Health Education & Health Promotion (HEHP) (2013) Vol. 1 (1) : (67- 79)

The Effect of Self Efficacy Education Program on Reducing Blood Sugar Levels in Patients with Type 2 Diabetes

Iraj Zareban[1]*, Shamsaddin Niknami[2], Fatemeh Rakhshani[3]

Received: 06/11/2012 Accepted: 25/05/2013

Abstract

Aims: Diabetes as the most common diseases caused by metabolic disorders is an important global challenge. This is a disease that requires lifelong self-care; because the self-care and improvement of the life quality is cost effective .The aim of this study is to determine the effects of the self-Efficacy education program on reducing blood sugar levels among the type 2 diabetic patients. It was conducted in Zahedan.

Methods and Materials: 138 diabetic type 2 patients were selected in Zahedan Diabetic Center and divided randomly into control groups (n=69) and test group (n=69); and special checklist and health belief model questionnaire were applied as data collection instruments. Reliability and validity of the questionnaire was evaluated and confirmed.

The data collected before intervention was analyzed, then educational design method executed 3 and 6 months after intervention and the collected data was analyzed using SPSS software.

Findings: According to the results, there is a significant statistical difference in average number of models before and after educational intervention (p<0001). Also, HbA1c and FBS after educational intervention were lower (p<0001).

Conclusions: Self-efficacy training in striation improves knowledge, attitude and self-care behaviours performance of the subjects and the related average of HbA1c and FB. The training seems to increase the learners' active participation in caring themselves, because they have experienced the results of the training program and they are motivated to enhance their better self-care behaviours.

Key words: Diabetes, Self-care, Self-efficacy, Health education, HbA1c

1.Assistant Professor, Health Promotion Research Centre, Zahedan University of Medical Sciences, Zahedan, Iran

Email: Zareban@gmail.com

2. Associate Professor, Faculty of Medical Sciences, Tarbiat Modares University, Tehran, Iran

Email: Niknamis@modares.ac.ir

3- Professor, Health Promotion Research Centre, Zahedan, University of Medical Sciences , Zahedan ,Iran

Email: rakhshani@Health.gov.ir

Introduction

Diabetes pandemic associates with sedentary life styles, notional changes and behavioural rich Factors [1]. Diabetes is an obvious epidemic which is strongly related to changes in life styles and economic situation [2]. According to statistics, more than 285 million people have been affected by diabetes mellitus worldwide [3]. 90 percent of the diabetes patients suffer the type2 and the number will reach to 439 million in 2030 [4]. Most of this increase depends on aging, unhealthy diet patterns, obesity and sedentary lifestyle which are common in developing countries [5].

National Study of the Risk Factors of Non-communicable Disease has estimated the prevalence of diabetes among the Iranian population was 7.7% in 2008 (With confidence interval of 95%:7.5-7.9) [6]. World Health Organization has estimated that the number of diabetic patients in Iran to reach over six million in 2030 [6]. The most common complication of diabetes is that the disease imposes high costs on individual and society. Onset of complications, especially if it is combined whit small and blood large vessels, (vascular injuries) the disease can lead to reduced life quality [5]. Pathogenesis and mortality due to the complications and major health-care issues are great concerns in the world [6] and that is why considerable attention has shifted to the investment for diabetes control [7]. Maintaining optimal level of blood glucose is essential in diabetes care as well as in reduction of diabetes complications [8]. International Diabetes Federation recommends that patients should maintain good glycolic control, and self-care measures. These measures include: 1-follow a healthy diet, 2 -Regular drugs use, 3- regular exercise, and 4 -Blood glucose monitoring. Although the prevention of the morbidity and mortality of these cases seems simple, many diabetic patients have not followed their physician's self-care recommendations. There is not enough information about the average blood sugar control among the Iranian patients, however increase of the diabetes prevalence, sound alarm of poor control [9, 10]. Self-care improves the life quality, reduces care costs and specifically the number of hospitalized cases. Complications of the acute and chronic diabetes can be prevented or delayed through continuous monitoring, [11]. One of the basic theories concerning the diabetic patients nursing is self-care theory of Orem. [12]. The theory expresses that the patient is passive and just recipient of health services, but he or she must be a strong, reliable and responsible individual who possesses decision making power. The power which can provide him or her with self-health care responsibility, better performance [12], more knowledge about various issues including diabetes self-care

