1

Evaluation of the Relation between Self-care Management and Treatment Compatibility Among Patients with Diabetes Mellitus

Diabetes Mellitus Hastalarında Öz Bakım Yönetimi ile Tedavi Uyumu Arasındaki İlişkinin Değerlendirilmesi

Ⓘ Gizem ŞENYÜREK ADA[1], Ⓘ Ali İhsan ÇABUK[2], Ⓘ Muhteşem Erol YAYLA[2]

[1]*Clinic of Family Medicine, Çukurova State Hospital, Adana, Türkiye*
[2]*Clinic of Family Medicine, University of Health Sciences Turkey, Adana City Training and Research Hospital, Adana, Türkiye*

ABSTRACT

Objective: To prevent complications of diabetes mellitus (DM) and to maintain health in the best way possible, the knowledge level of patients regarding diabetes should be increased, and every step of treatment and self-care management should be adopted by the patient. This study aimed to determine the relationship between self-care management and treatment compliance in patients with DM who applied to the University of Health Sciences Turkey, Adana City Training and Research Hospital Endocrinology and Metabolism Polyclinic.

Material and Methods: In this cross-sectional study, 320 patients aged between 18 and 85 years who applied to University of Health Sciences Turkey, Adana City Training and Research Hospital Endocrinology and Metabolism Polyclinic between 02.01.2023 and 02.04.2023, and who were diagnosed with diabetes for at least 1 month were included in the study. The socio-demographic data form consisting of 23 questions, the chronic disease self-care management scale (SCMP-G) consisting of 35 questions, and the Morisky medication adherence scale consisting of 8 questions were applied to the patients. The data were analyzed using the SPSS 24.0 package.

Results: 61.9% of the patients with DM who participated in the study were female, and the mean age was 55.08 ± 12.39 years. The mean body mass index of the participants was 30.31 ± 6.42 and the hemoglobin A1c (HbA1c) values were found to be 8.65 ± 2.68. A chronic disease accompanying diabetes was found in 71% of the participants, and the most common chronic disease was hypertension. In the treatment of diabetes, 37.5% of the participants used only oral antidiabetic (OAD), 27.8% OAD + insulin, 14.4% only insulin. It was found that 61.6% of the participants went to check-ups regularly, 15.9% performed physical activity, and 63.8% made changes in their eating habits. A weak negative correlation was found between the self protection subdimension and the number of drugs, duration of diabetes diagnosis, and HbA1c values. Participants who received diabetes education had high SCMP-G scores, which was a significant difference (p=0.008).

Conclusion: Disease self-care management will increase as self-protection and social protection for individuals with diabetes increase. Treatment compliance of individuals with high self-care management will also increase. Therefore, diabetes education should be given importance to individuals with diabetes.

Keywords: Diabetes mellitus, self-care management, treatment compliance

ÖZ

Giriş: Diabetes mellitus'un (DM) komplikasyonlarından korunmak ve sağlığı en iyi şekilde idame ettirebilmek için hastaların diyabet hakkındaki bilgi düzeyleri arttırılmalı, tedavinin her basamağı ve öz bakım yönetimleri hastaya benimsetilmelidir. Bu çalışmamızda, Sağlık Bilimleri Üniversitesi, Adana Şehir Eğitim ve Araştırma Hastanesi Endokrinoloji ve Metabolizma Polikliniği'ne başvuran DM hastalarının öz bakım yönetimi ile tedavi uyumu arasındaki ilişkiyi belirlemek amaçlanmıştır.

Gereç ve Yöntemler: Bu araştırma kesitsel olarak 02.01.2023-02.04.2023 tarihleri arasında Sağlık Bilimleri Üniversitesi, Adana Şehir Eğitim ve Araştırma Hastanesi Endokrinoloji ve Metabolizma Polikliniği'ne başvuran 18-85 yaş arası, en az bir aylık diyabet tanısı olan 320 hasta çalışmaya dahil edilmiştir. Hastalara, 23 soruluk sosyo-demografik veri formu, 35 sorudan oluşan Kronik Hastalık Öz Bakım Yönetimi Ölçeği (KHÖBY) ve 8 sorudan oluşan Morisky tedavi uyum ölçeği-8 uygulanmıştır. Veriler, SPSS 24.0 paket programı ile analiz edilmiştir.

