

Received: 12 October 2014 • Accepted: 18 November 2014



doi:10.15412/JBTW.xxxx

Self-care Behavior Promotion among Type 2 Diabetic Patients: A Randomized Controlled Trial

Leila Davari¹, Ahmad Ali Eslami^{1*}, Akbar Hassanzadeh², Mehdi Mirzaei Alavijeh³, Gholam Reza Mahmoodi⁴¹ Department of Health Education and Promotion, School of Health, Isfahan University of Medical Sciences, Isfahan, Iran² Department of Statistics and Epidemiology, Faculty of Health, Isfahan University of Medical Sciences, Isfahan, Iran³ Social Determinants of Health Research Center, Yasuj University of Medical Sciences, Yasuj, Iran⁴ Gorgan Bouyeh Faculty of Nursing & Midwifery, Golestan University of Medical Sciences, Gorgan, Iran

*correspondence should be addressed to Ahmad Ali Eslami, Department of Health Education and Promotion, School of Health, Isfahan University of Medical Sciences, Isfahan, Iran; Tell: +983137922710; Fax: +983137922710; Email: eslamiaa@gmail.com.

ABSTRACT

Diabetes mellitus is one of the most common metabolic disorders and one of the most important health problems in worldwide. Diabetes self-care is essential for prevention of disease complications. The purpose of this study is evaluating efficiency of self-care promotion educational program intervention among Type 2 diabetic patients in Khorramabad, Iran. In a randomized controlled trial, overall, sixty-four type 2 diabetic patients referred to Khorramabad diabetes center participated in this study and randomly divided into intervention (32 patients) and control (32 patients) group. Data were collected by filling a standard questionnaire, and analyzed by SPSS version 15. Our findings shows significant improvements in nutrition, physical activity and self-measurement of blood glucose ($P < 0.05$) after training intervention, but there is no significant improvement in foot care and adherence to medication regimen ($P > 0.05$) among intervention group. Based on our findings, it is recommended designing an education program for diabetic patients mainly focused on the self-care behaviors.

Key words: Training program, Self-care, Type 2 Diabetes

Copyright © 2014 Leila Davari et al. This is an open access article distributed under the [Creative Commons Attribution License](https://creativecommons.org/licenses/by/4.0/).

1. INTRODUCTION

Diabetes is the most common chronic disease can lead to complications (1). A national survey of risk factors of non-communicable diseases estimated the prevalence of diabetes in Iran as 7.7%; world health organization (WHO) has also estimated the number of diabetic patients in Iran over six million people up to 2030 (2). Diabetic patients report lower health status, higher rates of depression and disability, having obvious employment, social disorders, and lower levels of quality of life (3, 4). This disease involves direct costs of 2.5 to 15% of the total health budget (2). Researches indicated that control and caring of diabetes is as the main task of the individual and the family, and believes that the patients should accept the responsibility for their disease and control the diabetes according to their live style and culture through the best way (5). One of the reasons for the failure to achieve desired therapeutic outcomes in diabetic patients is the lack of patients' adherence in treatment. In diabetes, the treatment and management of disease is mainly dependent on the patient's measures, and self-caring is among the most important factors to curb the disease (6). The most important mainstay of diabetes controlling is the

changes in lifestyle and health behavior, and self-care based on professional treatment guidance. Doing daily self-care activities helps diabetic patients to avoid complications and health dangers related to diabetes. Self-care is defined as the foundation of diabetes care (1). Self-care behavior promotion could be achieved through patient training, and their education plays an important role in controlling diabetes (7). Interventions based on improving self-care behaviors lead to positive changes in attitudes, beliefs, improved health-related information and development of health skills and performance of individuals (8). Mint et al. in their meta-analytic study with reviewing of 47 randomized controlled trials reported that patients who had received their self-care management with any type of training and intervention period, had more controlled fasting blood glucose levels (9). Norris *et al* showed the positive impacts of self-care behaviors education on dietary habits such as modifying fat and carbohydrate intake in food, reducing received calorie and consumption of foods with low glycemic index (10). Vermeire et al in a retrospective review of 21 randomized controlled studies related to interventions based on improved adherence to the treatment in type 2 diabetes patients reported that im-

proved adherence to treatment recommendations was seen in 19 studies, and only two studies showed a slightly significant increase (11). The present study aims to investigate the efficiency of self-care promotion program intervention on Type 2 diabetic patients in Khoramabad, Iran.

