ISSN 2458-8865 E-ISSN 2459-1505
www.fppc.com.tr
Family Practice & Palliative Care

Research Article

Effect of variables of sociodemographic on disease management skills on individuals with type 1 and type 2 diabetes receiving insulin therapy

İnsülin tedavisi alan tip 1 ve tip 2 diyabet tanılı bireylerde sosyodemografik değişkenlerin hastalığı yönetim becerileri üzerine etkisinin incelenmesi

Gönül Düzgün[a], Gökşen Polat[a], Elif Ünsal Avdal[b], Funda Sofulu[b]

[a] Department of First aid and Emergency Care, Vocational School of Healthcare Services, İzmir Tınaztepe University, İzmir, Türkiye

[b] Faculty of Health Sciences, İzmir Katip Çelebi University, İzmir, Türkiye

Abstract

Introduction: Self-care and self-management skills are at the forefront of disease management skills in individuals with Type 1 and Type 2 diabetes. An individual with diabetes who defines his/her self-care well will have increased his/her disease management skills as well as self-management skills to the desired level. The aim of this study is to evaluate the self-management skills of individuals with Type 1 and Type 2 diabetes receiving insulin therapy according to their sociodemographic characteristics.

Method: The research is a prospective analytical study. Within the scope of the study, 913 individuals with Type 1 and Type 2 diabetes who applied to the diabetes polyclinic of a university hospital in Izmir in a month were included. The researchers collected the data through face-to-face interviews into Diabetes Patient Diagnosis Form and Diabetes Self-Management Skill Form.

Results: In study 99.8% of the patients received diabetes education at least once and 60.8% of the individuals had never experienced hypoglycemia. When the diabetes self-management skills and self-insulin making skills of individuals with diabetes are examined; A statistically significant difference was found between the diagnostic variable categories in the sub-dimensions of medical nutrition therapy, exercise and treatment management, awareness of chronic complications, and diabetic outpatient care behaviors. It was determined that there was a significant difference between the education styles of individuals with diabetes, the frequency of blood sugar control and the frequency of hypoglycemia, and the sub-dimensions of diabetes self-management skills and the ability to make insulin on their own ($p<0.001$).

Conclusion: Diabetes education given to individuals with diabetes contributes to their development of self-management skills. Multiple factors can affect individuals' self-management skills. As the number of educations, type of education, treatment methods, and education level of individuals with diabetes increase, their self-management skills and self-insulin making skills increase. If type 1 and type 2 diabetes patients can be followed closely and their training needs, diversity and application methods can be corrected, disease management will improve. Complications that may develop due to insulin application errors can be prevented.

Keywords*:* Diabetes, self-management, hypoglycemia

Öz

Giriş: Tip 1 ve Tip 2 diyabet tanılı bireylerde hastalık yönetim becerilerinin başında özbakım ve özyönetim becerileri gelmektedir. Özbakımını iyi tanımlayan diyabetli bir birey özyönetim becerisi yanında hastalık yönetim becerilerini de istendik düzeye yükseltmiş olacaktır. Araştırmanın amacı; insulin tedavisi alan Tip 1 ve Tip 2 diyabet tanılı bireylerin sosyodemografik özelliklerine göre özyönetim becerilerinin değerlendirilmesidir.

Yöntem: Araştırma prospektif analitik bir çalışmadır. Araştırma kapsamına İzmir'de bir üniversite hastanesinin diyabet polikliniğine bir ayda başvuran 913 Tip 1 ve Tip 2 diyabet tanılı birey alınmıştır. Araştırma verileri Diyabetli Hasta Tanılama Formu ve Diyabet Özyönetim Beceri Formuna, araştırmacılar tarafından yüz yüze görüşme yöntemi ile toplanmıştır.

Bulgular: Hastaların %99,8'i en az bir kez diyabet eğitimi almıştır. Araştırmaya alınan bireylerin %60,8'i hiç hipoglisemi yaşamadığını belirtmiştir. Diyabet tanılı bireylerin diyabet özyönetim becerileri ve kendi kendine insülin yapma becerileri incelendiğinde; tıbbi beslenme tedavisi, egzersiz ve tedavi yönetimi, kronik komplikasyonların farkına varma, diyabetik ayakta bakım davranışları alt boyutlarında tanı değişkeni kategorileri arasında istatistik olarak anlamlı fark bulunmuştur. Diyabet tanılı bireylerin eğitim alma şekilleri, kan şekeri kontrol sıklığı ve hipoglisemi yaşama sıklığı ile diyabet özyönetim becerileri alt boyutları ile kendi kendine insülin yapma becerisi arasında anlamlı bir fark olduğu saptanmıştır ($p<0,001$).

Sonuç: Diyabet tanılı bireylere verilen diyabet eğitimleri özyönetim becerilerini geliştirmelerine katkı sunmaktadır. Bireylerin özyönetim becerilerini birden çok faktör etkileyebilmektedir. Diyabet tanılı bireylerin diyabet ile ilgili aldıkları eğitim sayısı, eğitim alma şekli, tedavi şekilleri, eğitim seviyesi arttıkça özyönetim becerileri ve kendi kendine insülin yapma becerileri artmaktadır. Tip 1 ve Tip 2 diyabet hastalarının yakından takip edilerek eğitim ihtiyaçları, çeşitliliği ve uygulama şekilleri düzeltilebilirse hastalık yönetimi iyileşecektir. Özellikle insülin uygulama hatalarına bağlı gelişebilecek komplikasyonlar önlenebilir.

