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Investigation of the Relationship Between Alternative Treatment Methods Used by Type 2 Diabetes Patients and Their Nutritional Status and Self-Care

Tip 2 Diyabet Hastalarının Kullandıkları Alternatif Tedavi Yöntemleri ile Beslenme Durumları ve Öz Bakımları Arasındaki İlişkinin İncelenmesi

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Abstract

Type 2 diabetes mellitus (T2DM) is characterized by abnormalities in carbohydrate, fat, and protein metabolism and is caused by insulin secretion, insulin resistance, or a combination of both. This study examined the relationship between alternative treatment methods used by individuals with type 2 diabetes and their nutritional status and self-care. A total of 48 individuals diagnosed with type 2 diabetes participated in the study. The average duration of diabetes was 10.7 years, and 58.7% of the participants used oral anti-diabetic drugs. 47.9% of the participants stated that they had previously used Complementary and Alternative Medicine (CAM), and 55% indicated that they used CAM to get rid of the side effects of medication. The mean CAM attitude level of the patients was 32.3±8.1, and the mean self-care level was 71.9±13.4. A positive correlation was found between the number of meals, duration of diabetes, fasting and postprandial blood glucose, and self-care levels ($p<0.05$). Patients who applied a diet with oral anti-diabetic (80.6) or insulin with oral anti-diabetic (80.2) had higher self-care levels than other patients ($p<0.05$). A significant relationship was found between diabetes duration, regular glucose measurement, oral anti-diabetic intake, fasting and postprandial blood glucose levels, and diabetes self-care scale scores of the individuals participating in the study. No significant relationship was found between CAM attitude scale scores and self-care scale scores and other data.

Keywords: Alternative Medicines, Nutritional status, Self-Care, Type 2 Diabetes

Özet

Tip 2 diabetes mellitus (T2DM), karbonhidrat, yağ ve protein metabolizmasındaki anormalliklerle karakterize bir hastalıktır ve insülin salgılanması, insülin direnci veya her ikisinin birleşiminden kaynaklanır. Bu çalışmada tip 2 diyabetli bireylerin kullandıkları alternatif tedavi yöntemleri ile beslenme durumları ve öz bakımları arasındaki ilişki incelenmiştir. Çalışmaya tip 2 diyabet tanısı almış 48 birey katılmıştır. Diyabetin ortalama süresi 10,7 yıldır ve katılımcıların %58,7'si oral antidiyabetik ilaç kullanmaktadır. Katılımcıların %47,9'u daha önce Tamamlayıcı ve Alternatif Tıp (TAT) kullandığını, %55'i ise ilaçların yan etkilerinden kurtulmak için TAT kullandığını belirtmiştir. Hastaların TAT tutum düzeyi ortalaması 32,3±8,1, öz bakım düzeyi ortalaması 71,9±13,4'tür. Öğün sayısı, diyabet süresi, açlık ve tokluk kan şekeri ile öz bakım düzeyleri arasında pozitif korelasyon bulunmuştur ($p<0,05$). Oral antidiyabetik (80,6) veya oral antidiyabetik (80,2) ile insülin kullanan hastaların öz bakım düzeyleri diğer hastalara göre daha yüksek bulunmuştur ($p<0,05$). Çalışmaya katılan bireylerin diyabet süresi, düzenli glukoz ölçümü, oral antidiyabetik alımı, açlık ve tokluk kan şekeri düzeyleri ile diyabet öz bakım ölçeği puanları arasında anlamlı bir ilişki bulundu. TAT tutum ölçeği puanları ile öz bakım ölçeği puanları ve diğer veriler arasında anlamlı bir ilişki bulunmadı.

Anahtar Kelimeler: Alternatif Tıp, Beslenme durumu, Öz Bakım, Tip 2 Diyabet

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1. Introduction

Diabetes mellitus (DM) is a complex and chronic metabolic disorder characterized by persistent hyperglycemia or high blood glucose levels caused by defects in insulin secretion, insulin action, or both (American Diabetes Association [ADA], 2020). This disorder can be classified into two main categories: Type 1 Diabetes Mellitus (T1DM) and Type 2 Diabetes Mellitus (T2DM). T2DM is the most common form of the disease, representing approximately 90-95% of all diagnosed cases (Chatterjee et al., 2017). It is characterized by insulin resistance, a condition in which body cells do not respond appropriately to insulin, and a relative rather than an absolute deficiency in insulin secretion (Kahn et al., 2014). The development of T2DM is associated with many factors such as genetic predisposition, obesity, sedentary lifestyle and ageing (Tuomi et al., 2014). The pathogenesis of T2DM involves a combination of insulin resistance and impaired insulin secretion (Kahn et al., 2014). Insulin resistance, characterized by decreased sensitivity of peripheral tissues (especially liver, muscle, and adipose tissue) to insulin, leads to reduced glucose uptake and utilization as well as increased hepatic glucose production (Samuel and Shulman, 2016). Initially, pancreatic β-cells compensate for the increased insulin demand by increasing insulin secretion, but over time, β-cell dysfunction and a decrease in β-cell mass lead to a relative insulin deficiency (Chatterjee et al., 2017). The development of T2DM is influenced by many factors such as genetic predisposition, obesity, sedentary lifestyle and ageing. In particular, obesity plays an important role in the development of insulin resistance and T2DM because excessive accumulation of adipose tissue leads to the secretion of pro-inflammatory cytokines and adipokines that contribute to the disruption of insulin signaling pathways (Chatterjee et al., 2017).

