

The Effect of Family-Based Telephone Follow-Up on Self-Care of Patients with Diabetes

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Introduction: Family-centered education of patients with diabetes mellitus can play an important role in controlling the disease and reducing its complications.

Objective: The present study aims to determine the effect of family-based telephone follow-up about self-care in patients with type 2 diabetes mellitus in Uromia.

Materials and Methods: The present clinical trial study investigated 60 patients with diabetes. These 60 patients were randomly enrolled and divided into control (n = 30) and intervention (n = 30) groups. The intervention group received family-centered follow-up for three months. The data collection tool was demographic, the diabetes self-care questionnaire was completed through in-person interviews before and after intervention in both groups. Data were analyzed using descriptive and inferential statistics (Chi-square, T-test, and Mann-Whitney test).

Results: The results of this study showed that after the family-based telephone follow-up, the mean self-care scores and the dimensions (nutrition, physical activity, blood glucose control, foot care, and self-care) were significantly different between the intervention and control groups (P = 0.001). However, there was no significant difference between the mean scores of adherence to the medication regimen after the intervention between the two groups.

Conclusion: Family-oriented follow-up by a nurse can have important effects on self-care and its dimensions (nutrition, physical activity, blood glucose control, and foot care) in patients with diabetes. Therefore, it is recommended that nurses follow up and educate the family members of patients to participate in diabetes care.

Keywords: Self Care, Diabetes Mellitus Type 2, Cell Phones, Family

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Introduction

Diabetes mellitus is considered to be a chronic disease and a silent epidemic. It is one of the main health problems in many countries in the current century. In the United States alone, there are more than 15 million patients with diabetes and another 5 million undiagnosed. This disease causes thousands of annual deaths [1-3]. The

population of patients with diabetes in Iran is about 3.5 million [4]. According to estimation by experts in Iran, more than 12 million will develop diabetes by 2020 [5]. In most health systems in the world, health care cost for diabetic patients is 2-4 times more than those for non-diabetics [3]. The consequences of inappropriate diabetes control include frequent hospitalization,

high prevalence of complications, and poor quality of life [6]. Some complications of diabetes include reduced life expectancy and an increased risk of cardiovascular disease, renal failure, limb amputation, and blindness [7]. Universal consensus emphasizes this fundamental principle that self-care plays an important role in the care process of chronic diseases like diabetes [8]. With the implementation and continuity of self-care by the patient and family involvement, the onset of acute and chronic complications can be prevented or delayed [9].

One of the most important self-care activities in patients with diabetes is the adherence to a healthy diet and medication regimen, monitoring glucose levels, and regular physical activity [10]. According to Orem's self-care theory, inadequate information and understanding can reduce the judgment and decision-making power, resulting in the limitation of the individual in self-care [11]. Training patients and their families in self-care behaviors can increase patients' satisfaction, improve quality of life, as well as reduce anxiety and complications [12, 13]. In order to support patients with diabetes who have self-care problems, in addition to training programs, a follow-up program is necessary. This will further enhance awareness and improve their function and attitudes [14].

Various training programs can be undertaken by patients with diabetes. One of the most effective and supportive methods to solve the problems of patients is follow-up [15]. Telephone follow-up is a way of using information technology in patients' care. It is used to evaluate, follow-up, and monitor patients, decision-making, and providing necessary instructions. This can be designed based on a patient's care needs and is helpful when access to the patient is limited [16]. Telephone follow-up is thus a very useful and inexpensive way to assess a patient's

condition. It also reduces the number of visits for personal examinations [17]. With this technology, valuable interventions can be made over a short period of time and the type of care can be changed from hospital-oriented status to society-oriented status [18]. The results of various researches in Iran and abroad indicate the positive effect of telephone follow-up on the self-care status of patients with diabetes [19-21]. However, no study was found on telephone follow-up in the presence of one family member in Iran. Therefore, considering the need of patients with diabetes from an available care system, this study aimed to determine the effect of family-based telephone follow-up on self-care in patients with type 2 diabetes mellitus.

