risk of developing type 1 in the offspring.

Also, genetic risks can influence blood glucose levels and the β-cell responsible for the secretion of insulin (Roep *et al*. 2021).

Type 1 can lead to a number of problems, including diabetic ketoacidosis, which is a complication that poses a significant risk to a patient's life and can cause death in children and adolescents, in addition to other complications such as peripheral neuropathy, Celiac disease, and vitamin D deficiency (Robert *et al*. 2018).

Diabetes type 2 can develop for a number of reasons, the most common of which are insufficient insulin secretion (insulin deficiency) and insulin resistance; this type is also called adult-onset diabetes. In this type, patients do not depend on insulin. Its prevalence is high, as it represents 90–95% of diabetic (Nettina *et al*. 2013).

The high level of glucose in the blood is often not severe, and for this reason, it is often without symptoms and not diagnosed early. Patients with this type of diabetes often suffer from being overweight or obese. Insulin resistance is linked to obesity, which has an important part to play in the formation of this resistance. Unlike the first type, the occurrence of ketoacidosis is rare and usually caused by infection (DeFronzo *et al*. 2015). There are several complications associated with this type of diabetes, such as retinopathy, neuropathy, and nephropathy, which are known as micro vascular diseases, as well as hyperlipidemia and hypertension, which are known as macro vascular diseases. There is some evidence that indicates that having diabetes type 2 is linked to an increased likelihood of acquiring cancer (Wu *et al*. 2014).

Gestational DM occurs during pregnancy and is known as glucose intolerance. This disorder usually occurs in the last months of pregnancy (third trimester of pregnancy) in most women. Its incidence during pregnancy ranges from 8–9% of all pregnant women, but this percentage increases in people at risk of developing type 2 diabetes (Solis-Herrera *et al*. 2018). Gestational diabetes is one of the most common complications that occur during pregnancy. There are several complications associated with this type of diabetes, as it increases the risks of neonatal death and stillbirth (Hillier *et al*. 2021).

1.6 Symptoms of DM

The three typical signs and symptoms of diabetes are polyuria (excessively urinating), polydipsia (excessively thirsting), and polyphagia (excessively hungry). These classic signs are common in type 1 diabetes. These signs also occur in type 2, when blood glucose levels are very high. The loss of a significant amount of weight is a typical symptom of type 1 diabetes, which is another characteristic of this kind of diabetes; weight loss can also happen in type 2 diabetes if it remains undiagnosed for a long time (Ramachandran 2014). Additional sign and symptoms that are related with diabetes include as follows: slow wound healing, flushed face, yeast infection, genital and skin infection (Shaikh *et al*. 2022). Numerous warning indications of undiagnosed diabetes exist, including exhaustion, restlessness, pain in various parts of the body, and unexplained weight loss (Ramachandran 2014).

1.7 Causes of DM

There are several other factors that can cause the occurrence and development of diabetes, such as chronic diseases that affect the islet cells in the pancreas, such as inflammation of the pancreas (pancreatitis) and cystic fibrosis. Also, long-term use of some medications can impact how insulin works, which can result in a decrease in its level, which in turn causes a rise in the amount of blood glucose as a result of which (Williams and Hopper 2015).

Endocrinopathy, which includes many disorders like acromegaly and Cushing's syndrome, also plays a role in how diabetes develops and progresses and this is also another specific type of diabetes (Petersmann *et al*. 2019).

Immunity is considered the body's defense system to fight infection. When it destroys beta cells responsible for the synthesis of insulin within the pancreas, DM type 1 occurs. Additionally, genetic and environmental variables, such as viruses, play a part in the onset of diabetes (Dunning 2013).

Type 2 diabetes develops when muscle tissue and liver cells become resistant to the effects of insulin, in addition to the lack of insulin as a result of the disabled function of cells in the pancreas, and thus they are unable to bear the increased demand for insulin. Therefore, type 2 diabetes is more complex than type 1 (Nicki *et al*. 2010).

Gestational DM occurs as a result of glucose intolerance during pregnancy. Heredity, lifestyle, diet, and the number of previous pregnancies are all examples of factors that can play a part in the onset and progression of this form of diabetes. Also, its incidence has increased along with the spread of the obesity rate, which is considered a global epidemic (Dunning 2013).

1.8 Risk factors

A person's likelihood of getting type 1 diabetes is influenced by a number of different factors, which can be broken down into the following categories and explained in more detail as follows:

1. Family history: There is a higher likelihood of developing type 1 diabetes in individuals who have a first-degree relative who has the condition. Offspring have lower risks compared to siblings. Also, the offspring of diabetic mothers have a lower risk of developing this type compared to the offspring of diabetic fathers, since the presence of trans-placental islet autoantibodies plays a role in reducing the risks (DeFronzo *et al*. 2015).
2. Environmental factors: There are a variety of viruses that may be found in the environment, including enteroviruses and the coxsackie virus B (CVB). Coxsackie virus B (CVB) has an effect on the functioning of the pancreas, and this type of virus can be observed in childhood, and enteroviruses that infect the uterus early also raise the probability of having diabetes of this kind (Wu *et al*. 2013).

   Exposure to some environmental factors that are considered a risk factor during pregnancy plays a part in the progression of type 1 diabetes, such as preeclampsia or infectious diseases. Similarly, exposure to some pathological problems such as jaundice during the neonatal period contributes to an increase in risks. All of these factors have the potential

to stimulate the immune system, which in turn leads to the destruction of B-cells and eventually the occurrence of type 1 diabetes (Majeed and Mea 2011).

A person's likelihood of getting type 2 diabetes is influenced by a number of different factors, which can be broken down into the following categories and explained in more detail as follows (Wu *et al*. 2014):

1. Obesity is one of the most significant risk factors that arise as a consequence of an imbalance between the amount of energy that is expended and the amount of energy that is taken in. As a result, one of the factors that can lead to the occurrence of type 2 diabetes is being overweight and has an impact on insulin resistance.
2. The production of insulin is greatly aided by the contribution of vitamin D to the metabolic process, which thus contributes to the synthesis and secretion of insulin. The deficiency of this vitamin negatively affects glucose intolerance and the secretion of insulin, which means that it is a significant factor in the progression of this kind of diabetes and that maintaining its levels contributes to preventing or controlling it.
3. A diet that is poor in fiber content is one example of a type of diet that is thought to be a fundamental and important element in the development of type 2 diabetes (low-fiber diet). Additionally, insulin resistance may be affected by the fatty acids in the diet. Another factor related with an increased risk of acquiring type 2 diabetes is the intake of soft drinks. Other factors include alcohol consumption and smoking.

1.9 The Burdens of diabetes

Diabetes increases at a rate of 3–5% annually for type 1 diabetes, and this percentage is alarming (Maffi and Secchi 2017). Similarly, type 2 diabetes is rising quickly among young people, adolescents, and children. Diabetes has an important and fundamental role in increasing the death rate almost fivefold, especially in women. In addition, diabetes can cause other complications, such as end-stage renal disease, which can have a significant impact on the patient's quality of life as well as their ability to survive. It is generally accepted as the primary reason why Western

countries have such high rates of kidney disease (Ghaderian *et al*. 2015, Maffi and Secchi 2017, Ergun *et al*. 2021).

1.10 The Psychological Correlates of Diabetes Mellitus

Diabetes could potentially lead to a variety of complications, the most common of which are psychiatric issues (Jaser 2010, Kanwar *et al*. 2019). The physical complications that occur as a result of diabetes, such as micro-vascular complications and macro-vascular complications, which are cardiovascular disease, neuropathy, and nephropathy, are not the only ones that accompany diabetes. Diabetics are at a greater risk of acquiring anxiety, depression, and stress, in addition to the medical difficulties that are already associated with the disease (Alzahrani *et al*. 2019, Qiu *et al*. 2017).

These mental illnesses are brought on by a confluence of factors, all of which are intricately tied to the way a person chooses to live their life (Firth *et al*. 2020). The failure to adhere to a healthy lifestyle is connected to the development of major difficulties, which not just have a bad influence on one's level of well-being but also boost the risk of dying at an earlier age. Some factors increase the risk of mental disorders for example comorbid conditions. Diabetes patients who are uneducated, have a limited monthly income, have family problems such as divorce cases, abnormal sleep patterns (short period of sleep), and awareness of their condition increase comorbid psychological problems (Qiu *et al*. 2017).

According to the American Diabetes Association (2015), it is necessary to conduct a psychological and social assessment for people who have diabetes, as the presence of psychosocial problems is associated with an increased chance of having a low quality of life, a decreased interest in the disease, and nonadherence to prescribed medications for the disease. These are all factors that lead to a lack of control over normal glucose levels and a higher probability of long-term complications. This means that the requirements of diabetes, which include regular testing and monitoring of glucose levels (possibly daily), exercise, and a healthy diet, in addition

to taking drugs as they are prescribed, all lead to a decrease in emotional, physical, and social well-being among diabetic patients (Gupta *et al*. 2016).

Decreased mental well-being is widespread among diabetics as a result of difficulty coping with the routine that diabetes requires. Neglecting the psychological aspect and not treating psychological and social difficulties causes a higher chance of cardiovascular problems, physical symptoms, and depression among diabetic patients (Chew *et al*. 2014).

Diabetes is a complicated condition that has been connected to a tight relationship with mental illnesses. For instance, those who suffer from depression are more likely to engage in risky activities regarding their health, which may contribute to the development of diabetes (Eriksson *et al*. 2008, Hoerster *et al*. 2019). Because of this, depression is a risk factor that plays a more important part in the development of type 2 diabetes compared to anxiety's impact in the disease's progression (Mezuk *et al*. 2008, Edwards and Mezuk 2012).

There are several challenges facing a diabetic patient that are considered basic requirements for diabetes, such as adherence to treatment and coping with the challenges and distress that occur as a result of complications related to diabetes that affect the physical, social, and emotional aspects and lead to depression (Poretsky 2017).

The kind of diabetes a person has as well as the degree to which they have the condition under control both play a part in the development of psychological anguish. People who have uncontrolled type 1 diabetes, for instance, are more likely to exhibit violent behavior, experience high levels of psychological stress, and have a low quality of life (Vanstone *et al*. 2015). Also, the type of treatment affects the psychological state of the diabetic patient. Patients who have type 2 diabetes, for instance, find that the usage of insulin treatment is a source of trouble for them, especially considering that they rely on oral drugs to manage their glucose level (Peyrot *et al*. 2005).

It has been shown that psychological issues have a substantial negative influence on the quality of life and considerably interfere with increases in the rates of illness and death (Sobel and Markov 2005). In addition to this, they make it more difficult for the diabetic patient to comply with the necessary diabetes management procedures. Accordingly, it is necessary to conduct a routine examination of psychological disorders that accompany diabetes, such as anxiety and depression (Poretsky 2017).

Some medical recommendations overlook patient's psychological requirements. Because of this, there is a greater possibility that one's overall well-being and life's quality may deteriorate (Nicolucci *et al*. 2013, Kalra *et al*. 2013). Problems that the patient is experiencing on a psychological and social level may eventually lead to mental or depressive illnesses, which are linked to a worse quality of life, greater expenses for medical treatment, a higher mortality rate, inadequate self-care, and unfavorable metabolic consequences. In addition, many patients struggle to come to terms with the fact that they will need to take medicine for the rest of their life; as a result, they are unable to effectively self-manage their condition and do not stick to their prescribed therapy (Lustman *et al*. 2000, Ciechanowski *et al*. 2001, Goldney *et al*. 2004, Katon *et al*. 2005, Kumar *et al*. 2008, Young and Unachukwu 2012, Wardian *et al*. 2014). Thus, diabetes is strongly linked to psychological problems, and that diabetics suffer from high psychological stress, which is linked to several factors, such as difficulty controlling glucose levels in the blood, medications, and diet (Kalra *et al*. 2018).

