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IMPACT OF TEAM-BASED LEARNING PROGRAM ON THE KNOWLEDGE AND ATTITUDE OF PARENTS OF CHILDREN WITH TYPE 1 DIABETES: A CLINICAL TRIAL

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ABSTRACT

Introduction:Education and empowerment of parents can play an important role in controlling the level of blood glucose in their child, reducing the complications of the disease. Knowledge and positive attitude are effective in controlling chronic diseases such as diabetes. Therefore, this study was conducted to determine the effect of team-based learning on the knowledge and attitude of parents of children with diabetes.
Methods: A clinical trial was performed on 48 parents and children with type 1 diabetes over a three month period. The samples were randomly divided into two groups of intervention, team-based learning (TBL) and routine (control), (each group=24). The score of knowledge and attitude of parents toward diabetes were measured by a researcher-made questionnaire in both groups using a pre-test. In the intervention group, the parents received the team based learning in 5 sessions by a training team and participants in the control group received the routine training of the hospital. Post-test was performed 4 weeks after the intervention. Data were analyzed using SPSS software, Wilcoxon test and covariance analysis (P<0.05).
Results: There was a significant difference between the mean scores of knowledge of the participants in the team-based learning before and after the intervention (P <0.001). There was also a significant difference between the mean scores of knowledge in the routine group before and after the intervention (P = 0.001). The covariance analysis also indicated a significant difference between the mean score of attitude in the two groups after intervention (p <0.001).
Conclusion: The team-based learning has an impact on increasing their knowledge and attitudes. Therefore, it is recommended for health care providers to benefit this method for training primary caregivers of children after diagnosis in order to promote their disease self-management and control complications in children with diabetes.

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Introduction

Chronic diseases today account for about 47% of the total burden of diseases in the Middle East and 80% of chronic disease deaths occur in low-middle-income countries (1). Meanwhile, diabetes is one of the most common and costly chronic diseases in the world (2). Type 1 diabetes (T1D) is a chronic autoimmune disease in which pancreatic insulin-producing beta cells are destroyed (3). This metabolic disease is characterized by a relative or absolute insulin deficiency, an increase in blood glucose and metabolic disorders that impair the regular flow of life (3). Type 1 diabetes is one of the common chronic diseases in children and one of its potentially life-threatening, which affects all organs of the body, lifestyle, personality and affection of children and families (3, 4). There is a bimodal distribution of age at onset, with a peak age at presentation around age 4-6 years and a another at early puberty (10-14 years old) (5). The incidence of type 1 diabetes has been increasing throughout the

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globe. According to global statistics, about 346 million people suffer from diabetes, and currently, two people in the world develop diabetes every 10 seconds. There will be 642 million people with diabetes in the World in 2040. Unfortunately, the world's diabetic population will reach 366 million by 2030 and the prevalence of diabetes in Iran is 7.7%. In developing countries, about 90% of people being aware of their illness; whereas this figure is about 50% in Iran (6). According to studies, T1D accounts for 5–10% of the total cases of diabetes worldwide (7). Despite the cost spent on preventing and controlling diabetes, the number of people with diabetes and its related complications is rising day by day (1). It seems that there is a weakness in awareness and self-care of these patients, because raising awareness and having proper self-care behaviors are the most important factors in controlling this chronic disease (7). It is believed that education can be effective in raising awareness and improving attitudes, and ultimately in controlling diabetes (1). Few researches have been done on the importance of knowledge and attitudes toward diabetes and its impact on disease control, and the results indicate the impact of educational intervention on increasing the knowledge and attitudes of individuals towards the disease. Increasing the knowledge and attitude toward diabetes can help people with diabetes to control their diet and nutrition, as well as regulate their blood glucose and, consequently, prevent from disease complications (8). To raise the knowledge of parents about how to care is one of the things that help to improve the quality of life of families with children with diabetes and promote the conditions of the child and reduce complications as well; and since children with diabetes are dependent on their parents in self-care practices, so educational interventions need to be performed on the family so that diabetic children's get familiar with preventive, care and control methods (9). Education is a dynamic process and undeniably, it has an important role in the awareness and attitude change and self-confidence and can lead to lifestyle changes and is considered one of the goals of controlling diabetes. Today, education and care in diabetes are considered to be more advantageous than curative care (9). Team-based learning in patients is a new strategy that has been taken so far in most studies in students and caregivers. In a study, Bergl and Feagles measured the impact of team-based learning on medical students and reached positive statistical results (10). Team-based learning is regarded as an effective teaching method (11, 12). This team can be comprised of an Endocrinologist and diabetes specialist and a diabetes nurse and a nutrition expert (13). The team-based learning strategy has been emphasized for social reasons (9). The researcher selected this method because of its positive characteristics for training such as uniform training contents, collaboration and information exchange between the group, active participation of parents and the child, face-to-face communication and targeted activities (14). Team-based learning programs will not be positive and effective if they are not frequent and permanent (15). Team-based learning may also have its own problems, and the students must have a limited range of information and participate in discussions and are challenged (16). Considering the experience of the researcher as an endocrinology nurse (Diabetes) as well as the frequent hospitalizations in diabetic children in Rasht due to weak knowledge and attitude towards the ability to control diabetes and consequently the parental care function for regulation of blood sugar of these children to prevent its complications (17) as well as since no study been done so far on diabetic children in Iran, the researcher sought to investigate the impact of team-based learning groups (nurse, doctor, and nutritionist) on parent's knowledge and attitude of children with type 1 diabetes compared with routine training before and three months after intervention.