Treatment for type 2 diabetes includes lifestyle modifications such as weight loss, greater physical activity, and nutritional adjustments. Glycaemic control can be enhanced by eating a balanced diet high in fruits, vegetables, whole grains, and lean protein sources, with an emphasis on limiting carbohydrate intake and portion sizes. Insulin sensitivity and cardiovascular health can be enhanced by regular exercise, which should include at least 150 minutes of moderate-intensity aerobic activity per week. Losing weight is essential for improving glycaemic control and lowering the risk of complications related to type 2 diabetes, particularly in obese people (ADA, 2021).

Type 2 diabetes is a health problem that significantly affects the quality of life of individuals. It has become a global public health problem with rapidly increasing prevalence, complications, and treatment costs. Diabetes treatment includes the use of medication as well as lifestyle changes and especially adjustments in dietary habits. However, the side effects of drugs and high treatment costs cause individuals to turn to alternative treatment methods. As stated by the World Health Organisation, Complementary and Alternative Medicine (CAM) practices are becoming increasingly important in the management of many chronic diseases. This suggests that a range of treatment modalities used in addition to or in conjunction with conventional treatment approaches may play a potential role in the management of patients with Type 2 Diabetes (Blahova et al., 2021).

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However, in addition to conventional treatment methods, there are also complementary and alternative help patients feel better and alleviate the symptoms of the disease. However, more information is needed on the effects of these practices on nutritional status and general self-care (Evert et al., 2019).

Nutrition and self-care are vital to improve the quality of life of patients with Type 2 Diabetes and reduce the risk of complications. Dietary habits and self-care are known to play an important role in the management of diabetes and overall health status. Therefore, determining the effects of complementary and alternative therapies on these factors is important for developing more comprehensive and effective strategies in diabetes management (Di Onofrio et al., 2018; Kevin et al., 2017).

This study aimed to examine the relationship between alternative treatment methods used by individuals with type 2 diabetes and their nutritional status and self-care.

2. Method

This study was designed to be observational, descriptive and cross-sectional. The questionnaires and scales in the data collection tools were asked to the individuals verbally by face-to-face interview method and applied face-to-face with the answers received from the individuals.

2.1. Population and Sample of the Study

The population of this study consists of individuals with type 2 diabetes residing in Ataşehir District Ornek Neighborhood of Istanbul between 1 February 2023 and 1 May 2023. Data were collected from individuals with type 2 diabetes via a survey. Individuals' self-reports were taken into account.

The inclusion criteria of the study were determined as individuals diagnosed with type 2 diabetes, and the exclusion criteria of the study were determined as individuals who were not diagnosed with type 2 diabetes. G*Power 3.1 program was used to calculate the sample size. As a result of the analyses, it was determined that an effect size of 0.75 could be formed with 48 samples with a Type I error of 0.05 and a 95% confidence interval for this research.

2.2. Data Collection and Data Tools

In the study, the participants' general characteristics, characteristics related to their diseases, 24-hour food consumption records, and information about complementary and alternative methods were obtained. At the same time, attitudes towards complementary and alternative medicine scales and diabetes self-care scales were applied.

2.2.1. Socio-Demographic Characteristics of Individuals Questionnaire Form

In this section, age, gender, marital status, educational status, occupation, economic status, general nutritional status, and smoking/alcohol use were questioned.

2.2.2. Disease Related Characteristics Questionnaire Form

In this section, it was evaluated how long the individuals have had type 2 diabetes, the presence of an additional chronic disease, and whether they have developed any health problems due to type 2 diabetes. The treatment methods used in type 2 diabetes, how long they have been using this treatment method, and whether they have information about their disease were questioned. Finally, fasting and

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postprandial blood glucose levels and HbA1c values were questioned. These parameters are the results obtained when the patients last had their analysis done and were obtained from their own statements.

2.2.3.Questions on Complementary and Alternative Treatment Methods Questionnaire Form

In this section, it was questioned whether individuals with type 2 diabetes have any complementary and alternative treatment they use other than medical treatments, if any, what these are, where they heard about this alternative treatment method, whether they believe that it is effective in treatment and why they apply to this method, how long they have been using the alternative treatment method, whether they consulted any healthcare professional about this situation before using it, whether they saw the benefit, whether they applied this method in addition to medical treatment or by leaving medical treatment, and whether they would recommend this alternative treatment method.