Anahtar kelimeler: Diyabet, özyönetim, hipoglisemi

Received	Accepted	Published Online	Corresponding Author	E-mail
August 17, 2023	December 28, 2023	March 25, 2024	Gönül Düzgün	gonul.duzgun@tinaztepe.edu.tr
Correspondence	Gönül Düzgün. İzmir Tınaztepe Üniversitesi Aydoğdu, 1267/1. Sk. No:4, 35400 Buca/İzmir, Türkiye			
	https://doi.org/10.22391/fppc.1344746			

Key Points

1. The number of diabetes education received by individuals diagnosed with diabetes affects their self-management skills and self-insulin administration skills.
2. The type of diabetes education received by individuals diagnosed with diabetes affects their self-management skills and insulin self-administration skills.
3. Treatment modalities of individuals diagnosed with diabetes affect their self-management skills.

Introduction

Diabetes management is a process that is carried out in an organized and systematic manner, aiming for quality care that puts the patient at the center of care [1]. One of the most important goals of diabetes management is to prevent complications that may arise in individuals with diabetes in the short and long term. The most effective method in preventing the development of these complications is the self-management skills gained by diabetic patients [2]. Self-management is the whole of self-care behaviors that enable people with diabetes to use prescribed medications, comply with medical nutrition therapy and participate in physical activity. An individual with diabetes needs to have good self-management skills in order to keep blood sugar within normal limits and prevent complications in the long term [3]. The self-management success of an individual diagnosed with diabetes is directly proportional to the level of self-care power and self-efficacy and is affected by many factors such as level of knowledge about the disease, sociodemographic characteristics, health habits, beliefs, and environmental characteristics [4]. Diabetes self-management includes the knowledge and practical application that the individual needs for positive health outcomes [5]. In order for people diagnosed with diabetes to self-manage, they need to have knowledge about diabetes and its management and gain self-care skills [6]. Based on this, in this study, the frequency of blood glucose measurement was investigated in line with the way of receiving education and self-care skills in order to evaluate the effect of the information acquired by the individual on self-management. In evaluating the success of self-management skills, hypoglycemia was taken as a basis.

Methods

This study is a prospective analytical study. The study was conducted in the Diabetes Education Unit of the Endocrinology Outpatient Clinic of İzmir Katip Çelebi University Atatürk Training and Research Hospital.

Population and Sample of the Study

The population of the study consisted of 1500 individuals diagnosed with Type 1 and Type 2 diabetes who applied to the Endocrinology Outpatient Clinic of İzmir Kâtip Çelebi University Atatürk Training and Research Hospital within one month. The sample of the study consisted of 913 individuals diagnosed with Type 1 and Type 2 diabetes who received insulin treatment, received diabetes basic education at least six months ago, were between the ages of 19-65 years and agreed to participate in the study. The sampling power was determined as 90%.

Inclusion and Exclusion Criteria

Individuals who were diagnosed with Type 1 or Type 2 diabetes at least 6 months ago, received diabetes education at least 6 months ago, used insulin therapy, were between the ages of 19-65, and volunteered to participate in the study were included in the study.
Individuals with minor complications such as diabetic retinopathy and neuropathy, individuals who were diagnosed with the disease and received diabetes education less than 6 months ago, and individuals who did not voluntarily agree to participate in the study were not included in the study.

Data Collection Tools of the Research

Quantitative research methods were used to collect the data. The data were collected by face-to-face interviews by the researchers using the Diabetes Patient Identification Form and Diabetes Self-Management Skills Form.

The Diabetes Patient Identification Form was created by the researchers by conducting literature studies related to the subject [7]. The form consists of sociodemographic data (gender, age, educational status, type of diabetes) and 20 questions to diagnose the individual diagnosed with diabetes (duration of diabetes, diabetes education, from whom the education was received, type of education, treatment, family history, complications, hemoglobin A1c level, body mass index, smoking status, alcohol intake status, health check-up status, blood glucose monitoring and hypoglycemia frequency).

Diabetes Self-Management Skill Form (DSMAS) was created by the researchers in line with the information obtained from the topics included in the American Diabetes Association (ADA) 2015 guidelines with proven evidence level [8]. The form includes 14 questions about medical nutrition therapy, 10 questions about exercise management, 7 questions about treatment management, and 18 questions about diabetic foot care behaviors. The answers to these questions were in 3-point Likert type and were answered as "Yes", "Sometimes", "No". This form also includes 6 questions about recognizing chronic diseases. Answering these questions as "Yes" and "No" is also recommended in the American Diabetes Association (ADA) 2015 guidelines [8].

Ethical approval, informed consent and permissions

Approval was obtained from the Ethics Committee of a Training and Research Hospital in Izmir, where the study was conducted, with the decision number 38. The purpose of the study was explained to the individuals diagnosed with diabetes who participated in the study and verbal and written informed consent was obtained from the participants.

Statistical analysis

The data obtained were analyzed using the statistical package program (SPSS) (Version 17, Chicago IL, USA). In the study, reliability and validity analyses of the DSMAS and the Self-administered Insulin Injection Skill Form were conducted with the support of a statistical expert. Cronbach's alpha (α) coefficient was used for reliability analysis. Factor analysis was applied for validity analysis. The suitability for factor analysis was

assessed by Bartlett's test of sphericity and the adequacy of the sample size was assessed by Kaiser-Meyer-Olkin sampling adequacy statistics. The DSMAS was determined as a 5-factor structure as a result of the varimax rotation method. Descriptive statistics (mean, standard deviation, median value, minimum, maximum, number and percentile) were given for categorical and continuous variables. In addition, homogeneity of variances, one of the prerequisites of parametric tests, was checked with the "Levene" test. The normality assumption was evaluated with the "Shapiro-Wilk" test. When the differences between two groups could not be evaluated by "Student's t-Test", "Mann Whitney-U test" was used. In the analysis of the data, One-Way Analysis of Variance and Tukey HSD test, one of the multiple comparison tests, were used for comparisons of three or more groups, and Kruskal Wallis and Bonferroni-Dunn test, one of the multiple comparison tests, were used. In the study, $p<0.05$ level was considered statistically significant [9].