Materials and Methods

This Randomized Controlled Trial (RCT), approved by the Ethics Committee of Uromia University of Medical Sciences, was conducted from March 2014 to April 2015 on patients with with type 2 DM who referred to the Uromia Diabetes Association. The inclusion criteria for this research were: residence in Uromia city, primary consent of patients and one of their family members to participate in the study, ability of the patient and/or one family member to read and write, having no secondary problems such as history of mental illness, emergency hypertension $>180/110$, chronic kidney and heart disease, and consent to continue the research.

The minimum number of samples for each group was estimated to be 20. According to Jalilian et al. [22], the mean of self-management in the intervention group was 6.9 ± 1.37 . In the control group it was 5.33 ± 1.67 . The study power was 80% and confidence level was 95%. In order to increase the test power and accuracy of the study, with prediction of 10% sample loss, 30 samples were considered for each group. A total of 60 patients aged 18-55

years with diabetes mellitus were diagnosed by a specialist. Simple randomization was used to select a sample from the study population. After random selection of eligible samples, the researcher explained the study objectives to the patients and their families, including their parents, children, or their spouses during one session. He/she then received the signed written consent and a contact number for communication. Then, the height and weight of all patients were recorded.

The tool used in this study was a questionnaire consisting of two parts. One part was about demographic information and the second had questions about self-care activities in diabetes, adapted from the Toobert tool [23]. The standard short form of self-care behaviors had 17 questions covering five dimensions of self-care. The self-care behaviors outlined in this questionnaire include: diet(1-5), physical activity (6,7), blood glucose control (8,9), foot care (10-14), and regular use of medication (15-17). The responses ranged from zero (no self-care activity in the last seven days) up to 7 (everyday self-care activities in the last seven days). Higher scores indicated a more favorable self-care during the last seven days. In this questionnaire, each question was given a score from 0 to 7, and the total self-care score was obtained by the addition of the question scores. The diet scores ranged from zero to 35, exercise from zero to 14, blood glucose control from zero to 14, foot care from zero to 35, regular use of medications from zero to 21, and the total scores of care from zero to 119. The advice was given to the patients in the intervention group not to participate in Diabetes Association classes and other classes to determine the actual impact of this study on self-care. After completing the intervention period (three months), the questionnaire was completed again by a trained questioner interviewing patients.

questionnaire was validated in a research carried out by Hemmati et al. [23]. In the present study, the internal consistency of the tool was confirmed by Cronbach's alpha coefficient of 0.89 for diet, 0.78 for exercise, 0.92 for blood glucose control, 0.87 for foot care, 0.79 for regular use of medications, and 0.85 for total self-care. The questionnaire was completed by patients in the presence of the researcher.

The random allocation method was used to give each participant a number. Then, the subjects were selected using a random number table. In the intervention group, phone calls were made by one researcher twice a week in the first two months, and once a week in the third month. The call time was agreed between the subjects and one family member. It was scheduled between 9 am and 2 pm. The duration of each call was approximately 15 to 20 minutes. Telephone follow-up was conducted in the intervention group for three months. The content of the follow-up was determined based on the information obtained by the needs assessment and characteristics of the study population, including assessing self-care status of subjects in diet, exercise, blood glucose self-control, and foot care, and the response to questions of the subjects and their families. In the event of issues such as the lack of self-care or poor self-care, the researcher tried to find out the cause to help the individual and the family member who participated in the telephone follow-up. Finally, the proposed solution to resolve the problem was provided to the patient and the family member. Necessary

The control group received self-care education after the research.

Data was analyzed before and after the study using descriptive statistics and compared using Chi-square, independent T-test, and Mann-Whitney tests using SPSS 21 software. The normal distribution of data was tested by Kolmogorov-Smirnov test.

Results

Distribution of demographic variables in two groups was shown in table 1 and 2. The results of the Independent T-test and Mann-Whitney test showed that the mean scores in diet, physical activity, blood glucose control, adherence to medication regimen, and total self-care were not significantly different before intervention between the control and intervention

groups. Comparison of mean scores in the dimensions of diet, physical activity, blood glucose control, foot care, and self-care after intervention showed a statistically significant difference between the two groups ($p = 0.001$). However, there was no significant difference in adherence to the medication regimen after intervention in the two groups of control and intervention (Table 3).

