T.R.N.C

NEAR EAST UNIVERSITY

INSTITUTE OF HEALTH SCIENCES

Evaluation of Illness Perception and Patient Adherence in Type 2 Diabetic patients at Near East University Hospital in Northern Cyprus

A THESIS SUBMITTED TO THE GRADUATE INSTITUTE OF

HEALTH SCIENCES NEAR EAST UNIVERSITY

BY:

MUSHREF ALMUSHREF

In Partial Fulfillment of the Requirements for the Degree of

Master of Science in Clinical Pharmacy

NICOSIA 2018

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Advisor:

Prof. Dr. Fikret Vehbi Izzettin

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DEDICATION

Dedicated to my great parents, and all of my family

Especially dedicated to my brother Wasseem for his support

Dedicated to two great doctors, you're my second family to me Assoc. Prof. Dr. Bilgen Basgut and Prof. Dr. Fikret Vehbi Izzettin thank you very much for everything you have done, you are role models

I dedicate this work to all kindly friends

Approval

Thesis submitted to the Institute of Health Sciences of Near East University in partial fulfillment of the requirements for the degree of **Master of Science in Clinical Pharmacy**.

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ACKNOWLEDGEMENTS

This work would not have done without the efforts of an educational and psychological support from great doctors

I am very grateful to my advisor **Prof. Dr. Fikret Vehbi Izzettin,** it is my honor to be your student, I have learned a great from your knowledge. I am grateful to know a respectful man who has a great of scientific and humanity experience

I deeply acknowledge **Assoc. Prof. Dr. Bilgen Basgut** the head of clinical pharmacy department of the faculty of pharmacy at Near East University Cyprus for her encouragement throughout my master study thank you a lot my teacher, I learned a lot from you

I am very thankful to **Prof. Dr. Mesut Sancar** for all help in completing this thesis thank you for teaching and helping, I am very grateful to you

Special acknowledgment to my co advisor **Dr. Abdikarim Mohamed Abdi**, who guided me and helped me you are a teacher and friend

Thanks to all friends, who helped and supported me to complete my thesis.

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Abstract

Patients' perception of diabetes and adherence to its prescribed medications is a significant predictor of glycemic control and overall management of the disease. There is a paucity of such information in North Cyprus, hence the importance of this research. This study aimed to explore patients' perception of diabetes, their experience of taking hypoglycemic medications and explore factors that contribute to medication adherence in patients with type 2 diabetes in North Cyprus.

A questionnaire and interviews was conducted with at least 150 patients of type 2 diabetes mellitus (DM2) patients attending Near East Hospital in Lefkosa city between January and May, 2018. Participants were sampled representing different age groups, education levels, and glycemic status, this help to achieve maximum variation sampling. All interviews were conducted using a topic guide and analyzed the data after collecting by SPSS (Statistical Package for Social Sciences) for Windows 11.0 program.

Only 75 patients completed the study, in which thirteen (17%) patients were adherent while sixty two (83%) were non-adherent.

In comparing male and female patients, no significant differences were noted in terms of their illness perception. Patients with higher education level had significantly higher ($p < 0.005$) perception scores illness coherence than only primary school level educated patients, the main causes of T2DM strongly believed were due to genetic factors 42.7%, diet 29.3% and stress 24%.

A significant linear correlation was noted between personal control scores and adherence, the illness coherence scores were also correlated with higher adherence.

The current study has increased our understanding of Cypriot patients' Diabetes perceptions as their illness. Such perceptions are thought to play an important role in the poor adherence to therapies for diabetic patients. Non-adherence was seen in majority of DM patients attending NEUH in Northern Cyprus, with more prevalence in female patients than males. Patients believed on the chronicity of their disease and seriousness of its consequences, yet this couldn't be associated with their medication use behaviors may be due to sample size.

Key Words: diabetes, illness perceptions, medication adherence, Glycemic control, Type 2 diabetes

Content

Chapter 2

Chapter 3 Methodology

Chapter 4 RESULTS

Chapter 5

LIST OF ABBRREVATIONS

S. #	ABBREVATIONS	EXPLANATION
1	ADA	American Diabetic Association
2	IPQ-R	Ilness Perception Questionaire Revise
3	DM	Diabetic Mellitus
4	WHO	World Health organization
5	MMAS	Morisky Medication Adherence Scale
6	PPG	Post Prandial glucose
7	IDDM	Insulin Dependet Diabetes Milletus
8	IDF	International Diabetes Federation
9	TURDEP	Turkish Diabetes Epidemiology Study
10	NIDDM	NonInsulin-Dependent Diabetes Milletus
11	IRB	Institutional Review Board
12	FPG	Fasting Plasma Glucose Test
13	LDL	Low density lipo Protien
14	SPSS	Statistical Package for the Social Science
15	DDI	Drug Drug Interaction
16	EUR	Europe Region
17	UK	United Kingdom
18	PCOS	Polycystic Ovary Syndrome
19	HDL	High Density Lipoproteins

List of Figure

List of Tables

Chapter 1: Introduction

1.1 Diabetes Mellitus (DM)

Diabetes is a chronic disease when the blood glucose is too high, it occurs either when the pancreas does not produce enough insulin or when the body cannot effectively use the insulin it produces. Insulin is a hormone made by the pancreas that regulates blood sugar. It helps glucose from the food to get into body cells to be used for energy. The lack of control of blood sugar leads to high sugar, and according to the world health organization this leads to damage in the body organs such as nerves and blood vessels (World Health Organization, November 2017).

1.2 Epidemiology

Globally, an estimated 422 million adults were living with diabetes in 2014, compared to 108 million in 1980, and the prevalence of diabetes among young people has doubled since 1980 from 4.7% to 8.5% worldwide. This indicates risk factors like obese or being overweight etc.. more associated wıth diabetes. Over the last ten years, diabetes rate has increased more rabidly in low- and middle-income countries than in high-income countries (World Health Organization, November 2017).

The prevalence of diabetes in adults aged 20–79 years was estimated to be 8.8% in 2015 and predicted to rise to 10.4% in 2040.The high prevalence of diabetes in adults has important social, financial and development implications. There is an increasingly urgent need for governments to implement policies to decrease the risk factors for type 2 diabetes and gestational diabetes, and ensure appropriate access to treatment for all people living with diabetes. Tackling the global impact of diabetes is a monumental task and the International Diabetes Federation (IDF) continues to act as an advocate for people with diabetes, by educating both individuals and governments on the steps that can be taken for prevention and management of the disease (Ogurtsova, 2017).

In 2014, 8.5% of adults aged 18 years and older had diabetes. The main cause of 1.6 million deaths ın 2015 was diabetes, and in 2012 was the cause of another 2.2 million deaths. (World Health Organization, November 2017).

The prevalence of diabetes in Turkey is estimated to be 7.2% and the number of adults aged 20 years and over with diabetes to be over 4.5 million by the year 2025 (Satman, 2002).

1.3 Classification of diabetes mellitus

Type 1 diabetes

Type I diabetes, or insulin-dependent diabetes (IDDM) is defined as an autoimmune disease, which means it results from the immune system mistakenly attacking parts of the body. In the case of type 1 diabetes, the immune system incorrectly targets insulin-producing beta cells in the pancreas, it is characterized by the fact that pancreatic cells do not secrete insulin or produce very little, it accounts (5- 10) % of all diabetes cases (Daneman, 2006). This type is often diagnosed primarily in childhood or at age less than 30 year, although it can occur at any age (ADA, 2017).

Type 2 diabetes

Type 2 diabetes also it is called non–insulin-dependent diabetes(NIDDM) is a more complicated condition than type 1 diabetes in which there's a mixture of resistance to the action of insulin in body cells, the body compensates for the ineffectiveness of its insulin by producing more, but it can't always produce enough. With time, the over work placed on the beta cells by this level of insulin production can destroy them and at the end diminishing production of insulin (American Diabetes Association, 2017).

To adjust lifestyle, proper diet with exercise and taking the right medicine for each condition is the best management of type 2 diabetes. So the lifestyle modification should be accompanied by appropriate oral medication for type 2 diabetic patients (Ganesan, 2018).

There are differences between different types of diabetes and the main differences between Type 1 (T1DM) and Type 2 diabetes (T2DM) are shown in table (1).

Table 1: The main differences between type 1 and type 2 diabetes

Type 1 diabetes	Type 2 diabetes
Usually diagnoses in childhood	Usually diagnosed over 30 years old
High level of ketones then normal	Often associated with high blood pressure and/or cholesterol levels at diagnosis
Treatment should be insulin injection	Treatment starts without medication, or with oral antidiabetics + life style change
Not related to excess of body weight	Associated with excess body weigh
Control cannot be without insulin mainly	Control could be from antidiabetics medication mainly

1.4 Oral Antidiabetic Drugs

These drugs are used for type II diabetes mellitus but not for type I diabetes mellitus because they cannot prevent symptomatic hyperglycemia or diabetic ketoacidosis in such patients. These oral medications are divided into groups as shown in table (2).

Table 2: Classification of Oral Antidiabetic Medications

Medical group	Name of the drug
Biguanides	Metformin
Thiazolinedione	Rosiglitazone, pioglitazone
Sulfonylureas	Glipizide, glyburide, gliclazide, glimepiride
Meglitinides	Repaglinide, nateglinide
α-Glucosidase inhibitors	Acarbose, miglitol, voglibose
Sodium-glucose linked transporter inhibitors	Dapagliflozin, canagliflozin
Dipeptidyl peptidase inhibitors	Sitagliptin, saxagliptin, vildagliptin, linagliptin, alogliptin

1.5 Diagnosis of diabetes mellitus type 2

1.5.1 Glycated hemoglobin test

This test is sometimes called the hemoglobin A1C, HbA1c, or glycated hemoglobin test. Hemoglobin is the part of a red blood cell that carries oxygen to the cells. Glucose attaches to or binds with hemoglobin in your blood cells, and the A1C test is based on this attachment of glucose to hemoglobin, so this test measures the average level of glucose in the blood within the last three months. The advantages of being diagnosed this way are that you don't have to fast or drink anything.