Results

Among the patients included in the study, 50.4% were female, 51.8% were 46 years of age or older, 94.9% were diagnosed with Type 2 Diabetes and 47.1% were high school graduates. Most of the patients (77.9%) stated that they received diabetes education at least once and that this education was in the form of both individual and group education. When the presence of diabetes complications was investigated, 57.0% of the patients stated that they experienced complications and that these complications were stroke and neuropathy, heart, retinopathy, nephropathy and diabetic foot. The majority of patients did not smoke or drink alcohol. When the distribution of medical control status was analyzed, 76.3% of the patients stated that they went to a doctor every 1-3 months, 45.0% stated that they did not check their blood glucose regularly, and 60.8% stated that they had never experienced hypoglycemia. In addition, it was found that the patients included in the study were overweight with an average body mass index of 27.49±7.39 (Table 1).

Table 1. Distribution of individuals diagnosed with type 1 diabetes according to sociodemographic characteristics (n:913)

Sociodemographic Characteristics		**n**	**%**
Gender	Female	460	50.4
	Male	453	49.6
Age Mean ± SD (46,18 ± 8,89)	18-24 years	4	0.4
	25-31 years	49	5.4
	32-38 years	109	11.9
	39-45 years	258	28.3
	46 years and older	473	51.8
Diagnosis	Type 1	47	5.1
	Type 2	866	94.9
Education Status	Literate	38	4.2
	Primary School	111	12.2
	Middle School	272	29.8
	High School	430	47.1
	University	62	6.8
Diabetes Education	Yes	911	99.8
	No	2	0.2
How many times have you received diabetes education?	He/she never received any	2	0.2
	1 time	48	5.3
	2 times	312	34.2
	3 times	419	45.9
	4 times or more	132	14.5
How did you receive you diabetes education?	No training	2	0.2
	Individual	34	3.7
	Group	166	18.2
	Individual and group	711	77.9
Presence of diabetes complications	Yes	520	57.0
	No	393	43.0
Existing complications	Heart Problems	788	17.0
	Stroke	845	18.2
	Vision Problems	674	14.5
	Kidney Problems	768	16.6
	Neuropathy	825	17.8
	Foot Problems	733	15.8
Sociodemographic Characteristics			
Frequency of blood glucose control	1-2 times a day	157	17.2
	3-4 times a day	35	3.8
	5 times a day	5	0.5
	1 time a week	161	17.6
	2 times a week	86	9.4
	3 times a week	58	6.4

	Irregular	411	45.0
Hypoglycemia Frequency	Every day	17	1.9
	1-3 times a week	65	7.1
	4 times a week or more	1	0.1
	1-3 times a month	250	27.4
	4 times a month or more	2	0.2
	Never encounter	555	60.8
	Other	23	2.5
	Total	913	100.0
Body Mass Index (BMI) Mean ± SD	**27.49 ± 7.39**		

SD: Standard deviation

As a result of the 55 items calculated for the Cronbach Alpha Reliability Coefficient of the DSMAS, the Cronbach alpha (α) reliability coefficient was found to be 0.83, and with the coefficient above 70%, it was supported that the questionnaire used was appropriate. When the number of items and reliability coefficients of the sub-dimensions of the DSMAS were examined, it was observed that they were between 0.63 and 0.82. Accordingly, all sub-dimensions of the scale were found to be reliable (Table 2).

Table 2. Cronbach alpha reliability coefficients of diabetes self-management skills form

Sub- dimensions of the DSMAS	Number of Articles	Reliability Coefficient
Medical Nutrition Therapy	14	0.632
Exercise	10	0.775
Treatment Management	7	0.628
Recognizing Chronic Complications	6	0.724
Diabetic Foot Care Behavior	18	0.827

When medical nutrition therapy, exercise management, treatment management, awareness of chronic complications, diabetic outpatient care behaviors were examined in terms of diabetes self-management skills and diagnosis variable, it was found that individuals diagnosed with Type 1 diabetes had better self-management skills than individuals diagnosed with Type 2 diabetes. This difference obtained as a diagnosis variable was found to be statistically highly significant (Table 3).

Table 3. Diabetes self-management skills (DSMAS) of individuals diagnosed with diabetes according to their diagnosis

Scales & diagnosis		n	Average	SD.	SD. Error Mean	p
Medical nutrition therapy subdimension	Type 1	47	24.8	2.3	0.3	<0.001
	Type 2	866	26.7	3.5	0.1	
Exercise management subdimension	Type 1	47	17.04	2.8	0.4	0.006
	Type 2	866	15.6	3.5	0.1	
Treatment management subdimension	Type 1	47	11.2	2.2	0.3	<0.001
	Type 2	866	8.2	1.6	0.05	
Awareness of chronic diseases subdimension	Type 1	47	8.3	1.1	0.1	<0.001
	Type 2	866	10.6	1.6	0.05	
Diabetic foot care behaviors subdimension	Type 1	47	32.2	4.2	0.6	0.011
	Type 2	866	30.5	6.5	0.2	
Self-administered insulin subdimension	Type 1	47	26.9	3.9	0.5	<0.001
	Type 2	866	21.8	4.0	0.1	

SD: Standard deviation

In the evaluation of diabetes self-management skills according to the age variable, it is seen that the statistically significant difference between the age variable categories in terms of medical nutrition therapy, exercise management, treatment management, awareness of chronic complications sub-dimensions is in the 18-24 age group. ($p<0.05$) (Table 4).