ÖZ

Bulgular: Çalışmaya katılan DM tanılı hastaların %61,9'u kadın ve yaş ortalaması 55,08 ± 12,39 yıldı. Katılımcıların beden kitle indeksi ortalaması 30,31 ± 6,42 ve HbA1c değerleri 8,65 ± 2,68 olarak bulundu. Katılımcıların %71'inde diyabete eşlik eden kronik hastalık saptandı ve en sık eşlik eden kronik hastalık hipertansiyondu. Diyabet tedavisinde katılımcıların %37,5'i sadece oral antidiyabetik (OAD), %27,8'i OAD + insülin, %14,4'ü sadece insülin kullanıyordu. Katılımcıların %61,6'sının düzenli olarak kontrole gittiği, %15,9'unun fiziksel aktivite yaptığı ve %63,8'inin beslenme alışkanlıklarında değişiklik yaptığı bulundu. Öz koruma alt boyutu ile ilaç sayısı, diyabet tanı süresi, HbA1c değerleri arasında negatif yönlü zayıf bir ilişki bulundu. Diyabet eğitimi alan katılımcıların KHÖBY ölçek puanları yüksekti ve anlamlı bir fark vardı (p=0,008).

Sonuç: Diyabetli bireylerin öz ve sosyal korumaları yükseldikçe hastalık öz bakım yönetimleri de yükselecektir. Öz bakım yönetimi yüksek olan bireyin tedavi uyumu da artacaktır. Bu nedenle diyabetik bireylere diyabet eğitimlerine önem verilmelidir.

Anahtar Kelimeler: Diyabetes mellitus, öz bakım yönetimi, tedavi uyumu

INTRODUCTION

Diabetes mellitus (DM) is a chronic metabolic disorder that is often characterized by hyperglycemia, which is caused by a multisystemic attitude in which the body does not receive sufficient carbohydrates, fats, and proteins, and requires constant medical attention (1,2). Diabetes, one of the most important health problems of the 21st century, is increasing worldwide and, in parallel, the number of patients and incidence of diabetes are rapidly increasing in our country. Diabetes can cause disorders in all systems unless diagnosed early and treated properly. Diabetes may be prevented or delayed by identifying high-risk individuals and undergoing lifestyle changes (3). The treatment of DM is a life-long complex process (4). In addition to medical treatment, self-care management is a key component of diabetes treatment (5). Diabetes self-care management should be effective for individuals with diabetes. Diabetes management consists of self-care activities such as glycemic control, appropriate treatment, smoking and alcohol use, patient adjustment to treatment, checking at regular intervals, foot care, physical activity, and nutrition (6). Patient self-care management has been shown to be beneficial, reduce mortality and diabetes complications, reduce healthcare costs, and improve quality of life (7).

The aim of this study was to determine the relationship between self-care management and treatment adjustment in patients with DM who applied to the University of Health Sciences Turkey, Adana City Training and Research Hospital, Endocrinology and Metabolism Polyclinic.

MATERIALS and METHODS

This cross-sectional study was conducted with individuals diagnosed with diabetes aged 18-85 years who applied to the University of Health Sciences Turkey, Adana City Training and Research Hospital, Polyclinic for Endocrinology and Metabolism between 02.01.2023 and 02.04.2023. The sample size was calculated at a minimum of 319. At least 400 diabetic patients have been investigated. Patients diagnosed with diabetes for at least a month were included in the study. Eighty newly diagnosed patients with diabetes were excluded. Informed consent was obtained from all participants.

