Original Article
http://mjiri.iums.ac.ir

Medical Journal of the Islamic Republic of Iran (MJIRI)
Iran University of Medical Sciences

Determinants of adherence to self-care behavior among women with type 2 diabetes: an explanation based on health belief model

Mahmood Karimy[1], Marzieh Araban[2], Iraj Zareban*[3], Mohammad Taher[4]
Ahmadreza Abedi[5]

Received: 29 April 2015 Accepted: 12 September 2015 Published: 14 May 2016

Abstract

Background: Self-care is an essential element in treating a person with diabetes; and managing diabetes is of prime importance. The aim of this study was to investigate the predictors of adherence to self-care behavior among women with Type 2 diabetes.

Methods: This cross-sectional study was conducted on 210 female patients aged 30 to 60. Data collection tool was an anonymous valid and reliable questionnaire designed based on the Health Belief Model (HBM), which acquired information about the followings: Perceived susceptibility, severity, benefits, barriers, self-efficacy and diabetes self-care behavior. Data were analyzed by t-test, chi-square and regression analysis.

Results: The multiple regression models revealed 59.9% of the variance of self-care behavior with self-efficacy, perceived barrier, benefit and susceptibility. Additionally, the highest weight for β (β=0.87) was found for self-efficacy. Self-care behavior was positively correlated with all HBM variables except for perceived barriers showing a negative correlation.

Conclusion: The Health Belief Model may be used as a framework to design intervention programs in an attempt to improve adherence to self-care behaviors of women with diabetes. In addition, the results indicated that self-efficacy might play a more crucial role in developing self-care behaviors than t other HBM components. Therefore, if the focus is placed on self-efficacy when developing educational programs, it may increase the likelihood of adherence to self-care behavior.

Keywords: Diabetes, Health Beliefs Model, Self- Care, Self-Efficacy, Iran.

Cite this article as: Karimy M, Araban M, Zareban I, Taher M, Abedi A. Determinants of adherence to self-care behavior among women with type 2 diabetes: an explanation based on health belief model. *Med J Islam Repub Iran* 2016 (14 May). Vol. 30:368.

Introduction

Diabetes is a common chronic condition which requires several complex self-care chores(1). It has been reported that the incidence of Type 2 diabetes mellitus (T2DM) is increasing in both industrialized and developing countries due to behavioral causes and changes in the life style (2). It has been expected that the number of patients with diabetes be doubled by the year 2025, with most of these people living in low income countries (3). Based on a newly published data, 7.7% of adults aged 25-64 (2 million) are affected by diabetes. This survey added that 16.8% (4.4 million) of Iranian adults had impaired fasting glucose (3). The World Health Organization expect that the number of patients with diabetes increase to more than 6 million till the year 2030 (4).

Several vascular problems including both micro vascular and macro vascular complications, which imposed much more costs on health care systems, are caused by dia-

[1]. Assistant Professor, Public Health Department, Faculty of Health, Saveh University of Medical Sciences, Saveh, Iran. karimymahmoo@yahoo.com
[2]. Assistant Professor, Public Health Department, Faculty of Health, Ahvaz University of Medical Sciences, Ahvaz, Iran. araban62@gmail.com
[3]. (**Corresponding author**) Assistant Professor, Health education Department, Faculty of Health, Health Promotion Research Center, Zahedan University of Medical Sciences, Zahedan, Iran. zareban@yahoo.com
[4]. MSc, Nursing Department, Faculty of Nursing and Midwifery, Saveh University of Medical Sciences, Saveh, Iran. tahermohammad38@gmail.com
[5]. Assistant Professor, Nursing Department, Faculty of Nursing and Midwifery, Arak University of Medical Sciences, Arak, Iran. abedi.a@arakmu.ac.ir

betes. In fact, the consumption of health resources in patients with T2DM is two to six times more than what is used by people with other chronic diseases (5). Fatness, inactive lifestyle and poor diet are behavioral risk factors related to T2DM (6).

