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Determination of self-efficacy levels of diabetic individuals

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Abstract

This study was conducted as descriptive with an aim to determine the self-efficacy levels of diabetic individuals. The study was conducted with the participation of 248 patients receiving inpatient treatment in a university hospital between July 20, 2017, and February 15, 2018. Data were collected using a 28-item questionnaire and Type 2 Diabetes Self-Efficacy Scale. In the evaluation of the data, descriptive statistics and one-way analysis of variance, *T*-test, Tukey HSD test, Levine test, Kruskal–Wallis test and Mann–Whitney *U* test were used. It was found that 77% of the patients had a chronic disease, 49.2% used oral anti-diabetes, 33.5% insulin and 15.7% used both oral anti-diabetes and insulin. The median score of the Type 2 Diabetes Self-Efficacy was determined as 70.00 (21–100). In this study, it is recommended to conduct training to increase the self-efficacy levels of diabetic patients.

Keywords: Diabetes, self-efficiency, behaviour, knowledge.

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1. Introduction

Diabetes Mellitus (DM) is a chronic illness characterised by disorders of carbohydrate, fat and protein metabolism due to lack of insulin (Endocrinology and Metabolism Association of Turkey, 2018). Diabetes is quite prevalent worldwide, and it is estimated that the prevalence of diabetes, which was 3% in 2010, will be 5.4% in 2025 (IDF, 2015). According to the International Diabetes Federation (IDF), a person dies of diabetes-related complications every 6 seconds. Diabetes affects the quality of life negatively due to microvascular and macrovascular complications and imposes a high cost on health expenditures. Therefore, effective diabetes management will prevent possible complications. Diet, regular blood sugar check, exercise, oral antidiabetic and insulin therapy have a significant place in the management of diabetes. Healthy lifestyles will facilitate the management of diabetes for diabetic patients and will enable the prevention or early recognition of unfavourable situations (Akdemir & Birol, 2005). The maintenance of care activities by patients is of great importance in terms of their self-efficacy. Perception of self-efficacy, which is one of the critical components of health promotion behaviour in chronic illnesses, is an essential determinant in initiating and maintaining positive health behaviours (Ceyhan & Unsal, 2018).

The self-efficacy concept used by Albert Bandura as a key component of 'Social Learning Theory' in 1977 is widely used in the maintenance of health-related behaviours in the field of nursing and psychology. Albert Bandura argued that people develop special beliefs about their own coping skills throughout their life and that their self-efficacy beliefs are reflected in their behavioural changes (Bandura, 1977). The belief 'I can do it' has a positive effect on the outcome of behaviour (Bandura, 1977; 2004).

The ability of individuals with diabetes to develop self-efficacy and self-care activities depends on the improvement of personal or environmental factors, such as the perception of diabetes, the status of receiving diabetes education, the level of knowledge about diabetes and other psychosocial characteristics. Individuals with high levels of efficacy apply healthy lifestyle activities in a much more effective way and are successful in this regard. A high level of self-efficacy and self-care activities will increase the quality of life of diabetic individuals, facilitate their compliance with treatment and prevent the development of diabetes-related complications.

In the management of diabetes, nurses can provide individuals with positive perceptions of self-efficacy and may attempt to ensure that they maintain a healthy lifestyle. For this reason, nurses should first understand the level of self-efficacy of people with diabetes, why they cannot perform self-care activities and why they cannot manage their treatment and support them in the direction they deem necessary.

1.1. The objective of the study

Answers to the following questions have been sought in the present study conducted to determine self-efficacy levels of diabetic individuals:

- What are the socio-demographic and clinical characteristics of diabetic individuals?
- What are the self-efficacy levels of diabetic individuals?
- Do the socio-demographic and clinical characteristics of diabetic individuals affect their self-efficacy levels?

2. Material and methods

2.1. Place and time of the research

Conducted to determine the self-efficacy levels of diabetic individuals, the present study is a descriptive study. It was conducted at a university hospital between July 20, 2017, and February 15,

2018, with the participation of 248 inpatients who volunteered to participate and could communicate with us.

2.2. Population and sample of the research

In this study, patients were determined using simple random sampling, one of the probability sampling methods by which individuals can be selected from the universe with equal probability. Based on the previous research on the diabetic patients, the sample size was calculated with a 95% confidence limit and 90% power and 0.05 error margin in the Number Cruncher Statistical System-Power Analysis and Sample Size programme, and the minimum number of patients to be included in the study was calculated as 234. Considering that there might be data loss, 248 patients were reached, and the data collection process was completed. The inclusion criteria were as follows: being able to communicate, not having any illness or mental disability that prevents the patient from answering the questions, being 18 and above and volunteering to participate in the study. Patients who refused to participate in the study (*n*: 6) were excluded from the study. In conclusion, the study was completed with the participation of 248 patients. The response rate of questionnaires is 97.6%.

2.3. Data collection tools

Data were collected using the Personal Information Form and the 'Diabetes Management Self-Efficacy Scale' developed for patients with type 2 diabetes. The Personal Information Form consists of 28 questions to determine the socio-demographic and clinical characteristics of the patients. The questionnaire was tested with a group of 10 people, who were not included in the sample of the study. The data were collected by the researchers after the patients included in the study were informed and written informed consent was obtained from them.