2.2.4. 24-Hour Food Consumption Record

In this section, individuals were questioned about how many meals they consumed, which foods they consumed and what these foods contained, together with the times and amounts. It was made as a 24-hour reminder.

2.2.5. Attitude towards Complementary and Alternative Medicine Scale

The scale of attitudes towards complementary and alternative medicine was developed by Hyland et al. in 2003, and its validity and reliability was carried out by Erci (2007) in Turkey. The scale, which determines people's attitudes towards complementary and alternative medicine, consists of 11 items in a six-point Likert format as strongly agree (1), agree (2), somewhat agree (3), somewhat disagree (4), disagree (5) and strongly disagree (6). The scale has two sub-dimensions: Complementary and Alternative Medicine and Holistic Health. A minimum of 11 and a maximum of 66 points can be obtained from the scale. A low score on the scale indicates a positive attitude towards CAM.

2.2.6. Diabetes Health Promotion and Self-Care Scale

The Diabetes Self-Care Scale was developed by Lee and Fisher in 2005 in the USA in order to measure the self-care activities of individuals with type 2 diabetes, and the Turkish validity and reliability study was conducted by Karakurt and Kaşıkçı (2008). The Diabetes Self-Care Scale is a Likert-type scale and consists of 35 items. The minimum score on the scale is 92, and the maximum score is 140, and as the score increases, the patients' performance of self-care activities increases positively.

2.3. Ethical Aspects of the Study

This research was approved by the Haliç University Non-Interventional Clinical Research Ethics Committee on 25.01.2023 with decision number 17. Voluntary consent form was obtained from the participants for the research.

2.4. Analysis and Evaluation of Data

Statistical analyses were performed using the IBM SPSS 26 package program. Numerical data were summarised using mean, standard deviation, minimum and maximum values. Categorical data were

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summarised using frequency and ratio values. The normality assumption in numerical variables was checked by skewness and kurtosis values, and it was determined that numerical variables were normally distributed. An independent sample T-test was used to compare numerical data with binary categorical variables, and an ANOVA analysis was used to compare variables with more than two categories. Pearson correlation analysis was used to determine the relationship between numerical data, and simple regression analysis was used to determine the effect. A value of 0.05 was accepted for statistical significance (Hayran & Hayran, 2018).

3. Results

The distribution of socio-demographic characteristics of diabetic individuals participating in the study is shown in Table 1. The number of female and male patients participating in the study was equal. The mean age of the patients was 59.58±11.08 years.

Table 1. Socio-Demographic Characteristics

Socio-Demographic Characteristics	**Patients (n: 48)**	
	n	**%**
Gender		
Male	24	50
Female	24	50
Age (X ± Ss.)	59.58 ± 11.08	
Marital Status		
Married	44	91.7
Single	4	8.3
Education		
Illiterate	3	6.3
Primary School	19	39.6
Secondary School	9	18.8
High School	11	22.9
University	6	12.5
Cigarette Consumption		
Yes	19	39.6
No	29	60.4
Alcohol Consumption		
Yes	7	14.6
No	41	85.4

n= Number, %=Percentage

The analysis results regarding the patients' characteristics related to their diseases are shown in Table 2. The mean duration of diabetes among the patients participating in the study is 10.8±7.2 years. 47.9% of the patients have chronic diseases. 57.1% of the patients have diabetes-related diseases. 58.7% of the patients continue their treatment with oral anti-diabetic drugs. 70.8% of diabetic individuals regularly monitor their blood sugar and the mean HbA1C is 7.3±0.7.

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Table 2. Characteristics Related to Diabetes

Disease Related Features	Patients (n: 48)	
	S	%
Duration of Diabetes (Years)(X ± SD)	10.8 ± 7.2	
Chronic Disease		
Yes	23	47.9
No	25	52.1
Type of Chronic Disease		
Kidney Failure	3	13.0
Hepatitis	3	13.0
Blood Pressure	7	30.4
Heart Disease	3	13.0
Other (Thyroid, Gout, Cholesterol)	7	30.4
Diabetes Related Disease		
Yes	12	25.0
No	36	75.0
Type of Disease Associated with Diabetes		
Kidney Disease	4	33.3
Diabetic Foot	3	25.0
Heart Disease	3	25.0
Other (Vision Problem, Protein Leakage)	2	16.7
Treatment		
Oral Anti Diabetic	27	58.7
Insulin	4	8.7
Oral Anti Diabetic + Diet	6	13.0
Oral Anti Diabetic + Insulin	9	19.6
Duration of Treatment (Years) (X ± SD)	9.7 ± 7.2	
Education on Diabetes		
Yes	45	93.7
No	3	6.3
The Profession That Provides Education		
Nurse	11	12.9
Doctor	45	53.1
Dietitian	27	31.9
Pharmacist	2	2.1
Is the training adequate?		
Yes	45	93.7
No	3	6.3
Regular Sugar Measurement		
Yes	34	70.8
No	14	29.2
Fasting Blood Glucose (X ± SD)	155.5 ± 32.9	
Postprandial Blood Glucose (X ± SD)	208.8 ± 22.4	
HbA1C (X ± SD)	7.3 ± 0.7	