principles, the ways of continuous controlling the blood glucose and keeping it at near normal levels, prevention of the disease complications, and lastly it creates hope for longer life and less health care costs. Undoubtedly, achieving such goals requires dynamic and continuous public participation [13]. Without education and participation in self-care programs, health care costs will increase and life quality will decline [14].

The America Diabetes Association declares that diabetes patients should care about their undergoing treatment training and changes in their life style in order to prevent disease or delay its related complications through adopting the effective and appropriate treatment [15].

Rubin et al. studied the effects of training on self-care behaviours and metabolic control among 213 patients. After training program on self-care (exercise, nutrition, monitoring blood glucose and insulin pen values) and metabolic control the HbA1c measures were evaluated and Significant differences were seen in self-care behaviours before and 6 months after training [16]. Heisler studied the medical records of 1032 diabetic patients, and concluded that the mean of HbA1c changed from 8.3% to 7.3% after training and found that self-care behaviour (drug use, self monitoring of blood sugar, diet, exercise and foot care) is associated with lower HbA1c. The results showed that compared to the previous year tests, 15% HbA1c tests, 16% eye exams and 13% nephropathy screening tests decreased [17]. Also, the results of the study show the importance of self -care of diabetics in glycemic control [17].

Diabetes is a chronic disease and needs specific self-care behaviours until the end of life. In addition, diabetic patients require special skills and acute care to prevent fluctuations in blood sugar and should employ them in many health behaviours as well as in their life style in order to prevent long term complications diabetes [18].

Ahmad Khan, in a study entitled "Evaluation of awareness and self-care rate in diabetic patients" concluded that only 56% of patients had sufficient knowledge of hypoglycaemic, and that they gained it in informal and experimental ways. 15% of the patients were aware of chronic complications, 76% of their insulin self-injection, 10% of blood glucose using Glucometer and 6% were aware of the urine sugar tests [19].

M. Parchman et al. studied on 256 patients of age 18 years and older, regarding continuity of diabetes self-care behaviours and glycemic control in type 2 diabetic patients and observed that patients who had progressed by several times of regime change and continuity of self-care had lower HbA1c levels .This relation remained significant after controlling the number of visits, number of months after

diagnosis, number of days of study and period of diabetes [20].

Diabetes is one of the diseases whose main treatment is the patient's own responsibility and practically not feasible round the clock or when the patient is under medical supervision and in treatment centres. Therefore, self-care education reduces the problems caused by the disease. The findings of the study can be used elaborately in the field of interventional education in other diabetes centres in order to improve blood sugar control. Self-care is a very important issue in controlling the complications of the disease. Many problems and obstacles are felt concerning the education, especially in our community. With regard to the specific cultural features and characteristics dominated in Sistan and Baluchistan province and Zahedan, investigation of the issue seems to be essential for diabetic patients.

Materials and Methods

The study population was diabetic type 2 females referring to Hazrat Ali Asghar hospital, diabetes clinic. Samples were 138 individuals selected randomly and divided into control and test groups. The aim of this experimental study was to determine the effects of self-efficacy education program as independent variable on knowledge, attitude and self-care behaviour, as well as the effects of HbA1c and FBS as dependent variables on diabetes female patients (Zahedan-Iran, in 2011). Inclusion criteria of the study were: having at least one HbA1c test higher or equal to 7% during the past three months; blood sugar investigation; being a clinical case of Zahedan; consent to participate in the study; having no complications–kidney problems; and resistance to insulin. Those who intended to get pregnant, persons suffering from diabetes type 1, gestational diabetes, patients with severe impairment of vision and inability to speak were omitted.

