

# Research on Cardiovascular Disease in Patients with Diabetes Mellitus Type 2 from the Perspective of Health Belief Theory

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## Abstract:

With the arrival of people's lifestyle and aging process, the prevalence of diabetes in China is increasing rapidly, and there is no radical cure at present. Among the patients with diabetes mellitus type 2, the risk factors associated with cardiovascular disease are an important reason that endangers the health and life of patients with diabetes mellitus type 2. Related studies have shown that the health belief theory model can help reduce the risk of cardiovascular disease in the patients with diabetes mellitus type 2 to a certain extent. In this study, the Chinese version of the Health Beliefs Related to Cardiovascular Disease Scale (HBRCDs) was used to analyze the sample of the patients with diabetes mellitus type 2 to compare with and supplement the existing research. This study collected diabetes data from National Metabolic Management Center (MMC) of the First Affiliated Hospital of Fujian Medical University. 512 samples were collected from patients who were confirmed with diabetes mellitus type 2. Factor analysis and binary logistic regression were used to analyze the Health Beliefs Related to Cardiovascular Disease Scale (HBRCDs). Through the analysis of reducing dimensions, it was appropriate to extract 25 indicators of the scale into five factors. At the same way, using one-way ANOVA to compare the comprehensive score of health belief in preventing cardiovascular disease in patients with diabetes mellitus type 2 under different characteristics, the results showed that only degree was significant in statistics. The lower the education level, the lower the comprehensive score, and the higher the education level, the higher the comprehensive score. Other characteristics were not statistically significant. The results of binary logistic

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regression analysis showed that the degree of fitting of the model was low, indicating that there was no significant linear relationship between the health belief of preventing cardiovascular disease of the patients with diabetes mellitu type 2 and whether they suffered from cardiovascular disease. The results also showed that there was no significant linear relationship between the patients with diabetes mellitu type 2 who had the Cardiovascular disease and those who did not diagnose with Cardiovascular disease. It is suggested to strengthen the health belief of diabetes patients through online and offline diabetes education, management and other guidance. At the same time, the knowledge of diabetes and its complications for patients with diabetes should be supplemented. It also shows that exercise companion and the convenience of exercise equipment are the key points for diabetes patients to enhance their health belief in preventing cardiovascular disease. Therefore, sports equipment areas should be set up in communities, towns or villages to make exercise feasible everywhere. At the same time, it is necessary to supplement the knowledge of diabetes of family members of patients and accompany patients appropriately.

**Keywords:** *Health belief theory, Diabetes mellitu type 2, Cardiovascular disease*

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## I. INTRODUCTION

As a typical chronic noninfectious disease, diabetes has swept human health like a tsunami, and there is no radical cure at present. With the development of economy and the change of people's lifestyle, also with the acceleration of aging process and the arrival of the aging era, the prevalence of diabetes in China is rising geometrically. At present, China has become the country with the largest number of diabetes patients. Cardiovascular disease (CVD) also named circulatory system diseases and circulatory system diseases refers to diseases related to the heart or blood vessels [1]. In patients with diabetes mellitu type 2, the risk factor associated with cardiovascular disease is an important reason that endangers the health and life of patients with diabetes mellitu type 2.

Health belief model (HBM) is a behavioral theory model proposed by American social psychologists in 1952 [2]. The main idea is that people's behaviors can be controlled and changed by people's beliefs [3]. Its purpose is to stimulate patients' internal potential and make them believe that bad habits can be changed through healthy behavior model and achieve the desired effect [4]. Studies have shown that health belief is an important factor affecting the self-care behavior of diabetes patients [5], and health belief has a certain effect on the prevention of complications, especially in diabetes patients with Diabetic-foot [6,7]. The Health Beliefs Related to Cardiovascular Disease Scale (HBRCDS) developed by Elizabeth Gressle Tovar et al. is used to measure the impact of health belief on the prevention of cardiovascular diseases from the perspective of diabetes patients [8]. The scale has been widely used abroad, but the applicability of the Chinese version of the scale is still being studied in China. Yanjin Liu et al. applied The Chinese version of HBRCDS to diabetes patients in the First Affiliated Hospital of Zhengzhou University, and obtained good reliability and validity [9]. Wang Yang et al. directly applied the scale to the cardiovascular disease health belief survey of diabetic patients and showed that strengthening the health belief of the patients with diabetes mellitu type 2 can help reduce their risk of cardiovascular disease [10].