Self-care is a critical part of treating diabetes which is mostly highlighted in the handling of a person with diabetes, and its importance is approved in studies on people with different cultural and socioeconomic status (7). Diabetes' self- care is a dynamic, cognitive practice, and those who are affected by diabetes adhere to treatment regimens to delay adverse complications and improve their overall health (8). The American Association of Diabetes Educators proposes healthy eating, physical activity, monitoring blood glucose, compliance with medication and health coping skills as elements of self-care behaviors for people with diabetes (1).

Ruggiero et al. performed a study on the impact of training on self-care behaviors. After the training program, a significant overall improvement was observed in the mean of self-care scores across time (9). Heisler et al. found that self-care behavior (drug use, self-monitoring of blood sugar, diet, exercise and foot care) is associated with lower HbA1c and concluded that the mean of HbA1c level changed from 8.3% to 7.3% (10). In another study by Ahmed Khan, he concluded that only 56% of the patients had sufficient knowledge about self-care in diabetes (11). Also, the study by Hernandez et al. showed that the significant correlates found may help identify and involve patients who may benefit from the strategies that increase self-care adherence (12). Similarly, Ortiz et al. examined self-care behaviors and their relationship with glycemic control. They concluded that self-care behaviors were associated with fasting blood glucose (13).

Health beliefs could determine the degree to which patients comply to recommendations and adhere to self-care behaviors (14). Additionally, gaining knowledge about the health beliefs of patients is a cost-effective way to raise positive health outcomes (3-4,15).The Health Belief Model (HBM) was used as a conceptual model to understand and predict adherence to self-care behaviors.

Previous studies showed successful application of HBM in explaining and predicting preventive health behavior. Based on HBM, the individual should believe that he/she is susceptible to a disease (perceived susceptibility), understand the risks and its perceived severity, and follow self-care behaviors (16-17). Dehghani-Tafti et al. approved the efficiency of the Health Belief Model in predicting self-care behaviors among diabetic patients (18). In another study, Ekhtiari et al. found that HBM can be used as an appropriate tool to assess the status of pregnant women in the field of self-care behaviors (19).

Despite the clinical importance of evaluating adherence to self-care in patients with diabetes, little is known about self-care behavior and its related factors in women with diabetes in Zahedan, Iran. Such a study is needed given the importance and relevance of this topic in Zahedan, which is a critically under-developed and underprivileged city, and the serious adverse health effects of this problem on the population, particularly on the more susceptible groups such as middle-aged and older women. Hence, the aim of this study was to investigate the predictors of self-care behaviors among women with Type 2 diabetes in Zahedan, Iran.

Methods

Study Population and Setting

This was a cross-sectional study carried out from June 2013 to September 2013 at Hazrat Ali Asghar (AS) Hospital, the only referral diabetes clinic in Zahedan, affiliated to Zahedan University of Medical Sciences.

To detect the best predictor of self- care, considering the accuracy of 3% with a two-sided 5% significance level and a power of 80%, a sample size of 210 participants was necessary, given an anticipated dropout rate

of about 10%. The study sample was selected through random sampling method.

Women reffering to the hospital were approached by the coresspounding author and after declaring their interest to participate in the study, they received detailed information about the aim of the study and were asked to provide informed consent. Two hundred twenty-five women were contacted, but 10 (2.25%) refused to participate in the study.

Out of the 215 interested potential participants, 210 met the eligibility criteria, which were ass follows: Age range of 30-60 years, at least one year duration of diagnosed Type 2 diabetes, not suffering from any complications (e.g., nephropathy, rethinopathy, or any other vascular problems) during the course of diabetes and having completed the medical profile at the Clinic. Also, initial assessment to rule out the diabetes cardiovascular complications including nephropathy, rethinopathy, or any other vascular problems was done by a physician.