When self-management skills and self-insulin administration skills (SIAS) of individuals diagnosed with diabetes were examined according to educational status, a highly significant difference was found between the sub-dimensions of exercise, treatment management, awareness of chronic diseases and diabetic foot care behaviors and self-insulin administration skills, and it was found that individuals who were illiterate and primary school graduates were lower than other educational levels (Table 4).

Table 4. Association between sociodemographic variables and diabetes self-management skills and ability to self-administer insulin

Sociodemographic Variables	Medical Nutrition Therapy Subdimension				Exercise Management Subdimension				Treatment Management Subdimension				Awareness of Chronic Diseases Subdimension				Diabetic Foot Care Behaviors Subdimension				Self-administered Insulin Subdimension			
Age	**Means**	**SD**	**SD error**	**p**	**Means**	**SD**	**SD error**	**p**	**Means**	**SD**	**SD error**	**p**	**Means**	**SD**	**SD error**	**p**	**Means**	**SD**	**SD error**	**p**	**Means**	**SD**	**SD error**	**p**
18-24 years old	25.5	2.3	1.2	0.002	16.7	4.7	20.4	0.038	1.5	3.1	1.5	0.001	9.2	1.8	0.9	0.001	34.5	5.07	2.53	0.475	25.5	6.7	3.3	0.286
25-31 years old	25.7	4.0	0.5		14.8	3.9	00.5		8.6	1.9	0.2		10.5	1.9	0.2		29.9	7.6	1.09		22.1	4.2	0.6	
32-38 years old	26.4	3.2	0.3		15.0	3.1	00.3		8.0	1.3	0.1		11.2	1.4	0.1		30.1	6.45	0.62		21.7	3.6	0.3	
39-45 years old	26.3	3.3	0.2		15.5	3.3	00.2		8.1	1.6	0.1		10.8	1.4	0.09		30.5	6.09	0.38		21.8	4.1	0.2	
46 years old and older	27.1	3.2	0.1		15.9	3.6	00.2		8.3	1.8	0.09		10.2	1.6	0.08		30.9	6.54	0.3		22.2	4.2	0.2	
Total	26.7	3.3	0.1		15.6	3.5	00.1		8.2	1.7	0.06		10.5	1.6	0.05		30.6	6.46	0.22		22.07	4.1	0.14	
Education Status	**Means**	**SD**	**SD error**	**p**	**Means**	**SD**	**SD error**	**p**	**Means**	**SD**	**SD error**	**p**	**Means**	**SD**	**SD error**	**p**	**Means**	**SD**	**SD error**	**Means**	**SD**	**SD error**	**p**	**Means**
Literate	28.5	4.7	0.7	0.006	16.8	5.01	0.8	0.001	8.6	1.8	0.3	0.001	10.03	1.7	0.2	0.001	35.7	8.1	1.3	0.001	8.6	1.8	0.3	0.001
Primary School	26.5	4.6	0.4		16.9	4.2	0.4		8.9	1.8	0.1		9.4	2.04	0.1		33.1	8.4	0.8		8.9	1.8	0.1	
Middle School	26.7	3.4	0.2		15.6	3.5	0.2		8.4	1.7	0.1		10.3	1.7	0.1		31.1	6.7	0.4		8.1	1.7	0.1	
High School	26.4	2.9	0.1		15.3	3.02	0.1		7.9	1.4	0.07		10.9	1.2	0.06		29.3	4.9	0.2		7.9	1.5	0.09	
University	26.6	3.2	0.4		15.06	3.5	0.4		9.1	2.7	0.3		10.4	1.8	0.2		29.1	5.7	0.7		9.0	2.7	0.2	
Total	26.6	3.4	0.1		15.6	3.5	0.1		8.3	1.7	0.06		10.5	1.6	0.06		30.5	6.4	0.2		8.3	1.7	0.1	

Table 4 (continued). Association between sociodemographic variables and diabetes self-management skills and ability to self-administer insulin

