

A Systematic Review about Educational Interventions based on the Health Belief Model (HBM) aimed to prevent and control diabetes in Iran

Review Article

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Abstract

Background: Diabetes is one of the most common metabolic diseases in the world and a serious health problem, that requires comprehensive interventions. This systematic review was conducted to summarize educational interventions based on the Health Belief Model aimed to prevent and control diabetes. **Methods:** Searches were done on May 30, 2019 in PubMed, Web of Science, Google Scholar, Embase, Scopus, SID, Magiran, and IranMedex databases in English and Persian. The inclusion criteria included quantitative original interventional studies that aimed to control type 2 diabetes, and the intervention was based on the Health Belief Model. Studies done outside of Iran, interventions on other types of diabetes, non-interventional studies, and reviews were excluded. **Results:** Eventually, 13 studies (6 English and 7 Persian articles) entered this systematic review. The intervention durations were from 2 to 3 months. These studies fell into three broad categories: 1- Prevention of the disease 2- Improving Nutrition behaviors in patients 3-Prevention of disease complications or its progress. All of the educational interventions showed a positive effect for education on the prevention and control of diabetes. **Conclusions:** Interventions based on the HBM have shown an effective role in controlling and preventing diabetes.

Key Words: Systematic review, Diabetes, Health Belief Model, Intervention.

Introduction

Diabetes is a metabolic and multi factorial disorder characterized by chronic hyperglycemia, resulting from an insufficient secretion or action of insulin (1). Diabetes is referred to as an "epidemic" and is considered as a major public health problem, responsible for 9 percent of all deaths in the world (2). Diabetes type 1 and type 2 are two main forms of this chronic disease, affecting approximately 10% and 90% of the total population of diabetics (3).

Type 2 diabetes or adult diabetes includes patients who have insulin resistance, and may have insulin deficiency as well. Diabetes is associated with various disorders in the metabolism of glucose, protein, and fat. Chronic hyperglycemia causes damage to the body organs, especially the eyes, kidneys, nerves, the heart and blood vessels (4).

Diabetes is currently the fifth cause of death in Western societies and the fourth most common cause

for visiting a doctor. The global prevalence of diabetes is predicted to increase from 4% in 1995 to around 5.4% in 2025. During this time, the population of affected people will increase by 122% (5). The prevalence of diabetes in Iran in 1995, 2000, and 2025 was estimated to be 5.5, 5.7, and 6.8%, respectively (6).

The direct and indirect costs of diabetes and its complications are very high compared to other diseases. This disease is increasing with industrialization and urbanization. Physical activity, type of diet, familial history, stress and some environmental and genetic factors are involved in the development of this disease (7).

Given the increasing prevalence and burden of diabetes, educational interventions based on standardized frameworks are required to control the epidemic. Proper behavioral models should be used in order to increase the efficiency of education. One of these models is the Health Belief Model (8).

The Health Belief Model considers behavior as a function of the individual's knowledge and attitude, and according to its components prompts individuals to perceive a health threat and follow healthy behaviors (9). This model was initially developed to study why people do not accept health advice and to explain why people do not see themselves at risk for acquiring diseases (10). This model is a comprehensive model that closely relates to the prevention of disease and

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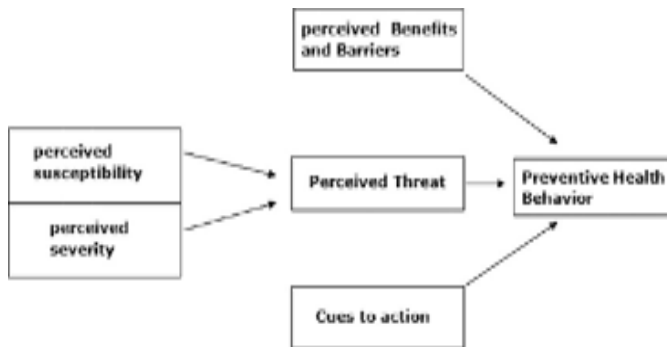
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shows the relation between beliefs and behavior. The health belief model has been used to develop effective interventions to change health-related behaviors by targeting various aspects of the model's key constructs. The Health Belief Model (HBM) constructs include perceived susceptibility, perceived severity, perceived barriers, perceived benefits, cues to action, and self efficacy (Figure 1) (3).

Figure 1



This systematic review was conducted to summarize educational interventions based on the Health Belief Model that aimed to prevent and control diabetes.

Materials and Methods

Search strategies

Searches were done on May 30, 2019 in PubMed, Web of Science, Google Scholar, Embase, and Scopus databases for Latin articles, and in the SID, Magiran, and Iran Medex databases for Persian articles. The search strategy has been shown in table 1.

Table 1: The search strategy used in this review.