Table 1. Distribution of demographic variables in the intervention and control groups (Qualitative)

Variable		Control group	Intervention group	Sig. *
		N (%)	N (%)	
Sex	Male	11 (36.7)	13 (43.3)	0.598
	Female	19 (63.3)	17 (56.7)	
Marital status	Married	29 (96.7)	28 (93.3)	0.601
	Un-married	1 (3.3)	2 (6.7)	
Family history of diabetes	Yes	19 (63.3)	15 (50)	0.297
	No	11 (36.7)	15 (50)	
History of other diseases	Yes	11 (36.7)	10 (33.3)	0.243
	No	19 (63.3)	20 (66.7)	
Educational level	Elementary	14 (46.7)	11(36.7)	0.339
	>High school	16(53.3)	19(63.3)	

*Chi 2 Test

Table 2. Distribution of demographic variables in the intervention and control groups (Quantitative)

Variable	Mean \pm SD Control group	Mean \pm SD Intervention group	Sig. *
Number of children	3.16 \pm 1.14	3.1 \pm 1.18	0.863
Duration of diabetes	11.33 \pm 5.66	9.26 \pm 5.47	0.584
BMI	28.25 \pm 3.85	29.41 \pm 4.06	0.946
Fasting blood sugar (mg/dl)	147.3 \pm 42.56	154.5 \pm 46.7	0.987
Cholesterol (mg/dl)	167.7 \pm 48.76	173.7 \pm 49.52	0.828
Triglyceride (mg/dl)	162.83 \pm 53.36	163.4 \pm 96.12	0.262
Glycosylated hemoglobin	10.86 \pm 18.77	8.22 \pm 1.13	0.08
Variable	Mean \pm SD Control group	Mean \pm SD Intervention group	Sig. **
Age (years)	50.6 \pm 3.74	49.46 \pm 4.76	0.522

*Independent T Test

**Man Whitney Test

Table 3. Comparison of self-care scores and the dimensions between intervention and control groups before and after the family-oriented training

Variable	Before				Sig.	After				Sig.
	Control group		Intervention group			Control group		Intervention group		
	Mean ± SD	Mean rank	Mean ± SD	Mean rank		Mean ± SD	Mean rank	Mean ± SD	Mean rank	
Diet	15.06±7.3	-	13.5±6.13	-	*0.327	12.96±6.9	-	25.9±4.33	-	* 0.001
Physical activity	5.9±3.55	-	4.53±3.03	-	*0.115	3.8±3.18	-	9.33±2.6	-	*0.001
Blood glucose monitoring	2.7±3.9	30.3	2.56±3.47	30.7	**0.924	1±1.74	15.97	8.66±2.96	45.03	**0.001
Medication regimen	20.86±0.73	32.93	20.36±1.42	28.07	**0.053	20.46±2.92	30.48	20.93±0.36	30.52	** 0.981
Foot care	14.3±9.07	-	15.16±8.96	-	*0.711	11.23±8.57	-	28.06±5.73	-	*0.5001
Total self-care	58.83±18.95	-	56.13±17.64	-	*0.57	46.46±16.35	-	92.9±11.09	-	*0.001

* Independent T Test

**Man Whitney Test

Discussion

Regular follow-up sessions and the continuation of self-care by patients and their families can prevent acute and chronic complications of the disease, or delay the onset of these complications [9]. The results of this study indicated a significant improvement in the self-care behavior of diabetes patients. This included improvements in diet, physical activity, blood glucose control, foot care dimensions, and total self-care after intervention.