X=mean, SD=standard deviation

The analysis results regarding the food consumption of the patients are shown in Table 3. nly macronutrient consumption was calculated in this analysis. The average energy of the patients was

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1669.5±379.6 kcal; the average carbohydrate percentage was 42.5±6.7; the average fat percentage was 40.3±6.2; and the average protein percentage was 17.0±3.8.

Table 3. Daily Energy, Macronutrient and Na Intakes of Patients

Food Consumption	Patients (n: 48)	
	X ± SD	Lower - Upper
Energy (kcal)	1669.46 ± 379.57	1082.0 – 2660.0
Carbohydrate (%)	42.48 ± 6.86	22.0 – 58.0
Fat (%)	40.33 ± 6.16	27.0 - 61.0
Protein (%)	17.0 ± 3.76	10.0 – 26.0

X=mean, SD=standard deviation

The analysis results regarding the responses of the patients regarding CAM methods are shown in Table 4. 47.9% of the patients stated that they used CAM method for diabetes and 87% of the patients using CAM method used medicinal plants and 43.5% of them heard about CAM method from their neighbors. 54.2% of the patients believe in medicinal plants and 52% of the patients who believe stated that they believe that cinnamon plant is effective on diabetes. 55% of the patients using CAM stated that it is to reduce the side effects of the medication they use. 83.3% of the patients stated that they will not give up the basic treatment even if they use CAM method and 87% of them stated that they will recommend CAM method.

Table 4. Responses to CAM Methods

Responses to CAM Methods	Patients (n: 48)	
	S	%
Have you used CAM for diabetes?		
Yes	23	47.9
No	25	52.1
CAM Method Used		
Medicinal Plants	20	87.0
Megavitamin Therapy	1	4.3
Hacemat	2	8.7
Where the Method is Heard		
Neighbors	10	43.5
Seller of medicinal herbs	2	8.7
Relatives/Friends	7	30.4
Media	2	8.7
Dietitian	2	8.7
Believing in the Effect of Herbs on Diabetes		
Yes	26	54.2
No	22	45.8
Plant Names		
Cinnamon	13	52.0
Black Cumin Seed	6	24.0

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Table 4. Responses to CAM Methods **(**Continued)

Turmeric	2	8.0
Ginger	3	12.0
Stinging nettle	1	4.0
Reason for CAM Use		
Getting rid of the side effect of the drug	11	55.0
Preventing disease/Restoring health	5	25.0
To lower blood sugar	2	10.0
Dietitian recommendation	2	10.0
Time to Start CAM		
As soon as diabetes is diagnosed	7	30.4
In the later stages of the disease	16	69.6
Health Worker Counseling Before CAM		
Yes	6	25.0
No	18	75.0
Knowing the CAM Effect		
Yes	24	50.0
No	24	50.0
Did you experience any health problems during the CAM process?		
No	23	100
Did you benefit from the CAM Process?		
Yes	21	91.3
No	2	8.7
Did the CAM process impose an economic burden?		
Yes	4	17.4
No	19	82.6
Treatment in the CAM Process		
I continued my treatment	21	91.3
I'm taking a break from my treatment	2	8.7
Would you discontinue basic treatment?		
Yes	4	16.7
No	20	83.3
Would you recommend the CAM Method?		
Yes	20	87.0
No	1	4.3
I don’t know	2	8.7

n=Numberı, %=Percentage

The analysis results of the patients' CAM attitude and self-care are shown in Table 5. The total CAM attitude score average of the patients participating in the study is 32.3±8.1; the total score average of the complementary and alternative medicine dimension is 25.5±8.5 and the total score average of the holistic health dimension is 6.9±2.5. The total score average of the patients' self-care is 71.9±13.4.

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Table 5. CAM Attitudes and Self-Care Levels

Scales and Subscales	Patients (n: 48)		
	X ± SD	Received Lower - Upper	Admitted Lower - Upper
CAM Attitude Scale	32.3 ± 8.1	15.0 – 41.0	11- 66
Complementary and Alternative Medicine	25.5 ± 8.5	10.0 – 36.0	6 – 36
Holistic Health	6.9 ± 2.5	2.0 – 14.0	5 – 30
Self-Care Scale	71.9 ± 13.4	57.0 – 120.0	35- 140

X=mean, SD=standard deviation

Table 6 shows the analysis results for the CAM attitude and self-care and socio-demographic characteristics and consumption habits of the patients. There is no statistically significant difference in the CAM attitude and self-care score averages of the patients participating in the study in terms of socio-demographic characteristics and consumption habits (p>0.05).

