Original Article

The effect of self care education on self care behaviors in adolescent with type 1 diabetes

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Abstract

Introduction: Self-care in type 1 diabetes includes blood glucose control, diet control, insulin administration, insulin dose adjustment, and having a proper pattern of psychical activity. The aim of this study was to examine the effect of self-care education on self-care in adolescents with type1 diabetes referred to Iran diabetes Association. Methods: This non-randomized clinical trial study was conducted on 74 adolescents (age range, 12-18 years) with type1 diabetes registered in the Iran diabetes Association. The participants were randomly divided into two groups of intervention and control. Data were collected using the demographic questionnaire and self-care questionnaire. The education during 5 session for the intervention group. After education, the patient of intervention group were follow up using mobile service for 3 month. Eventually all participants completed the questionnaires again. The data were analyzed using the SPSS.18 software. Results: Before the educational intervention, there was no significant difference in the average self-care subcategories' scores(diet, physical activity, drug use and control of diabetes complications and total self-care) between the two groups, but after the intervention, the mean scores of the variables in the intervention group were significantly increased and significant differences were found between the two groups ($P < 0.05$). Conclusions: education, the follow up after educational sessions and engaging parents in health programs can improve the self-care behaviors in adolescents with type 1 diabetes.

Keywords: Self-Care, education, adolescent, type1 diabetes

INTRODUCTION

Type 1 diabetes is one of the most common chronic metabolic diseases in childhood and adolescence [1], and its prevalence is rapidly increasing throughout the world [2]. It has been estimated that one in every 300-400 adolescents has type 1 diabetes [3]. This disease may affect many systems of the body, mainly if not controlled with appropriate timing; it is also associated with various complications such as cardiovascular diseases, nephropathy, neuropathy and retinopathy, which can lead to chronic morbidities and mortality [4]. For instance, the prevalence of cardiovascular diseases in patients with type 1 diabetes is ten times as many as in healthy people [5].

Furthermore, type 1 diabetes can affect many physical, social, behavioral, and financial aspects of the lives of patients and their families, especially when patients are young, becoming independent of their parents and starting to know themselves [6]. Therefore, learning to know how to be independent is of great importance for young patients with type 1 diabetes [7]. Interventions for managing diabetes and its complications have proven the critical role of blood glucose management in reducing the long-term complications of type 1 diabetes [8] and improving the life quality of patients. Self-care activities in diabetes include frequent blood glucose control (at least three times per day), diet control, insulin administration, insulin dose adjustment, and having a proper pattern of psychical activity (150 minutes per weak) [9]. Self-care is the process of raising knowledge or awareness by learning in order to live with the complex nature of a specific disease. Through self-care activities, the overall cost of a disease and its mortality rate can be reduced; moreover, lack of self-care awareness can negatively affect patients both physically and mentally [10]. Adolescents are far less successful in self-care activities, and therefore, they need to optimally include type 1 diabetes'

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self-care activities in their daily routines [11] based on age-appropriate education [2]. Adolescence is generally a challenging period of life, and teenage patients with diabetes commonly face the most significant challenges when managing their diabetes. In other words, adherence to treatment is very low in adolescent patients [12]. Accordingly, the present study was conducted to investigate the effect of education on self-care behaviors of adolescents with type 1 diabetes.

Methodology

The population in the present non-randomized clinical trial consisted of 427 adolescents (12-18 years old) with type 1 diabetes, who were referring to the Iranian Diabetes Association (IDA) in Tehran during the year 2015. In line with similar studies [13, 14] and based on the formulation for sample size determination ($n= (Z_1+ \beta)^2 Z_{1-}*2*SD^2/d^2$), Standard Deviation of δ_2 =3.83, error level of 5%, Confidence level of 95%, and test power of 80%, the sample size was determined to be 80 individuals (40 assigned to the intervention group and 40 to the control group). The names of the study's samples, selected via convenience sampling method, were written on 80 separate pieces of paper and the first 40 names were determined to be members of the intervention group, and the rest constituted members of the control group.

The inclusion criteria included being diagnosed with type 1 diabetes by a physician, passing of at least six months after the initial diagnosis of the disease, being in the age range of 12-18 years, living with family members, not suffering from diabetes debilitating complications such as kidney failure or blindness, being able to talk and communicate, and being ready to participate in the study. The exclusion criteria, on the other hand, included incomplete completion of the questionnaire and non-attendance at the training sessions.

