

Original Article

The effectiveness of nutritional education on the knowledge of diabetic patients using the health belief model

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Abstract

BACKGROUND: Patients have a major role in the control and treatment of type 2 diabetes. So, knowledge of different aspects of this disease especially diet therapy is very important for these patients. This study was conducted to determine the effectiveness of the Health Belief Model (HBM) on nutrition education in type 2 diabetic patients.

METHOD: Eighty eight type 2 diabetic patients attending Iranian Diabetes Association seminars were randomly selected to participate in the study (44 in intervention group and 44 in control group). The intervention was consisted of two educational sessions each one for 80 minutes. Data were collected by a validated and reliable questionnaire (58 questions) before intervention and one month after intervention.

RESULTS: After intervention, knowledge scores increased in the intervention group compared to the control group (Mean differences in the intervention and test group: 22.68 ± 15.90 vs -2.27 ± 17.30 , $P < 0.001$). Perceived susceptibility increased significantly in the intervention group compared to the control group (27.5 ± 18.5 vs 3.9 ± 17.2 , $P < 0.001$). The result was the same for perceived severity, perceived threatened and perceived benefits ($P < 0.001$). In contrast perceived barriers reduced in the intervention group compared to the control diet (-14.7 ± 13.3 vs 0.9 ± 13.9 , $P < 0.001$). In the intervention group, behavior grades increased more than control group (34.61 ± 14.93 vs -0.23 ± 8.52 , $P < 0.001$).

CONCLUSION: The efficacy of the health belief model in nutritional education to the diabetic patients was confirmed in the present study.

KEY WORDS: Type 2 diabetes mellitus, nutritional behavior, Health Belief Model, nutritional education.

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Diabetes is a clustering of common metabolic disorders resulting in hyperglycemia. In the USA, diabetes mellitus is the major cause of end-stage renal disease, non traumatic amputation in lower limbs and adult blinding. It is expected that diabetes remain the most common cause of death in the coming decades.¹

According to a community-based study 10.8% of the population in the older onset diabetes group had low vision and 2.7% had legal blindness.²

Cardiovascular diseases are responsible for 75% of death among diabetic patients in indus-

trial countries and 50% of patients with diabetes have retinopathy.³

In Iran, it is said that 7.7% of adults aged 25-64 years (2 million) have diabetes and 16.8% (4.4 million) of Iranian adults had impaired fasting glucose.⁴

Diet is a key factor in controlling diabetes. Diet therapy is a necessary component of the treatment and may result in lower costs of the disease.⁵ Since the patients have a major role in the control and treatment of type 2 diabetes, it is important to provide them with self-management education and diet therapy.⁶ The importance of education depends upon its be-

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havioral impact. Health Belief Model is recommended for nutrition education to increase the impact of educational programs.⁷ A major feature of this model holds that the patients have choices and are able to make suitable decisions regarding their health. This model suggests that whether or not individuals take action to protect their health depends on whether they believe that they are susceptible to an ill health condition; that the occurrence of that condition would have serious consequences; and that they have a course of action to avoid the condition and benefits of taking the action outweigh the costs.⁸

The components of this model are perceived as severity, susceptibility, threatened, benefits and barriers. Moreover, this model is more suitable than other models for nutrition education.^{8,9} Some researches also mentioned the beneficiary of applying this model in different health education programs.^{10,11} Anyhow, we are not aware of any study on the effects of nutritional education based on this model on the knowledge, attitude and practice of diabetic patients.

This study was conducted to determine the effectiveness of nutrition education on the knowledge of diabetic patients using health belief model.

Methods

In this semi-experimental study, 88 type 2 diabetic patients attending Iranian Diabetes Association seminars were randomly selected and divided into two groups of intervention and control (44 patients in each group). To control potential confounding factors, the two groups were matched. Inclusion criteria included age of 30 to 60 years, not to be illiterate, at least one year attendance in Iranian Diabetes Association seminars, regular follow-ups and no severe and chronic complications of diabetes. Those patients who were not willing to participate or continue the study were excluded. The intervention was consisted of two educational sessions, each 80 minutes. Data were collected using a questionnaire with 58 questions in four sections including demographic data, nutri-

tional knowledge, health belief models components, and nutritional practice. Validity and reliability of the questionnaire was assessed by the standard methods (the details will be reported in a forthcoming paper).

