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The Health Belief Model and Self-Care Behaviors among Type 2 Diabetic Patients

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Abstract

Objective: Diabetes mellitus is a major health problem worldwide. The diabetes self-care behavior is an effective strategy to control diabetes. The study aimed to investigate the predictors of self-care behavior based on the Health Belief Model (HBM) among type 2 diabetic patients.

Materials and Methods: This cross-sectional study was carried out on 390 diabetic patients referred to Hamadan Diabetes Research Center with a simple random sampling method. The participants completed a self-administered questionnaire including demographic characteristics, self-care behaviors and HBM constructs. Data were analyzed using parametric tests in SPSS-19 software.

Results: According to the findings, the diabetic patients had a moderate level of self-care behaviors. Also results showed that, HBM explained 29.6% of the variance in frequency of self-care behaviors. Perceived self-efficacy, perceived severity, perceived barrier and perceived susceptibility were the best significant predictors ($P<0.05$).

Conclusion: The researchers suggest to promote self-care behaviors, preparing training packages tailored to the needs of diabetic patients with emphasis on increasing self-efficacy and removal barriers of normal self-care behaviors are necessary.

Keywords: Attitude, Diabetes complications, Health belief model, Self-care

Introduction

Diabetes is the most common important metabolic disease. Due to its high prevalence, diabetes is considered as a health problem worldwide (1). Diabetes type 2 constitutes about 90 to 95 percent of diabetic patients and occurs most often in older than 40 years (2). This disease imposes great direct and indirect costs to health care systems (3). Major part of these costs is related to long-term complications of the disease, such as coronary heart diseases, stroke, blindness, lower limb amputation and kidney diseases (4). In 2010, about 285 million people worldwide were suffering from diabetes. Prevalence of diabetes will increase in future due to population growth, urbanization, the prevalence of obesity and sedentary lifestyle (1). According to studies (5,6) conducted in Iran 2% of the population are diabetics, and in people over 30 years is about 7.3 %.

Considering the multiple chronic complications of diabetes, such as visual,

renal, cardiovascular and nervous impairments, by appropriate and immediate prevention, control and treatment of this disease, numerous limitations and problems will be solved for diabetic patients (7). The diabetes care, treatment and complication costs, change of behavior and improving metabolic control is a major goal in the treatment of diabetes which is dependent on the patient's self-care behavior (8). Self-care will improve quality of life and continuous follow-up can prevent acute and chronic complications of the disease or delay its onset (9). Results of Ricci-Cabello et al (10) and Fransen et al (11) showed that lack of attention to self-care behaviors in diabetic patients is a major cause of failure of diabetes health programs. Also, several studies have shown that supporting self-care will provide beneficial outcomes such as improving health and quality of life, increasing patient satisfaction, reducing health costs, better management of symptoms and increasing life expectancy (12).

Obviously training diabetic patients is one of the fundamental principles of promoting self-care behaviors because the treatment will not be effective, unless a diabetic patient knows the nature of disease and takes positive steps to deal with it. In fact, the aim of education should be giving courage to them to personally face as much as possible with the control and treatment of diseases with the use of the mental and practical data (13). However, available evidences suggest that self-care behaviors among patients with diabetes are low which recommends failure of the health centers educational programs (14).

The training program failure reason is ignoring analytical studies and establishing them regardless of psychosocial models as a specified theoretical framework, in the training program (15). Therefore, HBM was used as a behavioral-analytical model to predict the proper health behaviors related to diabetes. The basis HBM is people's motivation to actions, and emphasizes on how the individual perception leads to motivation and motion, and causes some behaviors. This model shows the relationship between health beliefs and behaviors. HBM assumes proper health behavior is formed based on personal beliefs (16). HBM specifically suggests that people show good reactivity toward health when they feel they are in risk (Perceived Susceptibility), the risk is very serious (Perceived Severity) and change of behavior is beneficial for them (Perceived Benefits) and they can eliminate the barriers to health behavior (Perceived Barriers). On the other hand, self-efficacy refers to the belief in the ability to perform an action, and improve a person's health behaviors, and withdraw behaviors detrimental to health (16). Since, knowing the patient's attitudes and beliefs about diabetes and its consequences is effective in solving the problem, therefore, this study aimed to analyze the beliefs associated with self-care behaviors in diabetic patients of Hamadan using the HBM.