The data were collected through 23 question-dependent variables, including independent variables such as age, gender, educational level, duration of diabetes, treatment method, other chronic diseases (if any, the number of medications used, hemoglobin A1c (HbA1c) value, dietary habits, physical activity, the chronic disease self-care management scale (SCMP-G), and the Morisky medication adherence scale-8. The data were collected using face-to-face survey forms for patients who agreed to participate in the study after being informed by the researcher. After Jones and Preuett (8) defined the concept of self-care management process (SCMP), SCMP conservation was developed with the validity of the concept being tested and the characteristics of the protection concept being explained and added (9). SCMP-G, comprising a total of 35 items, has two sub-dimensions, namely, self-protection and social protection. The rating of the scale has been developed from a Likert-like form of 5 (I totally agree) and 1 (I never agree). A minimum of 35 points and a maximum of 175 points are awarded on the scale. The low SCMP-G score indicates that self-care management is poor, whereas the high score indicates that self-care management is good. Turkish validity and credibility studies were conducted in 2018 by Hançerlioğlu and Şenuzun Aykar (5). The Morisky treatment adjustment scale developed a four-question survey in 1986 to assess Morisky et al. compliance with antihypertensive drug therapy. In 2009, Morisky finalized eight questions to improve the validity and reliability of the survey. The first seven questions in the survey are closed-ended questions with answers in the form of yes or no. Yes answers questions 1 to 6 and 7 and yes answers question 5 are awarded 1 point. The last question was a five-choice question and "never/rarely" is rated 1 and all other answers are rated 0 points. A total score of <6 indicates low treatment compliance, 6-7 points moderate compliance, and 8 points indicates high therapy compliance (10). The study was approved by the University of Health Sciences Turkey, Adana City Training and Research Hospital Ethics Board (decision number: 2338, date: 29.12.2022)

Statistical Analysis

The statistical analysis was performed using the SPSS 24.0 package. Categorical measurements were expressed as numbers and percentages, and numeric variables were given as the mean +/- standard deviation with minimum (min) and maximum (max) values. In determining whether

the parameters included in the study had a normal distribution, the scale scores of the scales were considered. The independent Student's t-test was used for binary group analysis of normal distribution parameters and the one-way ANOVA test for three or more groups. Spearman's correlation analysis was used to evaluate the relationships among the numerical data. Linear regression analysis was performed to determine the relationship between scales and subdimensions. The difference was considered statistically significant at a p-value was <0.05.

RESULTS

Of the 320 patients diagnosed with diabetes included in the study, 61.9% (n=198) were women and 38.1% (n=122) were

men. The mean age of the participants was 55.08 ± 12.39 years. (min: 19, max: 79) (Table 1). The mean body mass index (BMI) of the participants was 30.31 ± 6.42 kg/m² (min: 17.9, max: 55.77). The average HbA1c was 8.65 ± 2.68 gr/dL (min: 4.6, max: 17.9). The response to the question "Do you have any physical or mental illness that requires medication?" was yes in 71% (n=227) and no in 29% (n=93). For chronic diseases, 49.1% (n=157) had hypertension, 33.8% (n=108) had hyperlipidemia, 20.3% had coronary artery disease, 7.8% had thyroid disorders, 7.5% had asthma/chronic obstructive pulmonary disease, and 19.1% had other diseases (anemia, anxiety, depression, arrhythmia, gastritis, chronic kidney failure, and chronic heart failure). The question "How many months/years ago did you get a diagnosis of diabetes?" was answered by 12.2% (n=39) from one month to one year, 21.6% (n=69) from 1 to 5 years, 23.4%

Table 1. Socio-demographic characteristics of participants		(n)	(%)
Age	35 and younger	22	6.9
	36-45	45	14.1
	46-55	81	25.3
	56-64	99	30.9
	65 and older	73	22.8
Gender	Female	198	61.9
	Male	122	38.1
Educational status	Illeterate	65	20.0
	Primary education	135	42.2
	Secondary education	46	14.4
	High school	43	13.4
	University and above	32	10.0
Marital status	Married	244	76.2
	Single or widowed/divorced	76	23.8
Smoking	Yes	74	23.1
	No, I have never smoked before.	186	58.1
	No, I used to drink, I quit	60	18.8
Alcohol	Yes, I use alcohol	28	8.8
	No, I do not use	292	91.2
Living together status	I live alone	36	11.2
	With my spouse/children	272	85.0
	With mom and/or dad	12	3.8
Requires the use of medication physical or mental illness	Yes	227	71
	No	93	29
Chronic diseases	Hypertension	157	49.1
	Hyperlipidemia	108	33.8
	Coronary artery disease	65	20.3
	Thyroid disorders	25	7.8
	Asthma/COPD	24	7.5
	Others	61	19.1
		Avr ± SD	**Min-max**
Number of medicines used daily		4.42 ± 2.58	1-15
n: Number, COPD: Chronic obstructive pulmonary disease, Avr ± SD: Average + standard deviation, Min-max: Minimum - maximum			