2. MATERIALS AND METHODS

2.1. Participants

This study was conducted among Type 2 diabetic's patient referred to Khorramabad diabetes center. From among 120 Type 2 diabetics' patients who were eligible for participating in this study, sixty-four patients have been chosen for this study. The sample size was calculated as at least 32 subjects in each group (based on $n = \frac{(z_1 + z_2)^2 \times 2s^2}{d^2}$ equation). (Z1 confidence factor of 95% means = 1.96), Z2 (factor test power of 80%, = 0.84), (s estimate of the standard deviation of each of the two groups), and (d is the minimum difference in mean scores of each variable, between two groups that shows a significant difference that 0.7s is considered). Thirty-two participants as intervention and 32 as control groups were enrolled at the baseline survey, of whom all were followed up after three month intervention. This study was conducted with approval from Isfahan University of Medical Sciences' institutional review board. Informed assent and consent were obtained from participants. Some of the inclusion criteria consisting of: definitively diagnosed with type 2 diabetes, age of 30 to 65 years old, underwent pharmacotherapy, at least 6 months of developing diabetes. The exclusion criteria include poor physical condition to answer the questions and cognitive problems and mental illness. Simple random sampling method was used. A list of qualified persons was chosen according to the file number set, and then sixty-four samples were delisted and noted?. Cases and controls were randomly assigned in two groups, the first list of 32 record intervention group and 32 cases in the control group were followed.

2.2. Measures

Before fulfilling the main study, a pilot study was conducted. 20 diabetic patients, with similar conditions as participants the main study, were asked to complete the questionnaire to check clarity, length comprehension, completion time, and internal reliability of measures. Diabetic participants filled the standardized writing questionnaire. Descriptive data was gathered from interviews. Questionnaire included three sections that comprised of 21 questions:

eight questions for demographic information; and thirteen questions about self-care behavior. Demographic items were designed to gather information related to age, sex, marital status, occupation, level of education, type of treatment, duration of diabetes, and income status. Self-care behavior was measured by standard questionnaires (12). This scale was a revised version of the Toobert-Glasgow self-care behaviors scale, reliability coefficients for Self-care behavior scale was reported ($\alpha = 0.76$); this scale is used to assess self-care activities in five core areas of self-care behaviors, including nutrition (4 questions), physical activity (2 items), adherence to medication regimen (3 questions), blood glucose monitoring (2 items), and foot care (2 questions). The answers to the questionnaire questions are designed in such a way that the patient's would report his own activities rate over the past week, and the range of responses is from zero (no self-care activities in the last 7 days) to 7 (seven days of doing self-care activities). Educational planning for this study was based on active learning through active participation of patients in educational programs. Educational level was low among patients. Additionally, a training session was held for patients' families to facilitate the training. A major aspect for controlling diabetes is regular of use prescribed medications. According to the result of this study, there was no significant difference between two studied groups. Due to good condition of patients in both groups, medication adherence was not significant; majority of the participants reported regular usage of prescribed medicines.

2.3. Statistical analysis

Analyses were conducted by using SPSS-15 and a probability level of 0.05 was used throughout. Chi-squared, independent T-test and ANOVA with repeated observations were employed to determine comparability of the intervention and control group.

3. RESULTS AND DISCUSSION

The mean age of respondents is 58.5 ± 7.9 and 57.3 ± 7.4 for intervention and control group, respectively. In addition, mean duration of diabetes in the intervention and control groups are as 9.9 ± 4.9 and 7.16 ± 4.5 , respectively. More details of demographic characteristics of the participants are shown in Table 1.

