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Patient Activity and Lifestyle Change in Individuals with Diabetes: A Descriptive Research

Diyabetli Bireylerde Hasta Aktifliği ve Yaşam Tarzı Değişikliği: Tanımlayıcı Bir Araştırma

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ABSTRACT Objective: The study is a descriptive study conducted to determine the ability to adapt to lifestyle changes that are important in preventing complications in individuals with Type 2 diabetes, the causes of non-compliance, and their relationship with patient activity. **Material and Methods:** Hundred and eighty patients with Type 2 diabetes constitued the sample of this research. The data were collected using "socio-demographic features form", "Lifestyle Change Questionnaire" and "Patient Activity Measure (PAM)". Data were analyzed using descriptive statistical methods, Mann-Whitney U test, and t-test. **Results:** Of the individuals in this study, 63.9% (n=115) were female, 61.7% (n=111) were primary school graduates, 67.2% (n=121) were not working, 66.1% (n=119) equal to income, 41.1% (n=74) did not receive any diabetes education, 38.9% (n=70) have hypertension and 7.8% (n=14) have heart failure and 53.3% (n=96) evaluated health perception as worse. Individuals 78.3% (n=141) do not comply with the diet, 82.2% (n=148) had no physical activity, 52,8% (n=95) never check regular blood sugar, and 65.6% (n=118) never took care of their feet. Individuals with high PAM were found to be significantly better at adapting to lifestyle changes ($p<0.05$). **Conclusion:** Our findings show that the majority of people with Type 2 diabetes do not adapt to lifestyle changes. Methods that will increase the motivation of individuals, mobilize them, produce solutions according to work intensities and remedies to their economic inadequacies should be tried. In addition, planning, training and support should be provided to increase the activity level of people with diabetes.

Keywords: Type 2 diabetes; complications; lifestyle changes; patient activation

ÖZET Amaç: Çalışma, Tip 2 diyabetli bireylerde komplikasyonları önlemede önemli olan yaşam tarzı değişikliklerine uyum sağlama yeteneği, uyumsuzluk nedenleri ve hasta aktifliği ile ilişkisini belirlemek amacıyla yapılmış tanımlayıcı bir araştırmadır. **Gereç ve Yöntemler:** Bu araştırmanın örneklemini, Tip 2 diyabetli 180 hasta oluşturmuştur. Veriler, "sosyodemografik özellikler formu", "Yaşam Tarzı Değişiklik Anketi" ve "Hasta Aktiflik Ölçeği [Patient Activity Measure (PAM)]" kullanılarak toplanmıştır. Veriler, tanımlayıcı istatistiksel yöntemler ve t-testi kullanılarak analiz edilmiştir. **Bulgular:** Araştırmaya katılan bireylerin %63,9'u (n=115) kadın, %61,7'si (n=111) ilkokul mezunu, %67,2'si (n=121) çalışmıyor, %66,1'inin (n=119) geliri giderine eşit olduğu, %41,1'inin (n=74) herhangi bir diyabet eğitimi almadığı, %38,9'unun (n=70) hipertansiyon, %7,8'inin (n=14) kalp yetersizliği olduğu ve %53,3'ünün (n=96) sağlığı algılamasını kötü olarak değerlendirdiği bulunmuştur. Bireylerin %78,3'ünün (n=141) diyetine hiçbir zaman uymadığı, %82,2'sinin (n=148) hiçbir zaman fiziksel aktivite yapmadığı, %52,8'inin (n=95) düzenli kan şekerine hiçbir zaman bakmadığı ve %65,6'sının (n=118) hiçbir zaman ayak bakımını yapmadığı bulunmuştur. Yüksek PAM'li bireylerin yaşam tarzı değişikliklerine uyum sağlamada önemli ölçüde daha iyi olduğu saptanmıştır ($p<0,05$). **Sonuç:** Bulgularımız Tip 2 diyabetli bireylerin büyük çoğunluğunun yaşam tarzı değişikliklerine uyum sağlayamadığını göstermektedir. Bireylerin motivasyonunu artıracak, harekete geçirecek, iş yoğunluklarına göre çözüm üretecek ve ekonomik yetersizliklerine çare olacak yöntemler denenmelidir. Ayrıca diyabetli bireylerin aktivite düzeylerinin artırılması için planlama, eğitim ve destek sağlanmalıdır.