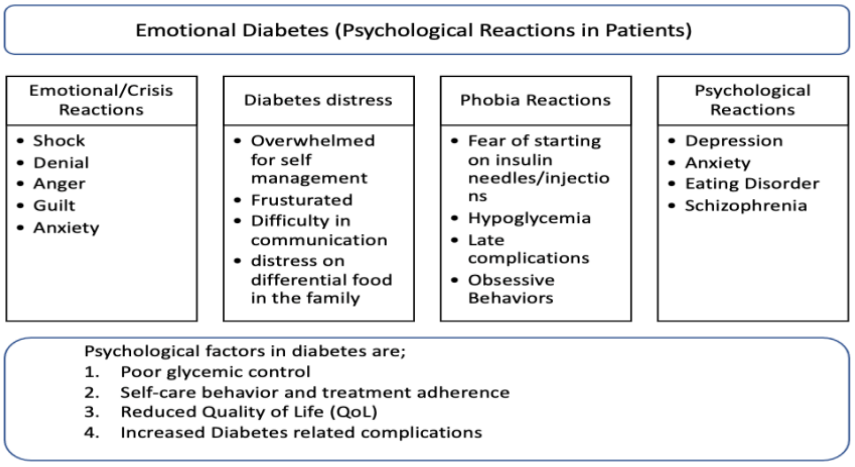

Figure 1.1 Common psychological factors and patients' reactions towards negative outcomes (Kalra *et al*. 2018)

1.10.1 Anxiety among patients with diabetes

Anxiety is defined as a state of mind that is marked by emotions of stress, thoughts of worry, and changes in bodily characteristics such as a rise in blood pressure. People who suffer from anxiety disorders almost always have frequent intrusive thoughts or worries as a symptom of their condition. They may steer clear of certain circumstances due to the anxiety they experience. In addition to this, individuals could have physical symptoms such as perspiring, trembling, feeling faint, or having a heartbeat that is beating too quickly, according to the American Psychological Association (APA 2022). According to the Diagnostic Statistical Manual of Mental Disorders 5, the condition known as generalized anxiety disorder is characterized by basic characteristics such as excessive anxiety as well as worrying about a wide variety of subjects, events, or activities (DSM-5, 2013).

Videbeck (2011) defines anxiety as a reaction to stimuli, either internal or external, and this response may have physical, emotional, behavioral, and cognitive symptoms. He explains that anxiety is a feeling of apprehension and dread that has several levels, which may be mild, moderate, severe, and panic. There are some unusual behaviors that can be demonstrated in people with this disorder, such as panic without reason or unjustified fear.

When compared to those who do not have diabetes, adult diabetic patients have a prevalence of anxiety disorders that is on average 20% higher than the general population (Smith *et al*. 2013, Li *et al*. 2008). There are several aspects that have had a role in increasing the risk of anxiety, such as gender (women are more susceptible to this disorder), other diseases associated with diabetes, and those with long-term diabetes (Asher and Aderka 2018, Huang *et al*. 2020a). Also, complications of diabetes, such as hypoglycemia, which can lead to a diabetic coma or death, play a significant part in elevating the likelihood of experiencing anxiety. Invasive self-care is a common problem for diabetics, as this care requires medical procedures such as injections or the implantation of insulin infusion devices subcutaneously (insulin pumps), as well as monitoring one's own blood glucose levels as part of self-care, all of which increase the risk of developing an anxiety disorder (De Groot *et al*. 2016).

Anxiety is a condition that can be exacerbated by diabetes, as the diabetes-related invasive treatments can trigger phobias such as needle or injection and hypoglycemia phobia. Conversely, one possible contributor to the onset of diabetes is anxiety as a result of its clinical features that are shared with diabetes, such as confusion, increased heart rate, tremors, and sweating, that leads to the failure of anxious individuals to perceive the warning signs that occur in hypoglycemia (Balhara 2011).

Counter-regulatory hormones including glucagon, catecholamine, and glucocorticoids are impacted and triggered when there is psychological stress (Nirupama *et al*. 2018). When these hormones are activated, they interfere with insulin action. As a result, the concentration of glucose increases, which results in poor metabolic and blood glucose management, which is a risk factor for the onset of anxiety and the worsening of its symptoms. In addition to this, there are a number of other characteristics that are known to potentially elevate the likelihood of anxiety, such as low educational level, family history of mental diseases, and nonadherence to medication (Sharma *et al*. 2021).

Emotional stress often occurs among diabetic patients. Because of this stress, anxiety and depression are prevalent disorders, and they have a substantial influence on people's standard of living, especially since the psychological aspect is neglected by family and doctors and they are only concerned with the physical symptoms of the illness (Parasar *et al*. 2017).

Diabetics have a twice-increased risk of experiencing a variety of psychiatric disorders, including anxiety and depression, in comparison to people who do not have diabetes (Dehesh *et al*. 2020, Li *et al*. 2009). The greater the demands that diabetes places on a person, the greater the likelihood of their acquiring anxiety (Mendes *et al*. 2019). For example, patients who use insulin have a higher prevalence of anxiety compared to patients who do not use insulin (Maqsood *et al*. 2017). In addition, habits that are linked to anxiety, such as not engaging in enough physical activity, excessive drinking, and smoking, are risk factors that raise the likelihood of getting diabetes (Praveen *et al*. 2020).

Persons who have diabetes have a greater incidence of anxiety disorders than people who do not have diabetes. In addition to this, research has revealed that the prevalence of anxiety disorders is much greater among those who have a poor level of education as well as among women (Mirzaei *et al*. 2016).

Those pregnant women who suffer from gestational diabetes have high levels of anxiety caused by several factors, such as having had premature ruptures of membranes or miscarriages, having had a previous caesarean section, or having their first pregnancy (Fu *et al*. 2021).

1.10.2 Depression among patients with diabetes

Depression, according to APA, is not just a feeling of sadness; it is the most prevalent psychological condition. Changes in eating and sleeping patterns, a lack of energy or desire, poor concentration, and avoidance of social activities are examples of some of the physical, cognitive, and social alterations that may be experienced by those suffering from depression (APA 2022).

Depression is one type of mental illness that is classified as a mood disorder in which a person lacks life interests and/or feels sad for two weeks or more. This is accompanied by a group of symptoms of depression (at least four), such as changes in concentration, weight, appetite, energy, goals, self-esteem, decision-making, and anhedonia (Videbeck 2011).

Diabetes and its complications place a tremendous mental strain on those who have the disease and contribute considerably to the elevated risk of clinical depression. Especially, those individuals who have not previously been identified as having diabetes have a greater prevalence rate of depression in comparison to patients who have been diagnosed with diabetes. It's possible that this is the outcome of a lot of different things, including not getting enough exercise or eating unhealthy foods. Diabetes has effects on the brain's structure, such as changes in blood flow or brain atrophy. This may also be a factor that contributes to the development of depression, as depression is linked to neurodegenerative processes (Bădescu 2016).

The incidence of depression varies greatly between the various types of diabetes. For example, insulin users with type 2 diabetes have a much greater incidence of depression compared to those with the same diagnosis who rely only on oral drugs or dietary interventions (Hermanns *et al*. 2005, Sunny *et al*. 2019). Therefore, insulin is a heavy burden on a diabetic. Also, people who suffer from frequent hypoglycemia or poor blood glucose control having a greater risk of experiencing symptoms of depression. There is a link between both diabetes and depression, as the use of antidepressant medications can promote the progression of diabetes, whereas the lifestyle changes that diabetes requires are also factors that can contribute to depression (De Groot *et al*. 2016).

Through lifestyle changes and medication, diabetes is often a manageable disease, but its never-ending requirements can cause many stresses on patients, such as modifying the diet, complications of diabetes, exercising, and observing blood glucose levels and these stresses can cause anxiety and depression and thus affect their quality of life and health (Sharma *et al*. 2021).

Reduced self-care, a worse quality of life, and lifestyle modifications brought on by diabetes all raise the risk of depression. There are also social and economic factors that have an impact on the occurrence and development of depression, such as gender, age (women and the elderly), food insecurity, low income, and low occupational status (Shinkov *et al*. 2018).

There is a difference in the incidence of mental illnesses like anxiety and depression among those who have diabetes, with the prevalence of anxiety being significantly greater than the prevalence of depression. Being single is another risk factor for developing depression, in addition to the fact that women, the elderly, and people with low levels of education are more vulnerable than other people to experience depression (Mukrim *et al*. 2019).

There are also chemical elements linked to diabetes, like hypercortisolemia and leptin activity as a result of neurological changes that occur in the endocrine glands. Psychological issues such as stress and behavioral factors like smoking are associated with diabetes. These factors contribute to an increased likelihood of

developing depression. The use of antidepressant drugs such as tricyclic antidepressants in high or moderate doses raises the possibility of developing diabetes when used intermittently or continuously in the long term, as these drugs increase the risk of weight gain and glucose tolerance impairment (Balhara 2011).

Diabetes and depression have a two-way or inverse relationship in which diabetes raises the risk of depression and depression raises the chance of diabetes. The factors related to diabetes and its requirements might raise the possibility of developing depression, such as an increase in health care expenditures, compliance with prescribed treatment, diet, and a decrease in quality of life. Additionally, the chance of getting diabetes may be increased by a number of conditions that are associated with depression. These factors include poor self-care, which may increase the risks of overweight and insulin resistance, as well as biochemical processes that take place as a result of depression or in the treatment of depression. Also, depression may be associated with a high level of glycosylated hemoglobin A1c over time, but this feature may only be for patients who use insulin. Also, depression is also associated with complications that occur as a result of diabetes, like vascular complications (DeFronzo *et al*. 2015).

The occurrence of depression among diabetics has serious consequences, as it can lead to suicide in many cases. There is a correlation between the risk factors that raise the likelihood of depression and the elements that increase one's chances of committing suicide. Some of these risk factors include a low educational level, diseases connected with diabetes, and poor glycemic management, along with other factors such as female gender, previous history of suicide (AbdElmageed and Hussein 2022).

1.10.3 Anxiety and depression in hospitals and outpatient clinics

The commonness of anxiety and depression varies between patients with diabetes who are hospitalized and patients who are outside the hospital (outpatient clinics), where inpatient patients have a substantially larger and more widespread prevalence of both anxiety and depression than outpatient patients do. In hospitalized patients, a

higher risk of anxiety and depression can be attributed to a variety of contributing factors, like immobility, social isolation, and length of one's stay in the hospital, as anxiety increases the longer the hospital stay (AlBekairy *et al*. 2017). Older patients suffer more from depression compared to other ages, and this may be the result of several factors that accompany elderly patients, such as the severity of the disease and low social interactions. Diseases associated with diabetes increase the risk of depression. For example, nephropathy has a significant impact, and this is linked to many factors related to nephropathy, such as adjusting medication doses during hospitalization.

1.11 Definition of coping strategies

Both Lazarus and Folkman define "coping" as continually changing thought and behavioral activities to cope with specific external or internal requirements that are evaluated as exhausting or exceeding the person's available resources. They also classified coping strategies into two categories: The first category includes strategies that focus on the problem, and these strategies include thoughts and behaviors aimed at solving a problem or stressful situation and coping with it effectively. The second category is strategies that focus on emotion, and it includes several strategies such as seeking social help, concentrates on the positive things, blaming oneself and distance, in addition to self-isolation (Lazarus and Folkman 1984).