Table 1. Distribution of the demographic characteristics among the participants

Variables	Number	Percent
Sex		
Male	19	29.7
Female	45	70.3
Education level		
Illiterate	16	25
Under Diploma	18	28.1

Diploma	17	26.5
Academic	13	20.4
Income status		
Weak	20	31.2
Average	42	65.6
Good	2	3.2
Positive family history of diabetic		
Yes	40	62.5
No	24	37.5
Treatment type		
Oral	52	81.2
Insulin	7	10.9
Both	5	7.9
Complications		
Yes	16	25
No	48	75

Table 2 shows not significant differences between two of them before implementation of the educational program. intervention and control groups in demographic variables

Table 2. Pretest equivalency results for intervention and control groups

Variables	Intervention n (%) mean (±SD)	Control group n (%) mean (±SD)	p-value
Average age (years)	58.5 (7.9)	57.3 (7.4)	0.54
Average duration of disease (years)	9.19 (4.9)	7.16 (4.5)	0.1
Sex			
Male	12 (37.5)	7 (21.9)	0.17
Female	20 (62.5)	25 (81.1)	
Education level			
Illiterate	7 (21.9)	9 (28.2)	0.36
Under Diploma	8 (25)	19 (31.2)	
Diploma	9 (28.1)	8 (25)	
Academic	8 (25)	5 (15.6)	
Income status			
Weak	9 (28.1)	11 (34.4)	0.39
Average	21 (65.6)	21 (65.6)	
Good	2 (6.3)	0 (0)	
Positive family history of diabetic			
Yes	19 (59.4)	21 (65.6)	0.6
No	13 (40.6)	11 (34.4)	
Treatment type			
Oral	23 (71.9)	29 (90.6)	0.5
Insulin	4 (12.5)	3 (9.4)	
Both	5 (15.6)	0	
Complications			
Yes	6 (18.8)	10 (31.2)	0.2
No	26 (81.2)	22 (68.8)	

Additionally, our results in Table 3 show the significant improvements in nutrition, physical activity, glycemic control among intervention group (P < 0.05). Overall table 3 shows the result about efficiency of self-care education program and our results show the average response for

total self-care behavior among intervention group improved from 52 to 85.5 three month after implementing educational program (P < 0.05).

Table 3. Average responses of diabetes self-care behavior before and after educational program

Variable	Group	Before intervention	First post-test (Immediately after the intervention)	Second post-test (Three month follow-up)	RM-ANOVA		
		Mean ± SD	Mean ± SD	Mean ± SD	F	P-value	Effect size
Nutrition	Intervention	16± 1.19	19.6± 4/27	20.4± 3/82	3.83	0.001*	0.68
	Control	17.1 ± 5/58	17.5± 5	17.2± 5	0.74	0.48	-
	t-test	0.7	1.80	2.45	-	-	-
	P- value	0.4	0.07	0.01	-	-	-
Physical Activity	Intervention	5.1± 3.83	6.93 ± 3.19	6.90 ± 3/14	11.57	0.001*	0.43
	Control	5.3 ± 3.69	3.60 ± 5.43	5.21 ± 3/66	1.78	0.186	-
	t-test	1.33	1.76	1.97	-	-	-
	P- value	0.8	0.08	0.05	-	-	-
Glycemic Control	Intervention	1.78± 1.79	4 ± 1.67	3.90± 2	42.71	0.001*	0.74
	Control	2.43 ± 3.8	3.4 ± 3.7	3.56 ± 3.68	0.56	0.577	-
	t-test	2.21	0.86	0.46	-	-	-
	P- value	0.06	0.3	0.6	-	-	-
Foot Care	Intervention	13.3± 1.2	13.7± 0/9	13.5± 1.43	1.68	0.2	0.1
	Control	12.7 ± 2.33	12.7 ± 2/16	12.6± 2.30	0.284	0.75	-
	t-test	1.21	2	1.95	-	-	-
	P- value	0.2	0.04	0.05	-	-	-
Adherence to Medication Regimen	Intervention	13.7± 2/92	12.7± 3.91	13.7 ± 4.12	0.195	0.8	0.01
	Control	12.6 ± 1/23	13.5± 1.23	13.7 ± 2.20	0.001	1	-
	t-test	0.2	0.3	0.02	-	-	-
	P- value	0.7	0.7	0.9	-	-	-
Total Self-care	Intervention	52± 10.14	57.93 ± 7.44	85.5 ± 7.50	40	0.001*	0.72
	Control	50± 9.30	53± 8.56	53.3 ± 8.38	1.231	0.3	-
	t-test	0.98	2.41	2.61	-	-	-
	P- value	0.3	0.01	0.01	-	-	-