Women were excluded from the study if they were experiencing lack of language proficiency.

Measures

A self-designed questionnaire derived from the literature was developed to collect data. It consisted of three parts:

1. Demographic and Medical Information: The first part of the questionnaire was related to demographic variables such as age, education, occupation, marital status, disease history, type of treatment, and family history of diabetes. Participants' height, weight and waistline were measured as part of the physical examination.Weight and height of the patients were measured and body mass index(BMI) was calculated. Participants were asked to respond to all questions included in the demographic questionnaire form.

2. Health Belief Model Constructs: This part consisted of 33 items derived from the available literature (3-4, 20-23).

Considering several different measures on HBM constructs, we produced a set of specific items for this study as recommended by experts. After careful examination and recombination of similar items or items very close in meanings, a final set of 33 items was provided. The questions Consisted of: (a) Perceived susceptibility to diabetes complications (5 items), which was measured with six items using five-interval Likert differentials scales, ranging from 1 (strongly agree) to 5 (strongly disagree), and with respect to the interpretation of scoring, higher scores indicated a high level of perceived susceptibility; (b) Perceived severity of diabetes and its complications as a serious illness (6 items), rated on a 5-point scale ranging from 1 (strongly agree) to 5 (strongly disagree); (c) Perceived benefits of self care (i.e., perception of individuals about the benefits of selfcare behaviors and its helpfulness) (6 items), and the scores for benefits item ranged from 1 (strongly disagree) to 5(strongly agree), with greater scores indicating a better condition; (d) Perceived barrier to selfcare (i.e., individuals own evaluation of obstacles for self- care behavior) (5 items) rated on a 5-point scale ranging from 1 (strongly agree) to 5 (strongly disagree). However, scores for perceived barriers were recoded to show a better condition; and (e) Self- efficacy to self- care (i.e., Perception about individuals ability to perform self- care behaviors) (10 items), and the answers were rated on a 5-point scale ranging from 1 (Never) to 5 (often). In total, HBM items were scored using a five-point Likert differential scale. A panel of 10 experts (health education & promotion specialist and internist) helped to assess the content validity by means of a quantitative method in which two coefficients of Content Validity Ratio (CVR) and Content Validity Index (CVI) were used in accordance with the Law she table that confirms a CVR if it is over 0.62 and a CVI if over 0.79. (CVI=0.85 and CVR=0.79). Next, a confirmatory factor analysis was used to assess the construct validity of the instruments. The model's fit

was confirmed for all scales (goodness-of-fit index 0.92–0.98). Internal consistency as measured by the Cronbach's alpha coefficient range was found to be 0.81-0.92.

3. Self-care behaviors: We measured diabetes self-care using revised Summary of Diabetes Self-Care Activities (SDSCA) scale (4,24). The RSDSCA measures the frequency of self-care activity in the last seven days for six aspects of the diabetes regimen: General diet (following healthy diet), specific diet (eating fruits/low fat diet), foot care, blood–glucose testing, taking medication and exercise. Both content validity and test re- test reliability showed satisfying results; (CVR, CVI=0.84) and correlation rate of 0.83.

All data analysis was conducted using Statistical Package for the Social Sciences (SPSS) version 18.0 (SPSS Inc., Chicago, IL, USA). Differences in socio-demographics among different subgroups were assessed using a t-test or ANOVA for continuous variables, and a chi-squared test for binary/categorical variables and proportions. To predict the variation in self-care behavior scores on the basis of the Health Belief Model variables, linear re-gression analysis was performed. In this study, Hierarchical multiple regression analysis assessed HBM factors to predict self- care behavior using centered variables. The normality of data was tested using the Kolmogorov–Smirnov test, the histogram and normality of the residuals. An alpha error of<0.05 indicated statistical significance.

Ethical approval was obtained from the Ethics Committee of Zahedan University of Medical Sciences. Permission was also received from ZUMS to apply the data collection tools.