The instrument used in this study was a questionnaire consisting of a demographic section and the Self-care Behavior Scale. The demographic section collected data related to the participants' age, gender, education level, disease duration, family history of diabetes, and number of family members. The Self-care Behavior Scale has been developed by Farsi in 2006. Validity and reliability of the scale were confirmed by the present study's researcher. Correlation coefficients in the range of 0.63 and 0.98 have been obtained between the scale's scores, and Cronbach's alphas in the range of 55% and 81% have been reported for the scale [15]. The obtained Cronbach's alpha for the mentioned scale was 91% in the current study. The Self-care Behavior Scale consists of 24 items scored on a 5-point Likert scale ranging from 'always' (scored 5) to 'never' (scored 1). In this scale, seven questions assess diet, six questions assess physical activity, two questions assess drug use (i.e., insulin use), five assess acute complications of diabetes, and four assess chronic complications of diabetes. the questions are scored as 4,3,2,1 and 5, respectively. Each questions' scores are calculated, separately. Then, the overall score of the Self-care Behavior Scale is the sum of all items' scores. The lowest and the highest possible scores in the Self-care Behavior Scale are respectively 24 and 120.

After receiving a research permit from the Ethics Committee of the University of Social Welfare and Rehabilitation Sciences -under the code IR.USWR.REC.1394.37- and the approval of officials of the Iranian Diabetes Association

for cooperating in the study, research objectives were explained to the participants and their families. They were also ensured that they had the right to end their participation at any stage of the study and their information would remain confidential. Then, all the participants signed the informed consent form and participated in the pretest. The pretest conducted for both experimental and the control group. After the pretest, only participants in the experimental group received the intervention. It must be mentioned that the present research project has also been registered at the Iranian Center for Clinical Trials under the code IRCT2015051322258N1.

The educational intervention consisted of five 90-minute sessions of self-care education (450 minutes total), which were held by the researcher for participants in the experimental group at the Diabetes Association. The participants participated in the educational program in groups of 12 people, and each participant could participate with one of his/her parents.

The sessions were held via lectures, group discussions, questions and answers, and slideshows. Practical skills training (e.g., insulin injection and glucose control with a glucometer) were also performed throughout the intervention, and after learning each skill, the participants could perform it and detect their areas of difficulty.

The contents of the sessions were as follows:

Sessions 1 and 2: educating adolescents and their parents on diabetes, its development, prognosis, and complications, including retinopathy, nephropathy, neuropathy, hypoglycemia, hyperglycemia, and diabetic ketoacidosis, and the consequences of ignoring diabetes treatment and self-care practices, explaining diabetes control methods and the importance of self-care behaviors

Sessions 3 and 4: educating adolescents and their parents on self-care behaviors in the areas of diet, physical activities, control of diabetes' complications, the proper use of insulin administration, and daily control of blood glucose

Session 5: at this stage, the participants had learned the previous contents and could briefly teach them to members of their families. The purpose of session 5 was to increase the participants' self-confidence by observing their abilities to provide their families with their newly-learned information and gaining their support. In order to ensure that the final step was followed, several questions about the

contents of the program were raised, and the participants and their families were asked to answer them.

In order to follow up the program, participants in the intervention group were asked to give their home and mobile phone numbers.

Two-stage evaluation: process and final evaluations were performed. During the intervention and before the beginning of each session, the process evaluations were performed by asking questions concerning the contents taught in previous sessions. One and a half months after the last session of the training program, the final evaluation was also done by asking the participants to complete the study's questionnaire for the second time. Of the 80 samples that were initially included in the study, six were excluded due to the reasons such as inadequate completion of the questionnaire (three individuals) and non-attendance at the training program (three individuals). Accordingly, 74 people were examined in the final evaluation stage.

Using the SPSS-18 software, the collected data were analyzed through descriptive and inferential statistics (i.e., independent t-test & ANCOVA) ($p<0.05$).

Results

The two groups were identical regarding demographic characteristics; there was no significant age-based difference between two groups (p=0/191); the average disease duration in the experimental and control groups were respectively 5/29±2/99 and 4/15±3/11 years, which were not statistically different (p=0/863).

The distribution of other demographic and disease-related variables in two groups along with results of the chi-square test of homogeneity are presented in table (1).

Before the intervention, no significant difference was observed in the average self-care subcategories' scores (diet, physical activity, drug use and control of diabetes complications and total self-care) between the two groups, but Two groups were different in diet score (P= 0/048). Nonetheless, after the intervention, the average self-care subcategories' scores and total self-care score increased in the intervention group, but they remained almost the same in the control group (p<0/001). The t-test results indicated that the differences were statistically significant. Since the pre-test average self-care subcategories' and total self-care scores were influential in their post-test scores, and thus, could distort the actual effect of the intervention, Covariance Analysis was conducted. Hence, the pre-test scores of dependent variables were entered into the model as confounding variables (covariates), and the group was included as the main independent variable. In both ANCOVA models with dependent variables of diet, physical activity, drug use and control of diabetes complications and total self-care, the pre and post-test intervention scores were significantly different. The independent variable of the group was also significant. The models showed that, after controlling the effects of pre-test scores, the intervention was both effective and significant (table 2).