Method

This study is a randomized clinical trial with two groups of pre-posttest performed on parents of children with type 1 diabetes who referred to the clinic and endocrine department of the Children's Hospital affiliated to the University of Medical Sciences in Rasht for three months in 2016. Inclusion criteria were the age range of the child (6-12 years), absence of another chronic disease in child, living with the parent, lack of mental or cognitive impairment in child and parents, the ability to read and write in parents, and parent’s willingness to participate in the study. In the case of a member of the health and care team in the child's family, the absence of parental cooperation during the study, the absences of more than one session by the child and parents at the training sessions were among the exclusion criteria. A total of 48 parents and children with type 2 diabetes who participated in the study were randomly assigned to control and interventional groups. They were matched in terms of the age, sex of the child and time. They were divided into intervention and control groups (24 in each group) using random blocking method with a block size of two and four with a 1:1 assignment sequence. The allocation sequence was determined by the person not involved in the study and using Randomizer software.

The data gathering tool was a researcher-made questionnaire, demographic information questionnaire and parents' knowledge and attitude questionnaire. The knowledge questionnaire composed of 22 items measuring the level of individual's knowledge about the nature of the disease, symptoms and symptoms of type 2 diabetes, risk factors in the occurrence of complications and the importance of controlling blood sugar in the natural range and ... in three options of Yes, with Score: 2, no with score and I do not know with score 0. The total score of each individual was then calculated. The maximum knowledge score was 22 and the minimum zero. The Attitude Questionnaire consisting of 20 items measures the reaction of a person with diabetes-related issues and situations. The questions were rated in a five-point Likert scale (5="Absolutely Agree” to 1="Absolutely Disagree"). It was asked from the respondents to express their agreement with the choice of one of the four options for the need for regular exercise, adherence to planned diet, regular use of medications, the need to maintain a normal blood sugar ranges, and regular referral to the physician. Total score of each person was calculated. The range of attitude score was 20-100. The content validity was used to determine the validity questionnaires. The questionnaires were given to ten faculty members of Tabriz University of Medical Sciences; nursing professors and pediatricians. Content validity index (CVR & CVR) in three areas of simplicity, clarity and relevancy was assessed for items and necessary corrections in the questionnaire items were made based on the comments. The reliability of given questionnaires was calculated in the present study by Cronbach’s alpha to be 0.93 and 0.85 for knowledge and attitude scale.

In the intervention group, team-based learning was performed by a trainer group (including a pediatrician, an endocrinology nurse and a nutritionist) for each group of 5 diabetic children with their parents in 5 sessions. The duration of each session was between 30-45 minutes. The training will be delivered through lecture, group discussion, question and answer. In parenting educational sessions, educational contents including diabetes definition, its causes, the short- and long-term complications of diabetes, the signs of low blood sugar and its rise, drug interactions, risk-taking measures, how to calculate high blood sugar correction insulin dose, and the first reference center since the beginning of the problem were explained by

endocrinology nurse in two sessions. In addition, explanations were provided on diabetes diet and its impact on blood glucose control, the carbohydrate content of all foods, measurement and carbohydrate count of each meal by the nutritionist at the next two sessions. Furthermore, how to test blood glucose with a glucometer, how to inject insulin and keep it, the way and site of insulin injection, self-care and regular and periodic visits, effects of walking and regular exercise in reducing blood glucose were instructed by the researcher in one session.

Control group: Parents were trained using similar educational contents for diabetic patients (routine training) in the form of lecture and the question- and-answer method by a staf nurse. The content of training in both groups includes the cause of diabetes, symptoms of diabetes, the identification of hypotensive and hyperglycemic risk symptoms, disease complications, dietary observation, the effect of exercise and walking, proper testing of blood sugar (glucose) using a glucometer device, correct way to give an insulin injection and a diabetes diet. These instructions were given to parents of children in the form of pamphlets or educational pictures.