Subedi defines coping as the ability or skill that allows people to manage or face their difficulties (2016). It is a set of actions and thoughts that a person takes to deal with stressful life events. There are two primary types of coping methods, which are strategies that focus on the problem and strategies that focus on emotion (Huang *et al*. 2020b).

Coping can also be defined by VandenBos (2015) as the ability to manage demands that affect a person's resources or the ability to reduce negative feelings or conflicts that arise due to the effects of stress through the use of behavioral or cognitive strategies. A coping mechanism can also be described as thought processes or a set of

actions that a person uses when facing a stressful situation in his life (VandenBos 2015).

Positive coping is a coping strategy that is targeted to solve the objective problem. It is also considered a problem-focused coping strategy. It consists of following sub-scales of Brief COPE: Active coping, use of instrumental support, positive reframing, planning, acceptance, and religion. Negative coping is a maladaptive coping strategy that is attached to an individual's emotions and modifies his or her experience of situation for reducing tension. It is also considered as emotion focused coping strategies. It consists of following sub-scales of Brief COPE: Self-distraction, denial, use of emotional support, substance use, behavioral disengagement, venting, humor, self-blame (Subedi 2016).

1.12 Types of coping strategies

Lazarus and Folkman (1984) divided coping strategies into strategies that focus on the problem and strategies that focus on emotion. Strategies that focus on the problem are commonly used when the problem is solvable or changeable and the focus is entirely on the suffering. One example of a method that is problem-focused is planning, which is a common strategy through which the necessary steps are taken to face difficulties or challenges, while emotional coping mechanisms are applied when a person views the problem as unchangeable. Avoidance is one example of a strategy that focuses on emotions, in which the person works to avoid the problem instead of finding solutions and answers to it, as well as the distancing strategy that people use to move away and escape from predicaments (Korsah 2015).

Coping strategies can also be categorized as negative and positive strategies (Chýlová and Natovová 2012). Positive strategies help the person to adjust well to the situation that causes strong stress, and this helps to restore emotional balance to the person, such as active coping methods. Therefore, positive coping, active coping, and problem-focused coping have the same goal, which is to adjust well to stressors. While negative coping methods involve the provision of support or help, but only for a little time (on a temporal basis), that is, these strategies do not work to solve

problems permanently, but, on the contrary, can cause problems for people in the end, such as alcohol use. Therefore, the strategies for emotional coping methods, negative coping methods, and passive coping methods are similar in that they are all temporary (Korsah 2015).

There are other types of coping that a person resorts to deal with stressful life events. For example, proactive coping is taking steps or prior action to deal with an event that may cause stress and working to avoid and confront the event before it occurs (Aspinwall and Taylor 1997, VandenBos 2015). Also, there is engagement coping, which is responses that take care of the thinking and emotions of the person and the cause of the stress, and there is disengagement coping, which is responses that are directed away from the person's thoughts and emotions as well as the source of tension. Besides, there is direct and indirect coping, as well as behavioral and cognitive coping (Skinner *et al*. 2003).

Seeking social support is another coping strategy that people use when facing stressful life events, which includes seeking comfort and advice from close people, such as friends, for help in solving problems. This strategy is considered a positive strategy in dealing with problems and negative feelings. It has a beneficial effect on both the mental and physical health of an individual, especially if this support focuses on the problem (Vélez *et al*. 2016).

1.12.1 Emotion-focused coping strategies

Emotionally focused coping skills are those that aim to manage the feelings that are triggered by stressful situations in one's life. These strategies often develop during adolescence. There are two kind of emotion-focused strategies. Active-emotion strategies that focus adaptive regulation of emotions such as the strategy of positive reframing and avoidant-emotion strategies such as the strategy of self-distraction. Emotion-focused coping may involve the use of cognitive or behavioral methods, such as positive reframing and obtaining emotional assistance from family and friends (Ryan 2013).

Emotion-focus coping can also be productive compared to active coping under some circumstances (when stressors in unchangeable) but often it is described as less effective. Self-blame and venting are emotional-focused coping strategies but are considered to typically represent negative coping strategies. This means venting and self-blame are not effective coping strategies for anyone trying to cope with daily stress. Self-blame and venting are associated with higher levels of anxiety, depression, and distress in both clinical and nonclinical samples (Subedi 2016).

Emotion-focused coping strategies gradually reduce feelings of stress and help with relaxation in the short-term. Examples are relaxation techniques, distraction, and deep breathing, and these methods contribute, in some way, to a lessening of the severity of the symptoms that accompany problems (Videbeck 2011).

1.12.2 Problem-focused coping strategies

The causes of stress can be eliminated through individual behavior modification, such as making active attempts to handle stressful events and altering the problematic relationship that exists between the person and their environment, and this is what strategies that focus on the problem represent (Schoenmakers *et al*. 2015). It plays a critical importance part in concentrating on the problem at hand and finding a solution to it by following certain steps. It deals mainly with active methods to discover the source of the problem and then deal with it (Videbeck 2011).

Active coping, planning, acceptance and positive reframing are all considered as the problem-focused or positive coping strategies as these all are known to manage tensions. Resettled Bhutanese used active coping and planning equally, while positive reframing and acceptance were utilized slightly less as means of solving stress or tension. Using positive coping strategies are related to the positive health outcomes, which as a result will increase psychological well-being (Subedi 2016).

1.12.3 Appraisal-focused strategies

Appraisal-focused strategies focus on changing people's thoughts (Hietala 2016). One of these strategies is denial, which can be defined as reducing the size of the problem or not admitting it, such as not admitting drug problems known to everyone (Gorman and Anwar 2014).

There are main differences between strategies that focus on problem, strategies that focus on the emotion, and appraisal-focused. The problem-focused coping deal with the actuality of the stressful circumstance and aim to remove or modify the cause of this tension; the emotion-strategies handle the feelings that are caused by the stressful incident (manage emotions); and finally, appraisal-focused coping, which is focused essentially on appraising and reappraising an event (Skinner *et al*. 2003).

Strategies that focus on emotion deal with feelings rather than the situation itself, and they are effective when dealing with out-of-control situations. One of these strategies is rejection. Conversely, problem-focused coping deal with the situation itself, and their goal is to solve the situation or change the stress source by creating positive attitudes (Muarifah *et al*. 2022).

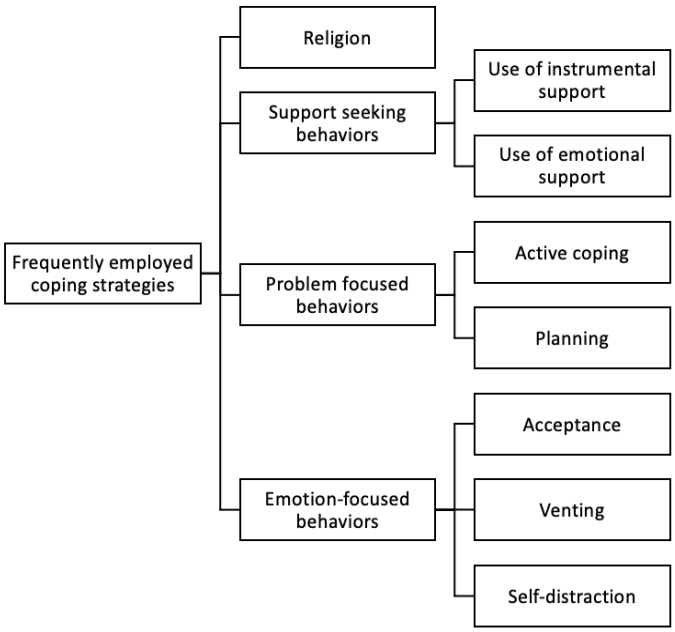

Figure 1.2 Strategies seen in depression and anxiety (Kasi *et al*. 2012)

1.13 The relationship between coping strategies, and anxiety and depression

Chronically ill patients, including those with diabetes have significant challenges that vary significantly depending on the coping methods they choose. Some strategies are commonly used by people, such as religion, acceptance, and active coping. People may use these methods to cope with the stressful occurrences in their lives in order to lower their levels of stress, but not all strategies are helpful. For example, people who resort to religion and spiritual beliefs have contributed to increasing their psychological well-being, while maladaptive strategies may be correlated to the patient's suffering detrimental consequences in terms of their health, like substance use (Kasi *et al*. 2012).

Some strategies promote positive psychological health, while others exacerbate these outcomes and increase stress. Some strategies may depend on other factors, such as personal resiliency (Smith *et al*. 2016). High personal resiliency has a positive effect on task-oriented strategies. This is because high levels of personal resiliency are directly correlated to increased usage of coping strategies based on tasks, this will, in turn, lead to solutions that are more adaptable. Also, high personal resilience had an impact on emotion-oriented strategies, which had a role in increasing negative psychological outcomes, as people who had high personal resilience relied little on these strategies. Besides, high level of personal resiliency is one factor that helps in minimizing the adverse impacts that occur as a result of emotion-oriented strategies on depression (McWilliams *et al*. 2003, Campbell-Sills *et al*. 2006, Smith *et al*. 2016, Konaszewski *et al*. 2021). Avoidance-oriented coping is also a type of strategy that contributes to the alleviation of tension and anxiousness, but this type of strategy works only in the short term such as soon after the stressful event occurs (Suls and Fletcher 1985).

When confronted with difficult life circumstances, people will turn to a variety of coping mechanisms. These mechanisms have either a positive or a negative association with the outcomes. For instance, the strategy of active coping as well as the strategy of seeking social assistance are both positively connected with life satisfaction as well as general health. On the other hand, emotional-focused coping

methods and those that are less problem-focused tend to be related to psychological problems such as anxiety (Chew *et al*. 2020). Also, coping methods based on one's positive emotions, such as humor, acceptance, and positive reframing, contributed to reducing psychological symptoms and were related to better mental health, while maladaptive strategies such as self-blame were related to poorer mental health (Gurvich *et al*. 2021). Self-perceived effective coping strategies are considered a factor affecting the quality of life and aim to achieve a good mentality (Kristofferzon *et al*. 2018).

According to the findings of a comprehensive study on the coping methods used by diabetes patients, greater levels of social support are linked to less emotional distress. (McCoy and Theeke 2019). They also reported that coping strategies have an impact on psychological health, as problem-focused coping mechanisms were linked to good psychological health outcomes, which result in improved psychological health. On the other hand, emotionally-centered coping mechanisms have been associated with an increased likelihood of both anxiety and depression. In diabetes patients, maladaptive coping mechanisms such as loneliness were connected to a decrease in overall life quality, while avoidance played a role in a worsening of symptoms associated with depression.

According to the findings of other studies, increased social support for diabetics is related to reduced levels of emotional stress (Ramkisson *et al*. 2017). The employment of coping mechanisms that are more emotionally focused has been linked to an increase in both patients' levels of anxiety and depression who have diabetes (Macrodimitris and Endler 2001). Diabetics who have a pessimistic outlook on the disease are more inclined to engage in actions that include avoiding situations or people. These strategies are associated with stressors and more depressive symptoms, while they have less use of strategies that focus on the problem (Shah *et al*. 2012).

Methods of coping that are not problem-focused, such as such as self-blame, were associated with a positive correlation with both anxiety and depression, which means that it contributes to an increase in mental disorders (Kulpa *et al*. 2016). According to the findings of the same study, a negative association was observed between

planning and acceptance on the one hand, and anxiety and depression on the other. In another study, the presence of family support was linked to a reduction in the utilization of emotion-focused techniques and an increase in the use of problem-focused methods. This, in turn, was linked to a reduction in the individuals' overall levels of anxiety (Sari *et al*. 2019). Negative coping mechanisms are more frequently used by individuals suffering from excessive levels of depression and anxiety (Son *et al*. 2016).

