T.C.

YEDITEPE UNIVERSITY

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DEPARTMENT OF CLINICAL PHARMACY

# IMPACT OF A PHARMACEUTICAL CARE PROGRAM AND EVALUATION OF THE QUALITY OF LIFE IN TYPE 2 DIABETIC PATIENTS AT A NURSING HOME SETTING

MASTER'S THESIS

NİMET SAĞLAM, B PHARM

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**THESIS APPROVAL FORM**

Kurum : Yeditepe Üniversitesi Sağlık Bilimleri Enstitüsü

Program : KLİNİK ECZACILIK

Tez Başlığı : Huzurevindeki Tip 2 Diyabet Hastalarında Farmasötik Bakımın Etkisi ve Yaşam Kalitesi Değerlendirmesi

Tez Sahibi : NİMET SAĞLAM

Sınav Tarihi : 18.03.2019

Bu çalışma jurimiz tarafından kapsam ve kalite yönünden Yüksek Lisans Tezi olarak kabul edilmiştir.

| | Unvanı, Adı-Soyadı (Kurumu) | İmza |
|---|---|---|
| Jüri Başkanı: | PROF. DR. TURGAY ÇELİK | |
| Tez danışmanı: | PROF. DR. FİKRET VEHBİ İZZETTİN | |
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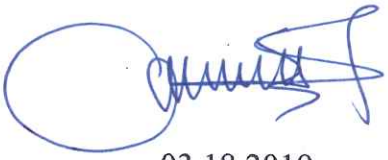
ONAY

Bu tez Yeditepe Üniversitesi Lisansüstü Eğitim-Öğretim ve Sınav Yönetmeliğinin ilgili maddeleri uyarınca yukarıdaki jüri tarafından uygun görülmüş ve Enstitü Yönetim Kurulu'nun 29./03./2019... tarih ve 2019/05-11... sayılı kararı ile onaylanmıştır.

Prof. Dr. Bayram YILMAZ
Sağlık Bilimleri Enstitüsü Müdürü

## DECLARATION

I hereby declare that this thesis is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person nor material which has been accepted for the award of any other degree except where due acknowledgment has been made in the text.



03.18.2019

Nimet Sağlam

**ACKNOWLEDGEMENTS**

I sincerely thank to my supervisor, Prof. Dr. Fikret Vehbi İZZETTİN, and co-supervisor Prof. Dr. Şule RABUŞ. I also want to thank to all of the members of Department of Clinical Pharmacy for continuously supporting me during my study.

Finally, I would like to thank my dear father and mother for supporting me with full faith during my lifetime.

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## LIST OF SYMBOLS AND ABBREVIATIONS

| | |
|---|---|
| AACE | American Association of Clinical Endocrinologists |
| ACE | The American College of Endocrinology |
| ADA | American Diabetes Association |
| AHFS | American Society of Health-system |
| BMI | Body Mass Index |
| CAD | Coronary Artery Disease |
| CVD | Cardiovascular Disease |
| CVE | Cerebrovascular Event |
| DİYAK | Quality of Life in Diabetes |
| DQOL | Diabetes Quality of Life |
| DSQOLS | Diabetes-Specific Quality of Life Scale |
| EASD | European Association for the Study of Diabetes |
| FPG | Fasting Plasma Glucose |
| GDM | Gestational Diabetes Mellitus |
| HbA1c | Haemoglobin A1C |
| HDL | High-density Lipoprotein |
| HRQOL | Health-Related Quality of Life |
| HT | Hypertension |
| IDF | International Diabetes Federation |
| IGT | Impaired Glucose Tolerance |
| LDL | Low-density Lipoprotein |
| MMAS | Morisky Medication Adherence Scale |
| MMAS-8 | Modified Eight Item Morisky Medication Adherence Scale |
| NICE | The National Institute for Health and Care Excellence |
| OGTT | Oral Glucose Tolerance Test |
| PG | Plasma Glucose |

QOL Quality of Life

SD Standard Deviation

SEM Standard Error of the Mean

T2DM Type 2 Diabetes Mellitus

TURDEP 2 Turkey Diabetes, Hypertension, Obesity and Endocrinology Diseases Prevalence Study-II

UKPDS United Kingdom Prospective Diabetes Study

## ABSTRACT

**Sağlam, N. (2019). Impact of a Pharmaceutical Care Program and Evaluation of the Quality of Life in Type 2 Diabetic Patients at a Nursing Home Setting. Yeditepe University, Institute of Health Sciences, Department of Clinical Pharmacy, MSc Thesis, Istanbul.**

The aim of this study was to evaluate the effect of pharmaceutical care services provided by the pharmacist to patients with type 2 diabetes residing at a nursing home as well as to assess diabetes-related quality of life of the patients. The patients with type 2 diabetes residing at the who have been prescribed at least one antidiabetic drug one month prior to the commencement of the pharmaceutical care program were first informed about the study and those who agreed to participate in the study (n=39) were included. During this longitudinal study, patients' data was collected and a patient record was created at the first interview; also, quality of life of the patients was assessed at the first interview. Drug knowledge level and patients' adherence to therapy were assessed at the initial and at the final interview. During the 3-months pharmaceutical care period, the pharmacist provided the patients oral and written education every 15 days. Written education included provision of patient education brochures that were prepared specifically about the drugs each patient was taking for diabetes. The significance of the difference between the initial and the final measures of the continuous variables such as HbA1c, fasting blood glucose, systolic and diastolic blood pressure was tested by paired-samples T-test, while Chi-square test (McNemar) was used for the categorical variables. The pharmaceutical care program showed positive results such as a significant decrease in HBA1C levels ($p < 0.05$), an increase in adherence scores ($p < 0.01$) and an increase in medication knowledge scores ($p < 0.001$); and diabetes-related quality of life was found to be correlated with the presence of social support, absence of severe hyperglycaemia or hypoglycaemia, absence of retinopathy, nephropathy and cardiovascular disease. Moreover, the age of patient's has been shown to associated with their quality of life.



**Keywords:** type 2 diabetes; pharmacist; education; drug information; drug adherence; quality of life; pharmaceutical care

# ÖZET

**Sağlam, N. (2019). Huzurevindeki Tip 2 Diyabet Hastalarında Farmasötik Bakımın Etkisi ve Yaşam Kalitesi Değerlendirmesi. Yeditepe Üniversitesi, Sağlık Bilimleri Enstitüsü, Klinik Eczacılık Ab.D., Yüksek Lisans Tezi, İstanbul.**

Çalışmanın amacı, huzurevinde kalmakta olan tip 2 diyabet hastalarına eczacı tarafından verilen farmasötik bakım hizmetlerinin etkisinin değerlendirilmesi ve hastaların diyabetle-ilişkili yaşam kalitelerinin belirlenmesidir. Bu çalışma Darülaceze Kayışdağı Tesisi'nde bakım görmekte olan ve çalışma hakkında bilgilendirildikten sonra çalışmaya katılmayı kabul eden, en az bir aydır, bir veya daha çok sayıda antidiyabetik ilaç kullanmakta olan 39 tip 2 diyabet hastasını (n=39) kapsamaktadır. Prospektif tasarımdaki çalışmamızda, ilk görüşmede hastalardan alınan bilgiler doğrultusunda hasta profili kaydı oluşturulmuş, hastaların yaşam kalitesi, ilaç bilgi düzeyleri ölçülmüş, ilaç uyuncu çalışma başında ve sonunda Morisky Uyum Ölçeği ile belirlenmiş ve hastanın ilaç bakım ihtiyaçları değerlendirilmiştir. Ayrıca, hastalara toplam 3 ay boyunca her 15 günde bir eczacı tarafından sözlü ve yazılı hasta eğitimi verildi. Bu dönemde, her hastanın diyabet için aldığı ilaca özel hazırlanan hasta eğitim broşürleri kullanıldı. HbA1c, açlık kan glukozu, sistolik ve diyastolik kan basıncı gibi sürekli değişkenlerin başlangıç ve son ölçümleri arasındaki farkın önemi, eşleştirilmiş örnekler T-testi ile test edilirken, kategorik değişkenler için Ki-kare testi (McNemar) kullanılmıştır. Bu çalışmada yapılan farmasötik bakım programı, HbA1c ortalamasındaki anlamlı düşüş ($p<0.05$), uyunç skorlarında ($p <0.01$) ve ilaç bilgisi skorlarında yükselme ($p <0.001$) ile belirlenen olumlu sonuçlar gösterdiği için klinik sonucu iyileştirmede etkili olmuştur. Diyabetle ilişkili yaşam kalitesinin, ilaç kullanımı ile ilgili sosyal destek varlığı, yardım gerektiren ciddi hiperglisemi veya hipoglisemi atakları yaşama durumu, retinopati, nefropati ve kardiyovasküler hastalık varlığı ile ilişkili olduğu ortaya konmuştur. Ayrıca, hastanın yaşının da yaşam kalitesiyle ilişkili olduğu gösterilmiştir.

**Anahtar Sözcükler:** tip 2 diyabet; eczacı, eğitim; ilaç bilgisi, ilaç uyuncu; yaşam kalitesi, farmasötik bakım

## 1. INTRODUCTION and AIM

Diabetes is a chronic, serious health problem. Diabetes, often makes people unable to perform normal functions in their middle ages and reduces their quality of life[1].

Due to this nature of the disease, patients should be trained to prevent the development of acute complications and to reduce the risk of long-term complications; therefore, they should be provided with the skills to perform diabetes-related self-care. The role of the pharmacist in diabetes care is highlighted in many sources [2]. In patients receiving insulin and oral antidiabetic therapy, drug use errors and drug-related problems also affect metabolic parameters negatively. [3]Therefore, diabetes education is an important part of diabetes care.

The necessity for and the benefits of pharmacists in the diabetes care team, and methods that are provided by national and regional organizations are mentioned in various sources.[4]

Routine pharmaceutical services are also provided to residents of nursing homes in countries such as the United Kingdom and USA, where patient-oriented pharmacy care services are developed [5]. The main purpose of the pharmacy services in nursing homes is to dispense prescribed medications to the patient and to ensure their safe and effective use. Medication is the treatment of choice in nursing homes for the maintenance or improvement of the health status of residents [6]. If the drug treatment is not applied properly, or not closely monitored, the drug effects are not controlled, and the risk of drug-related damage would increase. Pharmacists working in nursing homes contribute to the prevention of such damages and to improve the health status of residents.

The aim of this study was to evaluate the effect of pharmaceutical care services given by the pharmacist to patients with type 2 diabetes who have been prescribed at least one antidiabetic drug for at least one month, who have agreed to participate in the study, residing at a nursing home. Also, the quality of life of patients were evaluated.

# 2. LITERATURE REVIEW

## 2.1. Diabetes mellitus

### 2.1.1. Definition

Diabetes mellitus is a chronic disease that occurs when the pancreas is no longer able to make insulin, or when the body cannot make good use of the insulin it produces.[1]

Insulin is a hormone made by the pancreas that acts like a key to let glucose from the food we eat pass from the blood stream into the cells in the body to produce energy. All carbohydrate foods are broken down into glucose in the blood. Insulin helps glucose get into the cells [7].

Not being able to produce insulin or use it effectively leads to raised glucose levels in the blood (known as hyperglycaemia that is defined as a plasma glucose level > 140 mg/dL 2 h after the ingestion of food. Long-term high glucose levels are associated with damage to the body and failure of various organs and tissues [8]. As a consequence of this, various organs and tissues are seriously damaged. In particular, in the case of type 2 diabetes, the body does not use insulin properly. This means that it has insulin resistance. At first, the pancreas produces extra insulin to compensate for it. However, after a while, it cannot maintain and produce sufficient insulin to keep the blood glucose at normal levels [9].

Table 2.1 show the characteristics of different types of diabetes.

**Table 2.1.** Characteristics of the Common Types of Diabetes [9]

| Features of the General Types of Diabetes | | |
|---|---|---|
| | **Type 1** | **Type 2** |
| Age | Childhood | Pubertal |
| Onset | Acute; severe | Mild-severe; often insidious |
| Insulin secretion | Very low | Changeable |
| Insulin sensitivity | Normal | Declined |
| Insulin dependence | Permanent | Temporary; may occur later |
| Racial/ethnic groups at increased risk | All (low in Asians) | African Americans, Hispanics, Asian/Pacific Islanders, Native Americans |
| Genetics | Polygenic | Polygenic |
| Rate among those with diabetes | 80% | 10%-20% |
| Association with obesity | No | Strong |
| Acanthosis nigricans | No | Yes |
| Autoimmune etiology | Yes | No |

In the case of type 1 diabetes, the body cannot produce enough insulin. Thus, daily injections of insulin are necessary. Type 1 diabetes is often characterized during childhood, adolescent or early adulthood and it can be diagnosed at a rate of 1 in every 600 cases [10].

Type 2 diabetes is often seen in adulthood. But, the increase in the incidence of childhood obesity and the concomitant resistance to insulin may increase the number of children diagnosed with type 2 diabetes throughout the world [11]. In order to reduce morbidity, mortality and improve the long-term quality of life of patients diagnosed with type 2 diabetes mellitus (T2DM) [12] suitable medication management aimed at glycemic

control, hypertension and lipid management is important. Decrease in blood glucose levels is mainly maintained by a decrease in food intake, increased physical activity and ultimately oral drugs and/or insulin.

### 2.1.2. Diagnosis

Diabetes is often diagnosed in accordance with plasma glucose criteria, either the fasting plasma glucose (FPG) or the 2-h plasma glucose (2-h PG) value after a 75-g oral glucose tolerance test (OGTT).[1] In recent, International Expert Committee has been suffixed the A1C (threshold ≥6.5%) as a third diagnostic option. [13]

Table 2.2 shows the diagnosis criteria for diabetes.

**Table 2.2.** Diagnosis of Diabetes: Diagnostic Tests and Glucose Values [13]

| Diagnostic Test | Standard | Pre-diabetes | Diabetes |
|---|---|---|---|
| Hemoglobin A1c (A1c)[a] | <5.7% | 5.7-6.4% | ≥6.5% |
| Fasting plasma glucose[a] | < 100 mg/dL | 100-125 mg/dL | ≥126 mg/dL |
| Random plasma glucose[b] | < 130 mg/dL | 130-199 mg/dL | ≥200 mg/dL |
| Oral glucose tolerance test (OGTT) 2 hrs. after a 75 g oral glucose load | < 140 mg/dL | 140-199 mg/dL | ≥200 mg/dL |

[a] The diagnosis for A1c and fasting glucose must be approved by a second test.

[b]Random glucose of ≥ 200 mg/dL must be approved with a fasting glucose of ≥ 126 mg/dL or the OGTT. Random glucose of 130-199 mg/dL is abnormal and fasting glucose, OGTT, and or hemoglobin A1c are generally used for further testing.

### 2.1.3. Etiology and Classification

***Classification according to Diagnosis and Treatment of Diabetes Mellitus and Complications[14] :***

*A. Insulin resistance*

As a result of the problems at the cell-receptor level (post-receptor level) related with the use of insulin produced by the organism, glucose cannot be absorbed into the cells and cannot be used as energy (intracellular hypoglycaemia). The effect of insulin on peripheral tissues (especially muscle and adipose tissue) is insufficient. Glucose uptake was decreased in muscle and fat cells.

*B. Reduction of insulin secretion*

The pancreas cannot secrete enough insulin in response to blood glucose levels. Glucose production in the liver has increased tremendously. Insulin secretion defect and the more active counter-insulin hormones (cortisol, growth hormone and adrenaline) are responsible for the increase in hepatic glucose production. Generally, insulin resistance has prevailed over the years starting with type 2 diabetes, and a significant decrease in insulin secretion is prominent in later stages of diabetes.

***Etiological classification of diabetes mellitus[14] :***

I. Type 1 diabetes (There is usually β-cell destruction causing absolute insulin deficiency)

II. Type 2 diabetes (Characterized by progressive insulin secretion defect on the basis of insulin resistance)

III. Gestational diabetes mellitus (GDM) (A type of diabetes that occurs during pregnancy and usually improves with labor)

IV. Other specific types of diabetes

#### 2.1.3.1. Risk factors:

Risk factors related to type 2 diabetes are listed as follows:[13]

- Family history of diabetes
- Overweight
- Unhealthy diet
- Lack of physical activity
- Increased age
- High blood pressure
- Ethnicity
- Impaired glucose tolerance (IGT)
- History of gestational diabetes
- Insufficient nutrition during pregnancy

#### 2.1.3.2. Epidemiology

Diabetes is one of the largest global health emergencies of the 21st century, with the number of people with diabetes growing rapidly worldwide. According to IDF is 2018 data, approximately 425 million adults (20-79 years) were living with diabetes in 2017; by 2045 this figure is expected to increase to 629 million. This shows that the rate of people with type 2 diabetes is increasing in most countries. Considering that 1 out of 2 adults with diabetes is not diagnosed (212 million), we can understand the seriousness of the situation [15].