A questionnaire was designed and applied as data gathering instrument. It contained 51 questions on knowledge (26 items), attitude (5 items), self-care behaviours (10 items) and self-efficacy (10 items). Demographic variables including age, marital status, education level, occupation, type of treatment and smoking were predicted in this study and the related data were collected through interviews. To determine the questionnaire validity it was distributed among15 diabetic patients not included in the study population, and their comments were assessed. The ratio of content validity and content validity index was determined using the panel of experts' opinions and those items did not obtain the required score were deleted. To determine the reliability, the questionnaires were distributed to 30 individuals not included in the study population and the mean alpha structures based

on the total sample volume calculated as 76%. The second check list associated with the recorded HbA1c levels of patients and their blood glucose levels.

Blood samples were collected (using syringe) twice before and after the interventions and transferred to laboratory immediately to be conducted glycosylated haemoglobin test by Tosoh Automated Glico-haemoglobin Analyzer device. Moreover, during data collection process the questionnaires of the two groups were not disclosed to researchers and Laboratory. The questionnaires and check lists were filled out before the educational intervention by the control and test groups' members, and patients were referred to hospital laboratory for testing HbA1c. Then educational intervention was conducted in the test group for one month and in six training sessions containing lectures, film displaying, and group discussions. At the meetings the patients were recommended and informed about diabetes and its complications, proper diet, walking at least 3 sessions per week and 30 min each session, taking education regularly as directed by the physician, self- monitoring patient's blood sugar, diabetic foot care and the not smoking. They were also provided with educational CDs and diabetes pamphlets to be worked out at home. Patients were to be interest in education and management of self-care behaviour (how to cook, sports and success in managing diabetes).

Follow-up

3 months after completion of the training, questionnaires' data of both the test and control groups were collected and HbA1c tests were conducted. Of course, during this period, patients were permitted to communicate and ask their questions through telephone. Collected data were analyzes using SPSS software. In addition, inferential tests and Chi-square test and pair T-test were applied for comparison of the two groups.

Results

In this experimental study 200 type 2 diabetic women attending the Hazrat Ali Asghar Hospital were selected randomly, among which just 138 samples met the inclusion criteria. They were divided equally in the test and control groups (n = 69). Individual characteristics and demographic variables including age, education, marital status, occupation, type of treatment received, smoking and income were recorded; statistical similarity was observed ($P > 0.05$) and no significant difference was observed between the two groups in this regards. The age mean and standard deviation in test group was (73.47 ± 3.7) and in control group was (48.23 ± 0.2) .The t test results showed similar mean age between the two groups ($P = 0.68$.). Also, most of the subjects were married (88.4%) and illiterate (65.9%). All patients were diagnosed

with Type 2 diabetes and most patients (81.9) had used oral hypoglycaemic. Most samples (88%) received information about diabetes from doctors and health workers.

Thus, the values of the independent T-tests; chi-square and Fisher's exact test, were obtained for the two groups (Table1); and there was no significant difference between test and control groups. Concerning the awareness, the ANOVA test revealed a significant difference before and after education intervention. There is also a significant difference in independent T-Test awareness before intervention between the test and control groups (p=0.02). There was no significant difference according to the T-Test, between the test and control groups in other construction (p>0.05). There is a significant difference (p<0.0001) according to ANOVA test, concerning the self-care behaviours (diet, physical action, self-monitoring, blood sugar , regular drug intake, diabetic foot care, smoking) in control group before and after educational intervention (3months and 6 months later). However, there was no significant difference (p>0.05) in self-care behaviour average values. Also, HbA1c average increased to 9.7% after educational intervention (8.3% after 3month and 8.31 after 6 month) in the test group. There was no significant difference (p>0.5) between the test and control groups before intervention concerning theHbA1c and FBS (Table 2).