Diabetes OR "Type 2 diabetes" OR "Prevention and control of diabetes" OR "Metabolic disorder"
AND
Intervention OR "Health education" OR "Educational intervention" OR Effect
AND
"Health Belief Model" OR HBM

Inclusion and Exclusion Criteria

Inclusion criteria included quantitative original interventional studies that aimed to control type 2 diabetes, and the intervention was based on the Health Belief Model. Studies done outside of Iran, interventions on other types of diabetes, non-interventional studies, and reviews were excluded.

Quality Assessment

The Consolidated Standards of Reporting Trials (CONSORT) were used for appraising the studies. This

checklist contains 25 questions, in which each question is given a 0 or 1 score. Studies that scored more than 15 were included and studies with a score of 15 or less were excluded (11).

Extracting data

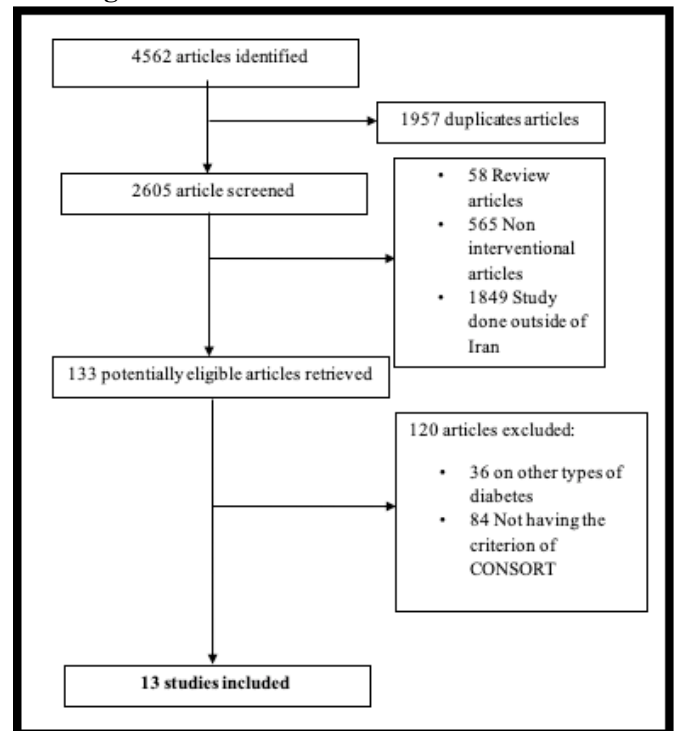
Two referees independently reviewed the criteria for including studies, and in case of disagreement between the authors, a third referee was used.

The study information was extracted according to a standard form. This form included the names of the authors, the location of the study, year of study, purpose of the study, type of study, target group, population size, description of the intervention, and the most important results of the selected articles.

Results

After searching the aforementioned electronic databases, 4562 related articles (2417 in English and 2145 in Persian) were retrieved. A large number of articles (1957 articles) were duplicates and were deleted. From the remaining 2605 articles, 2472 were excluded because they were reviews, non-interventional studies or studies done outside of Iran. 36 article were excluded because they were about other types of diabetes, and 84 did not score enough on CONSORT. Finally, 13 studies (6 English and 7 Persian articles) entered the review (Figure 2).

Figure 2: Flowchart for selection of studies



The results showed that these studies were mainly in three categories; 1- Prevention of the disease (four articles) 2- Improving Nutrition Behaviors in patient (four articles) 3- Prevention of disease complications or its progress (five articles). The information extracted from the studies are summarized in table 2.

Table 2. Summary of articles included in this review

Author / year	Place/ Study population and size	Study variables	Intervention method Duration of intervention	Results	CONSORT score
Shamsi, 2009 (12)	Isfahan/88 women with type 2 diabetes	Health belief model constructs, patient HbA _{1c} and FBS levels	Four 60-minute training sessions in the form of lectures, questions and answers, group discussions, PowerPoint presentations and practical demonstration (walking along with patients in urban parks), along with showing images of diabetic patients who suffer from diabetic complications were done. At the end of the training sessions, the content was provided as a booklet, pamphlet and poster to patients. 3 months	The mean scores of HBM Model variables, i.e susceptibility, severity, perceived benefit and barriers, significantly increased in the experimental group compared to controls after the intervention. Also, behavioral walking, rates of HbA _{1c} (before intervention 9.59%, after three months 8.63%) and FBS levels (before intervention 184.63mg/dl, after three months 151.29) improved significantly in the intervention group, compared to controls ($p < 0.001$).	20
Piri, 2010 (13)	Najafabad, 128 diabetic patients	Health Belief Model constructs, and diet	The intervention was undertaken in four, 40 minute, weekly sessions while participants in both case and control groups were under standard treatment identical to the pre-intervention phase. The intervention addressed educational needs and included some material congruent with the health belief model which was presented via lectures and pamphlets. 3 months	After the intervention, significant improvements were seen in the intervention group in perceived susceptibility ($P=0.001$), perceived severity ($P=0.001$), perceived barriers ($P=0.004$) and practice (diet obedience) ($P < 0.001$).	18
Motlagh, 2012 (14)	Gachsaran, 140 patients	Health Belief Model constructs	Four one-hour lectures and group discussions were held in one month. Also, two one-hour training sessions were conducted for the families of the patients in the intervention group. 3 months	The results showed a statistically significant improvement in the intervention group after the implementation of educational programs in the mean knowledge, perceived severity, perceived susceptibility, perceived benefits and perceived self-efficacy scores; and decrease in perceived barriers scores ($P < 0.05$).	22