2.3.1. Diabetes management self-efficacy scale for patients with type 2 diabetes

'Diabetes Management Self-Efficacy Scale' was developed by Van Der Bijl, Poelgeest-Eeltink & Shortridge-Baggett (1999) to determine the self-efficacy of patients with type 2 diabetes to perform self-care activities related to diabetes management. The original 5-point Likert type scale consists of 20 items and 4 sub-dimensions. The Cronbach alpha value of the scale was 0.81, and the variance was found to be 55% (Van Der Bijl et al., 1999). The validity and reliability of the Turkish Version of the scale were performed by Kara, Van Der Bijl, Shortridge-Baggett, Asti & Ergunay (2006). The items of the scale are rated with 5-point Likert type scoring (5 = Yes, I'm sure; 4 = Yes; 3 = Neither yes nor no; 2 = No; 1 = No, I'm not sure). The validity and reliability study of the Turkish Version calculated Cronbach's alpha reliability coefficient as 0.89 and reported that the scale was composed of a three-factor structure. These factors are diet + feet check (1–9, 11, 13 and 14), medical therapy (10, 12 and 18–20) and physical activity (15–17). In this study, the Cronbach alpha reliability coefficient of the scale was found to be 0.95. Cronbach's alpha reliability coefficients of the diet + feet check, medical therapy and physical activity sub-dimensions were determined as 0.95, 0.78 and 0.93, respectively. The lowest score that can be obtained from the scale is 20, and the highest score is 100 (Kara et al. 2006; Van Der Bijl et al., 1999). The mean score obtained from the scale indicates that individuals have low/medium/high self-efficacy. Higher scores indicate higher self-efficacy (Van Der Bijl et al., 1999).

2.4. Data collection

The data collection took approximately 10–15 minutes. The patients were told that it was entirely up to them whether or not to participate in the research, that their names would not be written on the questionnaire forms, and that the data to be collected from this study would be used only within the scope of the research. To collect the data, written permission was obtained from the management of the hospital where the study was conducted.

2.5. Data analysis

The statistical analysis of the data about the self-efficacy levels of diabetic patients was performed by the SPSS 21 package program. The data have been presented as frequency, percentage, mean-standard deviation and median. To determine the relationship between the total scores and socio-demographic and clinical characteristics of patients, for the groups with a normal distribution, the *t*-test was performed for independent groups, one-way analysis of variance (ANOVA) was performed in case of three or more groups and Tukey test was performed in multiple comparisons. For the analysis of the data not normally distributed, Mann–Whitney *U* test was used, and in case of three or more groups, the Kruskal–Wallis test was used. Spearman Correlation was used to examine the relationship between scale and its sub-dimensions. The significance level was taken as $p < 0.05$.

3. Results

Of the patients included in the study, 60.1% were female, 39.9% were male, 40.3% were secondary school graduates, 81.1% were married, 57.7% had income equal to their expenditures, 78.2% had a nuclear family, 94.4% had social security and 45.6% lived in districts. Also, 77% of the patients had a chronic illness other than the present illness, 57.3% had family member with diabetes, 48.4% reported their health status as 'moderate', 34.3% had their blood sugar checked every 3 months, 49.2% used oral antidiabetic, 33.5% used insulin, 15.7% used both oral antidiabetic and insulin, 91.1% used their medication regularly and 64.9% did not have any diabetes-related health problems. In addition, 72.2% of the patients received diabetes education, 54.8% stated that this education was sufficient, 83.5% did not smoke, 93.5% did not use alcohol and 79.8% did not exercise regularly. The mean age of the patients was 62.01 ± 13.32 (Table 1).

Table 1. Distribution of socio-demographic and clinical characteristics of diabetic individuals (*n* = 248)

Characteristics		*n*	%
Age groups	20–29 years	5	2.0
62.01±13.32	30–39 years	13	5.3
	40–49 years	26	10.5
	50–59 years	61	24.6
	60–69 years	77	31.0
	70–79 years	52	21.0
	80–89 years	14	5.6
Sex	Female	149	60.1
	Male	99	39.9
Educational level	Literate	38	15.3
	Primary school	24	9.7
	Secondary school	100	40.3
	High school	34	13.7
	University	52	21.0
Marital status	Married	201	81.1
	Single	47	18.9
Socio-economic status	Income less than expenditures	43	17.3
	Income equal to expenditures	143	57.7
	Income more than expenditures	62	25.0
Family type	Extended family	54	21.8
	Nuclear family	194	78.2
Social security	Yes	234	94.4
	No	14	5.6
Place of residence for the longest period	City centre	96	38.7
	District	113	45.6

	Village	39	15.7
Presence of family members with diabetes	Yes	142	57.3
	No	106	42.7
Presence of other illnesses	Yes	191	77.0
	No	57	23.0
Self-perceived health	Good	106	42.7
	Medium	120	48.4
	Bad	22	8.9
The frequency of monitoring diabetes	Never	73	29.4
	Every 3 months	85	34.3
	Every 6 months	58	23.4
	Once a year	32	12.9
	Oral antidiabetic	122	49.2
	Insulin	83	33.5
	Insulin + Oral Antidiabetic	39	15.7
Medication used in the treatment of diabetes	None	4	1.6
Regular use of medicine	Yes	226	91.1
	No	22	8.9
Presence of diabetes-related health problems	Yes	87	35.1
	No	161	64.9
Diabetes education	Yes	179	72.2
	No	69	27.8
If your answer is yes, was the education you received sufficient	Yes	136	54.8
	No	48	19.4
	Not marked	64	25.8
Smoking	Yes	41	16.5
	No	207	83.5
Alcohol use	Yes	16	6.5
	No	232	93.5
Regular exercise	Yes	50	20.2
	No	198	79.8

According to the answers given to the Diabetes Management Self-Efficacy Scale, the patients obtained the highest score from the 'I am able to visit my doctor once a year to monitor my diabetes' item (4.32 $\pm$ 0.89), whereas they obtained the lowest score from the 'I am able to take enough exercise, for example, walking with the dog or riding a bicycle' item (2.80 $\pm$ 1.21) (Table 2).