Seventy-nine percent of adults with diabetes live in low- and middle-income countries, with a maximum of 40-59 years of age. Diabetes caused 4 million deaths in the world. Diabetes costed at least $727 billion in health expenditures in 2017 (12% of total expenditure of adults) [15].

More than 21 million infants (1 in 6 births) were affected by hyperglycaemia during pregnancy. Also, 352 million people are at risk of developing type 2 diabetes [15].

Turkey is one of the 47 countries of the IDF is Europe region. 425 million people have diabetes in the world and more than 58 million diabetic people are in the Europe Region. In Turkey, while the number of adults (20-79 years) with diabetes in 2017 is 6694.5, it is estimated that it would be 11223.3 in the year 2045. The prevalence of diabetes is estimated to be 12.8% in 2017 and 16.5% in 2045. The number of deaths due to diabetes was not too high (4.63%), and under the age of 60, this rate was measured as 3% with a small decrease [15].

While total health expenditures (20-79 years) was 5445.6 million dollars in 2017, this figure will increase to 7339.4 million dollars in 2045 [15].

The number of births affected by hyperglycaemia in pregnancy is approximately 16.2% [15].

### 2.1.4. Clinical manifestations

***Symptoms:***

The symptoms of diabetes are associated with high blood glucose levels. They are as follows:

- Extreme urination, thirst and hunger
- Loss in weight
- Vulnerability to infections, particularly yeast and fungal infections [1].

***Acute complications:***

Some medications used to treat type 2 diabetes may cause symptoms of low blood glucose, which is called hypoglycemia (reduction of blood glucose level below 54 mg/dL) [1]. To reduce blood glucose levels, individuals with type 2 diabetes should take medications. But these medications might influence glucose levels negatively and decrease them underneath normal.

Symptoms of hypoglycemia are listed as follows: [1]

- Trembling
- Perspiration
- Giddiness

- Hunger
- Confusion
- Seizures and loss of consciousness (if hypoglycemia is not identified and corrected)

***Chronic complications:***

Diabetes has devastating effects on whole body. It potentially causes serious health problems and life-threatening complications. The complications are as listed below[1] :

- Atherosclerosis
- Retinopathy
- Neuropathy (Critical issues relating to foot)
- Nephropathy

### 2.1.5. Treatment of Diabetes

#### 2.1.5.1. Goals of Treatment

The primary target of cure is to keep blood glucose as regular as possible.

The blood glucose goals suggested by the American Diabetes Association are listed as follows[1] :

- HbA1c < 7.0%
- Level of glucose before meals 70-130 mg/dL
- Level of glucose after meals < 180 mg/dL

In recent years, the approach to the treatment of patients with type 2 diabetes has changed considerably. International authorities in this regard, one after the other have published current treatment algorithms. Most of these algorithms are supported by evidence-based studies; based on expert opinions. In previous algorithms, it was emphasized that glycemic control targets were further reduced, while in current algorithms, individualization of glycemic control targets according to patient characteristics and patient-centered treatment approach (taking into account patient

characteristics in treatment selection) are adopted. Thus, it is recommended to start combination therapies sooner rather than traditional cascade therapy [14].

In recent years ADA (American Diabetes Association)/EASD (European Association for the Study of Diabetes), IDF (International Diabetes Federation), AACE (American Association of Clinical Endocrinologists)/ACE (American College of Endocrinology), Joslin Diabetes Center, Canada Diabetes Association, American Physicians Association, UK NICE (The National Institute for Health and Care Excellence, United Kingdom), International Diabetes Center, Diabetes Association of Germany, Diabetes Association of Finland, Diabetes Federation of Italy and Diabetes Association have published guidelines for the treatment of diabetes. It is recommended that the treatment should be planned according to the characteristics of the patient (such as lifestyle, habits, accompanying problems of CVD, risk of hypoglycemia, presence of diabetes complications, treatment cost, duration of diabetes and previous degree of glycemic control) and patient's preferences [14].

#### 2.1.5.2. New Technologies

**Insulin Pumps:** These are insulin pumps that temporarily stop insulin infusion when the glucose level falls below a predetermined threshold level. These devices have been used in Europe and America for the past five years. Studies have shown a decrease in number of severe hypoglycemia episodes in patients with type 1 diabetes. In addition, pumps supported by newer sensor technologies are able to stop the development of hypoglycaemia before it occurs [14,16,17] .

**Patch pumps:** In order to provide effective basal insulin replacement in type 1 diabetics, a cell-like device placed directly on the skin in the form of patches and systems that send insulin under the skin with wireless remote controller are among the options of insulin pump therapy [14,16,17] .

**Bionics (artificial) pancreatic studies:** These are hormone pumps capable of insulin and glucagon infusion. These devices are able to stop insulin infusion at night and prevent nocturnal hypoglycemia [16] .

## 2.2. Pharmaceutical Care

Pharmaceutical care is a modality of pharmacy practise consisting of patient-centered service enabling the pharmacist to work in collaboration with other health-care professionals in order to promote health, prevent disease and monitor, asses, modify medication usage to assure that drug therapy regimens are effective and safe [6,17] . Pharmaceutical care is about achieving positive clinical outcomes and an improved quality of life within reasonable economic expenditures [17] .

### 2.2.1. Pharmaceutical care in diabetes mellitus

The increasing treatment costs in many diseases especially in chronic diseases is a reality of the health economics. Pharmacist taking place in the treatment and patient education of the diabetes patients and their positive effect on the clinical outcomes increase the importance and responsibility of the pharmacist in diabetes-care. There is a considerable amount of evidence that pharmacists have positive effects in the treatment of diabetes [18]. The patient with diabetes consults her/his pharmacist 5 times more frequently than their prescribing doctor.

Pharmacists also identify adherence problems, detect adverse drug effects, advice patients on dietary, exercise and diabetes self-care habits [19].

Evidence from a study in Australia showed that there was a significant decrease in HbA1c compared to the control group in diabetic patients who received care from the pharmacists[20].

In a meta-analysis of 36 studies, 0.62% reduction in HbA1c was demonstrated with the active role of pharmacists in patient treatment. In 69% of these studies, pharmacists have took the responsibility of pharmaceutical care and educated patients [21].

Diabetes education mostly consists of exercise, nutrition, drug treatment and disease information [22]. In another study, it has been shown that pharmacists reduced total health expenditures as a result of training diabetes patients[23] .

In a study that was conducted in the USA, when intervened by the pharmacist, it was found that there was a decrease in HbA1c levels. This study proved that the pharmacist had more positive effect when intervened in the overall therapy [21].

Beneficial effects of a pharmaceutical care program have been underlined by Srirams'study[24] . They obtained significant reduction in HbA1c values between the intervention and the control group. Also, patients' quality of life has increased in their work.

Study held by Turnacılar et al. on 43 diabetic patients showed that pharmacist intervention has beneficial effects on diabetes care. They achieved 23% reduction in fasting plasma glucose levels with pharmacist involvement in therapy [25].

Another study conducted on 109 diabetic patients by Okuyan et. al. suggested that self-activities encouraged by pharmacist has beneficial effects on prognosis of diabetes[26] .

#### 2.2.1.1. Role of pharmacists in diabetes management

Therapeutic agents to treat diabetes keep expanding and eventually the pharmacist's role in caring for diabetic patients has expanded. The pharmacist is a key health care professional to educate patients about the correct use of medications, screen for drug interactions and provide technical education on the use of monitoring devices [27].

The pharmacist is an important individual for communication with the patient to maintain control of their disease. The pharmacist monitors the patient's blood glucose levels, keeps a track of it and records every single side effect and patient attributes. The patients are more comfortable with the pharmacists and can openly get informed about their diseases and drug therapy regimens. The pharmacist is a key person to give consultation on insulin administration techniques so the patient becomes more comfortable with the usage. Pharmacists are always very easily accessed and are a value in the health care system. Pharmacists' role in helping diabetic patients is very effective and important [28].

### 2.3. Adherence

Adherence is the patient's usage of the drug at the recommended dose within recommended intervals and at the recommended time, according to the treatment protocol

[29].

Several factors play role in adherence such as health-related beliefs, concomitant diseases, cognitive competence and psychological status of the patient.

Lack of adherence is a result when the recommended drug is used in the wrong time, wrong dose and/or through a wrong way. Also, if there are multiple drugs prescribed, the inaccurate order of usage and untimely interruption of treatment are examples for lack of adherence [25].

Ensuring adherence is a dynamic process and requires a multidisciplinary approach. Increasing adherence increases the success of treatment [25].

Adherence encourages the person to take the prescribed medication with the appropriate treatment. [30].

There are different factors causing non-adherence such as low health literacy, age, ethnicity, presence of chronic diseases such as diabetes, multiple and complex drug regimens economic factors, beliefs and etc.

Pharmacist is the health-care professional patients can consult freely without time limits or appointments. Therefore, pharmacists are essential members of the health-care team.

### 2.3.1. Morisky Medication Adherence Scales: MMAS-4

Morisky and his colleagues first published the Morisky Medication Adherence Scale (MMAS) instrument in 1986, which was approved in ambulatory environments for antihypertensive pills [31]. The unique scale of Morisky includes four items with yes or no dichotomous response categories.

At the date of 2008, the Morisky Medication Adherence Scale (MMAS-8) was launched [32]. The first seven matters are dichotomous answer sections with yes or no, and the last matter has a 5-point Likert scale response option[33] .

MMAS-4 results are scored as; “high adherence, medium adherence, low adherence”[32] .

### 2.3.2. Medication Knowledge Level

The pharmacist's role has been extending towards being a patient caregiver, patient consultant and healthcare educator, from the mere function of drug distribution [34].

Pharmacist's involvement is important to identify the problems with the therapy, to solve the problems and to customize the therapy [31]. Pharmacists contribute to decreasing mortality and morbidity [35].

A systematic review; from the USA yielded the result that pharmacists have safe and positive effect on the economy in the healthcare system [36].

Pharmacist needs to collect patient-related data to develop a profile of the patient and so that they can plan education and identify the current problems.

We asked 5 key questions to access the medication knowledge of patients. (Appendix 4)

## 2.4. Quality of life

Quality of life (QOL) is the way in which people perceive their status within their environment of culture and values in relation to their goals, expectations, life-standards and interests. In other words quality of life defines the subjective perception of self-health in the socio-cultural environment in which the person lives [37].

The main purpose is to determine the extent to which people are satisfied with their physical, psychological and social functions and to what extent the presence or absence of features related to these aspects of their lives are disturbing them [37].

Quality of life is a very broad concept and is affected by physical health, psychological state, the level of independence, social relations and important features around it [37,38].

The term of quality of life generally includes psychological / emotional status, physical condition, social and individual situation, financial and material status.

Quality of life is divided into two parts[38] ;

- Quality of life that is not directly related to health

- Health-related quality of life (HRQOL) / disease-specific quality of life.

Health-related quality of life and diabetes-specific quality of life represent increasingly narrower concepts. Quality of life has importance for people with diabetes and their health care providers for several reasons. Diabetes leads to diminished self-care, which in turn leads to worsened glycemic control, increased risks for complications, and exacerbation of diabetes. Thus, quality-of-life issues are crucially important, because they may powerfully predict an individual's capacity to manage his disease and maintain long-term health and well-being [38].

# 3. MATERIALS AND METHODS

## 3.1. Study population

Forty-five patients with type 2 diabetes who were residing at Darülaceze Nursing Home have involved in this study. The study was conducted between 01.05.2014 and 30.08.2014 with approval of Yeditepe University Ethics Committee for Clinical Research; approval date and paper number were 04.22.2014 / 18897253-0001-248. Study population consisted of type 2 diabetic patients who had been taking at least one antidiabetic medication for at least one month. All the patients were informed about the study (Appendix 2) and informed consent was taken (Appendix 1). Six were lost to follow-up and the final analysis was conducted on the remaining 39 patients who completed the study.

Exclusion criteria for this study were insufficient cognitive functions, presence of psychiatric disorders, advanced sight disorders preventing them cooperating with the medication information and illiteracy.

This prospective cohort study was conducted in a state nursing home (Darülaceze Nursing Home) in Istanbul, Turkey. All the patients received pharmaceutical care provided by the pharmacist. This pharmaceutical care program was held for 3 months. It included an initial visit, followed by 4 “care and control” visits and a final control visit; each visit was held at two-week time intervals. Totally 6 interviews have been concluded with all patients.

### 3.1.1. Assessments at the initial visit

#### 3.1.1.1. Patient profile record

Demographic data of the patients taken with patient profile record file (Appendix 3). Also, laboratory data has collected from Darülaceze Kayışdağı Medical Center which data have already been performed for routine visits of patients. Fasting glucose levels, glycosylated haemoglobin (HbA1c) levels, body mass index, lipid levels (the total cholesterol, HDL, LDL, triglycerides), and blood pressure were recorded.

#### 3.1.1.2. Diabetes-related quality of life of the patients

Diabetes-related quality of life of the patients were assessed by DİYAK (Quality of Life in Diabetes). DİYAK is an instrument developed and validated by Apikoglu-Rabus et al. for the Turkish type 2 diabetes patients (Appendix 7) [39].

#### 3.1.1.3. Medication knowledge level of the patients

Medication knowledge level of the patients was assessed by the modified version of the 'medication knowledge test' developed by McPherson et al. (Appendix 4) [40].

#### 3.1.1.4. Assessment of patient adherence

The patient adherence to diabetes medication was assessed using the "Morisky Medication Adherence Scale-MMAS-4 (Appendix 5)" which was translated in Turkish and validated by Yılmaz [41]. The scale consists of four questions and the answer choices are 'yes/no'. Positive answers to the questions addressed problems regarding adherence; while negative answers to all questions indicated 'high adherence'[41].

#### 3.1.1.5. Assessment of pharmaceutical care needs

Pharmaceutical care needs were identified for each patient and recommendations addressing these issues were structured. Education regarding the medications of the patients was provided in both oral and written forms using the standard patient education leaflets prepared by the pharmacist. As presented in the sample (Appendix 6), the written patient education leaflet comprised of information including the name, usage, adverse effects, storage conditions, warnings regarding the medications. The leaflets were arranged utilizing the information obtained from American Society of Health-System Pharmacists-AHFS Consumer Medication Information ( www.ahfsdruginformation.com; 2014). These leaflets were handed out to the patients besides provision of oral information.

### 3.1.2. Assessments at Visit 2, Visit 3, Visit 4, Visit 5

Visit 2, Visit 3, Visit 4, Visit 5 were care and control visits; each two weeks apart.

#### 3.1.2.1. Assessment of pharmaceutical care needs (Appendix 6)

Current pharmaceutical care needs were identified for each patient at Visit 2, Visit

3, Visit 4, and Visit 5 and current recommendations addressing these issues were structured. Relevant oral education was provided to the patients.

### 3.1.3. Assessments at the final visit

Last visit was held 3 months after the initial visit. Controlled variables were, fasting glucose levels, glycosylated haemoglobin (HbA1c) levels, blood pressure, medication knowledge level (Appendix 4) and medication adherence of the patients (Appendix 5).

## 3.2. Statistical analysis

The impact of a pharmaceutical care program provided by the pharmacist on diabetes control parameters (HbA1c and fasting blood glucose) as well as the medication adherence and medication knowledge of the patients was evaluated by statistical analysis. Also, the diabetes-specific quality of life of the patients and its relation with clinical parameters were assessed. The significance of the difference between the initial and the final measures of the continuous variables such as HbA1c, fasting blood glucose, systolic and diastolic blood pressure was tested by paired-samples T-test, while Chi-square test (McNemar) was used for the categorical variables[42]. The normal distribution of the parameters was tested by Kolmogorov-Smirnov test[43]. Mann-Whitney U test was used for the analysis if DİYAK differs between various categories of "nominal or categorical" parameters[44]. On the other hand, the correlation of DİYAK with continuous variables was tested with Spearman's correlation test. The statistical significance was expressed as $p<0.05$.