Jaser and White conducted research to determine how specific coping techniques affected adolescents with diabetes type 1 in terms of their quality of life, their level of competence, and their metabolic control (2011). Patients who employed techniques that were problem-focused had a higher life quality and more metabolic control than those who utilized other techniques, such as denial (which is a disengagement coping strategy), which has a harmful impact on people's overall quality of life and metabolic control.

An individual's personality traits are important and helpful in coping with the difficulties faced by people with diabetes. Personality traits, such as openness, being careful or diligent, as well as being sympathetic and cooperative, are related to adaptive coping methods like planning and acceptance (Lawson *et al*. 2010).

Focusing on healthy coping techniques improves psychological health and results in an improved standard of living and overall quality of life, reducing negative emotions, and preventing psychological problems like anxiety and depression. Healthy coping includes several areas such as problem-solving, family therapy, and diabetes self-management education (Thorpe *et al*. 2013).

1.14 Coping strategies of diabetic patients

Psychological disorders such as depression are one of the problems that accompany diabetes, especially in those patients who have type 1 diabetes, as they have higher levels of anxiety and depression due to the requirements of the disease, such as insulin injections (de Ornelas *et al*. 2012, Bai *et al*. 2018). Therefore, the assessment

of mental health may play a role in providing psychological and social care and optimal treatment for diabetic patients.

Problem-focused strategies that include religion, acceptance, and positive reframing have positive benefits, according to coping theorists. For example, the religious factor plays a role in reducing the degree of anxiety and depression in diabetic, as well as to enhancing life quality and supporting psychological functions. Finally, it can have a favorable impact on the management of diabetes (Ahmadi and Anoosheh 2011, Amadi *et al*. 2016, Zaki Nejad and Moghaddam 2021, Onyishi *et al*. 2022). The effectiveness of coping strategies varies from culture to culture. For example, the venting strategy (The term "venting" refers to the act of releasing negative emotions through emotional words or physical actions that occur occasionally to attract attention, like screaming) is one of the strategies that focus on emotions that lead to negative health outcomes such as distress, but it may also be useful method in lowering the risk of psychological disorders and contributes to enhancing psychological well-being (Fisher *et al*. 2003, Tuncay *et al*. 2008, Li *et al*. 2012). Also, some strategies may be double-edged. For example, self-blame sometimes stimulates active coping, sometimes leads to feelings of guilt, and increases the risk of depression (Karlsen and Bru 2002). This means that some patients wish to deal actively with diabetes and at the same time blame themselves for not meeting the requirements of this disease. Economic status, educational level, and gender are all considered factors influencing anxiety levels. For example, those with a high monthly income, high educational level, and males have high levels of anxiety, in contrast to those with a low income and low education who resort to using the religious coping strategy, which is a problem-focused strategy that contributes to reducing psychological problems in cultures that have a religious character (Tuncay *et al*. 2008).

Educating and training diabetics, especially adolescents, to use coping strategies contributes to reducing the level of anxiety and depression. The aim of such training is to change negative coping styles into positive and constructive behaviors that lead to increased efficiency. This training resulted in a decrease in glycosylated hemoglobin levels, as well as a reduction in feelings of anxiety and depression. It also resulted in an improvement in self-efficacy, psychological functioning, and

behaviors linked with a high quality of life, such as diet and self-care (Edraki *et al*. 2018).

Improvement of diabetes-related factors such as glycated hemoglobin levels (HbA1C), improved blood glucose levels, improved dietary behavior, and improvement of psychological well-being factors such as decreased levels of anxiety and depression is linked to the use of problem-focused coping strategies (adaptive coping) that aim to eliminate stressors, whereas maladaptive coping strategies, such as self-blame, are linked to unfavorable results for blood glucose levels and psychological well-being, including high levels of depression and anxiety (Knowles *et al*. 2020).

Through the coping strategies that are used to manage diabetes, the disease can be maintained and its impact might be controlled, in addition to improving social and psychological adjustment to the disease. The people who vent their distress related to diabetes vary from culture to culture. For example, some strategies, such as maladaptive emotion-focused coping, which includes avoidance and emotional expression, are considered protective factors, while in many other studies, emotion-oriented coping is not considered to be a preventative but rather a risk factor for depression. Task-oriented coping is a protective factor that reduces depression. Also, in many cultures, the religious factor is considered a positive coping strategy that has a significant impact on psychological functioning, quality of life, and the levels of anxiety and depression (Yasui-Furukori *et al*. 2019).

Adaptive coping can be described as active coping or the use of help, whether this help comes from friends or family, to face and overcome problems. Also, doing positive things through religion is an adaptive coping strategy. This type of coping is necessary for diabetic patients as it helps them engage in healthy activities such as avoiding unhealthy food, encouraging physical activity, and taking pharmacological treatment, and patients who utilize adaptive coping strategies have been shown to have lower levels of anxiety than patients who use non-adaptive coping, which is the practice of illegal activities such as the use of illegal drugs or practicing negative strategies such as rejecting reality or blaming oneself in stressful life situations. This

strategy for dealing with stressful situations is linked to increased levels of anxiety (Napolion *et al*. 2021).

Diabetics who focused on problem-focused strategies and received support from friends were healthier compared to diabetics who used wish-fulfillment coping. Men also tended to use problem-focused strategies more than women. Finally, diabetes education programs play an important role in increasing family and friend support (Kvam and Lyons 1991).

Those diabetic adolescents who experience a good life quality and decreased rates and symptoms of depression are more likely to use principal control coping strategies, such as processes of problem-solving and secondary control engagement coping strategies, such as positive thinking, to manage their condition. This is because primary control coping strategies focus on the individual's ability to exert direct influence over a situation. Despite the fact that avoiding situations and engaging in other types of disengagement as a coping technique correlate to an elevated risk of clinical depression as well as a decreased life quality (Jaser *et al*. 2017).

While strategies that focus on the problem have been linked to positive psychological outcomes and good metabolic control in teenagers diagnosed with diabetes, avoidant coping techniques, particularly those that are focused on feelings, have a negative impact on one's quality of life, raise depressive symptoms, and cause poor social and psychological outcomes in addition to poor glycemic control (Jaser *et al*. 2012).

Diabetic patients' glycated hemoglobin and dietary habits both improved as a result of the employment of adaptive techniques (Hill-Briggs and Gemmell 2007), and controlling blood glucose levels (Murakami *et al*. 2020), which in turn contributed to a high level of life satisfaction.

Utilizing adaptive techniques, such as task-oriented ones, can help diabetic patients feel less anxious. This is one of the benefits that these methods provide. As a result, these types of coping methods are crucial not only for the control of blood glucose but also for the regulation of emotions (Sultan et al. 2008). On the other hand,

unhealthy coping strategies, such those that focus on emotions, have been connected to higher levels of anxiety and despair (Smári and Valtýsdóttir 1997).

Adaptive strategies such as social support, acceptance and planning helped to increase attention to the requirements and management of diabetes, while diabetic patients who tend to use maladaptive strategies such as denial are less interested in the requirements and management of diabetes (Albai *et al*. 2017). Therefore, educating patients to employ adaptive techniques is related with favorable results such as lower levels of anxiety and lower levels of A1C (Grey 2011).

In a study conducted on diabetics, older and less-educated patients used passive strategies, and these strategies were significantly associated with stress, While active adaptation contributed to increasing many positive results, such as good self-efficacy and psychological adjustment among diabetic patients (Samuel-Hodge *et al*. 2008). Active coping, problem-solving, and positive reappraisal are among the adaptive techniques that were substantially linked to reduced HbA1c and lower levels of anxiety and depression, while maladaptive strategies, particularly those that focus on emotions like self-blame, were linked to a lower life quality, a greater level of depression as well as worse metabolic regulation (Graue *et al*. 2004, Abazarian *et al*. 2015, Kraaij and Garnefski 2015).

Nursing interventions such as the provision of advice and encouragement on coping strategies, contribute to reduce psychological distress among patients with diabetes (Cossette *et al*. 2002). Attentions by the nurse to the psychological aspect of patients who are admitted to the hospital and follow-up on their condition after their discharge from the hospital contribute positively to the continuation of health care and the reduction of anxiety and depression (Cossette *et al*. 2015). Thus, focusing on psychological aspects of chronical illnesses might facilitate patients' both physical and psychological well-being.

2. METHODOLOGY

2.1 Study design

The present study used a descriptive correlation research design in which anxiety and depression symptoms among diabetics and the relationship between these symptoms and coping strategies are described. The study was carried out cross-sectionally during the 2021–2022 period in Kirkuk, Iraq.

2.2 The sample

The sample was selected using nonprobability sampling (convenience sample). The study sample consisted of 180 diabetic patients. The sample size was determined by Raosoft software, which includes a statistical equation (Richard Geiger's equation) with a confidence interval of 95% and an acceptable error of 5%, knowing that the number of patients who visit hospitals was 280, as determined by the statistics department in the hospital, where the patients who follow up on their condition inside the hospital without hospitalization were interviewed by visiting the consultant doctor who works inside the hospital.

2.2.1 Sampling inclusion criteria

- The participant should be 18 years of age or older.
- Acceptance of the study's participation (voluntarily).
- Diabetes diagnosis (type 1 and type 2) for at least 1 year.

2.3 Data collection

This study was conducted in Kirkuk General Hospital and Azadi Teaching Hospital, which are among the main hospitals in the city of Kirkuk, Iraq, and are considered public hospitals that include all specialties and departments. This study was conducted during the Corona pandemic, so there are some limitations in this study,

such as the difficulty of communicating with patients. For the purpose of data collection, a face-to-face questionnaire was used. This questionnaire includes three parts:

2.3.1 Socio-demographic data

The first part includes the fundamental socio-demographic variables, which are as follows: age, gender, marital status, educational level, monthly income, and housing situation. This part also includes information related to diabetes, which are the diabetes type and the history of diabetes. As these factors are closely related to a decrease or increase in the level of anxiety and depression and have an effect that is reflected positively or negatively on the patient (Asher and Aderka 2018; AbdElmageed and Hussein 2022; Camara *et al*. 2015).

2.3.2 Coping orientation to problems experienced inventory (Brief-Cope)

Carver (1989) developed the original COPE Scale for assessing coping strategies. It includes 15 coping strategies (subscales). Each strategy includes 4 items. Subsequently, this scale was shortened in 1997 to include 14 coping strategies, each of which includes 2 items. The COPE was rated on a four-point Likert scale. The scores are ranging from 1 (which represents that I haven't been doing this at all) to 4 (which represents that I've been doing this a lot) (Carver 1997).

The Arabic version of COPE was adapted by Jaber (2012). Since the internal consistency reliability of four subscales (acceptance, venting, denial, and humor) was less than 0.50, they were removed from the Arabic version. Factor analysis of the remaining subscales was resulted in four factors. The first factor, seeking support coping strategies, encompasses all of the components of instrumental support, emotional support, and self-distraction, in addition to one item of religion. The second factor, active coping strategies, includes items of active coping, items of planning, and one item of religion, in addition to one item of positive reframing. The third factor, which is referred to as non-problem-focused coping techniques, comprises items of self-blame and items of behavioral disengagement, in addition to

one item of positive reframing. The fourth factor is called substance use. This factor comprises the two components of substance use (Jaber 2012).

Table 2.1 Cronbach's alpha of COPE (Jaber 2012)

The factor	Number of items	Cronbach's Alpha
Seeking support coping	7	0.82
Active coping	6	0.79
Non problem focused coping	5	0.67
Substance use	2	0.70

The test-retest reliability ranged from .74 to .83 (Jaber 2012), which demonstrated that the Arabic version of the Brief COPE is a valid and reliable instrument that the Iraqi people can use to measure coping methods (See Appendix 1).