Table 2. Distribution of the responses of the diabetic individuals to the Diabetes Management Self-Efficacy Scale

Scale items	Mean ± S.D	Median Min–Max
I am able to follow a healthy eating pattern when I am away from home	3.41 ± 1.06	4 ± (1–5)
I am able to adjust my eating plan when I am away from home	3.38 ± 1.06	4 ± (1–5)
I am able to follow a healthy eating pattern when I am on holiday	3.29 ± 1.11	3 ± (1–5)
I am able to follow a healthy eating pattern when I am eating out or at a party	3.23 ± 1.13	3 ± (1–5)
I am able to keep my weight under control	3.41 ± 1.07	4 ± (1–5)
I am able to choose different foods and stick to a healthy eating pattern	3.44 ± 1.06	4 ± (1–5)
I am able to follow a healthy eating pattern most of the time	3.50 ± 1.08	4 ± (1–5)

I am able to adjust my eating plan when ill	3.17 ± 1.12	3 ± (1–5)
I am able to examine my feet for cuts	3.94 ± 1.05	4 ± (1–5)
I am able to visit my doctor once a year to monitor my diabetes	4.32 ± 0.89	5 ± (1–5)
I am able to choose the correct food	3.62 ± 1.01	4 ± (1–5)
I am able to take my medication as prescribed	4.29 ± 0.84	4 ± (1–5)
I am able to adjust my eating plan when I am feeling stressed or anxious	3.04 ± 1.08	3 ± (1–5)
I am able to adjust my medication when I am ill	3.30 ± 1.22	4 ± (1–5)
I am able to take more exercise if the doctor advises me to do so	2.97 ± 1.26	3 ± (1–5)
When taking more exercise I am able to adjust my eating plan	2.89 ± 1.19	3 ± (1–5)
I am able to take enough exercise. For example, walking with the dog or riding a bicycle	2.80 ± 1.21	3 ± (1–5)
I am able to correct my blood sugar when the sugar level is too high	3.13 ± 1.13	3 ± (1–5)
I am able to correct my blood sugar when the blood sugar is too low	3.31 ± 1.12	4 ± (1–5)
I am able to check my blood sugar if necessary	3.49 ± 1.48	4 ± (1–5)

SD: Standard Deviation, Min: Minimum, Max: Maximum.

The median of the total scores of the Diabetes Management Self-Efficacy Scale was 70.00 (21–100). It was found that the scores that the patients obtained from the Diabetes Management Self-Efficacy Scale differed according to educational level (p = 0.01, F = 5.186), social security (p = 0.002, t = 3.197), place of residence for the longest period (p = 0.035, F = 3.411), frequency of monitoring diabetes (p = 0.000, $X2$ = 18.029), regular use of medication (p = 0.000, U = 1,043.500), diabetes education (p = 0.000, U = 3,827.500) and regular exercise (p = 0.000, t = 6.244) (p < 0.05) (Table 3).

Table 3. Comparison of socio-demographic and clinical characteristics of diabetic individuals and total scores of the Diabetes Management Self-Efficacy Scale

Characteristics		**Median± (Min–Max) Mean ± SD**	**Test value**
***Age groups	20–29 years	78.20 ± 12.50	
62.01 ± 13.32	30–39 years	78.00 ± 10.76	p =0.05
	40–49 years	70.00 ± 17.15	F = 2.756
	50–59 years	69.73 ± 15.40	
	60–69 years	69.28 ± 15.33	
	70–79 years	62.64 ± 17.48	
	80–89 years	62.78 ± 12.41	
****Sex	Female	68.34 ± 15.85	p =0.70
	Male	67.55 ± 16.03	t = 0.386
***Educational level	Literate	58.82 ± 11.04[a]	
	Primary school	66.71 ± 17.24 [ab]	
	Secondary school	68.93 ± 16.78[b]	p = 0.01
	High school	68.82 ± 15.39[b]	F = 5.186
	University	73.37 ± 14.37[b]	
****Marital status	Married	68.46 ± 15.25	p = 0.510
	Single	66.52 ± 18.48	t = 0.662
*** Socioeconomic status	Income less than expenditures	63.72 ± 20.82	p = 0.087
	Income equal to expenditures	68.17 ± 14.50	F = 2.465

