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Validity and reliability study of the Turkish version of Health Belief Model Scale in diabetic patients

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Abstract

Background: Diabetes mellitus (DM) is an important health problem that leads to severe complications, is the cause of early death, and is showing an increase in frequency. The development of positive health behaviors is extremely important in the treatment of diabetic patients. There are various models that examine the health behaviors of individuals. One of these is the Health Belief Model. This model is very beneficial in explaining factors that affect patients' compliance with their disease.
Purpose: This research was planned to measure the validity and reliability of the Health Belief Model Scale in diabetic patients in the Turkish population.
Design: Questionnaire Survey.
Settings: The research population was all of the diabetic patients (4125) registered with the Turkish Diabetes Society, Denizli Province, Turkey.
Participants: A convenience sample was composed of 352 patients with Type 2 DM.
Methods: The research data were collected with three tools, a "sociodemographic data form" related to the diabetic patients, the "Health Belief Model Scale in Diabetic Patients," and the "Diabetes Management Self-Efficacy Scale." *For validity studies*: language validity, content validity, concurrent validity and construct validity were examined. *For reliability studies*: the tool's internal consistency reliability, Cronbach alpha reliability coefficient, test–retest reliability were examined.
Results: The tool's internal consistency reliability subscales' Cronbach alpha coefficient values ranged from 0.73 to 0.86. For the total tool a Cronbach alpha value of 0.89 was found. In the tool's internal consistency reliability total item correlation the three items that were below 0.30 were removed and the 36 items were reduced to 33 items. The tool's test–retest reliability was 0.90. According to factor analysis the tool contains five subscales of perceived susceptibility, perceived severity, perceived benefits, perceived barriers and recommended healthy behaviors.
Conclusion: The Health Belief Model Scale in diabetic patients was determined to be valid and reliable for use in the Turkish population.
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Keywords: Diabetes mellitus; Health beliefs; Validity; Reliability

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What is already known about the topic?

The Health Belief Model is beneficial in assessing health protection or disease prevention behaviors. Health-related behavior may also be explained by the Health Belief Model. It is also useful in organizing information about clients' views of their state of health and what factors may influence them to change their behavior. The Health Belief Model, when used appropriately, provides organized assesment data about clients' abilities and motivation to change their health status.

What this paper adds

The Health Belief Model is a usable model for evaluating diabetic individuals' health behaviors and their beliefs and attitudes about illness. The Health Belief Model Scale in diabetic patients has shown statically acceptable levels of reliability and validity for use in the Turkish population.

1. Introduction

Diabetes mellitus (DM) is an important health problem leading to severe complications and showing an increase in frequency (Strine et al., 2005; Kim et al., 2004; King et al., 1998). In a study conducted by the World Health Organization (WHO) in 2000 it was reported that there are 151 million people with DM and it is estimated that this number will increase to 221 million in 2010 and 366 million in 2030 (Wild et al., 2004; Satman et al., 2002; King and Rewers, 1993). Of this number 10–15% are Type 1 (insulin dependent diabetes) and 85–90% are Type 2 (non-insulin dependent diabetes) (Kara et al., 2005; Stover et al., 2001; Leontos et al., 1998).

For diabetic patients to be successful with the daily management of diabetes they need to have sufficient knowledge, skills and positive attitudes. Patients' beliefs, attitudes and behaviors about their own health and, particularly, about their own treatment, form the foundation for their diabetes treatment (Basco, 1998). The seriousness that individuals perceive about their illness and their beliefs and attitudes about whether they find recommendations that have been made to be beneficial or not affect their active participation in changes that are made for their illness (Dietrich, 1996). Patients who do not give importance to their illness are not motivated to learn about it. So the first topics that needs to be addressed in patients are their beliefs and attitudes (Tan, 2004; Hjelm et al., 2003a; Schwab et al., 1994). Before education is planned to develop behaviors and improve the health of individuals with chronic illness that require changes in individuals' lifestyles, how these individuals' perceive health and illness needs to be evaluated (Janz and Becker, 1984).

In research by Özcan (1999) patients who have a negative belief about the effect of diabetes on their lives face more barriers in their diabetes care compared to those with a positive belief and they are seen to have inadequate care. People with negative attitudes have worse metabolic control levels and higher HbA1c and blood pressure values. Similarly a significant correlation has been found between body mass index and diabetic attitudes (Özcan, 1999). According to research, individuals with positive attitudes have better glucose control, better self-care skills and higher levels of knowledge about diabetes (Çelik, 2002; Özcan, 1999). These results show that the evaluation of individuals' attitudes about their disease is an important parameter in achieving metabolic control.

