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Research Article

Health Beliefs, Self-Care Behaviors and Quality of Life in Adults with Type 2 Diabetes

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ABSTRACT

Aim: Diabetes mellitus is a lifelong metabolic disease accompanied by acute and chronic complications and requires continuous medical care. The aim of this study is to investigate the effect of the diabetes self-management educational intervention given to individuals with type 2 diabetes on their health beliefs, self-care activities, and quality of life.

Method: A single group randomized quasi-experimental study with the pre- and post-intervention design was conducted in two family health centers (n=60). The self-care activities, health beliefs, and quality of life of patients with type 2 diabetes were investigated.

Results: The mean pre- and post-intervention blood glucose subscale scores were 1.57±0.91 and 3.22±1.06, respectively. The mean pre- and post-intervention social/vocational issues subscale scores were 29.26±5.54 and 33.26±3.19, respectively. The mean scores of the quality of life increased in the primary school graduates and in those who previously had no diabetes intervention after the intervention program. It was determined that the mean body mass index values of the participants decreased after the intervention.

Conclusion: It is recommended to organize and implement periodic diabetes self-management educational intervention programs in family health centers and in centers providing diabetes health care to improve health beliefs and to increase self-care activities and quality of life in individuals with diabetes.

Keywords: Diabetes mellitus, education, health belief, nursing, quality of life, self-management

INTRODUCTION

Diabetes, the sixth leading cause of death in many countries, is regarded as one of the most common non-communicable diseases worldwide. The prevalence of diabetes in Europe is currently at 8.5% and is expected to rise to 10% (from 55 million to 66 million) by 2025 (TDV, 2020). The proportion of diabetic individuals over 20 years of age in Turkey was found to be 12% and 13.7%, respectively, in some studies (CREDIT, 2010 ; Satman & TURDEP II Study Group, 2010). The TURDEP II study results show that the incidence of diabetes in the adult population over 20 years of age was 90% higher than that in the TURDEP-I over the past 12 years (Satman & TURDEP II Study Group, 2010).

Chronic complications of diabetes are secondary conditions that occur in the late stages of diabetes and can cause serious problems. In this regard, diabetes poses a risk for many conditions including coronary artery disease, stroke, peripheral vascular diseases, blindness, kidney diseases, foot injuries, and lower extremity amputations (American Diabetes Association, 2014). The risks and complications comorbid with diabetes impose not only an economic burden to the individuals but also a social burden to the society and a serious economic burden to the national economy. In industrialized countries, 25% of these costs are spent on treatments aiming to lower high blood glucose levels, 25% on long-term complications (especially cardiovascular diseases), and 50% on general medical treatments (TDV, 2020).

The Health Belief Model (HBM), which is often used in patients with diabetes, provides information about patients' health beliefs, health behaviors, and perceptions of health and disease. This model provides information on diabetes management, the level of compliance with treatment, possible causes affecting compliance, and behaviors displayed (Dehghani-Tafti, Mazloomy-Mahmoodabad, Morowatisharifabad, Afkhami-Ardakani, Rezaeipandari, & Lotfi, 2015; Sol-

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hi, Gharibnavaz, Jalilian, & Motlagh, 2014). If a patient with diabetes is to successfully carry out daily diabetes management, it is imperative that he/she have sufficient knowledge and skills about diabetes and display positive attitudes. Helping these people gain the necessary knowledge, skills, and attitudes can be achieved through diabetes self-management educational (DSME) intervention. It has been reported that DSME intervention carried out on diabetes positively affects an individual's health belief levels, enhances their diabetes-related knowledge, allows them to acquire positive health behaviors, and enables them to ensure better metabolic control. It is important that health professionals should participate in the self-care and diabetes management educational intervention process as facilitators, motivators, educators, and consultants (Dehghani-Tafti et al., 2015; Solhi et al., 2014; TDV, 2020;). Thus, gaining positive health behaviors can encourage patients with diabetes to perform self-management of diabetes, reduce hospital admissions due to acute complications, prevent or reduce complications, and improve quality of life in the long term.