Materials and Methods

This analytical cross-sectional study in 2012 was conducted on 390 patients with type 2 diabetes attending the Diabetes Research Center of Hamadan (DRCH). Participants were selected by simple random sampling. The self-administered questionnaires were offered to them. For this purpose, the list of patients' health records was obtained from DRCH. Then, participants were randomly selected from health records using random numbers table. The Inclusion criteria were: Having health records in DRCH, at least one year of diabetes duration, the absence of associated diseases and complications of diabetes. Data collection methods were based on anonymous questionnaires that were completed by 2 trained interviewers. This study was conducted with approval from Islamic Azad University' institutional review board and ethical committee. Informed assent and consent were obtained from participants.

The self-administered questionnaire included closed questions and required approximately 20 min to complete. The questionnaire

included three sections: 1- demographic variebles: including age, gender, education, marital status and family history; 2- Self-care behaviors: this section was measured based on a standard questionnaire (8) and evaluated the patients' self-care behaviors in the past week in the form of 8 questions. This questionnaire included Options, "No", "Yes, sometimes," and "Yes, always". Score of 2 was always given to Option Yes. Score of 1 was sometimes given to Option "Yes, always". And score of zero was given to Option No; 3- HBM Theoretical constructs: HBM scales were measured in relation to diabetes beliefs that were modified from scales of Morowatisharifabad (9,17-18) and 43 items were composed under six major constructs: (a) perceived susceptibility; (b) perceived severity; (c) perceived benefit; (d) perceived barriers; (e) perceived self-efficacy and (f) cause to action. Moreover, the perceived susceptibility with 4 questions, perceived severity with 10 questions, perceived benefits with 6 questions, perceived barriers with 10 questions, perceived self-efficacy with 6 questions with 5-choice scale of 1 (Completely Disagree) to 5 (Completely Agree) and cause to action with 7 questions with 3-likert scale (Yes, No, Partially) were measured.

Content validity of questionnaire was confirmed by 10 health education and promotion experts through calculating the content validity index (CVI) and content validity ratio (CVR). Furthermore, due to the use of interview technique, equivalent validity was assessed using two interviewers on 10 subjects, that showed acceptable reliability (r=0.82). To assess the internal consistency reliability of the questionnaire, a pilot study was conducted on 30 diabetic patients' who were similar to the target population. Based on the results of this pilot study, the internal consistency coefficient of questions (Cronbach's alpha) was 0.73 for perceived susceptibility, 0.71 for perceived severity, 0.79 for perceived benefits, 0.81 for perceived barriers, 0.88 for perceived self-efficacy and 0.72 for cause to action was obtained respectively.

All statistical analyses were performed using version 19.0 of the statistical software package SPSS (SPSS Inc., Chicago, IL, USA) and an alpha level of .05 for all statistical tests. A series of independent T-tests, one-way ANOVA, linear regression and bivariate correlations and descriptive analysis were computed to determine self-care behaviors and predictive factors.

Results

From 390 participants, 64.6% were female, and 79% were married. Age of respondents ranged from 30 to 85 years, with a mean age of 57.1 years old (SD=9.6). About 40% of participants between 61-70 years old. Regarding the educational status, 47.9% of respondents were illiterate, and 17.7% were primary. Also, 31.5% of participants reported that had history of diabetes in first-degree family members.