Results

The mean age of the participants was 48.7 years (SD=6.8). The majority of the patients were house wives (92%); and most of them had primary education (69%) followed by secondary (27%, n=57) and

Table 1. Differences in Adherence to Self-Care and HBM Constructs by Demographic Status (n=210)

Variable	No. (%)	Percieved Susceptilility	Percieved Severity	Percieved Benefits	Percieved Barriers	Self Efficacy	Self Care
Characteristic		M± SD	M± SD	M± SD	M± SD	M± SD	M± SD
Age							
30-40 years	59(28)	16.9±6.1	15.3±5	22.9±6.2	13.0±4.2	30.2±5.2	3.4±1.2
41-50 years	71(34)	17±5.8	15.7±4.7	23.2±6.4	13.1±4.5	30.8±4.7	3.4±1.1
51-60 years	80(38)	17.6±5.2	16±5.2	23.7±6.5	13.8±4.0	31±5.1	3.6±1.5
*P-value		0.851	0.835	0.790	0.746	0.824	0.601
Level of Education							
Illiterate or Primary Education (1-5 years of education)	145(69)	15.2±5.1	14.1±3.2	20.9±4.4	15.6±3.7	28.2±4.6	2.9±1.6
Secondary (6-11 years of education)	56(27)	18.6±3.5	16.7±2.9	23.6±4.3	10.9±4.2	30.5±5.2	3.4±1.3
Diploma & Higher	9(4)	20.3±3.2	19.4±4.5	25.8±4.7	12.8±4.5	32.7±4.9	4.8±2.1
**P-value		0.001	0.001	0.001	0.001	0.001	0.001
Occupational Status							
House Holder	193(92)	17.1±5.9	15.5±6.3	22.7±5.8	13.6±4.7	31.2±5	3.5 ± 1.2
Employed	17(8)	17.3±4.5	15.6±5.1	22.5±4.4	13.1±4.8	31.8±4.8	3.4 ± 1.3
**P-value		0.888	0.924	0.815	0.512	0.825	0.434
Marital Status							
Single	31(15)	16.7±7.9	16.2±5.9	22.8±4.5	13.0±4.3	31.4±5.5	3.4 ± 1.3
Married	179(85)	17.2±5.6	16.4±3.5	23.1±4.1	13.1±4.6	32.7±5.2	3.4 ± 1.2
**P-value		0.814	0.724	0.678	0.556	0.625	0.855
BMI							
18.5-24.9 kg/m2	45(21)	20.1±3.5	16.4±5.0	24.2±5.7	12±4	30.7±5.1	4±0.87
25-29.9 kg/m2	69(33)	17.7±6.1	15.6±5.2	22.7±5.1	12.8±5.4	30.1±4.8	3.9±0.82
More than 30 kg/m2	96(46)	15.8±6.1	14.8±5.4	21.5±5	14.9±4.4	29.8±4.3	3.6±0.81
*P-value		0.001	0.189	0.001	0.001	0.05	0.01

* Results derived from ANOVA
**Results derived from chi-squared test

higher (4%, n=9) education. In terms of education, most participants (69%) were illiterate and 27%, and 4% had secondary (6-11 years of education) education and high school diploma, respectively. The mean ± SD duration of T2DM diagnosis was 8.4 ± 5 years; 36.1% (n=76) of the patients had a family history of diabetes. Almost half (n=102) of the patients reported they did not have any clinical symptoms. Based on the calculation of BMI, 42% (n=88) of patients were found to be in the overweight category. This finding showed that BMI has no significant statistical effect on self- care behavior. Baesd on the chi-square test, no significant differences could be detected in socio-demographic variables between women refusing to participate and women interested in participating ($p>0.05$). Table 1 demonstrates differences in adherence to self-care and HBM constructs by demographic status. Only the level of education had a significant effect on self-care behavior and HBM construct ($p<0.001$).