The purpose of the DSME intervention is to enable diabetic individuals to understand the nature and course of their illnesses, to help them identify future medical problems in their early, reversible stages, to encourage them to take part in the management of their treatment practices, to carry out self-care practices, and to make necessary changes in their lifestyles (TDV, 2020). The purpose of this study was to investigate the effect of the DSME intervention given to individuals with type 2 diabetes (T2D) on their health beliefs, self-care activities, and quality of life.

Research Question

1. What are the effects of DSME intervention on T2D individuals on health beliefs, self-care behaviors, and quality of life?

METHOD

Study Design

A single group (pre-post intervention) randomized quasi-experimental study.

Sample

The present study was conducted in two family health centers in a district of Izmir, a province located in the western part of Turkey, between January 2015 and July 2016. The environments the centers were in had similar socioeconomic conditions. The study population included individuals aged between 18 and 75 years who were registered in the aforementioned family health centers, were diagnosed with T2D at least six months ago, were literate, volunteered to participate in the study, and had no speech, hearing, communication, or psychiatric problems. Individuals with at least one chronic complication and/or gestational diabetes were not included in the study. A list of diabetic individuals was obtained from the records of the two-family health centers. The individuals to be included in the study sample were selected using the simple random sampling method, one of the probability sampling methods. In the power analysis, the minimum sample size required to conduct the study was calculated as 54 at the power of 95%, confidence interval level of 95%, margin of error of 5%, and effect size of 0.50. Considering that there might be data losses, 60 individuals were registered in the study. Of these, 12 who gave incomplete or inaccurate information or quit the intervention during the data collection phase were excluded from the study.

Data Collection

The steps followed in the study are given in Figure 1. Data collection and intervention were carried out in the home environment of the participants. During the first visit, after those who agreed to participate in the study were informed of the study, the Sociodemographic Characteristics Questionnaire, Health Belief Model in Patients with Diabetes (HBMPD) Scale, and Diabetes Quality of Life (DQOL) Questionnaire were filled in. During the first diagnosis, the participants' blood pressure levels, blood glucose levels, heights and weights, and waist-hip circumferences were measured. In line with the data obtained, interventions were conducted (45-60 minutes). After the first visit, the participants were given education once a week for three weeks. In the first month after the intervention, they were visited again, and the measurements were repeated. Intervention was repeated in case a participant needed it, and they were provided with counseling.

Sociodemographic Characteristics Questionnaire: This questionnaire that gathers the sociodemographic characteristics of the participants was developed by the researchers (Akpunar, 2012; Karaboğa, 2012; Yılmaz, 2011) on the basis of the pertinent literature. During the first visit/diagnosis and the