(n=25) from 5-10 years, 15.9% (n=51) from 10 to 10 years, 14.4% (n=46) from 15 to 20 years, and 12.5% (n=40) from 20 years and above. When the treatment patterns of the participants were studied, no patient received dietary therapy combined with exercise, diet alone, or exercise. Treatment methods are presented in Table 2.

The distribution of scores of the SCMP-G and Morisky treatment adjustment scale are presented in Table 3.

When the Morisky treatment adaptation scale was used to evaluate participants' treatment compliance, 47.5% (n=152) showed low therapy compliance (<6 points), 27.5% (n=88) showed moderate therapy adaptation (6 to 7 points), and 25%

(n=80 points) showed high therapeutic compliance (8 points). A comparison of the participants' self-protection and social protection subdimension revealed that the overall scores of the SCMP-G and the Morisky treatment adjustment scale scores did not show a significant difference between age, sex, smoking status, and alcohol use (p>0.05).

The average self-protection and SCMP-G scores of those who were regularly checked, had regular physical activity, and who had changed their dietary habits were significantly higher (p≤0.001) compared to those who did not go to regular checkups, did not exercise regularly, and did not change their eating habits.

Table 2. Data on diabetes of the participants					n	%
Duration of diabetes diagnosis	1 month- 1 year				39	12.2
	1-5 years				69	21.6
	5-10 years				75	23.4
	10-15 years				51	15.9
	15-20 years				46	14.4
	20 years and over				40	12.5
Regular check-ups status	Yes				197	61.6
	No				123	38.4
Regular physical activity status	Yes				51	15.9
	No				169	84.1
Nutrition habits amendment	Yes				204	63.8
	No				116	36.2
Diet program she implemented presence	Yes				38	11.9
	No				282	88.1
Treatment modes	Only OAD[*]				120	37.5
	Only Insulin				46	14.4
	OAD[*]	Insulin			89	27.8
	Diet	OAD[*]			14	4.4
	Diet	Insulin			9	2.8
	Exercise	OAD[*]			7	2.2
	Exercise	Insülin			1	0.3
	Exercise	Diet	OAD[*]		14	4.4
	Exercise	OAD[*]	Insulin		6	1.8
	Exercise	Diet	Insulin		4	1.3
	Diet	OAD	Insulin		4	1.3
	Exercise	Diet	OAD[*]	Insulin	6	1.8
n: Number, [*]OAD: Oral antidiabetic drugs, Min-max: Minimum - maximum						

Table 3. Scores taken by participants from scales	Number of items	Mean ± standart deviation	Min-max
Chronic disease self-care management scale	35	115.51 ± 14.26	69-146
Self-protection subsize	20	46.37 ± 5.77	24-60
Social protection subsize	15	35.88 ± 8.41	17-57
Morisky treatment adjustment scale	8	5.53 ± 2.11	0-8
Min-max: Minimum - maximum			

When a comparison was made according to the total scores of the Morisky treatment compliance scale, no significant difference was found between those who exercised and those who did not exercise, between those who dieted and those who did not diet, between those who used oral antidiabetics (OAD) and those who did not use them, and between those who used insulin and those who did not use it (p>0.05).

The average SCMP-G score of participants who received diabetes education was significantly higher than that of participants who did not receive diabetes education (p=0.008). There was a weak negative correlation between self-protection and the number of medications, duration of diabetes diagnosis, and Hb A1c values. (r=0.127; r=-226; r=-150). We could not find a relationship between other variables (Table 4).