# 4. RESULTS

## 4.1. Demographic features

Twenty-six percent of the persons with diabetes were women and of all the patients 23.1% were married. The mean (SEM) age of the subjects was 68.8±1.4 years (Figure 4.1).

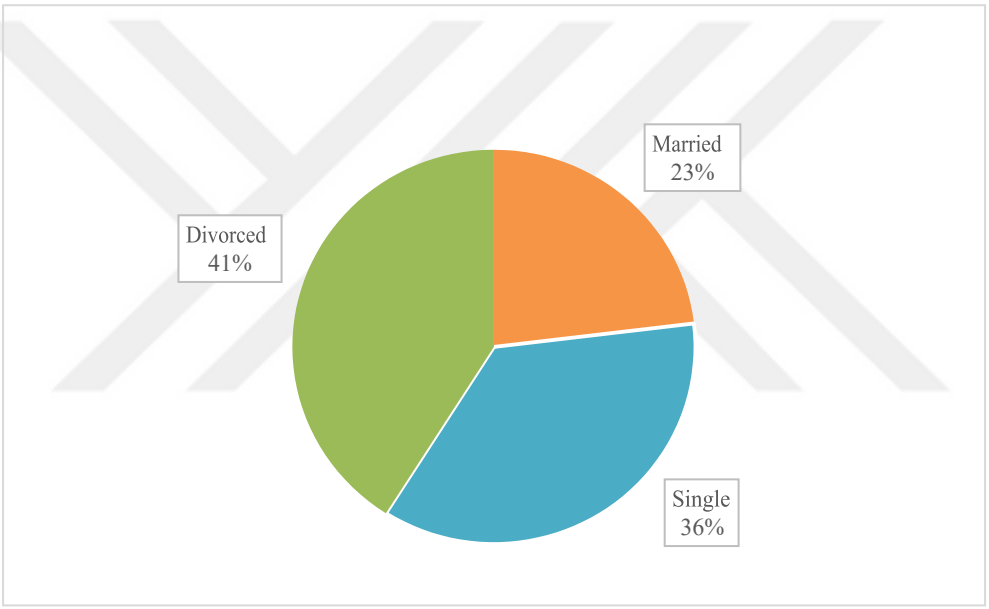


**Figure 4.1** Marital status of patients (n= 39)

Majority (56.4%) of the patients were primary school graduates, while only 10.3% had a university degree (Figure 4.2). While, 17.9% of the patients had not received a formal education, 15.4% were illiterate (Figure 4.3.). As all of the patients were residing at the nursing home, none of them had a current job.

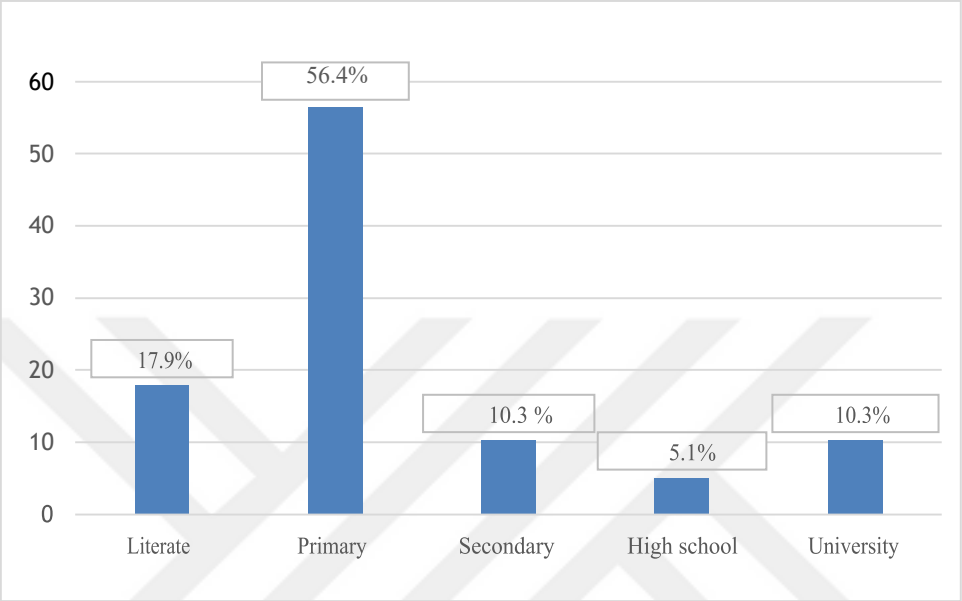


**Figure 4.2.** Education status of participants

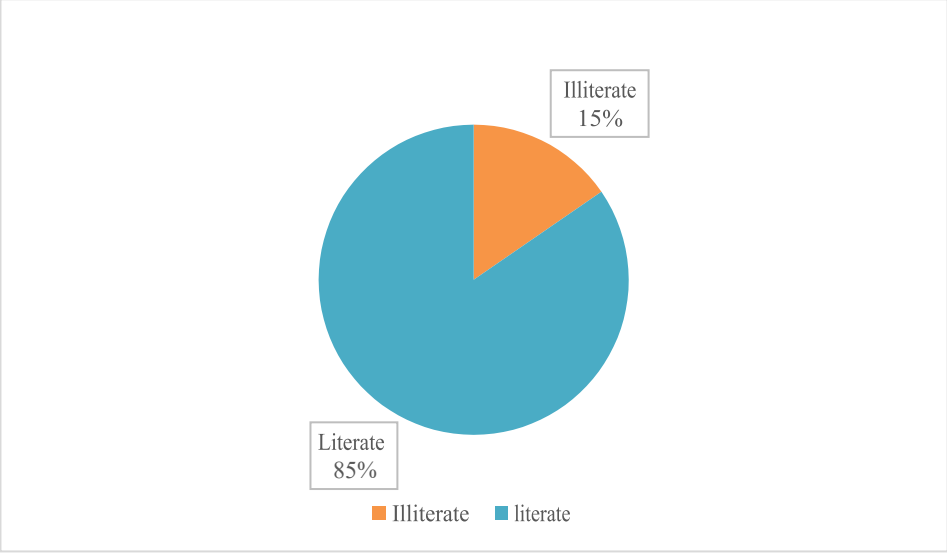


**Figure 4.3.** Literacy status of patients

### 4.2. General clinical features

Thirty-seven percent of the patients were obese while 26.3% had normal weight (Figure 4.4.). The mean (standard error) body mass index was 28.33±0.76. Thirty-one percent of the patients were smoking (Figure 4.5).

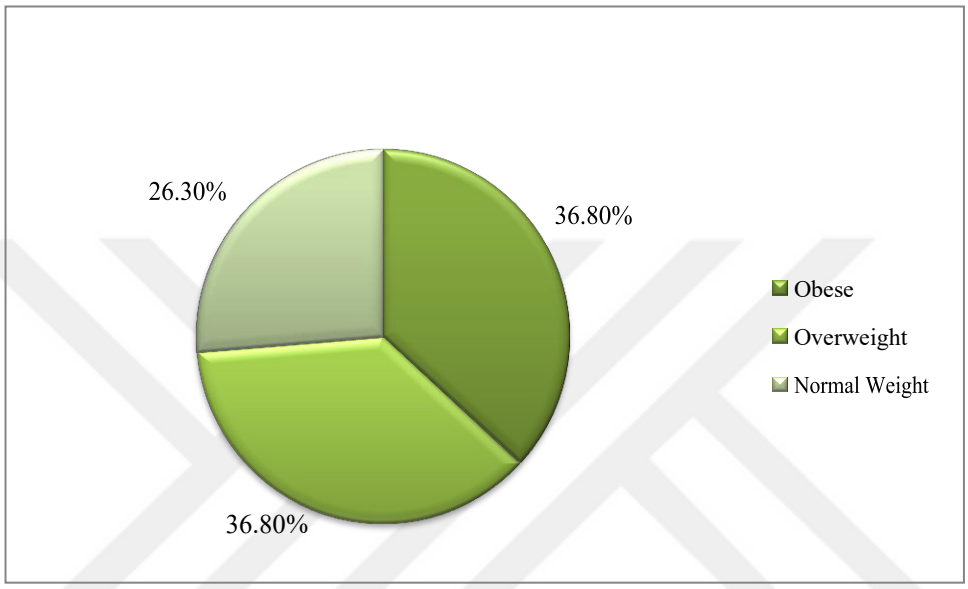


**Figure 4.4.** Body mass index of participants

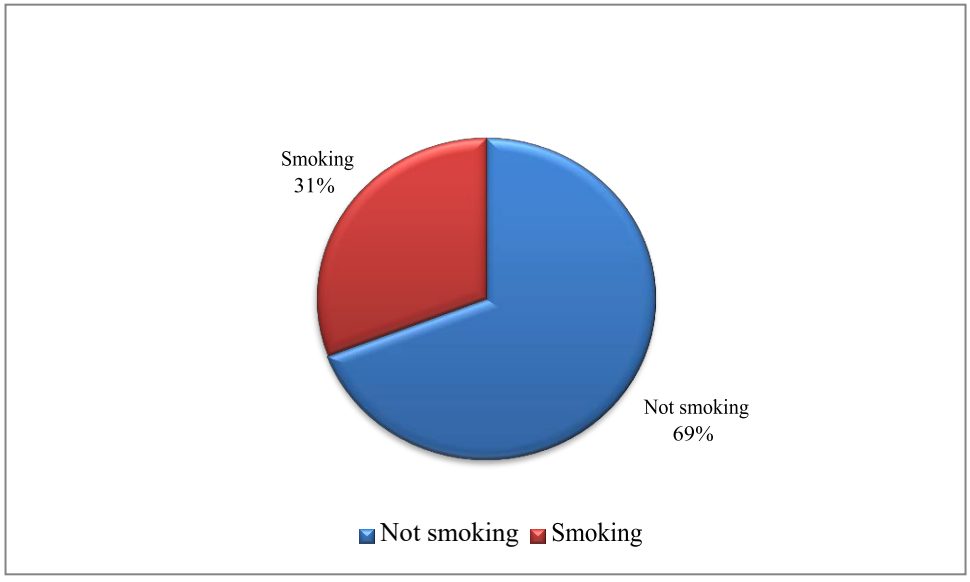


**Figure 4.5.** Smoking status of participants

Majority of the patients (77%) reported that they were not exercising regularly (Figure 4.6).

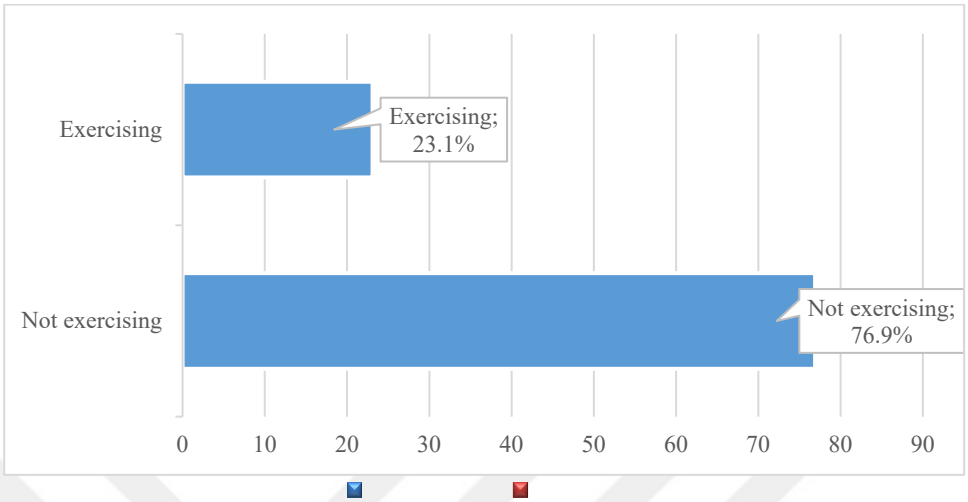


**Figure 4.6.** Physical activities of participants

As observed in Figure 4.7, the patients had diabetic co-morbidities as coronary artery disease (59%), hypertension (71.8%) and dyslipidaemia (56.4%). Ten percent of the patients had experienced a cerebrovascular event.

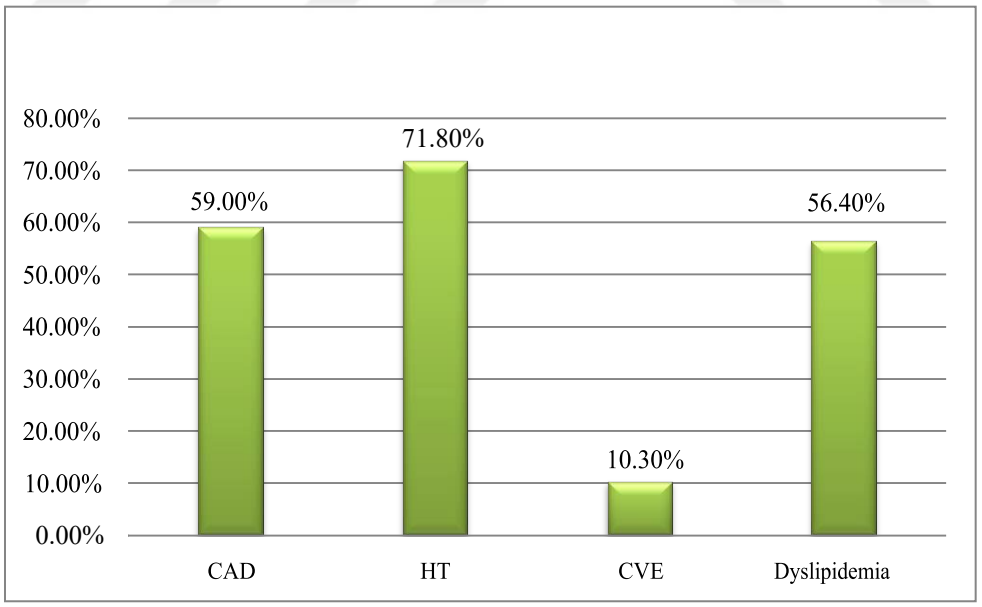


**Figure 4.7.** Distribution of the co-morbidities within the patients

***CAD:** Coronary Artery Disease
***HT** : Hypertension
***CVE:** Cerebrovascular Event

The lipid parameters of the patients were as presented in Table 4.1.

**Table 4.1.** Lipid parameters of the patients (n=39)

| | Mean | Standard error | Standard deviation |
|---|---|---|---|
| LDL cholesterol (mg/dL) | 111.3 | 4.06 | 25.34 |
| Total cholesterol (mg/dL) | 233.8 | 6.58 | 41.09 |
| HDL cholesterol (mg/dL) | 45.3 | 1.67 | 10.41 |
| Triglycerides (mg/dL) | 183.1 | 8.39 | 52.40 |

### 4.3. Diabetes-related clinical features

The time period from the date of diagnosis till the day of the research was termed as "diabetes age". The median (25%-75%) diabetes age of the patients was 50 (25-72) months. The mean (SEM) diabetes age was 78.8 (15.58) months. Approximately half of the patients had a family history of diabetes (Figure 4.8).

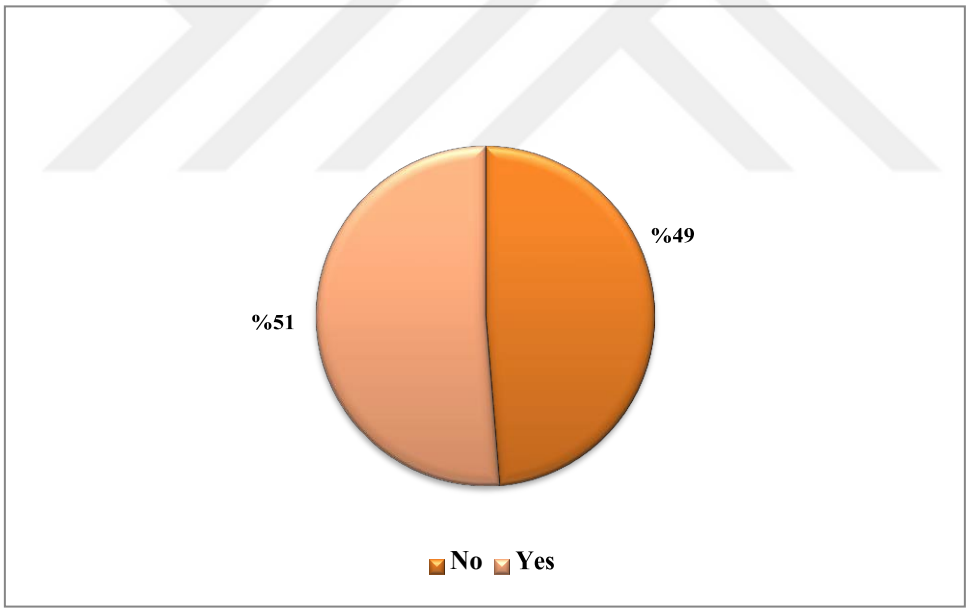


**Figure 4.8.** Family diabetes history of participants

Majority (64.1%) of the patients were using metformin for the control of their diabetes; this was followed by acarbose (35.9%), insulin (33.3%), gliclazide (5.1%) glimepiride (2.6%) and pioglitazone (2.6%). Diabetes medications and combinations which were used by the patients are shown in Figure 4.9. and Figure 4.10. in details.