In this study, the Chinese version HBRCDS was applied to diabetic patients, and factor analysis was used to analyze the scale in reducing dimensions so as to effectively supplement the existing theories of the prevention of cardiovascular disease in diabetic patients.

## II. DATA SAMPLES AND METHOD

### 2.1 Data Samples and Method

The data was collected from the National Metabolic Management Center (MMC) of the First Affiliated Hospital of Fujian Medical University, deleted missing values and duplicate values, and chose the sample of the patients confirmed with diabetes mellitu type 2. 512 samples were collected in total. Due to the relevant data from provincial grade a tertiary hospital, the inclusion criteria met the diabetes diagnostic criteria proposed by the World Health Organization [11], and there was no cognitive impairment or mental abnormality.

The questionnaire is divided into two parts. The first part is the basic demographic characteristics, and the second part adopts the HBRCDS as the core item, which is mainly used to evaluate the health belief of diabetes patients preventing cardiovascular disease. There are 25 items in this scale, and each item is represented as completely disagree, disagree, agree and completely agree by using 4-level Likert scoring method. Positive items are directly scored 1-4 points, and reverse questions are positively processed (5-score), with a score range of 25-100 points. The total score is the sum of the scores of each item. The higher the score, the higher the diabetics' belief in preventing cardiovascular disease.

### 2.2 Statistical Analysis

Factor analysis was used to analyze the HBRCDS of health belief scale for preventing cardiovascular disease in diabetic patients in reducing dimensions and its reliability and validity were verified. Finally, the patients with cardiovascular disease were analyzed by binary logistic regression. The Cronbach's A value was 0.875, indicating that the reliability of the scale was very good.

## III. RESULTS

### 3.1 Demographic Characteristics of the Respondents

As shown in Table I, A total of 512 valid samples were obtained through conditional screening, of which 312 were male, accounting for 60.5%. There were 476 married people, with an average age of 58, average height of 163 centimeter and average weight of 65 kilogram. Their education level is elementary and middle school level, and there are 234 retired people.

**Table I. Demographic characteristics of respondents**

Demographic variables	Grouping	Number of people	Percentage (%)	Effective percentage
Gender	male	310	60.5	60.5
	female	202	39.5	39.5
Age	Below 20	1	0.2	0.2
	20-40	46	9	9
	40-60	231	45.1	45.1
	Over 60	234	45.7	45.7
Educational background	Primary school	351	68.6	68.6
	Middle school	159	31.1	31.1
	High school	2	0.4	0.4
Marital status	Unmarried or divorced (widowed)	36	7.03	7.03
	Married or remarried	476	92.97	92.97
retirement	Not retired	278	54.3	54.3
	retired	234	45.7	45.7

### 3.2 Factor Analysis of the Health Beliefs Related to Cardiovascular Disease Scale (HBRCDS)

In previous studies, the scale was divided into four dimensions which were perceived benefit, perceived susceptibility, perceived severity and perceived disorder. But it was not directly divided into these four dimensions in this study. Instead, factor analysis and principal component analysis were performed to reduce the dimension of data again, so as to compare the differences with existing dimensions.

#### 3.2.1 Correlation test

There is a certain correlation between variables in factor analysis. KMO (Kaiser-Meyer-Olkin) test and Bartlett's test of sphericity are common methods for correlation test. The closer KMO value is to 1, the stronger the correlation between variables is, and the more suitable for factor analysis. Bartlett test of sphericity assumes that factors are independent of each other. When P value is significant, the null hypothesis is rejected, that is, there is correlation between variables and factor analysis can be carried out. The value of KMO test and Bartlett's test of sphericity of the scale were shown in table II. It can be seen that the KMO test value is greater than 0.7, indicating high correlation. The significance of Bartlett's test of sphericity statistics is to 0, indicating that there is correlation between variables, which shows the scale is suitable for factor analysis.

