

# Structural role of perceived benefits and barriers to self-care in patients with diabetes

Siamak Mohebi, Leila Azadbakht<sup>1</sup>, Avat Feizi<sup>2</sup>, Gholamreza Sharifirad<sup>3</sup>, Mehdi Kargar<sup>4</sup>

Department of Public health, Qom University of Medical Sciences, Qom, <sup>1</sup>Food Security Research Center, School of Nutrition and Food Science, Isfahan University of Medical Sciences, <sup>2</sup>Department of Biostatistics and Epidemiology, School of Health, Isfahan University of Medical Sciences, <sup>3</sup>Department of Health Education and Health Promotion, School of Health, Isfahan University of Medical Sciences, Isfahan, <sup>4</sup>Department of Public Health, School of Public Health, Fars University of Medical Sciences, Fars, Iran

## ABSTRACT

**Introduction and Goal:** In diseases and disorders such as diabetes, treatment and disease management depends mostly on patient's performance. So, self-care is very important in these patients and they can affect their own welfare, functional capabilities, and disease processes by achieving self-care skills. Nowadays, we know that self care follows individual, psychological and social factors which its recognition can assist health care providing systems to carry out educational programs. This study aimed to investigate the role of perceived benefits and barriers in doing self-care behaviors among diabetic patients. **Materials and Methods:** This study is a narrative review and articles with sectional, cohort, and interventional, clinical trial, qualitative and narrative designs were chosen using databases and academic search engines such as PubMed, SCOPUS, ProQuest, Elsevier and key words like self-care diabetes, perceived benefits and barriers. Persian articles were also selected using databases like IRANMEDEX, MEDLIB, as well as searching the articles in sites of domestic scientific magazines. **Results:** Reviewed articles' findings show the average situation of perceived benefits and barriers in diabetic patients regarding self-care. Qualified blood sugar (glucose) control, weight control, happiness feeling and expenses reduction are the most important perceived benefits. The most significant perceived barriers in self-care consist of lack of family support, shame feeling, forgetfulness and not being able to ignore foods' flavor. **Conclusion:** Perceived benefits and barriers, as central constructs in some patterns and theories of behavior change, were related to self-care, so that it was directly related to perceived benefits and reversely related to perceived barriers. Therefore, these two constructs can be considered as strategies for promoting self-care behaviors in diabetic patients.

**Key words:** Diabetes, perceived barriers, perceived benefits, self-care

**Address for correspondence:** Prof. Gholamreza Sharifirad, Department of Health Education and Promotion, School of Public Health, Isfahan University of Medical Sciences, Isfahan, Iran. E-mail: [sharifirad@hlth.mui.ac.ir](mailto:sharifirad@hlth.mui.ac.ir)

### Access this article online

#### Quick Response Code:



**Website:**  
[www.jehp.net](http://www.jehp.net)

**DOI:**  
10.4103/2277-9531.115831

## INTRODUCTION

Diabetes is one of the most important health problems and the most widespread chronic metabolic disease<sup>[1]</sup> complications of which are one of the main causes of mortality and morbidity.<sup>[2,3]</sup> So that diabetes is the reason of 9% of all deaths worldwide.<sup>[4]</sup> This disease causes direct costs about 5/2 to 15 percent of total health budget and indirect costs being several times more than this value.<sup>[5]</sup> WHO estimated that 4 to 5 percent of the health budget is spent on diabetes-related diseases. Besides, the medical expense of a diabetic person is 2 to 5 times higher than medical expense of healthy individuals.<sup>[5]</sup>

Copyright: © 2012 Siamak M. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

This article may be cited as: Mohebi S, Azadbakht L, Feizi A, Sharifirad G, Kargar M. Structural role of perceived benefits and barriers to self-care in patients with diabetes. J Edu Health Promot 2013;2:37.

However, diabetes has had an alarming incidence and is increasing rapidly so that the diabetes prevalence has increased 50% during the past 10 years.<sup>[6]</sup> Estimations in 2010 indicate that there are almost 285 million diabetic adults all over the world. It is expected that this number will continue to increase worldwide due to population aging, population growth, urbanism and high prevalence of obesity and sedentary lifestyle.<sup>[7]</sup> Our country has also been affected by this problem and it is predicted that the disease is rapidly increasing. In a national survey in Iran, the prevalence of diabetes have been reported 7/7% among 25-65-year old people.<sup>[4]</sup>

Besides, diabetes treatment is complex and needs lifestyle modification so that nutrition improvement, physical activity increase and use of glucose lowering drugs are recommended.<sup>[8]</sup> In other words, diabetes does not have any absolute treatment but it can be controlled.<sup>[9]</sup> It should be noted that in diseases and disorders such as diabetes, disease treatment and management depends largely on the patient's actions. So that self-care and adherence to it are the first steps in helping patients to better care and manage their disease.