If A1C result was less than 5.7% it is normal, 5.7% to 6.4% it is prediabetes, and equal to 6.5% or greater the patient will be diagnosed with diabetes (American Diabetes Association, 2018).

1.5.2 Fasting plasma glucose test

In asymptomatic patients, the American Diabetes Association recommended that if the fasting plasma glucose (FPG) was less than 100mg/dl this mean the result is normal , if FPG between (100mg/dl - 125mg/dl) this is prediabetes ,and if the fasting plasma glucose levels of > 126 mg/dl. (>6.99 mmol/L) be considered diagnostic for diabetes mellitus (American Diabetes Association, 2018).

1.5.3 An oral glucose tolerance test

A helpful test for diagnosing type II diabetes mellitus in patients whose fasting glucose is between 115 and 140 mg/dL (6.38 and 7.77 mmol/L), and for those with a clinical condition that might be related to undiagnosed diabetes mellitus (e.g. polyneuropathy, retinopathy). In this test, a glucose solution containing 75 g glucose is given and blood glucose is measured after 2 hours.

If the result of the analysis is less than 140mg/dl, then the person could be normal, if it is between (149/dl -199/dl) it is prediabetes, and if it was more than 200mg/dl it is considered diagnostic for diabetes mellitus (American Diabetes Association, 2018).

However, various conditions other than diabetes mellitus, such as effects of drugs, and normal aging can cause abnormalities in the oral glucose tolerance test (Curtis, 2001).

1.5.4 Postprandial glucose test (PPG)

It’s done by measuring glucose concentration in the blood after a meal. In general, the concentration of glucose reaches its peak after an hour of eating and then two or three hours after, it returns to its normal value concentration before eating. In non-diabetic people, its concentration rarely exceeds 140 mg. This test determines the absorption of carbohydrates, glucagon and insulin secretion and the associated with glucose metabolism in liver and peripheral tissues, since the absorption of sugar continued for five to six hours after the food, it was necessary to determine the time to do this test, American Diabetes Association determine that the glucose value should not be more than 140 mg/ dl after 2 hours of eating (American diabetic association, 2018).

1.6 Risk Factors for Type 2 Diabetes

The development of type 2 diabetes is related to a person's lifestyle and risk factors. For risk factors, genetic predisposition is one of these factors but cannot be controlled or changed, as well as age and ethnicity, but for the lifestyle, it can be influenced by changing eating habits, weight and physical activity, this helps to reduce the development of Type II diabetes.

Being overweight or obese

The danger of developing type 2 diabetes increases in people who have a body mass index (BMI) > 30 kg/m^2, epidemiological studies show that type 2 diabetes is related to overeating, particularly when coupled with obesity and lack of physical action, so people in middle and older age are more likely to be diabetic if accompanied with obesity. Obesity is the most powerful factor in determining the prevalence of type 2 diabetes globally, accounting for (80-85) % of the total risk of developing diabetes type 2 (Hauner H, 2010).

According to the National institution diabetes and digestive and kidney diseases (NIDDK), losing weight may delay or prevent the disease.

A medical history of diabetes in the family

The genetic factor has a strong role as a risk factor in developing type 2 diabetes, and if you are diagnosed with this disease, there is a good chance that you are not the only one in the family.

According to American Diabetes Association (ADA) the risk of developing type 2 diabetes is as follows:

- **A positive family history in which:**

• If one of your parents was diagnosed with diabetes before the age of 50, the risk of developing your disease is one in seven.

• If one of your parents was diagnosed with diabetes after the age of 50, the risk of developing your disease is one in thirteen.

• If both of your parents were diagnosis of diabetes, the risk of developing will be fifty percent (ADA, 2016).

- **The age of more than 45:** type two diabetes occurs more frequently at the middle-age and older. In the UK, it affects 10 percent of the Population over 65, and above 70 percent of cases of diabetes happened after age 50 years**.**
- **Ethnicity:** Being an South Asian descent, black African descent, African-Caribbean, African American, Alaska Native, Asian American, American Indian, or Hispanic/Latino it gives more risk to have diabetes type 2.
- **Inactivity:** The lack of physical activity will lead to obesity. The more activity, the greater the use of glucose as energy and improve the sensitivity of cells to insulin.
- **Having a high blood pressure:** Hypertension more than 140/90 millimeter of mercury leads to an increased risk of type 2 diabetes.
- **Having a high level of triglycerides, or low level of good cholesterol high density lipoprotien (HDL).**
- **Polycystic ovary syndrome (PCOS):** Is a special case in women and if it occurs, it is characterized by increased hair growth and obesity and increase the risk of diabetes.
- **Existence of a medical a history of heart disease or stroke.**
- **Gestational diabetes:** it raises the risk for having diabetes type 2 later.

Chapter 2:

2.1 Adherence

Adherence can be defined as the extent to which a person behaves towards a number of concepts, for example toward of taking medication, lifestyle changes, adherence to a specific diet (Haynes, 1996).

Regardless of lifestyle adjustments, for acquiring the full therapeutic benefits of the drug, sufficient adherence to medication therapy is required.

Adherence with regard to medication is a serious problem especially for patients with chronic diseases such as T2DM, ischemic heart disease, hypertension, and bronchial asthma. In Malaysia in a primary health clinic a previous work on patients with diabetes mellitus, asthma, and hypertension demonstrated that more than half of the study population was non-adherent to their medication (Aziz, 1999).

The patient's adherence to the therapeutic plan is affected by several factors such as knowledge of the side effects of the disease, the economic factor such as the price of medication, emotional factors (Rubin, 2005).

A number of studies have suggested that age has an effect on drug adherence level (Bartels D., 2004), (Bezie, 2006). However; Race was not clearly associated with adherence to the drug (Osterberg, 2005). Thus; controlling blood sugar is a challenge for older patients (Bezie, 2006) (Turner, 1996).

A study carried in Indonesia showed that among T2DM patients, 49.4% exhibited low adherence, 29.7% exhibited medium adherence, and 20.9% exhibited high adherence to diabetes medication. Adherence to prescribed medication showed a positive effect on diabetes-specific quality of life in patients. While evidence shows that patients with high adherence to medication had an improved quality of life (Alfian, 2016).

Medication use is undoubtedly important in the management of Type 2 Diabetes Mellitus. The effectiveness of diabetes treatment is largely dependent on patient level of adherence to medications prescribed. Adherence is important in chronic diseases that need long-term therapy for a better outcome (Bakar, 2016).

A published study looking at the medical records of a sample of patients with diabetes has shown that patients with a high evaluation of their self-management had lower HbA1c values (i.e., better control of their blood glucose levels) (Heisler, 2003).

2.2 Reasons for Non-Adherence to Drug Therapy

-Forgetting to take the drug (Wroe, 2002).

-Not understanding the instructions.

-Suffering from side effects (sometimes the side effect makes the disease worse) (Bartlett, 2002).

-Physical and chemical properties such as smell and taste of drug.

-Restriction with taking the medicine like (does not drink alcohol or avoided the sun).

-Taking drug very frequently, or taking a lot of drugs (Bangalore, 2007) (Claxton, 2001).

-Denying the disorder (repressing the diagnosis or its significance).

-Believing of uselessness of taking drug (Clifford, 2008).

-Not knowing the duration of the disease may stop the patient from taking the medicine if he thought he cured of the disease.

-Fearing dependence on the drug (Sabaté, 2003).

-Worrying about Costs of treatment (Briesacher, 2007).

-Not caring about getting better.

-Encountering obstacles (for example, having difficulty swallowing tablets or capsules, having problems opening bottles, or being unable to obtain the drug).

-Not trusting the health care team, or bad communication between the patient and health provider (Linn, 2012).

2.3 Results of Non-adherence

The lack of adherence to medicine in general will reflect negatively on the results of treatment, as symptoms will increase and will not be treated. Non-adherence is estimated to result in 125,000 deaths in heart diseases such as (Heart Attack and Stroke) every year. 23% of nursing home admissions, 10% hospital admissions and many doctors' visits, diagnostic tests, unnecessary treatment can be avoided if patients were adherent (Shalini S., 2018).

Non-adherence will worsen the quality of life, for example missed doses can lead to optic nerve damage or maybe blindness in people with glaucoma, and in people with high blood pressure can lead to stroke, cardiac arrest in CVD patients, bacteria resistance if the patient is non-adherent to his/ her antibiotic drug.

Medication adherence is vital for long-term healthcare expenditure. Low medication adherence may account for up to $300 billion of annual healthcare costs in the United States. It has been estimated that up to 50% of patients do not adhere to prescribed medications, defined as taking fewer doses than prescribed or discontinuing treatment. Low medication adherence may compromise the effectiveness of treatment for cardiovascular conditions, such as hypertension, dyslipidemia and hyperglycemia (Hennein, 2017).

Poor adherence is considered a critical barrier to treatment success and remains one of the leading challenges to healthcare professionals. A meta-analysis which includes 21 studies and 46847 participants showed that a consistent association exists between adherence to drug therapy and mortality. Even for participants with good adherence to placebo or beneficial drug therapy, the risk of mortality was about half that of participants with poor adherence (Simpson, 2006).

2.4 Illness Perception

Although patients with type 2 diabetes must take personal responsibility for the management of their illness as carrying exercise, changing their diet, use of oral medications involving self-monitoring of blood glucose and all are involved in education which provides the required knowledge, self-care behaviors are also influenced by beliefs so called illness perceptions regarding type 2 diabetes.