Table 1 shows bivariate associations between the HBM variables. According to the results, severity, self-efficacy and cause to action with perceived susceptibility were positively correlated and with perceived barriers were negatively correlated ($P<0.01$). Additionally, perceived severity was positively correlated with perceived benefit and self-efficacy and is negatively correlated with perceived barriers ($P<0.01$). Perceived benefits is positively

Table 1. Descriptive statistics and inter correlations between the HBM variables (n=390)

Variables	1	2	3	4	5	6	Mean (±SD)
1. Perceived susceptibility	1	0.298*	0.072	-0.141**	0.341**	0.167**	10.4(±2.8)
2. Perceived severity		1	0.262**	-0.501**	0.496**	0.079	31.1(±6.1)
3. Perceived benefit			1	-0.474**	0.305**	0.105*	25.1(±6.4)
4. Perceived barrier				1	-0.120*	-0.234**	30.8(±7.3)
5. Perceived self-efficacy					1	-0.182**	20.1(±4.7)
6. Cause to action						1	11.1(±2.8)

Note. ** $P<.001$, * $P<.05$

correlated with cause to action (*P*<0.05). Self-efficacy showed a negative correlation with perceived barriers (*P*<0.01). Perceived barriers was negatively correlated with self-efficacy (*P*<0.05) and cause to action. In addition cause to action & self-efficacy were negatively correlated (*P*<0.01). Also in this study, the mean self-care behaviors were 10.5±2.4 from acquired range of zero to 16 which was intermediate level.

Linear regression to predict the probability of doing on not-doing self-care behaviors (Table 2), self-efficacy, perceived severity, perceived barriers and perceived susceptibility were considered as factors related to self-care behavior. In total, 29.6% of the variance of behavior was predicted by these factors (*P*<0.05).

Table 3 presents association between demographic variables and HBM constructs, using independent t-tests and ANOVA. Test results showed that demographic variables were significantly related to HBM constructs (*P*<0.01).

Discussion

This study aimed to analyze the beliefs related to self-care behaviors in Type 2 diabetic Patients according with HBM. Results of present study confirmed the findings of previous studies which reported that self-care behaviors had a moderate level among diabetic patients. Our study participants obtained 65% of the maximum achievable score of self-care behaviors suggesting appropriate behavior among diabetic patients. This finding is consistent with results of Morowati Sharifabad et al (18) that reported the rate of self-care behaviors in diabetic patients as 62%. Additionally, in studies of Khosravi et al (19), Newell et al (20) and Barati et al (21)

conducted about diabetic patients' lifestyle and hypertensive patients, similar results were reported.

The results showed that, HBM constructs could explain 29.6% of the variance in self-care behaviors in type 2 diabetic patients. This finding is consistent with the results of Skinner et al (22) and Galilean et al (23) about the application of the HBM in prediction of self-care behaviors of non-communicable diseases (<30 %). Through the HBM constructs, perceived self-efficacy, susceptibility, severity and barriers were the best factors for predicting self-care behavior. Other studies also confirm the impact of self-efficacy in increasing self-care including Didarlu et al (6) that reported self-efficacy as a predictive factor of self-care behavior in diabetic patients. Also in a study by Henrietta (24) & Wen et al (25) similar results with the findings of the present study were reported. The self-efficacy is extremely important factor of behavior that is required to solve the problem in difficult conditions (26). Self-care behaviors require awareness, skill and different sources. Despite the present limitations, the patients should know when and how to do self-care behaviors, and be able to do self-care behaviors. Because providing all these requirements is somewhat difficult (18), so it's very necessary to improve patient's self-efficacy.

According to findings of this study, perceived threat (Perceived susceptibility & severity) predicts self-care behaviors. This means that by increasing the perceived threat, self-care is also increasing. These findings are consistent with results of other studies (9,27-28). In this study, the perceived threat of side effects such as impaired social relationships, dependency and blindness was at the lowest level. Also,

Table 2. Predicting self-care behaviors with HBM variable

Variables	B	S.E	95% CI		*P* value
			Lower	Upper	
Perceived self-efficacy	0.137	0.026	0.086	0.188	0.001
Perceived severity	0.146	0.023	0.101	0.190	0.001
Perceived barrier	0.049	0.017	0.016	0.081	0.003
Perceived susceptibility	0.083	0.040	0.004	0.162	0.040
Constant	0.887	1.006	-1.090	2.865	0.378

Note. N =390. B = unstandardized regression coefficient, SE= standard Error, CI = Confidence Interval.

perceived barriers were predicting self-care behaviors namely with the reduction of perceived barriers, level of self-care behaviors increases. Mohebbi et al (29), Nagelkerk et al (30) and Krichbaum et al (31) are consistent with our findings.