Self-care is an active and scientific process led by the patient and is necessary for preventing short-term and long-term complications.<sup>[10]</sup> Diabetes self-care is defined as a set of behaviors, which diabetic patients do daily to achieve diabetes control. These behaviors include the regulation of diet, exercise, and medication, self-discovery of blood sugar (glucose) levels and care of feet.<sup>[11]</sup> Most studies show that diabetes self-care causes the control of glucose in patients in turn leading to better health results.<sup>[12]</sup> Studies have shown that qualified control of glucose can prevent complications. So for changing lifestyle and better control of diabetes, patients' perception of the importance of diabetes, its complications and treatment should increase.<sup>[13]</sup>

Despite scientific support for glucose control as a therapeutic strategy in diabetes, many diabetics do not care enough of their disease, and this causes the lack of or imperfect control of glucose.<sup>[14]</sup> However, a number of studies have reported the amount of self-care behaviors in diabetic patients at a low level and have noted that rejecting the treatment programs has been a major problem in their treatment. Lack of self-care in this group is varied between 30 to 60%.<sup>[15,16]</sup> In fact, several studies which have assessed and managed diabetes in different countries, all indicate that diabetes management in different societies, even in developed countries is not desirable.<sup>[17]</sup>

Regarding the problems of creating and maintaining self-care behavior, as well as complexity of this behavior, it is necessary to use theories and patterns of behavior change.<sup>[18]</sup> This study aimed to investigate the role of perceived benefits and barriers as central constructs in some patterns of behavior change.

## MATERIALS AND METHODS

This study is a narrative review and articles with sectional, cohort, and interventional, clinical trial, qualitative and

narrative designs were chosen using databases and academic search engines such as PubMed, SCOPUS, ProQuest, Elsevier and key words like self-care diabetes, perceived benefits and barriers. Persian articles were also selected using databases like IRANMEDEX, MEDLIB, as well as searching the articles in sites of domestic scientific magazines. Time range of articles was from 1990 to the end of 2011. Some of the reviewed studies are given in Table 1.

## RESULTS

While the findings of these studies indicated undesirable condition of self-care in diabetic patients,<sup>[19,20]</sup> these studies showed that there are various benefits and obstacles in self-care and in the most results there was a relation between perceived benefits and barriers and this behavior. Simmons and Fisher, in their studies have focused on barriers' role in diabetic patients and have considered psychological barriers effective on occurrence or non-occurrence of health behaviors.<sup>[19-21]</sup> Vijan's study indicated various barriers of self-care in to diabetic patients so that some barriers such as costs and communication with health care providers were considerable and treatable.<sup>[22]</sup> Odea showed in his research that one of the barriers of accepting healthy food along with other barriers is related to the food's flavor.<sup>[23]</sup> On the one hand, forgetfulness, lack of access to suitable foods, lack of ideas for cooking were barriers of achieving nutritional goals in Brekke study.<sup>[24]</sup>

Klomegah also showed in a research that if family members, friends and acquaintances follow a healthy diet, following the healthy diet for diabetic patients will be very easy and it is related to the issue of perceived barriers.<sup>[25]</sup> Rafique study in Pakistan showed that emotional stresses and lack of family support are the most important barriers of self-care in diabetic patients.<sup>[26]</sup> Although, various barriers are referred to in most studies in this area, perceived barriers in Charron's study were in a desirable situation that is there were not many barriers for doing self-care behaviors.<sup>[27]</sup>

Galsgow showed in his study that there is a significant inverse relationship between perceived barriers and self-care behaviors in diabetic patients. He has introduced psychological barriers as one of the basic principles of uncertainty of self-management behaviors in diabetic patients.<sup>[28]</sup> In Aljaseem's study having investigated barriers' approach and self-efficacy of self-care behaviors in diabetic patients, it became clear that there is a significant inverse relationship between perceived barriers and self-care behaviors.<sup>[29]</sup>

The result of Polly's study in which perceived barriers in elderly diabetic patients were investigated, was that there is a significant relationship between severity and perceived barriers and glycemic blood control.<sup>[30]</sup> The studies of Daniel<sup>[31]</sup> and Mollem<sup>[32]</sup> show that the amount of self-care behaviors increases with decreasing perceived barriers. Tan's study aiming to determine the relationship between health beliefs and behaviors preventing diabetic