**Table II. KMO test and Bartlett’s test**

Test	Project	Value
KMO test		0.857
Bartlett’s test of sphericity	The approximate chi-square	16271.21
	Degree of freedom	300
	significant	0.000

### 3.2.2 Extraction of factors

Principal component analysis was used to extract and select eigenvalues greater than 1. The optimal number of extracted key factors was selected through eigenvalues, cumulative variance contribution rate and scree plot, which was to reduce the number of variables and finally achieve dimension reduction.

**Table III. Total Variance Explained**

Total Variance Explained									
component	Initial eigenvalues			Extraction sums of squares of loads			Sum of squares of rotational loads		
	Total	Percentage of variance	Cumulative %	Total	Percentage of variance	Cumulative %	Total	Percentage of variance	Cumulative %
1	7.234	28.936	28.936	7.234	28.936	28.936	4.906	19.622	19.622
2	6.277	25.109	54.045	6.277	25.109	54.045	4.876	19.503	39.125
3	2.981	11.923	65.968	2.981	11.923	65.968	4.130	16.518	55.644
4	1.797	7.189	73.158	1.797	7.189	73.158	4.098	16.392	72.035
5	1.462	5.848	79.006	1.462	5.848	79.006	1.743	6.971	79.006

Extraction method: Principal component analysis.

Table III showed the value of total variance explained. Variance contribution and variance contribution rate (variance interpretation rate) of factors are key indicators to measure the importance of factors, and variance contribution rate represents the degree of extraction of item information by factors. The variance percentage and cumulative variance after rotation of each factor showed that the variance contribution rate (variance explanation rate) of the five components were 19.62%, 19.50%, 16.52%, 16.40% and 6.97% respectively, and the cumulative variance contribution rate was 19.62%, 39.13%, 55.64%, 72.04% and 79.01% respectively. The cumulative contribution of the factors (cumulative variance explanation rate) was 79%, indicating that the extracted factors could well explain the scale indicators. Combined with the scree plot in Figure 1, it can be seen that it is appropriate to extract these 25 indicators into five factors.

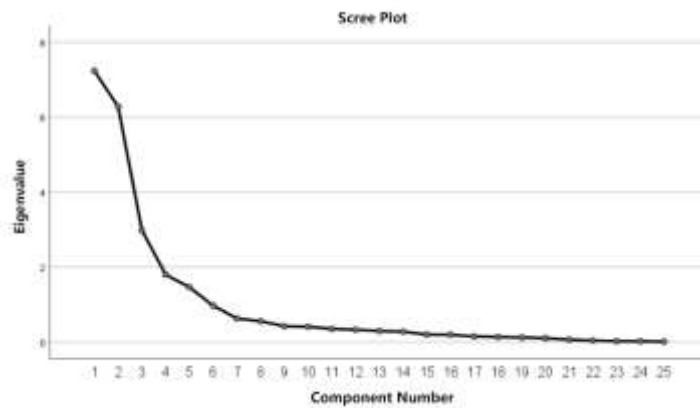


Figure 1: Scree Plot

### 3.2.3 Name the factors according to rotation matrix

Table IV showed that five factors were obtained after rotation. That was slightly different from the four dimensions initially set up by Elizabeth Gressle Tovar et al., but Tovar mentioned that the scale could indicate more than one dimension at least [8]. Yanjin Liu et al. collected the data of hospitalized diabetic patients from the First Affiliated Hospital of Zhengzhou University and analyzed the reliability and validity of the scale in Chinese version, and obtained four factors by factor analysis. Slightly different from Yanjin Liu’s research, this survey showed that the scale can be divided into five factors which were named: Perceived benefit (represented by letter B, from B1-B6 items ), Perceived susceptibility (represented by letter F, from F1-F5 items), Perceived disorder (represented by letter D, from D1-D7 items), Perceived severity (represented by letter S, from S1-S5 items), and Perceived psychology (represented by letter P, from P1-P2 items). The slight difference from Yanjin Liu was that dividing 9 items of Perceptual disorder into Perceptual disorders (7 items) and Perceptual psychology (2 items). At the same time, the factor loading coefficient corresponding to each item was higher than 0.545, indicating that the scale had good validity.