Sociodemographic Variables	Medical Nutrition Therapy Subdimension				Exercise Management Subdimension				Treatment Management Subdimension				Awareness of Chronic Diseases Subdimension				Diabetic Foot Care Behaviors Subdimension				Self-administered Insulin Subdimension			
Education Status	**Means**	**SD**	**SD error**	**p**	**Means**	**SD**	**SD error**	**p**	**Means**	**SD**	**SD error**	**p**	**Means**	**SD**	**SD error**	**p**	**Means**	**SD**	**SD error**	**p**	**ort**	**SD**	**SD error**	**p**
Never received	27.0	2.8	2.0		22.0	2.8	2.0		7.5	2.1	1.5		7.5	2.1	1.5		28.0	9.9	7.0		30.0	5.6	4.0	
1 time	26.2	3.3	0.4		16.7	3.3	0.4		9.4	2.04	0.2		9.4	2.04	0.2		31.08	6.9	1.0		25.4	5.6	0.8	
2 times	26.7	3.05	0.1		15.4	3.1	0.1		10.7	1.6	0.09		10.7	1.6	0.09		30.07	5.9	0.3		21.9	4.08	0.2	
3 times	26.7	3.2	0.1	0.185	15.6	3.5	0.1	0.016	10.6	1.4	0.07	0.001	10.6	1.4	0.07	0.001	30.3	6.02	0.2	0.001	21.6	3.5	0.1	0.001
4 times and more	25.9	4.7	0.4		15.5	4.2	0.3		9.9	1.9	0.1		9.9	1.9	0.1		32.4	8.03	0.7		22.4	4.6	0.4	
Total	26.6	3.4	0.1		15.6	3.5	0.1		10.5	1.6	0.06		10.5	1.6	0.06		30.5	6.4	0.2		22.08	4.1	0.1	
How to Receive Training	**Means**	**SD**	**SD error**	**p**	**Means**	**SD**	**SD error**	**p**	**Means**	**SD**	**SD error**	**p**	**Means**	**SD**	**SD error**	**p**	**Means**	**SD**	**SD error**	**p**	**ort**	**SD**	**SD error**	**p**
No training	27.0	2.8	2.0		22.0	2.8	2.0		11.5	4.9	3.5		7.5	2.1	1.5		28.0	9.9	7.0		30.0	5.6	4.0	
Individual	26.7	3.4	0.5		17.4	3.6	0.6		10.7	2.6	0.4		9.1	1.7	0.2		33.9	5.4	0.9		27.6	5.5	0.9	
Group	25.2	4.5	0.3		15.8	4.02	0.3		9.4	2.1	0.1		9.5	2.02	0.1		31.9	8.01	0.6		23.7	4.7	0.3	
Individual and Group	26.9	3.05	0.1	0.161	15.5	3.3	0.1	0.001	7.9	1.3	0.05	0.001	10.8	1.4	0.05	0.001	30.1	5.9	0.2	0.001	21.4	3.5	0.1	0.001
Total	26.6	3.4	0.1		15.6	3.5	0.1		8.3	1.7	0.06		10.5	1.6	0.06		30.5	6.4	0.2		22.08	4.1	0.1	

Table 4 (continued). Association between sociodemographic variables and diabetes self-management skills and ability to self-administer insulin

Sociodemographic Variables	Medical nutrition therapy subdimension				Exercise management subdimension				Treatment management subdimension				Awareness of chronic diseases subdimension				Diabetic foot care behaviors subdimension				Self-administered insulin subdimension			
Diabetes Treatment	**Means**	**SD**	**SD error**	**p**	**Means**	**SD**	**SD error**	**p**	**Means**	**SD**	**SD error**	**p**	**Means**	**SD**	**SD error**	**p**	**Means**	**SD**	**SD error**	**p**	**Means**	**SD**	**SD error**	**p**
Insulin	26.6	3.6	0.2	0.852	15.9	3.6	0.2	0.054	8.3	1.8	0.1	0.633	10.2	1.7	0.1	0.001	30.6	6.1	0.3	0.799	22.1	4.2	0.2	0.568
OAD and insulin	26.6	3.3	0.1		15.4	3.4	0.1		8.2	1.7	0.07		10.6	1.6	0.07		30.5	6.5	0.2		22.0	4.1	0.1	
Complication Status	**Means**	**SD**	**SD error**	**p**	**Means**	**SD**	**SD error**	**p**	**Means**	**SD**	**SD error**	**p**	**Means**	**SD**	**SD error**	**p**	**Means**	**SD**	**SD error**	**p**	**Means**	**SD**	**SD error**	**p**
Yes	26.5	3.6	0.1	0.517	16.06	3.4	0.1	0.001	8.4	1.8	0.08	0.003	9.7	1.5	0.07	0.001	30.7	5.8	0.2	0.265	22.3	4.1	0.1	0.019
No	26.7	3.1	0.1		15.1	3.5	0.1		8.1	1.7	0.09		11.4	1.3	0.07		30.3	7.0	0.3		21.7	4.1	0.2	
Blood Sugar Control	**Means**	**SD**	**SD error**	**p**	**Means**	**SD**	**SD error**	**p**	**Means**	**SD**	**SD error**	**p**	**Means**	**SD**	**SD error**	**p**	**Means**	**SD**	**SD error**	**p**	**Means**	**SD**	**SD error**	**p**
1-2 times a day	26.2	4.3	0.3	0.036	15.8	4.3	0.3	0.001	8.4	1.7	0.1	0.734	10.2	1.8	0.1	0.087	30.3	7.03	0.5	0.078	22.4	4.1	0.3	0.095
3-4 times a day	27.1	5.1	0.8		15.9	4.3	0.7		8.4	1.1	0.1		10.1	1.9	0.3		33.4	9.6	1.6		23.06	5.5	0.9	
5 times a day or more	31.2	3.5	1.6		20.2	8.07	3.6		8.8	2.4	1.1		9.4	3.1	1.4		31.0	13.1	5.8		23.0	6.9	3.1	
1 time a week	26.3	2.9	0.2		15.1	3.05	0.2		8.3	1.8	0.1		10.5	1.4	0.1		29.6	4.4	0.3		21.5	3.4	0.2	
2 times a week	26.7	3.6	0.4		14.3	3.05	0.3		8.1	1.2	0.1		10.7	1.7	0.1		33.09	9.09	0.9		21.9	3.8	0.4	
3 times a week	26.6	3.1	0.4		15.6	3.1	0.4		8.07	1.7	0.2		10.5	1.5	0.2		29.4	5.7	0.7		20.7	2.8	0.3	
Irregular	26.7	3.0	0,1		15.9	3.2	0,1		8.2	1.9	0.09		10.5	1.6	0.08		30.4	5.6	0.2		22.2	4.3	0.2	
Total	26.6	3.4	0,1		15.6	3.5	0,1		8.3	1.7	0.06		10.5	1.6	0.06		30.5	6.4	0.2		22.08	4.1	0.4	