There was a positive and medium strong relationship between the SCMP-G and the self-protection subdimension (r=0.552; p<0.001). There was a strong positive link between SCMP-G and the social protection subdimension (r=0.733; p<0.001).

There is a positive weak relationship between the Morisky treatment adjustment scale and the self-protection and SCMP-G (r=0.162; p=0.004) (Table 5).

When the effect of the SCMP-G variable on the Morisky treatment adjustment scale was studied, it was found that SCMP-G had a positive effect (F=8.524, p=0.004). SCMP-G improves Morisky treatment alignment.

When the impact of the self-protection and social protection variables on the Morisky treatment adjustment scale was examined, it was found that self-protection was positive (F=7.494, p<0.001), that social protection was ineffective (p>0.05). Self-protection sub-size enhances Morisky's therapeutic fit. The under-sized social protection did not affected Morisky's treatment compatibility.

DISCUSSION

When the Turkey Diabetes, Hypertension, Obesity and Endocrinologic Diseases Prevalence Study-II (TURDEP II) study was examined, the prevalence of diabetes was higher in women than in men (11). In a study of patients diagnosed with diabetes in 28 countries, the mean age was 54.0 ± 12.0 years (12). In our study, 30.9% of patients were aged 56-64 when grouped by age. According to the International Diabetes Federation 2021 data, the peak of diabetes occurred between the ages of 55 and 59 (13). The gender and age in our study are parallel to those of previous studies, and the age averages appear to be consistent with the age ranges in which diabetes was increasing (14-17).

Tablo 4. Body mass index correlation analysis between number of drugs, diabetes diagnosis duration and HbA1c values scales

		Self-protection	Social protection	Chronic disease self-care management scale	Morisky treatment adjustment scale
Body mass index	r	0.023	-0.097	-0.074	-0.027
	p	0.686	0.084	0.185	0.632
Number of drugs	r	-0.127*	0.096	0.012	-0.013
	p	0.023	0.088	0.827	0.822
Diabetes mellitus diagnosis duration	r	-0.226**	0.102	-0.052	0.031
	p	0.000	0.069	0.355	0.581
HbA1c	r	-0.150**	0.004	-0.065	-0.095
	p	0.007	0.945	0.248	0.090
*Spearman correlation analysis was used, r: Spearman's rho value, HbA1c: Hemoglobin A1c					

Table 5. Correlation analysis between scales

		Self protection	Social protection	Chronic disease self-care management scale	Morisky treatment compliance scale
Self protection	r	1			
	p				
Social protection	r	-0.064	1		
	p	0.257			
Chronic disease self-care management scale	r	0.552**	0.733**	1	
	p	0.000	0.000		
Morisky treatment compliance scale	r	0.211**	-0.036	0.162**	1
	p	0.000	0.518	0.004	
**Spearmans correlation analysis, r: Spearman's rho coefficient					

The most common chronic disease associated with diabetes is hypertension, and the same conclusion was reached in the studies of TURDEP II (11), Khawaldeh et al. (18), and Naous et al. (19). And our work supports that. In a study conducted with patients with DM in Nigeria, similar to the present study, no statistically significant difference was found between the duration of diagnosis and treatment adherence. (20). Sayiner et al. (21) found that as the duration of diabetes increased, treatment compliance was poor and explained that long-term therapies caused fatigue in patients. In a retrospective cohort study of patients with diabetes in the United States, the response rate for the first 3 months of treatment was 45%, and the response to the 12th month of treatment was 35% (22). According to these data, chronic diseases are not adapted to treatment as time passes. The patient's idea of taking medication throughout his life might distract him from receiving treatment. A previous study found a meaningful relationship between BMI and the subdimension of self-protection on the scale, and as BMI increased, self-protection decreased (23). Wallston et al. (24) found an inverse ratio between BMI and self-care management in patients with diabetes. HbA1c is an important indicator of diabetes self-management in individuals diagnosed with diabetes. The study by Mumcu and İnkaya (25) showed a positive improvement in HbA1c values as patients improved in self-care and quality of life. In a meta-analysis study by Wu et al. (26), mobile health practices were shown to strengthen self-management in individuals with diabetes and significantly reduce HbA1c values in individuals with increased self-management. In our study, patients' HbA1c values decreased as their self-protection increased. The decrease in HbA1c was seen to contribute to strengthening self-management. A study by Khalooei and Benrazavy (27) found that those who participated in diabetes education were better at self-care and self-management than those who did not receive education. A randomized, controlled study in China showed improvement in the self-management, clinical, lifestyle, and psychosocial conditions of patients undergoing diabetes education programs (28). Our findings suggest that people with diabetes education have better disease self-care management.