Reza Sadeghi et.al., Educational Interventions based on the Health Belief Model (HBM) aimed to prevent and control diabetes

Kashfi, 2012 (15)	Shiraz, 100 type 2 diabetic patients	Health Belief Model constructs , and fasting blood sugar (FBS) and glycoside hemoglobin (HbA1c)	The intervention was 3 sessions (each 60 minutes). 3 months	After the intervention, there was a significant improvement in the mean score of the HBM model variables (susceptibility, severity, benefit and perceived obstacles) in the intervention group. Additionally, behavioral jogging, level of HbA1C and FBS improved significantly in the intervention group compared to the control group.	23
Sadeghi, 2014 (16)	Sirjan, 80 people over 30 years old	Knowledge, Health Belief Model constructs	The intervention included two sessions of training for one hour in a one-month interval that included lecture and group discussion. At the end of the training sessions, the content was given as a booklet and pamphlet to the participants. 3 months	After the intervention, the knowledge scores increased significantly in both intervention and control groups, which were probably due to the routine education program in that center. But significant increase in attitude and practice was only observed in the intervention group. Also perceived benefits, perceived barriers and cues to action significantly increased in the intervention group compared to the control group ($p < 0.001$). But, there was not any significant change in the control group.	22
Bayat, 2013 (17)	Tehran, 120 patients with type II diabetes	Health Belief Model constructs	The educational program consisted of two 30 to 45 minute sessions, presented via pamphlets and face to face lectures using the “question and answer” method. The “question and answer” method was used to encourage the participants to get involved in the process and to make sure that they were paying attention. Also follow up phone calls were made to the participants after the program. 3 months	The educational program had a positive and significant impact ($p < 0.001$) on the extended health model belief constructs (including perceived susceptibility, perceived intensity, perceived benefits, perceived barriers and self-efficacy) in the intervention group, 3 and 6 months after the intervention.	21

International Journal of Ayurvedic Medicine, Vol 11 (1), 15-22

Zareban, 2013 (18)	Zahedan, 138 female diabetics aged 30 to 60 years	Health Belief Model constructs, self-care and HbA1c	An educational program in 5 sessions for one month. The educational program consisted of lecture, question and answer, group discussion and film screening. 3 months	The results showed that the mean scores of HBM structures in groups, before and after the educational intervention, had a statistically significant difference. Reduction of HbA1c levels in two studied groups was significant (from 9.63 mg/l before the intervention to 8.30 mg/l at 3 months after training).	22
Baghiani Moghadam, 2014 (19)	Birjand, 88 patients with type II diabetes	Health Belief Model constructs, knowledge, self-care behavior	Instructional text messages was sent by a bulk SMS system to the intervention group during one month. The SMS messages included 15 SMS messages, sent one day in between at 10:30 in the morning. 3 months	Before the intervention, there were no significant differences in demographic characteristics, the mean score of knowledge, self-care behavior and components of the HBM between two groups ($P>0.05$), but after the intervention, the mean score of these variables in the experimental group significantly increased ($P<0.01$).	20
Farahani , 2015 (20)	Arak, 130 patients with diabetes	Health Belief Model constructs	Four one-hour lecture and group discussions were held in 3 months. Also, the content was given to the participants as a booklet and brochure. 3 months.	After the educational intervention, perceived susceptibility, perceived benefits, self-efficacy, internal and external guidelines and performance in the field of medication adherence increased significantly ($p<0.05$) while perceived barriers and perceived severity, did not change significantly ($p>0.05$).	19
Zamani, 2016 (21)	Zarand, 100 patients with diabetes	Health Belief Model constructs, and medication adherence	Educational interventions included 4 training sessions of 8-12 people on a weekly basis. Each training session lasted for 60-90 minutes. 3 months.	After the intervention, the mean scores of perceived sensitivity ($P<0.001$), perceived severity ($P<0.001$), perceived benefits ($P<0.001$), perceived barriers ($P<0.001$), perceived self-efficiency ($P<0.0001$), cue to action ($P<0.0001$), and medication adherence ($P<0.0001$) increased significantly.	21