**Table 1: Reviewed studies in this study**

Writer	Year of study	Type of study	Study samples
Simmons D. <sup>[19]</sup>	1998	Qualitative review	57 diabetic patients
Simmons D. <sup>[20]</sup>	2007	Narrative (library)	-
Fisher KL. <sup>[21]</sup>	2006	Narrative (library)	-
Vijan S. <sup>[22]</sup>	2005	Sectional	446 diabetic patients
Odea AJ. <sup>[23]</sup>	2003	Qualitative	213 people in 34 focused groups
Brekke HK. <sup>[24]</sup>	2004	Interventional	73 patients with diabetes type II
Klomegah RY. <sup>[25]</sup>	2006	Sectional	151 diabetic patients
Rafique G. <sup>[26]</sup>	2006	Qualitative review	Semi-structured interview with 27 diabetic patients
Charron D. <sup>[27]</sup>	2001	Observational case	80 young girls with diabetes type I
Galsgow RE. <sup>[28]</sup>	2001	Narrative (library)	-
Aljasem LI. <sup>[29]</sup>	2001	Sectional	309 patients with diabetes type II
Polly RK. <sup>[30]</sup>	1992	Descriptive	102 elderly patients with diabetes type II
Daniel M. <sup>[31]</sup>	2002	Interventional	18 men and 16 women with diabetes type II
Mollem ED. <sup>[32]</sup>	1996	Sectional	240 patients with diabetes type I and II
Tan MY. <sup>[33]</sup>	2004	Sectional	128 patients with diabetes type II
Wen LK. <sup>[34]</sup>	2004	Sectional	138 patients over 55 years old with diabetes type II
Koch J. <sup>[35]</sup>	2002	Clinical trial	31 African women with diabetes type II
Pham DT. <sup>[36]</sup>	1996	Sectional	76 patients with diabetes type II
Lloyd CE. <sup>[37]</sup>	1993	Cohort	592 patients over 18 years old with diabetes type I
Nagelkerk J. <sup>[38]</sup>	2006	Qualitative review	24 adult patients with diabetes type II
Rothman RL. <sup>[39]</sup>	2008	Sectional	139 youth with diabetes type II
Krichbaum K. <sup>[40]</sup>	2003	Systematic review	37 articles have been reviewed
Chapman KM. <sup>[41]</sup>	1995	Sectional	48 elderly diabetic patients
Robin MN. <sup>[42]</sup>	2000	Systematic review	Meta analysis of 72 articles between 1985 to 1999
Kamel MN. <sup>[43]</sup>	1999	Sectional	218 diabetic patients
Corina G. <sup>[44]</sup>	2004	Interventional	150 diabetic patients
Adams AS. <sup>[45]</sup>	2003	Sectional	4565 diabetic patients
Karter AJ. <sup>[46]</sup>	2000	Sectional	44181 diabetic patients
Juan J. <sup>[47]</sup>	2001	Interventional	446 diabetic patients in 10 countries of Latin America
Patti L. <sup>[48]</sup>	2002	Interventional	170 diabetic patients
Gillibrand R. <sup>[49]</sup>	2006	Sectional	118 diabetic patients, 16-25 years old
Aalto AM. <sup>[50]</sup>	1997	Sectional	423 patients with diabetes type I
Pinto SL. <sup>[51]</sup>	2006	Sectional	patients with diabetes type I and II
Patino AM. <sup>[52]</sup>	2005	Sectional	74 patients with diabetes type I
Toobert DJ. <sup>[53]</sup>	2000	Narrative	7 research studies have been used to examine the instrument
Aboud D. <sup>[54]</sup>	2003	Interventional	53 people (28 persons in test group and 25 persons in control group)
Coates VE. <sup>[55]</sup>	1998	Sectional	263 insulin-dependent diabetic patients
Bond GG. <sup>[56]</sup>	1992	Sectional	56 youth with diabetes type I
Mohammad Ali Morovati Sharif Abad <sup>[57]</sup>	2009	Sectional	120 diabetic patients
Gholamreza Sharifi Rad <sup>[58]</sup>	2008	Interventional	88 diabetic patients (44 persons in test group and 44 persons in control group)
Mohammad Ali Morovati Sharif Abad <sup>[59]</sup>	2007	Sectional	120 diabetic patients
Elham Shakibazade <sup>[60]</sup>	2010	Sectional	128 patients with diabetes type II
Alireza Shahab Jahanloo <sup>[61]</sup>	2008	Sectional	76 patients with diabetes type I and II
Mohsen Shamsi <sup>[62]</sup>	2010	Interventional	88 diabetic patients (44 persons in test group and 44 persons in control group)

complications in Chinese patients showed that there is a significant relationship between severity, perceived barriers and benefits of disease and behaviors preventing diabetic complications. He acknowledges that perceived barriers cause less following of the instructions recommended by health staff.<sup>[33]</sup>

Wen also showed in his study that the amount of physical activity decreases with increasing the perceived barriers among the group in his study.<sup>[34]</sup> Koch also showed a significant negative correlation between perceived barriers and self-care behaviors.<sup>[35]</sup> In Pham's study the amount of physical activity decreased with increasing the perceived

barriers.<sup>[36]</sup> In Lloyd's research investigating the psychosocial factors associated with glycemic control, it became clear that patients' adherence to self-care instructions decreases with increasing the problems.<sup>[37]</sup> Rafique showed in his study that the amount of self-care behaviors decreases with increasing the perceived barriers.<sup>[26]</sup>