In this study, younger patients were reported more perceived threats and benefits, less perceived barriers, and higher self-efficacy. It seems that younger patients with higher education's, due to greater awareness of diabetes complications, perceived severity of the problem, the higher ability and better attitudes do more self-care. By increasing the educational levels of subjects, assigning more important roles and responsibilities by them in the community, their efficacy belief will increase naturally. These findings are consistent with results of other studies (18,21,32,33). Results of other studies suggest that patients with higher levels of education, judgment and decision making have better self-care behaviors (34). Family history of diabetes was associated with increased levels of self-efficacy and cause to action in our study. Family history of diabetes, patient involvement with this disease and observing the complications of diabetes in family members will lead to cause of action, as the internal cause. Also by copying from the other family members and enjoying their therapy experiences as one of the sources of self-efficacy enhances this ability of patients.

One of the study limitations was data collection method. This method is not always a reliable for assessing self-care, since the interviewer was not the treatment group member in this study, the patients answered

Table 3. Association between demographic variables and HBM constructs

Variables		Perceived susceptibility		Perceived severity		Perceived benefit	
		Mean(±SD)	P-value	Mean(±SD)	P-value	Mean(±SD)	P-value
Age (years)	30-40	11.83(±2.6)	0.001	33.73(±3.9)	0.002	28.22(±1.9)	0.001
	41-50	11.05(±2.5)		31.58(±6.3)		23.91(±7.4)	
	51-60	10.37(±3.1)		29.88(±6.6)		23.45(±7.7)	
	61<	11.26(±2.6)		30.73(±5.9)		25.81(±5.5)	
Gender	Female	10.54(±2.6)	0.085	31.05(±6.1)	0.966	24.94(±6.9)	0.423
	Male	10.89(±3.1)		31.08(±6.1)		25.49(±5.5)	
Education	Illiterate	9.81(±2.2)	0.001	30.85(±5.5)	0.107	25.67(±5.7)	0.001
	Primary	9.69(±2.5)		29.92(±6.9)		21.92(±7.6)	
	Secondary	11.58(±3.5)		31.50(±5.5)		25.08(±7.7)	
	High school	11.62(±3.1)		32.34(±6.9)		26.86(±4.7)	
Marital status	Married	10.55(±2.9)	0.135	31.06(±6.1)	0.786	24.89(±6.7)	0.371
	Single	10.01(±2.1)		31.57(±7.1)		26.18(±5.3)	
	Separated	9.75(±2.1)		30.63(±5.6)		25.88(±5.2)	
Family history	Yes	10.22(±2.9)	0.058	31.41(±5.9)	0.103	24.97(±6.9)	0.468
	No	10.80(±2.5)		30.32(±6.4)		25.48(±5.4)	

Table 3. Association between demographic variables and HBM constructs (continued table 3)

Variables		Perceived barrier		Self-efficacy		Cause to action	
		Mean(±SD)	P-value	Mean(±SD)	P-value	Mean(±SD)	P-value
Age (years)	30-40	27.84(±9.3)	0.001	22.90(±3.3)	0.001	16.30(±5.4)	0.477
	41-50	31.31(±7.8)		21.56(±4.6)		16.20(±5.1)	
	51-60	33.13(±6.3)		18.39(±4.4)		16.04(±4.5)	
	61<	29.98(±6.5)		19.78(±4.9)		16.69(±5.2)	
Gender	Female	31.21(±7.1)	0.137	19.87(±4.8)	0.104	16.60(±4.9)	0.526
	Male	30.05(±7.7)		20.69(±4.5)		16.25(±5.3)	
Education	Illiterate	29.43(±6.6)	0.001	18.67(±4.2)	0.001	14.26(±5.1)	0.001
	Primary	33.34(±6.4)		20.95(±5.2)		14.80(±3.6)	
	Secondary	30.93(±8.6)		21.54(±4.1)		17.92(±4.4)	
	High school	31.81(±7.9)		22.08(±5.1)		17.79(±5.7)	
Marital status	Married	31.44(±7.3)	0.001	20.57(±4.9)	0.005	17.94(±5.1)	0.145
	Single	26.84(±7.9)		18.78(±3.5)		18.37(±4.6)	
	Separated	29.77(±5.7)		18.51(±3.4)		18.59(±3.5)	
Family history	Yes	31.44(±7.6)	0.099	20.61(±4.6)	0.006	17.35(±5.2)	0.021
	No	30.41(±6.5)		19.19(±5.1)		16.07(±4.5)	

the questions honestly. So, the information were reliable.