	Income more than expenditures	70.66 ± 14.66	
** Family type	Extended	63 ± (32–100)	p = 0.313
	Nuclear	70 ± (21–100)	U = 4,742.500
****Social security	Yes	68.80 ± 15.63	p = 0.002
	No	55.07 ± 15.24	t = 3.197
***Place of residence for the longest period	City centre	70.13 ± 15.78 [a]	
	District	68.20 ± 15.99 [ab]	p = 0.035
	Village	62.33 ± 14.90 [b]	F = 3.411
**Presence of family members with diabetes	Yes	71 ± (21–100)	p = 0.581
	No	65 ± (32–100)	U = 959.000
**Presence of other illnesses	Yes	68 ± (21–100)	p = 0.233
	No	74 ± (34–100)	U = 4876.500
***Self-perceived health	Good	70.67 ± 17.56	p = 0.066
	Medium	66.38 ± 13.65	F = 2.741
	Bad	64.41 ± 17.56	
* The frequency of monitoring diabetes	Never	67 ± (36–100)[ab]	
	Every 3 months	74 ± (32–100)[a]	p = 0.000
	Every 6 months	70 ± (21–100)[a]	X^2 = 18.029
	Once a year	59 ± (34–80)[b]	
*** Medication used in the treatment of diabetes	Oral Antidiabetic	66.07 ± 15.44	
	Insulin	70.31 ± 16.74	p = 0.095
	Insulin + Antidiabetic	70.38 ± 15.24	F = 2.144
	None	57.00 ± 7.79	
**Regular use of medication	Yes	70 ± (21–100)	p = 0.000
	No	56 ± (34–88)	U = 1,043.500
**** Presence of diabetes-related health problems	Yes	67.10 ± 16.46	p = 0.495
	No	68.56 ± 15.65	t = −0.684
**Diabetes education	Yes	71 ± (21–100)	p = 0.000
	No	60 ± (32–100)	U = 3,827.500
****Smoking	Yes	63.93 ± 14.42	p = 0.071
	No	68.84 ± 16.08	t = −1.815
****Alcohol use	Yes	60.56 ± 18.59	p = 0.052
	No	68.56 ± 18.59	t = −1.952
**** Regular exercise	Yes	79.70 ± 13.57	p = 0.000
	No	65.08 ± 15.09	t = 6.244

SD: Standard Deviation, Min: Minimum, Max: Maximum.

* Kruskal–Wallis Test, ** Mann–Whitney *U* Test, *** One-Way ANOVA, **** Independent Sample *T* test.
a-b-c: There is no difference between the groups with the same letter.

The mean score of the diet+feet check sub-dimension was 40.73 ± 10.38, the mean score of the medical therapy sub-dimension was 18.54 ± 4.08 and the mean score of the physical activity sub-dimension was 8.75 ± 3.44. It was found that the scores the patients obtained from the diet+feet check sub-dimension differed according to educational level (p = 0.012, $X2$ = 12.831), frequency of monitoring diabetes (p = 0.001, $X2$ = 15.990), regular use of medication (p = 0.000, U = 1,364.500), diabetes education (p = 0.000, U = 4,200.500) and regular exercise (p = 0.000, U = 2,735.500) (p < 0.05) (Table 4).

Table 4. Comparison of socio-demographic and clinical characteristics of diabetic individuals and total scores of the diet-feet sub-dimension of the Diabetes Management Self-Efficacy Scale

Socio-demographic characteristics of the patients		Median ± (Min–Max) Mean ± SD	Test value
*Age groups	20–29 years	48 ± (32–57)	p = 0.05
62.01±13.32	30–39 years	47 ± (35–57)	X^2 = 13.239
	40–49 years	42 ± (19–60)	
	50–59 years	43 ± (18–60)	
	60–69 years	43 ± (13–60)	
	70–79 years	36 ± (16–60)	
	80–89 years	40 ± (24–50)	
**Sex	Female	42 ± (16–60)	p = 0.175
	Male	42 ± (13–60)	U = 6,625.000
*Educational level	Literate	37 ± (16–52) [a]	p = 0.012
	Primary school	44 ± (16–59) [ab]	X^2 = 12.831
	Secondary school	41 ± (13–60) [ab]	
	High school	43 ± (22–60) [ab]	
	University	46 ± (18–60) [b]	
**Marital status	Married	42 ± (13–60)	p = 0.769
	Single	42 ± (16–60)	U = 4,494.500
*Socioeconomic Status	Income less than expenditures	40 ± (13–60)	p = 0.598 X^2 = 1.027
	Income equal to expenditures	42 ± (16–60)	
	Income more than expenditures	43 ± (18–60)	
**Family type	Extended	42 ± (16–60)	p = 0.906
	Nuclear	42 ± (13–60)	U = 5,156.500
**Social security	Yes	42 ± (13–60)	p = 0.054
	No	38 ± (22–48)	U = 1,136.000
* Place of residence for the longest period	City centre	42 ± (18–60)	p = 0.088
	District	43 ± (13–60)	X^2 = 4.853
	Village	38 ± (16–52)	
** Presence of family members with diabetes	Yes	43 ± (13–60)	p = 0.164
	No	41 ± (16–60)	U = 6,749.000
**Presence of other Illnesses	Yes	42 ± (13–60)	p = 0.201
	No	44 ± (18–60)	U = 4,836.000
*Self-perceived health	Good	43 ± (13–60)	p = 0.224
	Medium	41 ± (16–60)	X^2 = 2.989
	Bad	40 ± (19–60)	
* The frequency of monitoring diabetes	Never	40 ± (24–60) [b]	p = 0.001
	Every three months	45 ± (16–60) [cb]	X^2 = 15.990
	Every six months	42 ± (13–60)[b]	
	Once a year	33 ± (16–48)[a]	
*** Medication used in the treatment of diabetes	Oral Antidiabetic	39.58 ± 9.91	p = 0.184
	Insulin	42.06 ± 11.36	F = 1.625
	Insulin + Antidiabetic	42.08 ± 9.67	
	None	34.75 ± 4.57	