Table 6. Comparison of CAM Attitudes and Self-Care with Socio-Demographic Characteristics and Consumption Habits

Socio-Demographic Characteristics		CAM Attitude		Self-care	
		X	SD	X	SD
Gender	Male	34.0	7.4	69.9	11.7
	Female	30.6	8.5	73.9	14.9
		t=1.480; p=.146		t=-1.031; p=.308	
Age		r=-.187 p=.204		r=.141 p=.340	
Marital Status	Married	31.8	8.2	71.4	13.6
	Single	38	3.8	77.8	11.1
		t=-1,687; p=,098		t=0.898; p=.374	
Cigarette Consumption	Yes, I do	33.9	7.3	72.7	10.9
	No, I don't	31.3	8.5	81.5	15.1
		t=1.121; p=.268		t=0.300; p=.766	
Alcohol Consumption	No, I don't drink	31.4	8.2	71.6	14.1
	Yes, I do	37.6	5.7	74.1	8.7
		t=-1.902; p=.063		t=-0.461; p=.647	

**p<0.05 X=Mean, SD. Standard Deviation, r= Correlation Coefficient, t=Independent Sample T-Test, F=Anova Analysis, p= Significance Level (*p<.05)*

The results of the analysis conducted to determine the CAM attitude and self-care levels of the individuals participating in the study according to their disease-related characteristics are shown in Table 7. There is a positive and statistically significant relationship between the mean self-care scores of the patients participating in the study and the duration of diabetes (r=.426; p<0.05). As the duration of diabetes increases, the self-care levels also increase.

There is a positive and statistically significant relationship between the mean self-care scores of the patients participating in the study and fasting blood sugar (r=.399; p<0.05). As the fasting blood sugar of the patients increases, the self-care levels also increase. There is a positive and statistically significant relationship between the mean self-care scores of the patients participating in the study and postprandial

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blood sugar (r=.393; p<0.05). There is a statistically significant difference in the mean self-care scores of the patients participating in the study according to the treatment methods of the patients (f=4.264; p<0.05). It is observed that patients whose treatment is ongoing in the form of oral anti-diabetics have lower self-care scores than patients whose treatment is continuing with other treatments. There is a statistically significant difference in the mean self-care scores of the patients participating in the study according to their regular blood sugar measurement status (t=3.114; p<0.05). It is observed that patients who regularly measure their blood sugar have higher self-care scores than patients who do not.

Table 7. Comparison of CAM Attitude and Self-Care Scores with Disease Characteristics

Disease Related Features		CAM Attitude		Self-care	
		X	SD	X	SD
Duration of Diabetes		r=.009 p=.954		r=.426 **p=.003***	
Chronic Disease	Yes	31.6	8.2	71.7	13.3
	No	33.0	8.1	72.2	13.8
		t=-0.590; p=.558		t=-0.128; p=.898	
Diabetes-related Disease	Yes	33.0	9.3	72.5	15.4
	No	32.1	7.7	71.8	12.8
		t=0.344; p=.732		t=0.156; p=.876	
Treatment	Oral Anti-Diabetic	33.4	7.8	66.9	5.7
	Insulin	31.0	4.9	78.8	29.2
	Oral Anti-Diabetic + Diet	33.3	8.9	80.7	5.9
	Oral Anti-Diabetic + Insulin	29.7	8.9	80.2	18.8
		F=0.559; p=.645		F=4.264; **p=.010***	
Treatment Duration		r=-.065 p=.661		r=.219 p=.134	
Diabetes Education	Yes	32.3	8.2	72.5	13.7
	No	29.0	1.4	64.5	9.2
		t=2.077; p=.083		t=0.814; p=.420	
Is the education enough?	Yes	32.2	8.3	72.0	13.8
	No	34.7	5.7	71.3	7.5
		t=-0.511; p=.612		t=0.082; p=.935	
Regular Blood Sugar Measurement	Yes	31.6	8.7	74.6	14.9
	No	34.2	6.2	65.5	5.4
		t=-1.033; p=.307		t=3.114; **p=.003***	
Fasting Blood Glucose		r=-.028 p=.851		r=.399 **p=.005***	
Postprandial Blood Glucose		r=-.005 p=.976		r=.393 **p=.006***	
HbA1C		r=.087 p=.559		r=.238 p=.103	

**p<0.05 X=Mean, SD=Standard Deviation, r=Correlation Coefficient, t=Independent Sample T-Test, F=Anova Analysis, p= Significance Level (*p<.05)*

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The analysis results conducted to determine the relationship between the food consumption of the patients participating in the study and the CAM attitude and self-care are shown in Table 8. There is no relationship was found between the CAM attitude scores of diabetic individuals and their dietary patterns.

