Effective Intervention of Self-Care on Glycaemia Control in Patients With Type 2 Diabetes

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Background: Diabetes is one of the most common diseases, which requires lifelong self-care to improve the quality of life.
Objectives: The current study aimed to determine the impact of self-care education programs on reducing HbA1c in patients with type 2 diabetes.
Patients and Methods: The current experimental study was conducted on 138 female patients with type 2 diabetes in Zahedan city, Iran. The data were collected by a self-administered questionnaire which included items on demographics, awareness, beliefs, Self-care behaviors. Before the educational intervention, the (HbA1c) test check list was completed for the patients in both groups. Then the training was applied for the intervention group in five 60-minute educational sessions within one month. Three months following the training, the data collection based on the check list was repeated for both groups. Data were analyzed using SPSS software.
Results: The mean scores of awareness, beliefs, Self-care behaviors of the educational group, were 46.6 ± 8.57, 46.5 ± 0.86 and 29.06 ± 10.02, respectively; and it was found that after the education, knowledge, attitude, and self-care scores increased significantly (P < 0.001 Before the training, the scores of self-care, beliefs, and awareness were less than average in the intervention and control groups. In addition, the levels of HbA1c in the patients were higher than the normal levels. Following the intervention, the mean of self-care and HbA1c of the intervention group significantly reduced as compared with those of the control group (P < 0.001).
Conclusions: Self-care training instructions led to improve knowledge, attitude, and performance of the subjects under study and also the average HbA1c. Therefore, the nurses and health care staff should be educated accordingly.

Keywords: Diabetes Mellitus; Self-Care; Health Education; HbA1

1. Background

Diabetes is the most common disease caused by metabolic disorders (1), remains as a global challenge (2). According to the statistics, more than 285 million people are affected by diabetes mellitus worldwide (3-5). The national study of risk factors of the non-communicable disease, has estimated the prevalence of diabetes in Iran in 2008, as 7.7% (with confidence interval of 95%: 7.5-7.9) (6). The World Health Organization (WHO) has predicted that the number of patients with diabetes in Iran will exceed six millions till 2030 (7). Maintaining optimal levels of blood glucose is essential in diabetes care and reduces the incidence of diabetes complications (8). International Diabetes Federation recommends that patients should maintain good glycemic control, and self-care measures. The measures include: 1) taking a healthy diet, 2) regular use of drugs, 3) regular exercise, and 4) monitoring the blood glucose. Although the prevention of morbidity and mortality of these cases seems simple, many patients with diabetes do not follow their physician's self-care recommendations regarding diabetes. Although Iranian patients have little information about the average blood sugar control, the increasing diabetes prevalence is an alarm of the poor diabetes control among them (9, 10). Self-care improves the quality of life and also may reduce costs. Especially the number of hospitalized cases is reduced. Continuous monitoring of the complications regarding acute and chronic diseases can prevent or delay their onset (11). One of the basic theories is the nursing of the patients with diabetes, the self-care theory of Orem (12).

According to this theory, the patient is passive and not just recipient of the health services, but should be strong, reliable and responsible, with a power of decision making that can provide self-health care responsibility, and good performance (12) to increase the knowledge about various issues including diabetes self-care principles, and

continuous control of blood glucose levels near normal to prevent the early and late complications of the disease, ensure a longer life for the patient, and reduce the health care costs (13). Without patients` participation in the educational and self-care programs, there will be more health care costs, and the quality of life will suffer further declines (14).

According the American Diabetes Association, people with diabetes should care about the treatment training they are undergoing, and for effective and appropriate treatment, the patients should adopt changes in their lifestyle to prevent the disease or delay its relevant complications (15). Rubin et al. performed a study on both the impact of training on self-care behaviors and metabolic control on 213 patients. After a training program on self-care and metabolic control by measuring, the HbA1c level was evaluated (16). Heisler et al. studied the medical records of 1032 patients with diabetes, and concluded that the mean of HbA1c level changed from 8.3% to 7.3%. They found that self-care behavior (drug use, self-monitoring of blood sugar, diet, exercise and foot care) is associated with lower HbA1c (17).

Ahmed Khan, in a study entitled the evaluation of awareness and self-care rate in patients with diabetes. He concluded that only 56% of the patients had sufficient knowledge regarding hypo glycemic, that too they gained it as more Informal and more experimental (18). Diabetes is a chronic disease which needs life-long specific self-care control (19). Parchman et al. conducted a study on 256 patients aged 18 years and older, regarding continuity of diabetes self-care behaviors and glycemic control in patients with type 2 diabetes observed that patients who had progressed by several times of regimen change and continuous self-care had lower HbA1c levels (20).

2. Objectives

The current study aimed to prove the importance of self-care and its effect on diabetes control and the findings of the study can be used more in the field of interventional education in other diabetes centers in order to better control the blood sugar. Therefore, diabetes self-care can be considered as a very important issue especially in controlling the incidence of complications of the disease. Many problems and obstacles are felt to implement self-care education, especially in our community. It is essential to investigate specific cultural features and characteristics governing the Sistan and Baluchistan province and Zahedan city, Iran, regarding this issue in patients with diabetes. Therefore this study aimed to determine the impact of self-care education program on reducing HbA1c, in patients with type2 diabetes.