Table 1: Individual and test group-based information

Variable		**Intervention group**		**Control group**		**Type and test result**
		frequency	**percentage**	**frequency**	**percentage**	
Married status	Single	58	84.1%	59	85.5%	Exact Fisher test P > 0.5
	married	11	15.9%	10	14.5%	
Education level	Educated	46	66.7%	45	66.7%	Exact Fisher test P = 0.641
	uneducated	23	34.8%	24	34.1%	
Occupational status	House holder	65	94.2%	65	94.2%	Exact Fisher test P = 0.641
	Employed	4	5.8%	4	5.8%	
Type of treatment	Regime	6	7.2%	5	7.2%	Pierson p=0.244
	Physical activity	4	5.8%	4	5.8%	
	Oral drug	58	84.5%	55	79.7%	
	Insulin	5	7.8%	5	7.8%	
Smoking	Smoker	13	18.8%	11	15.9%	Exact Fisher test P=0.823
	Non-smoker	56	81.2%	58	84.1%	
Information Sources	Doctors	60	87%	61	88.4%	Exact Fisher test P > 0.5
	Health care staff	9	13%	8	11.6%	

Table 2: Comparison of the mean and standard deviation scores of knowledge, attitude and performance and the mean and standard deviation of the haemoglobin, glycogen and FBS of the test group and the control group, before and after training invention.

Study Group Variables		Before Intervention Mean (±SD)	After Intervention Mean±(SD)		P value
			3 Month	6 Month	
knowledge	Intervention	46.46±5.66	51.76±2.28	51.78±2.32	P<0.001
	Control	48.59±4.41	48.59±4.31	48.69±4.3	P=0.183
Attitude	Intervention	8.57±0.86	12.98±1.02	12.84±1.03	P<0.001
	Control	9.02±0.95	9.11±0.94	9.1±0.9	P=0.224
Self-efficacy	Intervention	29.33±5.67	42.03±20.42	41.83±2.34	P=0.351
	Control	30.46±5.51	30.5±5.48	30.52±5.49	P<0.001
behaviour	Intervention	29.36±9.91	39.69±4.74	39.58±4.74	P<0.001
	Control	27.59±8.95	27.8±9.09	27.89±9.09	P=0.52
HbA1c	Intervention	9.71±1.81	8.3±1.17	8.31±1.17	P<0.001
	Control	9.04±1.54	9.06±1.52	9.07±9.07	P=0.57
FBS	Intervention	174.82±35.62	134.66±17.85	135.69±16.43	P<0.001
	Control	176.73±54.96	177.17±54.43	177.25±54.35	P=0.169

Discussion

This study aimed at determining the effects of training programs on reducing HbA1c levels among the type 2 diabetic patients in South East of Iran. One of the reasons for diabetic patients' failure to achieve the desired outcomes is their lack of participation in treatment. This participation is an important factor in the treatment of patients who are willing to follow a treatment plan throughout the life [21]. Researchers were to present an educational model in order to increase patients' knowledge and improve their attitudes, behaviours and ultimately their self-care. The study examined the efficacy of education based on the HBM in improvement of knowledge, attitude, behaviour and self-care. The finding showed that the improved knowledge and skills of diabetic patients after educational intervention leads to promotion of self-control [22]. In this study, the knowledge of the intervention group significantly increased after the education. Education enhances collaborative learning, cooperation and communication.

The first step in controlling diabetes is education that can be effective in improving patients' self-care. One of the reasons why patients do not control their disease is lack of awareness [21]. Several studies concluded that lack of knowledge; self-care skills; and correct information about the treatment programs

hinder the improvements. One important problem is non-compliance and adherence to the treatment plan [16] however, we must not emphasis just on knowledge; because in many cases, people know what to do, but do not put their knowledge in action [17].

Normal blood glucose control significantly reduces cardiovascular and renal complications in patients up to 50%. This would not happen if the patient did not have good self-care behaviour. The most difficult part of this step is follow-up training [20, 21].

