Original Article

Self-Management Barriers Perceived by Patients with Type 2 Diabetes: A Confirmatory Factor Analysis

Abstract

Background: Self-management remains poor among most of the diabetic patients due to various individual and environmental barriers which affect it. These barriers should be identified and intervened promptly. The current study aimed to determine self-management barriers perceived by patients with type 2 diabetes. **Methods:** A cross-sectional study carried out on 681 patients with type 2 diabetes who referred to the diabetes center which is affiliated to Kerman University of Medical Sciences, Kerman, Iran during 2018. Through a structured interview, demographic and disease-related data were recorded and the Persian version of the modified Personal Diabetes Questionnaire (PDQ) was used to assess self-management barriers. The tool has four subscales including diet, medication, monitoring, and exercise barriers. The higher score in each subscale indicates a higher level of barriers in that section. Data analyzed by SPSS 20 using T-test, ANOVA, and multiple linear regressions. **Results:** The majority of the patients (62.8%) were female, married (78.3%) with monthly income 10 to 20 million IRRLs (78.4%) and the mean age of 55.65 ± 14.65 years. Body Mass Index, marital status, monthly income, and HbA1C significantly predicted the barriers' score. The instrument had excellent reliability (α = 0.95). In confirmatory factor analysis, the fit indices had approximately acceptable levels. **Conclusions:** The Persian version of modified PDQ had good psychometric properties and can be used as a valid and reliable instrument in the primary health care setting. The significant perceived barriers should be identified and intervened by health care providers through the comprehensive management of diabetic patients.

Keywords: *Barriers, diabetes mellitus, Iran, reproducibility, self-management*

Shohreh Jafari, Habibeh Ahmadipour[1]

Department of Community and Family Medicine, School of Medicine, Kerman University of Medical Sciences, Kerman, Iran, [1]Social Determinants of Health Research Center, Institute for Futures Studies in Health, Kerman University of Medical Sciences, Kerman, Iran

Address for correspondence:
Dr. Habibeh Ahmadipour, Social Determinants of Health Research Center, Institute for Futures Studies in Health, Kerman University of Medical Sciences, Kerman, Iran.
E-mail: ahmadipour@kmu.ac.ir

Introduction

Diabetes mellitus as a growing health challenge brings a huge economic impact on individuals, families and health care systems.[1] According to World Health Organization (WHO), 422 million adults lived with diabetes in 2014 and 1.6 million deaths happened directly due to diabetes in 2016.[2] The majority of these deaths occurred under the age of 70 and in the low and middle-income countries.[1]

Reducing the burden of diabetes requires multidimensional management in which the patient, family, community, and health care system are involved. One dimension in which the patient plays an important role is self-management that includes following a healthy lifestyle, adherence to medications, caring about the feet and self-monitoring of blood glucose levels in some cases. The morbidity and mortality of diabetes can be reduced through proper self-management, but the evidence indicating that self-management remains poor among diabetic patients, because it is affected by various individual and environmental barriers.[3-6] These barriers may be related to the patients, providers and even health system which should be effectively overcome to improve diabetes outcomes.[7]

One of the prerequisites for diabetes management, especially in the primary health care setting, is that the perceived barriers in the management processes be identified using a valid tool.[8,9] After that, the primary care provider can design and implement an appropriate strategy to improve self-care behaviors based on the patient's situation.[3]

A variety of tools have been developed to measure self-care behaviors and self-management among patients with diabetes such as Summary of Diabetes Self-Care Activities Questionnaire (SDSCA), Diabetes

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Self-management Questionnaire (DSMQ), and Personal Diabetes Questionnaire (PDQ).[9-11]

Family Physician Project was developed in 2005 in our country and some of our general practitioners are working as primary care providers especially for the management of chronic diseases.[12,13] Therefore, they must be aware of the state of self-care behavior among their patients and the barriers which affect it. For a comprehensive and accurate evaluation, the existence of a valid instrument is essential. The PDQ was developed by Stetson and colleagues in 2011 to measure diabetes self-care behaviors and barriers in clinical settings.[11] According to our review, despite the excellent validity and reliability of the tool, it has not been evaluated in the Iranian population. Therefore, the current study aimed to evaluate the psychometric properties of the modified PDQ and use it to determine self-management barriers perceived by patients with type 2 diabetes in a diabetes center which is affiliated to Kerman University of Medical Sciences (Kerman, Iran) during 2018.

Methods

A cross-sectional study carried out on 681 patients with type 2 diabetes who referred to the diabetes center which is affiliated to Kerman University of Medical Sciences between September and December 2018. The participants were selected through convenience sampling method. Inclusion criteria were informed consent to participate and at least one year from the diagnosis. The patients with more than 10% unanswered questions were excluded.