Table 4 (continued). Association between sociodemographic variables and diabetes self-management skills and ability to self-administer insulin

Sociodemographic Variables	Medical nutrition therapy subdimension				Exercise management subdimension				Treatment management subdimension				Awareness of chronic diseases subdimension				Diabetic foot care behaviors subdimension				Self-administered insulin subdimension			
Frequency of Hypoglycemia	**Means**	**SD**	**SD error**	**p**	**Means**	**SD**	**SD error**	**p**	**Means**	**SD**	**SD error**	**p**	**Means**	**SD**	**SD error**	**p**	**Means**	**SD**	**SD error**	**p**	**Means**	**SD**	**SD error**	**p**
Every day	24.3	5.05	1.2	0.078	17.2	4.6	1.1	0.001	9.3	1.9	0.4	0.001	9.2	2.1	0.5	0.001	31.1	8.7	2.1	0.001	23.8	3.8	0.9	0.001
1-3 times a week	26.2	5.3	0.6		16.08	4.7	0.5		8.8	1.6	0.2		9.6	2.03	0.2		31.3	8.2	1.02		22.9	6.01	0.7	
1-3 times a month	26.5	4.07	0.2		15.7	3.0	0.2		9.03	2.2	0.1		10.1	1.8	0.1		32.8	7.6	0.4		23.2	4.6	0.2	
I never encounter	26.8	2.7	0.1		15.4	3.2	0.1		7.7	1.1	0.05		10.9	1.3	0.06		29.3	5.1	0.2		21.1	3.1	0.1	
Other	25.7	2.6	0.5		18.3	2.4	0.5		11.7	2.5	0.5		8.3	1.03	0.2		32.7	5.01	1.04		27.7	4.9	1.04	
Total	26.6	3.4	0.1		15.6	3.5	0.1		8.3	1.7	0.06		10.5	1.6	0.06		30.5	6.3	0.2		22.08	4.1	0.1	

SD: Standard deviation; ; multiple regression analysis

When diabetes self-management skills and self-insulin skills of individuals diagnosed with diabetes were examined according to diabetes education status, it was found that there was a highly significant difference between the sub-dimensions of exercise, treatment management, awareness of chronic diseases and diabetic foot care behaviors and the ability to self-insulin, and it was determined that the group with the highest difference was the group with no education (Table 4).

When self-management skills and self-insulin skills and self-insulin skills of individuals with diabetes education were evaluated, it was found that there was a statistically significant difference between individuals with no education and other individuals between exercise, treatment management, awareness of chronic diseases and diabetic foot care behaviors sub-dimensions and self-insulin skills (Table 4).

When diabetes self-management skills and insulin self-administration skills of individuals diagnosed with diabetes were examined according to the type of diabetes treatment, it was found that there was a difference between the sub-dimension of awareness of chronic diseases and the ability to self-administer insulin between individuals using insulin and individuals using insulin and oral antidiabetic drugs (Table 4). When diabetes self-management skills and the ability to self-administer insulin were evaluated with the presence of diabetes complications, a difference was found between the ability to self-administer insulin in the sub-dimensions of exercise, treatment management, awareness of chronic diseases (Table 4). The incidence of complications was found to be higher in individuals with low diabetes self-management skills.

When diabetes self-management and self-insulin skills of individuals diagnosed with diabetes were examined according to the frequency of blood glucose control, a significant difference was found between the exercise sub-dimension and self-insulin skills (Table 4).
There was a significant difference between the frequency of hypoglycemia and self-management skills in the sub-dimensions of exercise, treatment management, awareness of chronic diseases and diabetic foot care behaviors, and the ability to self-administer insulin. It was found that individuals with better self-management had a lower frequency of hypoglycemia (Table 4).

When the relationship between the duration of disease diagnosis, HbA1c and Body Mass Index (BMI) values of individuals diagnosed with diabetes and diabetes self-management skills and ability to self-administer insulin was examined, it was found that there was a significant positive relationship between the duration of disease diagnosis and exercise management and treatment management sub-dimensions, but there was a significant relationship in the opposite direction between the chronic disease awareness of individuals with longer disease duration. A statistically significant positive relationship was found between the HbA1c levels of the patients and the other sub-dimensions of the self-management skills sub-dimensions except for the sub-dimension of being aware of chronic disease. It was observed that as the patients' awareness of chronic diseases increased, their HbA1c levels decreased (Table 5).

Table 5. The relationship between health parameters and diabetes self-management skills and insulin self-administration skills of individuals diagnosed with diabetes

		Diabetes Self-Management Skills					
		Medical nutrition therapy subdimension	**Exercise management subdimension**	**Treatment management subdimension**	**Awareness of chronic diseases subdimension**	**Diabetic foot care behaviors subdimension**	**Self-administered insulin subdimension**
Disease diagnosis time	**r**	-0.008	0.129	0.163	-0.341	0.036	0.120
	p	0.806	**<0.001**	**<0.001**	**<0.001**	0.272	**<0.001**
	n	913	913	913	913	913	913
HbA1c	**r**	0.174	0.159	0.165	-0.093	0.313	0.171
	p	**<0.001**	**<0.001**	**<0.001**	**0.005**	**<0.001**	**<0.001**
	n	913	913	913	913	913	913
BMI	**r**	0.213	0.125	0.010	0.003	0.298	0.146
	p	**<0.001**	**<0.001**	0.755	0.921	**<0.001**	**<0.001**
	n	913	913	913	913	913	913