The other dimension examined in this study was patients' awareness, knowledge and skills education of which is necessary to begin the self-control process [22]. Training increases awareness and collaborative learning significantly and the video communication enhances it, because at the next session the patients' feedbacks would be confirmed. Our findings concerning the increased awareness of diabetic patients are comparable with other studies [23-27]. The result obtained in this study, have showed statistically significant differences in the area of attitude scores of the test group after the educational intervention, which is consistent with previous studies [23-28]. The results showed that the patients' mean field performance in the test group has improved after the intervention. Mean pair t-test showed that the self-care behaviour scores in the test group is different, but not in the control group. Results of the earlier studies concerning the diabetic patients' physical activity [29] taking medications on time [30] and appropriate diet [31-33] were consistent with this study [34-36]. Statistical analysis showed a significant difference between HbA1c levels before and after intervention in the test group, but not in the control group. These results are consistent with other studies, too [17, 18, 35-37]. Reduction in haemoglobin A1C in the test group was comparable with other studies [35, 36]. Reduction of haemoglobin A1C is mainly the result of behaviour change in the test group and the average of blood glucose levels in patients during the 6-8 weeks education was closer to normal and in the long-term complications risk reduced [36]. Exercise has a major role in glucose metabolism. Blood glucose self-monitoring provides the patients with possibility of continuous awareness of the problem and reducing or fixing it at an acceptable level for example through reduction of daily carbohydrates consumption.

Despite of too many training programs and advices, still a significant proportion of patients in the test group did not attempt to control their blood glucose; and this is a major obstacle. Encouragement and support measures should be given to patients who are not able to purchase a blood glucose-meter. As was mentioned, sports play an important role in reducing haemoglobin

A1c; therefore, exercises appropriate to the age and physical condition of the patients and encouraging to do exercises regularly are highly recommended. Although, the relation between training and metabolic control in diabetic patients in some cases is doubtful, some researchers have reported that education have positive effects on reducing haemoglobin A1C [36-38]. Maintaining low levels of haemoglobin A1C will prevent complications of diabetes. It has been reported that the average hemoglobinA1c equal to 7.2. The results showed 76% reduction in retinopathy, 60% in neuropathy, 50% in kidney diseases and 35% reductions in cardiovascular diseases [29, 30, and 39]. Haemoglobin A1c is a simple blood test which can be taken round the clock and regardless of meal consumption [40].

The limitation of this study related to patients' ignorance about timely participation in classes and timely referring to conducted experiments. However, the study provided basic information which is of important to health policy makers.

Conclusion

The findings of the study showed that this method (participatory and educational CD) can promote effectively the patients' awareness, attitude changes and self- care behaviours.

Results

Since education is a major component of health care, more attention is needed to plan the cooperative education, interactive behaviour changes for health and health issues in the country. The results of this study showed that training based on participation and interaction improves learners' attitudes and beliefs. In order to promote diabetes self-care behaviours educational CDs can be useful.So, training programs can be designed in accordance with the social and cultural characteristics of the region. Effective educational intervention based on behaviour patterns reduces the complications, morbidity and mortality among diabetic patients.

Acknowledgement

I appreciate all participants of this project .Respected management oh Hazrat Ali Asghar Hospital and diabetes clinic personnel who had sincere cooperation during execution of this project. This project is part of the first author's PhD thesis at Terabit Modares University and the Research Project of Zahedan.

References

[1] Butt J. Media Backgrounder Diabetes in the developing world 2010. http:// www.world diabetes foundation.org. [Last Accessed: 2 May 2011]

[2] Abolhassani F, Mohajeri Tehrani MR, Tabatabaei O, Larijani B. Burden of diabetes and its complications in Iran, in

year 2000 Iran J Diabetes Lipid Disord 2005; 5: 35-48.

[3] Show JE, Sicree RA, Zimmer PZ. Global estimates of the prevalence of diabetes for 2010 and 2030. Diabetes Res Clin Pract 2010; 87: 4-14.