Data were collected through the structured interview by a trained interviewer who had experience in diabetes care. Demographic data such as age, marital status, level of education, household income, and employment status and data related to the disease recorded. The Persian version of the modified Personal Diabetes Questionnaire (PDQ) used to asses self-management barriers perceived by patients with type 2 diabetes.[11]

The PDQ consists of 49 items with eight subscales including the Diet Knowledge and Skills (9 items), Diet Decision-Making (6 items for patients on insulin and 5 items for others), Eating Problems (3 items), Diet Barriers (7 items), Problems in medication use (1 items), Medication Barriers (8 items), Monitoring Barriers (8 items), and Exercise Barriers (7 items). The subscales had good internal consistency in original (α = 0.65–.83) and Chinese (α = 0.61–.89) versions. Also, the Chinese version demonstrated excellent test-retest reliability (ICC = 0.73–0.96).[11]

In the current study, according to the considered aim, the barrier-related subscales including diet, medication, monitoring and exercise barriers with 7, 8, 8, and 7 items were employed.

Response to all items is based on a 6-point Likert scale with a range of 1 (Never) to 6 (one or more times per day). The higher score in each subscale indicates a higher level of barriers in that section.

After obtaining permission, the forward and backward method used to translate the questionnaire into Persian and then adapted culturally. Face and content validity of the questionnaire was confirmed by the panel of experts. A confirmatory factor analysis applied using Chi-square test and goodness of fit statistics including root mean square error approximation (RMSEA), standard root mean square residual (SRMR), goodness of fit index (GFI), adjusted goodness of fit index (AGFI), normed fit index (NFI), non-normal fit index (NNFI), comparative fit index (CFI).

In a pilot study which consisted of 50 participants, the internal consistency of the subscales (using Cronbach's Alfa coefficient) was determined.

The study approved by the Ethics Committee of Kerman University of Medical Sciences (IR.KMU.AH.REC.1397.025). The interviews were conducted voluntarily and anonymously and it took 15 min to complete each interview. The participants were assured that the data would be used only for study purposes.

Results

A total of 681 patients with type 2 diabetes participated. The majority of the patients (62.8%) were female, married (78.3%) with monthly household income 10 to 20 million IRRLs (78.4%) and the mean age of 55.65 ± 14.65 yrs [Table 1].

The internal consistency of the instrument (using Cronbach's Alfa coefficient) calculated as 0.94 for the whole questionnaire and 0.75, 0.89, 0.84, and 0.89 for diet, medication, monitoring, and exercise barriers subscales, respectively.

A direct significant correlation was found between the last HbA1c and the total score and its subscales (r = 0.1-0.2, P = 0.001-0.02) which represents the concurrent validity of the tool. In confirmatory factor analysis, the fit indices had approximately acceptable levels in the model [Table 2].

The mean of barriers' total score and its subscales (diet, medication, and BG monitoring and exercise barriers) were 75.08 ± 24.14, 18.29 ± 5.70, 19.92 ± 6.96, 20.49 ± 7.38, 16.85 ± 6.52, respectively.

The total score had no statistically significant difference according to demographic data except for household monthly income and employment status. Accordingly, diabetic patients with income equal to or more than 20 million IRRLs had a higher score than the others. (F = 30.8, P = 0.001) Retired patients had a higher score than employed/self-employed. (F = 4.1, P = 0.001).

The mean body mass index (BMI) was 26.97 ± 3.89. Of all participants, 344 (50.5%) and 136 (20.0%) were overweight and obese, respectively. There was a direct significant correlation between BMI and barriers' total score and its subscales. (r = 0.27- 0.33, *P* = 0.001).

In multiple linear regressions, BMI, marital status, and household monthly income and HbA1C significantly predicted the barriers' total score. Accordingly, with every increase of one unit in BMI, the total score (on the average) increases by 1.87 units. The married, divorced, and widowed patients had on the average 11.69, 26.62, and 14.40 point lower score compared to the singles, respectively. The participants with household monthly income equal or more than 20 million IRRLs had on the average 21.82 points higher score compared to those with income less than 10 million IRRLs. With every increase of one unit in HbA1C, the total score (on the average) increases by 2.43 units. The results of the regression indicated that these predictors explained only 21.00% of the variance (R2 = 0.21, F = 14.20, *P* = 0.001) [Table 3].