There is a need to have information about patients' beliefs and attitudes in order to develop strategies for the prevention of complications and maintaining compliance with treatment. The Health Belief Model shows that the interventions of health care team and members can change the possible causes of patients' lack of compliance with their treatment (Potter and Perry, 1999). There is no instrument in Turkey which measures the behaviors of diabetic patients and their health beliefs related to their illness which is sensitive to the culture in Turkey. There is a need for this information from these patients in the prevention of complications, to ensure adaptation to treatment, and for the development of strategies. For all these reasons this research was planned to measure the validity and reliability of the Health Belief Model Scale in diabetic patients for the Turkish population.

2. Health Belief Model

The model was developed for the purpose of understanding why some people are successful in assuming responsibility for protecting themselves from illnesses and others are not (Stanhope and Lancester, 2000). At the same time it describes situations which are effective in what does or does not motivate people to do healthy actions, particularly in their performance of behaviors. It was first developed in 1950 by a group of psychologists (Hochbaum, Kegeles, Leventhal and Rosenstock) who were working for the United States Public Health Services (Redding et al., 2000; Michail, 1994; Champion, 1985). This model has generally been used for the purpose of examining or explaining health-related behaviors (Hjelm et al., 2002; Stanhope and Lancester, 2000; Harris et al., 1987).

The model has been used in many areas including protection of public health and health-related behaviors

(Stanhope and Lancester, 2000; Michail, 1994). The most frequent areas of use are in areas of health promotion, such as, breast self examination, keeping hypertension under control, having pap smears done to check for cervical cancer, prevention of tuberculosis, diabetes and coronary artery disease (Gözüm and Aydın, 2004; Stanhope and Lancester, 2000).

In studies conducted using the Health Belief Model with diabetic patients, it has been determined that there is a significant correlation between the health behaviors and attitudes of individuals and their compliance behaviors that have been determined to be necessary for their treatment (Daniel and Messer, 2002). According to the model, the likelihood that an individual will follow the recommended health-related actions is influenced by perceived susceptibility and perceived severity of the disease, as well as perceived benefits versus perceived barriers to follow the recommended actions (Tan, 2004; Polly, 1992). If perceived barriers are at the minimum, in comparison to perceived seriousness and perceived susceptibility to an illness, then there will be a higher probability that recommended health-related activities will be done (Tan, 2004; Schwab et al., 1994). These perceptions are affected by demographic characteristics, such as, the individuals' age, gender, race and religion, psychosocial factors, such as, personality, social status and peer pressure, and conceptual factors such as what is known about the illness and previous experience with the illness (Hjelm et al., 2003b; Redding et al., 2000; Schwab et al., 1994)

In the international literature there are several diabetes instrument have been designed based on the Health Belief Model for the purpose of examining health beliefs in diabetic patients. Becker and Janz (1985) developed a 16-item Diabetic Health Belief Model Scale. The Cronbach alpha value for the tool was 0.64 (Becker and Janz, 1985). This short tool was seen to be quite effective in the evaluation of individuals' health beliefs. In 1990 Hurley developed an 11-item Diabetic Health Belief Model Scale that was based on this tool. Hurley proposed that this short format tool was more useful in examining self-care behaviors. Its Cronbach alpha value was 0.80 (Katalanos, 2004).

Schwab et al. (1995) developed a 65-item Diabetic Health Belief Model Scale to be able to improve the compliance of low income level Mexican American Type 2 diabetic individuals with their treatment, by evaluating their beliefs and attitudes to develop an effective implementation plan and determine realistic implementation strategies. This tool was adapted the basic subscale of the Health Belief Model as specified by Becker and Janz. The reliability study for this tool that has five subscales only two of the subscales were found to be reliable. The Cronbach alpha coefficient values of these subscales were 0.72 for perceived severity and 0.64 for perceived barriers (Schwab et al., 1994).

Tan (2004), based on the five subscale tool developed by Schwab et al., developed a tool in a study that examined the relationship between health beliefs and complication prevention behaviors of Chinese individuals with Type 2 DM who lived in Malaysia. The Cronbach alpha coefficient for internal consistency reliability was calculated. The Cronbach alpha coefficient varied between 0.52 and 0.87 for the tool's subscales and was 0.72 for the total tool (Tan, 2004).