The aim of this study is to assess the effectiveness of a self-care education program among type 2 diabetic patients. Even though the duration of the educational intervention in this study was short, but after manipulation, significant improvements were seen. Our findings indicated a significant increase in mean score of total self-care among cases in the intervention group. In this regard, Ko *et al* carried out the long-term effects of educational intervention on type 2 diabetic patients and reported that after the educational intervention with 4-year follow-up, a significant increase in the mean score was observed in patient self-care activities among intervention group (13). Also, Rubin *et al* in his study among 213 diabetic patients, reported a significant difference in self-care behavior including physical activity, nutrition, and glycemic control 6 months after education program (14). Regular physical activity has been considered as an important behavior to enhance health and prevent or delay chronic diseases and early mortality. There has, also, been evidenced that regular physical activities would lead to better mental health, less anxiety and depression, satisfaction with life and life enhancement

(15); on the other hand, several studies showed that 80 per cent diabetic patients suffered from lack of enough physical activities, which results in resistance against insulin in body [which is a certain factor in diabetes type 2] (16). Results from present study reported a significant increase of physical activity among intervention group; in this regard, many studies (14-17) showed the efficiency of training courses on doing physical activities among diabetic patients. Another important activity to control diabetes is to use prescribed medicines; Kamel *et al.* mentioned that lack of knowledge or misunderstanding with treatment plan are considered as reasons to avoid following suggested treatment plan (18). Results showed that there was no significant statistical difference between two groups in this regard, which was different from results by Rubin *et al* (14). In addition, our results show significant increasing of nutrition behavior among intervention group after education program. In this regard, Redmond *et al* reported that training could be improving dietary behaviors on diabetic patients (19). Considering a major impact of nutrition behavior on diabetic control, as well as usefulness of training

program on increasing nutrition behavior, it is recommended to raise special attention in diabetes education programs. Concerning efficiency of intervention, except increasing foot care behavior after intervention, it was found no significant differences between intervention and control groups and these outcomes aren't consistent with similar studies (13, 20, 21). This can be justified due to awareness of type 2 diabetic patients following benefiting from current educations in the diabetes center as well as simplicity and low cost of caring of feet. Furthermore, in this study, the rate of foot care behaviors in both groups was sufficient at baseline, which can influence the results insignificance? Foot care is simple and has no special cost; it appears that providing training programs in this regard can be effective to prevent the emergence of diabetic foot disease and imposed enormous costs on the individual and the health care system. Further investigations focusing on the foot care behavior and using of behavioral change model regarding to improvement of foot care behavior are recommended to predict factors related this behavior in Iranian patients at future research. Patient empowerment is a useful approach in diabetes training. The goal is to create knowledge on diabetes, self-care skills, and increase self-awareness on needs and aims among patients, so that 95 percent of patients control their diabetes personally (22). Results from the present study showed meaningful increase of average total score on self-care behavior among intervention group which corresponds to results in this field (23). It is suggested the positive effect of holding training courses to improve self-care behavior among diabetic patients.

4. CONCLUSION

Based on our results education program shows a significant improvement in nutrition, physical activity, glycemic control among intervention group but not significant improvement of foot care behavior and adherence to medication regimen, we recommend focusing on the specifically self-care behaviors in designing intervention program for diabetic patients.

ACKNOWLEDGMENT

This article is a part of the research project supported by Isfahan University of Medical Sciences (number project is 391445). We would like to thank Deputy of Research of Isfahan University of Medical Sciences for financial support of this study.

AUTHORS CONTRIBUTION

This work was carried out in collaboration among all authors.

CONFLICT OF INTEREST

The authors declared no potential conflicts of interests with respect to the authorship and/or publication of this article.