Revised Illness Perceptions Questionnaire (IPQ-R) is a tool created to assess the illness perceptions that could be useful in patients with chronic diseases to customize care plans in order to determine the needs of each individual patient measuring the five components of the illness representation – identity, consequences, timeline, control and cause illness coherence in addition to emotional state (Broadbent, 2006).

The IPQ-R is divided into three sections with the identity and causal dimensions presented separately from the remaining others. In the first section the identity scale is presented with 14 commonly known symptoms (e.g., fatigue, dizziness, etc.) and participants are asked whether or not they believe the symptom to be related to the illness (1 – yes; 0 – no). The sum of the yes-rated items forms the identity subscale of this version. In the following section, consequences, timeline acute/chronic, timeline cyclical, coherence, personal control, treatment control, and emotional representation of the IPQ-R are rated on the original 5-point Likert type scale: from strongly disagree to strongly agree.

38 items were presented with a five-point response scale: strongly disagree, disagree, neither agree nor disagree, agree, and strongly agree. Lastly, in the third section, 18 possible causes of diabetes were listed. Responses were recorded on a five-point scale as mentioned above. The scale was scored accordingly: strongly disagree = 1, disagree = 2, neither agree nor disagree = 3, agree = 4, and strongly agree = 5. Identity was scored as yes or no, where yes = 1 and no = 0 (Mc Sharry, 2011).

The perceptions of disease are among the modifiable factors that have been assumed to influence adaptive behavior in disease. Therefore, illness perceptions studies may help to understand drug adherence among diabetics.

This concept was presented by the Common Sense Model (CSM) of disease perceptions. (CSM) illustrating the role of cognitive perceptions as well as the emotional representation of disease in guiding human adaptation behaviors. CSM affects adaptive behaviors in diabetes and other chronic diseases (M. S. Hagger & Orbell, S. 2003).

In some studies, it was found that the understanding of the disease had a significant influence on the psychological distress of the patient and self-care and other health outcomes of type 2 diabetes (Mc Sharry, 2011).

The association between illness perception and the health outcomes could be due to the fact that engagement in self-care practices involves complex decision making which depends on

the patients' representation of their illness in terms of whether it is controllable, comprehensible, curable, cyclical and severe or not. However, it has been observed among a sample of Ghanaians living with diabetes that their overall illness perception influences their level of psychological distress (Nyarko K., 2014). Other studies have shown that there is a correlation between the understanding of diabetes and self-care (Abraham, 2015) (VanPuffelen et al, 2015). Another study reported that patients' diabetes perceptions affect their adherence to medication, and life style like diet (Osterberg L. et al, 2005). Also, illness perception domains were reported to predict self-management practices of individuals with diabetes in the UK (Abubakari, 2011).

Diabetes knowledge has been identified as one of the key determinants of adherence to diabetes self-care practices. In order to achieve a good outcome of blood sugar control there is an important association between knowledge of diabetes and self care practicing (Schillinger, 2002) (Bains, 2011) (Smalls, 2012).

Providing the patient information and knowledge of his/ her disease is likely to telling the patient how to manage diabetes. Thus, the more knowledge patients have about their illness, the more likely they are to comprehend their illness and take up self-care behaviors such as diet, exercise and blood sugar testing among others. (Schillinger, 2002) (Bains, 2011) (Smalls, 2012).

Patient's perception of their illness is an important variable affecting their health behavior and problem management. Research has indicated that illness perceptions are important determinants of behavior which are associated with adherence treatment and functional recovery (Keogh, 2007).

2.5 Morisky medication adherence scale (MMAS)

Although healthcare professionals may increasingly aware that non-adherence is a significant public health problem, individual patients do not readily communicate their non-adherence without specific efforts to detect levels of adherence. The advantages of the MMAS-4 include its feasibility in all care settings, simplicity, speed and potential enhancement in the validity.

Drug errors of omission could occur in many different ways such as forgetting, carelessness, stopping the drug when feeling better or starting the drug when feeling worse, so the MMAS-

4 was used to measure medication adherence via these parameters. It is a valid scale that comprises the following four items (‘do you forget to take your medicine, do you forget to take your medicine in its time, do you stop taking medication when you feel good, if you feel bad when you take the medicine, will you stop taking the medicine?). Each item is attached to a yes or no response. The possible total score range is from 0 to 4. A score of 0 indicates low adherence, a score of (1-2): indicate medium adherence, a score (3-4) indicate high adherence (Armay et al, 2007). A Turkish version was obtained with permission from the scale copyright owner. This version was found to be reliable and valid among patients with T2DM (Armay et al, 2007).

This scale is used to measure adherence in many clinical cases. Non-adherence to pharmacological and non-pharmacological therapy which includes dietary and physical activity leads to poor glycemic control (Ho P. M. et al, 2006). Items in the scale show the impediments to adherence to drug and allow the health provider to improve compliance.

In the last 50 years, it has been shown that there is a clear overlap between adherence to medication, psycho social and sociological aspects and types of environment support given to the patient (Broadbent, 2006).

Non-adherence to the medication regimen is one of the major problems in the patients' treatment (Aziz, 1999). The clinical importance of non-adherence relates to the degree to which it interferes with the therapeutic goal (Aziz, 1999). Consequently, healthcare providers are becoming increasingly aware of the significance and detection of non-adherence in the long-term management of patients with diabetes.

A study demonstrated that adherence to a diet resulted in a mean HbA1c that was 1.1 percentage points lower (Davidson et al., 2014). Another study carried in Brazil revealed that adherence to insulin therapeutic regimen resulted in lower mean HbA1c values (Gomes, 2016).

A number of studies have suggested that age has an effect on drug adherence (Bartels D. , 2004) (Bezie, 2006). However Race was not clearly associated with adherence to the drug (Osterberg L. &., 2005). Controlling blood sugar is a challenge for the patient (Bezie Y. M., 2006).

Hence this project aims to address the extent of understanding of diabetes and the factors that affect the level of adherence of T2DM patient.

2.6 Role of Pharmacist

The pharmacist's role has changed over the last three decades. Instead of distributing the drug just as it was seen by people, the role of the pharmacist has been related to drug development, After the 1960s, the pharmacist's role has become more focused in the field of clinical pharmacy and more importance in monitoring the treatment of patients. It aims at improving the quality of life of patients, this is done in cooperation with health care workers such as doctors, nurses and others, through this role pharmacist can educate patients their diseases to the potential adverse effects, side effects, interactions, resulting in better outcomes (Schnipper, et al 2006).

Information can be provided to the patient or his / her representative about the use of the drug, its complications, storage, and diet or lifestyle modification. The provision of information can be face-to-face to ensure that the information arrives correctly, and that the patient understands it in the form required to reach the desired results best (Dooley M., 1996).

The pharmacist's role in diabetes care has increased, as the pharmacist can increase the patient's knowledge of the disease and its side effects, especially because of the increase in the drugs used in the treatment, educating the patient how to take the drug correctly, knowing the drug interactions will help in success of the therapy (Schnipper, et al 2006).

The pharmacist's role is important in helping the patient control his illness, although the pharmacist does not play a major role in diagnosing the disease. Patients can contact the pharmacist and ask him questions for more information they did not have asked the doctor or that the pharmacist can contact the patient and give him information. The pharmacist has an important role to play in the patient's counseling and education to help him.

As diabetes is a chronic disease in which patient related factors play an important role in disease controlling, the patient and his family play an important role in the care and i control of the disease. For this in order to achieve targets of therapy its necessary to make educational efforts to help manage the disease and this is a task of all medical care team to give support and increased self-confidence and information related to disease and therapy (Glasgow RE., 1999) (Etzwiler DD.,1997).

One of the most important goals in controlling diabetes is to reduce the risk of complications of the disease and to improve the symptoms that appear on the patient in order to improve the quality of life and reduce mortality. In order to get appropriate care to diabetes and its

complications this required food and exercise modification, appropriate drugs, and appropriate control of blood sugar levels (American Diabetes association, 2004). Studies have shown that controlling blood sugar levels has helped to reduce the complications of diabetes (Testa MA.,1998).

A study in Marmara university in turkey has shown that the pharmaceutical care services delivered by the clinical pharmacist in improving the clinical outcomes of the diabetic patients (Turnacilar, 2009). Also, other similar studies have shown that the clinical pharmacist plays an important role in solving drug related problems and improving the patient's condition in cancer patients with diabetes (Izzettin, 2017).

2.6.1 Essential Components of Diabetic Counseling

I. Counseling regarding the disease:

Diabetes will last chronically with the patients; it needs lifestyle modification beside pharmacological therapies which necessitate from the medical team extensive education sessions focused on educating patients on diabetes as a disease so to positively impact lifestyle and quality of life (william, 2006) (Sisson, E., & Kuhn, C. 2009).

II. Counseling regarding life style modifications:

It includes diet, smoking, alcohol intake, exercise in type 2 of diabetes counseling is offered on carbohydrate, fats and fiber.

Carbohydrates: the pharmacist should explain to the diabetic patient and monitor the amount of carbohydrates that he should take to fit situation and do not exceed the limit.

Fat: since increasing the risk of death in coronary artery disease in diabetics, so you should not eat fat or be replace unsaturated fat instead of saturated fats. In addition, fat will cause obesity because it contains more energy than carbohydrates, proteins and obesity is a risk factor for diabetes, so attention must be paid to the quantity and quality of fat.

Fiber: fiber has benefits as it gives a sense of satiety and reduces the absorption and digestion of complex carbohydrates, so it is useful in the treatment of high sugar, the amount of 15 grams of soluble fiber improved 10% of reducing the level of fasting sugar and LDL cholesterol and glycated hemoglobin, pharmacist suggest eating fruits, and vegetables (william, 2006) (Sisson, E., & Kuhn, C. 2009).