3. Materials and methods

3.1. Sample and setting

The research population was made up of the 4125 diabetic patients registered with the Turkish Diabetes Society in Denizli province, which is in western Turkey, in 2005. This study used a convenience sample of 352 patients was recruited from patients with Type 2 DM. The 352 participants met the criteria for an adequate sample at least 10 times the total number of items on the tool (Burns and Grove, 2001). The age limits for diabetic patients registered in the center where the research this center was a minimum of 30 and maximum of 70 years of age. Type 2 diabetic patients who were registered in the center where the research was conducted were 30 years of age and above and agreed to be interviewed were included in the research sample. Exclusion criteria; Because the research data were collected using the face-to-face interview method, it was assumed that diabetic patients who had developed chronic compliations with their sight, hearing and mobility would have difficulty answering the questionnaire survey and not included in the research. In addition because the original study was used with Type 2 diabetic patients the other diabetic patients were not included in the research. The interview lasted approximately 20 min for each patient.

3.2. Instruments

The research data were collected with three tools, a "sociodemographic data form" about the diabetic patients, the "Health Belief Model Scale in Diabetic Patients," and the "Diabetes Management Self-Efficacy Scale."

3.2.1. Sociodemographic data form about the diabetic patients

The sociodemographic data form contained seven questions about the patients' gender, age, marital status, income status, treatment type, health insurance and length of time they had been diabetic.

3.2.2. Health Belief Model Scale in diabetic patients

Tan (2004), based on the five subscale of the Health Belief Model described by Schwab et al. (1994) which were perceived susceptibility (5 items), Perceived Severity (3 items), Perceived Benefits (7 items), Perceived Barriers (11 items) and Recommended health-related activities (10 items) (Tan, 2004). This tool was developed by Tan (2004) for the purpose of being able to evaluate diabetic patients' health beliefs and attitudes about complication prevention behaviors and active health-related behaviors.

The items of the Health Belief Model Scale are evaluated in a 5-point Likert scale, from 1 (I strongly disagree) to 5 (I strongly agree). Every subscale mean is determined by dividing the total points of all the subscale items by the total number of items. The total scale score mean is calculated by dividing the total points of all the items by the total number of items. The maximum points for each item was 5. A minimum score was 1 point for each item. Lower scores indicate negative belief, higher scores indicate positive beliefs (Tan, 2004).

A pilot study of the first preliminary Turkish version of the scale was conducted with 10 participants. Results showed that the questions were understandable for these individuals and results of this pilot study were not included in the larger study.

3.2.3. Diabetes Management Self-Efficacy Scale

Self-Efficacy Type 2 Scale, diabetes management tasks necessary to adequate control of DM, including adherence to recommend diet, physical exercise and blood glucose monitoring (Van der Bilj et al., 1999). This tool was developed by Jaap Van der Bilj et al. (1999) for the purpose of determining diabetic patients' status of performing their self care activities in western cultures. This tool was used in this study for the purpose of measuring "concurrent validity".

The tool has 20 items. The items are in a 5-point Likert scale from 1 (absolutely no) to 5 (absolutely yes). The lowest possible score from the scale is 20, the highest is 100. The tool's validity and reliability study for Turkey was conducted by Usta in Izmir in 2001. The total scale Cronbach alpha value was found to be 0.89 and the test–retest reliability was found to be 0.98 as a result of this study (Usta, 2001). In addition an intercultural adaptation of the tool was conducted in 2005 by Kara et al. in Erzurum and a Cronbach alpha value of 0.89 was found (Kara et al., 2005).

3.3. Validity studies

For validity studies; translation procedures, content validity, concurrent validity and construct validity were examined.

3.3.1. Translation procedures

Before beginning the research, permission was received from the tool's author (Tan) to use it. The first of the validity–reliability studies of the Health-Belief Model Scale was the language validity studies. The tool was translated from English to Turkish by two nursing instructors and one English specialist. The three translated versions were compared by the authors and the researchers developed a common Turkish text from these three Turkish translations. Then, The initial translation into Turkish was back translated into English by English language specialists who know English well and had not see the original English text and by an American nurse living in Türkey. The tool's English statements that had been translated from Turkish into English were compared to the original statements and necessary revisions were made.

3.3.2. Content validity

To test clarity and content validity the translated version was submitted to a panel consisting of nine specialists in the area of knowledge of the instrument, who were informed of the measures and concept involved. The Turkish version of the tool was shown to six public health nurses, two public health physicians, and one psychiatrist for their opinions. These specialists evaluated every item for its distinctiveness, understandability and appropriateness for the purpose. Changes were made in the statements based on their recommendations and the tool was given its final form. In the susceptibility subscale the parenthetical explanation (young type of diabetes) was added to the item, "Type 1 diabetic people have a high chance of developing diabetic complications" after "Type 1 diabetic people." In the same manner the parenthetical phrase (adult type of diabetes) was added to the statement, "I don't think Type 2 diabetic people generally develop diabetic complications" after "Type 2 diabetic people". The statement, "Diabetes is a serious illness" was changed to "I think that diabetes is an illness that needs to be taken seriously."