Anahtar Kelimeler: Tip 2 diyabet; komplikasyonlar; yaşam tarzı değişiklikleri; hasta aktifliği

In the literature, it is stated that diabetes and related complications, can be delayed and prevented by lifestyle changes as well as medical treatment.[1,2] There is evidence that interventions involving lifestyle modification are also successful in preventing complications.[1-3] There is also evidence that all attempts to control weight, diet changes, increase physical activity, and reduce or quit alcohol and

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smoking in line with lifestyle changes are successful.[1,2] Regular and balanced diet, regular physical activity, blood sugar monitoring, foot care, and behaviors such as reducing or quitting smoking and alcohol use are frequently mentioned as lifestyle changes.[2] Among these lifestyle interventions, a decrease in hemoglobin A1c (HbA1c) levels of around 1-2% (range 0.5-2.6%) has been observed with medical nutrition therapy.[2] Regular blood glucose monitoring is important in adjusting the drug and insulin doses of individuals and preventing complications.[2] It has been observed that individuals who can monitor their blood sugar at home have better adherence to treatment and can better intervene in sudden decreases and increases in blood sugar values.[3] Foot care, which is another lifestyle change, is important in reducing foot problems and preventing amputations in individuals with diabetes.[2,4,5] Fan et al. in diabetic patients before and after education, it was determined that problems such as skin (dryness, cracks, pallor) decreased with appropriate foot care.[6] Reducing smoking and alcohol use, which is another lifestyle change, is associated with being the most important risk factor for cardiovascular diseases.[7] In the studies, a significant relationship was found between the incidence of diabetic nephropathy, neuropathy, and cardiovascular diseases, as smoking increases the HbA1c value, microvascular and macrovascular complications occur and progress earlier in diabetic patients compared to the non-smokers' group.[8-10] Alcohol, on the other hand, causes health problems such as severe hypoglycemia, cardiovascular events, and fatty liver in individuals with additional diseases besides diabetes. Despite this information showing that lifestyle changes have negative effects on metabolic values and complications, many individuals with diabetes have difficulty in implementing and complying with healthy lifestyle behaviors.[11] The presence of comorbid diseases (hypertension, heart failure, etc.) or the occurrence of diabetes-related complications also affect the ability of patients with diabetes to comply with treatment and lifestyle changes.[7] In studies conducted solely on diet and exercise, it was observed that 48-88% of patients could not comply with their diet and 34-52% could not follow their exercise plan.[11-13] In studies determined that 32-81% of individuals with diabetes could not follow their blood sugar monitoring, 59-70% to foot care.[12-14] In another study, it was found that 74.3% did not follow the dietary recommendations and scored the highest for the weekly average consumption of foods with high sugar content, and the lowest for fruit and vegetable and food consumption.[15] Individuals who can carry out lifestyle changes must be individuals who have self-management skills and can take active action. Active individuals are individuals who know how to manage and control their current situation, can manage the disease, and adapt to behavioral changes. Studies show individuals with high levels of activity have better self-care behavior and better health outcomes.[16] However, many adults still struggle to practice and adhere to healthy lifestyle behaviors.[11] In this context, evaluating the ability of individuals with diabetes to adapt to lifestyle changes, together with the reasons for not being able to adapt, is the focal point for the interventions made to individuals to be effective. This study was conducted as a descriptive research to determine the ability of patients with Type 2 diabetes to adapt to lifestyle changes, the reasons for their inability to adapt, and their relationship with patient activity.

- What is the ability of individuals with Type 2 diabetes to adapt to lifestyle changes?
- What are the reasons why people with Type 2 diabetes cannot comply with lifestyle changes?
- Does the activity level affect ability to adapt to lifestyle changes?

MATERIAL AND METHODS

This study is a descriptive study. The study was conducted with individuals with Type 2 diabetes in a university hospital, and endocrinology outpatient clinic from October 2017-June 2018. The sample of the study consisted of 180 ($n=t^{2*}p^{*}q/d^{2}$) individuals with Type 2 diabetes voluntarily agreed to participate in the study. Simple-random sampling method was used in sample selection. The data of the study were collected by interviewing individuals with Type 2 diabetes in the diabetes education room in the outpatient clinic. In the elderly individuals, the questions of the questionnaire were read and the answers were filled

in by the researcher. It took an average of 15-20 minutes to fill out the questionnaires.