Exercise: according to the American Diabetes Association recommendation of light exercises for a period of 3 or 4 minutes every 30 minutes during prolonged sedentary activities for improved blood sugar management, for people with type 2 diabetes these exercises like overhead arm stretches, desk chair swivels, torso twists, side lunges, and walking in place. These updated guidelines make sure that everyone does these exercises for at least half an hour a day. For pre-diabetic patients advices to combine physical activity and healthy lifestyle changes, or gestational diabetes they are given tips for aerobic exercise most days of the week they help manage the level of sugar in the body.

Smoking: the pharmacist advises to stop smoking that causes hypertension and coronary artery disease and to provide strategies for stopping smoking, particularly people with an age more than 40 year.

III. Counseling regarding medication**:**

The patient must understand at least the following points regarding the medication:

1-Why this medication is prescribed?

2- How to use this medication?

3- When this medication is used?

4-What are the probable side effects of this mediation?

5- Is this medication will be taken before or after the meals?

6- If the patient forgets to take the medication what should he do?

7- How to store this medication?

The pharmacist interventions can improve adherence to diabetes medication by up to 61 percent (Lindenmeyer, 2006).

Chapter 3: Methodology

3.1 Aim and objectives

This study aims to evaluate the disease perception and the patient's adherence of diabetic patients who present to Near East University Hospital. The objectives are to evaluate patient's current knowledge about their illness and determine possible unmet information needs of patients with diabetes; determine the prevalence of non-adherence in diabetic patients to medication and assess the factors associated and demonstrate fields and potential roles that pharmacist can carry to further optimize patient care.

Location of the Study:

This Study was carried out in Northern Cyprus Republic in Lefkosa city at Near East University Hospital.

In order to achieve the aim a descriptive cross-sectional study was conducted between January and April 2018. Permission was obtained to use a Turkish adaptation of 'Illness Perception Questionnaire-Revised', and to use Morisky scale for adherence to apply in the research.

Illness Perception Questionnaire was developed in 1996 by Weinmann et al. and revised by Moss-Morris et al. in 2002. Turkish adaptation of questionnaire was validated by Armay et al. in 2007 as 'Hastalık Algısı Ölçeği'.

The study was conducted using structured questionnaires to collect data. Before conducting the survey, a patient profile were taken, and face-to-face survey was performed with the patient, at first, the patient was asked to accept the survey, after his approval (see appendix1), he was asked the survey questions to answer considering the patient's health status, the survey takes about 10 minutes to be finished, mostly close ended questions were used. According to the sections of the questionnaire, the data were summarized and organized by using descriptive statistics.

The survey sample was 150 patients at the Near East University Hospital they visited in different departments: Cardiology, Respiratory, General Surgery, and Internal Medicine consideration specified criteria.

3.2 Inclusion Criteria

1- Patients who are aged above of 18 years.

2- Patients who have type 2 diabetes.

3- Patients who use at least 1 diabetic medication.

3.3 Exclusion Criteria:

1- Patients who were have a critical disease like cancer.

2- Patients who were mentally ill.

3.4 Sample size and data collection

Forty patients refused admission to the study, while thirty-five patients were excluded due to having one or more exclusion criteria and seventy-five patients were enrolled to the study.

The questionnaire was in Turkish language, and patient approval form was obtained from the patients before interview, the questionnaire consisted of the following three sections:

Section 1:

Patient profile: queries socio-demographic information, such as age, sex, educational level, the number of days spent in the hospital, is there a visit to the hospital in the last six months and comorbidity (see appendix 2).

Section 2:

Patient illness perception: this section includes three parts

Part 1: Consists of 18 questions to understand the causes of the disease according to patient opinion. A 5-point Likert scale of strongly disagree, disagree, neutral, agree and strongly agree were asked on eighteen questions (see appendix 3.1).

Part 2: part two was to know the symptoms that appeared on the patient since the onset of diabetes and whether these symptoms are believed to be due to illness or not. The answers were yes or no for everyone (see appendix 3.2).

Part 3: Part three consists of thirty-eight questions about the patient's view of diabetes to understand the patient's understanding, how the patient feels toward the disease, how the

disease affects his life and whether the patient can adapt to the disease. A 5-point Likert scale of strongly disagree, disagree, neutral, agree and strongly agree were asked on thirty-eight questions (see appendix 3.3).

Section 3:

Morisky adherence scale to know the patient's adherence to treatment consists of four questions and the answers yes or no (see appendix4).

3.5 Statistical analysis

The data collected were analyzed using the Statistical Package of Social Sciences (SPSS) program version 20.0. The methods used to analyze the data include an analysis of descriptive statistic variables such as percentages and frequency for the categorical variables. The continuous variables were expressed by means and standard deviations and analyzed using the Mann–Whitney U test and Kruskal–Wallis test. Level of significance is $p < 0.05$.

Participants were sampled representing different age groups, education levels, number of years since diagnosis with diabetes, and glycemic status, this help to achieve maximum variation sampling.

3.6 Ethical Consideration:

Confidentiality was assured during the study and also patients' privacy. The study was approved by the Near East Institutional Reviews Board (IRB) of Near East University Hospital that assigned this research as being just observational study and just initials were used during the study (see appendix 5).

Chapter 4

Results:

4.1 Patients Profile and Characteristics:

A total of 150 patients were admitted to NEUH during the study period and matched the inclusion criteria, all were invited to participate while only 75 patients (50% response rate) fully completed the survey. The mean (SD) age for patients was 58.69 years old. 34 (45.3%) patients were females and rest 41 (54.7%) were males. 9 (12%) were only able to read and write. 9(12%) were only primary school graduates. 16 (21.3 %) were middle school graduates. 18 (24%) were high school and finally, 23 (30.7 %) were university graduates. the most frequent co-morbidities in these diabetic patients were; heart disease (45.3%), high cholesterol (33%), Anemia (10.7%), ulcer (9.3%), osteoporosis (6.7%), kidney disease (2.7%), and Liver disease (1.3%).

The distribution of patient's characteristics was shown in table (3).

Table 3: distribution of patient's characteristics

Demographic	**N**	**Percentage%**
Gender		
Male	41	54.7
Female	34	45.3
Education		
Able to read and Write	9	12
Primary School	9	12
Middle School	16	21.3
High school	18	24
University	23	30.7
Age		
40-55	29	38.7
56-70	37	49.3
More than 70	9	12

4.2 Patient's Illness perception:

Participants mainly perceived T2DM as being a chronic disease (high timeline IPQ scores 20.5 (11-30)) that has had some serious consequences (high consequence scores 19.8 (14-27)) on their life. Patients perceived themselves to have a high personal ability to control their disease status by their own though relatively lower illness coherence scores are reported by them.

In comparing male and female patients, no significant differences were noted in terms of their illness perception, and all patient responses on illness perceptions are shown in table 4.

Table 4: All patient responses on illness perceptions

	Mean +/- STD (min-max)	Sex	Mean +/- STD	Education	Mean
TimelineAcuteChronic	20.48 +/- 4.3 (11-30)	Female	20.94 +/- 4.3	Able to read and write	20.55 +/- 3.64
				Priamary School	20.44
				Middle school	20.81
		Male	20.10 +/- 4.4	High school	20.0000
				University	20.4545
TimelineCyclic	12.33 +/- 2.0 (8-20)	Female	12.68 +/- 2.2	Able to read and write	12.7778
				Priamary School	11.0000
				Middle school	12.4375
				High school	13.0556
		Male	12.05 +/- 1.7	University	12.1818
Consequences	19.84 +/- 3.2 (14-27)	Female	20.0 +/- 3.34	Able to read and write	19.1111
				Priamary School	19.4444
				Middle school	20.5000
				High school	20.2778
		Male	19.71 +/- 3.16	University	19.3636
PersonalControl	19.53 +/- 3.1 (13-27)	Female	19.21 +/- 3.08	Able to read and write	18.3333
				Priamary School	19.3333
				Middle school	19.1250
				High school	20.2778
		Male	19.80 +/- 3.21	University	19.6818
TreatmentControl	16.61 +/- 3.1 (11-27)	Female	17.24+/-2.98	Able to read and write	16.2222
				Priamary School	14.3333
				Middle school	17.1250
				High school	16.6667
		Male	16.10+/-3.15	University	17.0909
IllnessCoherence	14.47 +/- 4.0 (7-27)	Female	14.75+/- 4.22	Able to read and write	12.5556
				Priamary School	11.2222
				Middle school	14.2500
				High school	14.2222
		Male	14.24+/-3.89	University	16.7273
Emotional	18.20 +/- 3.8 (10-28)	Female	18.38 +/- 3.68	Able to read and write	19.8889
				Priamary School	20.7778
				Middle school	17.1875
				High school	18.5000
		Male	18.05 +/-3.95	University	17.2727

Patients with higher education level had significantly higher perception scores ($P< 0.005$) in illness coherence than primary school level and less than primary school educated patients. The correlations analysis of illness perception scores is shown in the table (5).

Our data indicates a (+) correlation and segment at 0.01 level (2- tailed) between the items of illness perception as followings:

Timeline acute / chronic with consequences ($p< 0.05$), personal control with treatment control and illness coherence, the illness coherence with treatment control, and the data indicates (-) correlation between emotional with personal control and illness coherence calculated as shown in the table (5).