As demonstrated in Table 2, stepwise multiple linear regression analyses were used to predict patients' self-care behavior. The final regression equation explained 59.9% (adjusted R^2) of the variance of self-care behavior. Also, the highest weight for β (β=0.68) was found for self-efficacy, showing that self-efficacy was the strongest determinant of self- care. The addition of the perceived susceptibility failed to produce a significant increase for the variance (β=0.017, p=0.459).

Applying Pearson's correlation coefficient, it was found that self-care behaviors had a statistically significant positive association between self-care and perceived susceptibility (r=0.33), perceived severity (r=0.35), perceived benefits (r=0.41) and self–efficacy (r = 0.44) were found while perceived barriers had a negative association (r=- 0.38).

Discussion

Patient adherence to self-care remains to be a key challenge in the long-term controlling of T2DM. Yet, there is a lack of research concerning the predictors of adheres to self-care. This study revealed predictors of self-care behavior based on HBM among women with T2DM. HBM constructs were able to explain 59.9% of the variance in self-care behavior, with self-efficacy, perceived barrier, benefit and susceptibility emerging as significant predictors of adherence to it. The present results are broadly in line with previous studies, which have shown a predictive power of the HBM for

Table 2. Results Obtained from Multiple Linear Regression Analyses (n=210)

		Unstandardized Coefficients		Standardized β	-t	p
		B	SE			
Step 1						
	Self- efficacy	0.30	0.02	0.68	10.5	<0.001
	Model R^2=45.9%					
Step 2						
	Self-efficacy	0.45	0.03	1.0	11.4	<0.001
	Barrier	0.35	0.07	0.45	5.0	<0.001
	Model R^2=54.5%					
Step 3						
	Self-efficacy	0.40	0.04	0.90	10.0	<0.001
	Barrier	0.42	0.06	0.54	6.2	<0.001
	Severity	0.17	0.04	0.29	3.8	<0.001
	Model R^2=59%					<0.001
Step 4						
	Self-efficacy	0.38	0.04	0.87	9.7	<0.001
	Barrier	0.42	0.06	0.54	6.1	<0.001
	Severity	0.10	0.05	0.18	2.1	<0.04
	Benefit	0.31	0.15	0.16	2.0	<0.04
	Model R^2=59.9%					<0.001

self-care behavior. For example, Brownlee-Duffeck stated that the HBM accounted for 52% of the variance in self-reported adherence metabolic control for adolescents and adults with diabetes mellitus (25). Similarly, Morowati indicated that HBM constructs was able to explain 51% of the variance of self-care behavior in patients with T2DM (21).

In this study, self-efficacy was the strongest predictor of self-care behavior. Several studies have documented associations between self-efficacy and diabetes self-care (20,26-27). For instance, in a review of the existing literature, Sigurardo´ttir (28) clarified that the greater the self-efficacy for diabetes, the better the self-care behaviors and subsequently better metabolic control. Likewise, Berg et al. (29) reported that self-efficacy was the most prominent factor in managing diabetes. A case-control study conducted in Georgia highlighted the role of self-efficacy in attaining self-care behaviors as well (30).

A study in Ethiopia also had similar findings which perceived self-efficacy as a strong predictor of physical activity and self-care adherence among patients with Type 2 diabetes (31). This may have resulted from the fact that those patients with higher self-confidence are more likely to keep on in their attempts to perform the suggested behavior in different situations. It seems that focusing on self- efficacy is the most powerful element in the success of health promotion programs. These findings could be helpful in designing health promotion innervations in diabetes management programs.

In the present study, negative associations were found between self-care behaviors and perceived barriers. Based on HBM, barriers are the potential negative aspects of a particular health action; perceived barriers may act as impediments in undertaking recommended behaviors. In line with our study, results from the study conducted by Janz and Becker (32) found similar effects for perceived barriers. Similarly, Jalilian et al. reported a significant relationship between perceived barriers and diabetes self-care behaviors (33). On the contrary, Rickheim (34) reported that a barrier was the strongest predictor of regimen adherence and metabolic control. One possible explanation for such a difference is the fact that the study population and the type of behavior assessed were not the same.