Socio-Demographic Characteristics Form: Questionnaire was created by the researcher by scanning the literature in order to define age, gender, marital status, employment status, income status, alcohol and smoking status, chronic diseases, and diabetes.[2]

Lifestyle Change Questionnaire: Questionnaire was created by the researcher in order to determine the patients' daily eating habits, physical activity status, cigarette alcohol use, blood glucose measurement, and foot care in line with the relevant literature.[2]

Patient Activity Measure Scale: Patient Activity Measure (PAM) was developed by Hibbard and Greene in 2004 in *United States of America* in order to detect and evaluate patient activity levels and its short form was studied again by Hibbard and Greene in 2005. The Turkish adaptation was made by Kosar and Besen.[17,18]

Descriptive statistics, Mann-Whitney U test, and t-test were used while evaluating the data. The significance level was determined as $p<0.05$. Written permission was obtained from the institutions where the research would be conducted and the Dokuz Eylül University Non-Invasive Research Ethic Committee (date: October 12, 2017; decision no: 2017/24-24). Permission was obtained from scale developers and verbal consent and written informed consent form were obtained from individuals with diabetes. All procedures performed in the present study were made in accordance with the ethical standards of the Helsinki Declaration (2008).

RESULTS

The sociodemographic and diseases-related characteristics and PAM average scores and level distribution of the individuals participating in the study are given in Table 1.

The answers given by the participants to the nutrition questions and the distribution of the most frequently consumed foods are given in Table 2.

The distribution of participants' lifestyle change behaviors is given in Table 3. It was determined that 82.2% (n=148) of the individuals participating in the study never exercised, 52.8% (n=95) never followed their blood sugar, 65.6% (n=18) never regularly performed foot care, 27.2% (n=49) smoked, 17.2% (n=31) used alcohol.

Reasons of can not lifestyle changes (diet, exercising, monitoring blood sugar, foot care) is given in Table 4.

What the participants understand from the concept of lifestyle change and the factors encouraging the change is given in Table 5.

Participants' comparison of PAM total scores by lifestyle changes (physical activity, blood sugar and foot care, nutritional status) is given in Table 6.

DISCUSSION

It is not easy to start a regular diet, do regular physical activity, to apply and maintain a routine that includes continuous drug use, monitor blood sugar regularly, and take care of feet; however, it is necessary to keep the disease under control.[19] In this context, in the management of diabetes, it is important to know whether individuals can comply with treatment and lifestyle changes and the reasons for their inability to comply.[7] As a result of the study, it was determined that individuals with Type 2 diabetes had a low rate of adapting to lifestyle changes, the reasons for not being able to adapt were varied, and there was a significant relationship between PAM total scores and compliance with lifestyle changes. Low activity levels (PAM) of the study group, low compliance rates, and non-compliance can be associated with the fact that the majority of the individuals sampled have a low level of education, low income, not working, and perceive their health as bad or moderate. The findings are explained in detail in the continuation of the discussion in this direction.

The rate of adaptation to lifestyle changes of individuals with Type 2 diabetes is 2.2% (n=4) who follow their regular diet, 3.9% (n=7) who do regular physical activity, and 7.8% (n=14) who can check their blood sugar regularly. It was found that 7.8% (n=14) were able to do regular foot care. According to the study data, the rates of non-compliance with lifestyle changes were 78.3% (n=141) never following their diet, 82.2% (n=148) never doing physical

TABLE 1: Sociodemographic and diseases-related characteristics and PAM average scores and level (n=180).