**Regular use of medication	Yes	43 ± (13–60)	p = 0.000
	No	32 ± (18–52)	U = 1,364.500
**Presence of diabetes-related health problems	Yes	40 ± (13–60)	p = 0.210
	No	43 ± (18–60)	U = 6,288.500
**Diabetes Education	Yes	43 ± (13–60)	p = 0.000
	No	37 ± (16–60)	U = 4,200.500
**Smoking	Yes	41 ± (18–60)	p = 0.070
	No	43 ± (13–60)	U = 3,484.500
**Alcohol use	Yes	35 ± (18–60)	p = 0.074
	No	43 ± (13–60)	U = 1,361.000
**Regular exercise	Yes	47 ± (18–60)	p = 0.000
	No	40 ± (13–60)	U = 2,735.500

SD: Standard Deviation, **Min:** Minimum, **Max:** Maximum * Kruskal–Wallis Test, ** Mann–Whitney *U* Test, *** One-Way ANOVA, **** Independent Sample T test, a-b-c: There is no difference between the groups with the same letter.

Also, the scores the patients obtained from the medical therapy sub-dimension differed according to educational level (p = 0.000, $X2$ = 32.761), socio-economic status (p = 0.007, $X2$ = 10.019), social security (p = 0.000, U = 664.000), place of residence for the longest period (p = 0.029, $X2$ = 7.071), presence of family members with diabetes (p = 0.000, U = 5335.500), frequency of monitoring diabetes (p = 0.001, $X2$ = 17.203), regular use of medication (p = 0.000, U = 1,042.000), diabetes education (p = 0.000, U = 3,531.000), alcohol use (p = 0.034, U = 1,268.500) and regular exercise (p = 0.000, U = 2,948.000) (p < 0.05) (Table 5).

Table 5. Comparison of socio-demographic and clinical characteristics of diabetic individuals and total scores of the medical therapy sub-dimension of the Diabetes Management Self-Efficacy Scale

Characteristics		Median± (Min–max)	Test value
*Age groups	20–29 years	20 ± (20–25)	p = 0.05
62.01±13.32	30–39 years	21 ± (18–23)	X^2 = 16.750
	40–49 years	20 ± (13–25)	
	50–59 years	20 ± (6–25)	
	60–69 years	19 ± (5–25)	
	70–79 years	17 ± (9–25)	
	80–89 years	17 ± (10–23)	
**Sex	Female	18 ± (9–25)	p =0.167
	Male	20 ± (5–25)	U = 6,613.000
*Educational level	Literate	15 ± (10–23)[a]	p = 0.000
	Primary school	19 ± (13–25)[b]	X^2 = 32.761
	Secondary school	20 ± (5–25)[b]	
	High school	20 ± (6–25)[b]	
	University	20 ± (8–25)[b]	
**Marital status	Married	19 ± (5–25)	p = 0.461
	Single	18 ± (6–25)	U = 4,302.000
*Socio-economic status	Income less than expenditures	17 ± (5–25) [a]	p = 0.007
	Income equal to expenditures	19 ± (9–25)[a]	X^2 = 10.019
	Income more than	20 ± (8–25) [b]	

	expenditures		
** Family type	Extended	17 ± (9–25)	p = 0.058
	Nuclear	19 ± (5–25)	U = 4,334.000
**Social security	Yes	19 ± (5–25)	p = 0.000
	No	15 ± (9–20)	U = 6,64.000
*Place of residence for the longest period	City centre	20 ± (6–25)[a]	p = 0.029
	District	19 ± (5–25) [ab]	X^2 = 7.071
	Village	17 ± (9–23)[b]	
**Presence of family members with diabetes	Yes	20 ± (5–25)	p = 0.000
	No	17 ± (6–25)	U = 5,335.500
**Presence of other illnesses	Yes	19 ± (5–25)	p = 0.476
	No	20 ± (6–25)	U = 5,106.000
*Self-perceived health	Good	19 ± (5–25)	p = 0.140
	Medium	19 ± (6–25)	X^2 = 3.927
	Bad	18 ± (11–25)	
* The frequency of monitoring diabetes	Never	18 ± (6–25) [ac]	p = 0.001
	Every three months	20 ± (8–25) [b]	X^2 = 17.203
	Every six months	20 ± (5–25) [bc]	
	Once a year	17 ± (9–25) [a]	
*Medication used in the treatment of diabetes	Oral Antidiabetic	18 ± (6–25)	p = 0.040
	Insulin	20 ± (5–25)	X^2 = 8.287
	Insulin + Antidiabetic	19 ± (9–25)	
	None	17 ± (14–18)	
**Regular use of medication	Yes	19 ± (5–25)	p = 0.000
	No	14 ± (6–22)	U = 1,042.000
**Presence of diabetes-related health problems	Yes	19 ± (5–25)	p = 0.452
	No	19 ± (6–25)	U = 6,558.000
**Diabetes education	Yes	20 ± (5–25)	p = 0.000
	No	16 ± (6–25)	U = 3,531.000
**Smoking	Yes	19 ± (9–25)	p = 0.10
	No	19 ± (5–25)	U = 3,555.000
**Alcohol Use	Yes	17 ± (8–25)	p = 0.034
	No	19 ± (5–25)	U = 1,268.500
**Regular exercise	Yes	22 ± (8–25)	p = 0.000
	No	18 ± (5–25)	U = 2,948.000

Min: Minimum, Max: Maximum *Kruskal–Wallis Test, ** Mann–Whitney i Test, a-b-c: There is no difference between the groups with the same letter.