Bernal (35) reported a significant relationship between perceived benefits and diabetes self-care behaviors. Our findings revealed that patients who had better perceived benefit of self- care were more adherent to self- care, and these outcomes are consistent with similar studies (18-19). In contrast, study of Ayeleet al. (36) and Tamirat et al. (31) revealed no significant association between perceived benefits and self-care behaviors of diabetic patients. One possible explanation for such a difference in the results may be due to the fact that the majority of the patients in Ayeleet's study were older than 50 years of age, while 62 % of the population in our study were younger than 50. In line with the assumption of the HBM, those who exhibit optimal beliefs in susceptibility and severity are not expected to adopt any recommended suggestions unless they perceive the action as potentially beneficial by reducing the threat (37).

The usefulness of perceived severity as another construct of HBM has been shown previously (23,25,32,38). In this study, it was indicated that self-care behaviors had positive correlations with perceived severity; and patients who had more perceived severity of the disease were more adherent to self- care. Therefore, perceived severity of the disease is helpful for the likely hood of adherence to self- care. The previous study indicated that perceptions of severity contributed to sick-role behavior (i.e., after diagnosis) (14). For instance, a study by Ayele (36) in patients with diabetes in Harari, Eastern Ethiopia, showed that individuals with high perceived severity of the disease and its complications were 12.3 times more likely to perform self- care. In contrast, in the study of Brownlee (25), there was no significant relation between

perceived severity and self- care. A study in Iran suggested the low perceived susceptibility as the reason for patients not caring about their health (39).

Based on HBM, severity is the perception of diabetes as a serious illness, ranging from perceiving few complications in diabetes as a life-threatening disease.

A few important limitations should be taken into account while interpreting the findings of this study. First, the analysis was based on cross-sectional data; thus, causal relationships could not be inferred. Secondly, recording the behavior of patients was based on their own report.

Conclusion

This study provides support for the use of the Health Belief Model (HBM) to examine adherence of diabetic patients to self- care behaviors among women with T2DM. Furthermore, conducting future research is recommended to examine how interventions can be designed to utilize HBM as a part of patient education. Since long-term complications of diabetes can be prevented through providing education and encouraging proper preventative care, results of this study may provide an essential framework to educate T2DM patients to increase their adherence to self-care behavior.

Conflict of Interest

The authors state that they have no conflicts of interest.

References

1. Jansà M, Vidal M, Giménez M, Conget I, Galindo M, Roca D, et al. Psychometric analysis of the Spanish and Catalan versions of the Diabetes Self-Care inventory-revised version questionnaire. Patient preference and adherence 2013;7:997.

2. Esteghamati A, Meysamie A, Khalilzadeh O, Rashidi A, Haghazali M, Asgari F, et al. Third national Surveillance of Risk Factors of Non-Communicable Diseases (SuRFNCD-2007) in Iran: methods and results on prevalence of diabetes, hypertension, obesity, central obesity, and dyslipidemia. BMC Public Health 2009;9(1):167.

3. Sharifirad G, Entezari MH, Kamran A, Azadbakht L. The effectiveness of nutritional education on the knowledge of diabetic patients using the health belief model. Journal of research in medical sciences: the official journal of Isfahan University of Medical Sciences 2009;14(1):1.

4. Zareban I, Niknami S, Hidarnia A, Rakhshani F, Karimy M, Shamsi M. The Effect of Education Program Based on Health Belief Model on Decreasing Blood Sugar Levels in Diabetic Type 2 Patients in Zahedan. Health Scope 2013;2(2):73-8.