Table 8. Relationship between CAM Attitude and Self-Care and Food Consumption

Food Consumption	CAM Attitude	Self-care
Energy (kcal)	r=.109	r=-.161
	p=.462	p=.273
Carbohydrate (%)	r=-.018	r=-.232
	p=.902	p=.113
Fat (%)	r=.042	r=.109
	p=.778	p=.461
Protein (%)	r=.015	r=.235
	p=.918	p=.108

*r =Correlation Coefficient, p= Level of Significance (*p<.05)*

The results of the analysis conducted to determine the relationship between the CAM attitudes of the patients participating in the study and self-care are shown in Table 9. No statistically significant relationship was found between the CAM attitudes and sub-dimension levels of the patients participating in the study and their self-care levels (p>0.05).

Table 9. Relationship between CAM Attitudes and Self-Care

Scale and Subscales	Self-care
CAM Attitude Scale	r=.146
	p=.322
Complementary and Alternative Medicine	r=.155
	p=.291
Holistic Health	r=-.053
	p=.722

*r = Correlation Coefficient, p= Level of Significance (*p<.05)*

4. Discussion

There are few studies based on T2DM patients who prefer complementary and alternative medical therapies. In our study, we obtained results on the determinants, prevalence, and knowledge of CAM therapy use among patients with T2DM and the association of CAM use with self-care levels and nutritional status.

Our results indicate that 47.9% of individuals with diabetes have used CAM methods for diabetes. In Turkey, various studies conducted by Küçükgüçlü et al. (2012), Polat and Kaynak (2017), Ceylan et al. (2009), Özkan and İlaslan (2023) have found the rates of CAM application use to be 34.6%, 48.1%, 41%, and 36.5%, respectively. This prevalence rate can be compared with the findings in the Middle East region, where studies among patients with T2DM revealed a CAM use prevalence rate of 30.1%, 38%, and 41.7% in Saudi Arabia, Lebanon, and Egypt, respectively. Compared to our study findings,

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studies from the UK, Germany and Canada revealed a lower prevalence of CAM use with 17%, 18.4% and 25%, respectively. In contrast, studies from Thailand, Taiwan, the USA, Mexico, Korea and India show a higher prevalence of CAM use with a range between 47.8% and 72.8%. However, worldwide studies examining CAM use in patients with T2DM have yielded significantly different results, ranging from 17% to 72.8% (Radwan et al., 2020). These studies indicate that the tendency of diabetic patients to use CAM methods varies significantly. Differences in the use of CAM methods may be due to different attitudes and awareness levels of individuals in different studies. On the other hand, it has been reported that the high use of some CAM methods in studies may be due to different cultural-religious beliefs of individuals and also their place of residence (Jafari et al., 2021). These differences in the prevalence of CAM use by region can be explained by differences in cultural perceptions regarding CAM use and differences in the study design and definition of CAM used in various studies (Chang et al., 2007). Different socio-cultural orientations, health beliefs and attitudes of patients, as well as the health care system and access to modern medicine can be attributed to the regional diversity of CAM use. In addition, it is stated that differences in the definition of CAM in different study designs may have contributed to this diversity (Rafi et al., 2020).

In our current study, the majority of diabetic individuals (73.9%) reported that the sources from which they heard about CAM were neighbors, relatives/friends, and in addition to this, a large majority of diabetic individuals (87%) who used CAM stated that they would recommend CAM to someone else. Küçükgüçlü et al. (2012) reported that family and friends constitute the majority of CAM users' sources of information about complementary and alternative medicine practices. The same study reported that CAM users generally learned about CAM practices from members of the community they lived in. In the study conducted by Rafi et al. (2020), family and friends were the most frequently reported sources of information about CAM, consistent with the findings of other Asian countries.

Herbal treatments are widely used in many countries across all health systems (Judith et al., 2016). According to the World Health Organization (WHO), it has been found that approximately 80% of the population in developing countries, such as those in Africa and Asia, use this form of treatment for primary care (WHO, 2019). In our study, the most frequently used CAM method was herbal treatment, which supports the current findings. It was also determined that half of the diabetic patients (52%) believed in the cinnamon plant for its effects on diabetes. It was revealed in the study conducted by Arslan (2022) that 10% of diabetic patients use cinnamon to lower their blood sugar levels. Literature data also show that cinnamon is the most frequently used herbal medicine in Turkey among herbal medicines used for diabetes (Pınar et al., 2017). In the study of Manya et al. (2012), it was found that 46% of diabetic patients in Sydney used CAM and cinnamon was used more commonly than other methods. Cinnamon is the CAM method frequently preferred by individuals with diabetes, not only in Turkey but also in other countries (Yıldırım & Marakoğlu, 2018).