Nagelkerk also showed that for adopting effective self-management strategies, perceived barriers should be considered. He showed an inverse relationship between perceived barriers and diabetes self-management behaviors. He also indicated that perceived barriers are the most important components of health belief model in doing behaviors recommended in diabetes care. In his opinion, the most important barriers are lack of awareness of healthy diet, lack of support and lack of proper understanding of self-care.<sup>[38]</sup> Rothman showed in a research in America by studying diabetic patients that improper diet and wrong sport habits in these patients are related to perceived barriers. This is also evident in Krichbaum's study. In his systematic narrative review, he has referred to this point that the amount of self-care decreases with increasing the perceived barriers.<sup>[40]</sup>

Chapman's study done with the aim of investigating the effect of social-psychological variables on behaviors related to diabetes self-care based on health belief model and programmed behavior showed that patients' adherence to healthy and recommended diet decreases with increasing the barriers. Kamel and Robin introduce the perceived barriers as the most important factors of behavior change in diabetic patients on diet change and express that in educational interventions, programmers should pay attention to this factor.<sup>[42,43]</sup>

Corina also showed that self-care of diabetic patients decreases significantly with increasing the perceived barriers.<sup>[44]</sup> In the studies of Adams<sup>[45]</sup> and Karter,<sup>[46]</sup> similar results have been achieved. This continues until the studies of Juan and Patti would indicate that perceived barriers have the strongest relation with self-care behaviors.<sup>[47,48]</sup> Despite numerous studies indicating an inverse significant relationship between self-care and perceived barriers, no significant correlation was observed between perceived barriers and self-care behaviors in Gillibrand's study.<sup>[49]</sup>

In the other side of the scale and against the perceived barriers, there are perceived benefits, according to the evidence plays role in self-care of diabetic patients. In most of the studies such as Daniel's, perceived benefits were at an acceptable level.<sup>[31]</sup> In Aalto's study in multiple-variable regression analysis, self-efficacy and perceived benefits had a strong correlation with glucose self-search. In his study, the constructs of developed health belief model predicted 14% of the variance of adherence to diet and 21% of the variance of adherence to glucose self-search.<sup>[50]</sup> Pinto said that the perceived benefits increase self-care practice in diabetic patients.<sup>[51]</sup>

The research of Koch<sup>[35]</sup> and Patino<sup>[52]</sup> also showed that there is a significant direct correlation between patients' perception of self-care benefits and their obedience of this behavior. The study of Toobert<sup>[53]</sup> and Charron<sup>[27]</sup> showed similar results. Abood's research proves the fact that self-care behaviors increase with increasing diabetic patients' perception of the benefits of these behaviors.<sup>[54]</sup> Alato,<sup>[50]</sup> Wen,<sup>[34]</sup> Coates<sup>[55]</sup> and Bond<sup>[56]</sup> showed that net benefits (perceived benefits minus perceived barriers) are directly related to self-care behaviors. However, no correlation was found between the perceived benefits and self-care in the study of Gillibrand and Patino.<sup>[49,52]</sup>

In studies performed in our country, results similar to most mentioned studies have also been obtained. In Muhammad Ali Morovati's study, net benefits directly affect self-care behaviors. Also in his study, the resource of chance control and social support indirectly affected self-care behavior by affecting the net benefits. On the one hand, in this study, the net benefits indirectly affected the behavior by affecting self-efficacy.<sup>[57]</sup> Gholamreza Sharifi Rad also showed in his study that the amount of glucose, weight and BMI in diabetic patients under the study decreases with increasing the perceived benefits and decreasing the perceived barriers. In the opinion of patients in his study, the most important perceived benefits of diet were better control of glucose, weight control, enjoying eating, sense of freshness, reduction of disease costs and preventing disease's complications. On the other hand, barriers mentioned in this research were lack of social and family support, need to calculation and time, shy feeling in obeying diet and prevention of favorite foods.<sup>[58]</sup>

In another study by Muhammad Ali Morovati, perceived benefits had a direct correlation with self-care behaviors and perceived barriers were inversely correlated with these behaviors. In his study, variables of perceived benefits and barriers predicted 28/2% of self-care behavior changes. Also in this study, perceived barriers had stronger predictive power.<sup>[59]</sup> In her study, Elham Shakibazade has also referred to the significant negative correlation between perceived barriers and self-care behaviors in diabetic patients. In her study, 51% of self-care changes were specified by mentioned barriers and self-efficacy.<sup>[60]</sup> Alireza Shahab Jahanloo has expressed in a research that the amount of perceived barriers and benefits in patients with undesirable diabetes control is more unsuitable than those with desirable control. Generally, perceived barriers and benefits in his study were lower than average.<sup>[61]</sup> Mohsen Shamsi also showed in his study that glucose level decreases with increasing perceived benefits and decreasing perceived barriers due to doing proper physical activity.<sup>[62]</sup>