Table 2.2 Cronbach's alpha of current study (COPE)

The factor	Number of items	Cronbach's Alpha
Seeking support	7	0.88
Active coping	6	0.83
Non problem focused coping	5	0.78
Substance use	2	0.91

2.3.3 The Hospital anxiety and depression scale (HADS)

It is a self-administered scale to determine whether or not they are suffering from anxiety or depression and is used as a means to identify patients who need assistance and further psychological evaluation. This scale is applicable in a wide variety of settings, such as hospitals, clinics, and communities. This scale was developed by Zigmond and Snaith in 1989.

It consists of 14 questions, seven of which are designed to evaluate anxiety, and seven of which are designed to evaluate depression. This scale reflects the patient's condition and mood in the past week. Both anxiety and depression are measured on a scale with four points (from 0: no not at all to 3: yes definitely). Two items of

anxiety and four items of depression were reverse (from 3 no not at all to 0 yes definitely). For both anxiety and depression, the total score can vary from 0 to 21, with mild being 8-10, moderate being 11-14, and severe being 15-21. Higher scores reflect higher distress level (Stern 2014, Zigmond and Snaith 1983).

El-Rufaie adapted and translated the Arabic version of HADS into Arabic in 1987. An anxiety-related item, which was "I get a sort of frightened feeling like butterflies in the stomach," is unknown in Arab culture and modified to reflect feelings of tension and fear (Jaber 2012). To determine validity, Cronbach's alpha test was carried out as shown in Table 2.3. One of the items (I can sit at ease and feel relaxed) was removed since it did not have significant correlation with the overall scale.

Table 2.3 Cronbach's alpha of HADS (Jaber 2012)

The subscales	Items	Cronbach's Alpha
Depression	7	0.758
Anxiety	6	0.78

The test-retest reliability varied between 0.62 and 0.69 (Jaber 2012) and the Arabic language version of the HADS is regarded as a valid and reliable instrument that can be used by the Iraqi population to measure anxiety and depression (See Appendix 2).

Table 2.4 Cronbach's alpha of current study (HADS)

The subscales	Items	Cronbach's Alpha
Depression	7	0.71
Anxiety	6	0.71

2.4 Statistical data analysis

Frequencies, percentages, means (M) and standard deviations (SD) were computed to present descriptive statistics. To test the hypotheses, independent samples *t*-test, one-way analysis of variance, Kruskal-Wallis test, and multiple linear regression coefficients were computed. There was no normal distribution for some of the

variables, so a nonparametric test was used. SPSS (ver. 26) was used to analyze the data in the study.

2.5 Ethical principles of research

To facilitate the task of obtaining information from patients, the necessary ethical approval was taken by the Iraqi Ministry of Health/Kirkuk Health Department through an administrative order directed to Kirkuk General Hospital and Azadi Teaching Hospital (See Appendix 3 and Appendix 4). The Turkish Ethical Committee also approved the study (See Appendix 5) and the Iraqi Ethical Committee (See Appendix 6 and Appendix 7). Also, permission was taken from the researcher who translated the COPE scale and the HADS scale into Arabic (See Appendix 8). In order to participate in the study, patients' informed permission is obtained once the researcher has explained the study's goals and procedures to them.

3. RESULTS

The results are presented in three sections. First the descriptive analysis is reported. Then, the anxiety and depression level of the sample and their relationship with demographic variables are presented. Finally, the relationship between variables is presented.

3.1 Descriptive statistics

The number and percentages related to duration of illness, type of diabetes, age, gender, education level, income level, residence and marital status was displayed in Table 3.1.

Table 3.1 Frequencies and percentages of the sample according to the variables (n=180)

Variables	N	%
Duration of diabetes mellitus		
3 years and less	69	38.3
More than 3 years	111	61.7
Type of diabetes		
Type 1	22	12.2
Type 2	158	87.8
Age		
18-29	13	7.2
30-39	13	7.2
40-49	64	35.6
50-59	52	28.9
60 and over	38	21.1
Gender		
Male	82	45.6
Female	98	54.4
Educational		
Uneducated	13	7.2
Primary school	67	37.2
Secondary school	50	27.8
Undergraduate	50	27.8

Monthly income		
Low	86	47.7
Medium	46	25.6
High	48	26.7
Housing		
Urban	58	32.2
Rural	122	67.8
Marital Status		
Married	160	88.9
Single	20	11.1

Table 3.1 shows that more than half (61.7%) of patients had diabetes for more than three years (N=111) while 38.3% of participants had a disease duration of 3 years and less (N= 69). There are 12.2% of people in our study who have type 1 diabetes (N=22) while the number of participants who have type 2 diabetes is 87.8% (N=158). The ages of patients are classified into five groups. The majority of participants, as seen in the table, were middle-aged, between the ages of 40 and 49 (N = 64, 35.6%) and 50 and 59 (N = 52, 28.9%). The number of males is 82 (45.6%), while the number of females is 98 (54.4%). Regarding to education level, the number of uneducated diabetic patients is low (N=13, 7.2%). Most of the patients had a primary education level is (N=67, 37.2%), secondary education level is (N=50, 27.8%) or higher education (Undergraduate) (N=50, 27.8%). Most of the participants had a weak monthly income is (N=86, 48.8%), while 25.6% (N=46) of them had moderate and 26.7% (N=48) had a good monthly income. Minority of participants (N=58, 32.2%) reside in rural areas while majority of them (N=12, 67.8%) live in urban areas. Finally, most of the participants (N=160, 88.9%) were married while a smaller percentage of them (N=20, 11.1%) were unmarried.

3.2 Depression and anxiety level of patients

Table 3.2 shows a descriptive analysis of the anxiety among diabetic patients. The mean anxiety was 8.76 and standard deviation 3.38.

Table 3.2 Descriptive statistics of anxiety

Variable	N	Minimum	Maximum	M	SD
Anxiety	180	.00	3.00	8.76	3.38

Table 3.3 shows that 44.4% of patients have mild anxiety and represent the largest number of patients, and that 24.4% of patients have moderate anxiety, and 5.1% of patients have severe anxiety, while 26.1% of the patients did not have anxiety.

Table 3.3 Frequency and relative distributions of the patients according to the level of anxiety

Anxiety level	Anxiety scores	Number of patients	Percentage
Normal	0-7	47	26.1%
Mild	8-10	80	44.4%
Moderate	11-14	44	24.4%
Severe	15-21	9	5.1%
Total		**180**	**100%**

To identify the depression level of patients, we computed mean scores. Table 3.4 shows a descriptive analysis of depression. The mean of anxiety was 8.57, and the standard deviation was 3.71.

Table 3.4 Descriptive statistics of depression

Variable	N	Minimum	Maximum	M	SD
Depression	180	.00	3.00	8.57	3.71

Table 3.5 shows that 35.6% of patients have mild depression, 19.4% of patients have moderate depression, and 4.4% of patients have severe depression, while 40.6% of the patients did not have depression.

Table 3.5 Frequency and relative distributions of the patients according to the level of depression

Depression level	Depression scores	Number of patients	Percentage
Normal	0-7	73	40.6%
Mild	8-10	64	35.6%
Moderate	11-14	35	19.4%

Severe	15-21	8	4.4%
Total		180	100%

3.3 The Relationship between socio-demographic and anxiety

Homogeneity of variances is one of the assumptions of t-test and ANOVA. Therefore, before comparing the groups, we conducted a Levene's test of homogeneity of variances. Table 3.6 shows the findings of Levene's test of homogeneity for variances. The findings revealed that age, gender, monthly income, educational qualification, marital status, diabetes type and disease duration are all homogeneous. As for housing, the Levene's test result showed that it is not homogeneous, and accordingly, the value of the t-test was chosen in the case that the variable was not homogeneous (equal variances were not assumed).

We have carried out a number of t-tests and ANOVAs as part of our investigation into whether or not the levels of anxiety exhibited by patients are influenced in any way by the sociodemographic characteristics of the patients, as shown in Table 3.6.

Table 3.6 The anxiety level of participants according to socio-demographic data

Variables	**N**	**M ± SD**	**Levene's test**		**Statistics**	**Value**	**p**
			f	**p**			
Type of diabetes							
Type 1	22	10.31±3.42	0.182	0.670	*t*-test	2.324	0.021*
Type 2	158	8.55±3.33					
History of the disease							
3 years and less	69	6.92±3.40	0.933	0.335	*t*-test	-6.352	0.000
more than 3 years	111	9.91±2.83					
Gender							
Male	82	8.40±3.07	0.444	0.506	*t*-test	-1.324	0.187
Female	98	9.07±3.60					
Housing							
Rural	58	8.13±3.79	4.706	0.031	*t*-test	-1.618	0.109
Urban	122	9.06±3.14					
Marital status							
Married	160	8.65±3.31	1.075	0.301	*t*-test	-1.311	0.191
Single	20	9.70±3.86					
Monthly income							
Low	86	9.32±3.24	0.167	0.846	One-way ANOVA	5.873	0.003
Medium	46	9.17±3.43					
High	48	7.37±3.23					

Educational levels							
Uneducated	13	9.15±3.50	0.279	0.841	One-way ANOVA	2.584	0.005
Primary	67	9.52±3.53					
Secondary	50	8.60±3.02					
Undergraduate	50	7.82±3.32					
Age							
18-29	13	10.15±2.79	1.173	0.324	One-way ANOVA	5.066	0.001
30-39	13	8.84±4.45					
40-49	64	7.34±3.30					
50-59	52	9.61±3.06					
≥60	38	9.50±3.02					

There are statistically significant distinctions between the different types of diabetes and the levels of anxiety that people experience. The findings indicated that individuals with type 1 diabetes experience a higher level of anxiety in comparison to people with type 2 diabetes. There are significant differences between the duration of the disease and anxiety, as anxiety is more among patients who have suffered from diabetes for more than three years (M = 9.91, SD = 2.83) compared to diabetic people who have had the condition for less than three years (M = 6.92, SD = 3.40). For housing, the t-test is equal to (-1.618) and the p-value is 0.109, and this value is more than the 0.05 level of significance, which means that there are no significant differences between the degrees of anxiety according to housing. With regard to gender, there are no significant differences in anxiety levels according to gender. The table also shows that there is no significant difference between married and single participants (t = -1.31, p = 0.19). There are significant differences in the levels of anxiety as a result of monthly income, meaning that there is an effect of monthly income on the level of anxiety. That is, the level of anxiety was lower among patients whose monthly income level is high (M = 7.37, SD = 3.23) compared to patients whose monthly income level is low (M = 9.32, SD = 3.24) or medium (M = 9.17, SD = 3.43). Also, there are significant differences in the levels of anxiety according to the education level of participants. The test showed that patients with a graduate level of education (M = 7.82, SD = 3.32) had lower levels of anxiety compared to patients with a primary school education (M = 9.52, SD = 3.53). Finally, there are significant differences in the levels of anxiety as a result of age, meaning that there is an effect of age on the level of anxiety. Participants aged between 40-49 (M= 7.34, SD= 3.30) significantly lower anxiety than participants aged between 18-29 (M=

10.15, SD= 2.79), 50-59 (M= 9.61, SD= 3.06) and participants with 60 years or over (M= 9.50, SD= 3.38).