**Table IV. The rotated component matrix**

+The rotated component matrix <sup>a</sup>					
	composition				
	1	2	3	4	5
B1: A healthy diet can help reduce the risk of coronary heart disease or stroke	0.925	-0.019	0.200	-0.042	-0.020
B2: Consistent exercise can reduce the risk of death from coronary heart disease or stroke	0.917	-0.014	0.181	-0.054	-0.003
B3: Maintain a healthy diet and exercise at least 30 minutes a day to prevent coronary heart disease or stroke	0.897	-0.012	0.173	-0.077	-0.006

B4: I will keep a healthy diet	0.851	-0.002	0.146	-0.015	0.099
B5: Maintaining a healthy diet can help reduce the risk of coronary heart disease or stroke	0.839	0.064	0.172	-0.028	0.074
B6: I will choose a healthy way of exercise	0.821	-0.028	0.170	-0.003	0.150
F1: coronary heart disease or stroke will happen to me	0.019	0.936	0.016	0.292	0.025
F2: I will have coronary heart disease or stroke in my lifetime	0.027	0.934	0.026	0.299	0.020
F3: I could have coronary heart disease or stroke in the future	-0.028	0.920	0.005	0.316	0.053
F4: I have a higher risk of coronary heart disease or stroke than others	-0.015	0.919	0.012	0.318	0.052
F5: I will have coronary heart disease or stroke in the last few years	-0.003	0.881	0.040	0.300	-0.029
D1: Healthy food is too expensive for me	0.157	-0.064	0.867	0.055	-0.016
D2: I don't have time to cook for myself	0.120	0.140	0.838	-0.033	-0.067
D3: I have more important things to do than diet and exercise	0.131	-0.130	0.816	0.129	-0.011
D4: I don't know what diet is to reduce the risk of coronary heart disease	0.120	-0.173	0.776	0.115	0.054
D5: I don't have time to exercise 30 minutes a day	0.120	0.072	0.742	-0.127	-0.058
D6: I can't find the right form of exercise to reduce my risk of coronary heart disease	0.206	0.132	0.589	-0.005	-0.035
D7: A five-minute walk is painful for me	0.280	0.164	0.545	-0.032	-0.274
S1: My whole life would change if I had coronary heart disease	-0.034	0.333	0.049	0.904	0.039
S2: Having coronary heart disease will greatly affect my sex life	-0.008	0.350	0.062	0.894	0.056
S3: Having coronary heart disease affects my relationship with friends and family	0.036	0.316	0.030	0.885	0.014
S4: Coronary heart disease or stroke is fatal in my life	-0.252	0.195	-0.063	0.787	0.054
S5: If I have coronary heart disease or stroke, I will die within 10 years	0.017	0.399	0.030	0.741	-0.077
P1: I can easily find sports equipment	0.107	0.026	-0.093	0.045	0.897
P2: Someone will exercise with me	0.129	0.067	-0.093	0.011	0.890

Extraction method: Principal component analysis.

Rotation method: Kaiser normalized maximum variance method.

a. Rotation converges after 6 iterations.



### 3.2.4 Factor weight expression

Factor weight expression is the main purpose of factor analysis, which uses factor weight calculation variables to replace the original index variables for analysis. Since the cumulative contribution of five factors was 79%, the weighted contribution of variance was obtained by weighting the factors. Therefore the comprehensive score of health belief in the prevention of cardiovascular disease in patients with diabetes mellitu type 2 was obtained, which was  $Z=0.2484B+0.2468F+0.2091D+0.2075S+0.0882P$ , and each factor score was generated by regression method. The comprehensive score of health belief in the prevention of cardiovascular disease in patients with diabetes mellitu type 2 indicated the strength of patients' belief in the prevention of cardiovascular disease.

### 3.2.5 Comparison of the comprehensive score of health belief in cardiovascular disease prevention among diabetic patients with different demographic variables

One-way ANOVA was used to compare the comprehensive score of health belief in cardiovascular disease prevention in patients with diabetes mellitu type 2 under different demographic variables, and the results were shown in Table V.