Outcomes: Three months after the training sessions, knowledge questionnaire, and parent's attitudes questionnaire toward diabetic children were resubmitted to the parents and were completed. Data were analyzed by SPSS software. Covariance analysis was utilized in order to compare the mean of knowledge and attitude variables in two educational groups after checking the normality of variables and homogeneity of variances assumption. A significant level (less than 5%) was considered.

Ethical considerations: After obtaining necessary permissions from Tabriz University of Medical Sciences (approval number IR.TBZMED.REC.1395.295) and registration on IRCT site as well as receiving a referral from the vice president of research in Guilan University of Medical Sciences and Managers of Faculty of Nursing, the research was performed on parents of children with Type 1 diabetes referring to the Endocrine Clinic and Center of children's hospital in 17 Shahrivar, Rasht in 2016-2017.

Findings

According to Table 1, although the individual-social variables of children and their parents are not the same in terms of frequency and percentage in both groups, Chi-square test showed no significant difference among the individual variables of both groups and both groups are homogeneous (P> 0.05). In Table 2 and based on the Wilcoxon test, there was a significant difference between the mean scores of knowledge for the participants in the study before and after the intervention (P <0.001), and there was also a significant difference between the mean scores of knowledge in the routine group before and after the intervention (P=0.001). According to Table 3, the results of covariance analysis showed a significant difference between the mean score of attitude in both groups after the training (p <0.001).

Table 1. Describes the baseline characteristics of the participants in study between the two groups (n=48)

Demographic characteristic n(%)	**Team-based Education group (n= 24)**	**Control group Routine learning (n= 24)**	**χ^2 or t P value**
Child Age (year, M±SD)	8.99±2.1	9.8±2.1	*0./42
% male/% female	%29/%71	%46/%54	**0**/24**
BMI 17/73±3/20 Underweight Normal Over Weight		17/47±2/95 7.5 %12.5 %12.5	T=0.29 Df=46+ P=0.48
Diabetes in family yes no	%87.5 %12.5	%87.5 %12.5	**0.77
Previous Diabetes instruction YES NO	%66.7 %33.3	%62.5 %37.5	**0.76
Time since diagnosis (years)			

*T test, ** Chi-Square

Table 2 Means and Standard Deviations of knowledge Scores of mothers in Team-based (n= 24)) and Routine education (n= 24) participated in the study at began and after education

Group type		**Team-based Education group (n= 24)**	**Control group Routine learning (n= 24)**	**Independent t test**
knowledge	**Began**	31/67±5/37	32/38±6/06	P=0.67
	After	41/71±3/95	39/50±6/00	P=0.14
	Changes	10/04±6/41	7/13±	P=0.21
	paired t test	P=0.67	P=0.67	

Fig 1. Compares knowledge score in two groups in two times

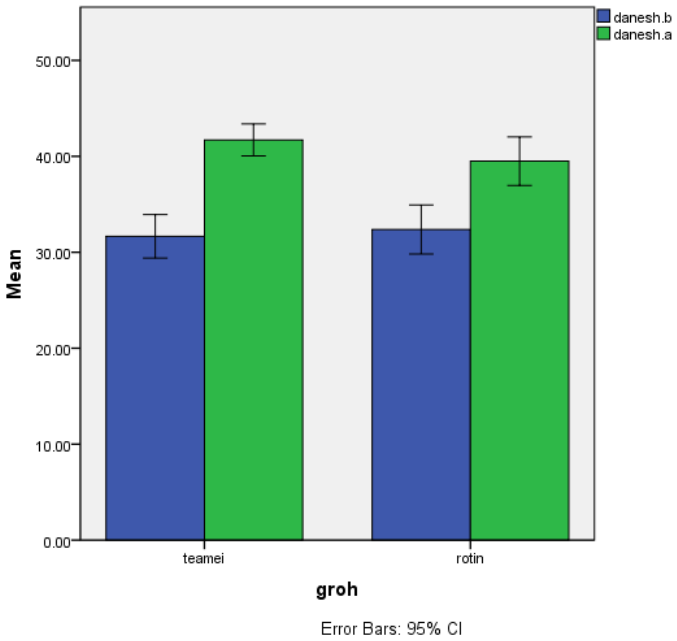
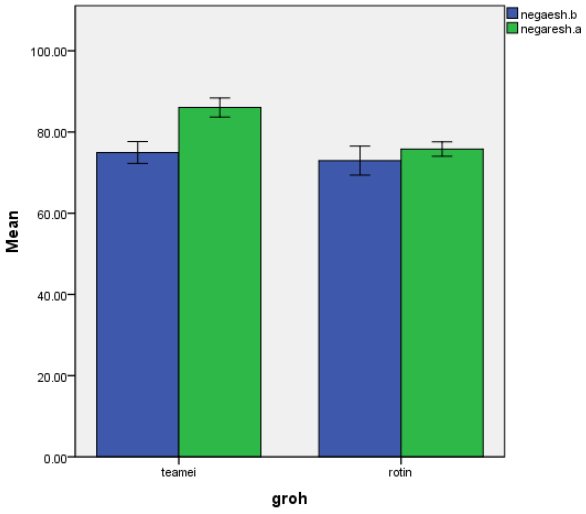