3.4 The comparison of depression levels according to socio-demographic variables and illness-related data

In order to test the homogeneity of variances assumption for t-test and ANOVAs, we conducted a Levene's test of homogeneity of variances. Table 3.7 shows that each of the following variables is homogeneous: age, gender, educational level, marital status, and type of diabetes. As for housing, the Levene's test showed that it is not homogeneous, and accordingly, the value of the t-test was chosen in the case that the variable was not homogeneous (equal variances were not assumed). Also, the Kruskal test was used to clarify the relationship between monthly income and depression instead of a one-way ANOVA as a result of non-homogeneity. In order to investigate if the depression level of patients differs according to sociodemographic variables, we have carried out groups of t-test, ANOVAs and Kruskal Wallis when the homogeneity of variances assumption is not met. The results are presented in Table 3.7.

Table 3.7 The comparison of depression level according to socio-demographic data

Variables	N	M ± SD	Levene's test		Statistics	Value	p
			f	p			
Type of diabetes							
Type 1	22	10.86±4.01	0.210	0.647	*t*-test	3.158	0.002
Type 2	158	8.25±3.56					
History of the disease							
3 years and less	69	6.71±3.10	6.851	0.010	*t*-test	-5.983	0.000
more than 3 years	111	9.73±3.59					
Gender							
Male	82	7.84±3.40	2.808	0.096	*t*-test	-2.468	0.015
Female	98	9.19±3.86					
Housing							
Rural	58	7.41±3.16	4.479	0.036	*t*-test	-3.169	0.002*
Urban	122	9.13±3.83					
Marital status							
Married	160	8.39±3.54	1.512	0.220	*t*-test	-1.894	0.060
Single	20	10.05±4.71					
Monthly income							

Low	86	105.00	6.273	0.002	Kruskal-Wallis Test	18.845	0.000
Medium	46	90.49					
High	48	64.53					
Educational levels							
Uneducated	13	8.76±4.04	0.250	0.862	One-way ANOVA	0.815	0.487
Primary	67	9.07±3.79					
Secondary	50	8.42±3.80					
Undergraduate	50	8.02±3.44					
Age							
18-29	13	10.07±3.70	0.893	0.469	One-way ANOVA	4.679	0.001
30-39	13	9.84±4.91					
40-49	64	7.06±3.71					
50-59	52	9.26±3.20					
≥60	38	9.23±3.20					

The differences between the types of diabetes and the degrees of depression are statistically significant, as shown in Table 3.7. According to the findings, people with type 1 diabetes have more depression than those with type 2 diabetes. There are differences that are statistically significant between the duration of the disease and depression, as depression is more among patients who suffer from diabetes for more than three years (M = 9.73, SD = 3.59) compared to individuals with diabetes who have had it for no more than three years (M = 6.71, SD = 3.10). There are significant differences that are statistically significant between the levels of depression according to gender. From the data above, we note that depression score of females (M= 9.19, SD=3.86) is higher than males (M=7.84, SD=3.40). With regard to housing, the value of the t-test is (-3.169), the p-value is 0.002, and this value is less than the level of significance of 0.05, indicating that there are major variations between the levels of depression due to housing, as we note that the mean degree of depression among residents in the urban area is (9.13), and this degree is higher than the degree of depression among residents in the rural area (7.41). We conclude that those reside in urban areas are more likely to suffer from depression than those who reside in rural areas. For marital status, the table shows that the value of the t-test is equal to (-1.894) and the p-value is 0.060, and this value exceeds the 0.05 level of significance, so there are no correlation between the levels of depression according to marital status. There are differences that are statistically significant in the levels of depression as a result of monthly income, meaning that there is an effect of monthly income on the level of depression. That is, the level of depression was lower among patients whose monthly income level is high (M = 64.53), compared to patients whose monthly income level is medium (M = 90.49) or low (M = 105.00).

Additionally, there are statistically significant disparities in the degrees of depression based on individuals' educational levels. For the educational level, the value of the F-test (one-way ANOVA test) was 0.815, and the probability value was 0.487; this value exceeds the 0.05 level of significance. Therefore, there are no differences between the levels of depression and education. Finally, there are differences that are statistically significant in the levels of depression as a result of age. Participants aged between 40-49 (M=7.06, SD=3.71) had lower depression scores than those aged between 18-29 (M=10.07, SD=3.70), 30-39 (M=9.84, SD=4.91), 50-59 (M=9.26, SD=3.20), and ≥60 (M=9.23, SD=3.20).

3.5 The comparison of coping strategies according to socio-demographic data

Levene's test results showed that each of the following variables was not homogeneous: gender, housing, history of disease, marriage situation, and type of disease. Therefore, the value of the t-test was chosen in the case that the variable was not homogeneous (equal variances were not assumed). The test also showed that each of the following variables: age, monthly income, and educational level are not homogeneous, and for this reason, in place of the one-way ANOVA, the Kruskal-Wallis test was carried out. In order to identify if active coping strategies differ according to sociodemographic and illness-related variables, t-test and Kruskal test were applied.

Table 3.8 shows the comparison of active coping with regard to socio-demographic characteristics.

Table 3.8 The comparison of active coping strategies according to socio-demographic factors

Variables	N	M ± SD	Statistics	Value	p
Type of diabetes					
Type 1	22	10.68±1.46	t-test	-2.220	0.030
Type 2	158	11.62±3.64			
History of the disease					
3 years and less	69	13.46±4.35	t-test	5.685	0.000
more than 3 years	111	10.29±1.98			
Gender					
Male	82	13.09±4.17	t-test	5.823	0.000
Female	98	10.18±1.91			

Housing					
Rural	58	12.17±4.30	t-test	1.561	0.122
Urban	122	11.19±2.95			
Marital status					
Married	160	11.34±3.26	t-test	-1.406	0.174
Single	20	12.85±4.64			
Monthly income					
Low	86	73.17	Kruskal-Wallis Test	27.051	0.000
Medium	46	91.14			
High	48	120.93			
Educational levels					
Uneducated	13	64.15	Kruskal-Wallis Test	16.532	0.001
Primary	67	77.63			
Secondary	50	93.44			
Undergraduate	50	111.66			
Age					
18-29	13	109.00	Kruskal-Wallis Test	45.749	0.000
30-39	13	99.69			
40-49	64	120.13			
50-59	52	67.61			
≥60	38	62.46			

The results of the independent samples t-test indicate that there is a statistically significant relationship between the types of diabetes, the duration of the disease, gender, and active coping. Patients with type 2 diabetes (M ± S.D=11.62±3.64), males (M ± S.D=13.09±4.17), who have diabetes for 3 years or less (M ± S.D=13.46±4.35), used the active coping strategy more in contrast to those who suffer from type 1 diabetes (M ± S.D=10.68±1.46), females (M ± S.D=10.18±1.91), and those with diabetes mellitus more than three years (M ± S.D=10.29±1.98).

As for housing and marital status, there was no statistical significance between these factors and active coping. Kruskal's test also demonstrated that there is a statistical significance between monthly income, educational level, age, and active coping. The patients who have a high monthly income (M=120.93) and those who have a high (graduated) educational level (M=111.66) and whose ages range between 40-49 (M=120.13) use the active coping strategy more than those who have a medium income (M=91.14), a low income (M=73.17), a low (uneducated) educational level (M=64.15), patients whose ages range between 50-59 (M=67.61), and those who are 60 years and over (M=62.46).

Levene's test results showed that each of the following variables was not homogeneous: gender, housing, history of disease, and marital status. Therefore, the value of the t-test was chosen in the case that the variable was not homogeneous (equal variances were not assumed). The test also showed that each of the following variables: age, monthly income, and educational level are not homogeneous, and for this reason, in place of the one-way ANOVA, the Kruskal-Wallis test was carried out. In order to identify if seeking support strategies differ according to sociodemographic and illness-related variables, t-test and Kruskal test were applied.

Table 3.9 shows the comparison of seeking support strategies with regard to socio-demographic characteristics.

Table 3.9 The comparison of seeking support strategies according to socio-demographic factors

Variables	N	M ± SD	Statistics	Value	p
Type of diabetes					
Type 1	22	12.04±2.14	t-test	-1.991	0.048
Type 2	158	13.86±4.19			
History of the disease					
3 years and less	69	15.65±5.23	t-test	4.885	0.000
more than 3 years	111	12.38±2.3			
Gender					
Male	82	13.91±5.51	t-test	0.783	0.435
Female	98	13.40±2.14			
Housing					
Rural	58	14.74±4.88	t-test	2.277	0.025
Urban	122	13.11±3.46			
Marital status					
Married	160	13.48±3.85	t-test	-1.170	0.255
Single	20	14.90±5.25			
Monthly income					
Low	86	86.66	Kruskal-Wallis Test	13.528	0.001
Medium	46	74.90			
High	48	112.33			
Educational levels					
Uneducated	13	88.19	Kruskal-Wallis Test	1.430	0.698
Primary	67	85.04			
Secondary	50	95.50			
Undergraduate	50	93.41			
Age					
18-29	13	90.46			

30-39	13	72.15	Kruskal-Wallis Test	11.072	0.026
40-49	64	106.59			
50-59	52	84.63			
≥60	38	77.72			

There is statistical significance, as shown by the independent samples t-test between type of diabetes, history of the disease, housing, and active coping. Patients that suffer from diabetes type 2 (M ± S.D=13.86±4.19), patients who live in rural area (M ± S.D=14.74±4.88), who have diabetes for 3 years or less (M ± S.D=15.65±5.23), utilized the seeking support coping strategy more than patients with type 1 diabetes (M ± S.D=12.04±2.14), patients who live in urban area (M ± S.D=13.11±3.46), and those with diabetes mellitus more than three years (M ± S.D=12.38±2.34). The results of the t-test did not indicate the existence of a statistically significant connection between gender, marital status, and the seeking support coping. Kruskal's test also showed that there is a statistical significance between monthly income, age, and seeking support coping strategy. The patients who have a high monthly income (M=112.33), and whose ages range between 40 and 49 (M=106.59) use the seeking support coping strategy more than those who have a medium income (M = 74.90), a low income (M = 86.66), whose ages range between 30-39 (M = 72.15), and those who are 60 years and over (M = 77.72). While the Kruskal-Wallis test did not find any statistically significant associations between both the patient's degree of education and their use of strategies to seek support.

Levene’s test results showed that each of the following variables was not homogeneous: gender, housing, history of disease, and marital status. Therefore, the value of the t-test was chosen in the case that the variable was not homogeneous (equal variances were not assumed). The test also showed that each of the following variables: age, monthly income, and educational level are not homogeneous, and for this reason, in place of the one-way ANOVA, the Kruskal-Wallis test was done. In order to identify if non-problem-focused coping strategies differ according to sociodemographic and illness-related variables, t-test and Kruskal test were applied.

Table 3.10 shows the difference in the use of non-problem-focused coping strategies according to demographic factors.