3. Patients and Methods

3.1. Study Design

This experimental study aimed to investigate the effect of educational program as an independent variable on knowledge, attitude and self-care, and HbA1c as a dependent variable on female patients aged 30 to 60 years with type2 diabetes referred to the diabetes center at Hazrat Ali Asghar (AS) Hospital, Zahedan, Iran, in 2011. The study inclusion criteria: Female patients with type2 diabetes, aged 30-60 years, being diagnosed with diabetes at least for one year, having at least one HbA1c test higher or equal to 7% during the past three months for investigation of Hyperglycemia, no diabetic complications and neuropathy, be a clinical case of Zahedan, signing the letter of consent to participate in the study. Those who intended to get pregnant, persons suffering from diabetes type 1 and gestational diabetes, patients with severe impairment of vision and inability to speak, and those who failed to respond to the questions were not enrolled. Sample volume was calculated as with 100 people, applying easily selected method and random loss (one in the middle), randomly divided into two (case and control) groups (each group n = 69), and the level of significance was P=0.5.

3.2. Instrument

The applied questionnaire questions included knowledge (26 questions), attitude (five questions) and self-care behaviors (10 questions) were used. Demographic variables including age, marital status, education level, occupation, type of treatment, consumption or non-consumption of (cigarettes, hookah or opium) for this study were prepared, and through interviews with the subjects the questionnaire was completed.

The validity of the questionnaire was determined ad follows: To determine clarity of the items, questionnaires were given to 15 patients with diabetes who did not include in the study population, and then comments on them were applied. The ratio of content validity and content validity index was determined by the panel of experts and the items that did not obtain the required score were not selected. To determine the validity, questionnaires were distributed among 30 similar individuals and the mean alpha structures based on the total sample volume was 76%. The second check list showed records associated with HbA1c levels of the patients. Before the educational intervention in the control and intervention groups the mentioned questionnaire form and check list were completed, and the patients were referred to the hospital laboratory for HbA1c test.

3.3. Educational Program

The educational intervention for the case group was implemented for one month in five training sessions in the form of lectures, film screenings, and group discussion. The training sessions described the diabetes and its complications, and recommended proper diet, walking for 60 minutes at least three times a week, taking medication regularly as directed by the physician, blood

sugar self-monitoring, diabetic foot care and the not smoking. Educational CDs and diabetes pamphlets were also provided to the patients to be worked out at home. Patients' interest in the education, management of self-care behavior (how to cook food, sports and success in managing diabetes) were required from the patients in the training. A three months follow-up after completion of the training data through questionnaires of the case and control groups were collected and HbA1c tests were done. Also, during this period, patients were able to communicate with researchers through telephone and raise their questions.

3.4. Statistics

Collected data using SPSS software in addition to inferential tests and Chi square test in each group paired t-test and for comparison between groups t- test was used.

4. Results

Finding of the study showed statistical similarity (P>0.05) in the case and control groups, in terms of individual characteristics and demographic variables including age, education, marital status, occupation, type of treatment received, smoking and the source of income, and no significant difference was observed between the two groups. Also the highest frequency (2.94%) in the groups belonged to the housewives; regarding marital status (8.84%) of the subjects were married. Most of the subjects (65.9%) in the intervention and control groups were illiterate. All patients were diagnosed with type2 diabetes. And most of the patients (81.9%) of intervention and control groups had used oral hypoglycemic. Most of the subjects (88%) had information about diabetes from

physician and health workers. Thus, there was no statistically significant difference between the P value of the independent t-tests, chi-square and Fisher's exact tests, of the two groups from the view point of individual and base (Table 1).

The results showed that the average and standard deviation score of the intervention group about awareness before the educational intervention was 48.86 ± 4.64 and reached 52.80 ± 2.20 three months after the educational intervention. Mean and standard deviation score of the attitude of test group before the educational intervention was 16.55 ± 5.45 and reached 21.16 ± 3.58 three months after educational intervention. The self-care behaviors in the group before the educational intervention were 29.06 ± 10 and reached 39.69 ± 4.74 three months after educational intervention; therefore, the paired t-test showed statistically significant differences between them, (P < 0001). Also, the findings of this study showed that the mean HbA1c (9.7%) of the intervention group reached 8.30 three months after the educational intervention, paired t-test with 95% confidence showed significant difference between the groups (Table 2).

The results showed that the mean and standard deviation scores for areas of knowledge, attitude and performance of the control group before training (51.93 ± 5.40, 17.83 ± 6.17 and 27.58 ± 8.94) changed to 51.87 ± 5.47, 17.86 ± 6.17 and 27.79 ± 9.05) three months after the educational intervention, respectively, and the paired t-test showed no statistically significant differences between them. The control group mean and standard deviation of HbA1c 9.04 ± 1.54 reached 9.06 ± 1.52 three months after the educational intervention, a paired t-test showed no statistically significant differences between them (Table 3).