	X±SD	Minimum-maximum	
Age	56.27±13.62	26-86	
Diabetes year	10.39±7.95	1-35	
Body mass index	27.32±4.56	19.03-46.07	
PAM total score	30.93±5.76	13-52	
		n	%
PAM levels	1. Level (lowest activity: 0-47)	176	97.8
	2. Level (47.1-55.1)	4	2.2
	3. Level (55.2-67.0)	-	-
	4. Level (highest active: 67.1-100)	-	-
Gender	Female	115	63.9
	Male	65	36.1
Educational status	Literate	5	2.8
	Primary school	111	61.7
	Middle school	21	11.7
	High school	24	13.3
	University	19	10.6
Marital status	Married	163	90.6
	Single	17	9.4
Working status	Working	59	32.8
	Not working	121	67.2
Income status	Income less than expenses	51	28.3
	Income equals expense	119	66.1
	Income more than expenses	10	5.6
Whoes live with at home	Alone	14	7.8
	Friend	3	1.7
	Family	163	90.6
Responsible for taking care of anyone	Yes	77	42.8
	No	103	57.2
Health perception status	Worse	96	53.4
	Moderate	58	32.2
	Good	26	14.4
Cancer, hypertension, infectious diseases screening	Yes	59	32.8
	No	121	67.2
Hypertension	Yes	70	38.9
	No	110	61.1
Heart failure	Yes	14	7.8
	No	166	92.2
Other (cancer, thyroid diseases, psychiatric diseases..)	Yes	89	49.4
	No	91	50.6
Type of treatment received	OAD usage	95	52.8
	Insulin use	4	2.2
	OAD and insulin use	81	45.0
Diabetes education	Yes	106	58.9
	No	74	41.1

PAM: Patient Activity Measure; SD: Standard deviation; OAD: Oral Antidiabetic Drug.

activity, 52.8% (n=95) never checking their blood sugar regularly and 65.6% (n=118) never did foot care. In addition, it was determined that 55.1% (n=27) of smokers (n=49) of the individuals participating in the study did not reduce smoking, while 35.5% (n=11) of alcohol users (n=31) did not reduce

TABLE 2: Distribution of participants by most commonly consumed foods, answers to the questions related to nutritional habits (n=180).

The most commonly consumed foods		n	%
Mainly on vegetables	Yes	149	82.8
	No	31	17.2
Mainly carbohydrates	Yes	45	25.0
	No	135	75.0
Protein-heavy	Yes	58	32.2
	No	122	67.8

	Never		Rarely		Sometimes		Often		Always	
Questions related to nutritional	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
I follow a special diet related to diabetes	145	80.6	13	7.2	8	4.4	5	2.8	9	5.0
I follow my diet regularly	141	78.3	11	6.1	10	5.6	14	7.8	4	2.2
I have breakfast every morning	9	5.0	5	2.8	10	5.6	25	13.9	131	72.8
I eat 2-3 servings of fruit a day	14	7.8	27	15.0	49	27.2	61	33.9	29	16.1
I consume 4-5 servings of vegetables a day	7	3.9	13	7.2	25	13.9	105	58.3	30	16.7
I eat milk, yogurt, cheese, eggs every day	0	0.0	7	3.9	4	2.2	44	24.4	125	69.4
I use plant-based foods instead of animal-derived foods	31	17.2	3	1.7	20	11.1	88	48.9	38	21.1
I regularly eat 3 main meals	14	7.8	19	10.6	33	18.3	72	40.0	42	23.3
I take 3-4 snacks regularly	21	11.7	31	17.2	97	53.9	20	11.1	11	6.1

alcohol (Table 3). Our results on compliance with lifestyle changes are similar to the relevant literature. In the study of Çınar et al., they found that 85.7% of the patients did not follow their diet, 77.1% did not exercise regularly, and 68.6% did not monitor their blood sugar levels at home.[20] In the study by Marinho et al., it was found that 59.3% for foot care, 56.1% for blood sugar monitoring, 29.2% for diet, and 22.5% for exercise.[14] Hankó et al., in their study in hungary with Type 2 diabetes patients, determined that 76.8% of them did not comply with the diet, 33.8% did not do physical activity, and 81% could not monitor their blood sugar.[12] In studies conducted only on diet and exercise, it was observed that 48-77% of patients could not comply with their diet and 34-52% could not follow their exercise plan.[11,12] In the study of Aktaş, it was stated that in the follow-up of blood sugar, approximately 30% to 60% of the patients looked when they felt bad.[3] In the study conducted by Aslantekin et al., the rate of not doing foot care in diabetic patients was found to be 74.3%.[21] In studies examining the relationship between smoking and diabetes; in the study of Chakkarwar, smoking was found to be an important risk factor in the development of diabetic nephropathy.[9] In the study of Dönder et al. and Kayar et al., a significant correlation was found between the fact that 33.2% (n=251)