Table 5: Illness perception scores and correlations analysis

	Correlations							
		Timeline Acute/Chronic	Timeline Cyclic	Consequences	Personal Control	Treatment Control	Illness Coherence	Emotional
Timeline Acute/Chronic	Pearson Correlation (r)	1	-.114	**.312****	.077	-.028	.227	.020
	P-value		.331	.006	.509	.810	.050	.862
Timeline Cyclic	Pearson Correlation (r)	-.114	1	-.013	-.166	.088	-.041	.002
	P-value	.331		.913	.156	.451	.729	.988
Consequences	Pearson Correlation (r)	**.312****	-.013	1	.017	-.135	.111	.065
	P-value	.006	.913		.888	.250	.342	.577
Personal Control	Pearson Correlation (r)	.077	-.166	.017	1	**.366****	.315**	**-.237***
	P-value	.509	.156	.888		.001	.006	.041
Treatment Control	Pearson Correlation (r)	-.028	.088	-.135	.366**	1	.293*	-.169
	P-value	.810	.451	.250	.001		.011	.146
Illness Coherence	Pearson Correlation (r)	.227	-.041	.111	**.315****	**.293***	1	**-.306****
	P-value	.050	.729	.342	.006	.011		.008
Emotional	Pearson Correlation (r)	.020	.002	.065	**-.237***	-.169	**-.306****	1
	P-value	.862	.988	.577	.041	.146	.008	
**. Correlation is significant at the 0.01 level (2-tailed).								
*. Correlation is significant at the 0.05 level (2-tailed).								

4.3 The patient's perceptions related to the symptoms of their disease

Patient's perceptions related to the symptoms of their disease were shown in the table (6). The most three symptoms were Fatigue (89.3%), loss of energy (78.7%), headache (72%), also the respondents showed low diabetes identity perception, (mean=4.65, SD=2.1) indicating that they attributed few of the symptoms they experienced to their diabetes and patients show different symptoms to their disease.

Table 6: Symptoms and their relation to disease scores in percentages

	I have had this symptom since beginning of the disease		This symptom related to diabetes	
Pain	yes (37.3%)	no	yes (14.7)	no
Burn in throat	yes (25.3%)	no	yes (6.7%)	no
Nausea	yes (57.3%)	no	yes (34.7%)	no
Difficulty in breathing	yes (32%)	no	yes (14.7%)	no
Weight loss	yes (47.7%)	no	yes (42.7%)	no
Fatigue	yes (89.3%)	no	yes (57.3%)	no
Joint stiffness	yes (30.7%)	no	yes (10.7%)	no
Burning sensation in the eyes	yes (32%)	no	yes (6.7%)	no
wheezy breathing	yes (54%)	no	yes (12%)	no
Headache	yes (72%)	no	yes (40%)	no
Stomach complaints	yes (61.3%)	no	yes (16%)	no
Difficulity in sleeping	yes (60%)	no	yes (29.3%)	no
Dizziness	yes (60%)	no	yes (34.7%)	no
Loss of energy	yes (78.7%)	no	yes (41.3%)	no

4.4 The attitude of respondents on causes of disease

The main causes of T2DM perceived were genetic factors 42.7%, diet 29.3% and stress 24% respectively. Other causes are shown in table (7)

Table 7: Attitude of respondents on causes of disease

	Strongly not believe	**Not believe**	**Normal**	**Believe**	**Strongly believe**
Stress or worry	11 (14.7%)	8 (10.7%)	12 (16%)	26 (34.7%)	18 **(24%)**
Hereditary – it runs in my family	5 (6.7%)	4 (5.3%)	11 (14.7%)	23 (30.7%)	32 **(42.7%)**
A germ or virus	24 (32%)	17 (22.7%)	10 (13.3%)	15 (20%)	9 (12%)
Diet or eating habits	6 (8%)	8 (10.7%)	18 (24%)	21 (28%)	22 **(29.3%)**
Chance or bad luck	23 (30.7%)	10 (13.3%)	10 (13.3%)	15 (20%)	17 (22.7%)
Poor medical care in my past	18 (24 %)	20 (26.7%)	17 (22.7%)	11 (14.7%)	9 (12 %)
Pollution in the environment	23 (30.7 %)	17 (22.7%)	10 (13.3%)	19 (25.3%)	6 (8%)
My own behavior	7 (9.3%)	22 (29.3%)	14 (18.7%)	21 (18.4%)	11 (14.7%)
My mental attitude like as thinking about life negatively	7 (9.3%)	20 (%26.7)	22 (29.3%)	18 (24%)	8 (10.7%)
Family problems or worries caused my illness	17 (22.7%)	17 (22.7%)	18 (24%)	11 (14.7%)	12 (16%)
Overwork	13 (17.3%)	13 (17.3%)	17(22.7%)	15 (20%)	17 (22.7%)
My emotional state like as feeling down, lonely, anxious, empty	14 (18.7%)	18 (24%)	17 (22.7%)	20 (26.7%)	6 (8%)
Ageing	16 (21.3%)	10 (13.3%)	18 (24%)	20 (26.7%)	11 (14.7%)
Alcohol	16 (21.3%)	21 (28%)	7 (9.3%)	20 (26.7%)	11 (14.7%)
Smoking	11 (14.7%)	18 (24%)	15 (20%)	20 (26%)	11 (14.7%)
Accident or injury	**27(36%)**	**27(36%)**	11(14%)	8(10.7%)	2(2.7%)
My personality traits	7(9.3%)	19(25.3%)	24(32 %)	14(18.7%)	11(14.7%)
Altered immunity	6 (8%)	13(17.3%)	24(32%)	17(22.7%)	15(20%)

4.5 Adherence to medication:

Only thirteen (17%) patients were adherent (Morisky Adherence Scale-4 scores = 4) while 62 (83%) were non-adherent (Morisky Adherence Scale-4 scores <4) as shown in figure (1). Reported answers to Morisky Adherence Scale-4 scores are presented in figure (2) Table (8). Around 36% of the patients reported that they forget to take their diabetic medicine; around half (51.0%) of the patients report that they have problems remembering to take their Diabetic medication; 34.7% of the participants report that they discontinued taking their medications without telling their doctor when they felt better upon taking their medications; while finally 37.3% of the participants report that they sometimes discontinue taking their medications without telling their physicians when they feel worse upon taking their medications

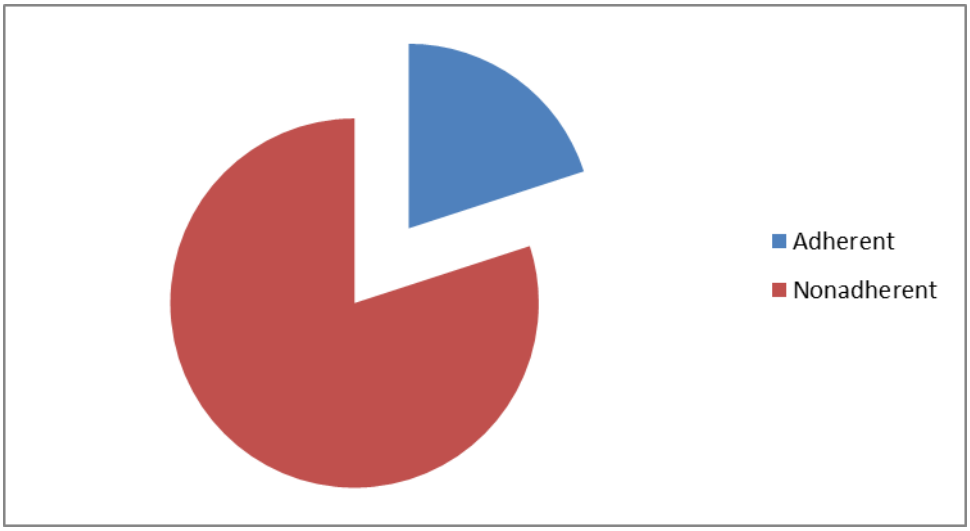

Figure 1: Frequency of Adherence in sampled patients

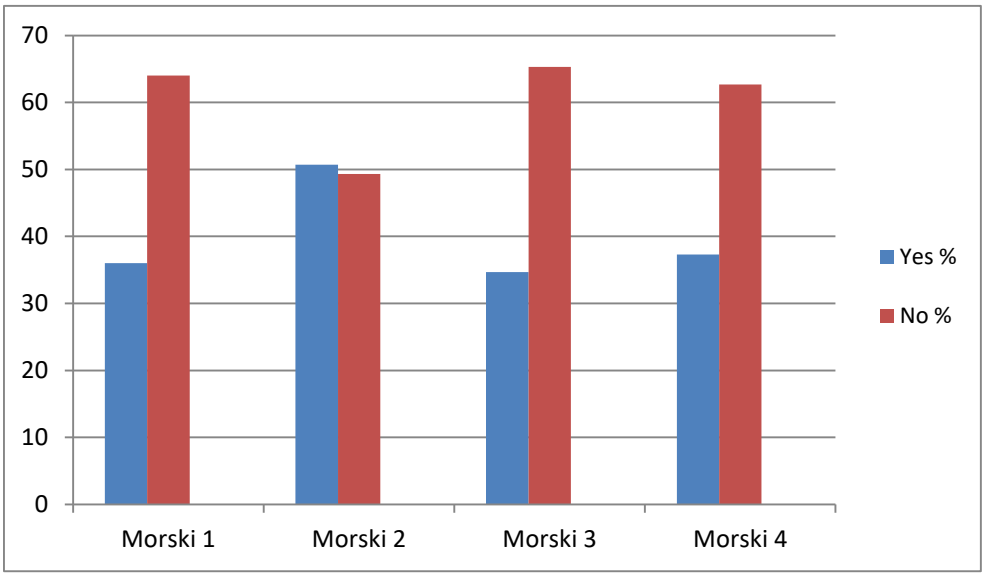

Figure 2: Patient Adherence measured on Morisky Medication Adherence Scale (MMAS)

Table 8: Patient Adherence measured on Morisky Medication Adherence Scale (MMAS)

The Morisky 4-Item Self-Report MEASURE of Medication-taking Behavior [MMAS-4]	**Yes**	**No**
Do you ever forget to take your Diabetic medicine?	27 (36%)	48(64%)
Do you ever have problems remembering to take your Diabetic medication?	38(50,7%)	37(49,3%)
When you feel better, do you sometimes stop taking your Diabetic medicine?	26 (34,7%)	49(65,3%)
Sometimes if you feel worse when you take your Diabetic medicine, do you stop taking it?	28 (37,3%)	47(62,7%)

A significant linear correlation was noted between personal control scores and adherence scores measured on MMAS. Higher Illness coherence scores were also associated with higher adherence (figure 3).