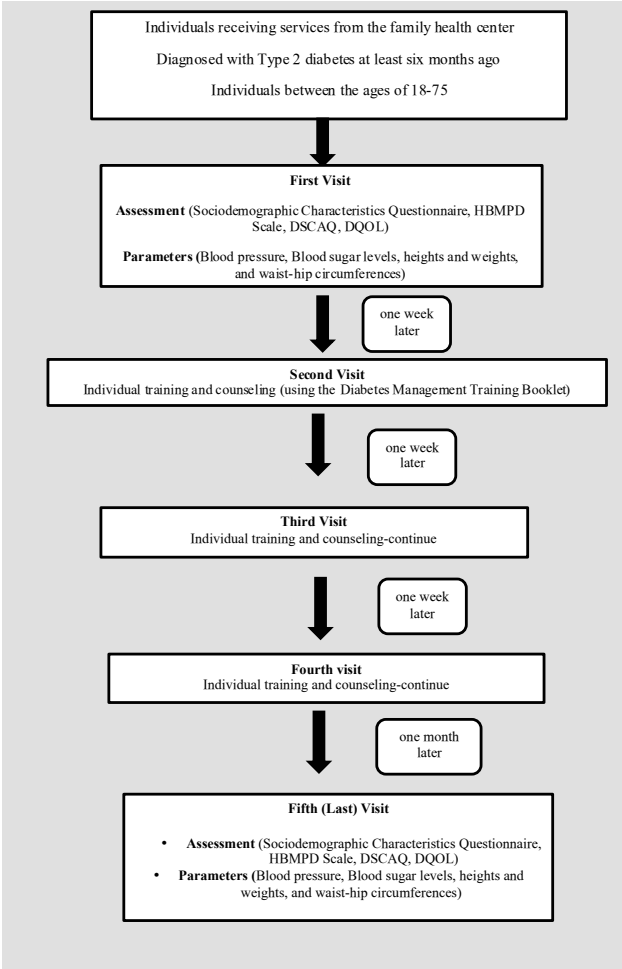

Figure 1. Research process

last visit, the participants' fasting blood glucose levels, blood pressure levels, heights and weights, and waist-hip circumferences were measured.

Health Belief Model in Patients with Diabetes (HBMPD) Scale: This scale is used to assess diabetes patients' health beliefs and attitudes toward diabetes and to examine their health behaviors. The scale consists of 33 items and five sub-dimensions. Whereas a score of ≥4 indicates a positive health belief, a score of ≤3 indicates a negative health belief (Akpunar, 2012; Kartal & Özsoy, 2007; Schwab, Meyer, & Merrell, 1994; Tan, 2004)

Diabetes Self-Care Activities Questionnaire (DSCAQ): This questionnaire has questions about how many times the patient performed the self-care activities listed under the headings of diet, exercise, blood glucose test, foot care, and cigarettes during the last seven days (days/week). Higher scores obtained in an item indicate that the patient performs the pertinent self-care activity more (Coşansu & Erdoğan, 2010; Toobert, Hampson, & Glasgow, 2000).

Diabetes Quality of Life (DQOL) Questionnaire: This questionnaire consists of four parts: 1) satisfaction with treatment, 2) psychological impact of the treatment, 3) worry about the future effects of diabetes, and 4) worry about social/vocational issues. The questionnaire has no cut-off point. The higher the score, the better the quality of life (Yıldırım, Akinci, Gozu, Sargin, Orbay, & Sargin, 2007).

Diabetes Self-Management Booklet: A study booklet to be used in the intervention was prepared by the researchers in accordance with the relevant literature. The opinions of six clinicians and academicians expert in the field of diabetes were consulted for the booklet preparation. The booklet revised in line with the suggestions by the six experts was used in the education.

Data Analysis

The data were analyzed using the SPSS PASW (Predictive Analytics Software Statistics) 20.0.

In statistical analysis, descriptive statistics such as numbers, percentages, and arithmetic mean were used. In the analysis of the nominal data, non-parametric tests were used, whereas in the analysis of the quantitative data, parametric tests (dependent t-tests) were used. Blood glucose measurement values between 80 and 110 were considered as "good," between 111 and 140 as "borderline," and higher than 140 as "bad" (Akpunar, 2012). Blood pressure values and body mass index were assessed according to the World Health Organization classification (Öksüz, 2004). p values <0.05 (95% confidence interval) were considered statistically significant.

Ethical Considerations

To conduct the study, permissions were obtained from the İzmir Katip Celebi University Ethical Committee (dated and numbered: 18/12/2014; 272) and the Provincial Public Health Directorate. Before the measurements, the participants were informed about the process to be carried out and then their verbal consent was received. They were told that participation was voluntary.