Conclusion

According to the results, HBM constructs explains 29.6% of the variance of self-care behaviors in Type 2 diabetic Patients. Also, perceived self-efficacy, susceptibility, severity and barriers were considered as the best factors for predicting self-care behaviors. Therefore paying attention to these constructs can be used as strategies for promoting self-care behaviors of patients.

Acknowledgments

References

1. Shaw JE, Sicree RA, Zimment PZ. Global estimates of the prevalence of diabetes for 2010 and 2030. Diabetes Res Clin Pract 2010;87:4-14.

2. National Center for Chronic Disease Prevention and Health Promotion. National Diabetes Statistics Report, 2014. CDC Web Site; 2015 [updated 10 May, 2015; cited 21 May, 2015]; Available from: http://www.cdc.gov/diabetes/pubs/statsreport14/national-diabetes-report-web.pdf

3. Fattahi A, Barati M, Bashirian S, Heydari Moghadam R. Physical Activity and Its Related Factors Among Type 2 Diabetic Patients in Hamadan. Iranian Journal of Diabetes and Obesity 2014;6(2):85-92.

4. Health Quality Ontario. Behavioral interventions for type 2 diabetes: an evidence-based analysis. Ont Health Technol Assess Ser 2009;9(21):1-45.

5. Aghamolaei T, Eftkhar H, Mohammad K, Nakhjavani M, Shojaeizadeh D, Ghofranipour F, Safa O. Effects of health education program on behavior, HbA$_1$c and health-related quality of life in diabetic patients. Acta Medica Iranica J 2004;43:89-94.

6. Didarloo AR, Shojaeizadeh D, Gharaaghaji R, Habibzadeh H, Niknami Sh, Pourali R. Prediction of self-management behavior among Iranian women with type 2 diabetes: application of the theory of reasoned action along with self-efficacy (etra). Iran Red Crescent Med J 2012;14(2):86-95.

7. Sharifirad Gh, Hazavehi MM, Baghianimoghadam MH, Mohebi S. The Effect of a Health Belief Model Based Education Program for Foot Care in Diabetic Patients Type II in Kermanshah, Iran. Int J Endocrinol Metab 2007;2:82-90.

8. Agha Molaei T, Eftekhar H, Mohammad K. [Application of health belief model to behavior change of diabetic patients]. Payesh 2005;4(4):263-269. (in Persian)

9. Morowatisharifabad MA, Rouhani Tonekaboni N. Perceived severity and susceptibility of diabetes complications and its relation to self-care behaviors among diabetic patients. Armaghan-e-Danesh 2007;12(3):59-68. (in Persian)

10. Ricci-Cabello I, Ruiz-Pérez I, Rojas-García A, Pastor G, Rodríguez-Barranco M, Gonçalves DC. Characteristics and effectiveness of diabetes self-management educational programs targeted to racial/ethnic minority groups: a systematic review, meta-analysis and meta-regression. BMC Endocr Disord 2014;14(1):60.

11. Fransen MP, Beune EJ, Baim-Lance AM, Bruessing RC, Essink-Bot ML. Diabetes Self-management Support for Patients with Low Health Literacy: Perceptions of Patients and Providers. J Diabetes 2014.

12. Tan TS, Brown MB, Funnell MM, Anderson RM. Social Support, Quality of Life, and Self-Care Behaviors Among African Americans With Type 2 Diabetes. The Diabetes Educator 2008;34(2):266-76.

13. Milenkovic T, Gavrilovic S, Percan V, and Petrovski G. Influence of diabetic education on patient well-being and metabolic control. Diabetol Croat 2004;33(3):91-6.

14. 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.