Reza Sadeghi et.al., Educational Interventions based on the Health Belief Model (HBM) aimed to prevent and control diabetes

Fani, 2017 (22)	Tehran, with 216 type 2 diabetes patients	Health Belief Model constructs, nutrition adherence, and HbA1c	Educational interventions included 6 training sessions. Also, the content was given to participants as a poster, pamphlet, booklet and brochure. 3 months.	In the intervention group, there were statistically significant differences between all parts of HBM after educational intervention (perceived susceptibility ($p < 0.001$), perceived severity ($p < 0.001$), perceived benefits ($p < 0.001$), perceived barriers ($p < 0.001$), cues to action ($p < 0.001$)), also nutrition adherence ($p < 0.001$) and HbA1c. But, there was no significant change in the control group after intervention.	20
Porgholmi, 2017 (23)	Rasht, 84 patients with type II diabetes	Health Belief Model constructs, self-care behavior, and HbA1c	The educational program for the patients in the intervention group was held in six, 30 to 45 minute sessions, and included lectures, group discussion and role playing techniques along with providing pamphlets, posters and educational films. 3 months.	After the intervention, the mean HbA1c in the intervention group significantly changed. However, the mean HbA1c in the control group did not change significantly. The average score of self-care behavior in the experimental group before and three months after the intervention, significantly increased ($p = 0.001$). But this difference was not significant in the control group.	20
Tehrani , 2019 (24)	Tiran and Karvan counties (Isfahan), 100 patients with Type 2 Diabetes	Awareness, Health Belief Model constructs, and blood glucose	Within a month, four lecture sessions, questions and answers were conducted using video projector and PowerPoints. 3 months.	After the intervention, a significant improvement was seen in the intervention group in terms of awareness, perceived susceptibility, perceived severity, perceived benefits, perceived barriers, self-efficacy and eating behavior ($P < 0.05$). The mean of blood glucose in the experimental group was significantly lower after the educational intervention compared to pre-intervention ($P < 0.05$).	21

Discussion

Diabetes is a disease that can be prevented and controlled by improving knowledge, attitude and practice, especially through education (25). The Health Belief Model (HBM) is a good framework for these interventions (26). This systematic review was conducted to investigate the effect of educational interventions based on the Health Belief Model in the prevention and control of diabetes.

In the first category of our included studies, prevention of the disease was the most important goal. Type 2 diabetes is a preventable disease that can be prevented by appropriate interventions to change life-style (27). Given the high prevalence of diabetes in developing countries, the primary prevention of diabetes is of particular importance especially in Iran. Identifying the risk factors of type 2 diabetes and identifying appropriate strategies for reducing the incidence of diabetes in the society is now the focus of attention of many researchers and health educators (28).

Genetic predisposition (family history), insulin resistance, obesity, glucose tolerance, gestational diabetes mellitus, physical inactivity and inappropriate diet are among the most important contributing factors, although other factors may also be effective (29). Therefore, preventive interventions are very useful in this regard. Studies by Marion et al. show interventions such as regular physical activity and behavioral interventions help improve lifestyle and prevent diabetes (30). Lindström et al. showed that adherence to lifestyle changes after the intervention and during the follow up period led to greater risk reduction for diabetic patients (31).

The second part of our included studies, were studies in which improving nutrition behaviors among patient was their most important goal. Training on the importance of dieting among patients with diabetes can be helpful in promoting their nutritional knowledge, and observing the principles of proper nutrition is one of the most important factors in preventing the complications of diabetes (32). Sharifirad et al., considered nutrition education for diabetic patients as a necessity (33). Also, food choices in individual's have a direct effect on their energy balance, body weight, lipid levels and blood pressure (34) and by conducting nutritional interventions and ongoing support for behavior changes, health care professionals can improve their patients' health (35). The results of Tehrani et al.'s study indicated the positive effectiveness of correctly implemented educational interventions based on the health belief model on nutritional behaviors in type 2 diabetic patients (24).

In the third part of the included studies, prevention of disease complications or its progress were the most important goal. Diabetes and its complications can cause significant morbidity, mortality, and economic costs. Therefore, the prevention of its complications is very important, as these complications can lead to death (1). In the study of Rezaei et al., the knowledge and practice of diabetic patients increased after training, and their diabetes management improved (36). The study by Sharifirad et al showed the effect of Health Belief Model on Foot Care in Diabetic Patients with Type 2 Diabetes and showed that training was very effective on controlling diabetic wounds (37).

However, it seems that in these studies, patients were not followed up sufficiently, and in order to track the impact of educational interventions, there is a need for longer follow-ups, for at least 6 months. Therefore, future studies should do longer follow-ups to examine the impact of educational interventions and its outcomes.

Conclusion

Designed interventions based on the HBM have shown to be effective in controlling and preventing diabetes.

Conflict of interest: None.

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