A study by Alanyali and Arslan (29) found that individuals with physical activity have good self-management. The study, which examined the levels of self-sufficiency among individuals with diabetes, found that individuals who performed regular physical activity had higher levels of self-sufficiency (30). Regular nutrition, accompanied by adequate and regular physical activity, were one of the important determinants of self-management. A study that evaluated the dietary habits and diabetes management of 100 patients with diabetes between the ages of 18 and 64 found that individuals who changed their eating habits had better diabetes management (31). This is parallel to our findings.

In France, a study on therapeutic adjustments in patients with type 2 DM showed no significant difference in treatment adjustments between OAD and insulin (32). A study conducted by Kara and Kara (33) examined the treatment adjustment and quality of life of diabetic patients compared with OAD + insulin patients and found that OAD patients adjusted better to treatment. In a study of hypertensive patients, Melnikov (34) found that taking blood pressure measurements at home and self-monitoring increased disease control and treatment compliance in patients. The previous study, which evaluated epilepsy and self-management, found that individuals with good self-care management have high convictions regarding both drug compliance and treatment (35).

Study Limitation

The study was cross-sectional in nature and did not report cause and effect. The fact that the study was conducted in a single center was one of the limitations of the study.

CONCLUSION

In conclusion, the higher the level of self-protection and self-care management, the greater the therapeutic compliance, and individuals with higher levels of self-protection and social protection would manage the disease better. The longer the diagnosis duration, the fewer the patients' protection. Patients with regular physical activity had higher levels of self-protection and self-care management.

Individuals who changed their dietary habits showed good self-protection and self-care management and high treatment adherence. Patients should be monitored during diabetes treatment and should be included in the treatment phase. Patients should be encouraged to acquire the necessary skills for self-care management of chronic diseases, and their compliance with and satisfaction with treatment should be evaluated.

Ethics

Ethics Committee Approval: The study was approved by the University of Health Sciences Turkey, Adana City Training and Research Hospital Ethics Board (decision number: 2338, date: 29.12.2022)

Informed Consent: Informed consent was obtained from all participants.

Author Contributions

Surgical and Medical Practices: A.İ.Ç., M.E.Y., G.Ş.A., Concept: A.İ.Ç., G.Ş.A., Design: M.E.Y., G.Ş.A., Data Collection or

Processing: G.Ş.A., A.İ.Ç., Analysis or Interpretation: A.İ.Ç., M.E.Y., G.Ş.A., Literature Search: G.Ş.A., A.İ.Ç., Writing: G.Ş.A., A.İ.Ç., M.E.Y.

Conflict of Interest: All authors declare that they have no conflict of interest.

Financial Disclosure: The authors declared that this study has received no financial support.

REFERENCES

1. Türkiye Endokrin ve Metabolizma Derneği. Diabetes Mellitus ve komplikasyonlarının tanı, tedavi ve izlem kılavuzu, 2022. Access at:https://file.temd.org.tr/Uploads/publications/guides/documents/diabetes-mellitus_2022.pdf

2. Dinççağ N. Diabetes Mellitus tanı ve tedavisinde güncel durum. İç Hastalık Derg. 2011; 18: 181-223

3. Coşansu G. Diyabet: küresel bir salgın hastalık. Med J Okmeydani Train Res Hosp. 2015; 31(1): 1-6

4. Lee EH, Lee YW, Moon SH. A Structural Equation Model Linking Health Literacy to Self-efficacy, Self-care Activities, and Health-related Quality of Life in Patients with Type 2 Diabetes. Asian Nurs Res (Korean Soc Nurs Sci). 2016; 10(1): 82-7. doi: 10.1016/j.anr.2016.01.005