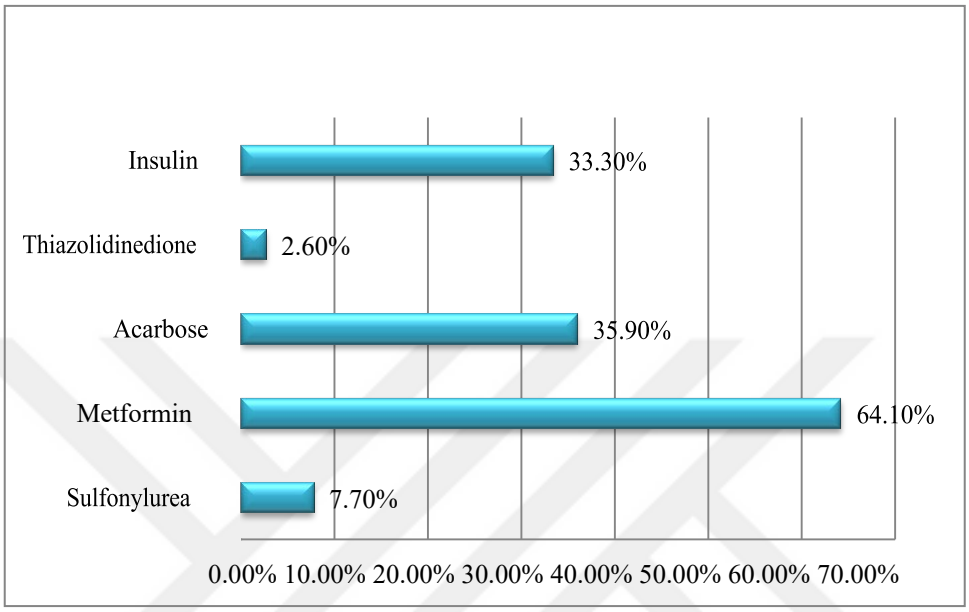


**Figure 4.9.** Diabetic medications used by participants

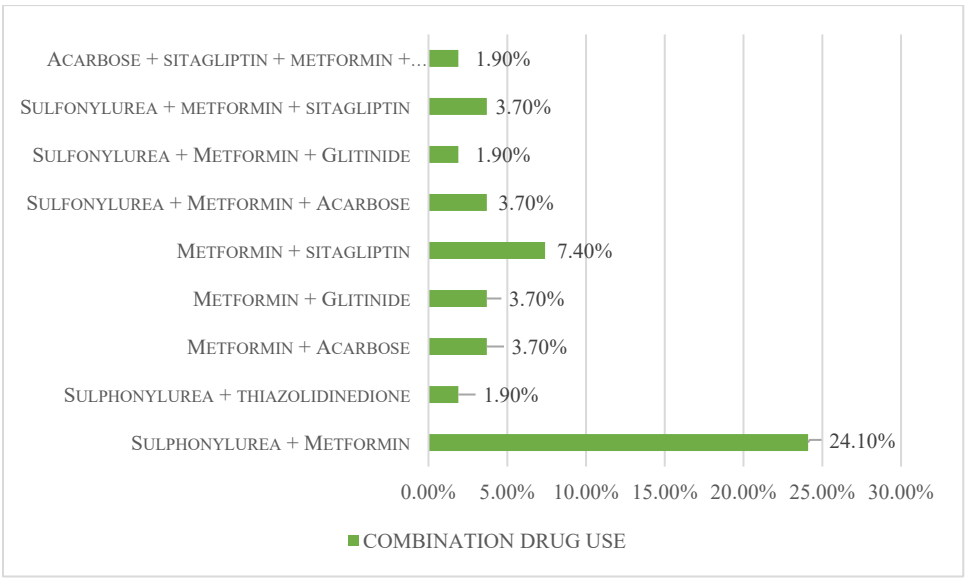


**Figure 4.10.** Type of medication combinations used by participants

As the diabetic complications, patients suffered from retinopathy (23.1%), nephropathy (17.9%), neuropathy (20.5%) and diabetic foot (10.3%). The observations are mapped on Figure 4.11.

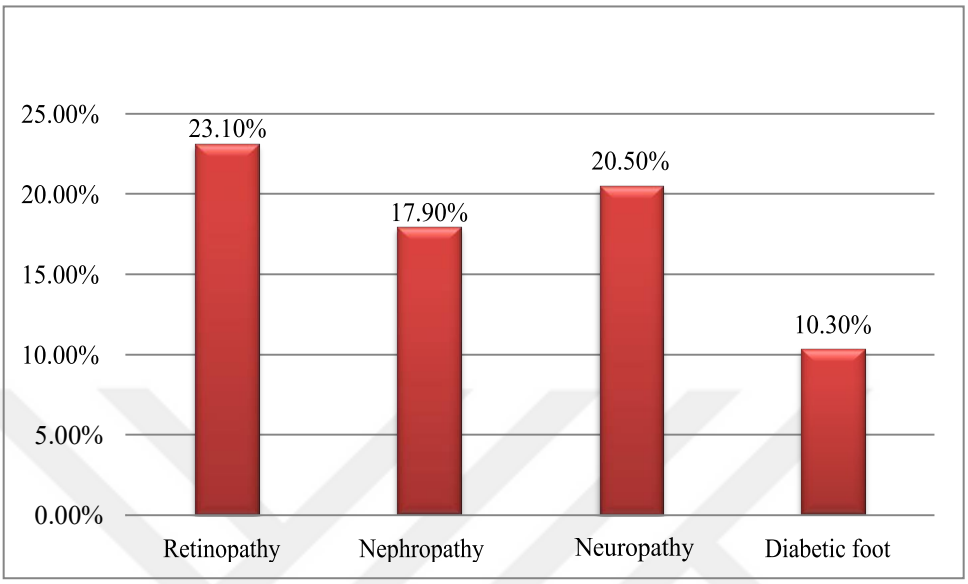


**Figure 4.11.** Complication observed in diabetic patients

Only 12.8% of the patients reported that they have received diabetes education; of those patients 75% received the education from the physician and none received it from the pharmacist (Figure 4.12.).

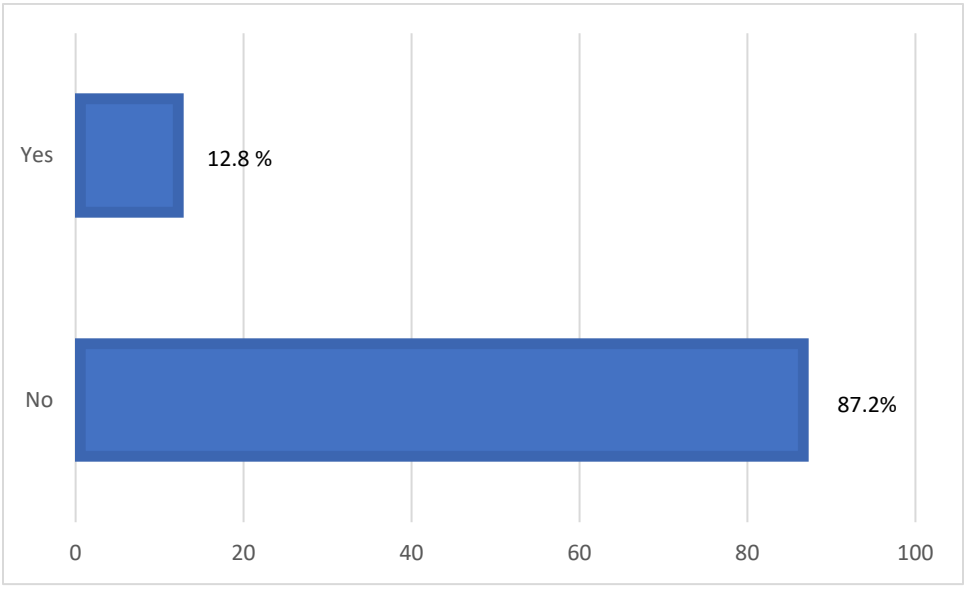


**Figure 4.12.** Percent age of patients who received diabetes education

Similarly, only 10.3% of the patients reported that they have received education regarding their diabetes medications; of those patients 50% received the education from the physician and none received it from the pharmacist (Figure 4.13. and Figure 4.14.).

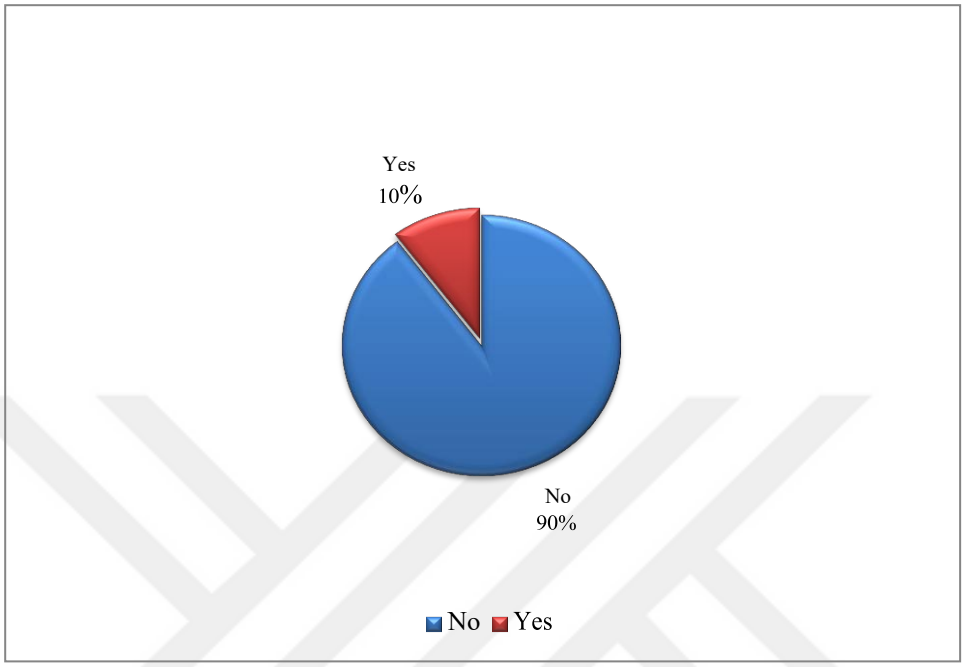


**Figure 4.13.** Percent age of patients who received diabetes

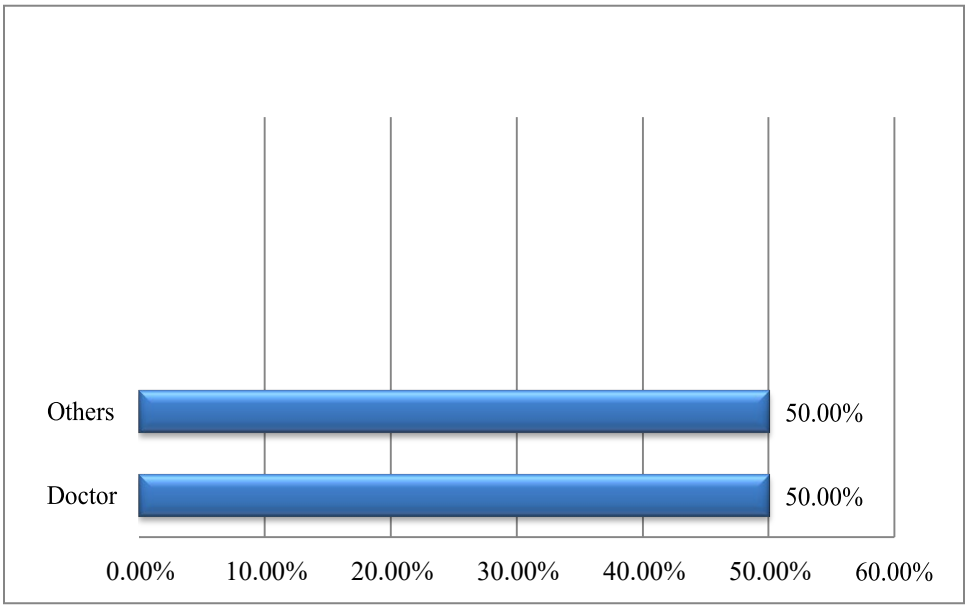


**Figure 4.14.** Diabetes medication education resource

79% of patients told they were educated about nutrition (Figure 4.15.). 48% of patients were managed by dieticians for medical nutrition therapy. None of them have an education received from the pharmacist.

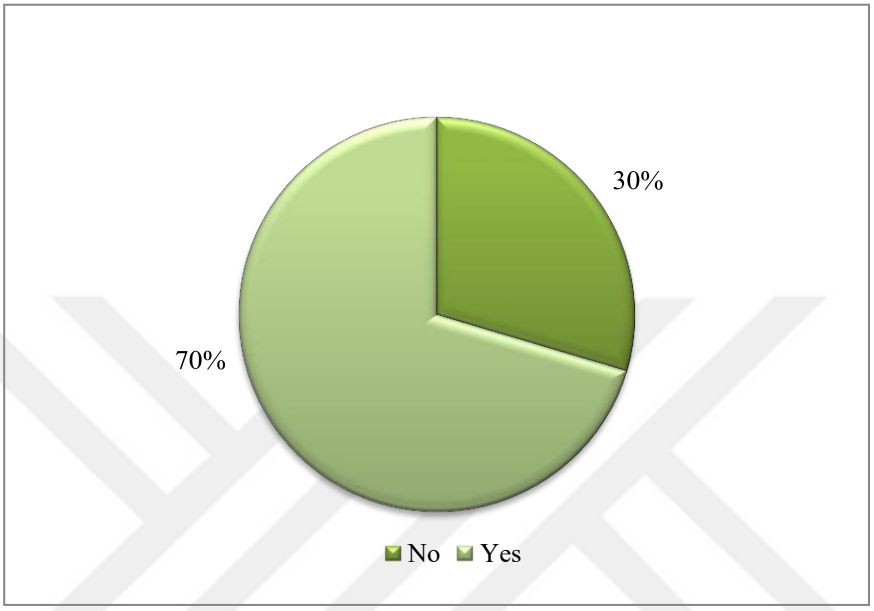


**Figure 4.15.** Percent age of patients who received nutrition education

Among all patients 84.6% reported that they take social support in terms of their medication use. This rate was 50% for the women and 96.6% for the men ($p<0.05$) as shown in Figure 4.16.

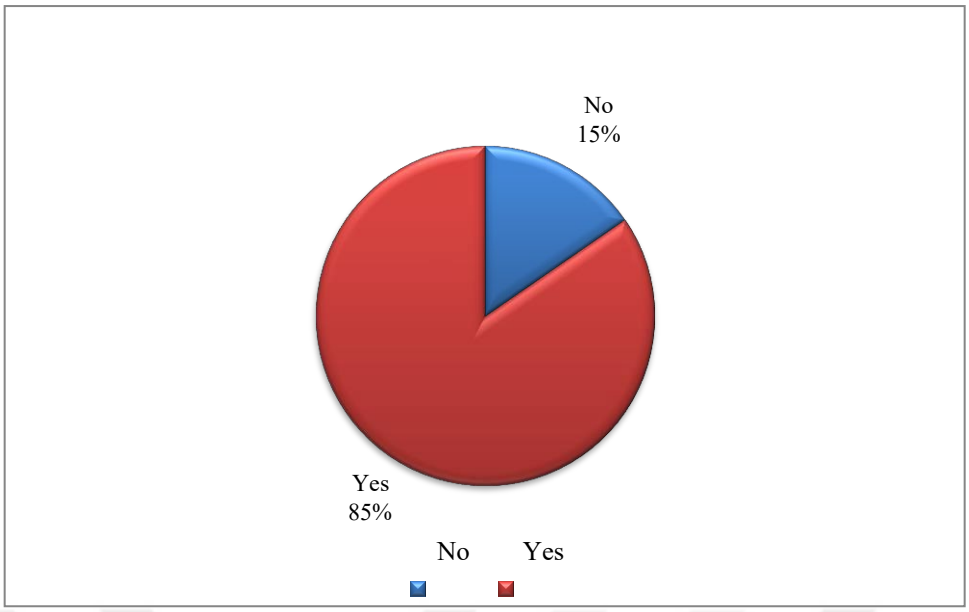


**Figure 4.16** Percent age of patients who were receiving medication use support

Only 25.6% of the patients were carrying simple carbohydrates (candies or sugar cubes) with them (Figure 4.17.). Likewise, 23.1% of them had a glucometer (Figure 4.18.).