[4] World Health Organization. Diabetes program. WHO Estern Mediterranean Region: the prevalence of diabetes in the WHO Eastern Mediterranean Region. Available from: htth//www.who.int/entity/diabetes/actionnow/en/consultation; [Last Accessed::on 2012 may 2].

[5] Marshal SM, Flybjerg A .Prevention and early detection of vascular complications of diabetes. BMJ 2006; 33: 475-80.

[6] World Health organization and international Diabetes Federation. Diabetes Action Now: an initiative of world Health organization international Diabetes Federation. Available From: htth//www.who.int/entity/diabetes/actionnow/en/consultation. [Last Accessed on: 2010 May 2]

[7] Funnell MM, Brown TL, Childs BP, Haas LB, Hosey GM, Jensen B. , Maryniuk M, Peyrot M, Piette JD, Reader D, Siminerio LM, Weinger K, Weiss MA National standards for diabetes self-care management education. Diabetes Care 2008; 13(Supp11): 97-104.

[8] Gagliardino JJ.A model education program for people with type 2 diabetes. Diabetes Care 2001; 24: 1001-7.

[9] Abdoli S, Ashktorab T, Ahmadi F, Parvizi S. [Barriers to and Facilitators of Empowerment in People with Diabetes]. Iran J Endocrinol Metab IJEM 2009; 5: 455-64. (Persian)

[10] Simmons D, Lillis S, Swan J, Haar J. Discordance in perceptions of barriers to diabetes care between patients and primary care and secondary care. Diabetes Care 2007; 30: 490-5.

[11] Tabish SA. Is diabetes becoming biggest Epidemic of the twenty first century? International Journal of health sciences 2007; 1:5-8;

[12] American Diabetes Association (ADA). Standard of medical care in diabetes. Diabetes Care .2008; 31: 16-24.

[13] Harris MA, Wysocki T, Sadler M, Wilkinson K, Harvey LM, Buckloh LM, Mauras N, White NH: Validation of a structured interview for the assessment of diabetes self-management. Diabetes Care 2000; 23:1301-4.

[14] Catherine Antoline, Amy Kramer, Mark Roth. Implementation and Methodology of a Multidisciplinary Disease-State-Management Program for Comprehensive Diabetes Care. Perm J 2011; 15(1): 43-8.

[15] Sheri R. Colberg, Ronald J. Sigal, Bo Fernhall, Judith G. Regensteiner, Richard

R. Rubin, Lisa Chasan-Taber, Ann L. Albright, Barry Braun. The American College of Sports Medicine and the American Diabetes Association: joint position statement. Diabetes Care 2010; 33(12): 147-67.

[16] Rubin R. Differential effect of diabetes education on self regulation and life stage behaviors. Diabetes Care 1998; 14: 335-8.

[17] Heisler M, Smith DM, Hayward RA, Krein SL, Kerr EA. How well do patients assessments of their diabetes self management correlate with actual glycemic control and receipt of recommended diabetes services? Diabetes Care 2003; 26: 738-43.

[18] Centers for Disease Control and Prevention. National Diabetes Fact Sheet, 2011. Atlanta, GA: Centers for Disease Control and Prevention, US Department of Health and Human Services; 2011. http://www.cdc.gov/diabetes/pubs/pdf/ndfs_2011. pdf. Accessed April 16, 2011.

[19] Ahmed Khan L, Ahmed Khan S. Level of knowledge and self care in diabetes in a community hospital in najran Available from: URL: http//www.kfshrc.edu.sa/annals/203_204/99-177R. [Last Accessed::on 2012 may 2].

[20] Nair KM, Dolovich LR, Ciliska DK, Lee HN. The perception of continuity of care from the perspective of patients with diabetes. Fam Med 2005; 37(2): 118-24.

[21] Tan AS, Yong LS, Wan S, Wong ML. Patient education in the management of diabetes mellitus. Singapore Med J 1997; 38: 156-60.