RESULTS

The participants' sociodemographic and health characteristics are given in Table 1. According to the

Table 1. Sociodemographic and health characteristics (n=60)

Sociodemographic Characteristics	n	%
Age[a]	55.22±7.21	
Gender		
Female	39	65.0
Male	21	35.0
Education Level		
Primary school graduates	48	80.0
High school	12	20.0
Marital Status		
Married	52	86.7
Single/widower	8	13.3
Working Status		
Employed	16	26.7
Unemployed	44	73.3
Income		
Income < expenses	23	38.3
Income = expenses	36	60.0
Income > expenses	1	1.7
The Person Living Together		
Living alone	3	5.0
Living with a partner	21	35.0
Living with family members	36	60.0
Smoking Status		
Never use	26	38.3
Quit	22	36.7
Current	15	25.0
Alcohol Use		
Never use	47	78.3
Quit	6	10.0
Currently using	7	11.7
DM Type of Treatment		
Oral diabetic medicine	35	58.3
Oral diabetic medicine + insulin	15	25.0
Insulin	10	16.7
Hospitalizations Due to DM and Cause		
Non-hospitalizations	57	95.0
Due to hyperglycemia	2	3.3
Due to hypoglycemia	1	1.7
Receive any Training on DM		
Diabetes training	8	13.3
No diabetes training	52	86.7

[a]Age is given as average.

table, the participants' mean age was 55.22±7.21 years. Of them, 65% were female, 80% were primary school graduates, 86.7% were married, 73.3% were unemployed, 60% were living with family members, 60% had an income equal to the expenses, 38.3% were never smokers, 36.7% smoked but quit, 78.3% never drank alcohol, 58.3% used oral diabetic medication, 5% were hospitalized at least once because of DM, and 13.3% did not receive any intervention for DM over the past year (Table 1). The mean scores the participants obtained from the HBMPD were 3.90±0.43 before the intervention and 3.80±0.53 after the intervention ($p>0.05$). There was not much difference between the participants' pre- and post-intervention scores for the overall HBMPD ($p>0.05$). Even though there were some differences between the participants' pre- and post-intervention scores for the subscales of the HBMPD, the differences were not statistically significant ($p>0.05$) (Table 2).

The comparison of the mean subscale scores revealed no difference between pre- and post-intervention diet, exercise, and foot care subscale scores ($p>0.05$) but a significant difference between pre- and post-intervention blood glucose subscale scores ($t=-4.13$, $p=0.00$) (Table 2). There was not much difference between the participants' pre- and post-intervention scores for the overall DQOL ($p>0.05$). As to the subscales of the DQOL, the only difference was determined between the pre- and post-intervention social/vocational issues subscale scores (Table 2).

Variables such as age, gender, education level, employment status, and previous diabetes intervention did not affect the mean pre- and post-intervention HBMPD and DQOL scores ($p>0.05$). However, intervention affected the mean DSCAQ scores, which increased after the intervention ($t=2.50$, $p=0.02$). The mean DSCAQ scores of the participants with primary school education increased after the intervention. Similarly, DSCAQ scores of the participants who had a previous intervention on diabetes also increased after the intervention ($t=2.16$, $p=0.04$) (Table 3).

BMI averages decreased after the intervention ($t=2.436$, $p=0.02$). Although there was a decrease in waist/hip ratio after the intervention, the decrease was not significant ($p>0.05$). No differences were determined between the participants' pre- and post-intervention glucose levels and systolic and diastolic blood pressure levels ($p>0.05$) (Table 4).

Table 2. Comparison of pre and post-training scores of HBMPD, DSCAQ, and DQOL scales and sub- dimensions