Table 3.10 The comparison of non-problem focused coping strategies according to socio-demographic factors

Variables	N	M ± SD	Statistics	Value	p
Type of diabetes					
Type 1	22	16.90±2.44	t-test	1.823	0.070
Type 2	158	15.36±3.85			
History of the disease					
3 years and less	69	13.01±4.03	t-test	-7.636	0.000
more than 3 years	111	17.13±2.47			
Gender					
Male	82	14.46±4.47	t-test	-3.556	0.001
Female	98	16.46±2.68			
Housing					
Rural	58	14.81±4.57	t-test	-1.645	0.104
Urban	122	15.91±3.22			
Marital status					
Married	160	15.69±3.54	t-test	1.075	0.294
Single	20	14.45±5.02			
Monthly income					
Low	86	102.73	Kruskal-Wallis Test	21.557	0.000
Medium	46	96.15			
High	48	63.17			
Educational levels					
Uneducated	13	100.50	Kruskal-Wallis Test	12.522	0.006
Primary	67	103.90			
Secondary	50	87.47			
Undergraduate	50	72.97			
Age					
18-29	13	95.46	Kruskal-Wallis Test	43.314	0.000
30-39	13	89.19			
40-49	64	60.32			
50-59	52	106.67			
≥60	38	117.95			

There is statistical significance, as shown by the independent samples t-test between the history of the disease, gender, and non-problem-focused coping strategies. Female (M ± S.D=16.46±2.68), and who have diabetes more than three years (M ± S.D=17.13±2.47), used non-problem focused coping strategy more compared to male (M ± S.D=14.46±4.47), and those with diabetes mellitus for 3 years and less (M ± S.D=13.01±4.03). The results of the t-test did not indicate the existence of a statistically significant link between the different types of diabetes, housing, marital status, and non-problem-focused coping skills. Kruskal's test also showed that there is a statistical significance between monthly income, educational level, age, and a

non-problem-focused coping strategy. The patients who have a low monthly income (M=102.73) and those who have a low (primary) educational level (M=103.90) and whose ages ≥60 (M=117.95) use the non-problem focused coping strategy more than those who have a medium income (M=96.15), a high income (M=63.17), a high (graduated) educational level (M=72.97), patients whose ages range between 40-49 (M=60.32), and 30-39 years (M=89.19).

Levene's test results showed that each of the following variables was not homogeneous: type of diabetes, housing, history of disease, and marital status. Therefore, the value of the t-test was chosen in the case that the variable was not homogeneous (equal variances were not assumed). The test also showed that each of the following variables: age, monthly income, and educational level are not homogeneous, and for this reason, in place of the one-way ANOVA, the Kruskal test was done. In order to identify if substance use coping strategies differ according to sociodemographic and illness-related variables, t-test and Kruskal test were applied.

Table 3.11 shows the difference in substance use according to demographic factors.

Table 3.11 The comparison of substance use according to socio-demographic factors

Variables	N	M ± SD	Statistics	Value	p
Type of diabetes					
Type 1	22	2.09±0.42	t-test	-3.370	0.001
Type 2	158	2.51±1.08			
History of the disease					
3 years and less	69	2.20±0.79	t-test	-2.912	0.004
more than 3 years	111	2.62±1.12			
Gender					
Male	82	2.5±1.16	t-test	0.461	0.645
Female	98	2.42±0.90			
Housing					
Rural	58	2.32±0.86	t-test	139.322	0.195
Urban	122	2.52±1.10			
Marital status					
Married	160	2.50±1.07	t-test	3.095	0.003
Single	20	2.1±0.447			
Monthly income					
Low	86	97.33			
Medium	46	87.62	Kruskal-	6.892	0.032

High	48	81.03	Wallis Test		
Educational levels					
Uneducated	13	93.35	Kruskal-Wallis Test	6.174	0.103
Primary	67	91.16			
Secondary	50	80.98			
Undergraduate	50	98.40			
Age					
18-29	13	80.12	Kruskal-Wallis Test	14.322	0.006
30-39	13	73.50			
40-49	64	82.39			
50-59	52	101.45			
≥60	38	98.54			

There is statistical significance, as shown by the independent samples t-test between type of diabetes, history of the disease, marriage situation, and substance use. Patients that suffer from diabetes type 2 (M ± S.D=2.51±1.08), married (M ± S.D=2.50±1.07), who have diabetes more than three years (M ± S.D=2.62±1.12), tend to substance use more, in contrast to those who suffer from type 1 diabetes (M ± S.D=2.09±0.42), single (M ± S.D=2.1±0.44), and those with diabetes mellitus for 3 years and less (M ± S.D=2.20±0.79). The results of the t-test did not indicate the presence of a correlation that was statistically significant between housing, gender, and substance use. There exists a statistically significant link based on the Kruskal-Wallis test between an individual's age, monthly income, and substance use. The patients who have a low monthly income (M = 97.33) and whose ages range between 50 and 59 (M = 101.45) tend to substance use more than those who have a medium income (M = 87.62), a high income (M = 81.03), and patients whose ages range between 30-39 (M = 73.50) and 18-29 years (M = 80.12).

3.6 The Relationship between anxiety, depression, and coping strategies

The Pearson's correlation coefficients were computed to determine the association between various coping mechanisms and anxiety. Table 3.14 shows whether the coping strategies are associated with anxiety. Multiple linear regression was used to reveal this relationship. According to the results of the Pearson test, there is a statistically significant inverse link between anxiety and the utilization of positive coping mechanisms that are active coping, which is a moderate relationship (-0.432), and seeking support coping, which is a weak relationship (-0.392). There is also a statistically significant and moderately inverse link between anxiety and coping

mechanisms that do not center on the problem (0.529), and a weak inverse relationship with substance use (0.253).

Table 3.12 The Pearson Correlations between anxiety and coping strategies

	1	**2**	**3**	**4**	**5**
1. Anxiety	1.00	-0.432	-0.392	0.529	0.253
p		.000	.000	.000	.000
2. Active coping		1.00	.902	-.910	-.244
p			.000	.000	.000
3.Seeking support coping			1.00	-.879	-.297
p				.000	.000
4.Non-problem focused coping				1.00	.392
p					.000
5.Substance use					1.00

In order to determine whether or not certain types of coping methods might predict levels of anxiety, a multiple regression analysis was carried out. Table 3.15 illustrates the findings of the analysis that was performed.

Table 3.13 Multiple linear regression for anxiety

Variables		**R**	**R^2**	**Adjusted R^2**	**F**		**Beta**	**t**	
					Value	**p**		**Value**	**p**
Anxiety	Active coping	.55	.30	.29	19.24	.000	.11	.626	.532
	Seeking support coping						.25	1.704	.090
	Non-problem focused coping						.64	4.903	.000
	Substance use						.02	.343	.732

The findings of the multiple linear regression analysis indicate that the model is significant (F = 19.24, p=0.000). This indicates that the use of coping mechanisms

does have an impact on anxiety, and through the value of R square, these strategies explain 30.5% of the variation in anxiety (R^2 =.30). The value of beta that illustrates the link between non-problem-focused coping and anxiety is (.64), and the level of significance is (.000). This suggests that there's a clear association between this way of coping and anxiety, meaning that the more the non-problem focused coping strategy is used, the level of anxiety increases, whereas there was no discernible link between other coping mechanisms and anxiety, which shows that it does not have an impact on the level of anxiety, despite the relationship that appeared through the Pearson correlation, as shown in Table 3.14.

The Pearson's correlation coefficients were computed to determine the association between various coping mechanisms and depression. Table 3.16 shows whether the coping mechanisms and depression are linked. Multiple linear regression was employed to reveal this relationship. Considering the outcomes of the Pearson test, there is a statistically significant inverse link between depression and the utilization of positive coping mechanisms that are the active coping (-0.35) and seeking support coping (-0.31). There is also a statistically significant and moderately inverse link between depression and coping mechanisms that do not center on the problem (0.44), and a weak inverse relationship with substance use (0.28).

Table 3.14 The Pearson Correlations between depression and coping strategies

	1	**2**	**3**	**4**	**5**
1.Depression	1.00	-0.35	-0.31	0.44	0.28
p		.000	.000	.000	.000
2.Active coping		1.00	.90	-.91	-.24
P			.000	.000	.000
3.Seeking support coping			1.00	-.87	-.29
p				.000	.000
4.Non-problem focused				1.00	.39
p					.000
5.Substance use					1.00

In order to determine whether or not certain types of coping methods might predict levels of depression, a multiple regression analysis was carried out. Table 3.17 illustrates the findings of the analysis that was performed.

Table 3.15 Multiple linear regression for depression

Variables		R	R^2	Adjusted R^2	F		Beta	t	
					Value	p		Value	p
Depression	Active coping	.48	.23	.21	13.43	.000	.07	.39	.692
	Seeking support coping						.26	1.78	.076
	Non-problem focused coping						.51	3.97	.000
	Substance use						.10	1.36	.176

The findings of the multiple linear regression analysis indicate that the model is significant (F = 13.43 at the level of significance .000). This indicates that the use of coping mechanisms does have an impact on depression, and through the value of R square, these strategies explain 23.5% of the variation in depression (R^2=.23). The value of beta that illustrates the link between non-problem-focused coping and depression is (.51), and the level of significance is (.000). This indicates that there is a significant correlation between this type of coping and depression, meaning that the more the non-problem focused coping strategy is used, the level of depression increases, while other types of coping did not have a significant link with depression, which shows that it does not have an impact on the level of depression, despite the relationship that appeared through the Pearson correlation, as shown in Table 3.16.

4. DISCUSSION

Diabetes, one of the most frequent forms of chronic disease, calls for a high level of self-care on the patient's part. In addition, diabetes is associated with a wide variety of problems, all of which have a negative impact on the patient's physical life. As a consequence of this, those who have diabetes are more likely to suffer from psychological disorders, particularly anxiety and depression. In the course of our research, we wanted to determine the extent to which diabetic patients suffer from anxiety and depression, as well as the coping mechanisms that diabetics employ in order to deal with these psychological disorders, and the nature of the relationship that exists between these coping mechanisms and anxiety and depression.

4.1 The relation between anxiety, depression, and socio-demographic data

This study showed that anxiety among diabetic patients is higher than depression, where the prevalence of anxiety was 73.8%, while depression was 59.4%. These results are consistent with other literature in which anxiety is often higher than depression (Tan *et al*. 2015, Kaur *et al*. 2013). The high incidence of both anxiety and depression seen in diabetic appears to be expected in the light of the psychological stressors imposed by diabetes, such as adherence to treatment, frequent and regular examinations, and dietary patterns, play a role in increasing psychological stressors. In addition, the current circumstances in which the country is experiencing social and economic instability, as well as the lack of psychological counseling services for patients, might contribute to an increase in the rates of psychological disorders. Finally, the poor experience of patients in dealing with life stressors leads to anxiety and depression occurring as a response to these stressors.

The study revealed that anxiety and depression among type 1 diabetics are higher than among type 2 diabetics. This may result from type 1 diabetes requirements such as insulin injections, dietary modifications, and daily monitoring of blood glucose levels. This conclusion is in line with the findings of the study that was conducted by de Ornelas et al. (2013). In that study, the levels of anxiety and depression among type 1 patients were found to be 60% and 52.4% respectively, while the levels

among the type 2 were 43.8% and 38.1%. It seems that the diabetic requirements according to the type of diabetes might increase the burden of the disease as reflected in increased symptoms. The high level of anxiety and depression in type 1 may be attributed to several reasons, as they need insulin injections on a daily basis, which causes physical pain, and this affects their psychological condition.

The findings also pointed to a link between the severity of anxiety and depression and the duration of diabetes. It is common knowledge that anxiety disorders and depressive disorders share a high probability of co-occurrence (Belzer and Schneier 2004), and both of these symptoms are extremely common in diabetics (Rajan *et al*. 2022). Patients who have had diabetes for a longer period of time tend to experience higher levels of both anxiety and depression, and this is in keeping with other literature that has shown the same results (Khan *et al*. 2019). Therefore, it seems important to take into account the psychosocial impact of the chronic conditions such as diabetes.

Concerning age, our research revealed that patients between the ages of 18 and 29 years old have a higher incidence of anxiety and depression than patients in other age groups. Since young patients have more recently been diagnosed with diabetes compared to the older age groups, the adaptation process to the chronic condition might have been continuing for them. Also, this may be the result of the many requirements for type 1 diabetes, in contrast to other studies that showed that the prevalence of anxiety and depression was associated with older age (Mikaliūkštienė *et al*. 2014, Khan *et al*. 2019).