5. Ricci-Cabello I, de Labry AO, Bolívar-Muñoz J, Pastor-Moreno G, Bermudez-Tamayo C, Ruiz-Pérez I, et al. Effectiveness of two interventions based on improving patient-practitioner communication on diabetes self-management in patients with low educational level: study protocol of a clustered randomized trial in primary care. BMC health services research 2013;13(1):433.

6. Carolan-Olah MC, Cassar A, Quiazon R, Lynch S. Diabetes care and service access among elderly Vietnamese with type 2 diabetes. BMC health services research 2013;13(1):447.

7. Rodrigues FFL, Zanetti ML, Santos MAd, Martins TA, Sousa VD, Teixeira CRdS. Knowledge and attitude: important components in diabetes education. Revista Latino-Americana de Enfermagem 2009;17(4):468-73.

8. Blonde L, Karter AJ. Current evidence regarding the value of self-monitored blood glucose testing. The American journal of medicine 2005;118(9):20-6.

9. Baghianimoghadam MH, Shogafard G, Sanati HR, Baghianimoghadam B, Mazloomy SS, Askarshahi M. Application of the health belief model in promotion of self-care in heart failure patients. Acta Medica Iranica 2013;51(1):52-8.

10. Heisler M, Spencer M, Forman J, Robinson C, Shultz C, Palmisano G, et al. Participants' assessments of the effects of a community health worker intervention on their diabetes self-management and interactions with healthcare providers. American journal of preventive medicine 2009;37(6):S270-S9.

11. Khan LA, Khan SA. Level of knowledge and self-care in diabetics in a community hospital in Najran. Annals of Saudi medicine 2000;20(3/4): 300-1.

12. Hernandez R, Ruggiero L, Riley BB, Wang Y, Chavez N, Quinn LT, et al. Correlates of self-care in low-income African American and Latino patients with diabetes. Health Psychology 2014;33(7):597.

13. Ortiz LGC, Pérez BDÁ, González ER, Martínez SP, Quirarte NHG, Berry DC. Self-Care Behaviors and Glycemic Control in Low-Income Adults in México With Type 2 Diabetes Mellitus May Have Implications for Patients of Mexican Heritage Living in the United States. Clinical nursing research 2015:1054773815586542.

14. Harvey J, Lawson V. The importance of health belief models in determining self-care behaviour in diabetes. Diabetic Medicine 2009;26(1):5-13.

15. Mahjouri MY, Arzaghi SM, Qorbani M, Esfahani EN, Larijani B. Evaluation of psychometric properties of the third version of the Iranian Diabetes Attitude Scale (IR-DAS-3). Iranian Journal of Diabetes and Lipid Disorders 2011; 10(2):1-6.

16. Karimy M, Montazeri A, Araban M. The effect of an educational program based on health belief model on the empowerment of rural women in prevention of brucellosis. Arak Medical University Journal 2012;14(7):85-94.

17. Heidarnia A. Factors influencing self-medication among elderly urban centers in Zarandieh based on Health Belief Model. Arak Medical University Journal 2011;14(5):70-8.

18. Dehghani-Tafti A, Mahmoodabad SSM, Morowatisharifabad MA, Ardakani MA, Rezaeipandari H, Lotfi MH. Determinants of Self-Care in Diabetic Patients Based on Health Belief Model. Global Journal of Health Science 2015; 7(5):p33.

19. Ekhtiari YS, Majlessi F, Foroushani AR. Measurement of the Constructs of Health Belief Model related to Self-care during Pregnancy in Women Referred to South Tehran Health Network. Community Health 2015;1(2):89-98.

20. Al-Khawaldeh OA, Al-Hassan MA, Froelicher ES. Self-efficacy, self-management, and glycemic control in adults with type 2 diabetes mellitus. Journal of Diabetes and its Complications 2012; 26(1):10-6.

21. Morovati Sharifabad M, Rouhani Tonekaboni N, Baghiani Moghadam M. Predictors of Self-Care Behaviors among Diabetic Patients Referred to Yazd Diabetes Research Centre Based on Extended Health Belief Model. Journal of Shahid Sadoughi University of Medical Sciences And Health Services 2007.