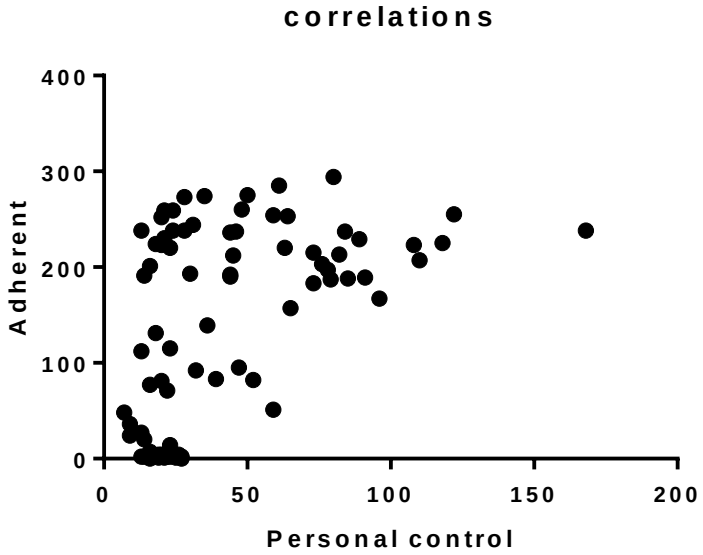

Figure 3: Correlation between adherence and personal control

Chapter 5

Discussion:

Diabetes mellitus as one of the most prevalent chronic diseases emerges as one of the most significant problems facing today's healthcare system in Cyprus, Turkey and all around the world (Wild, 2004).

According to IDF there were 93.200 cases of diabetes in Cyprus in 2017 (International Diabetes Federation, 2018).

However, estimates of diabetes prevalence in 2013 vary widely in the 56 diverse countries in EUR from 2.4% in Moldova to 14.9% in Turkey (Tamayo, 2014).

Despite the presence of effective and beneficial medications current research shows that target glycemic goals are achieved in less than 50% of patients, leading to higher rates of long-term complications increase morbidity and premature mortality, and never the less more burden and increased costs to the healthcare system ((García-Pérez, 2013) (World Health Organization, 2003). Worldwide, high blood glucose kills about 3.4 million people annually. Almost 80% of these deaths occur in low- and middle-income countries, and almost half are people aged less than 70 years.

Across diabetes literature lack of adherence is the main attribute to all these consequences. Reasons for non-adherence are multifactorial including complexity of therapy regimens, polypharmacy, psychological factors, tolerability and cost but never the less illness perception, patient's belief of their medication and safety (García-Pérez, 2013) (Gonder-Frederick, 2002).

In our study most of patients were non-adherent 83%, males are reported to be significantly more adherent compared to female patients, while no significant differences are seen in different age or educational groups.

In the current study the distribution of educational status was 21.3% to middle school level; 24% to high school level; 30.7% to university level, half of the patients were high school and university graduates, yet no significant difference was noted in their illness perception except that illness coherence; in which higher education was associated with more understanding of the nature of the disease.

In our study the sampled patients perceived diabetes to be a disease of chronic nature with serious consequences but could be controlled well with available therapies. This quite resembles results reported from other surveyed European patients and surveyed Iranian group of patients, while differs from Tongo patients who had a more acute perception of their illness and perceived their disease to be more cyclical in nature than Iranians, European patients and Cypriots as the results of the current study indicate (Aflakseir, A., 2012) (Barnes, L., Moss-Morris, R., & Kaufusi, M., 2004).

Yet Cypriots patients tend to be less emotionally distressed by their illness compared to Iranians and Tongo patients while less likely to believe that their treatment could control their diabetes than Iranians and Tongo patients respectively more resembling other European patients beliefs (Aflakseir, 2012) (Barnes, L., Moss-Morris, R., & Kaufusi, M., 2004).

Ongoing research over the past 30 years has demonstrated the importance of illness representations to patient behavior (Petrie, 1997). Changing patients' illness perceptions has been shown to improve recovery following myocardial infarction (MI) (Petrie K. J., 2002), and other self-regulatory interventions in illnesses as diverse as diabetes and AIDS have also improved patient outcomes (Petrie, K. J., & Broadbent, E., 2003).

Therefore for determining patients' illness perceptions about diabetes, we measured patients' perceptions using "Illness perception questionnaire". In the current study, patients got the highest mean score (20.48±4.3) from timeline (acute/chronic) subscale whereas they got the lowest mean score (12.33± 2.0) from timeline (cyclical) subscale. The result of timeline (acute/chronic) subscale indicates that the patients think that diabetes will not recover quickly, it will continue for a long time and it is permanent. Although the mean score of the female was found higher in the timeline (acute/chronic) subscale, no statistically meaningful difference in accordance with sex could be determined. Similarly, in a study done by (Keni, et al, 2017) although the mean score of the female was found higher in the timeline (acute/chronic) subscale, no statistically meaningful difference in accordance with sex could be determined (Keni, et al. 2017).

The result of timeline (cyclical) subscale indicates that the patients believe their illness is cyclical. It can be said that they can think the illness can't be known before, it has good and bad periods, and the symptoms vary from one day to another day and sometimes disappear. Although the mean score of the female was found higher in the timeline (cyclical) subscale, no statistically meaningful difference in accordance with sex could be determined. Similarly,

in a study done by Aflakseir (2012), patients got the lowest mean score (12.87 ±2.55) from timeline (cyclical) subscale (Aflakseir, 2012).

Poor medication adherence in T2D is well documented to be very common and is associated with inadequate glycemic control; increased morbidity and mortality; and increased costs of outpatient care, emergency room visits, hospitalization, and managing complications of diabetes (Polonsky & Henry, 2016).

Adherence is usually regarded as the proportion of patients taking at least 80% of their prescribed medication, but this cut-off can be up to 90% in some studies (García-Pérez, 2013).

Despite the effectiveness of drug therapy in diabetes management, high rates of poor adherence persist (Mann, et al., 2009).

To cut such alarming prevalence of non-adherence multiple interventions including pharmaceutical care services and MTM were proven to be effective, as the introduction of a clinical pharmacist in diabetic patient care in Magusa city of Cyprus was associated with better adherence and HBA1c compared to control (Erku, 2017) (Korcegez, 2017). Extension and continuation of these services not only for the purpose of research is of critical importance for DM patients in North Cyprus.

In our current study No significant differences were also found in males and female illness perceptions.

Of particular significance and attention seeking findings is the prevalence of non-adherence among the surveyed patients. Only 17% were identified to be totally adherent with non-adherence being more prevalent in woman than man as other studies also show ((García-Pérez, 2013) (Hemphill, 2013) (Santos, 2015).

In current study there is a positive correlation ($p<0.01$) between personal control dimension score and treatment control dimension score and this mean there is a positive correlation between patients perception that they can control their disease and the ability of treatment to control the diabetes, also there is a positive correlation ($p<0.01$) between personal control dimension score and illness coherence dimension score, indicating that patients perception that they can control their disease correlated positively to understanding the disease. A negative correlation ($p<0.05$) between personal control dimension score and emotional dimension score also exist which may indicate that patients who were distress emotionally

toward diabetes they showed less control to diabetes. Similarly, in a study done by Akgüç (2013) a positive correlation ($p<0.01$) between personal control dimension score and treatment control dimension score was found. A positive correlation ($p<0.01$) between personal control dimension score and illness coherence dimension score was also found. A negative correlation ($p<0.05$) between personal control dimension score and emotional dimension score was found too (Akgüç, 2013).

In the current study there is a positive correlation ($p<0.05$) between illness coherence dimension score and treatment control dimension score, this mean patient's perception that they understand the diabetes correlated positively with that the treatment can control the disease, and finally there is a negative correlation ($p<0.01$) between illness coherence dimension score and emotional dimension score (patient perceiving that he/she did not understand diabetes was distressed emotionally), similarly a study reported a negative correlation ($p<0.01$) between illness coherence dimension score and emotional dimension score (Akgüç, 2013).

In the current study depending on the patients' answers the 3 most experienced symptoms associated with the beginning of diabetes were found as fatigue (89.3%); loss of energy (78.7%) and headache (72%), these results are comparable to a study done in turkey which showed the 3 most experienced symptoms associated with the beginning of diabetes were found as fatigue (74.6%); loss of energy (57.8%) and pain (41%) depending on patients' answers (İzgi, 2014).

In the current study among the symptoms most frequently reported to be experienced were those associated with the diabetes as fatigue (57.3%); weight loss (42.7%); loss of energy (41.3%); headache (40%) and dizziness - nausea (34.7%), similarly a study in turkey showed that among the symptoms most frequently reported to be experienced were those associated with diabetes as dizziness (52.6%); weight loss (49.4%); loss of energy (47.5%); burning sensation in the eyes (46.8%) and fatigue - burn in throat (45.6%) depending on patients' answers (İzgi, 2014), the respondents showed in current study low diabetes identity perception, (mean=4.65, SD=2.1) indicating that they attributed few of the symptoms they experienced to their diabetes and patients show different symptoms to their disease, similarly in a study carried out in Libya

in our current study we found that most respondents attributed their diabetes to uncontrolled external factors like genetic cause, diet or life style eating habits, actually these two causes are

risk factors to diabetes disease, and also attributed their disease to psychological factors like stress or worry and they did not attribute their disease to injury, accident or pollution of environment. Reassembly, a study in the United States reported heredity, diet and eating habits, and own behavior as the top three perceived causes for diabetes (Hart, 2010).