5. Hançerlioğlu S, Şenuzun Aykar F. Kronik Hastalıklarda Öz-Bakım Yönetimi Ölçeği'nin Türkçe'ye Uyarlanması, Geçerlik ve Güvenirliği. Gümüşhane Üniversitesi Sağlık Bilimleri Dergisi. 2018; 7(1): 175-83

6. American Diabetes Association. Standards of medical care in diabetes-2010. Diabetes Care. 2010;33 (Suppl 1):S11-61. doi: 10.2337/dc10-S011. doi: 10.1016/j.numecd.2011.02.006

7. Zwerink M, Brusse-Keizer M, van der Valk PD, Zielhuis GA, Monninkhof EM, van der Palen J, et al. Self management for patients with chronic obstructive pulmonary disease. Cochrane Database Syst Rev. 2014; 2014(3): CD002990. doi: 10.1002/14651858.CD002990.pub3

8. Jones LC, Hill K, Honer K, McDaniels S. (1986) Self-care management process used by individuals with chronic illness. Unpublished manuscript

9. Huffman DM. (1987) Development of an instrumen to measure use of self-care management processes-guarding (SCMP-G). Unpublished master"s thesis, Lousiana State University Medical Center, New Orleans

10. Morisky DE, Ang A, Krousel-Wood M, Ward HJ. Predictive validity of a medication adherence measure in an outpatient setting. J Clin Hypertens (Greenwich). 2008;10(5):348- 54. doi: 10.1111/j.1751-7176.2008.07572.x

11. Satman I, Omer B, Tutuncu Y, Kalaca S, Gedik S, Dinccag N, et al. Twelve-year trends in the prevalence and risk factors of diabetes and prediabetes in Turkish adults. Eur J Epidemiol. 2013; 28(2): 169-80. doi: 10.1007/s10654-013-9771-5

12. Litwak L, Goh SY, Hussein Z, Malek R, Prusty V, Khamseh ME. Prevalence of diabetes complications in people with type 2 diabetes mellitus and its association with baseline characteristics in the multinational A1chieve study. Diabetol Metab Syndr. 2013; 5(1): 57. doi: 10.1186/1758-5996-5-57

13. IDF Diabetes Atlas 2021. Acsess at:https://diabetesatlas.org/idfawp/resource-files/2021/07/IDF_Atlas_10th_Edition_2021.pdf

14. Faselis C, Katsimardou A, Imprialos K, Deligkaris P, Kallistratos M, Dimitriadis K. Microvascular Complications of Type 2 Diabetes Mellitus. Curr Vasc Pharmacol. 2020; 18(2): 117-24. doi: 10.2174/1570161117666190502103733

15. Vazini H, Barati M. Health belief model and self-care behaviors among Type 2 diabetic patients. Iranian Journal of Diabetes and Obesity. 2014; 6(3): 107-13

16. Pournima MP, Walvekar PR. Prevalence of type 2 diabetes mellitus among adults aged 30–60 years residing in rural area: a cross-sectional study. Int J Community Med Public Health. 2018; 5(8): 3639.

17. Sweileh WM, Zyoud SH, Abu Nab'a RJ, Deleq MI, Enaia MI, Nassar SM, et al. Influence of patients' disease knowledge and beliefs about medicines on medication adherence: findings from a cross-sectional survey among patients with type 2 diabetes mellitus in Palestine. BMC Public Health. 2014; 14: 94. doi: 10.1186/1471-2458-14-94

18. Al-Khawaldeh OA, Al-Hassan MA, Froelicher ES. Self-efficacy, self-management, and glycemic control in adults with type 2 diabetes mellitus. J Diabetes Complications. 2012; 26(1): 10-6. doi: 10.1016/j.jdiacomp.2011.11.002

19. Naous E, Boulos M, Sleilaty G, Achkar AA, Gannagé-Yared MH. Quality of life and other patient-reported outcomes in adult Lebanese patients with type 2 diabetes during COVID-19 pandemic. J Endocrinol Invest. 2022; 45(4): 763-72. doi: 10.1007/s40618-021-01701-6