Finally, the scores the patients obtained from the physical activity sub-dimension differed according to educational level (p = 0.000, $X2$ = 25.528), socio-economic status (p = 0.010, $X2$ = 9.285), family type (p = 0.014, U = 4,078.500), social security (p = 0.002, U = 818.500), self-perceived health (p=0.001, $X2$ = 14.490), regular use of medication (p = 0.000, U = 1,163.000), diabetes education (p = 0.001, U = 4,495.000) and regular exercise (p = 0.000, U = 1,490.000) (p < 0.05) (Table 6).

Table 6. Comparison of socio-demographic and clinical characteristics of the diabetic individuals and total scores of the physical exercise sub-dimension of the Diabetes Management Self-Efficacy Scale

Characteristics		Median ± (Min–max)	Test value
*Age groups	20-29 years	12 ± (7–12)	p = 0.05
62.01 ± 13.32	30-39 years	12 ± (7–13)	X^2 = 17.612
	40–49 years	9 ± (3–15)	
	50-59 years	10 ± (3–15)	
	60-69 years	8 ± (3–15)	
	70-79 years	7 ± (3–15)	
	80-89 years	7 ± (3–12)	
**Sex	Female	8 ± (3–15)	p = 0.091
	Male	9 ± (3–15)	U = 6,449.000
*Educational level	Literate	6 ± (3–12)[a]	p = 0.000
	Primary school	7 ± (3–15)[ab]	X^2 = 25.528
	Secondary school	9 ± (3–15)[b]	
	High school	9 ± (3–15)[b]	
	University	11 ± (3–15)[b]	
**Marital status	Married	9 ± (3–15)	p = 0.530
	Single	7 ± (3–15)	U = 4,351.000
*Socio-economic status	Income less than expenditures	6 ± (3–15)[a]	p = 0.010
			X^2 = 9.285
	Income equal to expenditures	9 ± (3–15)[b]	
	Income more than expenditures	9 ± (3–15)[b]	
** Family type	Extended	7 ± (3–15)	p = 0.014
	Nuclear	9 ± (3–15)	U = 4,078.500
*Social security	Yes	9 ± (3–15)	p = 0.002
	No	6 ± (3–12)	U = 818.500
*Place of residence for the longest period	City centre	9 ± (3–15)	p = 0.656
	District	9 ± (3–15)	X^2 = 0.843
	Village	8 ± (3–15)	
**Presence of family members with diabetes	Yes	9 ± (3–15)	p = 0.094
	No	7 ± (3–15)	U = 6,597.500
**Presence of other illnesses	Yes	9 ± (3–15)	p = 0.572
	No	9 ± (3–15)	U = 5,177.000
*Self-perceived health	Good	10 ± (3–15) [a]	p = 0.001
	Medium	8 ± (3–15)[b]	X^2 = 14.490
	Bad	6 ± (3–15)[b]	
* The frequency of monitoring diabetes	Never	9 ± (3–15)	p = 0.138
	Every three months	9 ± (3–15)	X^2 = 5.519
	Every six months	9 ± (3–15)	
	Once a year	8 ± (3–12)	
*Medication used in the treatment of diabetes	Oral Antidiabetic	8 ± (3–15)	p = 0.199
	Insulin	9 ± (3–15)	X^2 = 4.656
	Insulin + Antidiabetic	10 ± (3–15)	

	None	6 ± (3–9)	
**Regular use of medication	Yes	9 ± (3–15)	p = 0.000
	No	6 ± (3–14)	U = 1,163.000
**Presence of diabetes-related health problems	Yes	8 ± (3–15)	p = 0.994
	No	9 ± (3–15)	U = 6,956.000
**Diabetes education	Yes	9 ± (3–15)	p = 0.001
	No	7 ± (3–15)	U = 4,495.000
**Smoking	Yes	7 ± (3–15)	p = 0.241
	No	9 ± (3–15)	U = 3,755.500
**Alcohol Use	Yes	7 ± (3–15)	p = 0.534
	No	9 ± (3–15)	U = 1,685.000
**Regular exercise	Yes	12 ± (6–15)	p = 0.000
	No	7 ± (3–15)	U = 1,490.000

Min: Minimum, Max: Maximum, *Kruskal–Wallis Test, ** Mann–Whitney *U* Test,
a-b-c: There is no difference between the groups with the same letter.

In addition, a high, positive, significant relationship was found between the total scores from the scale and diet ± feet check (p = 0.000, r = 0.946), medical therapy (p = 0.000, r = 0.810) and physical activity (p = 0.000, r = 0.744) sub-dimensions (Not tabulated).