p<0.05 , p<0.01, BMI: Body Mass Index, HbA1c: Glycated Hemoglobin

Discussion

Regardless of the type of diabetes, the more developed the self-management skills in chronic diseases, the higher the level of the symptoms experienced due to diseases, the treatment management of the disease, the physical and psychosocial effects caused by the disease, and the management of lifestyle changes required to live with a chronic disease and the level of quality of life associated with it [10-12]. In our study, 57% of individuals diagnosed with diabetes experienced a diabetes-related complication. Almost half of the individuals diagnosed with diabetes did not perform regular blood glucose control and their BMI averages were in the overweight category. In similar studies, it is seen that the positive effects of regular blood glucose and weight control, disease awareness and related self-management skills have a positive effect on the patient's quality of life [11-13]. When the self-management skills of the patients were evaluated according to the diabetes subtype, it was determined that the self-management skills of individuals diagnosed with Type 1 diabetes were better in the sub-dimensions of medical nutrition, treatment management, exercise and awareness of chronic complications. The reason for this may be that individuals diagnosed with Type 1 diabetes are diagnosed earlier and the importance of disease management is better understood as a result of the complications that develop due to the fact that no insulin is produced, creating a more vital situation. In our study, it was observed that the educational status of the individual had an effect on self-management skills. It was determined that self-management skills and the ability to self-administer insulin increased as the level of education increased. While there are results supporting our study in similar studies [14], there are also studies showing that education level has no effect on self-management [15,16].

One of the factors affecting treatment compliance of individuals diagnosed with diabetes is diabetes education. In our study, it was found that diabetes self-management skills of individuals who had never received diabetes education were weaker than individuals who had received group or individual education. In similar studies, it is seen that receiving education affects compliance with the disease awareness pathway [17]. HbA1c is an important parameter used in the course of the disease. In parallel with the lifespan of erythrocytes, the amount of glucose on its surface provides key information in evaluating 3-month glucose levels. In a study, it was found that patients who self-measured their blood glucose levels once a week, and every fifteen days showed a significant improvement in HbA1c levels at the end of the third month and a decrease in the rate of complications [18]. There are many studies in the literature supporting that individuals with poor diabetes self-management skills have higher HbA1c values [12,13]. Hypoglycemia is defined as a decrease in blood glucose level below 50 mg/dL and its symptoms include autonomic (hunger, dizziness, sweating, palpitations, nervousness) and neuroglycopenic (headache, weakness, fatigue, seizures, coma) symptoms [20]. In our study, it was found that individuals with better diabetes self-management sub-parameters had a lower frequency of hypoglycemia. Similar to our results, studies have reported that diabetes self-management skills of individuals diagnosed with diabetes reduce the frequency of hypoglycemia [21,22]. When health parameters such as duration of diagnosis, HbA1c value and BMI values, diabetes self-management skills and self-insulin skills of individuals diagnosed with diabetes were evaluated, it was found that there was a negative relationship between the sub-dimension of being aware of the disease among the self-management sub-dimensions, and HbA1c values and BMI values of individuals with good self-management skills were found to be lower. In our study, a negative relationship was found between the sub-dimension of self-management skills of being aware of chronic diseases and HbA1c values and duration of diagnosis. This relationship is thought to be due to the increase in individuals' mastery of issues such as disease complications, treatment management, and medication management over the years. In the literature, it is stated that disease duration is associated with poor glycemic control [23,24].Ahmad et al. found that each one-year increase in disease duration was associated with a 5% decrease in the probability of targeted glycemic control [25]. However, some studies have reported that there is no relationship between disease duration and glycemic control [26,27].

Limitations

The limitation of the study is that it is a single-center study.

Conclusion

The results of our research show that, although DSMAS has a very important place in the management of diabetes treatment, diabetes self-management training is necessary for diabetes management and improvement of other health parameters in individuals diagnosed with diabetes. Multiple factors can affect individuals' self-management skills. The number of diabetes-related trainings received by individuals diagnosed with diabetes, the number of trainings received.

Conflict of interest:

Author Contributions		**Author Initials**
SCD	Study Conception and Design	GD, EÜA
AD	Acquisition of Data	EÜA
AID	Analysis and Interpretation of Data	EÜA, FS
DM	Drafting of Manuscript	GD, GP
CR	Critical Revision	GD, EÜA, GP, FS

Financial support

There is no financial support in our research.

Acknowledgments

We thank the Endocrinology Outpatient Clinic team of İzmir Katip Çelebi University Atatürk Training and Research Hospital.

Prior publication

Our article has not been presented as a paper anywhere and has not been submitted for publication in any journal.

References

1. Pasquel FJ, Lansang MC, Dhatariya K, Umpierrez GE. Management of diabetes and hyperglycaemia in the hospital. Lancet Diab Endoc 2021; 9(3), 174-88. https://doi.org/10.1016/S2213-8587(20)30381-8
2. Sherifali D, Viscardi V, Bai JW, Ali RM. Evaluating the effect of a diabetes health coach in individuals with Type 2 Diabetes. Can J Diab 2016;40(1):84-94.https://doi.org/10.1016/j.jcjd.2015.10.006
3. Demirtaş Adli G. [Tele health technologies and the role of the nurse in diabetes self-management education and support] (in Turkish). Gevher Nesibe J Med Health Sci. 2023; 8(1), 142-51. http://doi.org/10.5281/zenodo.7601177
4. Bakir GG, Zengin N. [Investigation of self-management and affecting factors in individuals with diabetes] (in Turkish). J Health Life Sci. 2023; 5(1):9-17. https://doi.org/10.33308/2687248X.202351289
5. Surucu HA. [Diabetes self-management education, group-based education and ındividual education] (in Turkish). DEUHYO ED. 2014; 7 (1): 46-5. https://dergipark.org.tr/tr/pub/deuhfed/issue/46810/587021
6. Polat G, Avdal EU. [Diabetes technologies according to the theory of Orem's self-care deficiency] (in Turkish). DEUHYO ED. 2021;14(3):283-9. https://doi.org/10.46483/deuhfed.865886
7. Sherifali D, Bai JW, Kenny M, Warren R, Ali MU. Diabetes self-management programmes in older adults: A systematic review and meta-analysis. Diab Med. 2015; 32(11):1404-14. https://doi.org/10.1111/dme.12780
8. American Diabetes Association: Standards of medical care in diabetes abridged for primary care providers. Clin Diab. 2015; 33(2): 97–111. https://doi.org/10.2337/diaclin.33.2.97
9. Disci R. Basic and Clinical Biostatistics.1st ed. Ankara: Nobel Medical Bookstore; 2023.