In the treatment of T2DM, combination drug therapies constitute the first-line treatment options (Padhi et al., 2020). Most people who use medication believe that modern drugs have serious side effects, especially if they are used for a long time (Meraya et al., 2022). In our study, 55% of diabetic individuals

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reported that they used CAM to reduce the side effects of the medication they used. Arslan (2022) reported that the reason for the preference of CAM methods may be the high side effect rates of diabetes medications and their advantages such as the ability to improve compliance with medical treatment. In various studies conducted in different countries, it is observed that individuals resort to various CAM methods in order to reduce the symptoms of the disease and prevent the side effects of medications (Jafari et al., 2021, Vishnu et al., 2017).

In our current study, it was found that a low percentage (25%) of individuals with diabetes shared their CAM use with healthcare professionals. Similarly, in the study conducted by Yıldırım and Marakoğlu (2018), 98% of CAM users did not disclose information about CAM use to their physicians. In another study, only a quarter of patients informed their treating physician about CAM use (Radwan et al., 2020). In the study conducted by Chang et al. (2023), the rate of disclosure of CAM use to healthcare professionals in diabetes clinics remained consistently low, with only 24.6% in 2007 and a slight increase to 30.3% in 2023. Such a finding is consistent with studies conducted in Turkey and other countries, which show that healthcare practitioners continue to be minimally involved in their patients' decisions regarding CAM use. Without adequate monitoring and guidance from healthcare professionals, the significant increase in the use of CAM methods in combination with conventional medicine carries a significant risk of irregular blood sugar control, impaired diabetes management, and potential harm to health outcomes (Sari et al., 2021). The reason why Turkish patients prefer not to share such information with their healthcare providers should be further investigated. Possible reasons include patients not trusting their healthcare providers or healthcare providers not asking their patients about their CAM use, or perhaps healthcare providers spending too little time with each patient.

CAM use can enhance or render ineffective allopathic treatment using modern drugs and even lead to delay or failure of treatment. Inappropriate use of CAM can worsen diabetic complications, and healthcare providers should inform and educate patients with evidence-based facts about the appropriate use and safety of CAM, as well as possible interactions of CAM interventions with antidiabetic treatments (Meraya et al., 2022). In another study, most CAM users believed that the therapies were safe. However, patients should be aware that despite the benefits that CAM therapies can provide, herbal products can be toxic (Sari et al., 2021). Covert, simultaneous, and regular use of CAM may potentially modify treatment efficacy, leading to unforeseen outcomes and adverse effects. Diabetic patients should be apprised of this and urged to disclose their CAM usage to their healthcare provider (Radwan et al., 2020).

In a study conducted in the USA, it was hypothesized that patients use alternative therapies influenced by their cultural values, beliefs, and philosophical orientations on health and life, rather than being satisfied with traditional medicine (Astin, 1998). In another study supporting the results of this study, it was reported that diabetic patients believe in traditional lifestyles and that this positively affects their health belief behaviors (Kasole et al., 2019). On the other hand, since traditional management of diabetes requires a disciplined lifestyle for diet, lifestyle, and behavior, which is often difficult to maintain, it has been suggested that these patients try to compensate by using CAM because they believe that they can gain more personal autonomy and control over their disease (Rafi et al., 2020). None of the

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patients participating in our study experienced any health problems due to the CAM method; the vast majority of them benefited from the CAM method and continued their traditional treatment while using CAM. As can be understood, the vast majority of the patients participating in our current study used these CAM practices as a complement to traditional treatment. Similar findings have been reached in various studies, and most CAM users combined CAM treatments with conventional medical treatments (Naja et al., 2014; Rafi et al., 2020; Sari et al., 2021). According to one study, most diabetes patients had a favorable attitude toward using complementary and alternative medicine (CAM), and most patients (71.56%) were not well-informed on the therapeutic benefits of CAM therapies.

According to the study's findings, the majority of type 2 diabetic patients are not well-informed about complementary and alternative medicine (Jafari et al., 2021). Healthcare providers should, therefore, provide their patients with evidence-based information about the safety issues, effectiveness, and potential interactions of the most commonly used CAM interventions (Sari et al., 2021). Individuals with diabetes should be warned about possible interactions between CAM practices and conventional drug therapy.

In our study, no statistically significant relationship was found between the CAM attitude score averages of the patients participating in the study and the duration of diabetes ($p>0.05$). However, some studies in the literature have findings opposite to these results. In a study conducted by Polat and Kaynak (2017), it was determined that there was a statistically significant relationship between the duration of diabetes and CAM use, and that CAM use increased in those with a diabetes duration of more than 5 years ($p<0.05$). In addition, in a study conducted by Ceylan et al. (2009), it was observed that CAM use increased with the increase in the duration of diabetes (in those with a diabetes duration of more than 5 years). The reason for reaching a different finding from the literature may be due to the small population. Individuals with diabetes face significant complications of the disease, and in order to prevent the development of these complications, they need to learn and maintain self-care activities related to health care and daily life (Kav et al., 2017).