## DISCUSSION AND CONCLUSION

Nowadays, we know that the important principle in self-care is participation and accepting responsibility by the patient so that many disease complications can be controlled by correctly doing behaviors related to it.<sup>[65]</sup> Although, self-care behaviors



don't always lead to good control of metabolic status of the person, its ignorance most likely results in the weakness of metabolic status of the person.<sup>[66]</sup> Different factors including biological, psychological, economic, social-cultural factors and health care systems of the community affect directly and indirectly self-care behaviors in diabetic patients.<sup>[67]</sup>

Regarding the place of establishment and maintenance of self-care behavior, as well as the complexity of this behavior, it is necessary to use the concepts of theories and patterns of behavior change in this field. The constructs of perceived benefits and barriers in doing self-care activities investigated in this study are introduced as health promotion patterns in some theories of behavior change such as health belief pattern and are central elements in these patterns.

These patterns set the constructs of perceived barriers and benefits in the context of value expectation. That is, if the perceived barriers prevail the anticipated benefits, behavior's appearance will become less likely. In fact, people's behavior is determined by balance or imbalance between perceived positive and negative forces on their health behavior. This concept in the model shows the person's evaluation of benefits minus barriers (net benefits).<sup>[68]</sup>

Therefore, the person behaves or rejects behaving based on the review and analysis of benefits minus barriers. It should be noted that doing action for preventing the disease or taking action on a disease is dependent on the perception of its benefits and barriers.

Perceived benefits are related to the perception of usefulness of taking action to reduce disease risk or the perception of healthy action benefits. The person chooses a behavior that firstly has the most benefits (individual, family, social and ... benefits) and secondly is accessible in society. I.e. the relative effectiveness of available options has a major role in shaping the person's actions.<sup>[69]</sup> In studies performed for reviewing health promotion model, it was found that 61% of the empirical support for the importance of perceived benefits was to influence health behavior. This factor provides a medium support for this construct. It is assumed that the person's planning for doing a behavior is dependent on the predicted results and benefits. In the health promotion model, perceived benefits act as direct motivational factors of behavior and indirect motivational factors of behavior (through commitment to performing the behavior anticipated benefits of which will be achieved).<sup>[68]</sup>

Behavior's predicted benefits and mental protests are the positive and reinforcing results of the behavior. According to the theory of value anticipation, motivational importance of predicted benefits based on personal results of previous direct experiences or replacement experiences through observational learning of behaviors done by others. People tend to use their time and resources in activities which more likely increase their experiences' positive results. The benefits of performing a behavior may be internal or external.

Increasing alertness and reducing fatigue are obvious samples of internal benefits and external benefits include financial rewards or social interactions resulted from performing a behavior. Initially, the external benefits of health behavior may have high motivational importance, while the internal benefits may be a powerful factor in motivational maintenance of health behavior. The importance of expected benefits and financial relation between the benefits and the performance has numerous effects on predicted benefits as a determiner of health behavior. Positive beliefs about expected benefits or results are usually shown as an essential factor in doing a special health behavior but are not enough.<sup>[70]</sup>

On the other hand, perceived barriers refer to beliefs about actual and conceived costs of following the new behavior. In other words, it includes the perceived negative aspects which are potential and act as a barrier for doing a behavior. These aspects include: a) profit cost: Here, the person at first analyzes how profitable healthy behavior is. Whether cost value is paid or has the time assigned to it? B - Side effects: Negative aspects of behavior may be potentially unpleasant, painful, uncomfortable, inconvenient, and is time consuming for the person. These all are barriers as potentially negative aspects of behavior and affect the individual's behavior.<sup>[69]</sup>

Empirical studies have shown that predicted barriers frequently affect the intention of doing a special behavior and actual performance of the behavior. Of studies having tested health promotion model, 79% have expressed social support for the importance of barriers as a determinant of health promoting behavior. Regarding health promotion behaviors, barriers may be imaginary or real. They include ideas about non-availability, lack of suitability, expensiveness, difficulty or time consuming of a special act. Barriers are often considered as dams or personal expenses resulting from a behavior. Loss of pleasure or satisfaction resulting from non-health behaviors like smoking and eating fatty foods for compatibility with a healthier lifestyle can create barriers. Barriers usually stimulate an incentive for preventing a behavior's acquisition. When readiness for act is low and barriers are high, the action is impossible to occur. When readiness for act is high and barriers are low, the action is more likely to happen. Perceived barriers affect directly the health promotion behavior through creating a barrier to act and also indirectly through decreasing commitment and devotion to action's planning.<sup>[68]</sup>

However, self-care of diabetes is dependent on individual, psychological and social factors, perception of which helps health care providers to design and perform suitable and strong interventions for promoting diabetes self-management behavior. Among the studies having investigated the factors related to diabetes self-care, both perceived benefits and barriers have important roles. These studies showed that self-care behaviors have significant direct relationship with perceived benefits and significant inverse relationship with perceived barriers. Therefore, the application of these constructs alone or in combination with other constructs such

as perceived self-efficacy and social support in educational interventions programs is recommended for more desirable effectiveness.