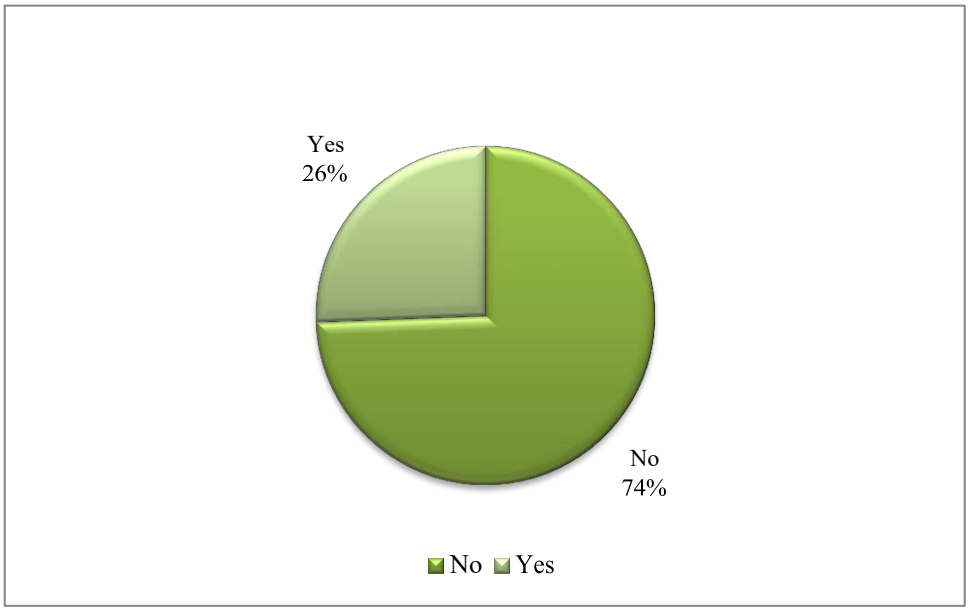


**Figure 4.17.** Percent age of patients carrying simple carbohydrates with them

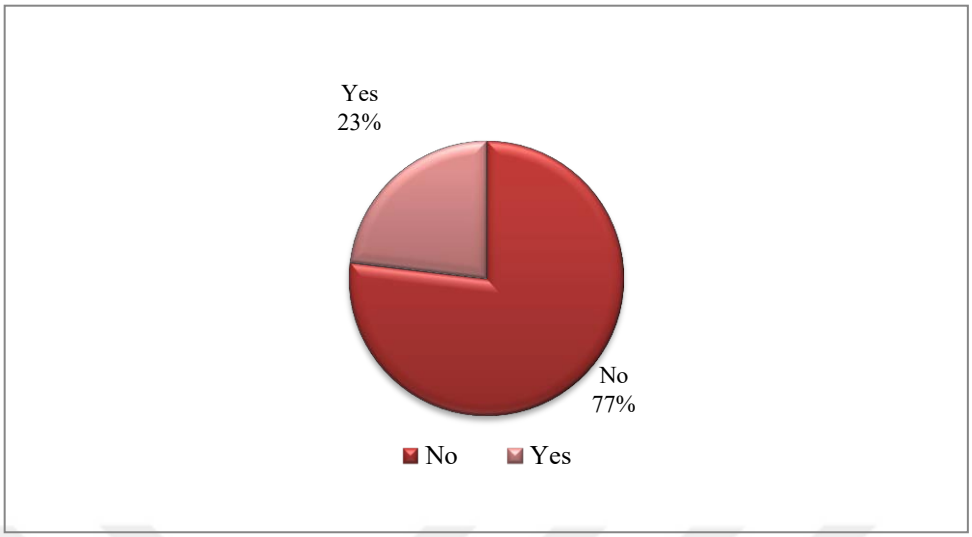


**Figure 4.18.** Percent age of patients who had a glucometer

Only one patient was not measuring her blood glucose level, while 92% claimed that they were measuring or had it measured once a fortnight (Figure 4.19.).

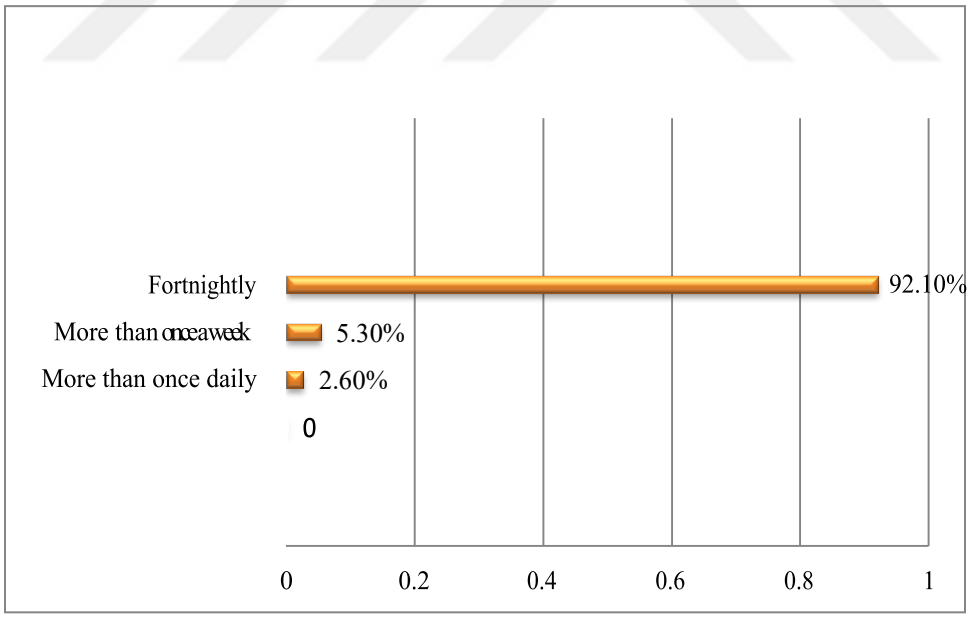


**Figure 4.19.** Frequency of blood glucose monitoring

All of the patients reported that they were experiencing hypoglycemia; majority (64.1%) of the patients had hypoglycaemia less often than once a month, while only one patient had daily hypoglycaemia episodes (Figure 4.20.). Twenty-eight percent of the patients reported that they experienced severe hypoglycemia necessitating the help of others (Figure 4.21.).

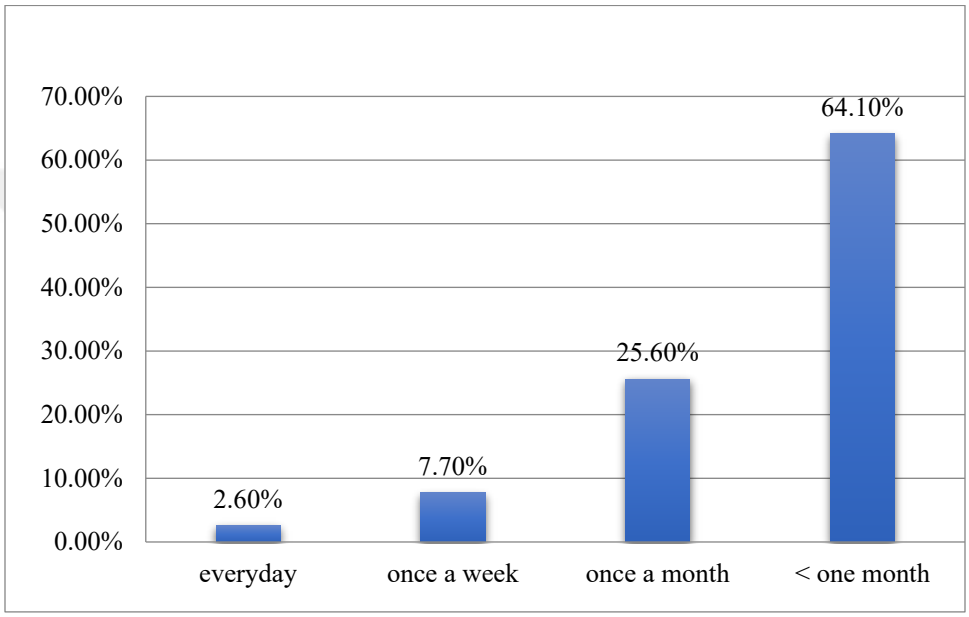


**Figure 4.20.** Frequency of hypoglycaemia episodes reported by the patients

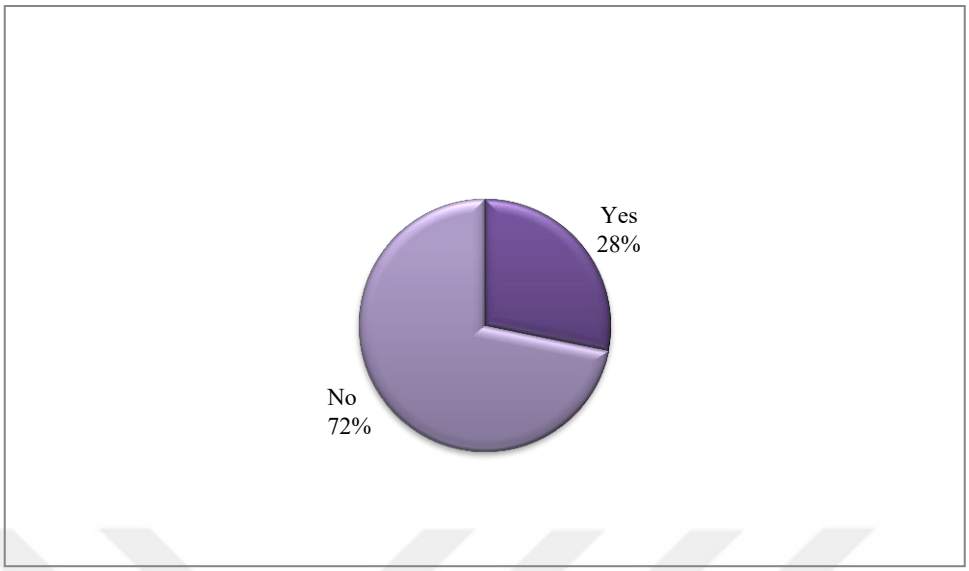


**Figure 4.21.** Percent of patients who experienced hypoglycemia necessitating the help of others

All of the patients reported that they were experiencing hyperglycemia; majority (59%) of the patients had hyperglycemia less frequently than once a month, while only one patient had daily hyperglycemia episodes (Figure 4.22.). Twenty-one percent of the patients reported that they experienced severe hyperglycemia necessitating the help of others (Figure 4.23.).

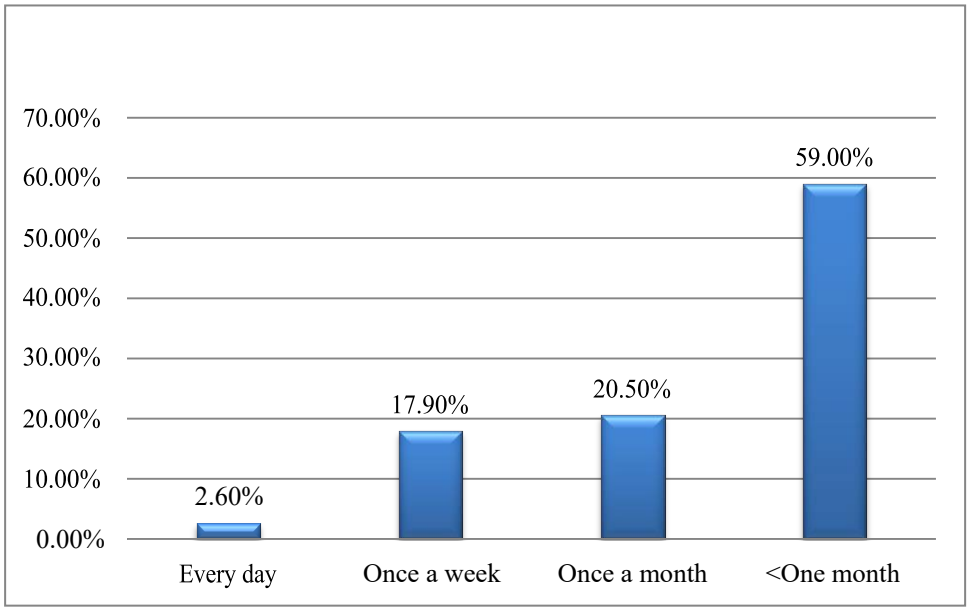


**Figure 4.22.** Frequency of hyperglycemia episodes reported by patients

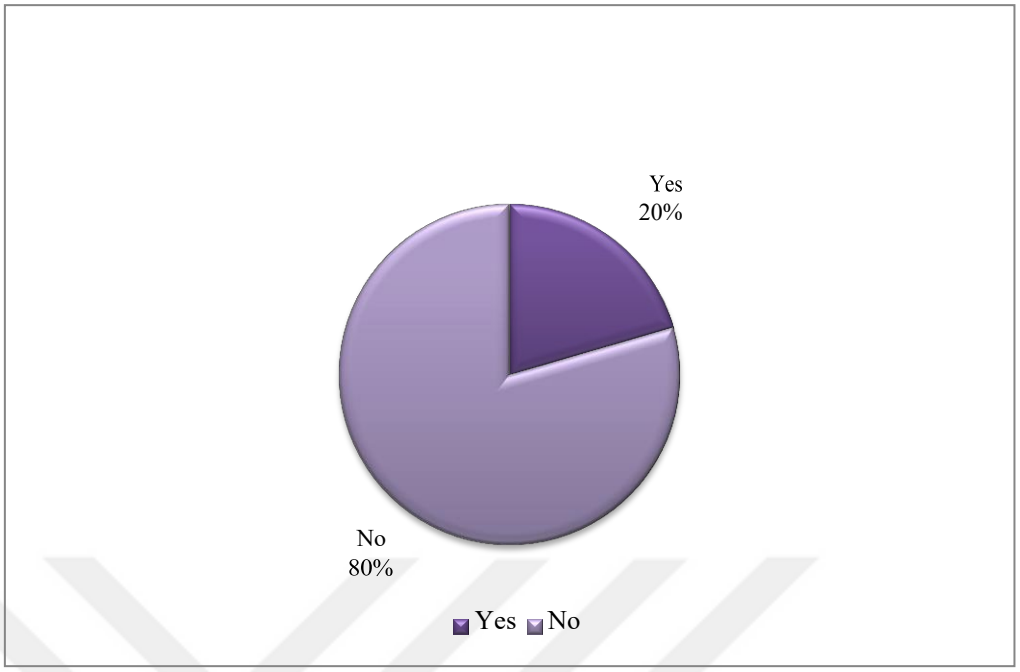


**Figure 4.23.** Percent age of patients who experienced hypoglycemia necessitating the help of others

The medicine adherence of the patients according to Morisky Medication Adherence test before and after pharmacist's intervention were as seen in Figures 4.24. and 4.25., respectively.