15. Simbar M, Ramezani Tehrani F, Hashemi Z. Sexual-Reproductive Health Belief Model of college students. Iranian South Medical Journal 2004; 7(1):70-78. (in Persian)

16. Glanz K, Rimer BK, Viswanath K. Health Behavior and Health Education: Theory, Research and Practice. 4th ed. San Francisco: Jossey-Bass publisher, 2008,67-92.

17. Morowatisharifabad M, Rouhani Tonekaboni N. Perceived Benefit and Barrier in self-care behaviors among diabetic patients. Journal of Nursing in Tehran University of Medical Sciences (Hayat) 2009; 13(1):17-27. (in Persian)

18. Morowatisharifabad M, Rouhani Tonekaboni N. Perceived self-efficacy in self-care behaviors among diabetic patients referring to Yazd Diabetes Research Center. Journal of Birjand University of Medical Sciences.2009; 15(4):91-100. (in Persian)

19. Khosravi A, Ansari R, Shirani Sh, Baghaei AM. The causes of failure to control hypertension in population aged over 65. The Journal of Qazvin University of Medical Sciences.2005;9(35):8-10. (in Persian)

20. Newell MA. Knowledge, perceptions, beliefs and behaviors related to the prevention of hypertension among Black Seventh-day Adventists living in London. A Dissertation in Degree of Doctor of Public Health in Health Education, School of Public Health, Loma Linda University, Colifornia, 2008.

21. Barati M, Darabi D, Moghimbygi A, Afsar A. Self-regulation behaviors of hypertension and related factors among hypertensive patients. Journal of Fasa University of Medical Sciences 2011;3(1):60-6. (in Persian)

22. Skinner TC, Hampson SE. personal models of diabetes in relation to self-care, well-being, and glycemic control. Diabetes Care 2001;24:828-3.

23. Jalilian F, Zinatmotlagh F, Solhi M. Effectiveness of education program on increasing self-management among patients with type 2 diabetes. Scientific Journal of Ilam University of Medical Sciences 2012;20(1):26-34. (in Persian)

24. Henrietta H. Influence of self-efficacy and spirituality on self-care behaviors and glycemic control in older African Americans with type 2 diabetes. [Dissertation] Barry University, 2006:93-110.

25. Wen LK, Shepherd MD, Parchman ML. Family support, diet, and exercise among older Mexican Americans with type 2 diabetes. Diabetes Edue 2004;30(6):980-93.

26. Jalilian F, Mirzaei Alavijeh M, Emdadi Sh, Nasirzadeh M, Barati M, Hatam-Zadeh N. The Quality of Life of Women with Type 2 Diabetes: the Study of Self-Efficacy. Journal of Health System Research 2011;7(6):1013-9. (in Persian)

27. Daniel M, Messer LC. Perceptions of disease severity and barriers to self-care predict glycemic control in Aboriginal persons with type2 diabetes mellitus. Chronic Dis Can 2002;23(4):130-8.

28. Charron-Prochownik D, Sereika SM, Becker D, Jacober S, Mansfield J, White NH. Reproductive health beliefs and behaviors in teens with diabetes: application of the expanded health belief model. Pediatric Diabetes 2001;2:39-40.

29. 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;2:1-7.

30. Nagelkerk J, Reick K, Meengs L. Perceived barriers and effective strategies to diabetes self management. J Adv Nurs 2006;54:151‑8.

31. Krichbaum K, Aarestad V, Buethe M. Exploring the connection between self‑efficacy and effective diabetes self‑management. Diabetes Educ 2003;29:653‑62.

32. Baghiyani Moghaddam MH, Ayvazi S, Mazloomi Mahmoodabad SS, Fallahzadeh H. Factors in relation with self- regulation of Hypertension, based on the Model of Goal Directed behavior in Yazd city. Journal of Birjand University of Medical Sciences 2007; 15(3):78-87. (in Persian)

33. Shojaei F, Asemi S, Najaf Yarandi A, Hosseini F. [Self-care behaviors in patients with heart failure]. Payesh 2009;8(4):361-9. (in Persian)

34. Rockwell JM, Riegel B. Predictor of self-care in persons with heart failure. Heart & Lung: The Journal of Critical Care 2002;30:18-25.