Table 1. Comparison of Frequency of Demographic Variable Between the Intervention and Control Groups [a]

Variable	Intervention Group	Control Group	Type and Test Result	P Value
Married status			exact Fisher test	> 0.5
Single	58 (84.1)	59 (85.5)		
Married	11 (15.9)	10 (14.5)		
Education level			exact Fisher test	0.641
Educated	46 (66.7)	45 (66.7)		
Uneducated	23 (34.8)	24 (34.1)		
Occupational status			exact Fisher test	0.641
Householder	65 (94.2)	65 (94.2)		
Employed	4 (5.8)	4 (5.8)		
Type of treatment			Pierson	0.244
Regimen	6 (7.2)	5 (7.2)		
Physical activity	4 (5.8)	4 (5.8)		
Oral drug	58 (84.5)	55 (79.7)		
Insulin	5 (7.8)	5 (7.8)		
Sources of information			exact Fisher test	> 0.5
Doctors	60 (87)	61 (88.4)		
Health-care staff	9 (13)	8 (11.6)		

[a] Data are presented as No. (%).

Table 2. Comparison of the Mean and Standard Deviation Scores in the Domains of Knowledge, Attitude, Self-Care and the Mean and Standard Deviation of Hemoglobin, Glycogen of the Intervention Group Before and After the Training Invention [a]

Variables	Before Educational Intervention	After Educational Intervention	P Value [b]
Awareness	48.86 ± 4.64	52.80 ± 2.20	< 0/001
Attitude	8.57 ± 0.86	12.98 ± 1.02	< 0/001
Self-care	29.06 ± 10.02	39.69 ± 4.74	< 0/001
Hemoglobin, glycogen	9.63 ± 1.83	8.30 ± 1.17	< 0/001

[a] Data are presented as Mean ± SD.
[b] Paired t-test.

Table 3. Comparison of the Mean and Standard Deviation Scores in the Domains of Knowledge, Attitude, Self-Care and the Mean and Standard Deviation of Hemoglobin Glycogen of the Control Group Before and After Training [a]

Variables	Before Educational Intervention	After Educational Intervention	P Value [b]
Awareness	51.93 ± 5.40	51.87 ± 5.47	< 0.832
Attitude	9.02 ± 0.95	9.11 ± 0.94	< 0.205
Self-Care	27.58 ± 8.94	27.79 ± 9.05	< 0.804
Hemoglobin, glycogen	9.04 ± 1.54	9.06 ± 1.52	< 0.233

[a] Data are presented as mean ± SD.
[b] Paired t-test.

5. Discussion

In the present study self-care training instruction led to improve knowledge, attitude and also the average HbA1c level among the patients with diabetes. In the current study normal blood glucose control significantly reduced cardiovascular and renal complications in the patients about 50%, this would not have happened unless the patients had good self-care and success in the most difficult part of this step, which was the effective follow-up training (20, 21). One of the dimensions examined in this study was patients' knowledge and skills obtained through diabetes education, it seems necessary to begin the process of self-control (22). Awareness of the subjects in this study significantly increased after training and it can enhance the collaborative learning and the use of video communication, because the next meeting confirmed the patient feedback. Results of the increased awareness in patients with diabetes are comparable with those of the other studies (23-27).

The results obtained in the current study, showed statistically significant differences in the area of attitude scores of case group after the educational intervention, which is consistent with those of the other studies (23, 28). The results showed that the patients' mean field performance of the intervention group improved after the intervention. In this study, behaviors such as physical activity, regular and timely use of medication, blood glucose self-monitoring, taking diet, and diabetic foot care were counted as the results of practice.

There was no significant difference in the average performance. Performance score the case group increased three months after the educational intervention, but no performance score increase in the control group was observed. Performance results of the patients with diabetes in the studies on physical activity (29), taking medications on time (30), and appropriate diet (31-33) were consistent with those of the current study (34-36).

The performance behaviors (diet, physical activity, self-monitoring of blood glucose, medications and diabetic foot care and smoking) were evaluated, and the test results showed that the impact of educational programs to promote self-care behavior performance improvement and training of health behaviors was one of the most important components of the design and planning education for diabetes, because it reduced two-third of the complications of diabetes (37, 38). The results of the current study were consistent with those of the other studies (34-36). HbA1c levels before and after the case group intervention showed significant differences, while in the control group, no significant differences were observed in HbA1c levels before and after the intervention, which was consistent with the results of other studies (24, 39-42).

The limitations of this study can be used to determine the cases and controls from a specified center and confine the control group of subjects and training sessions (morally) and record the behavior of people based on their own report .To compensate this limitation, after end of this project control group were given training CDs, So that they are not to be deprived of educational materials. Other limitations of this study include lack of

timely cooperation of patients to participate in classes and also timely referring to conduct experiments can be mentioned. Giving gifts to participants that this problem was partly solved. In spite of, all such restrictions, a detailed study was carried out.

The findings of this study showed that using this method (participatory and educational CD) in training the patients on awareness, attitude changes and self-care behaviors promotion was effective (43).

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