The questionnaire was completed before and after intervention. The educational intervention was executed in 4 sessions each 40 minutes.

Nutritional education was based on the nutritional recommendations of the world health organization and American Diabetes Association.¹² The patients learned about food exchange list. One month after intervention, patients were evaluated by completing the questionnaire. The knowledge section consisted of questions about dietary planning, energy intake, number of meals, and some information about healthy food for diabetic patients. Practice was assessed by food records. The components of HBM were perceived as severity, susceptibility, threatened, benefits and barriers. Data were analyzed by SPSS (version 13.0, Chicago IL). Student's t test was used to compare the values between the two groups before and after intervention. The mean differences of variables were compared by paired t test. P values less than 0.05 were considered significant.

Results

Mean of age was 47.1 ± 6.7 years for the intervention group and 49.9 ± 7.5 years for the control group.

There was no significant difference between the two groups regarding age and diabetes duration.

Most of the participants in both groups were women. The two groups were matched in sex, educational level and knowledge background. Demographic characteristics of the patients are presented in Table 1.

Before the intervention, patients were in the moderate level of the perceived susceptibility, severity, threat, benefits and barriers. There was no significant difference between the two groups regarding the components of the health belief model. After the intervention, the values

Table 1. Demographic characteristics of diabetic patients in the case and control groups.

Variable	Case	Control	P
Age	47.1 ± 6.7*	49.9 ± 7.5	0.22
Diabetes duration	7.8 ± 4.4*	7.4 ± 5	0.55
Knowledge regarding diabetes	88.6 [†]	81.8	0.36
Educational level			0.27
Primary school	27.3 [†]	40.9	
Junior high school	29.5	22.7	
High school	31.8	27.3	
Higher than diploma	11.4	9.1	
Sex			0.17
Men	25 [†]	14	
Women	75	86	

*Mean ± SD

[†]%

of the mentioned variables increased significantly in the case group and showed a significant differences compared to the control group ($p < 0.001$). Table 2 shows the mean and standard deviation of the components of the health belief model in the two groups before and after intervention as well as the mean differences.

After intervention, perceived susceptibility increased significantly in the case group vs. control group (mean differences in case and control groups: 29.6 ± 18.5 vs. -2.6 ± 14.0 respectively, $p < 0.001$). The results was the same regarding the perceived severity (mean differences in case and control groups: 27.5 ± 18.5 vs.

3.9 ± 17.2 respectively, $p < 0.001$), perceived threatened (mean differences in case and control groups: 28.5 ± 13.0 vs. 0.6 ± 11.1 , respectively, $p < 0.001$) and perceived benefits (mean differences in case and control groups: 21.1 ± 16.3 vs. -3.1 ± 18.9 respectively, $p < 0.001$). Perceived barriers reduced significantly after intervention in the case group compared to the control group ($p < 0.001$).

Table 3 compares the means of nutritional knowledge and practice before and after the intervention in the two groups and the mean differences.

Table 2. Mean ± SD of the Health Belief Model components in diabetic patients in the case and control groups and the mean differences.

Variable	Case			Control			P value for comparing case and control			
	before intervention	after intervention	p	mean differences	before intervention	after intervention	p	mean differences	before intervention	after intervention
Perceived susceptibility	51 ± 20	81 ± 13	< 0.001	29.6 ± 18.5	53 ± 18	50 ± 18	0.22	-2.6 ± 14.0*	0.71	< 0.001
Perceived severity	50 ± 19	56 ± 15	< 0.001	27.5 ± 18.5	77 ± 16	60 ± 16	0.14	3.9 ± 17.2*	0.10	< 0.001
Perceived threaten	50 ± 14	79 ± 9	< 0.001	28.5 ± 13.0	54 ± 11	55 ± 12	0.71	0.6 ± 11.1*	0.17	< 0.001
Perceived benefits	60 ± 14	81 ± 14	< 0.001	21.1 ± 16.3	56 ± 19	52 ± 16	0.27	-3.1 ± 18.9*	0.21	< 0.001
Perceived barrier	55 ± 20	40 ± 14	< 0.001	-14.7 ± 13.3	30 ± 17	29 ± 20	0.66	0.9 ± 13.9*	< 0.001	< 0.01

*Significantly different between case and control groups

Table 3. Mean ± SD of the nutritional knowledge and practice in type2 diabetes before and after intervention in the case and control groups and the mean differences.