Another study was conducted at the National Centre for Diabetes and Endocrinology in Tripoli, Libya and the population of the study attributed their diabetes to psychological factor like worry or stress, but they did not attributed to diet and eating habits (Ashur, 2015), also another study carried out in Nepal diabetic status that pollution and immunity were frequently reported as the causes of diabetes, whereas emotional state was among one of the least perceived causes (Kart, 2007).

This study has several limitations of mention is the necessity of obtaining and correlating patients beliefs and illness perception with surrogate outcomes as HbA1C and occurrence of complications, also other factors such as total medications the patient is using and prevalence of DDI in this group wasn't covered which exclude important parameters that could be helpful in describing patients characteristics and analyze their behaviors and perceptions. Also, the small sample size may limit us from extrapolating the study findings to the whole population. Yet the results of this study have several implications. It's the first to explore illness perception of Cypriot patients and thus may help medical practitioners to realize the role of illness perceptions and act on illness perceptions and medication beliefs in order to enhance adherence to DM treatment. The study also highlighted the poor adherence prevalent in Turkish Cypriots which necessitate initialization of suitable interventions within the healthcare system to enhance the adherence of patients to their therapy.

Future studies should focus on interventions to change illness perceptions of Cypriot patients and also shall recruit a larger sample size to further develop associations and develop correlations between adherence and specific illness perceptions, patient's behaviors and medication beliefs (Kucukarslan, 2012).

CONCLUSION

The current study has increased our understanding of Cypriot patients' Diabetes perceptions as their illness. Such perceptions are thought to play an important role in the poor adherence to therapies for diabetic patients. Non-adherence was seen in a majority of DM patients attending NEUH in Northern Cyprus, with more prevalence in female patients than males. Patients believed in the chronicity of their disease and seriousness of its consequences, yet this couldn't be associated with their medication use behaviors due to sample size. Further larger studies should be conducted, and interventions should be employed to cut the high prevalence of non-adherence among the studied group.

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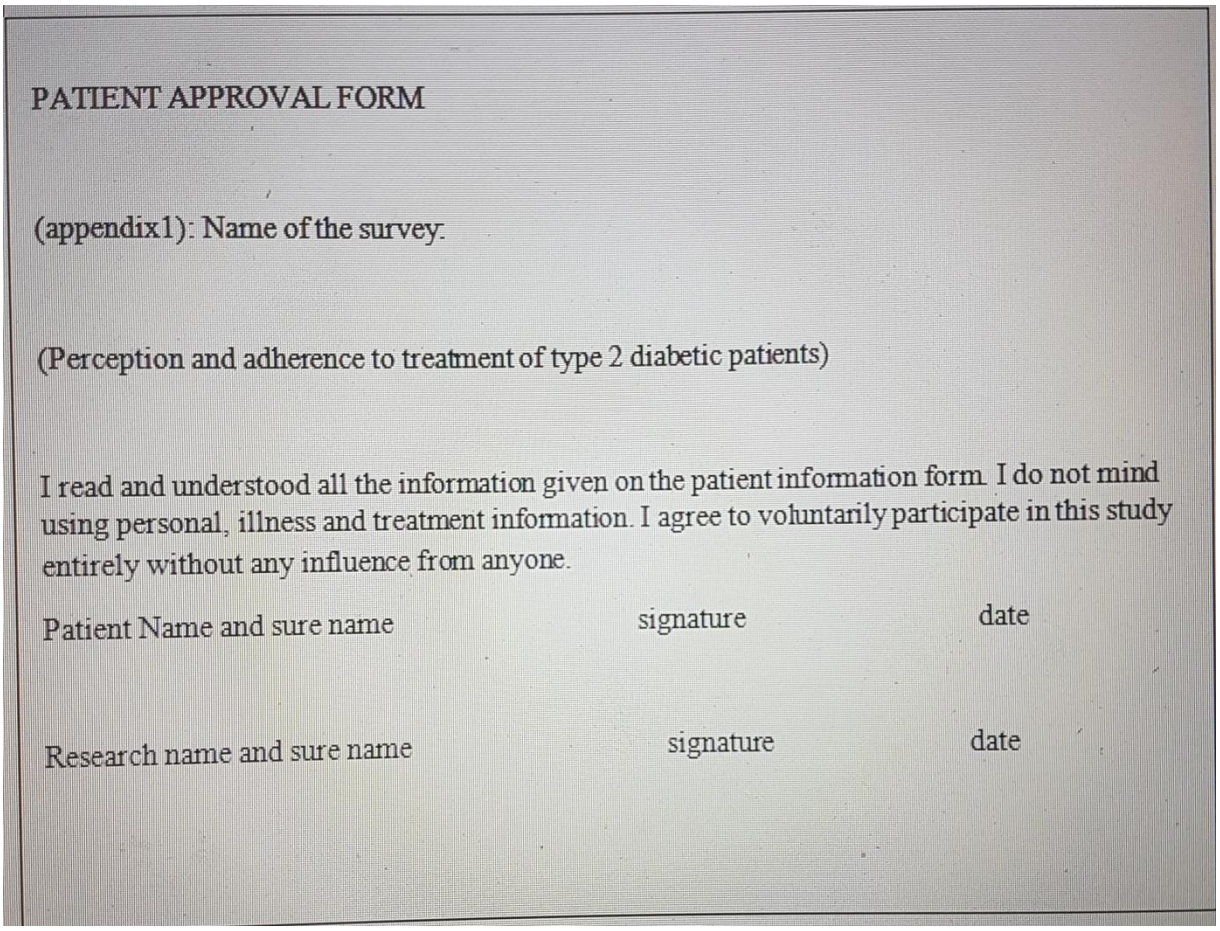
Appendix (1): PATIENT APPROVAL FORM



PATIENT APPROVAL FORM

(appendix1): Name of the survey:

(Perception and adherence to treatment of type 2 diabetic patients)

I read and understood all the information given on the patient information form. I do not mind using personal, illness and treatment information. I agree to voluntarily participate in this study entirely without any influence from anyone.

Patient Name and sure name signature date

Research name and sure name signature date

Appendix (2): sociodemographic of patient's characteristic

PATIENT PROFILE RECORDING				
Gender	☐woman		☐man.	
Education state	☐ Can read and write	☐ primary school	☐ Middle school	
	☐ high school	☐university	☐Post graduate master/doktora	
Birth day	...			
Past disease history	☐ high cholestrol	☐ Diyabet	☐ heart disease	☐chf
	☐ Ülser	☐ kidney disease	☐ liver disease	☐canser
	☐Anemia	☐Depreesion	☐ Mental disease	☐Osteoporoses
	☐other			
Clinic department				
Total number of days in hospital				
Hospitalization story in the last 6 months				

Appendix (3.1): CAUSES OF DISEASE

What is the reason for your sickness in your opinion ? There is no correct answer to this question because everyone is different. Here is a list of possible causes of your illness. Please indicate each of the reasons for reading the cause and whether the cause of the illness has caused it to occur by marking the appropriate box (X).

1. I strongly do not think so 4. I think so

2. I do not think so 5. I strongly think so

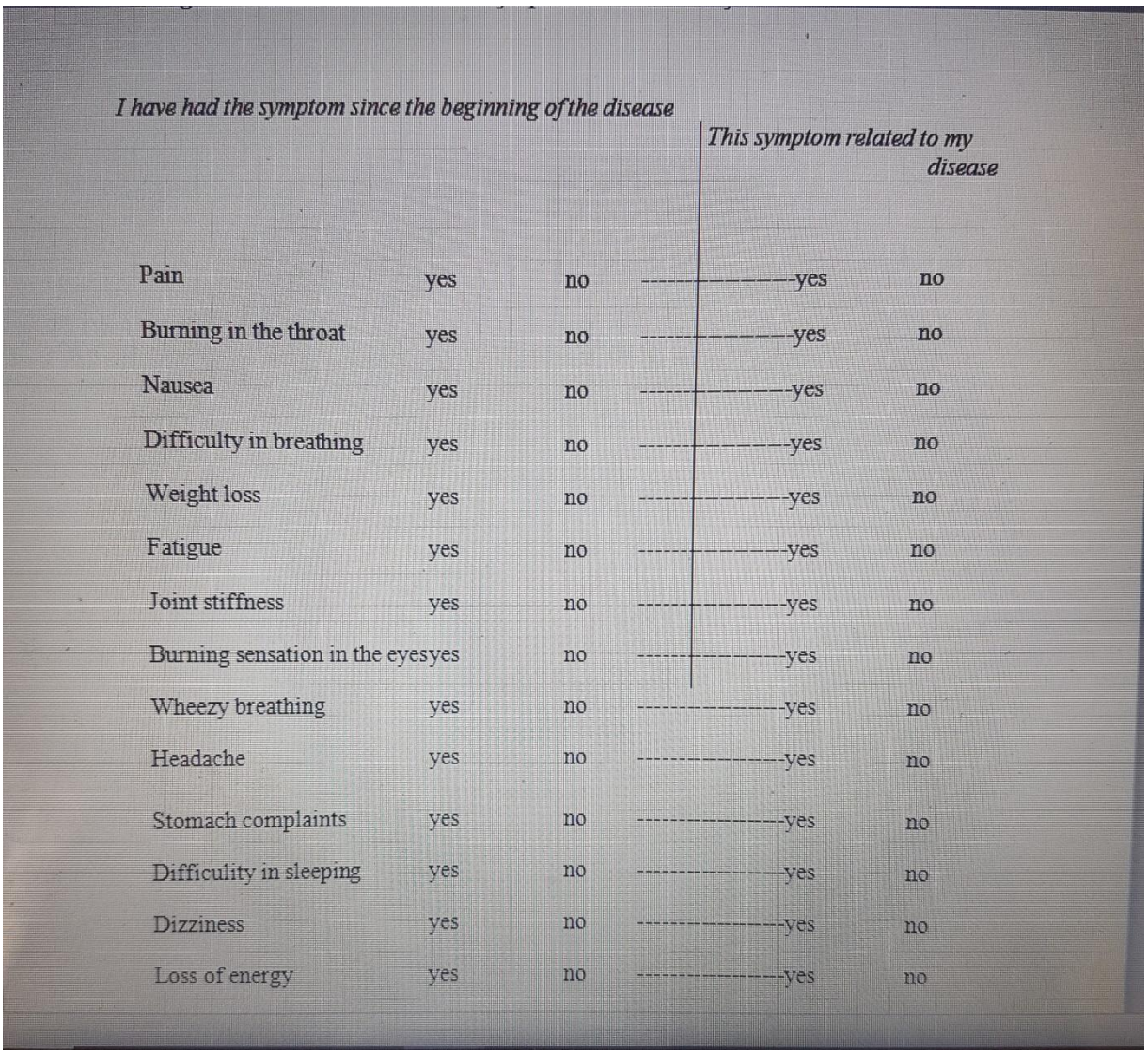
3. I do not know

Causes of the disease	1	2	3	4	5
Stress or worry					
Hereditary – it runs in my family					
A germ or virus					
Diet or eating habits					
Chance or bad luck					
Poor medical care in my past					
Pollution in the environment					
My own behavior					
My mental attitude e.g. thinking about Life negatively					
Family problems or worries caused my illness					
Overwork					
My emotional state e.g. feeling down, lonely, anxious, empty					
Ageing					
Alcohol					
Smoking					
Accident or injury					
My personality traits					
Altered immunity					