TABLE 3: Distribution of participants of life style change behaviours (regular exercise status, regular blood glucose monitoring, regular foot care, smoking and alcohol use) (n=180).

		n	%
Regular exercise status			
Never		148	82.2
Rarely		6	3.3
Sometimes		8	4.4
Often		11	6.1
Regularly all the time		7	3.9
Status of monitoring blood sugar			
Never		95	52.8
Rarely		27	15.0
Sometimes		9	5.0
Often		35	19.4
Regularly all the time		14	7.8
Regular foot care status			
Never		118	65.6
Rarely		32	17.8
Sometimes		6	3.3
Often		10	5.6
Regularly all the time		14	7.8
Smoking and alcohol use status			
Smoking	Yes	49	27.2
	No	131	72.8
The state of reducing smoking	Yes	22	44.9
	No	27	55.1
Alcohol use	Yes	31	17.2
	No	149	82.8
The state of reducing alcohol use (n=31)	Yes	20	64.5
	No	11	35.5

TABLE 4: Reasons of can not lifestyle changes (diet, exercising, monitoring blood sugar, foot care).

	Order of priority											
	1st place		2nd place		3rd place		4th place		5th place		6th place	
Not adapt to diet (n=176)	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Can not find time	69	39.2	71	40.4	9	5.0	6	3.4	11	6.2	10	5.9
Do not feel hungry	10	5.9	60	34.1	82	46.5	3	1.7	4	2.2	17	9.7
Think unnecessary*	21	11.9	29	16.5	26	14.7	6	3.4	33	20.6	61	34.7
Desire lose weight	60	34.0	11	6.2	46	26.0	12	6.8	10	5.6	37	21.3
Economic reasons	7	3.9	2	1.1	9	5.0	82	46.5	41	22.2	35	19.9
Difficult to change	9	5.1	3	1.7	5	2.8	67	38.2	77	43.2	15	8.5
Total	176	100.0	176	100.0	176	100.0	176	100.0	176	100.0	176	100.0
	Order of priority											
	1st place		2nd place		3rd place		4th place		5th place			
Not to exercising (n=173)	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**		
Laziness	15	8.7	62	35.8	5	2.8	42	24.5	49	28.3		
Not finding time	55	30.9	17	9.8	38	22.0	6	3.5	57	32.7		
Far sports center	88	50.9	43	24.8	28	16.5	6	3.5	8	4.4		
Material reasons	13	7.6	45	26.1	58	33.4	39	23.5	18	10.4		
Lack of exc. habit	3	1.9	6	3.5	44	25.3	78	45.0	42	24.2		
Total	173	100.0	173	100.0	173	100.0	173	100.0	173	100.0		
	Order of priority											
Not monitoring regular	1st place		2nd place		3rd place		4th place		5th place		6th place	
blood sugar (n=166)	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
It hurts	8	4.7	64	38.5	53	31.8	15	9.3	3	1.7	23	13.8
To forget	83	50.0	29	17.6	23	13.8	5	3.1	14	8.7	12	7.3
It unnecessary	34	20.3	14	8.4	50	30.6	13	7.8	7	4.2	48	28.9
Far health centers	15	9.0	52	31.3	14	8.6	39	23.5	12	7.2	34	20.5
Economic reasons	14	8.3	6	3.6	8	4.8	57	34.3	75	45.1	6	3.6
Other**	13	7.7	1	0.6	17	10.4	37	22.0	55	33.1	43	25.9
Total	166	100.0	166	100.0	166	100.0	166	100.0	166	100.0	166	100.0
	Order of priority											
	1st place		2nd place		3rd place		4th place		5th place		6th place	
Not taking foot care (n=166)	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Laziness	19	11.6	47	28.5	38	22.9	10	6.2	3	1.9	49	29.7
Not finding time	13	8.3	16	9.8	38	22.9	45	27.1	46	27.8	7	4.4
Forgetting	25	15.0	14	8.5	23	13.8	23	13.8	48	28.9	32	19.3
Intense social life	40	24.0	12	7.3	54	33.2	19	11.4	32	19.3	8	4.9
Fatique	14	8.6	35	21.2	10	6.0	40	24.0	20	12.3	46	27.8
Other***	54	32.5	41	24.7	2	1.2	29	17.5	16	9.8	23	13.9
Total	166	100.0	166	100.0	166	100.0	166	100.0	166	100.0	166	100.0