**Table V. Differences in the comprehensive score of health belief in cardiovascular disease prevention among diabetic patients with different demographic variables**

Demographic variables	grouping	Number of people	Comprehensive scores (Mean ± standard deviation)	T/F value	P values
gender	male	310	0.018±0.503	1.161	0.246
	female	202	0.028±0.402		
Age	< 20	1	0.186	1.143	0.331
	20-40	46	0.118±0.539		
	40-60	231	0.013±0.457		
	> 60	234	0.011±0.459		
Educational background	Primary school	351	0.055±0.442	7.901	0.000
	Middle school	159	0.119±0.497		
	High school	2	0.140±0.376		
Marital status	Unmarried or divorced	36	0.060±0.30	0.634	0.426
	Married or remarried	476	0.005±0.476		
retirement	Not retired	278	0.021±0.466	1.265	0.261
	retired	234	0.025±0.466		
Smoking	Not smoke	401	0.004±0.452	0.305	0.581



	smoking	108	0.002±0.501		
drinking	Not drink	358	0.014±0.465	1.001	0.317
	drinking	154	0.031±0.469		

As shown in Table V, Educational background had statistical significance on the comprehensive score of health belief in cardiovascular disease prevention in patients with diabetes mellitu type 2. The lower the education level, the lower the comprehensive score, and the higher the education level, the higher the comprehensive score. Other demographic variables such as gender, age, marital status and retirement status had no statistical significance on the comprehensive score of health belief in cardiovascular disease prevention in patients with diabetes mellitu type 2. Lifestyle habits such as smoking and drinking were not statistically significant as well.

### 3.3 Binary Logistic Regression Analysis

512 samples were divided into two groups: A total of 110 samples with coronary heart disease or other cardiovascular diseases in diabetes mellitu type 2, and 402 samples without cardiovascular disease. These two groups were set as dependent variables. Five factors after dimension reduction in factor analysis were taken as independent variables, and binary logistic regression analysis was conducted by input method.

As shown in Table VI, minus 2 times of the logarithmic likelihood function value was 512.139 and Nagelkerke  $R^2$  was 0.029 which was close to 0, indicating a low degree of equation fitting.

**Table VI. Binary logistic regression analysis**

variables	B	Standard error	wald	significant	Exp(B)
Perceived benefit	-0.171	0.114	2.226	0.136	0.843
Perceived susceptibility	-0.137	0.113	1.467	0.226	0.872
Perceived disorder	-0.045	0.112	0.160	0.690	0.956
Perceived severity	0.151	0.111	1.843	0.175	1.163
Perceived psychology	-0.243	0.113	4.604	0.032	0.784

Table VI showed that for the logitY linear relationship, the stronger the perceived psychology, the fewer patients with cardiovascular disease in type 2 diabetes, indicating an inverse relationship between the two. The probability P values corresponding to the Wald observed values in the significance test of other variables were all greater than the significance level, so the null hypothesis cannot be rejected, that is, the linear relationship between each factor and LogitY was not significant.

## IV. DISCUSSIONS

This study explored the reliability and validity of the scale from the perspective of the health belief of the patients in diabetes mellitu type 2 to prevent cardiovascular disease, obtained the comprehensive score

of the health belief of type 2 diabetes patients to prevent cardiovascular disease through factor analysis, and explored the differences of the comprehensive score under different demographic variables. The results of One-way ANOVA analysis showed that only educational background had statistical significance on the comprehensive score of cardiovascular disease prevention in patients with diabetes mellitu type 2. The lower the education level, the lower the comprehensive score, and the higher the education level, the higher the comprehensive score. Other variables were not statistically significant, which mean that education played a key role in the health belief of preventing cardiovascular disease. Although the educational background of the interviewees was under high school, the comprehensive score of junior high school education or above was higher than that of primary school education. To some extent, education level represents cognitive level, and they also show higher belief in the health belief of preventing cardiovascular disease.