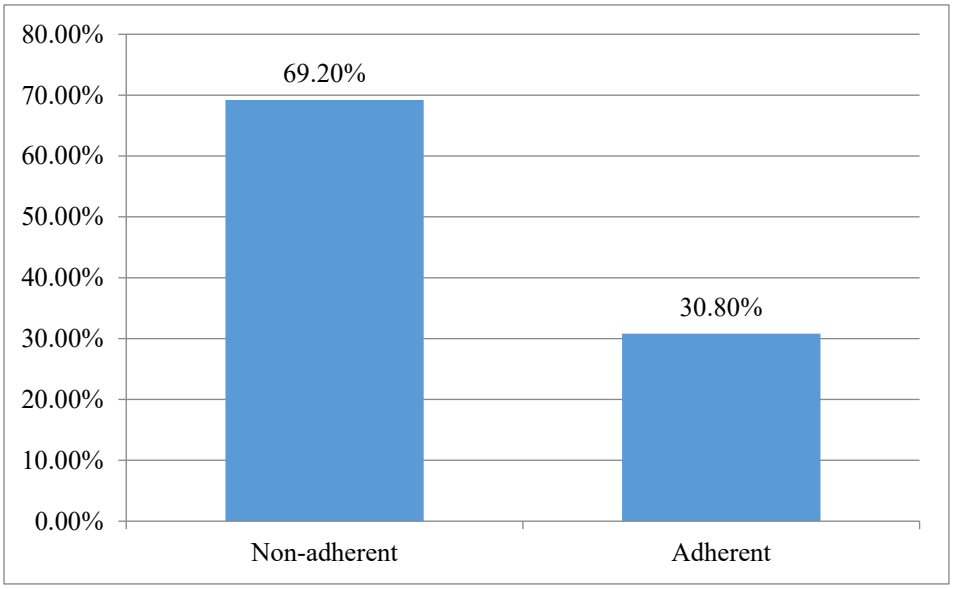


**Figure 4.24.** Medication adherence of the patients at the first interview

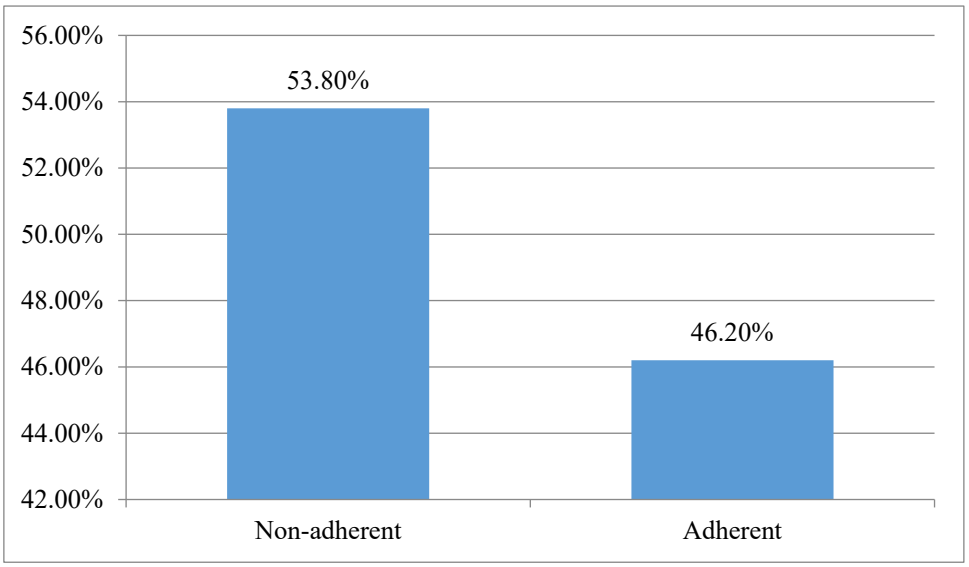


**Figure 4.25.** Medication adherence of the patients at the last interview

### 4.4. Impact of pharmaceutical care on clinical parameters

Blood pressure of patients measured before and after pharmaceutical care was as presented in Table 4.2. and the rate of patients reaching the blood pressure goal was as presented in Table 4.3. It was seen that the improvement at blood pressure measures as well as at the rate of patients reaching the blood pressure goal of <140/90 mmHg failed to reach a statistical significance ($p>0.05$).

**Table 4.2.** Blood pressure of patients before and after pharmaceutical care (n=39)

| | Mean | Standard Deviation | Standard Error | p |
|---|---|---|---|---|
| Initial systolic blood pressure (mmHg) | 125.4 | 21.8 | 3.48 | >0.05 |
| Final systolic blood pressure (mmHg) | 120.9 | 13.3 | 2.13 | |
| Initial diastolic blood pressure (mmHg) | 73.2 | 11.8 | 1.89 | >0.05 |
| Final diastolic blood pressure (mmHg) | 72.9 | 8.9 | 1.42 | |

**Table 4.3.** Rate of patients reaching the blood pressure goal before and after pharmaceutical care (n=39)

| | n | % | P |
|---|---|---|---|
| Initial rate of patients reaching the blood pressure goal | 29 | 74.4 | p> 0.05 |
| Final rate of patients reaching the blood pressure goal | 33 | 84.6 | |

The fasting blood glucose levels and the HbA1c levels of the patients measured at the initial and the final visits were as presented in Table 4.4. Besides, the rate of patients reaching the fasting blood glucose goal of <100 mg/dL and HbA1c goal of <6.5% were as presented in Table 4.5. The HbA1c levels seemed to improve by pharmaceutical care ($p<0.05$), while the improvement for fasting blood glucose levels could not reach statistical significance ($p>0.05$). Similarly, the improvements in rates of patients reaching the fasting blood glucose and HbA1c goals could not reach statistical significance ($p>0.05$).

**Table 4.4.** Fasting blood glucose and HbA1c levels of patients before and after pharmaceutical care (n=39)

| | Mean | Standard deviation | Standard error | P |
|---|---|---|---|---|
| Initial fasting blood glucose (mg/dL) | 148.4 | 59.72 | 9.56 | >0.05 |
| Final fasting blood glucose (mg/dL) | 137.5 | 58.86 | 9.43 | |
| Initial HbA1c (%) | 7.02 | 1.53 | 0.25 | 0..028 |
| Final HbA1c (%) | 6.67 | 1.23 | 0.20 | |

**Table 4.5.** Rate of patients reaching fasting blood glucose and HbA1c goals before and after pharmaceutical care (n=39)

| | N | % | P |
|---|---|---|---|
| Initial rate of patients reaching the fasting blood glucose goal | 9 | 23.1 | >0.05 |
| Final rate of patients reaching the fasting blood glucose goal | 13 | 33.3 | |
| Initial rate of patients reaching the HbA1c goal | 17 | 43.6 | >0.05 |
| Final rate of patients reaching the HbA1c goal | 21 | 53.8 | |

### 4.5. Impact of pharmaceutical care on patients' medication knowledge

The medication knowledge scores of the patients measured at the initial and the final visits were as shown in Table 4.6. It was observed that the medication knowledge scores of the patients improved by pharmaceutical care ($p<0.001$).

**Table 4.6.** Medication knowledge scores of patients before and after pharmaceutical care (n=39)

| | Mean | SD | SEM | Median | Min. | Max. | 25% Percentile | 75% Percentile | p |
|---|---|---|---|---|---|---|---|---|---|
| Initial medication knowledge test score | 2.67 | 1.56 | 0.25 | 3 | 0 | 5 | 1 | 4 | p<0.001 |
| Final medication knowledge test score | 5.44 | 1.10 | 0.18 | 6 | 3 | 7 | 4 | 6 | |

## 4.6. Impact of pharmaceutical care on patients' medication adherence

The medication adherence scores of the patients measured at the initial and the final visits were as shown in Table 4.7. It was observed that the medication adherence scores of the patients improved by pharmaceutical care ($p<0.01$).

**Table 4.7.** Medication adherence scores of patients before and after pharmaceutical care (n=39)

| | Mean | SD | SEM | Median | Min. | Max. | 25% Percentile | 75% Percentile | P |
|---|---|---|---|---|---|---|---|---|---|
| Initial medication adherence score | 2.90 | 0.97 | 0.16 | 3.00 | 1 | 4 | 2.00 | 4.00 | p<0.01 |
| Final medication adherence score | 3.28 | 0.79 | 0.13 | 3.00 | 1 | 4 | 3.00 | 4.00 | |

According to the Kolmogorov-Smirnov test, it was found that DIYAK score did not show normal distribution. For this reason, Mann-Whitney U test was used to determine whether there was a significant difference between the different categories of parameters represented by nominal and categorical data. On the other hand, Spearman's correlation test was used to determine whether DIYAK score was correlated by scale data.

According to the results of the analysis, it was determined that the DIYAK score did not show a significant difference between the different categories of the parameters represented by nominal and categorical data in terms of the following parameters: gender, marital status, educational status, literacy status, obesity status, smoking, exercise status, education of diabetes-medication, frequency of hypoglycemia, frequency of hyperglycemia, presence of diabetic foot, presence of hypertension, presence of cerebrovascular event, presence of dyslipidemia.

On the other hand, it was determined that DIYAK score showed a significant difference between the different categories of the parameters presented in Table 4.8:

**Table 4.8.** DIYAK score between the different categories of the parameters (n=39)

| | n | DİYAK | | | p |
|---|---|---|---|---|---|
| | | Median | 25% Percentile | 75% Percentile | |
| **Total** | 39 | 85.7 | 78.6 | 100 | - |
| **Social support for drug use** | 33 | 92.9 | 78.6 | 100 | 0.009 |
| **No social support for drug use** | 6 | 67.9 | 48.2 | 82.1 | |
| **Severe hypoglycemia attack requiring help** | 11 | 71.4 | 50 | 85.7 | 0.005 |
| **No severe hypoglycemia attack requiring help** | 28 | 92.9 | 80.4 | 100 | |
| **Severe hyperglycemia attack requiring help** | 8 | 64.3 | 44.6 | 94.6 | 0.023 |
| **No severe hyperglycemia attack requiring help** | 31 | 92.9 | 78.6 | 100 | |
| **Retinopathy** | 9 | 71.4 | 64.3 | 89.3 | 0.03 |
| **No retinopathy** | 30 | 92.9 | 78.6 | 100 | |
| **Nephropathy** | 7 | 71.4 | 42.9 | 85.7 | 0.004 |
| **No nephropathy** | 32 | 92.9 | 78.6 | 100 | |
| **Cardiovascular disease** | 23 | 78.6 | 64.3 | 92.9 | 0.001 |
| **No cardiovascular disease** | 16 | 96.4 | 92.9 | 100 | |
| **Adherent with medication-treatment** | 12 | 78.6 | 53.6 | 91.1 | 0.016 |
| **Non-adherent with medication-treatment** | 27 | 92.9 | 78.6 | 100 | |

As a result of the correlation analysis, the DIYAK score did not correlate with the duration of training, body mass index, systolic blood pressure, diastolic blood pressure, HbA1c, fasting blood glucose, total cholesterol, LDL, HDL and triglyceride levels, drug information level score and Morisky Medication Adherence score. It was found that the DIYAK score was correlated with age ($p < 0.05$; rho = 0.325).

## 5. DISCUSSION

In our study, the effects of pharmaceutical care given by the pharmacist on clinical parameters, drug knowledge level and medication adherence of the patients with type 2 diabetes residing at a nursing home was evaluated. Besides, diabetes-related quality of life of these patients was evaluated as well.

Our study was conducted for four months in total with six interviews with the patients. The first interviews comprised of collecting demographic information, general and diabetes-related health data, evaluation of compliance and medication knowledge of the patients. Following visits were conducted every two weeks and patients were educated both written and orally about their drugs of the patients.

At the end of the four months, the diabetes-related data medical was taken again; medication knowledge levels, adherence, and the impact of pharmaceutical care given by the pharmacist were also assessed.

Seventy-four percent of the patients who involved in our study were male. According to TURDEP 2 data, the incidence of diabetes was found slightly lower in women than men, and no important distinction was found between different sexes (TURDEP 2) [45].

In our study, 26.3% of the patients was in normal weight range, the rate of patient who are overweight and obese was 36.8%. In accordance with the literature, half of the diabetic female population was obese, while in diabetic male population this rate was 32.1%. According the findings of TURDEP 2 study overweight in men and obesity in women is more common [45]. A study from Forouhi et al proposed that in their study the countries with highest prevalence of obesity also had the highest prevalence of diabetes [46].

The similar results were obtained in our study, 42.9% of the male participants were overweight, while the rate in women participants were 50%. Clinical trials showed that with moderate weight loss, diabetes-related mortality is reduced by 30-40% [47]. The rate of overweight patients in our study was 73.6% which could be related with diabetes related health outcomes as well.

We found similar results as TURDEP study. Prevalence of type 2 diabetes in our country was found to be 7.2% in TURDEP. Impaired glucose intolerance has been associated with prediabetes [45]. In TURDEP study ratios of individuals with impaired glucose intolerance were 6.7% and glucose intolerance has increased with obesity [45]. On the other hand, increasing rate of obesity could be due to sedentary life style. Among our patients 76.9% had no physical exercise habits, which could lead to poor prognosis of diabetes.

Obviously, obesity is a significant risk factor for type 2 diabetes and 90% of type 2 diabetics are obese. Obesity is one of the modifiable factors for type 2 diabetes. Pharmacist active role on obesity management especially in diabetic obese patients, could be an important element of pharmaceutical care of diabetes. Pharmacist cooperation with physicians and nutritionists may reduce diabetes related complications and improve quality of life of the patients.

Family history is an important risk factor for developing a number of serious diseases, especially type 2 diabetes. In our study family history of diabetes was 51.3%. In clinical studies, individuals with a family history of diabetes were found to be at increased risk of T2D [48]. Another study revealed that parental history of diabetes was associated with 3-fold increase in T2D.

Three-quarters of the diabetes related deaths is due to cardiovascular diseases, and coronary artery disease. Diabetes mellitus is an important threat for cardiovascular risks. Cardiovascular mortality increased 2-3 subjects fold in diabetic men and 3-5 fold in diabetic women compared to non-diabetic. Hyperglycemia (especially fasting blood sugar as an independent risk factor) increases cardiovascular mortality by causing changes in the polyol and protein kinase C activation pathways, leading to an increase in glycosylated end-products. In the United Kingdom Prospective Diabetes Study (UKPDS), 1.0% reduction of HbA1c has been linked with 25% decrease in the risk of vascular disease and 16% reduction of heart attack risk [49].

The Framingham study pointed out that risk of developing heart failure in diabetic individuals has increased 2 times for men and, 5 times for women. In the United Kingdom Prospective Diabetes Study, each 1% increase in HbA1c has been shown to lead to a 12% increase in morbidity and mortality due to heart failure [49]. In our study, the prevalence of coronary artery disease was similar in men and women with diabetes (60% in women, 58.6% in men).

The rate of dyslipidemia was found to be 56.4% in our study. Decreasing the LDL levels can reduce the risk of cardiovascular disease in diabetics by 20-30%. Cholesterol-lowering drugs prevent the occurrence of cardiovascular events and mortality in diabetics[50] .

According to the literature, by regulating blood pressure the risk of developing any complication is diabetes related mortality decreased by 76% and by 68%, respectively [49]. According to the results of a meta-analysis, decrease in systolic blood pressure by 5-10 mm/Hg in diabetics, provides a 20-30% decrease in cardiovascular risk.

In the present study, the rate of hypertension which is an important risk factor together with diabetes was found to be 71.8% and the rate of hypertension was determined to be 60% in women and 75.9% in men. Impaired glucose levels and hypertension dramatically increases risk of cardiovascular events or even death. A firm management and monitoring of hypertension are needed for those patients.

In our patients, long-term diabetic complications were also present, with the following rates: neuropathy (20.5%), nephropathy (17.9%), retinopathy (23.1%) and diabetic foot infections (10.3%). Diabetic nephropathy is seen in 20-30% of diabetic patients, but it is noted that a very small proportion of type 2 diabetes patients have end stage renal failure[51] . Long-term complications of diabetes are another problem for diabetics. Loss of function of vital organs such as kidney, eye and sensation could be seen in uncontrolled diabetic patients in time and this situation may lead patients in a vicious cycle. As seen our result pointed out not only diabetes could be monitored but long-term organ failure due to diabetes should also be monitored closely as well. Patients with diabetes have to be educated about their condition, and regular hospital visit should be appointed every 3 months. Unfortunately, when a damage occurs in body it is very hard to recover from it but with optimum care it is possible to slow down the progression or even stop it.

Diabetic retinopathy is reported in more than 60% of patients with type 2 diabetes[52] . Peripheral neuropathy is the most common complication in diabetic patients, and can cause loss of sensation, motion perception, and loss of body balance. In literature peripheral neuropathy is reported to occur in 50% of diabetics over 60 years of age [53]. Peripheral neuropathy can lead to increased reflex duration and deterioration of postural stability, thus increasing the risk of falls [53].

Butt et al. has stated that pharmacist-led diabetes intervention programmes had favourable impacts on HbA1c, adherence and QOL scores of patients[54] . In their study Morisky adherence score improved by 20% in the intervention group. Lipid profiles, BMI values and HbA1c levels were also improved and the difference was found to be statistically significant.