According to the findings of the study, women account for a significantly higher proportion of depressed patients when compared to male patients. This disparity may be attributable to a number of factors that are correlated with gender, such as responsibilities at home, postpartum stress, menstruation, and pregnancy. In general population, females are more prone to depression and anxiety (Deischinger *et al*. 2020, Curran *et al*. 2020). This result is consistent with the findings of other research that came to the same conclusions (Salk *et al*. 2017, Zhao *et al*. 2020, Khuwaja *et al*. 2010). As for anxiety, our study failed to prove a relationship between gender and

anxiety, unlike other studies that have proven that anxiety is higher and more prevalent among women (McLean *et al*. 2011, Maeng and Milad 2015).

According to the findings of our research, there is a link between having a higher degree of education and experiencing anxiety. According to the findings, individuals with diabetes who have completed more education had lower levels of anxiety. In other words, educated patients are less anxious about their condition. It might be possible that they might access more information that lower the uncertainty about their chronic condition and lower the anxiety. It is interesting to note that our study was unable to demonstrate a relationship between the educational level and depression, in contrast to other studies that demonstrated patients with higher levels of education have lower levels of depression (Jain and KaDeangaDi 2020, Mikaliūkštienė *et al*. 2014). It is no secret that study contributes to increasing health information, and therefore the educated person has a clear background about the dangers of psychological problems and thus works to avoid and reduce them.

When compared to diabetes patients who reside in rural areas, the percentage of urban diabetic patients who suffer from depression is significantly higher, and this may be attributed to several reasons related to socio-economic factors, as the cost of living is higher and the level of social communication between people is lower in urban areas. The results of this study are consistent with those found in other research (Tusa *et al*. 2020). As for feelings of anxiety, our research was unable to find any correlation between housing conditions and anxiety, in contrast to other studies that found that feelings of anxiety are more widespread in urban settings (Camara *et al*. 2015). The cost of living in urban areas is high. People who live in these areas need a high monthly income compared to people who live in rural areas, who live a very simple life.

Our study showed that patients with a good monthly income had decreased levels of both anxiety and depression. It's possible that the numerous requirements of diabetes that require high costs are one of the factors that contribute to the widespread prevalence of anxiety and depression among diabetic patients who have a limited monthly budget, such as treatment and frequent visits to outpatient clinics, which

cause psychological stress. Other studies showed the same results as our current study (Rajput *et al*. 2016, Camara *et al*. 2015, Habtewold *et al*. 2016).

As for marital status, studies have shown that married people are less likely to develop depression and that non-marriage is linked to poor mental health. This is completely unlike our study, which demonstrated that there is no link between marital status and having anxiety or depression (Lindström and Rosvall 2012, Tan *et al*. 2015).

4.2 The relation between coping strategies and socio-demographic data

People employ a variety of coping mechanisms; these mechanisms can change and are influenced by a number of factors, including age, gender, monthly income, and other demographic characteristics.

In our study, patients with type 2 diabetes used positive strategies (active coping and seeking support coping) more than patients with type 1, while there was no relationship between the type of diabetes and non-problem focused coping, unlike the Karlsen study, which demonstrated that people with type 1 diabetes frequently employ strategies that do not focus on the problem, including self-blame, while at the same moment they seek out more support (Karlsen 2002). The lack of requirements for type 2 diabetes compared to type 1 makes the person more comfortable and contributes to reducing negative thinking about the disease. Therefore, he does not need to practice a lot of strategies to face these challenges, and therefore he resorts to using more adaptive strategies.

Patients who had diabetes for three years or less used positive strategies (active coping and seeking support), while patients who had diabetes for more than three years used negative strategies (non-problem focused coping). The findings of this study are in line with those of other studies that showed that patients with long-term diabetes resort to using negative strategies that do not focus on the problem, such as avoidance (Hanson *et al*. 1989). As a result of the increased requirements of diabetes with the long duration of the disease and the aggravation of the disease, in addition to

the possibility of complications with the passage of time, all of these factors may contribute to the occurrence of despair and loss of hope in life, and for this reason he resorts to negative strategies.

The findings revealed that women typically utilize non-problem focused coping more than men, which may be a result of women's emotional propensity. This finding is similar with past research that found that women typically use emotion focused techniques more frequently than men (Renk 2003, Sipaviciene 2022).

Also, patients who have a high monthly income use positive strategies (active coping and seeking support) more than patients who have a low monthly income. This finding is in line with the findings of the Gao study, which demonstrated that people with high incomes engage more in the active coping strategy (Gao *et al*. 2016). The emotional nature of women makes them often blame themselves for doing things, and this in itself is a negative strategy, which is self-blame.

Concerning the patient's degree of education, our research revealed that those patients who had a higher level of education utilized positive methods (active coping) more than patients with a low educational level. The findings of this study are in line with those of another study that showed that people with a high educational level tend to use adaptive coping strategies (Roohafza *et al*. 2009).

Middle-aged patients (40–49) use positive strategies (active coping and seeking support) more than elderly patients. This is consistent with other literature which showed that middle-aged patients resort to strategies that deal with problem solving (De Minzi and Sacchi 2005) and that older people tend to use maladaptive strategies (Calderon *et al*. 2021). The elderly may see themselves as being at the end of life and not needing to live longer. They often have thoughts of despair and loss of hope, so they do not resort to positive strategies.

4.3 The relation between anxiety, depression, and coping strategies

Coping mechanisms are recognized as a factor that can have an effect on anxiety and depression, and they play a significant part in the process of either raising or decreasing the severity of these conditions. According to the findings of our research, a negative association exists between positive coping methods (active coping and seeking help) and both anxiety and depression. At the same time, there is a positive association between negative coping techniques (substance use and non-problem-focused coping), and both anxiety and depression. These results are largely consistent, as they mean that the patient's level of anxiety and depression will be lower the more frequently they use active coping and the seeking support coping, and that the level of anxiety and depression will be higher the less frequently they use these. On the other side, an increase in anxiety and depression corresponds to an increase in the use of non-problem-focused coping mechanisms and substance use. These findings are really reasonable, and they are in agreement with other research that has been done in this area of science and that considers the use of negative methods to be a risk factor for both anxiety and depression (Doering *et al*. 2004, Yan *et al*. 2021).

Some studies that also demonstrated that negative coping strategies lead to the development of anxiety and depression and have a negative impact on physical function. In contrast, positive strategies such as active coping have a significant role in reducing these risks (Zhang *et al*. 2009). The employment of coping mechanisms that focused on the problem was also linked to positive psychological and physical health. On the other hand, using negative coping mechanisms was linked to an increased risk of developing depression and its symptoms, as well as a diminished quality of life. Also, social support is linked to improved psychological health (McCoy and Theeke 2019). Therefore, psychiatric nurses might focus on the coping strategies of patients and make interventions to support problem-focused coping strategies and activating social support resources of diabetic patients.

Other studies have also demonstrated that problem-focused strategies are associated with general health, including anxiety and depression. And this is entirely consistent

with our research, which showed that active coping and other positive strategies are linked to an increase in one's mental wellbeing (Duangdao and Roesch 2008).

Pamungkas's study showed that emotional support, especially family support, has a positive effect on mental health (Pamungkas *et al.* 2017). This is completely consistent with our study, which showed that seeking support coping strategy is associated with anxiety and depression. Similarly, McPherson *et al*. (2003) found that there is a relationship between an increase in the use of active coping and a decrease in the level of anxiety. Avoidance seemed to be ineffective for patients, it seems better for the patients to accept their chronical conditions and focusing on actively solving the problems aroused by the illness.

Other studies have shown that non-problem-focused coping strategies, such as self-blame, lead to negative feelings (Martin and Dahlen 2005), anxiety and depression (Garnefski and Kraaij 2007), and distress (Callebaut *et al*. 2017). Also, this is proven by our current study, which showed that there is a relationship between these strategies and both anxiety and depression. Psychiatric nurses could deal with these kinds of negative feelings of patients and help the patients to turn these feelings into self-control. Instead of blaming themselves for their conditions, patients could take responsibility of their health related behaviors.

5. CONCLUSION

The study demonstrated that diabetes patients had an anxiety rate of 73.9% (mild, moderate or severe) and a depression rate of 59.4% ((mild, moderate or severe), which is a worrying finding because it indicates that anxiety and depression are common among diabetic patients. Patients with type 1 diabetes are more likely to experience anxiety and depression than patients with type 2 diabetes. Patients between the ages of 18 and 29 years, patients who have had diabetes for a long duration, patients who have a low monthly income, and patients who have had diabetes for a long duration are also more likely to experience anxiety and depression. Patients who reside in urban regions and women are more likely to suffer from depression than patients who live in rural areas and man. Those with lower levels of education have also been shown to have higher levels of anxiety.

Our research also led us to the conclusion that there is a link between coping mechanisms and both anxiety and depression, since the levels of both disorders were found to decrease when people engaged in positive coping mechanisms (active coping and seeking support strategies). In contrast, the more negative coping strategies the patient used (substance abuse and non-problem-focused coping strategies) in the face of stressful life events, the higher the level of depression and anxiety.

The results of this study indicate the need to pay attention to the psychological aspects of diabetes patients to improve their psychological and physical well-being, especially those who use non-problem-focused coping strategies and substance abuse to deal with stressful life events.

Recommendations

Diabetes has not only a biological impact but also have psychological impact on patients. Given that the biological and psychological factors interact with each other health staff should focus on both sides of the illness. Some recommendations can be resulted from the findings of the current study.

Based on the results of the current research, there is a need for focusing on the psychosocial factors in chronical conditions. We also recommend the more active function of psychological counseling unit for such kind of chronic illnesses with heavy burdens and develop such services in all hospitals and primary care centers. Providing psychological care, especially to patients who appear to have moderate or severe depression or anxiety, and planning activities to alleviate patients' symptoms. Patients should be informed how to confront such chronic disorders and taught how to more actively use positive coping strategies and avoid negative coping strategies.

Patients with low monthly income had higher anxiety and depression. Activating psychological counseling units for patients who are at high risk of anxiety and depression and working to find solutions for low-income patients, such as obtaining free health services, educating uneducated patients when they visit the hospital, and contributing to increasing their health information.

Anxiety and depression were found to be higher among diabetic patients. Therefore, it might help to inform hospital staff about the risks of anxiety and depression among patients. Conducting seminars and scientific lectures for nurses who work in primary health care centers on coping strategies in order to guide and educate patients, improve their coping strategies, and train them to use more effective strategies are also suggested.

Active coping strategies were found to be related lower anxiety and depression. Therefore, directing researchers to conduct more studies on the relationship between coping strategies and anxiety and depression because of its importance and benefit that reflects positively on patients and thus improve their coping strategies and reduce psychological problems such as anxiety and depression. Finally, experimental studies might investigate the effectiveness of intervention programs which focus on strengthening the diabetic patients with more useful coping strategies on depression and anxiety level of patients.

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APPENDICES

Appendix 1. Questionnaire (Socio-demographic data and COPE scale)

Appendix 2. Questionnaire (HADS scale)

Appendix 3. Duty facilitation (The permission-Arabic language)

Appendix 4. Duty facilitation (The permission-Turkish language)

Appendix 5. Turkish Ethical Committee

Appendix 6. Iraqi Ethical Committee (Arabic language)

Appendix 7. Iraqi Ethical Committee (Turkish language)

Appendix 8. The Permission to use the questionnaire

Appendix 1. Questionnaire (Socio-demographic data and COPE scale)

Appendix 2. Questionnaire (HADS scale)

Appendix 3. Duty facilitation (The permission-Arabic language)

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Appendix 8. The Permission to use the questionnaire.

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