* Thinking that eating three main meals is unnecessary; **Reasons such as losing the device, forgetting the device at home or nearby, breaking the device;
***Doesn't know how to take care of feet.

of the patients were still smoking and the development of diabetic nephropathy from smoking.[8,10] In addition, Kayar et al. found that smoking increases the HbA1c value, microvascular and macrovascular complications occur and progress earlier in diabetic patients compared to the non-smokers' group, and there is a significant relationship between the incidence of diabetic nephropathy, neuropathy, and cardiovascular diseases.[8] Similarly, the literature shows that individuals with diabetes cannot comply with recommended lifestyle changes at high rates. This finding can also be associated with the low level of

TABLE 5: What the participants understand from the concept of lifestyle change and the factors encouraging the change (n=180).

	Order of priority									
Understand concept of	**1st place**		**2nd place**		**3rd place**		**4th place**		**5th place**	
"lifestyle change"	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Reducing or quitting smoking	16	8.9	0	0.0	17	9.4	78	43.3	69	38.3
Reducing or quitting alcohol use	2	1.1	4	2.2	44	24.4	75	41.7	55	30.6
Do regular exercise	46	25.6	1	0.6	68	37.8	23	12.8	42	23.3
Eating a regular and balanced diet	110	61.1	10	5.6	45	25.0	4	2.2	11	6.1
Have regular health checkups	7	3.9	165	91.7	5	2.8	0	0.0	3	1.7
Total	180	100.0	180	100.0	180	100.0	180	100.0	180	100.0
Encouraging factors				**n**				**%**		
Economic opportunities				56				31.1		
Being healthy (I don't have any health problems..)				43				23.8		
Have time				25				13.8		
Social support				18				10.0		
Satisfaction with work place and time				11				6.1		
Coping with stress				10				5.5		
Easy access to the hospital				8				4.4		
Not having any dependents				5				2.7		
Having emotional support				4				2.2		
Total				180				100.00		

TABLE 6: Participants comparison of PAM total scores by lifestyle changes (physical activity, blood sugar and foot care, nutritional status) (n=180).

				PAM		
		n	**X**	**SD**	**t value**	**p value**
Ability to do physical activity	Never	162	30.4	5.3	-3.324	0.030
	Always	18	35.1	7.5		
Checking blood sugar	Never	131	29.9	5.0	-3.824	0.008
	Always	49	33.5	6.7		
Being able to do foot care	Never	156	29.9	5.0	-6.516	0.000
	Always	24	37.3	6.2		
				PAM		
Nutritional status		**n**	**X**	**SD**	**U**	**p value**
I follow a special diet related to diabetes	Never	166	30.4	5.2	-3.794	0.008
	Always	14	36.3	8.4		
I follow my diet regularly	Never	162	30.2	5.2	-4.797	0.045
	Always	18	36.7	7.3		
I have breakfast every morning	Never	24	29.8	6.9	-1.009	0.436
	Always	156	31.1	5.5		
I eat 2-3 servings of fruit a day	Never	90	30.7	6.2	-0.555	0.079
	Always	90	31.7	5.2		
I consume 4-5 servings of vegetables a day	Never	45	31.3	6.8	0.558	0.106
	Always	135	30.8	5.3		
I eat milk, yogurt, cheese, eggs every day	Never	11	29.6	9.8	-0.772	0.003
	Always	169	31.0	5.4		
I use plant-based foods instead of animal-derived foods	Never	54	30.3	5.9	-0.950	0.296
	Always	126	31.2	5.6		
I regularly eat 3 main meals	Never	66	30.5	5.9	-0.749	0.685
	Always	114	31.8	5.6		
I take 3-4 snacks regularly	Never	149	30.3	5.2	-2.968	0.002
	Always	31	33.6	7.4		

PAM: Patient Activity Measure; SD: Standard deviation.

education and income of the study group and the fact that the majority of them are not working.