[22] Rayman KM, Ellison GC. When management works an organizational culttureand facilitates learning to self manage Type 1 diabetes. Diabetes Educ 1998; 24: 612-7.

[23] Norris Sl, Lau J, Smith SJ, Schmid CH, Engelgau MM. Self-management for adults whit type2 diabetes: a meta-analysis of the effect on glycemic.control. Diabetes Care 2002; 25: 1159-71.

[24] Brown SA, Blozis SA, Kouzekanani K, Garcia AA, and Winchell M, Hanis CL. Dosage effects of diabetes self-management education for Mexican Americans: The starr county border health initiative. Diabetes Care 2005: 28: 527-32.

[25] Basa RP, McLeod B. Evaluation of a diabetes specialty center: Structure, process and outcome. Patient Educ Couns 1995: 25: 23-9.

[26] Teresa Truong, Mark Britton, Donald Harrison, Nancy Letassy, Becky Armor, Darryl Tonemah, Ann Nguyen. Assessing the need for diabetes self-management education in the Oklahoma City vietnamese community. Diabetes Ther 2011; 2(2): 81-91.

[27] Snowling NJ, Hopkins WG. Effects of different modes of exercise training on glucose control and risk factors for complications in type 2 diabetic patients: a meta-analysis. Diabetes care 2006; 29(11): 2518-27.

[28] Jackson BS, Bolen S. Brancati FL, Batts-Turner ML, Gray TL. A Systematic Review of Interactive Computer –assisted Technology in Diabetes Care Interactive information technology indiabetes care Chanada L. J Gen Intern Med 2006; 21: 105-10.

[29] Erasmus RT, Blanco EB, Okesina AB, Gqweta Z, Matsha T Assessment of glycogenic control in stable type 2 black South Africa diabetes attending a periurban clinic. Postgrad Med J 1999; 75: 603-6.

[30] Russell L, Malone R, Bryant B, Shintani AK, Crigler B, Dewalt DA, Dittus RS, Weinberger M, Pignone MP A randomized trial of a primary care–based disease management program to improve cardiovascular risk factors and glycated hemoglobin levels in patients with diabetes. Am J Med 2005; 118: 276-84.

[31] Chapman KM, Ham JO, Liesen P, Winter L. Applying behavior models to dietary education of elderly diabetic patients. J Nutr Educ 1995; 27: 75-9.

[32] Gucciardi E, Demelo M, Lee RN, Grace SL. Assessment of two culturally competent diabetes education models: individual versus individual plus group education in Canadian potuguese adult's whit type 2 diabetes. Ethn Health 2007; 12: 163-87.

[33] Sharifirad G. Hazaveyee S. Mohebi S. The effect of education program based on health Belief Model on diabetic foot Care. Int J Diba Dev Cries 2007; 27: 18-23. (Persian)

[34] Kashfi SM, Khani Jeihooni A, Rezaianzadeh A, Amini SH. The effect of health belief model educational program and jogging on control of sugar in type 2 diabetic patients. Iran Red Crescent Med J 2012; 14: 442-6.

[35] American diabetes Association (ADA) Standard of Medical Care for patient with diabetes Mellitus. Diabetes Care 2002; 25: 533-49.

[36] Hee-Sung K. Impact of Web –based nurse's education on glycosylated hemoglobin in type Diabetes Prevention program research group. Within –trial cost- effectiveness of life style intervention for the primary prevention of type 2 diabetes .Diabetes Care 2003; 203: 2618-23.

[37] Aghamollaei T, Eftekhar H, Shojaeizadeh D, Mohammad K, Nakhjavani M, Ghofrani Pour F: Behavior, Metabolic Control and Health-related Quality of Life

in Diabetic Patients at Bandar Abbas Diabetic Clinic. Iranian J publ Health 2003; 32(3): 54-59

[38] Tankova T, Dakovska G, Koev D. Education of diabetic patients – a one year experience. Patient Educ Couns 2001; 43: 139-45.