Variable	Case		P	mean dif- ferences	Control		P	mean dif- ferences	P value for compar- ing case and control	
	before in- tervention	After inter- vention			Before in- tervention	After inter- vention			before in- tervention	after inter- vention
Knowledge	57 ± 16	80 ± 11	< 0.001	22.8 ± 15.90	54 ± 14	52 ± 13	0.37	-2.27 ± 17.30*	0.32	< 0.001
Practice	17 ± 12	52 ± 15	< 0.001	34.61 ± 14.93	14 ± 10	13 ± 8	0.80	-0.32 ± 8.52*	0.12	< 0.001

*Significantly different between case and control groups

There was no significant difference in the knowledge scores of the two groups before the intervention but after the intervention, the knowledge scores of the case group were significantly higher than the control group ($p < 0.001$). Also, there were increases in the knowledge and practice scores in the case group, compared to the control ($p < 0.001$).

Table 4 shows the mean of the metabolic variables before and after educational intervention in the two groups. Fasting blood glucose, weight and body mass index of the two groups were not significantly different before the intervention. But after the intervention, there was a significant difference in fasting blood glucose of the two groups and it reduced significantly in the case group compared to the control group ($p < 0.001$). However, there was no significant difference between the two groups in weight and BMI.

Discussion

The results of the present study showed that nutritional education could increase patients' knowledge and reduce their fasting blood glucose.

Before the intervention, mean of knowledge scores was in the moderate level for both groups. The nutritional knowledge grades in other studies were also in the moderate grades.¹³ Heidari et al¹⁴ reported the grade of 68% in nutritional knowledge of diabetes before intervention, which significantly increased after the intervention. One study in Iran¹⁵ and another in Spain¹⁶ showed a significant increase in the patients' knowledge.

The components of the health belief model were in the moderate stage in the present study. In other studies also the attitude of patients was in the moderate stage.¹⁷⁻²⁰ After the intervention, in the present study, the

Table 4. Mean ± SD of the metabolic indices in diabetic patients before and after intervention in the case and control groups and the mean differences.

Variable	Case		P	Mean dif- ferences	Control		P	Mean differences	P value for comparing the case and control	
	Before in- tervention	After inter- vention			Before in- tervention	After inter- vention			before in- tervention	after inter- vention
Fasting blood sugar (mg/dl)	168 ± 44	134 ± 24	< 0.001	-33.4 ± 32.3	158 ± 46	149 ± 35	0.10	-8.7 ± 34.7*	0.31	0.02
Weight (kg)	72 ± 15	71 ± 15	< 0.001	-0.93 ± 1.45	71 ± 12	71 ± 12	0.11	-0.36 ± 1.48	0.68	0.83
BMT(kg/m ²)	28 ± 5	28 ± 5	< 0.001	0.36 ± 0.57	28 ± 4	28 ± 4	0.11	-0.14 ± 0.58	0.84	0.98

*Significantly different between case and control groups

mean values of the health belief model increased in the case group compared to the controls. This means that patients in the case group see the danger of poor adherence to the diet (the increase of perceived susceptibility) and feel the benefits of adherence to the diet (the increase of perceived benefits), and this makes them follow the diet. The main benefits of dieting for patients were mentioned as controlling their fasting blood sugar and weight, and lowering the costs of disease.

In a study by Aghamolayee et al,²¹ the mean values of the perceived susceptibility, severity, benefits and behavior increased after intervention and the perceived barriers reduced in the intervention group.

Brekke et al²² reported that unavailability of healthy food and lack of healthy recipes in restaurants were barriers of adherence to the diet.

Conflict of interest

Authors have no conflicts of interest.

Authors' Contributions

GHS, MHE and AK designed the study, collected and analyzed the data and wrote the manuscript. LA helped with manuscript preparation. All authors have read and approved the content of the manuscript.

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