Scales	Pre-training	Post-training	Test, p	
		x±SS	x±SS	
HBMPD scale and sub-dimensions	Perceived susceptibility	3.10±0.67	2.95±0.48	t=.798 p=0.43
	Perceived severity	4.00±1.02	3.79±0.84	t=-.744 p=0.46
	Perceived benefits	3.76±0.88	3.88±0.91	t=-.398 p=0.69
	Perceived barriers	3.89±0.71	3.59±0.72	t=1.055 p=0.30
	Health-related activities	4.11±0.49	4.14±0.70	t=.150 p=0.88
	HBMPD scale total	3.90±0.43	3.80±0.53	t=.504 p=0.62
DSCAQ and sub-dimensions	Diet	3.02±1.56	3.17±0.70	t=-0.40 p=0.69
	Exercise	2.44±2.01	2.78±1.31	t=-0.63 p=0.53
	Blood sugar test	1.57±0.91	3.22±1.06	t=-4.13 p=0.00
	Foot care	3.88±3.25	4.21±2.84	t=-0.40 p=0.69
	DSCAQ Total	10.63±1.64	12.69 ± 0.87	t=-1.331 p=20
DQOL scale and sub-dimensions	Satisfaction with treatment	46.73±8.36	48.80±11.49	t=-.784 p=0.44
	Psychological impact of the treatment	64.70±9.46	66.64±10.46	t=-.918 p=0.37
	Worry about the future effects of diabetes	15.26±3.34	15.78±3.02	t=-.804 p=0.43
	Worry about social/vocational issues	29.26±5.54	33.26±3.19	t=-2.546 p=0.02
	DQOL total	154.50±22.64	160.16±23.69	t=-.922 p=0.37

HBMPD: Health belief model in patients with diabetes scale, DSCAQ: Diabetes self-care activities questionnaire, DQOL: Diabetes quality of life questionnaire

Table 3. Comparison of pre- and post-training scores of DSCAQ, HBMPD, and DQOL scales and sub-dimensions according to sociodemographic characteristics of diabetic individuals

	DSCAQ		HBMPD		DQOL	
Sociodemographic Characteristics	**Pre X±SS**	**Post X±SS**	**Pre X±SS**	**Post X±SS**	**Pre X±SS**	**Post X±SS**
Gender						
Female	9.93±4.80	12.47±3.76	3.72±0.53	3.79±0.37	160.75±23.12	158.71±21.83
Male	13.71±5.95	13.08±3.60	3.76±0.29	3.91±0.56	159.00±28.42	169.00±14.50
t, p	t=1.110; p=0.28		t=-0.728; p=0.48		t=1.743; p=0.11	
Education Level						
Primary school graduates	11.02±5.37	12.81±3.70	3.76±0.36	3.74±0.52	162.22±22.03	161.68±21.10
High school and over	12.20±6.08	12.40±3.77	3.85±0.26	3.94±0.63	154.00±32.00	164.00±32.69
t, p	t=2.507; p=0.02		t=-0.450; p=0.66			t=1.737; p=0.11
Business/Working Status						
Employed	13.42±6.36	12.08±4.38	3.75±0.37	3.79±0.53	162.00±25.51	170.18±15.33
Unemployed	10.47±4.99	13.02±3.29	3.79±0.34	3.80±0.57	158.85±24.29	159.23±21.01
t, p	t=0.982; p=0.34		t=0.627; p=0.97			t=1.671; p=0.12
Receive any Training on DM						
Educated	13.68±7.37	13.37±3.63	3.84±0.27	3.61±0.49	158.66±24.82	164.85±23.57
Non-trained	10.88±5.13	12.48±3.72	3.72±0.35	3.86±0.55	160.66±24.83	161.90±19.81
t, p	t=2.160; p=0.04		t=0.435; p=0.67			t=0.640; p=0.53

HBMPD: Health belief model in patients with diabetes scale, DSCAQ: Diabetes self-care activities questionnaire, DQOL: Diabetes quality of life questionnaire

Table 4. Comparison of pre- and post-training scores of anthropometric and hemodynamic parameters of individuals

	Pre-training	Post-training	
Parameters	**X±SS**	**X±SS**	**Test, p**
Anthropometric Parameters			
BMI	34.31±4.43	30.95±5.86	t=2.43 p=0.02
Waist / hip ratio	0.93±0.10	0.90±0.07	t=0.72 p=0.47
Hemodynamic Parameters			
Blood sugar levels	168.9±15.2	185.1±26.1	t=-0.50 p=0.62
Diastolic blood pressure	125.0±17.9	131.3±16.8	t=-1.00 p=0.33
Systolic blood pressure	73.8±14.1	76.4±10.3	t=-0.59 p=0.55

BMI: Body mass index

DISCUSSION

The main goal of diabetes management is to improve the quality of life of the patient so that he/she can lead a normal life. This study was conducted to investigate the effect of a DSME intervention on health beliefs, self-care behaviors, and quality of life of diabetic individuals.