Table 1. demographic characters of adolescents with type 1 diabetes

p-value	Control group	Intervention group	Variables	
	Frequency(percent)	Frequency(percent)		
0/098	23 (%67/50)	13 (%38/23)	Female	Sex
	17 (%42/50)	21 (%61/77)	Male	
0/531	7 (%17/50)	3 (%8/8)	Grade school	Education
	17 (%42/50)	18 (%53)	Junior high school	
	15 (%37/20)	13 (%38/2)	High school	
0/797	8 (%20)	6 (%17/60)	Yes	family history of diabetes
	32 (%80)	28 (%82/40)	No	
0/678	10 (%25)	9 (%26/50)	Three-people	Number of family
	22 (%55)	17 (%50)	Four-people	
	8 (%20)	8 (%22/50)	Up to 4	

Table 2. comparison of average self-care subcategories' scores in two group before and after intervention

p-value**	*p*-value*	t	Mean and standard deviation	Group	self-care subcategories	**Test phase**
	0/048	2/015	2/97±0/30 2/85±0/23	intervention control	Diet	**Pretest**

	0/336	0/968	2/99±0/41	intervention	Physical activity	
			2/91±0/31	control		
	0/844	-0/198	2/73±0/33	intervention	drug use and control of diabetes complications	
			2/74±0/20	control		
	0/177	1/36	2/90±0/23	intervention	Total self-care	
			2/83±0/17	control		
<0/00001	<0/00001	12/52	3/54±0/25	intervention	Diet	**Posttest**
			2/82±0/24	control		
<0/00001	<0/00001	12/24	3/76±0/33	intervention	Physical activity	
			2/82±0/32	control		
<0/00001	<0/00001	10/73	3/30±0/27	intervention	control of diabetes complications	
			2/61±0/22	control		
<0/00001	<0/00001	17/49	3/53±0/21	intervention	Total self-care	
			2/77±0/16	control		

p-value*:independent T-Test
p-value** : Covariance Analysis

Discussion

Purpose of this study was determination of effect of education on self-care behaviors in adolscents with type 1 diabetes. According to the results of this study, it can be concluded that self-care education led to an increase in the average scores of self-care subcategories of diet, physical activity, and control of diabetes complications in adolescents with type 1 diabetes.

In this study, the average scores of self-care subcategories (i.e., diet, physical activity, and control of diabetes complications) in the intervention group significantly increased after the intervention, while they remained unchanged in the control group. Based on the Health Belief Model, Fani and colleagues studied the effect of education on dietary compliance and found that education can enhance dietary compliance [16]. In a clinical trial aiming at evaluating the effectiveness of self-care education based on Family-Centered Empowerment Model among patients with type 2 diabetes, Ghotbi and colleagues showed that education increased the average scores of self-care subcategories of diet, physical activity, control of diabetes complications, drug consumption, and foot care in the intervention group [13]. Hartayu and colleagues also showed that education could enhance self-care behaviors of patients with type 2 diabetes [17]. In their descriptive study, Lin and colleagues concluded that education and continuous insulin use could improve self-care behaviors in patients with type 1 diabetes [9]. The results of the present study are in line with the mentioned results.

Contrary to the results of this study, Santiprabhob and colleagues claimed that education does not affect self-care behaviors of adolescents with type 1 diabetes [18]. Similarly, Rothman and colleagues reported low levels of dietary compliance and physical activity in adolescents with type 2 diabetes [19].

In the current study, it was also found that post-intervention follow-ups through social networks of cellphones were also important factors that enhanced the educational program. In line with this finding, kazemi majd and colleagues showed the effectiveness of educational text messages in improving Self-efficacy and Adherence to the Medication Regimen in Adolescents with Epilepsy [20]. Parizad and colleagues showed that education and telephone-based follow-ups could enhance self-care behaviors of patients with type 2 diabetes [21]. In a study on patients with type 2 diabetes, Sacco and colleagues reported that telephone-based follow-ups for six months improved diabetic patients' adherence to their dietary, exercise programs and also enhanced their foot conditions [22].

Among the limitations of the present study, limited time for further analysis of the intervention's effectiveness and non-randomized assignment of samples can be mentioned. Accordingly, researchers are recommended to conduct future studies on self-care education with multiple follow-ups or follow-ups more than three months and random allocation of samples.

Conclusions

According to the results of this study, developing self-care educational programs, proper follow-up plans through mobile phone (e.g., forming groups in telegram), and engaging parents in health and self-care programs can improve self-care behaviors of adolescents with type 1 diabetes. Applying some methods such as mobile phones in training people, especially the adolescents, is practical in our society because of more tendency to use mobile phones, reluctance to participate in training sessions; moreover, it is an effective, comfortable and cost effective way.

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