Seven fundamental self-care practices have been identified by the American Association of Diabetes Educators (2020) as indicators of positive outcomes for people with diabetes. These include eating well, exercising, keeping an eye on blood sugar, taking prescription drugs as directed, lowering risk, practicing healthy coping mechanisms, and having problem-solving abilities (AADE, 2020). In our study, it was observed that as the fasting blood sugar levels of the patients increased, their self-care levels also increased. As a result of the literature review, it was observed that the findings of our study did not overlap with the literature data. In the studies conducted by Kara and Çınar (2011) and Aydın et al. (2005), it was stated that the self-care behaviors of patients with high fasting blood sugar were inadequate, and their compliance was poor.

In our study, it was found that as the mean self-care scores of the patients participating in the study increased, their postprandial blood sugar values increased. As a result of the literature review, results that contradict our findings were found. In a study conducted by Huang et al. (2022), a negative relationship was found between the mean self-care scores of patients with type 2 diabetes and

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postprandial blood sugar levels. This negative relationship, which was also found in various studies conducted in Turkey, is supported (Kara & Çınar, 2011; Orhan & Karabacak, 2016).

In our study, no statistically significant difference was found between the CAM attitude and self-care scores of individuals and their food consumption values ($p>0.05$). Similarly, in a study conducted in 2018, no relationship was found between the diabetes nutrition knowledge of diabetic individuals and their actual diet self-care behavior (Thewjitcaroen et al., 2018). In a study conducted with cancer patients in Malaysia, where the differences in nutritional status between individuals who use CAM and those who do not use CAM were investigated, no statistical difference was found between those who use CAM and those who do not use CAM (Jamhury et al., 2024). It is reported in the literature that CAM treatments are used at a higher rate in diabetic patients than in other patient groups (Arslan et al., 2022). Another study conducted on patients with Type 2 Diabetes showed that patients have a positive attitude towards CAM methods and believe that using these methods can help them control their disease better (Ching et al., 2023). The interactions between individuals' eating habits, nutritional preferences and CAM usage need to be examined in depth in future studies.

In the treatment of patients with diabetes mellitus, ADA primarily recommends changes in diet and lifestyle (American Diabetes Association, 2020). In the study conducted by Candar et al. (2018), the frequency of CAM methods use by diabetic individuals was found to be 46.1%, while freedom of eating and freedom of drinking were the most negatively affected elements that directed patients to use CAM. It was observed that patients' expectations regarding diet and physical activity were disrupted. In this current study, it was reported that patients were directed to seek alternative treatments due to their dietary obligations. However, in our study, no relationship was found between the CAM attitude scores of diabetic individuals and their diet consumption. The attitudes, uses and nutritional habits of diabetic individuals towards CAM applications should be questioned in detail, and the purposes for which diabetic individuals use alternative treatments in addition to their first-line treatments should be investigated in depth.

The high frequency of CAM use emphasizes how crucial it is to take it into account when managing diabetes and how health care providers must have candid conversations with patients about CAM practices. Knowing what influences CAM use can help policymakers and healthcare professionals create effective plans to incorporate CAM techniques into standard diabetic treatment. (Ghorat et al., 2024).

There are some limitations to this study. The most important limitation is that the study sample included a narrow population. The study was conducted in a cross-sectional design in a single center, and this is an important limitation in terms of the generalizability of the results. For this reason, the population can be increased by reaching more individuals with T2DM. Another limitation is that the study data were based on patients' self-report. The fact that biochemical findings were taken as a single value is also a limitation of the study. In this study, only the relationship between the data obtained from food consumption records and CAM practices was examined. The dietary habits of individuals with T2DM should be examined in more detail, and their relationship with CAM practices should be investigated. In the current study, it was revealed that the majority of patients benefited from the CAM method. However,

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in this study, it was not questioned what kind of benefits individuals with diabetes obtained that would contribute to their health status due to the use of CAM. In future studies, this issue should be emphasized, and the possible benefits of CAM applications should be examined more closely.

5. Conclusion

This study found a statistically significant increase in self-care levels as the duration of diabetes increased. No statistically significant relationship was found between complementary and alternative medicine (CAM) attitude and self-care levels.

There was no statistically significant difference between the dietary habits of individuals with diabetes and CAM attitude and self-care scores. The prevalence of CAM use among patients with diabetes is high worldwide, but few studies have adequately evaluated the relationship of CAM use with dietary patterns and its effects on biochemical parameters. More studies are needed to examine the relationship between the nutritional status of individuals with diabetes and their use of CAM practices.

Authors Contributions

Selection of topic: DS, CO; Design: DS, CO; Planning: DS, CO, EGŞ; Data collection and analysis: DS, EGŞ; Writing manuscript: DS, CO, EGŞ; Critical Review: CO, EGŞ.

Conflict of Interest

The authors declared no conflict of interest.

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