20. Jackson IL, Adibe MO, Okonta MJ, Ukwe CV. Medication adherence in type 2 diabetes patients in Nigeria. Diabetes Technol Ther. 2015; 17(6): 398-404. doi: 10.1089/dia.2014.0279

21. Sayiner Z, Savas E, Kul S, Morisky D. Validity and reliability of the Turkish version of the 8-item morisky medication adherence scale in patients with type 2 diabetes. Eur J Ther. 2020; 26: 47-52

22. Chapman RH, Benner JS, Petrilla AA, Tierce JC, Collins SR, Battleman DS, et al. Predictors of adherence with antihypertensive and lipid-lowering therapy. Arch Intern Med. 2005; 165(10): 1147-52. doi: 10.1001/archinte.165.10.1147

23. Akgün DB. Tip 2 diyabet ve eşlik eden kronik hastalıkların öz bakım yönetimine etkisi, Erzurum Üniversitesi, Uzmanlık Tezi, Erzurum, 2008

24. Wallston KA, Rothman RL, Cherrington A. Psychometric properties of the Perceived Diabetes Self-Management Scale (PDSMS). J Behav Med. 2007; 30(5): 395-401. doi: 10.1007/s10865-007-9110-y.

25. Mumcu CD, İnkaya BV. Web tabanlı eğitim ile diyabet öz bakım yönetimi. Acta Med Nicomedia. 2020; 3: 88-91

26. Wu IXY, Kee JCY, Threapleton DE, Ma RCW, Lam VCK, Lee EKP, et al. Effectiveness of smartphone technologies on glycaemic control in patients with type 2 diabetes: systematic review with meta-analysis of 17 trials. Obes Rev. 2018; 19(6): 825-38. doi: 10.1111/obr.12669

27. Khalooei A, Benrazavy L. Diabetes self-management and its related factors among patients with type 2 diabetes in primary healthcare settings in Kerman, Southeast Iran. J Pharm Res Int. 2019; 1-9

28. Zheng F, Liu S, Liu Y, Deng L. Effects of an Outpatient Diabetes Self-Management Education on Patients with Type 2 Diabetes in China: A Randomized Controlled Trial. J Diabetes Res. 2019; 2019: 1073131. doi: 10.1155/2019/1073131

29. Alanyali Z, Arslan S. Diabetes symptoms and self-management perceptions of individuals with type 2 diabetes. Arch Health Sci Res. 2020; 7(3): 238-43

30. Erol Ö, Tekin Yanık Y. Tip 2 Diyabetli Bireylerin Öz-Yeterlilik Düzeylerinin Değerlendirilmesi. Anadolu Hemşirelik ve Sağlık Bilimleri Dergisi. 2016; 19(3)

31. Köseoğlu Ö. Tip 2 diyabetik bireylerde beslenme eğitiminin diyabet durumu ve beslenme alışkanlıklarına etkisi. Başkent Üniversitesi Sağlık Bilimleri Enstitüsü Beslenme ve Diyetetik bölümü, Başkent Üniversitesi, Uzmanlık Tezi, Ankara, 2015

32. Bezie Y, Molina M, Hernandez N, Batista R, Niang S, Huet D. Therapeutic compliance: a prospective analysis of various factors involved in the adherence rate in type 2 diabetes. Diabetes Metab. 2006; 32(6): 611-6. doi: 10.1016/S1262-3636(07)70316-6

33. Kara AM, Kara T. Relationship between treatment method and medication adherence, quality of life, and depression in patients with type 2 diabetes. Med Bull Haseki. 2019; 57(4): 377-85

34. Melnikov S. Differences in knowledge of hypertension by age, gender, and blood pressure self-measurement among the Israeli adult population.*. Heart Lung. 2019; 48(4): 339-46. doi: 10.1016/j.hrtlng.2019.02.001

35. Adadioglu O. Epilepsy and self-management. J Turk Epilepsi Soc. 2016; 22(1): 1-4