The results of binary logistic regression analysis showed that the fit degree of the model was low, indicating that there was no significant linear relationship between the health belief of patients in diabetes mellitu type 2 to prevent cardiovascular disease and whether they suffered from cardiovascular disease. The results showed that there was no significant linear relationship in the health belief scale dimensions between diabetic patients with cardiovascular disease and those without cardiovascular disease. It also did not show that the health belief of diabetic patients without cardiovascular disease was stronger than that of diabetic patients with cardiovascular disease. The reason may be that the questionnaire was conducted before the health belief education of the patients, and the patients themselves may not have strong awareness of the health belief. However, in the case of low fitting degree, the regression between perceived psychology and diabetes patients with cardiovascular disease was statistically significant, and these two showed an inverse relationship, indicating that the stronger the perceived psychology, the fewer patients with cardiovascular disease in diabetes mellitu type 2. Perceived psychology including "It is easy for me to find exercise equipment" and "someone will exercise with me" indicated that the convenience of exercise equipment and exercise together were the key to strengthen the healthy belief of preventing cardiovascular disease in patients with diabetes mellitu type 2.

## V. CONCLUSIONS

At present, diabetes patients are concentrated in the elderly, gradually spreading to the middle-aged and young people. Most of the elderly patients were born in the early days of the founding of the People's Republic of China, so their education level is a little weak. It is suggested to carry out online and offline diabetes education, management and psychological guidance to enhance the health belief of patients with diabetes. At the same time, because diabetes treatment process is long, it needs to have strong willpower and self-discipline. Health belief theory says that if patients do not have enough awareness of the seriousness of diabetes and are not aware of disease or health problem is the threat to the individual, family and society, they will not be able to actively take healthy behavior [12]. Therefore, it is necessary to supplement the knowledge of diabetes and its complications for patients with diabetes.

Perceived psychology shows that exercise companion and the convenience of exercise equipment are

the key points for diabetes patients to enhance their health belief in preventing cardiovascular disease. Therefore, sports equipment areas should be set up in communities, towns or villages to make exercise feasible everywhere. At the same time, it is necessary to supplement the knowledge of diabetes of family members of patients and accompany patients appropriately.

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### REFERENCES

- [1] Mendis, Shanthi; Puska, Pekka; Norrving, Bo. Global Atlas on Cardiovascular disease Prevention and Control. Geneva: World Health Organization in collaboration with the World Heart Federation and the World Stroke Organization. 2011: 3-18.
- [2] Jingheng Huang .Health Education. Version 3.Shanghai: Fudan University Press. 2002:28-34.
- [3] Tavafian SS, HasaniL, A gham olaei T. Prediction of breast selfexam ination in a sample of Iranian women: an application of the Heath Are the Model. Journal of BMC women's Health, 2009, 9 (1): 37-38.
- [4] Rongxia Zhang, Huili Wang. Health beliefs and self-care behavior in patients with diabetes mellitus type 2. Xinjiang Medical Journal, 2015(1): 41.
- [5] Shn CR, Weir C, King GL, et al. Translated by Pan Changyu. Beijing: People's Medical Publishing House. 2007:623-625.
- [6] Juan Wang. Effect of health belief model education on prevention of diabetic foot in diabetic patients. World Latest Medical Information Abstracts (continuous electronic journal), 2020 volume 68, pp. 131-132.
- [7] Jia Wang. The preventive effect of health belief model nursing on elderly diabetic foot. Medical Theory and Practice, 2020 volume 13, pp. 2222-2224.
- [8] Elizabeth Gressle Tovar, Mary Kay Rayens, Michele Clark & Hoang Nguyen, Development and Psychometric testing of the Health Beliefs Related to Cardiovascular Disease Scale: preliminary findings. Journal of advanced nursing, 2010.
- [9] Yanjin Liu, Min Wang, Xiaofang Dong, et al. Health belief scale for prevention of cardiovascular disease in diabetic patients: A review. Journal of Nursing, 2015, 30(015):23-25.
- [10] Yang Wang, Bo Yang. Risk assessment of cardiovascular disease and health beliefs in patients with type 2 diabetes mellitus. Occupational and Health, 2016, 32(8):1057-1059, 1062.
- [11] Xueli Li, Yayun Jiang, Jingling Zhang, et al. Comparison of WHO and American diabetes association

criteria for diagnosis of diabetes mellitus. Chinese journal of endocrinology and metabolism, 2000, 16 (2):87-90.

- [12] Guixia Xu, Hong Xie, Beiqing Guo, et al. Effect of health belief theory on self-care behavior of type 2 diabetes patients. Journal of Bengbu Medical College, 2011(02):90-92.