REFERENCES

- Jallilian F, Motlagh FZ, Solhi M, Gharibnavaz H. Effectiveness of self-management promotion educational program among diabetic patients based on health belief model. *Journal of education and health promotion.* 2014;3:14
- Organization WH. Definition and diagnosis of diabetes mellitus and intermediate hyperglycemia: report of a WHO/IDF consultation. Geneva: World Health Organization. 2006:1-50.
- Bruce DG, Davis WA, Davis TM. Longitudinal Predictors of Reduced Mobility and Physical Disability in Patients With Type 2 Diabetes The Fremantle Diabetes Study. *Diabetes care.* 2005;28(10):2441-7.
- Von Korff M, Katon W, Lin EH, Simon G, Ciechanowski P, Ludman E, et al. Work disability among individuals with diabetes. *Diabetes care.* 2005;28(6):1326-32.
- Clark M. Diabetes self-management education: a review of published studies. *Primary care diabetes.* 2008;2(3):113-20.
- Sigurðardóttir ÁK. Self-care in diabetes: model of factors affecting self-care. *Journal of clinical nursing.* 2005;14(3):301-14.
- Dunning T. Care of people with diabetes: a manual of nursing practice: John Wiley & Sons; 2013.
- Marks R, Allegrante JP. Falls-prevention programs for older ambulatory community dwellers: from public health research to health promotion policy. *Sozial-und Präventivmedizin.* 2004;49(3):171-8.
- Minet L, Møller S, Vach W, Wagner L, Henriksen JE. Mediating the effect of self-care management intervention in type 2 diabetes: a meta-analysis of 47 randomised controlled trials. *Patient education and counseling.* 2010;80(1):29-41.
- Norris SL, Engelgau MM, Narayan KV. Effectiveness of self-management training in type 2 diabetes: a systematic review of randomized controlled trials. *Diabetes care.* 2001;24(3):561-87.
- Vermeire E, Wens J, Van Royen P, Biot Y, Hearnshaw H, Lindenmeyer A. Interventions for improving adherence to treatment recommendations in people with type 2 diabetes mellitus. *Cochrane Database Syst Rev.* 2005; 18(2):CD003638.
- Toobert DJ, Hampson SE, Glasgow RE. The summary of diabetes self-care activities measure: results from 7 studies and a revised scale. *Diabetes care.* 2000;23(7):943-50.
- Ko SH, Song KH, Kim SR, Lee JM, Kim JS, Shin JH, et al. Long-term effects of a structured intensive diabetes education programme (SIDEP) in patients with Type 2 diabetes mellitus—a 4-year follow-up study. *Diabetic medicine.* 2007;24(1):55-62.
- Rubin RR, Peyrot M, Saudek CD. Differential effect of diabetes education on self-regulation and life-style behaviors. *Diabetes care.* 1991;14(4):335-8.
- Udezue E, Nashwan R, Azim AA, Hasweh M, Al Nuaim A, Al Dossary I. The impact of a multi-disciplinary management approach on diabetic control in young Saudi patients. *Annals of Saudi medicine.* 2005;25(2):85-9.
- Kirk A, Mutrie N, MacIntyre P, Fisher M. Increasing physical activity in people with type 2 diabetes. *Diabetes care.* 2003;26(4):1186-92.
- Kirk AF, Mutrie N, MacIntyre PD, Fisher MB. Promoting and maintaining physical activity in people with type 2 diabetes. *American journal of preventive medicine.* 2004;27(4):289-96.
- Kamel N, Badawy Y, El-Zeiny NA, Merdan I. Sociodemographic determinants of management behaviour of diabetic patients. Part II. Diabetics' knowledge of the disease and their management behaviour. *Eastern Mediterranean health journal= La revue de sante de la Mediterranee orientale= al-Majallah al-sihhiyah li-sharq al-mutawassit.* 1999;5(5):974-83.
- Redmond EH, Burnett SM, Johnson MA, Park S, Fischer JG, Johnson T. Improvement in A1C levels and diabetes self-management activities following a nutrition and diabetes education program in older adults. *Journal of Nutrition for the Elderly.* 2007;26(1-2):83-102.
- Fan L, Sidani S, Cooper-Brathwaite A, Metcalfe K. Feasibility, Acceptability and Effects of a Foot Self-Care Educational Intervention on Minor Foot Problems in Adult Patients with Diabetes at Low Risk for Foot Ulceration: A Pilot Study. *Canadian journal of diabetes.* 2013;37(3):195-201.
- Patout CA, Birke J, Horswell R, Williams D, Cerise F. Effectiveness of a comprehensive diabetes lower-extremity amputation prevention program in a predominantly low-income African-American population. *Diabetes care.* 2000;23(9):1339-42.
- Clarke J, Crawford A, Nash DB. Evaluation of a comprehensive diabetes disease management program: progress in the struggle for sustained behavior change. *Disease management.* 2002;5(2):77-86.
- Viswanathan V, Shobhana R, Snehalatha C, Seena R, Ramachandran A. Need for education on footcare in diabetic patients in India. *The Journal of the Association of Physicians of India.* 1999;47(11):1083-5.