Good metabolic control plays a crucial role in the improvement of the quality of life of people with diabetes and prevention of early and late complications related to diabetes. In the present study, the vast majority of individuals reported that they did not receive intervention on DM within the last year. Akaltun and Ersin reported that 67.5% of the diabetic patients did not receive any training on diabetes, and more than half of the patients did not want to receive training on diabetes (Akaltun & Ersin, 2016). These rates indicate that DSME interventions should be more widespread. Today diabetes schools are actively involved in endocrine units; however, because they only serve in hospitals in big cities, patients with diabetes living in smaller cities, towns, or rural areas cannot actively utilize these services. Therefore, it would be beneficial to actively carry out these services in public health units so that individuals both in urban and rural areas can benefit. In addition, it is inevitable for nurses working in primary healthcare facilities to perform their educational and counseling roles in chronic disease management more actively. In the current study, the participants' pre-intervention health beliefs levels did not differ much after the intervention. In a 10-week follow-up (observational/cohort) study, pre-intervention health belief levels of the participants in the experimental and control groups were similar. However, after the intervention, the health belief levels of the participants in the experimental group were higher (Kartal & Altuğ-Özsoy, 2014). In several studies conducted with patients with diabetes, the experimental and control groups were compared. The results demonstrated that the participants in the experimental group obtained higher scores from the health belief model and its perceived susceptibility, perceived severity, perceived benefits, perceived barriers, and health-related activities subscales (Akpunar, 2012; Solhi et al., 2014). In the present study, there was no control group. Therefore, the pre- and post-intervention scores of all the participants were compared instead of scores of experimental and control groups. If this study had included a control group too, it would have been possible to determine whether there was a difference between the experimental and control groups.

Although the importance of self-care behaviors in successful individual management of diabetes and achievement of better quality of life have been emphasized, studies have shown that diabetes self-care behaviors (medical nutrition therapy, exercise, glucose monitoring, insulin use, etc.) are not performed at desirable levels (Sousa, Zauszniewski, Musil, Price-Lea, & Davis, 2005; Tan & Magarey, 2008). Current results show that the participants' diabetes self-care activity levels were low. It was also determined that self-care behavior scores of the participants with primary school education and those of the participants who did not have diabetes education previously increased significantly after the intervention program. This suggests that the intervention was effective in individuals with low education levels, which can be interpreted as a positive outcome even though individuals were educated for the first time. The results of studies conducted in different countries to investigate patients' compliance with treatment in terms of self-care behaviors, (Ausili, Bulgheroni, Ballatore, Specchia, Ajdini, & Bezze, 2017; Saleh, Mumu, Ara, Hafez, & Ali, 2014)

indicated that the proportion of patients who regularly monitored their blood glucose levels was low. It was determined that the participants complied with their self-care behaviors (diet, exercise, blood test, foot care) at different levels and that their quality of life was related to exercise, blood glucose monitoring, and foot care (Ausili et al., 2017). Similarly, it was determined that the most frequently performed diabetes self-care behavior was diet, and the least frequently performed one was exercise (Saleh et al., 2014). Foot care, food consumption without professional support, and physical activity were the least frequently performed diabetes self-care behaviors, and as the education level decreased, so did the frequency of performing self-care behaviors (Freitas, Silva, Rezende-Neta, & Silvada, 2014). The results of all the aforementioned studies and the present study confirm the conclusion that diabetic individuals do not pay enough attention to self-care behaviors, that they put forward such excuses as lack of time, or they were afraid of confronting undesired results (Saleh et al., 2014).