Table 3 Means and Standard Deviations of Attitude Scores of mothers in Team-based (n=24)) and Routine education (n= 24) participated in the study at began and after education

Group type		Team-based Education group (n= 24)	Control group Routine learning (n= 24)	Independent t test
Attitude	**Began**	74.96 ±6.36	72.96 ±8.48	P=0.36
	After	86.04±5.56	75.79 ±4.21	P<0.001
	Changes	11.08 ±6.41	2.83 ±9.54	P=0.002
	paired t test	P<0.001	P=0.159	

M= **Mean, SD= Standard Deviation**

Fig 2. Compares Attitude score in two groups in two times



Discussion:

In this study, the impact of team-based learning on the level of knowledge and attitude of parents of children with type 2 diabetes was investigated and the results showed that there was a significant difference between the mean score of knowledge and attitude of people in both groups after the training period (P<0.001). The results of this study were consistent with the results of the study by Ramezani et al. on mothers with diabetes (18). The results of other study suggest that the exchange of information among the group, the active participation of parents and the child, face-to-face communication and targeted activities affect the level of knowledge and attitudes of parents in self-care (14). In addition, the results of a study by M et al. (2014) in the United States indicated that using team-based learning has been influential in increased knowledge of children and adolescents and their families in controlling diabetes (13). Moreover, the results of a study by Goodarzi et al. on people with diabetes indicate that improving the knowledge, attitude and practice of caring for patients, making fundamental changes and resorting to new strategies are essential for reducing the dependence of these patients on health organizations (1). Team-based learning is a novel and very important approach in medicine, and has many advantages over traditional teaching methods and lectures. In another study by Yaminini et al. on health care providers (physician-social worker, health mediator and etc.), the results showed consistency with the results of this study (11). Also, the results of this study have been in line with the results of the study by Frame and colleagues regarding providing team-based learning for nursing diabetic patients (19). Other studies also found that the application of different educational approaches and the active participation of patients in educational programs could lead to positive outcomes (15). However, the results of a study by Hashmi et al. on providing team-based learning to treat diabetes for medical students revealed that TBL approach can be useful in time management and more effective learning and learners also have a high degree of satisfaction (12). In this study, team-based learning was implemented as a team consisting of physicians, nurses, nutritionists. The uses of team-based learning approach in the form of a team consisting of several specializations and benefiting from professional capabilities of various trainers are very influential. Team-based learning approach in patients is a new strategic approach that has so far been used in most studies by students and care teams. In a study, Bergl and Feagles measured the impact of team-based learning on medical students and reached positive statistical results (10). This study sought to minimize the risk of disturbing variables and potential biases by random selection of subjects for intervention and control groups. Yet, the most important limitation of this research was the climate of the region during the stady that caused the training sessions to take place at an irregular interval due to heavy snowfall. Additionally, the mental status of mothers of children with diabetes, as the main caretakers of the child, had an impact on the educational content and how they responded to the questionnaire that was beyond the control of the researcher. It seems that the status of administering training sessions among team members (physician, nurse and nutritionist) such as parent-child participation in meetings and their interaction with each other as well as engagement in question and answer sessions have been effectively contributed to improving their knowledge and attitudes towards diabetes and have led to an increase in their ability to control children's blood glucose and diabetes management. The results of this study showed that team-based learning has been effective in promoting the knowledge of parents of children and their attitude toward the disease. Thus, team-based learning has been suggested to be effective for all nurses involved in many challenges of managing diabetes in children in the worldwide and all children who are suffering from this disease and have self-care problems after diagnosis, especially in the early stages of the disease. It can also assist families of these children to upgrade their knowledge and attitudes toward the disease through various stages of life and, therefore, compensate for their performance. According to the results of the study on the suitable effectiveness of team-based learning in increasing the knowledge and attitude of children's parents in controlling diabetes, practitioners can use this method to provide very effective care in managing chronic disease such as diabetes. Because of the existence of sensitive and critical periods in children development and the need to use multiple post-diagnostic care techniques, use of individuals' capabilities in the form of team-based learning and suitable interacting atmosphere and providing appropriate feedback to parents in training sessions, can provide the basis for solving and meeting these needs; therefore, it is recommended to implement this technique in all care settings that face such challenges. The results of this study can help the health sector’s managers to design health promotion interventions in the form of team-based learning.

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