10. Celik S. [Recommendations of diet and lifestyle in prostate cancer patients] (in Turkish). Bullet Urooncology. 2015;14(2):88-93. https://doi.org/10.4274/uob.307
11. Zuhur S, Olgun N. [What level have we met the diabetes self-management education and support standards in our country?] (in Turkish). Turk J Diab Nurs. 2022; 2(1):33-8. https://doi.org/10.29228/tjdn.58310
12. Orhan B, Karabacak BG. Association between cognitive and social factors and metabolic control parameters in patients with Type 2 Diabetes. Clin Exp Health Sci. 2016; 6(1):1-8. https://dergipark.org.tr/tr/pub/clinexphealthsci/issue/17866/187381
13. Cıtıl R, Ozturk Y, Gunay O. [Metabolic control status and accompanying factors in diabetic patients who applied to a health center in Kayseri city center] (in Turkish). Erciyes Med J. 2010; 32: 111-22.
14. Alanyalı Z, Arslan S. [Diabetes symptoms and self-management perceptions of individuals with Type 2 Diabetes] (in Turkish). Arc Health Sci Res. 2020;7(3):238-43. https://doi.org/10.5152/ArcHealthSciRes.2020.19031
15. Selen F, Polat U. Sleep quality and perceived self-management in patients with diabetic foot ulcers: Corum/Turkey. J Hitit Uni Soc Sci Inst. 2018; 11: 627-48. https://doi.org/10.17218/hititsosbil.411193
16. Wallston KA, Rothman RL, Cherrington A. Psychometric Properties of the perseived diabetes self-management scale (PDSMS). J Behav Med. 2007; 30: 395-401. https://doi.org/10.1007/s10865-007-9110-y
17. Ozkaptan BB, Kapucu S, Demirci İ. Relationship between adherence to treatment and acceptance of illness in patients with type 2 diabetes. Cukurova Med J. 2019; 44(1): 447-54. https://doi.org/10.17826/cumj.554402
18. Aydın H, Deyneli O, Yavuz D, Tarcın O, Akalın S. Does the frequency of the self -monitoring of blood glucose influence glycemic control in Type 2 Diabetic patients? Marmara Med J. 2005;18(1):13-6.
19. Kara K, Cınar S. [The relation between diabetes care profile and metabolic control variables] (in Turkish). Kafkas J Med Sci. 2011; 1(2): 57-63.
20. Erol O. [Hypoglycemia Fear and Nursing Role for It's Management: Review] (in Turkish). Turk Clin J Nurs Sci. 2012; 4(1):37-44. https://www.turkiyeklinikleri.com/article/tr-hipoglisemi-korkusu-ve-yonetiminde-hemsirenin-rolu-62181.html
21. Świątoniowska N, Sarzyńska K, Szymańska-Chabowska A, Jankowska-Polańska B. The role of education in type 2 diabetes treatment. Diab Res Clin Pract. 2019;151:237-46. https://doi.org/10.1016/j.diabres.2019.04.004
22. Huang J, Liu Y, Zhang Y, Yao H. Correlation between self-management and knowledge of and attitude to diabetes in type 2 diabetic patients in Changsha. J Central South Uni Med Sci. 2013;38:176-81. https://doi.org/10.3969/j.issn.1672-7347.2013.02.011
23. Khattab M, Khader YS, Al-Khawaldeh A, Ajlouni K. Factors associated with poor glycemic control among patients with Type 2 Diabetes. J Diab Complications. 2010; 24(2):84-9. https://doi.org/10.1016/j.jdiacomp.2008.12.008
24. de Pablos-Velasco P, Parhofer KG, Bradley C, Eschwege E, Gonder-Frederick L, Maheux P, et al. Current level of glycaemic control and its associated factors in patients with Type 2 diabetes across Europe: Data from the panorama study. Endocrinol (Oxf). 2014;80:47-56. https://doi.org/10.1111/cen.12119
25. Ahmad NS, Islahudin F, Paraidathathu T. Factors associated with good glycemic control among patients with type 2 diabetes mellitus. J Diab Invest. 2014; 5(5):563-9. https://doi.org/10.1111/jdi.12175
26. ALAboudi IS, Hassali MA, Shafie AA, Saleem F. self-efficacy, self-care behaviours and glycaemic control in Type 2 diabetic patients in Riyadh, Saudi Arabia. J Public Health. 2016; 24:281-90. https://doi.org/10.1007/s10389-016-0723-x
27. Avcı D, Selçuk KT. [Glycemic control and affecting factors in patients with type 2 diabetes: the role of depression] (in Turkish). GUSBD. 2016; 5(3):70-9.