## REFERENCES

- Tazakori Z, Zare M, Mirzarahimi M. The effect of nutrition education on blood sugar level and macronutrients intake in IDDM patients in Ardabil. *J Ardabil Univ Med Sci* 2003;2:17-21.
- Bate KL, Jerums G. 3: Preventing complications of diabetes. *Med J Aust* 2003;179:498-503.
- Chan YM, Molassiotis A. The relationship between diabetes knowledge and compliance among Chinese with non-insulin dependent diabetes mellitus in Hong Kong. *J Adv Nurs* 1999;30:431-8.
- Alberti KG, Zimmet P, Shaw J. International diabetes federation: A consensus on type 2 diabetes prevention. *Diabet Med* 2007;24:451-63.
- Larijani B, Tabatabai A. The economics of diabetes mellitus. *ISMJ* 2002;4:157-63.
- Metzger BE. American association guide to living with diabetes: Preventing and treating type 2 diabetes. John Wiley and Sons; 2007. p. 17.
- Shaw J, Sicree R, Zimmet P. Global estimates of the prevalence of diabetes for 2010 and 2030. *Diabetes Res Clin Pract* 2010;87:4-14.
- Odegard PS, Capoccia K. Medication taking and diabetes: A systematic review of the literature. *Diabetes Educ* 2007;33:1014-29.
- Monahan FD, Sands JK, Neighbors M, Marek JF, Green CJ. Phipps' medical-surgical nursing: Health and illness perspectives. St. Louis: Mosby Elsevier; 2007.
- American Diabetes Association (ADA). National standards for diabetes self-management education. *Diabetes Care* 2005;28:72-9.
- National Health Priority Action Council (NHPAC). National service framework for diabetes. Canberra: Australian Government Department of Health and Ageing; 2006.
- Knowler W, Barrett-Connor E, Fowler S, Hamman R, Lachin J, Walker E, *et al.* Reduction in the incidence of type 2 diabetes with lifestyle intervention or metformin. *N Engl J Med* 2002;346:393-403.
- Arzaghi M, Hakim Shoushtari M. In translation: Psychology in diabetes care-2005. In: Snoek FJ, Skinner TC, editors. 1<sup>st</sup> ed. Tehran: Nashrevista; 2008. p. 105-21.
- Maizlish N, Shaw B, Hendry K. Glycemic control in diabetic patients served by community health centers. *Am J Med Qual* 2004;19:172-9.
- Hertz R, Unger A, Lustik M. Adherence with pharmacotherapy for type 2 diabetes: A retrospective cohort study of adults with employer-sponsored health insurance. *Clin Ther* 2005;27:1064-73.
- Janice Clarke RN. Evaluation of a comprehensive diabetes disease management program: Progress in the struggle for sustained behavior change. *Dis Manag* 2002;5:77-86.
- Amini M, Gooya MM, Delavari AR, Mahdavi AL, Tabatabaei A, Haghighi S. Keifiyate edareye diabet dar Iran dar salhaye 2005-2006. *JMCIRI Majaleye Sazmane Nezame Pezeshkie Iran* 2008;26:20-9.
- Yamaguchi Y, Miura S, Urata H, Himeshima Y, Yamatsu K, Otsuka N, *et al.* The effectiveness of a multicomponent program for nutrition and physical activity change in clinical setting: Short-term effects of PACE+Japan. *Inter J Spo and Hea Sci* 2003;1:229-37.
- Simmons D, Weblemoe T, Voyle J, Prichard A, Leakehe L, Gatland B. Personal barriers to diabetes care: Lessons from a multi-ethnic community in New Zealand. *Diabet Med* 1998;15:958-64.
- 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.
- Fisher KL. Assessing psychosocial variables: A tool for diabetes educators. *Diabetes Educ* 2006;32:51-8.
- Vijan S, Stuart NS, Fitzgerald JT, Ronis DL, Hayward RA, Slater S, *et al.* Barriers to following dietary recommendations in type 2 diabetes. *Diabet Med* 2005;22:32-8.
- O'Dea AJ. Why do kids eat healthful food? Perceived benefits of and barriers to healthful eating and physical activity among children and adolescents. *J Am Diet Assoc* 2003;103:497-500.