The reason why the individuals participating in the study could not comply with the lifestyle changes was that the option "I skip meals because they want to lose weight" was mostly chosen in the first place, and 42.2% (n=76) of the body mass index (BMI) values were overweight, 22.8% (n=41) was found to be obese. In the study by Marinho et al., it was found that BMI affects the ability to adapt to lifestyle changes.[14] In the *second place* of the individuals participating in the study, n=71 (40.4%) "*I can't find time due to workload*" made them think that they couldn't find time due to their working situation. However, 67.2% (n=121) of the individuals participating in the study did not work, thus suggesting that the reasons for skipping meals may be the daily work activities of the individuals or the people they are responsible for at home. It was determined that 90.6% (n=163) of the participants stayed with their families and 42.8% (n=77) was the person they were responsible for taking care of (Table 4). In the *3rd place* of the individuals in the study, n=82 *It is thought that* (46.5%) chose "*I skip meals because I do not feel hungry*" and they skip meals because it is difficult to change their eating habits (Table 4). The difficulty of the participants in reaching the food is also one of the important factors affecting their ability to comply with the nutrition plan. *4th place in the* study n=82 *It was found* that (46.5%) of people skipped meals due to "*economic reasons*". In the study, it was determined that 28.3% of them (n=51) had less income than their expenses and had difficulty in complying with the diet prepared by the dietitian. In the studies conducted by Acemoğlu et al., Elley et al., and Mumu et al., it was stated that economic reasons affect the nutritional status.[22-24] Ayele et al. found in their study that 74.3% of the participants did not comply with the dietary recommendations due to the difficulty of obtaining nutrients due to economic reasons.[15] Reyes et al. study revealed that participants were unable to buy healthy foods due to economic reasons.[25] In our study, "*because it is difficult to change eating habits*" *5th place* n=77 (43.2%) selected (Table 4). Shultz et al. in their study to determine the barriers in front of nutritional behaviors of patients with Type 2 diabetes and diabetes educators stated that both patients and educators want to eat foods that are not on their diet lists as the reasons for not complying with their diet.[11] Non-compliance with dietary rules may result from difficulties in reorganizing eating habits, mostly due to the difficulty of dietary restrictions.[19]

Another important lifestyle factor is regular physical activity. As the reasons for not being able to do the physical activity; *n=88 (50.9%) "far away from the sports center", n=62 (35.8%) "laziness", n=58 (33.4%) "material reasons", "third place", "not having the habit of exercising" in the 4th rank, n=78 (45.0%) and "not finding time" in the 5th rank n=57 (32.7%)* (Table 4). In the study of Shultz et al. to determine the obstacles in front of exercise behaviors, they mentioned the weather conditions as a priority.[11] Saleh et al. showed that 374 Bangladeshi Type 2 diabetes patients did not comply with exercise due to advanced age.[13]

One of the most important findings is to be able to check blood sugar regularly from lifestyle changes.[2] Vincze et al. attributed the barriers in monitoring blood sugar in individuals with Type 1 diabetes to economic reasons.[26] In the study of Ünlüsoy, it was determined that the reason for the obstacle in monitoring blood sugar at home was that it was not economical and the procedure was painful.[27] In our study, it was seen that it could not be done due to "forgetting", "pain", and "economic reasons", supporting Ünlüsoy.[27] In the study conducted by Acemoğlu et al., it was learned that only 18% of the patients had devices to monitor their blood sugar at home.[22] Due to economic reasons, the absence of instruments that can monitor blood sugar regularly at home is one of the biggest obstacles to the compliance of patients. In the study of Ünlüsoy, it was observed that 78.9% (n=195) of those who received diabetes education monitor their blood sugar, while 21.1% (n=52) do not.[27] In our study, it is thought that the low rate of education about diabetes (58.1%), at the same time low education and income level may have affected the ability to check blood sugar regularly.