3.3.3. Concurrent validity

Self-efficacy is quite important both for the intentions of the individuals towards changing health-related behaviors and also in the phase of control activities. Health beliefs about the illness and self-efficacy perceptions are quite important in effective diabetes management. In previous studies it has been emphasized that individuals who have high self-efficacy perception and positive health beliefs are able to do and maintain positive healthy behaviors. In addition in recent literature the concept of self-efficacy has been added as a dimension in subcategories to the health belief model (Finfgeld et al., 2003; Hjelm et al., 2002). For all these reasons it is thought that there is a correlation between

health belief and self-efficacy perception and for this reason it was used as an instrument for examining same-time validity.

3.4. Reliability study

The tool's internal consistency reliability, Cronbach alpha reliability coefficient, test–retest reliability were examined.

3.5. Data analysis

The statistical program SPSS 11.0 was used for evaluation of the data obtained.

3.6. Ethical considerations

Written permission was obtained from the author of the tool on 20 October 2004 to use the tool in the research. Before beginning the research permission was obtained from Ege University School of Nursing Ethics Committee. Permission was also received from the Turkish Diabetes Society of Denizli Province. All of the diabetic patients who participated in the research were informed about the research and purpose and informed that they could withdraw from the research at any time they wanted to do so.

4. Results

4.1. Sample characteristic

The mean age of the diabetic patients who participated in the research was 55.52 years (SD = 10.59), the mean number of diabetic years was 7.66 (SD = 6.77). Of the patients 55.1% were female and 44.9% male; 83.2% were married; 60.9% had balanced income and expenses, and 56.9% were using oral antidiabetic medications. The majority of the patients (94%) had health insurance (Table 1).

Table 1
Demographic characteristics of the study population

	Mean	SD
Mean age	55.52	10.59
Duration of Type 2 DM	7.66	6.67
	N	%
Gender		
Women	194	55.1
Men	158	44.9
Marital status		
Married	293	83.2
Single	7	2.0
Widowed/divorced	52	14.8
Income status		
Low income	121	34.6
Balanced income	215	60.9
High income	16	4.5
Mode of treatment		
Diet	55	15.6
Diabetes pills	201	56.9
Insulin	61	17.3
Diabetes pills and insulin	36	10.2
Health insurance		
Yes	331	94.0
No	21	6.0

4.2. Reliability analysis

4.2.1. Scale's internal consistency reliability and Cronbach alpha reliability coefficient

Item to total correlation coefficient was calculated for the items of the tool used in the research. In this way all of the tool's items were determined to be consistent with the whole (Table 2). Cronbach alpha was examined to evaluate the homogeneity of the items in the tool.

In the evaluation a total of three items had correlation coefficients that were below 0.30 (Table 2). Because the correlation coefficient values for these three items on the tool (Susceptibility item 3, Barriers item 17, Barriers item 20) were low ($r = 0.12$, 0.07, 0.12) they were removed from the tool. The remaining items were within acceptable limits and had significant correlation (0.30–0.77).

The Cronbach alpha reliability of the subscales for these items was retested. After removal of the one item (Susceptibility item 3) from the perceived susceptibility subscale the Cronbach alpha coefficient increased from 0.65 to 0.73. In a similar way after the perceived barriers subscale's two items (Barriers item 17, Barriers item 20) were removed the Cronbach alpha coefficient increased from 0.71 to 0.76. The Cronbach alpha coefficient for the total scale also increased from 0.88 to 0.89. The Cronbach alpha values for all the subscales were in the range of 0.73 to 0.88. The tool's internal consistency reliability coefficients (Table 2) and the Cronbach alpha values after the three items were removed are shown in Table 3.