- Brekke HK, Sunesson A, Axelsen M, Lenner RA. Attitudes and barriers to dietary advice aimed at reducing risk of type 2 diabetes in first-degree relatives of patients with type 2 diabetes. *J Hum Nutr Diet* 2004;17:513-21.
- Marzilli G, Cossege W. The effects of social support on eating behavior in patients with diabetes. Available from: (<http://www.insulin-pumpers.org/textlib/psyc353.pdf>). [Last accessed on 2010 May 5].
- Rafique GH, Shaikh F. Identifying needs and barriers to diabetes education in patients with diabetes. *J Pak Med Assoc* 2006;56:347-52.
- Charron-Prochownik D, Sereika SM, Becker D, Jacober S, Mansfield J, White NH, *et al.* Reproductive health beliefs and behaviors in teens with diabetes: Application of the expanded health belief model. *Pediatr Diabetes* 2001;2:30-9.
- Glasgow RE, Toobert DJ, Gillette CD. Psychosocial barriers to diabetes self-management and quality of life. *Diabetes Spectr* 2001;14:33-41.
- Aljaseem LI, Peyrot M, Wissow L, Rubin RR. The impact of barriers and self\_efficacy on self\_care behaviors in type 2 diabetes. *Diabetes Educ* 2001;27:393-404.
- Polly RK. Diabetes health beliefs, self-care behaviors, and glycemic control among older adults with non-insulin-dependent diabetes mellitus. *Diabetes Educ* 1992;18:321-7.
- Daniel M, Messer LC. Perceptions of disease severity and barriers to self-care predict glycemic control in Aboriginal persons with type 2 diabetes mellitus. *Chronic Dis Can* 2002;23:130-8.
- Mollem ED, Snoek FJ, Heine RJ. Assessment of perceived barriers in self-care of insulin-requiring diabetic patients. *Patient Educ Couns* 1996;29:277-81.
- Tan MY. The relationship of health beliefs and complication prevention behaviors of Chinese individuals with type 2 diabetes mellitus. *Diabetes Res Clin Pract* 2004;66:71-7.
- Wen LK, Shepherd MD, Parchman ML. Family support, diet, and exercise among older Mexican Americans with type 2 diabetes. *Diabetes Educ* 2004;30:980-93.
- Koch J. The role of exercise in the African- American woman with type 2 diabetes mellitus: Application of the health belief model. *J Am Acad Nurse Pract* 2002;14:126-9.
- Pham DT, Fortin F, Thibaudeau MF. The role of the health belief model in amputees' self-evaluation of adherence to diabetes self-care behaviors. *Diabetes educ* 1996;22:126-32.
- Lloyd CE, Wing RR, Orchard TJ, Becker DJ. Psychosocial correlates of glycemic control: Pittsburgh epidemiology of diabetes complications (EDC) study. *Diabetes Res Clin Pract* 1993;21:187-95.
- Nagelkerk J, Reick K, Meengs L. Perceived barriers and effective strategies to diabetes selfmanagement. *J Adv Nurs* 2006;54:151-8.
- Rothman RL, Mulvaney S, Elasy TA, VanderWoude A, Gebretsadiq T, Shintani A, *et al.* Selfmanagement behaviors, racial disparities, and glycemic control among adolescents with type 2 diabetes. *Pediatrics* 2008;121:912-9.
- Krichbaum K, Aarestad V, Bueth M. Exploring the connection between self-efficacy and effective diabetes self-management. *Diabetes Educ* 2003;29:653-62.
- Chapman KM, Ham JO, Liesen P, Winter L. Applying behavioral models to dietary education of elderly diabetic patients. *J Nutr Educ* 1995;27:75-9.
- Robin W. Strategies to facilitate lifestyle change associated with diabetes mellitus. *J Nurs Scholarsh* 2000;32:225-8.
- Kamel MN, Badawy YA, Merdan LA. Diabetic's knowledge of the disease and their management behavior. *East Mediterr Health J* 1999;5:974-83.
- Corina G, Michael PR, James JD. Diabetes education program use and patient-perceived barriers to attendance. *J Clin Resh and Meth* 2004;31:358-63.
- Adams AS, Mah C, Soumerai SB, Zhang F, Barton MB,