One of the dimensions of self-care is the following of a specific diet. This was investigated in the present study and the results showed that family telephone follow-up has a positive effect on the diet regimen of patients with diabetes. In accordance with the results of this thesis, the study of Zolfaghari et al. examined the effect of mobile and telephone follow-up methods in the two groups. The results showed a significant difference between

the two groups after the intervention in diet adherence of patients with Type 2 DM [24]. A study by Mons et al. entitled, "The Effectiveness of Telephone Support Intervention in Type 2 Diabetes", showed equal efficacy of telephone and in-person intervention in controlling hemoglobin glycosylated after 12 months and 18 months of intervention. This also confirmed the efficacy of telephone intervention, compared to in-person intervention for glycosylated hemoglobin control [25]. The findings of this study were similar to the findings of a study by Hakim et al. [26].

There was no significant difference between the control and intervention groups after the intervention in the post-intervention period. A study by Sanaei et al. entitled, "The effect of family-centered empowerment model on family collaboration in follow-up of post-coronary artery bypass graft surgery (CABG)" showed that a family-centered empowerment model led to increased

family collaboration in the patient's adherence to diet and medication regimen, and physical activity after CABG [27]. The results of the study by Hakim et al. showed that family-based empowerment can increase adherence to therapeutic regimens and delay the possible complications of diabetes by controlling diabetes [26]. A study by Turner and colleagues also found that nursing care with telephone follow-up increased patients' compliance with their medication regimen [28]. Perhaps, the lack of a significant difference in medication regimen after intervention between the two groups in the present study suggests that patients with diabetes consider medication regimen as the only treatment of their disease and in the intervention group, the use of medications was regularly performed before the study.

Today, experts point out that regular physical activity, along with the right diet and medication are the three principles in the treatment of diabetes. In this regard, a study by Ghotbi et al. showed that after family-centered education in the intervention group, the scores of diet, physical activity, and medication regimen dimensions significantly increased in patients with diabetes [29]. Studies by Fonseca-Guedes et al. as well as Sacco et al. confirmed the effect of telephone follow-up on compliance with physical activity in patients with diabetes [30, 31]. Self-monitoring of blood glucose can improve blood glucose control and prevent early and late complications of diabetes [32]. The results of this study showed a significant difference between the control group and the intervention group after the intervention. In line with the findings of this study, Lorig et al. showed that telephonic intervention improves self-monitoring of blood glucose in the intervention group [19].

Another dimension of self-care, studied in this study, was the attention to foot care

for prevention of diabetic foot. The results of this study showed a significant difference between the intervention group and the control group after intervention. This finding is similar to that of Parizad et al [20], and for foot care in patients with diabetes using telephone by Ghotbi and colleagues [29].

The results of this study showed a statistically significant difference in total self-care between the intervention and control groups after intervention. Consistent to the results of this study, the results of the study by Garcia et al. entitled, "Family intervention in controlling type 2 DM" showed that family-centered intervention resulted in a significant reduction of glycosylated hemoglobin in patients with diabetes [33]. The findings of this study are also in line with the findings of studies by Teufel-Shone et al. [34] and Pedram Razi et al. [35].

Despite advising patients in the intervention group not to attend the Diabetes Association classes as well as other classes, one of the limitations of this study was the probability of informational interaction between intervention and control groups in Diabetes Association classes.

Controlling diabetes involves self-care behaviors. Diabetes mellitus, due to its chronic nature, involves a patients' family and associates in controlling and treating diabetes. The results of this study showed that implementation of family-based telephone calls promotes self-care behaviors in most dimensions of self-care, which results in patients' independence, reducing and controlling complications, and increasing the satisfaction of the patient and his/her relatives. According to the results of this study, it is suggested that policymakers and health care administrators use informational and communicational technology to follow up, train, control, and evaluate the self-care status of patients with chronic diseases in

the health care system. In addition, using this method and involving families in the care process, a large number of patients can be followed in a wide range of geographical areas, including distant districts.

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Conflict of interest

No conflict of interest has been declared by the authors.

Author contributions

All authors have agreed on the final version and meet at least one of the following criteria [recommended by the ICMJE

(<http://www.icmje.org/recommendations/>):

-Substantial contributions to conception and design, acquisition of data, or analysis and interpretation of data;

-Drafting the article or revising it critically for important intellectual content.

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