4.3. Stability

The stability of the scale was established by measuring the test–retest reliability. A total of 30 patients were interviewed again two weeks later and data were collected. Then, by means of the intraclass correlation coefficient (ICC), the test–retest reliability could be

Table 2
Item analysis and internal consistency of the Health Belief Model Scale

Items	Mean	SD	Item total correlation	If item deleted alpha
Susceptibility				
1. People with Type 1 diabetes (young type) have higher chance to get diabetes complications	3.16	0.72	0.44	0.57
2. People with Type 2 diabetes (adult type) do not usually get diabetes complication	3.11	0.71	0.49	0.55
3. As long as I feel, well my diabetes is in good control	3.17	0.92	0.12	0.73
4. As long as I feel well, I am unlikely to develop diabetes complications	2.83	0.80	0.52	0.53
5. I will not get diabetes complications because my wound heals fast	2.92	0.85	0.50	0.54
Seriousness				
6. I think that diabetes is a serious disease	3.96	0.71	0.67	0.83
7. Type 1 diabetes (young type) is a serious disease	3.88	0.68	0.71	0.80
8. Type 2 diabetes (adult type) is as serious as Type 1 diabetes	3.86	0.72	0.77	0.73
Benefits				
9. Keeping blood sugar close to normal can help to prevent diabetes complications	3.69	0.58	0.48	0.85
10. Regular exercise helps to improve diabetes control	3.69	0.67	0.66	0.83
11. Reduce weight helps overweight people with diabetes to delay or prevent complications	3.64	0.64	0.71	0.82
12. Stop smoking helps to delay or prevent diabetes complication	3.67	0.71	0.69	0.83
13. Avoiding regular sweet intake helps in diabetes control	3.71	0.66	0.70	0.82
14. Low fat diet helps to delay or prevent diabetes complication	3.65	0.63	0.61	0.84
15. Control blood pressure helps to delay or prevent diabetes complication	3.59	0.63	0.50	0.85
Barriers				
16. There is not much use in trying to have good blood sugar control because the complications of diabetes will happen anyway	3.65	0.69	0.44	0.68
17. Blood sugar testing is meant for people with Type 1 diabetes (young type)	2.83	0.87	0.07	0.74
18. People with Type 2 diabetes (adult type) do not need to do regular blood sugar tests	3.47	0.67	0.35	0.69
19. It is not necessary to do blood sugar testing at home because I go to see doctor regularly	3.32	0.68	0.32	0.69
20. Taking sweetened food daily is necessary to prevent low blood sugar reactions	3.20	0.77	0.12	0.72
21. Deep fried and fatty food is not a problem for people with diabetes	3.79	0.76	0.44	0.67
22. As long as I take my medication daily, I do not have to control my diet intake	3.76	0.75	0.54	0.66
23. There is no relationship between smoking and diabetes complications	3.55	0.65	0.40	0.68
24. Looking slightly rounded in body size is a sign of good health	3.88	0.74	0.38	0.68
25. I do not have to check my feet daily because they look healthy	3.55	0.68	0.49	0.67
26. Diabetes is curable so it is not a serious disease	3.52	0.62	0.48	0.67
Recommended health-related action				
27. It is important to keep my blood sugar in good control	4.12	0.51	0.54	0.82
28. It is important to check my blood sugar several times a week at home	3.76	0.67	0.45	0.82
29. It is important to keep my weight under good control	4.05	0.51	0.60	0.80
30. It is important to stop smoking	4.04	0.49	0.58	0.81
31. It is important to take a low fat diet	4.05	0.44	0.64	0.80
32. It is important to avoid regular sweet intake	4.15	0.47	0.30	0.83
33. It is important to take medication as prescribed	4.28	0.49	0.33	0.83
34. It is important to check my feet daily	3.93	0.52	0.56	0.81
35. It is important to check my blood pressure regularly	3.87	0.58	0.57	0.81
36. It is important to make exercise regularly	3.87	0.68	0.64	0.80

N: 352, $\alpha = 0.88$, item: 36.

Table 3
Item total subscale correlation and Cronbach alpha for subscale ($N = 352$)

Subscale	Number of items	Item–total subscale correlation	Cronbach α
Susceptibility	4	0.45–0.61	0.73
Seriousness	3	0.67–0.77	0.85
Benefits	7	0.48–0.71	0.86
Barriers	9	0.32–0.56	0.76
Recommended health-related action	10	0.30–0.64	0.83
Total	33		0.89

Table 4
Distribution of correlations between Health Belief Model Scale and Self-Efficacy Scale

Health Belief Model Scale	Self-Efficacy Scale concurrent validity correlation coefficient
Susceptibility	0.41
Seriousness	0.45
Benefits	0.45
Barrier	0.37
Recommended health-related action	0.45
Total	0.52

$p < 0.001$.

calculated. ICC was determined to evaluate the test retest reliability between the two measurement sessions: ICC = 0.90 ($p < 0.001$ and 95% CI: 0.85–0.93).