4. Discussion

Knowing the self-efficacy levels in chronic illnesses will contribute to the ability of individuals to cope with the illness and compliance with the treatment and improve quality of life (Ceyhan & Unsal, 2018). In this section, the data about the factors affecting the self-efficacy levels of diabetic patients were discussed together with the findings of previous studies. In the present study, no statistically significant difference was found between age, sex, marital status and occupation and self-efficacy levels of the patients. 60.1% of the patients were female and no significant difference was found between self-efficacy levels and sex. Many studies have reported that diabetes is more prevalent in women (Onat, 2007; Satman et al., 2013). Even though many studies have reported findings that are consistent with those of the present study (Kilic, 2016; Ucakan et al., 2015; Yanik and Erol, 2016), some other studies have reported a higher level of self-efficacy in male patients (Cherrington, Wallston & Rothman, 2010; Van der Ven, Weinger, Yi, Pouwer & Van Der Ploeg, 2003).

In our study, it was found that as the educational level of individuals increased, the total scores of the Diabetes Management Self-Efficacy Scale increased. In addition, there was a statistically significant difference between the educational levels and the total scores of the Diabetes Management Self-Efficacy Scale and sub-dimensions. It was observed that as the level of education of people with diabetes increases, their diabetes management self-efficacy levels also increase. This finding is consistent with the studies in the literature (Lerman, 2005; Sharoni & Wu, 2012; Yanik & Erol, 2016). This may be attributed to the fact that individuals with good education are better at reaching information on health-related issues and understanding/applying diabetes education.

Since diabetes is a chronic health problem, diabetic individuals need to be involved in an active education process. Increasing knowledge and skill levels of individuals will facilitate the management of diabetes and will positively affect the quality of life of individuals. In our study, 72.2% of the participants received education about diabetes. When the scale and sub-dimension scores of the individuals who received diabetes education were compared, a significant relationship could be observed between them (p < 0.05). Many studies have been conducted on the relationship between diabetes and self-efficacy (Aydogar, 2018; Eren Arpaci, 2018; Eroglu, 2017). Sharoni and Wu (2012) reported that the level of self-efficacy is high in individuals with a high level of education and that they

have more confidence in checking their blood sugar. In a study to improve the self-efficacy levels of individuals with type 2 diabetes in Taiwan, Wu et al. (2013) reported that the groups that received training to increase self-efficacy besides standard diabetes education had higher levels of self-efficacy and obtained higher scores from the self-care behaviours scale. In an experimental study examining the exercise behaviours of diabetic individuals, it was observed that a regular training programme provided the intervention group with positive progress in the exercise change stages (Sekerci, 2016). This may be attributed to the fact that diabetes management education increases the self-confidence and thus perceived self-efficacy of individuals with regards to controlling the illness.

The answers to the questions related to diabetes in the study show that the majority of patients use their medication regularly (91.1%). There was a significant difference between the total scores that the participants who used their medication regularly obtained from the scale and the total scores they obtained from the sub-dimensions ($p < 0.05$). In a study with 345 patients with diabetes, Erol (2009) reported that individuals using insulin had higher levels of self-efficacy. Kilic (2016) reported that 88% of diabetic patients use their medication regularly and individuals who use their medication regularly obtain higher scores from the medical therapy sub-dimension. Considering that medical therapy is a step in diabetes management, patients with high levels of efficacy are expected to have a high level of compliance with medical therapy.

In this study, it was found that 20.2% of the individuals diagnosed with diabetes exercise regularly and that self-efficacy levels of the individuals who exercise regularly were higher than those who did not exercise regularly. Relevant studies, however, have reported a low level of regular physical activity among the patients with a chronic illness and diabetic individuals (Caliskan et al., 2007; Ceyhan and Unsal, 2018; Kilic, 2016; Yanik & Erol, 2016). Studies have also reported findings that reflect the positive effects of regular physical activity on diabetes management (ADA 2015; Sekerci, 2016). In a study with 200 patients with diabetes, Ucakan et al. (2015) reported high levels of diabetic diet and weight, blood sugar, general diet, medical treatment control, and self-esteem but low levels of physical activities. These results indicate that the importance of exercise in diabetes management is not sufficiently understood by individuals. The finding that individuals who exercise regularly have high levels of self-efficacy supports the finding that the individual is in harmony with diabetes treatment and care.

When smoking and alcohol use status of diabetic individuals in the present study were examined, it was seen that the self-efficacy levels of non-smokers and non-alcohol-users were higher. A significant relationship was found between the alcohol use status and the medical therapy sub-dimension of the Diabetes Management Self-Efficacy Scale. However, although non-smokers and non-alcohol-users had high scores from the scale, no statistically significant relationship was found between smoking and alcohol use and self-efficacy levels ($p > 0.05$). Diabetes studies conducted in our country reported the rate of smoking and alcohol use as 5%–29% among diabetic patients (Aydogar, 2018; Gedik, 2016; Yanik, 2011). This result reveals that the education programmes and public service ads on the harms of cigarettes and alcohol increase the awareness level of individuals.

In the present study, the mean total score of the Diabetes Management Self-Efficacy Scale was 70.00 (21–100). The mean score of the diet + feet check sub-dimension was 40.73 $\pm$ 10.38, and the mean score of the medical therapy sub-dimension was 18.54 $\pm$ 4.08 and the mean score of physical activity sub-dimension was 8.75 $\pm$ 3.44. In the study by Kilic (2016) conducted with 325 patients with diabetes, the participants obtained 39.4 ± 12.5 from the diet+feet check sub-dimension, 22.6 ± 3.1 from the medical sub-dimension and 9.0 ± 4.5 from the physical activity sub-dimension.