Appendix (3.2): symptoms related to disease

Your think about the disease

Below is a list of the symptoms you have been experiencing since the onset of your illness. Please, circle if you had the symptom. Once again, circle your thoughts about whether or not these symptoms are related to your illness



	I have had the symptom since the beginning of the disease		*This symptom related to my disease*	
Pain	yes	no	yes	no
Burning in the throat	yes	no	yes	no
Nausea	yes	no	yes	no
Difficulty in breathing	yes	no	yes	no
Weight loss	yes	no	yes	no
Fatigue	yes	no	yes	no
Joint stiffness	yes	no	yes	no
Burning sensation in the eyes	yes	no	yes	no
Wheezy breathing	yes	no	yes	no
Headache	yes	no	yes	no
Stomach complaints	yes	no	yes	no
Difficulity in sleeping	yes	no	yes	no
Dizziness	yes	no	yes	no
Loss of energy	yes	no	yes	no

Appendix (3.3): responses patient to disease

We want to know your views about your disease. Please tick the appropriate box (X) for each sentence you read.

1. I strongly do not think so
2. I do not think so
3. Neither agrees nor disagrees
4. I think so
5. I strongly think so

Discussion your opinion about disease	1	2	3	4	5
1. My illness will last a short time (r)					
2. My illness is likely to be permanant rather Than temporary					
3. My illness will last for a long time					
4. This illness will pass quickly					
5. I expect to have this illness for the rest of my life					
6. My illness is a serious condition					
7. My illness has majör consequences on my life					
8. My illness does not have much effect on my life					
9. My illness strongly affects the way others see me					
10. My illness has serious financial consequences					
11. My illness causes difficulties for those Who are close to me					
12. There is a lot which I can do to control my symptoms					
13. What I do can determine whether my illness Gets better or worse					
14. The course of my illness depends on me					
15. Nothing I do willaffectmy illness					
16. I have the power to influence my illness					
17. My actions will have no effect on the outcome of my illness					

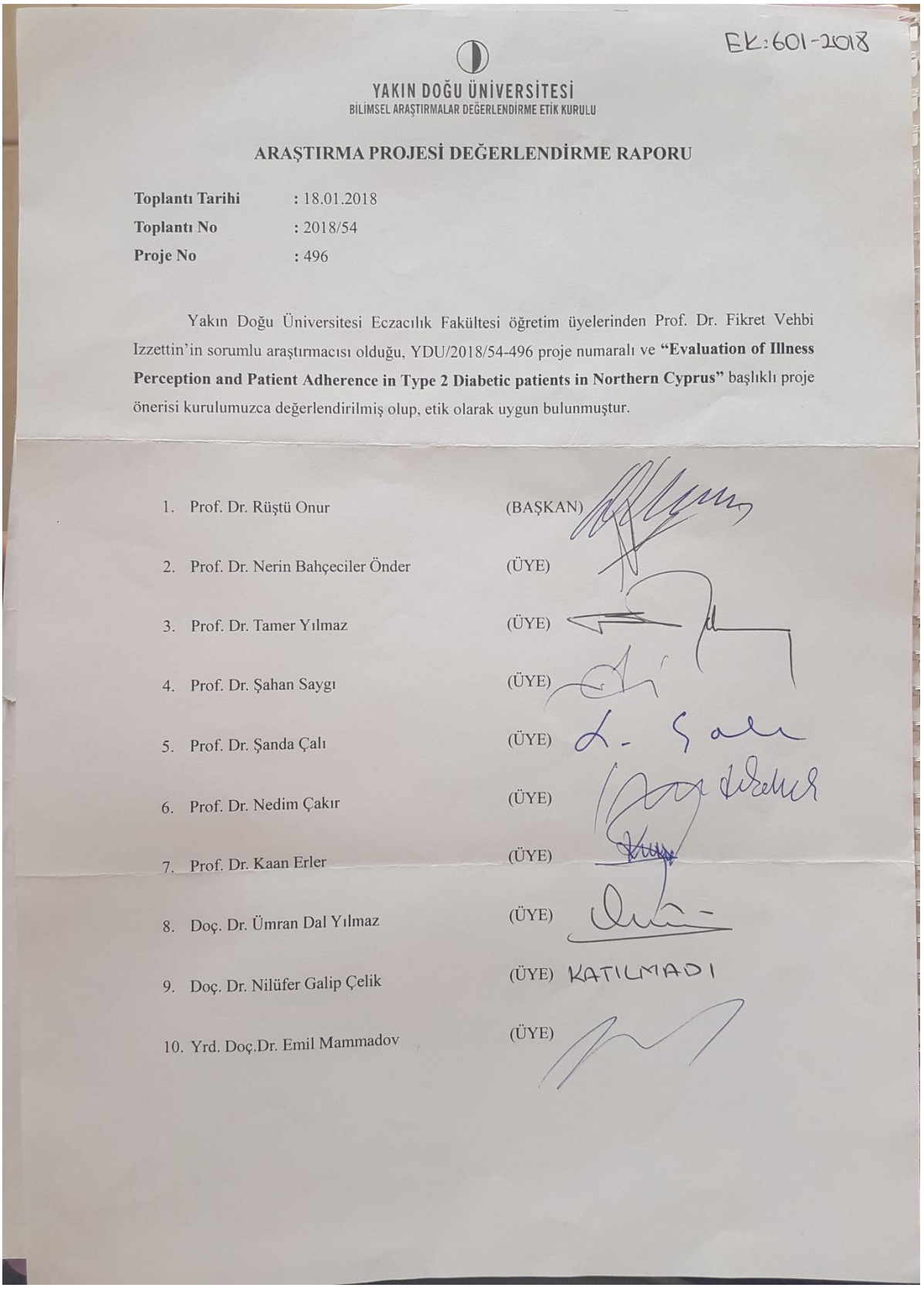
18. My illness will improve in time (r)					
19. There is very little that can be done to improve my illness					
20. My treatment will be effective in curingmy illness					
21. The negative effects of my illness can Be prevented (avoided) by my treatment					
22. My treatment can control my illness					
23. There is nothing which can help my condition					
24. I am surprised from the symptoms					
25. My illness is a mystery to m					
26. I don't understand my illness					
27. My illness doesn't make any sense to me					
28. I have a clear picture or understanding of my condition					
29. The symptoms of my illness change a great Deal from day to day					
30. *My symptoms come and go in cycles					
31. My illness is very unpredictable					
32.I go through cycles in which my illness gets better and worse					
33. I get depressed when I think about my illness					
34. I get sad hen i think abou tmy illness					

35. My illness makes me feel angry					
36. My illness does not worry me					
37. Having this illness makes me feel anxious					
38. My illness makes me feel afraid					

Appendix (4): Morisky scale of adherence

	Morisky Compliance Scale	yes	No
1.	Do you forget to take your medicine?	☐	☐
2.	Do you forget to take your medicine on time?	☐	☐
3.	Do you stop taking medication when you feel good?	☐	☐
4.	If you feel bad when you take the medicine, will you stop taking the medicine?	☐	☐

Appendix (5) Ethical Approval



EK:601-2018

YAKIN DOĞU ÜNİVERSİTESİ
BİLİMSEL ARAŞTIRMALAR DEĞERLENDİRME ETİK KURULU

ARAŞTIRMA PROJESİ DEĞERLENDİRME RAPORU

Toplantı Tarihi : 18.01.2018
Toplantı No : 2018/54
Proje No : 496

Yakın Doğu Üniversitesi Eczacılık Fakültesi öğretim üyelerinden Prof. Dr. Fikret Vehbi Izzettin'in sorumlu araştırmacısı olduğu, YDU/2018/54-496 proje numaralı ve **"Evaluation of Illness Perception and Patient Adherence in Type 2 Diabetic patients in Northern Cyprus"** başlıklı proje önerisi kurulumuzca değerlendirilmiş olup, etik olarak uygun bulunmuştur.

1. Prof. Dr. Rüştü Onur (BAŞKAN)
2. Prof. Dr. Nerin Bahçeciler Önder (ÜYE)
3. Prof. Dr. Tamer Yılmaz (ÜYE)
4. Prof. Dr. Şahan Saygı (ÜYE)
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7. Prof. Dr. Kaan Erler (ÜYE)
8. Doç. Dr. Ümran Dal Yılmaz (ÜYE)
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10. Yrd. Doç.Dr. Emil Mammadov (ÜYE)