4.4. Concurrent Validity

For concurrent validity between the Health-Belief Model Scale and the Diabetes Management Self-Efficacy Scale in Type 2 diabetes patients, was examined correlation analysis. The result of correlation coefficient are low to show validity of the scale even though these were statistically significant (Table 4).

4.5. Construct validity

The data were analyzed by means of factor analysis and varimax rotation. İn order to attain the best fitting structure and the correct number of factors, the following criteria were used: eigenvalues higher than 1.0, factor loadings higher than 0.30 (Stevens, 1996). Before conducting the factor analysis of instrument Kaiser–Meyer Otkin (KMO) measure of sampling adequacy (KMO) and Barlett's test was calculated to evaluate whether the sample was large enough to perform a satisfactory factor analysis. Barlett test 4793.95, $p < 0.001$. The calculated KMO was 0.85 indicating that the sample was large enough to perform a satisfactory factor analysis.

Factor analysis with varimax rotation was conducted to evaluate the construct validity of the 33 item instrument. As can be seen in Table 5 there were a total of five factors. Eight items in the tool's Health-Related Recommended Activities and one item in the Barriers subscale made up 13.98% of the variance with Factor 1. All of the Perceived Benefits subscale's items made up 12.08% of Factor 2 with variance. All but one item of the eight for Perceived Barriers made up 9.16% of the third factor with variance. Three items of the tool's Seriousness subscale and two items from Health-Related Recommended Activities (REC32, REC33) made up 8.15% of the fourth factor with variance. All of the items from the Susceptibility subscale made up 6.86% of the fifth factor with variance. Of the tool's total variance 50.26% was explained.

The size of the variance percentages are that are obtained as a result of factor analysis is the strength of the factor structure. When the factor pattern is developed factor values between 0.30 and 0.40 can be taken as the factor loads bottom cut-off point (Stevens, 1996). Except for one item (BAR 18) all of the items' factor load was over 0.40.

Health-Related Recommended Activities subscale items REC32 (It is important to avoid regular sweet intake), REC33 (It is important to take medication as prescribed) were in the seriousness dimension that makes up the fourth factor. These items' correlation was checked again with their own subscale and a significant correlation was found (for REC32 $r = 0.42$, for REC33 $r = 0.45$). Thus these two items were taken back to their own subscale. In the same manner the item BAR18 (People with Type 2 diabetes [adult type] do not need to do regular blood sugar tests) in the first factor was found to have a significant correlation with its own subscale ($r = 0.37$). This item was taken back into the Perceived Barriers subscale (Table 5).

In the comparison of the Cronbach alpha values from this research with those of the Chinese sample, although three subscales were close to each other in both scales, the Cronbach alpha coefficients of the Perceived

Table 5
Rotated factor analysis of the Health Belief Model scale

Factor 1, Recommended health-related action	Factor 2, Benefits	Factor 3, Barriers	Factor 4, Seriousness	Factor 5, Susceptibility
REC36 0.75	BEN13 0.82	BAR22 0.66	SER8 0.52	SUS4 0.75
REC35 0.69	BEN11 0.79	BAR25 0.61	SER7 0.51	SUS5 0.72
REC31 0.67	BEN12 0.75	BAR26 0.60	SER6 0.47	SUS2 0.55
REC34 0.67	BEN14 0.73	BAR16 0.54		SUS1 0.51
REC29 0.66	BEN10 0.70	BAR23 052	**REC32 0.63**	
REC30 0.65	BEN9 0.55	BAR21 0.51	**REC33 0.59**	
REC27 0.58	BEN15 0.52	BAR24 0.49		
REC28 0.54		BAR19 0.48		
BAR18 0.30				
Eigenvalue				
4.61	3.98	3.02	2.69	2.26
Variance explained				
13.98	12.08	9.16	8.15	6.86

REC: Recommended health-related action; BEN: Benefits; BAR: Barriers; SER: Seriousnes; SUS: Susceptibility.
N: 352, item: 33.

Table 6
Turkish HBMS subscales Cronbach's alpha coefficient of study sample and Chinese samples

Scale	Current study Cronbach alpha	Tan's study Cronbach alpha
Susceptibility	0.73	0.73
Seriousness	0.85	0.72
Benefits	0.86	0.80
Barriers	0.76	0.52
Recommended health-related action	0.83	0.87

Seriousness and Perceived Barriers subscales were higher in our study than in the original (Table 6).