On the other hand, a study examining the relationship between self-efficacy levels and self-care activities of diabetic patients reported the mean total score of the scale as 60.9 ± 19.9, the mean score of blood sugar as 9.1 ± 4.5, the mean score of general diet and medical therapy as 29.9 ± 8.1, which were above the average, whereas the study reported the mean score of diabetic diet and weight as

13.4 ± 6.7 and the mean score of physical activity as 7.6 ± 3.9, which were below the average (Usluoglu & Gungormus, 2018).

It was found that the total scores of the patients from the Diabetes Management Self-Efficacy Scale differed according to the educational level, social security, place of residence for the longest period, the frequency of monitoring diabetes, regular use of medication, diabetes education and regular exercise variables. Consistent with the findings in the present study, some studies reported that the total scores of self-efficacy and variables such as occupation, the frequency of monitoring diabetes, socio-economic level and social security affected the total score (Calli, 2014; Taskaya, 2014). In the previous studies, diabetic individuals mostly stated their socio-economic levels as 'medium and poor' and had lower income levels. In this respect, in the present study, the self-efficacy levels of the individuals with high-income levels were found to be high. A good socioeconomic level is also associated with social security and a high level of education. These variables have a great effect on diabetes management and the management and maintenance of diet and medical therapy steps.

Regular health checks are an indication of the importance that people attach to their health. In the present study, 34.3% of the participants had a general health check every 3 months, whereas 29.4% stated that they never had a general health check. In this study, a statistically significant difference was found between the total scores of diabetic patients who regularly had general health checks and who did not ($p < 0.05$). No significant relationship was found between the total scores of the sub-dimensions of the scale. The differences in individuals' total scores from the scale among the groups may be related to the fact that the number of individuals who had a general health check every 3 months was close to the number of people who never had a general health check.

It was found that the median scores of the diet+feet check sub-dimension differed according to educational level, the frequency of monitoring diabetes, regular use of medication, diabetes education and regular exercise. When we look at the previous studies on this issue, we can see that some of the studies have reported a statistically significant difference in the mean diet+feet check scores of the groups created according to the age, perceived economic status and the number of family members (Kilic, 2016).

It was found that the median scores of the medical therapy sub-dimension differed according to educational level, socio-economic status, social security, place of residence for the longest period, the presence of family members with diabetes, the frequency of monitoring diabetes, regular use of medication, diabetes education, alcohol use and regular exercise. The participants who resided in 'city centres' for the longest period obtained higher scores from the medical therapy sub-dimension than those who resided in 'district and villages'. Some of the previous studies have also reported similar findings (Gedik, 2016). This can be explained by the insufficiency of health services and health facilities in rural areas and other variables such as poor educational background and low-income levels of the participants living in rural areas.

It was found that the median scores of the physical activity sub-dimension differed according to educational level, socio-economic status, family type, social security, self-perceived health, regular use of medication, diabetes education and regular exercise. Some of the previous studies have reported effects of variables such as age, marital status, educational level, occupation, economic situation and self-perceived health on the physical activity sub-dimension (Calli, 2014; Gedik, 2014; Kilic, 2016). In the present study, the participants who perceived their health as 'good' obtained higher scores from the physical activity sub-dimension. When we look at the relevant literature, some of the studies have reported that individuals diagnosed with diabetes have poorer health conditions and quality of life than those not diagnosed with diabetes (Anders, Olson, Wiebe, Bean, Digregorio & Guillermina, 2008; Koopmanschap, 2002; Yanik & Erol, 2016). Erol (2009) reported a positive relationship between the self-perceived health scores and self-efficacy levels. This result suggests that the individual's self-perceived health significantly affects the compliance with treatment and the maintenance of diabetes care.

5. Conclusion

Considering the patients' responses to the items of the Diabetes Management Self-Efficacy Scale, the patients obtained the highest score from the 'I am able to visit my doctor once a year to monitor my diabetes' item (4.32 $\pm$ 0.89), whereas they obtained the lowest score from the 'I am able to take enough exercise, for example, walking the dog or riding a bicycle' item (2.80 $\pm$ 1.21). The median score of the Diabetes Management Self-Efficacy Scale was 70.00 $\pm$ (21–100). Also, it was found that the total scores of the Diabetes Management Self-Efficacy Scale differed according to educational level, social security, place of residence for the longest period, the frequency of monitoring diabetes, regular use of medication, diabetes education and regular exercise. Besides, a high, positive, significant relationship was found between the total scores of the scale and its sub-dimensions.

We can say that the Diabetes Self-Efficacy Scale scores of the patients were above the middle level. It is vital that nurses consider the personal and diabetes-related characteristics of diabetic individuals for whom they offer health care to determine the factors affecting their self-efficacy levels. We recommend planning of training programmes to ensure that diabetic patients cope with diabetes and to increase their self-care and self-efficacy levels in diabetes management.

6. Limitations of the research

The present study has a limited sample since it was conducted with the inpatients with type 2 diabetes in a university hospital between July 20, 2017, and February 15, 2018. Therefore, we cannot generalise the results to the population. We recommend that subsequent studies utilise qualitative research methods when collecting data, conduct focus group interviews with patients and determine/assess the methods they use in diabetes management and the factors that affect these methods.

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