Table 1: Demographic and disease-related characteristics of the participants

	n (%)
Gender	
Male	253 (37.2)
Female	428 (62.8)
Level of education	
Illiterate	54 (7.9)
Under high school diploma	179 (26.3)
High school diploma	323 (47.5)
Academic	125 (18.4)
Employment status	
Employed	59 (8.7)
Self-employed	147 (21.6)
Unemployed	6 (0.9)
Housekeeper	272 (39.9)
Retired	170 (25.0)
Others	27 (4.0)
Marital status	
Married	533 (78.3)
Single	32 (4.7)
Divorced	7 (1.0)
Widow/widower	109 (16.0)
Household monthly income (IRRls)	
<10 million	8 (1.2)
10-20 million	534 (78.4)
≥ 20 million	139 (20.4)
Concurrent medical disease	
Yes	454 (66.7)
No	227 (33.3)
Concurrent psychological disorder	
Yes	106 (15.6)
No	575 (84.4)

Discussion

Our result revealed that the Persian version of the modified PDQ such as its original version[11] had acceptable reliability using Cronbach's Alfa coefficient. Approximately, most of the fit indices had excellent levels in confirmatory factor analysis. Therefore; the instrument can be used by our health care providers for the comprehensive care of diabetic patients. Cheng *et al.* found the Chinese version of the PDQ had good psychometric properties and recommended it as a patient-centered, feasible tool to determine need and concerns among diabetic patients.[14]

Most of the routine management of the patient with type 2 diabetes is undertaken in primary health care especially by the family physicians.[15] For better and qualified management, it is important to consider the barriers perceived by patients to identify and resolve them promptly.[6]

The current study showed a direct significant correlation between BMI and the barriers' total score. Also, in multivariate analysis, BMI significantly predicts the barriers score. Perhaps that is why; similar studies have shown that the adherence to diabetes treatment is more difficult among overweight and obese patients.[16,17]

In our study, uni and multivariate analysis showed that the level of hemoglobin A1C had a significant correlation with the total and subscales scores and can significantly predict the score. Cheng *et al.* revealed a positive correlation between the value of hemoglobin A1C and the total and subscales scores.[14] This result, also, confirmed the concurrent validity of the instrument.

We found the household monthly income was the other significant predictor for the barriers score. Accordingly, participants with higher income perceived more barriers. Financial resources are among the most important factors that affect the management of diabetes.[7,18] Similar studies found that diabetic patients with low annual income and socioeconomic status had more problems in disease management[18,19] which seems to be incompatible with our study. However, it may be worth mentioning that in the current study, the perceived barriers have been investigated and perhaps the patients with higher income have a better understanding of the barriers may be due to higher health literacy. Onwudiwe *et al.* found limited health literacy is a predictor for self-management barriers.[20] Also, having

Table 2: Goodness of fit statistics of the Persian version of modified PDQ

Model	X^2/df	SRMR	RMSEA	GFI	AGFI	NFI	NNFI	CFI	IFI
Modified PDQ	2879/399	0.07	0.1	0.73	0.7	0.94	0.94	0.95	0.95

Table 3: The prediction of the barriers' total score in multiple linear regressions

	Unstandardized Coefficients		*t*	Sig.	95.0% Confidence Interval for B	
	B	Std. Error			Lower Bound	Upper Bound
Constant	-0.48	12.08	-0.04	0.96	-24.21	23.24
Age	0.14	0.07	1.90	0.06	-0.00	0.29
BMI	1.87	0.22	8.17	0.001	1.42	2.31
Married	-11.69	4.61	-2.53	0.01	-20.75	-2.63
Divorced	-26.62	9.39	-2.83	0.005	-45.07	-8.17
Widow	-14.40	5.63	-2.55	0.01	-25.46	-3.34
Income=10-20 million (IRRls)	7.13	7.68	0.92	0.35	-7.94	22.22
Income ≥20 million (IRRls)	21.82	7.82	2.78	0.005	6.45	37.20
HbA1C	2.43	0.86	2.80	0.005	0.72	4.13

different concept of diabetes self-management should be considered in this regards.[21]

The married, divorced, and widowed patients had on the average lower score compared to the singles.

The current study was cross-sectional and limited to a convenience sample of diabetic patient who referred to the diabetes center affiliated to Kerman University of Medical Sciences; therefore, the finding must be generalized with caution. Also, our data was collected as self-reporting, which does not necessarily yield precise evidence. But on the other hand, for the first time, the psychometric properties of the tool have been verified in an Iranian population.

Conclusions

We found that the Persian version of modified PDQ had good psychometric properties. Therefore, it can be used as a valid, reliable, and feasible instrument by our health care providers for comprehensive care in diabetic patients. BMI, marital status, and household monthly income and HbA1C significantly predicted the perceived barriers 'score among patients with type two diabetes.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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