In a systematic review, Presley et al. suggested that pharmacist intervention had positive outcomes on diabetes care[55] . In their work studied factors were medication adherence, HbA1c, fasting plasma glucose, postprandial plasma glucose.

The first medication adherence rate was 30.8% in our patients, and it was 46.2% after patient education was observed that the education given by the pharmacist increased the medication adherence by 15.4% in our patients (n=39). The increase in medication adherence between first and last interviews was statistically significant ($p<0.001$).

McPherson et al. founded out that medication knowledge given by a clinical pharmacist has improved HbA1c result by 1% [40]. Patients who understand medications adherence to their therapy better.

The improvement in medication knowledge of the patients between the first and the last interviews was also statistically significant.

## 6. CONCLUSIONS

The results of our study indicated the favourable effect of the clinical pharmacist in provision of glycemic control in diabetic patients residing at a nursing home. Pharmaceutical care provided by the clinical pharmacist to type 2 diabetic patients was help achieve a reduction in blood glucose levels and in improve their medication knowledge. Pharmacist's intervention has shown to improve both the clinical status as well as the medication knowledge level of the patients.

Although the drugs were provided, administered under one-to-one supervision, important outcomes were obtained in our study. If we consider the age and psychological status of the patients, the results show that the clinical pharmacist plays an effective role in treatment.

As a healthcare team member pharmacist should take place at every setting where medications are used or prescribed, especially in nursing homes where medical staff consists of either only nurses or in some rare cases doctors. We recommend that each nursing home would benefit from implementation of pharmaceutical care services by a pharmacist.

Even though the results were improved, the limitations are of this study, such as the limited number of patients (n=39). However, our study could be an initiative for further research in this area.

## 7. REFERENCES


1. A. J. Diagnosis and Classification of Diabetes Mellitus: New Criteria. *Am Fam Physician*. 1970;58(6):1355. doi:10.2337/dc14-S081
2. Campbell RK. Role of the pharmacist in diabetes management. *Am J Health Syst Pharm*. 2002;59 Suppl 9.
3. Krentz AJ, Bailey CJ. Oral antidiabetic agents: Current role in type 2 diabetes mellitus. *Drugs*. 2005;65(3):385-411. doi:10.2165/00003495-200565030-00005
4. Meeting WHO. 11 Annual Meeting of EuroPharm Forum. 2002;(October).
5. Krzyzaniak N, Pawłowska I, Bajorek B. An overview of pharmacist roles in palliative care: A worldwide comparison. *Med Paliatywna w Prakt*. 2016;10(4):160-173.
6. Van Gruting CWD. WHO report: "The role of the pharmacist in the health care system." *Pharm Weekbl*. 1991;126(16-17):411-412. doi:10.1353/hpu.2010.0345
7. Cavan D, Diogo J, Huang Y, Makaroff L. *Access to Medicines and Supplies for People with Diabetes: A Global Survey on Patients' and Health Professionals' Perspective*.; 2016. https://www.idf.org/e-library/epidemiology-research/diabetes-atlas/106-global-survey-on-access-to-medicines-and-supplies-for-people-with-diabetes.html.
8. Baird CW, Bornstein J. PLASMA-INSULIN AND INSULIN RESISTANCE. *Lancet*. 1957;269(6979):1111-1113. doi:10.1016/S0140-6736(57)91680-X
9. Care D, Suppl SS. Comprehensive medical evaluation and assessment of comorbidities: Standards of medical care in Diabetesd2018. *Diabetes Care*. 2018;41(January):S28-S37. doi:10.2337/dc18-S003
10. Mabel Yau M and MS. *Treatment of Diabetes Mellitus in Children and Adolescents*. (Feingold KR, Anawalt B, Boyce A et al, ed.). South Dartmouth (MA): MDText; 2000.
11. A.L. R, W.E. W, J.R. J, R.S. Y. Emerging epidemic of type 2 diabetes in youth. *Diabetes Care*. 1999;22(2):345-354. doi:10.2337/diacare.22.2.345
12. Statistik BP. Overview of medical care in adults with diabetes mellitus. In: *Katalog BPS*. Vol XXXIII. ; 2014:81-87. doi:10.1007/s13398-014-0173-7.2
13. Nathan DM, Balkau B, Bonora E, et al. International expert committee report on the role of the A1C assay in the diagnosis of diabetes. *CPD Bull Clin Biochem*. 2010;10(1):25-33. doi:10.2337/dc09-9033
14. Kilavuzu- TVEİ, Baski O. *TÜRKİYE ENDOKRİNOLOJİ ve METABOLİZMA DERNEĞİ*. Vol 2912.; 2018. http://www.temd.org.tr.
15. International Diabetes Federation. IDF_Atlas_8e_ppt_2018. *8th Ed*. 2017:29. http://diabetesatlas.org/resources/2017-atlas.html.
16. Grunberger G, Abelseth JM, Bailey TS, et al. AACE / ACE Consensus Statement Task Force for Insulin Pump Management. 2014;20(5). doi:10.4158/EP14145.PS
17. Einstein RIW, Enry ROH. Comparison of Insulin Aspart With Buffered Regular Insulin and Insulin Lispro in Continuous Subcutaneous. 2002;25(3):439-444.
18. Hoti K. The role of the pharmacist in the management of type 2 diabetes : current insights and future directions. 2017:15-27.
19. Doucette WR, Witry MJ, Farris KB, Mcdonough RP. Community Pharmacist – Provided Extended Diabetes Care. 2009;43. doi:10.1345/aph.1L605
20. Krass I, Armour CL, Mitchell B, et al. The Pharmacy Diabetes Care Program : assessment of a community pharmacy diabetes service model in Australia.

2007:677-683. doi:10.1111/j.1464-5491.2007.02143.x
21. Wubben DP, Vivian EM, Pharm D. Effects of Pharmacist Outpatient Interventions on Adults with Diabetes Mellitus : A Systematic Review. 2008.
22. Bajcar J, Guzzo GC, Einarson TR. Sensitivity of Patient Outcomes to Pharmacist Interventions . Part II : Systematic Review and Meta-Analysis in Hypertension Management. 2007;41. doi:10.1345/aph.1K311
23. Dalton K, Byrne S. Role of the pharmacist in reducing healthcare costs: current insights. *Integr Pharm Res Pract*. 2017;6:37-46. doi:10.2147/IPRP.S108047
24. Sriram S, Chack LE, Ramasamy R, Ghasemi A, Ravi TK, Sabzghabaee AM. Impact of pharmaceutical care on quality of life in patients with type 2 diabetes mellitus. *J Res Med Sci*. 2011;16 Suppl 1(Suppl1):S412-8. http://www.ncbi.nlm.nih.gov/pubmed/22247727. Accessed March 31, 2019.
25. Federation IP, Pharmaceutique F internationale. FIP STATEMENT OF PROFESSIONAL STANDARDS THE ROLE OF THE PHARMACIST IN CRISIS MANAGEMENT: INCLUDING MANMADE AND NATURAL DISASTERS AND PANDEMICS. 2009:689-695. doi:10.1007/s11096-009-9333-9
26. B. O, Y. O, M. S, et al. The self-care activities of diabetic patients at community pharmacy setting: Introduction to pharmaceutical care. *Int J Clin Pharm*. 2013;35(5 SUPPL. 2):896. doi:http://dx.doi.org/10.1007/s11096-013-9801-0
27. Smith M. Pharmacists' role in improving diabetes medication management. *J Diabetes Sci Technol*. 2009;3(1):175-179. doi:10.1177/193229680900300120
28. Setter SM, White JR CR. Diabetes. In: DR HE and G, ed. *Text Book of Therapeutics Drug and Disease Management.* 7th ed. Wilkins, Baltimore.: Lippincots Williams & :377-406.
29. Krigsman K, Nilsson JLG, Ring L. Refill adherence for patients with asthma and COPD : comparison of a pharmacy record database with manually collected repeat prescriptions y. 2007;(September 2006):441-448. doi:10.1002/pds
30. Vrijens B, Geest S De, Hughes DA, et al. A new taxonomy for describing and defining adherence to medications. 2012:691-705. doi:10.1111/j.1365-2125.2012.04167.x
31. Morisky DE, Ang A, Krousel-wood M. Predictive Validity of A Medication Adherence Measure in an Outpatient Setting. 2009;10(5):348-354.
32. Morisky DE, Ang A, Krousel-wood M, Ward HJ. Predictive Validity of a Medication Adherence Measure in an Outpatient Setting. 2008;10(5).
33. Tan Isha Patel Jongwha Chang X, Tan X, Patel I, Chang J. *Number 3 Article 165 2014 Review of the Four Item Morisky Medication Adherence Scale (MMAS-4) and Eight Item Morisky Medication Adherence Scale (MMAS-8)*. Vol 5.; 2014. http://pubs.lib.umn.edu/innovations/vol5/iss3/5. Accessed March 31, 2019.
34. Manolakis PG, Skelton JB. Pharmacists' contributions to primary care in the United States collaborating to address unmet patient care needs: the emerging role for pharmacists to address the shortage of primary care providers. *Am J Pharm Educ*. 2010;74(10):S7. http://www.ncbi.nlm.nih.gov/pubmed/21436916. Accessed March 31, 2019.
35. Huri HZ, Ling LC. Drug-related problems in type 2 diabetes mellitus patients with dyslipidemia. 2014;(July).
36. Anderegg S V, Pharm D, Demik DE, et al. Acceptance of Recommendations by Inpatient Pharmacy Case Managers : Unintended Consequences of Hospitalist and Specialist Care.
37. MATTHIAS ROSE, URSULA BURKERT GS, THEA SCHIROP, GERHARD

DANZER BFK. D e t e rminants of the Quality of Life of Patients With Diabetes Under Intensifie d Insulin Therapy. *E p i d e m i o l o g y / H e a l t h S e r v i c e s / P s y c h o s o c i a l R e s e a r c h*. 1998;21(11).
38. Patient TC. The Cancer Patient and Quality of Life. *ANDREW BOTTOMLEY*. 2002:120-125.
39. Ş.Apikoğlu-Rabuş, D.Yazıcı, M.Hurşitoğlu, F.Mete, R.Demirtunç, F.V.İzzettin. Diyabette Yaşam Kalitesi (DİYAK) Ölçeğinin Geliştirilmesi ve Validasyonu. In: *2. Ulusal Klinik Eczacılık Farmasötik Bakım Kongresi Dahilinde*. Antalya, 28 Kasım-1 Aralık 2013
40. Mcpherson ML, Pharm D, S BCP, et al. Association between diabetes patients ' knowledge about medications and their blood glucose control. 2008;4:37-45. doi:10.1016/j.sapharm.2007.01.002
41. Yilmaz S. Drug side effects and drug compliance in psychiatric patients. 2004.
42. Hazra A, Gogtay N. Biostatistics Series Module 4: Comparing Groups - Categorical Variables. *Indian J Dermatol*. 2016;61(4):385-392. doi:10.4103/0019-5154.185700
43. Anderson TW, Darling DA. *Asymptotic Theory of Certain "Goodness of Fit" Criteria Based on Stochastic Processes*. Vol 23.; 1952. http://www.cithep.caltech.edu/~fcp/statistics/hypothesisTest/PoissonConsistency/AndersonDarling1952.pdf. Accessed March 31, 2019.
44. MacFarland TW, Yates JM. Mann–Whitney U Test. In: *Introduction to Nonparametric Statistics for the Biological Sciences Using R*. Cham: Springer International Publishing; 2016:103-132. doi:10.1007/978-3-319-30634-6_4
45. Ilhan Satman, Sazi Imamoglu, Candeger Yılmaz, Goksun Ayvaz AC. Türkiyede ve Dünyada Diyabet. 2012:1-56.
46. Forouhi NG, Wareham NJ. Epidemiology of diabetes. *Medicine (Baltimore)*. 2010;38(11):602-606. doi:10.1016/j.mpmed.2010.08.007
47. Jung RT. Obesity as a disease. 1997;3(2):307-321.
48. Consortium TI. The link between family history and risk of type 2 diabetes is not explained by anthropometric , lifestyle or genetic risk factors : the EPIC-InterAct study. 2013:60-69. doi:10.1007/s00125-012-2715-x
49. King P, Peacock I, Donnelly R. The UK Prospective Diabetes Study ( UKPDS ): clinical and therapeutic implications for type 2 diabetes. 1999:643-648.
50. Downs JR, Clearfield M, Weis S, et al. Primary prevention of acute coronary events with lovastatin in men and women with average cholesterol levels: results of AFCAPS/TexCAPS. Air Force/Texas Coronary Atherosclerosis Prevention Study. *JAMA*. 1998;279(20):1615-1622. http://www.ncbi.nlm.nih.gov/pubmed/9613910. Accessed April 9, 2019.
51. Nephropathy in Diabetes. *Diabetes Care*. 2004;27(Supplement 1):S79-S83. doi:10.2337/diacare.27.2007.S79
52. Molitch ME, DeFronzo RA, Franz MJ, et al. Diabetic nephropathy. *Diabetes Care*. 2003;26 Suppl 1:S94-8. http://www.ncbi.nlm.nih.gov/pubmed/12502629. Accessed April 9, 2019.
53. Deursen V. Foot and Ankle Sensory Neuropathy, Proprioception, and Postural Stability. 1999;29(12):718-726.
54. Butt M, Mhd Ali A, Bakry MM, Mustafa N. Impact of a pharmacist led diabetes mellitus intervention on HbA1c, medication adherence and quality of life: A randomised controlled study. *Saudi Pharm J*. 2016;24(1):40-48. doi:10.1016/j.jsps.2015.02.023

55. McClellan WM, Millman L, Presley R, Couzins J, Flanders WD. Improved diabetes care by primary care physicians: results of a group-randomized evaluation of the Medicare Health Care Quality Improvement Program (HCQIP). *J Clin Epidemiol*. 2003;56(12):1210-1217. doi:10.1016/S0895-4356(03)00198-7

# 8. APPENDIX

## 8.1. Appendix 1: Patient Approval Form

## HASTA ONAY FORMU

**Çalışmanın Adı:** Huzurevindeki Tip 2 Diyabet Hastalarında Farmasötik Bakımın Etkisi ve Yaşam Kalitesi Değerlendirmesi

**Protokol No:**

Hasta bilgilendirme formunda verilen tüm bilgileri okudum ve anladım. Kişisel, hastalık ve tedavi bilgilerimin ve anket sonuçlarımın kullanılmasında bir sakınca görmüyorum. Bu çalışmaya hiç kimsenin etkisi altında kalmadan tamamen kendi rızamla gönüllü olarak katılmayı kabul ediyorum.

Hasta Adı Soyadı İmza Tarih

## 8.2. Appendix 2: Patient Information Form

### HASTA BİLGİLENDİRME FORMU

**Çalışmanın Adı:** Huzurevindeki Tip 2 Diyabet Hastalarında Farmasötik Bakımın Etkisi ve Yaşam Kalitesi Değerlendirmesi
**Protokol No:**

Yeditepe Üniversitesi Eczacılık Fakültesi Klinik Eczacılık Bilim Dalı'nda yürütülen yüksek lisans tezi olan ve yukarıda adı geçen çalışmaya davet edilmiş bulunuyorsunuz.

Bu çalışmada huzurevinde bakım alan ve çalışma hakkında bilgilendirildikten sonra çalışmaya katılmayı kabul eden, en az bir aydır, bir veya daha çok sayıda antidiyabetik ilaç kullanmakta olan tip 2 diyabet hastalarına uygulanan farmasotik bakimi ve yaşam kalitesine etkisini değerlendirmeyi amaçlamaktayız.

Bu çalışma için sizden kişisel ve tedavinizle ilgili bazı soruları cevaplamanız istenecektir. Size, eczacı tarafından antidiyabetik ilaçlarınızla ilgili sözlü ve yazılı eğitim verilecektir. Değerlendirme için, çalışmanın başlangıcında ve eczacı tarafından verilen eğitimden 3 ay sonra yaşam kalitesinizi ve ilaç kullanım tutumlarınızla ile ilgili sorular sorulacaktır. Bundan başka herhangi bir ek girişim talep edilmeyecektir. Sizden çalışmayla ilgili hiçbir ücret talebinde bulunulmayacaktır.