The participants' quality of life scores increased slightly after the intervention, but the increase was not significant. The fact that the participants' post-intervention health beliefs and self-care behaviors were not significantly different from the pre-intervention ones was closely related to the fact that their DQOL scores did not change. However, their DQOL social/vocational issues subscale scores differed after the intervention program. Social and vocational anxiety is related to problems likely to arise in social and occupational areas because of diabetes (Yıldırım et al., 2007). That the participants' quality of life scores in this domain increased is thought to result from the fact that the participants' concerns related to social life were eliminated after the intervention. It was determined that both physical and psychosocial quality of life were lower in individuals who developed complications (Adriaanse, Drewes, van der Heide, Struijs, & Baan, 2016). In a German study conducted by providing education and counseling, the quality of life of the patients with diabetes participating in the program increased (Ose, Miksch, Urban, Natanzon, Szecsenyi & Kunz 2011). The quality of life of individuals with diabetes was also found to be low in several studies (Ausili et al., 2017; Martínez, Prado-Aguilar, Rascón-Pacheco, & Valdivia-Martínez, 2008; Saleh et al., 2014). On the basis of the results, it can be assumed that the compliance with treatment is adversely affected as the duration of illness is prolonged, that misbehaviors and practices become habits, and that the symptoms are perceived as normal and thus the quality of life decreases.

In the present study, it was determined that according to the results of the anthropometric measurements of the individuals, their mean BMI values decreased after intervention. The BMI values of the participants in this study sample were higher than those of diabetic individuals in other studies (Adriaanse et al., 2016; Ausili et al., 2017). This suggests that the BMI of the participants with low levels of health beliefs brings about many risks. It was reported that post-intervention anthropometric measurements and hemodynamic parameters were significantly lower than their pre-intervention anthropometric measurements and hemodynamic parameters (Musacchio, Lovagnini Scher, Giancaterini, Pessina, Salis, & Schivalocchi, 2011; Tang, Funnell, Brown, & Kurlander, 2010).

CONCLUSION AND RECOMMENDATIONS

For improvement of self-care skills and quality of life of individuals with diabetes, following them up by visiting them in their living environment frequently, performing recurrent DSME interventions, and encouraging them to gain positive health behaviors are as important as evaluating them in the hospital environment. It is recommended that effective DSME programs aimed at reaching wider populations should be implemented in family health centers as an important unit of public health and in health centers where diabetes care is provided. It is also recommended to educate the public on diabetes mellitus through audio-visual and mass communication media and to pay regular patient visits and to improve home care services for the continuity of these interventions.

In the light of the data obtained in the present study, which was conducted to investigate the effects of DSME intervention given to individuals with T2D on their health beliefs, self-care activities, and quality of life, it can be said that individualized DSME programs given to support lifelong chronic disease management can contribute to reduction in anthropometric measurements and encourage patients to perform self-care activities more.

Ethics Committee Approval: Prior to the study, Izmir Katip Celebi University Ethical Committee Approval was obtained with 18.12.2014-E.27632, no: 272.

Informed Consent: Verbal consent was obtained from individuals who wanted to participate in the study.

Peer-review: Externally peer-reviewed.

Author Contributions: Concept – M.Y., B.A., F.D., G.K.; Design – M.Y., B.A., F.D.; Supervision M.Y.; Resources – M.Y., B.A., F.D., G.K.; Materials – M.Y., B.A., F.D., G.K.; Data Collection and/or Processing – M.Y., F.D., GK; Analysis and/or Interpretation – M.Y., B.A.; Literature Search – M.Y., B.A., F.D., G.K.; Writing Manuscript – MY, BA, FD, GK; Critical Review – M.Y., B.A.

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