5. Discussion

According to factor analysis resulted all of the tool's subscales explained 50.26% of the total variance. In a study with the Diabetic Health Belief Scale by Harris et al. (1987) all of the tool's subscales explained 44.4% of the variance (Harris et al., 1987). In a study with the Health Belief Scale by Schwab et al. (1994) the results of the factor analysis yielded only two subscale each containing 9 items. The nine items in Factor 1 (Barriers), and the nine items in Factor 2 (Benefits) (Schwab et al., 1994). It is recommended that the variance that is explained in single dimensional tools be at least 30% and in multidimensional tools to be higher (Büyüköztürk, 2002). In this respect it can be said that the explained variance is sufficient for the tool, which is evaluated to be multidimensional.

The calculated KMO was 0.85 indicating that the sample was large enough to perform a satisfactory factor analysis. It has been reported that for KMO when statistical information is between 0.90 and 1.00 the sample is excellent, 0.80 and 0.89 it is very good, 0.70 and 0.79 it is good, 0.60 and 0.69 it is average, 0.50 and 0.59 it is weak, and when it is less than 0.50 it is not acceptable (Akgül, 1997). In the study the KMO was 0.85, which shows that the size of the sample was very good.

The factor loads for the items on the the scale varied between 0.30 and 0.82. In a study with the Diabetic Health Belief Scale by Harris et al. (1987) the factor loads for the items on the scale varied between 0.30 and 0.83 (Harris et al., 1987). In every study it is appropriate for the factor loading that will be accepted to be determined by the size of the sample. As the sample size increases smaller factor loadings are accepted (Burns and Grove, 2001; Stevens, 1996).

As a result of the analysis three items were observed to be in different subscales. In the original tool the Perceived Barriers subscale item BAR18 (People with Type 2 diabetes [adult type] do not need to do regular blood sugar tests) was in Factor 1. In the same way two items in the Health-Related Recommended Activities subscale REC32 (It is important to avoid regular sweet intake) and REC33 (It is important to take medication as prescribed) were in Factor 4. However, because these items were shown to have significant correlation with their own subscales they were taken back to their own subscales. These differences which are characteristics of

the culture of our country may have affected the beliefs and attitudes of individuals about the diabetes management of patients.

The item to total correlations as internal consistency reliability analysis and the Cronbach alpha values were examined, and the correlation coefficients for all the items except for three (SUS3, BAR17, BAR20) were found to be between 0.30 and 0.71 (Table 2). Because the correlation coefficients of these three items (SUS3, BAR17, BAR20) were found to be below 0.20, they were removed from the tool. It is recommended that items with a correlation coefficient below 0.20 be removed from the tool. To remove an item from the tool it is necessary to evaluate the ''change in alpha if item deleted. ''If the alpha coefficient increased when some items are removed from a tool then that item decreases the reliability of the tool and needs to be removed (Büyüköztürk, 2002; Özdamar, 1997). In our study after one item was removed from the Susceptibility subscale (SUS3) the alpha value increased from 0.65 to 0.73. After two items were removed from the Barriers subscale (BAR17, BAR20) it increased from 0.71 to 0.76. The Cronbach alpha value for the total tool increased from 0.88 to 0.89.

For tool stability test–retest reliability intra class coefficients (ICC) for the total scale was 0.90. In the study by Schwab et al. (1994) the test–retest results for all of the subscales except for Perceived Seriousness (0.30) were between 0.56 and 0.85 (Schwab et al., 1994). The analysis results show that the questions were correctly perceived by the patients.

The tool's Cronbach alpha coefficient values for all the subscales were between 0.73 and 0.88. The total scale Cronbach alpha coefficient was 0.89. In the research by Tan (2004) the Cronbach alpha coefficient for Perceived Susceptibility was 0.73, for Perceived Seriousness was 0.72, for Perceived Benefits was 0.80, for Perceived Barriers was 0.52, and for Health-Related Recommended Activities was 0.87. The total scale Cronbach alpha coefficient was 0.72 (Tan, 2004). In the comparison of our research Cronbach alpha values with the original tool's Cronbach alpha values, although three subscales had very similar values, the Cronbach alpha coefficients for the perceived seriousness and perceived barriers subscales were higher in our study than in Tan's study (2004). In the examination of studies related to other health belief models conducted with diabetic patients in the international literature, it was seen that the Cronbach alpha value for the total scale in Becker and Janz's study (1985) was 0.64 (Becker and Janz, 1985). The Cronbach alpha coefficients were between 0.69 and 0.80 for the Becker tool used in the study by Daniel (2002) in British Columbia (Daniel and Messer, 2002). In the study conducted by Schwab et al. (1992) only two of the five subscales were found to be valid and reliable. The Cronbach alpha coefficients for these subscales were 0.72 for Perceived Seriousness subscale and 0.64 for Perceived Barriers (Schwab et al., 1994). In comparison of the findings in the literature the findings in our study were found to be higher. These results show that the tool can be used for the same purpose in Turkey. In the evaluation of the tool the tool's validity and reliability were observed.