Çalışmaya katılmanız halinde kişisel bilgileriniz bizde saklı tutulacak ve herhangi bir yerde açıklanmayacaktır. Çalışma ile ilgili danışmak istediğiniz bir konu olduğunda aşağıda telefon numarası yazılı bulunan araştırmacıyla temasa geçebilirsiniz:

Ecz. Nimet Sağlam- Yeditepe Üniversitesi Eczacılık Fakültesi Klinik Eczacılık Bilim Dalı (Tel no:0506 356 5981)

Prof. Dr. Fikret Vehbi İzzettin- Marmara Üniversitesi Eczacılık Fakültesi Klinik Eczacılık Bilim Dalı (Tel no:0216 346 4060)

Doç. Dr. Şule Apikoğlu Rabuş- Marmara Üniversitesi Eczacılık Fakültesi Klinik Eczacılık Bilim Dalı (Tel no:0533 724 7324)

Bu çalışmaya gönüllü olarak katılmanızı, herhangi bir etki ya da baskı altında kalmadan iştirak etmenizi istiyoruz. İstediğiniz her an bu çalışmadan çekilme hakkına sahipsiniz. Çalışmadan çekilmeniz durumunda hastalığınızla ilgili hiçbir tedavi işleminiz ve tıbbi bakım hizmetleriniz yarıda kalmayacak, eski seyrinde devam edecektir.

## 8.3. Appendix 3: Patient Profile Record

### Hasta Profil Kaydı

| | | | | |
|---|---|---|---|---|
| **Adı Soyadı** | | | | |
| | | | | |
| **Cinsiyeti** | Kadın | Erkek | | |
| | | | | |
| **Doğum Tarihi** | | | | |
| | | | | |
| **Medeni Durumu** | EVLİ | BEKAR | DUL | |
| | | | | |
| **Öğrenim Durumu** | YOK | İLKOKUL | ORTAOKUL | LİSE |
| | ÜNİVERSİTE | | | |
| | | | | |
| **Eğitim Yılı** | | | | |
| | | | | |
| **Okur-Yazarlık** | VAR | YOK | | |
| | | | | |
| **Mesleği** | | | | |
| | | | | |
| **Evde Kiminle Yaşıyor** | YALNIZ | EŞİYLE | KIZI/ OĞLU | DİĞER |
| | | | | |
| **Boy** | | | | |
| | | | | |
| **Kilo** | | | | |
| | | | | |
| **Sigara Kullanıyor Mu?** | EVET | HAYIR | | |
| | | | | |
| **Kan Basıncı** | | | | |
| | | | | |
| **Diyabet Tanı Tarihi** | | | | |
| | | | | |
| **Diyabet Süresi** | | | | |
| | | | | |
| **Ailede Diyabet Öyküsü** | VAR | YOK | | |
| | | | | |
| **Tıbbi beslenme tedavisi eğitimi** | VAR | YOK | | |
| | | | | |
| **Varsa nereden** | DOKTOR | ECZACI | HEMŞİRE | FİRMA |
| | DİĞER | | | |
| | | | | |
| **Hastalığıyla ilgili eğitimi** | VAR | YOK | | |
| | | | | |
| **Varsa nereden** | DOKTOR | ECZACI | HEMŞİRE | FİRMA |
| | DİĞER | | | |
| **İlaçlarıyla ilgili eğitimi** | VAR | YOK | | |

| | | | | |
|---|---|---|---|---|
| | | | | |
| **Varsa nereden** | DOKTOR | ECZACI | DİĞER | |
| | | | | |
| **Egzersiz Alışkanlığı** | VAR | YOK | | |
| | | | | |
| **İlaç kullanımı ile İlgili sosyal destek** | VAR | YOK | | |
| | | | | |
| **Varsa Nereden** | AİLE | ÇEVRE | DİĞER | |
| | | | | |
| **Komplikasyonlar- Akut** | | | | |
| | | | | |
| **Şekerinin Düştüğünü Nasıl Hissediyor** | | | | |
| | | | | |
| **Bunun Sıklığı** | HERGÜN | HAFTADA BİR | AYDA BİR | DAHA SEYREK |
| | | | | |
| **Bu Semptomlar Varlığında Ne Yapıyor** | | | | |
| | | | | |
| **Bu Semptomların Neden Kaynaklandığını Düşünüyor** | | | | |
| | | | | |
| **Başkasından Yardım İsteyecek Kadar Kötü Hissetti mi** | EVET | HAYIR | | |
| | | | | |
| **Şekerinin Yükseldiği Nasıl Hissediyor** | | | | |
| | | | | |
| **Bunun Sıklığı** | HERGÜN | HAFTADA BİR | AYDA BİR | DAHA SEYREK |
| | | | | |
| **Bu Semptomlar Varlığında Ne Yapıyor** | | | | |
| | | | | |
| **Bu Semptomların Neden Kaynaklandığını Düşünüyor** | | | | |
| | | | | |
| **Başkasından Yardım İsteyecek Kadar Kötü Hissetti mi** | EVET | HAYIR | | |
| | | | | |
| **Yanında Şeker Taşıyor mu** | EVET | HAYIR | | |
| | | | | |
| **Kan Şekeri Ölçüm Cihazı** | VAR | YOK | | |

| | | | | |
|---|---|---|---|---|
| | | | | |
| **Ölçüm Sıklığı** | GÜNDE BİR | HAFTADA BİR | | |
| | GÜNDE BİRDEN SIK | HAFTADA BİRDEN SIK | | |
| | | | | |
| **Beslenme** | | | | |
| **Öğün Sayısı** | ANA ÖĞÜN | | | |
| | ARA ÖĞÜN | | | |
| | | | | |
| **Son Hba1C** | | | | |
| **Son Açlık Glukoz** | | | | |
| **Hedef HbA1c** | | | | |
| **Hedef Açlık Glukozu** | | | | |
| | | | | |
| **Komplikasyonlar- Kronik** | | | | |
| **Retinopati** | VAR | YOK | | |
| **Nefropati** | VAR | YOK | | |
| **Nöropati** | VAR | YOK | | |
| **Diyabetik Ayak** | VAR | YOK | | |
| **Geçirilmiş Miyokard Infarktüsü, İskemik Kalp Hastalığı** | VAR | YOK | | |
| | | | | |
| **Eşlik Eden Hastalıklar** | | | | |
| **Hipertansiyon** | VAR | YOK | | |
| **Serebrovasküler Olay** | VAR | YOK | | |
| **Dislipidemi** | VAR | YOK | | |

| **HASTANIN KULLANDIĞI İLAÇLAR** | **DOZU** |
|---|---|
| | |

## 8.4. Appendix 4: Medication Knowledge Test

**İlaç Bilgi Düzeyinin Ölçülmesi**

1- Kullanmakta olduğunuz ilacın adını söyleyebilir misiniz?
-İlacın adını bilmiyor-0
- İlacın adını biliyor-1

2- Bu ilacı neden kullanmakta olduğunuzu söyleyebilir misiniz?
-Bilmiyor-0
-Kan şekerini düşürmek için-1
-İlacın nasıl çalıştığını kesin şekilde tanımlayabiliyor-2

3-İlacınızın nasıl ve ne zaman alınacağını biliyor musunuz?
-Bilmiyor-0
-Ne zaman alınacağını biliyor fakat nasıl alınacağını bilmiyor-1
- Nasıl alınacağını biliyor fakat ne zaman alınacağını bilmiyor-1
-İlacının nasıl ve ne zaman alınacağını biliyor-2

4- İlacınızın hangi yan etkilere yol açabileceğini ve bu yan etkiler görüldüğünde ne yapmanız gerektiğini söyleyebilir misiniz?
-Biilmiyor-0
-Yan etkileri biliyor fakat ne yapması gerektiğini bilmiyor-1
- Ne yapması gerektiğini biliyor fakat yan etkileri bilmiyor-1
-Yan etkilerini ve bunlar gözlendiğinde ne yapacağını biliyor-2

5-İlacınızın 1 dozunu almayı unuttuğunuzda ne yapmanız gerektiğini biliyor musunuz?
-Bilmiyor veya "çift doz alırım" diyor-0
-Hiç doz kaçırmıyor veya normal şekilde devam ederim veya doktor veya eczacıya sorarım diyor-1

## 8.5. Appendix 5: Morisky Medication Adherence Scale: MMAS-4

**Morisky Uyum Ölçeği**

| | **Morisky Uyum Ölçeği** | Evet | Hayır |
|---|---|---|---|
| **1.** | İlacınızı almayı unutuyor musunuz? | ☐ | ☐ |
| **2.** | İlacınızı zamanında almayı unutur musunuz? | ☐ | ☐ |
| **3.** | Kendinizi iyi hissettiğinizde ilaç almayı bırakıyor musunuz? | ☐ | ☐ |
| **4.** | İlaç aldığınızda kendinizi kötü hissederseniz ilaç almayı bırakır mısınız? | ☐ | ☐ |

## 8.6. Appendix 6: Patient Education Form Sample

**Örnek Yazılı Hasta Eğitim Formu**

# METFORMİN

***Etken maddenin eczane bulunan isimleri:***

- Diaformin®
- Glange®
- Glifor®
- Glucophage®
- Metfull®
- Gluforce®
- Gluformin®
- Glukofen®
- Matofin®

***Kullanım Amacı:***

- ✓ Diyet ve egzersizle bazen diğer ilaçlarla birlikte Tip 2 Diyabetin (şeker hastalığının) tedavisinde yüksek kan şekeri seviyesini düşürmek için kullanılır.

***Kullanım Şekli:***

- ✓ İlacı tok karnına yemekten hemen sonra 1 bardak su ile alınız.

***Yan etkiler:***

- Gaz ve şişkinlik
- İshal
- Ağızda metalik tat
- B12 Vitamin eksikliği

***Saklama koşulları:***

- ✓ İlacı orijinal kutusunda, kapalı bir biçimde ve çocukların ulaşamayacağı yerlerde saklayınız.
- ✓ Oda sıcaklığında (25˚C), aşırı nem ve ısıdan muhafaza ederek saklayınız.
- ✓ Son kullanma tarihi geçmiş ilaçları kullanmayınız.

***İlacı Almayı Unuttuğunuzda Ne Yapılmalı:***

- ✓ Bir doz almayı unutursanız hatırladığınız anda alınız. Eğer bu süre bir sonraki doza yakınsa, unutulmuş dozu atlayıp her zaman aldığınız saatte alınız.
- ✓ Telafi etmek için çift doz almayın.

**ÖNEMLİ NOTLAR:**

- ✓ Kullandığınız tüm ilaçları ve bitkisel ürünleri-gıda takviyelerini doktorunuza ve eczacınıza bildiriniz.
- ✓ Olağan dışı yorgunluk, baş dönmesi, şiddetli halsizlik, üşüme, kas ağrısı, hızlı ve/veya zor nefes alma, yavaş düzensiz kalp atışı, mide bulantısıyla eşlik eden karın ağrısı ve/veya kusma ve/veya ishal olduğunuzda doktorunuza başvurunuz.

***Bu ilacı kullanırken dikkat edilmesi gereken durumlar:***

- Böbrek hastalığı olanlar
- Karaciğer hastalığı olanlar
- Yakın zamanda ameliyat geçirenler
- Kalp yetmezliği olanlar
- Kalp krizi öyküsü olanlar
- İnme
- Enjeksiyonla radyolojik görüntüleme ilaçları kullananlar

## 8.7. Appendix 7: Quality of Life in Diabetes (DİYAK)

**DİYABETTE YAŞAM KALİTESİ ÖLÇEĞİ**

| | | |
|---|---|---|
| 1. Şeker hastalığınızın tedavisi için harcadığınız çaba sizi bıktırıyor mu? | evet | hayır |
| 2. Yaşamınızı yiyecekler mi kontrol ediyor? | evet | hayır |
| 3. İnsanlar size sürekli ne yemeniz gerektiğini söylediklerinde sinirleniyor musunuz? | evet | hayır |
| 4. Şeker hastalığınız sokağa veya seyahate çıkmanızı sınırlıyor mu? | evet | hayır |
| 5. Şeker hastalığınız nedeniyle mutsuz veya bunalımlı hissediyor musunuz? | evet | hayır |
| 6. Gelecekte şeker hastalığının neden olabileceği başka hastalıklara yakalanmaktan korkuyor musunuz? | evet | hayır |
| 7. Şeker hastalığınız nedeniyle aile içindeki saygınlığınızın azaldığını düşünüyor musunuz? | evet | hayır |
| 8. Şeker hastalığınız sosyal ilişkilerinizi ve arkadaş ziyaretlerinizi sınırlıyor mu? | evet | hayır |
| 9. Şeker hastalığınız aile yaşantınızı olumsuz şekilde etkiliyor mu? | evet | hayır |
| 10. Şeker hastalığınız günlük iş, okul ve ev işlerinizi sınırlıyor mu? | evet | hayır |
| 11. Şeker hastalığınız nedeniyle kendinizi duygusal olarak bağımlı (muhtaç) hissediyor musunuz? | evet | hayır |
| 12. Şeker hastalığınız nedeniyle kendinizi bedensel olarak bağımlı (muhtaç) hissediyor musunuz? | evet | hayır |
| 13. Şeker hastalığınız nedeniyle ailenize ve çevrenizdekilere yük olduğunuzu düşünüyor musunuz? | evet | hayır |
| 14. Diyet ve kan şekeri ölçümleri konularında ‘kendinizi kandırdığınızda’ suçluluk hissediyor musunuz? | evet | hayır |

## 8.8. Appendix 9: Institution Approval

T.C.
İSTANBUL BÜYÜKŞEHİR BELEDİYE BAŞKANLIĞI
Sağlık ve Sosyal Hizmetler Daire Başkanlığı İstanbul Darülaceze Müdürlüğü

Sayı : 97294061-773.99- 176/11416 17/01/2014

Konu : Ecz. Nimet Sağlamı' ın
Klinik Eczacılık Yüksek Lisans Tezi Hk.

YEDİTEPE ÜNİVERSİTESİNE
(Sağlık Bilimleri Enstitüsü)

İlgi: 09.01.2014 tarihli 18897253-0001-248 sayılı yazımız.

İlgi yazınızda Üniversiteniz Enstitünüzde yüksek lisans tezini yapmakta olan Ecz. Nimet Sağlam' ın "Huzurevindeki Tip 2 Diyabet Hastalarında Farmosotik Bakımın Klinik Parametreleri ve Yaşam Kalitesine Etkisi" başlıklı çalışmasını kurumumuzda yapması için izin talep edilmektedir.

Söz konusu talepleriniz Müdürlüğümüz tarafından incelenerek, çalışmanızın her aşamasında bilgi verilmesi ve çalışma sonuç raporunun tarafımızla paylaşılması kaydıyla uygun bulunmuştur.

Bilgilerinizi rica ederim.

İsrafil AYDIN
İstanbul Darülaceze Müdürü

Kayışdağı Mahallesi Kayışdağı Caddesi No 211 34755 Ataşehir-İSTANBUL
Telefon : 0216 528 84 00 Pbx Faks : 0216 471 31 67
e-posta : darulaceze@ibb.gov.tr

Ayrıntılı Bilgi İçin S.KARAKIŞ
Dahili No: 8627

# 9. CURRICULUM VITAE

**Kişisel Bilgiler**

| | | | |
|---|---|---|---|
| **Adı** | Nimet | **Soyadı** | Sağlam |
| **Doğum Yeri** | Yozgat | **Doğum Tarihi** | 18.01.1984 |
| **Uyruğu** | T.C. | **TC Kimlik No** | 22633612016 |
| **E-mail** | sglmnmt@gmail.com | **Tel** | 5063565981 |

**Öğrenim Durumu**

| Derece | Alan | Mezun Olduğu Kurumun Adı | Mezuniyet Yılı |
|---|---|---|---|
| **Doktora** | | | |
| **Yüksek Lisans** | | | |
| **Ön Lisans** | İşletme Yönetimi | Anadolu Üniversitesi | 2013 |
| **Lisans** | Eczacılık | Marmara Üniversitesi | 2009 |
| **Lise** | Fen Bilimleri | Hüseyin Avni Sözen Anadolu Lisesi | 2002 |

| **Bildiği Yabancı Dilleri** | **Yabancı Dil Sınav Notu (#)** |
|---|---|
| İNGİLİZCE | 67.5 |

**İş Deneyimi (Sondan geçmişe doğru sıralayın)**

| **Görevi** | **Kurum** | **Süre (Yıl- Yıl)** |
|---|---|---|
| Eczacı | Doğa Eczanesi | 2012- devam ediyor |

**Bilgisayar Bilgisi**

| **Program** | **Kullanma becerisi** |
|---|---|
| Windows Office | Orta |