One of the most important and common complications of diabetes is diabetic foot ulcers.[4,28,29] The patients who participated in the study stated that they did not do foot care and they did not know the importance of foot care due to the fact that they did not know their feet among the reasons for not doing foot care (Table 4). This finding is consistent with the literature findings. In the study conducted by Sözen and Kızılcı to examine and compare the foot care behaviors of individuals with diabetes, it was found that the patients did not have sufficient information.[4] In the study of Ekore et al. in which they examined attitudes and awareness regarding diabetic foot, they found that very few of the patients were informed about foot care and examination.[30] Gülşen and Olgun emphasized in their study that 15.2% of people received diabetes education, 69.7% of people did not receive any diabetes education and those who received diabetes education were better at daily foot care and follow-up.[5]

Active individuals have better attitudes toward the disease, their adherence to treatment, and their ability to adapt to lifestyle changes. Remmers et al. found that individuals with diabetes had higher health check-ups after 2 years, according to their activity levels determined by PAM, and higher rates of getting tested for HbA1c and low-density lipoprotein levels and having HbA1c check-ups at the end of 2 years.[31] In the study of Rask et al. in which they examined the relationship between patient activity, self-care management, and health behaviors in individuals with diabetes, it was found that more active patients had less difficulty in performing their self-care behaviors (nutrition, doctor control and planning lifestyle change) and that foot control, eye control, examination revealed that they tended to do regular exercise more.[16] Parchman et al. examined the relationship between diabetes patients' participation in decisions about treatment and their level of activity and found that individuals who said they participated in decisions about the disease process and treatment had higher levels of activity.[32] Mayberry et al. found that there is a significant relationship between glycemic control and self-management behaviors of patients with Type 2 diabetes who are active.[33] In the study of Hendriks and Rademakers, in which they examined the relationship between the activity level of diabetes patients and their knowledge about the disease and their health outcomes, they found that there was a significant relationship between the level of activity and the state of having disease-specific knowledge.[34] In the same study, it has also been determined that individuals at the first activity level have less knowledge of the disease than those at the 2nd and 4th activity level, and there is a relationship between their activity level and the status of foot examination and eye control. Those at Levels 2 and 4 were found to have much more knowledge of HbA1c than those at Level 1.[34] The activity level of the individuals participating in our study is actually low, and 97.8% of them are at Level 1 according to the PAM level (Table 1). However, it was determined that individuals with high activity scale total score averages were significantly higher in adapting to lifestyle changes ($p<0.005$) (Table 6). This finding is similar to the literature, it is seen that individuals with low activity levels cannot do regular nutrition, regular physical activity, regular blood sugar monitoring, and foot care. In addition, low activity levels (PAM) of the study group can be associated with the fact that the majority of the individuals sampled have a low level of education, low income, not working, and perceive their health as bad or moderate. For this reason, it is important to determine the activity level and address these points in increasing the adaptation of individuals.

LIMITATIONS

The limited study sample made it difficult to interpret in comparative analyses.

CONCLUSION

Considering that diabetes is a complex and multifaceted condition that must be managed by both the clinician and the patient, solutions must be planned in collaboration with the patient.[35] The results of the research showed that diabetes management should be viewed from a different perspective for individuals with diabetes to adapt to lifestyle changes. For the effective management of diabetes and its complications, it is important to know the ability to adapt to lifestyle changes, the reasons for non-adaptation, and related factors.

RECOMMENDATIONS

In line with the study results, planning, training, and support should be provided to increase the activity level of individuals with diabetes. Methods that will increase individuals' motivation, motivate them, produce solutions according to their workload, and eliminate their economic inadequacies should be tried.

Source of Finance

During this study, no financial or spiritual support was received neither from any pharmaceutical company that has a direct connection with the research subject, nor from a company that provides or produces medical instruments and materials which may negatively affect the evaluation process of this study.

Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

Authorship Contributions

Idea/Concept: *Dilek Büyükkaya Besen, Bahar Çiçek Uyunmaz;* ***Design:*** *Dilek Büyükkaya Besen, Bahar Çiçek Uyunmaz;* ***Control/Supervision:*** *Dilek Büyükkaya Besen, Bahar Çiçek Uyunmaz;* ***Data Collection and/or Processing:*** *Bahar Çiçek Uyunmaz;* ***Analysis and/or Interpretation:*** *Dilek Büyükkaya Besen, Bahar Çiçek Uyunmaz;* ***Literature Review:*** *Dilek Büyükkaya Besen, Bahar Çiçek Uyunmaz;* ***Writing the Article:*** *Dilek Büyükkaya Besen, Bahar Çiçek Uyunmaz;* ***Critical Review:*** *Dilek Büyükkaya Besen.*

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