6. Limitations of study

As a result of the analysis three items were observed to be in different subscales. Because the correlation coefficients of these three items (SUS3, BAR17, BAR20) were found very low. Translated instrument may have lower reliability scores. In addition, cultural difference in response patterns have statistical methodological implications. Looking specially at the items in the Turkish instrument compared with the original scale, the cultural characteristics may have been an influencing factor in the result. Because the research was conducted in one region of Turkey with patients registered in a diabetes center the results cannot be generalized. For this reason it is recommended that research be done with different sample groups.

7. Conclusion and recommendations

At the conclusion of psychometric measurements ''Health Belief Model Scale,'' was found to be valid and reliable for use in Turkey. In the findings that we obtained the factor structure (perceive susceptibility, perceived seriousness, perceived benefits, perceived barriers, recommended health-related action) were covered extremely well with the health belief model.

The Health Belief Model is a usable model for evaluating diabetic individuals' health behaviors and their beliefs and attitudes about illness. This instrument can also be used to test the effectiveness of intervention strategies. It is necessary to examine the health beliefs and attitudes of patients before an educational program is begun to develop positive health behaviors, to acquire quality of life, to prevent complications, and to maintain good diabetic control.

The HBM provides a useful framework for understanding how individuals with diabetes live with their disease, the problems they encountered and its treatment. Information generated from this could help to improve future educational programs that address those beliefs attitudes and behaviors so as to promote good diabetes control, prevent complications, and improve quality of life and address practical barriers to positive health behavior.

It could easily be used by nurses and other health care providers to determine the beliefs in need of interventions. Once nurses understand patient's beliefs, they can begin to interact with the patients to devise strategies that will alter beliefs and behaviors. To decrease DM mortality through early detection nurses must broaden their understanding of the factors that influence with diabetes patients screening behaviors.

A recommendation that this scale should be further evaluated; with a large enough sample size, in different regions in Turkey. Further research on diabetes beliefs, behavior and Glycemic control is required to better control the growing epidemic of diabetes in Turkey populations.

Appendix A. Health Belief Model Scale

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Perceived Susceptibility					
1. People with Type 1 diabetes (young type) have higher chance to get diabetes complications					
2. People with Type 2 diabetes (adult type) do not usually get diabetes complication					
3. As long as I fell well, I am unlikely to develop diabetes complications					
4. I will not get diabetes complications because my wound heals fast					
Perceived Seriousness					
5.I think that diabetes is a serious disease					
6. Type 1 diabetes (young type) is a serious disease					
7. Type 2 diabetes (adult type) is as serious as Type 1 diabetes					
Perceived Benefits					
8. Keeping blood sugar close to normal can help to prevent diabetes complications					
9. Regular exercise helps to improve diabetes control					
10. Reduce weight helps overweight people with diabetes to delay or prevent complications					
11. Stop smoking helps to delay or prevent diabetes complication					
12. Avoid regular sweet intake helps in diabetes control					
13. Low fat diet helps to delay or prevent diabetes complication					
14. Control blood pressure helps to delay or prevent diabetes complication					
Perceived Barriers					
15. There is not much use in trying to have good blood sugar control because the complications of diabetes will happen anyway					
16. People with Type 2 diabetes (adult type) do not need to do regular blood sugar tests					
17. It is not necessary to do blood sugar testing at home because I g o to see doctor regularly					
18. Deep fried and fatty food is not a problem for people with diabetes					

19. As long as I take my medication daily, I do not have to control my diet intake
20. There is no relationship between smoking and diabetes complications
21. Looking Slightly rounded in body size is a sign of good health
22. I do not have to check my feet daily because they look healthy
23. Diabetes is curable so it is not a serious disease

Recommended Health-Related Action

24. It is important to keep my blood sugar in good control
25. It is important to check my blood sugar several times a week at home
26. It is important to keep my weight under good control
27. It is important to stop smoking
28. It is important to take a low fat diet
29. It is important to avoid regular sweet intake
30. It is important to take medication as prescribed
31. It is important to check my feet daily
32. It is important to check my blood pressure regularly
33. It is important to make exercise regularly

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