- Ross-Degnan D. Barriers to self-monitoring of blood glucose among adults with diabetes in an HMO: A cross sectional study. *BMC Health Serv Res* 2003;3:1-8.
46. Karter AJ, Ferrara A, Darbinian JA, Ackerson LM, Selby JV. Self monitoring of blood glucose: Language and financial barriers in a managed care population with diabetes. *Diabetes Care* 2000;23:477-83.
  47. Gagliardino JJ. A model education program for people with type 2 diabetes. *Diabetes Care* 2001;24:1001-7.
  48. Rickheim PL, Weaver TW, Flader JL, Kendall DM. Assessment of group versus individual diabetes education: A randomized study. *Diabetes Care* 2002;25:269-74.
  49. Gillibrand R, Stevenson J. The extended health belief model applied to the experience of diabetes in young people. *Br J Health Psychol* 2006;11:155-69.
  50. Aalto AM, Uutela A. Glycemic control, self-care behaviors, and psychosocial factors among insulin treated diabetics: A test of an extended health belief model. *Int J Behav Med* 1997;4:191-214.
  51. Pinto SL, Lively BT, Siganga W, Goodman MH, Kamm G. Using the health belief model to test factors affecting patient retention in diabetes-related pharmaceutical care services. *Res Social Adm Pharm* 2006;2:38-55.
  52. Patino AM, Sanchez J, Eidson M. Health beliefs and regimen adherence in minority adolescents with type 1 diabetes. *J Pediatr Psychol* 2005;30:503-12.
  53. Toobert DJ, Hampson SE, Glasgow RE. The summary of diabetes self-care activities measure. *Diabetes Care* 2000;23:943-50.
  54. Abood D, Black DR, Feral D. Nutrition education worksite intervention for university staff: Application of the health belief model. *J Nutr Educ Behav* 2003;35:260-7.
  55. Coates VE, Boore JR. The influence of psychological factors on the self-management of insulin-dependent diabetes mellitus. *J Adv Nurs* 1998;27:528-37.
  56. Bond GG, Aiken LS, Somerville SC. The health belief model and adolescents with insulin-dependent diabetes mellitus. *Health Psychol* 1992;11:190-8.
  57. Morowatisharifabad MA, Rouhani Tonekaboni N. Diabetes self-care determinants model of diabetic patients referred to yazd diabetes research center. Daneshvar, scientific-research. *JSHU* 2009;16:29-36.
  58. Sharifirad GH, Entezari MS, Kamran A, Azadbakhat L. Effectiveness of nutrition education to patients with type 2 diabetes: The health belief model. *IJDLD* 2008;7:379-86.
  59. Morowatisharifabad MA, Rouhani Tonekaboni N. The relationship between perceived benefits/barriers of self-care behaviors and self management in diabetic patients. *JFNM* 2007;13:17-27.
  60. Shakibazadeh E, Rashidian A, Larijani B, Shojaezadeh D, Forouzanfar MH, Karimi Shahanjarini A. Perceived barriers and self-efficacy: Impact on self-care behaviors in adults with type 2 diabetes. *JFNM* 2010;15:69-78.
  61. Jahanloo AS, Ghofranipour F, Vafaei M, Kimiagar M, Heydarnia AR, Sobhani A. Health Belief Model constructs measured with HbA1c in diabetic patients with good control and poor. *JHUMS* 2008;12:37-42.
  62. Shamsi M, Sharifirad G, Kachoyee A, Hassanzadeh A. The effect of educational program walking based on health belief model on control sugar in woman by type 2 diabetics. *IJEM* 2010;11:490-9.
  63. Bernal H, Woolly S, Schensul JJ, Dickinson JK. Correlates of self-efficacy in diabetes self-care among hispanic adults with diabetes. *Diabetes Educ* 2000;26:673-80.
  64. Keshavarz Z, Simbar M, Ramezankhani A. Effective factors on nutritional behavior of female workers based on "integrated model of planned behavior and self-efficacy": A qualitative approach. *Hakim* 2010;13:199-209.
  65. Schreurs KM, Colland VT, Kuijter RG, de Ridder DT, van Elderen T. Development, content, and process evaluation of a short self-management intervention in patients with chronic diseases requiring self-care behaviors. *Patient Educ Couns* 2003;51:133-41.
  66. Park H, Hong YS, Lee H, Ha E, Sung Y. Individuals with type 2 diabetes and depressive symptoms exhibited low adherence with self-care. *J Clin Epidemiol* 2004;57:978-84.
  67. Bell RA, Arcury TA, Snively BM. Diabetes foot self-care practices in a rural triethnic population. *Diabetes Educ* 2005;31:75-83.
  68. Pender NJ, Murdaugh CL, Parsons MA. Health-promotion in nursing practice. 4<sup>th</sup> ed. USA: Prentice Hall; 2002. p. 60.
  69. Glanz K, Rimer BK, Lewis FM. Health behavior and health education: Theory, research, and practice. 3<sup>rd</sup> ed. Jossey-Bass; 2002.
  70. Nutbeam D, Harris E. Theory in a nutshell: A practical guide to health promotion theories. 2<sup>nd</sup> ed. Mc Graw- Hill Australia Pty Ltd; 2004.

Source of Support: Nil, Conflict of Interest: None declared