22. Tan MY. The relationship of health beliefs and complication prevention behaviors of Chinese individuals with Type 2 Diabetes Mellitus. Diabetes research and clinical practice 2004;66(1):71-7.

23. Harris R, Linn MW. Health beliefs, compliance, and control of diabetes mellitus. Southern Medical Journal 1985;78(2):162-6.

24. Gao J, Wang J, Zheng P, Haardörfer R, Kegler MC, Zhu Y, et al. Effects of self-care, self-efficacy, social support on glycemic control in adults with type 2 diabetes. BMC family practice 2013;14(1): 66.

25. Brownlee-Duffeck M, Peterson L, Simonds JF, Goldstein D, Kilo C, Hoette S. The role of health beliefs in the regimen adherence and metabolic control of adolescents and adults with diabetes mellitus. Journal of consulting and clinical psychology 1987;55(2):139.

26. Johnston-Brooks CH, Lewis MA, Garg S. Self-efficacy impacts self-care and HbA1c in young adults with Type I diabetes. Psychosomatic Medicine 2002;64(1):43-51.

27. Sousa VD, Zauszniewski JA, Musil CM, Price Lea PJ, Davis SA. Relationships among self-care agency, self-efficacy, self-care, and glycemic control. Research and theory for nursing practice 2005;19(3):217-30.

28. Sigurardo´ttir AK. Self-care in diabetes: Model of factors affecting self-care. Journal of Clinical Nursing 2005;14(3):301-14.

29. Berg CA, King PS, Butler JM, Pham P, Palmer D, Wiebe DJ. Parental involvement and adolescents' diabetes management: The mediating role of self-efficacy and externalizing and internalizing behaviors. Journal of pediatric psychology 2011; 36(3):329-39.

30. Julia L. Self-monitoring of blood glucose in type 2 diabetes. Aust Prescr 2010;33:138-40.

31. Tamirat A, Abebe L, Kirose G. Prediction of physical activity among Type-2 diabetes patients attending Jimma University specialized Hospital, southwest Ethiopia: Application of health belief model. Science 2014;2(6):524-31.

32. Janz NK, Becker MH. The health belief model: A decade later. Health Education & Behavior 1984;11(1):1-47.

33. Jalilian F, Motlagh FZ, Solhi M, Gharibnavaz H. Effectiveness of self-management promotion educational program among diabetic patients based on health belief model. Journal of education and health promotion 2014;3.

34. Rickheim PL, Weaver TW, Flader JL, Kendall DM. Assessment of Group Versus Individual Diabetes Education A randomized study. Diabetes care 2002;25(2):269-74.

35. Bernal H, Woolley S, Schensul JJ, Dickinson JK. Correlates of self-efficacy in diabetes self-care among Hispanic adults with diabetes. The Diabetes Educator 2000;26(4):673-80.

36. Ayele K, Tesfa B, Abebe L, Tilahun T, Girma E. Self Care Behavior among Patients with Diabetes in Harari, Eastern Ethiopia: The Health Belief Model Perspective. PloS one 2012;7(4):e35515.

37. Karimy M, Niknami S, Hidarnia AR, Hajizadeh I. Intention to start cigarette smoking among Iranian male adolescents: usefulness of an extended version of the theory of planned behaviour. Heart Asia 2012;4(1):120-4.

38. Patino AM, Sanchez J, Eidson M, Delamater AM. Health beliefs and regimen adherence in minority adolescents with type 1 diabetes. Journal of pediatric psychology 2005;30(6):503-12.

39. Karimy M, Niknami S, Heidarnia A, Hajizadeh I. Assessment of knowledge, health belief and patterns of cigarette smoking among adolescents. Journal of Fasa University of Medical Sciences 2011;1(3):142-8.