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Research Article

Application of Health Belief Model in predicting preventive behaviors against cardiovascular disease in individuals at risk

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Abstract

Background: Cardiovascular disease is the most common cause of mortality in most countries and the leading cause in Iran. There are two categories of risk-factors associated with this disease including modifiable risk factors such as smoking, dietary habits, alcohol consumption and physical activity and non-modifiable factors such as age, gender, genetics and family history. This study was performed to determine the preventive behaviors against cardiovascular disease based on the Health Belief Model among people at risk in Birjand City.

Methods: This cross-sectional study was performed on 112 individuals at risk of cardiovascular disease who were referred to health centers across Birjand city in the summer of 2016. To collect data, a demographics form and self-made questionnaires were used that covered items on knowledge, health belief model constructs, and preventive behaviors against cardiovascular disease. The collected data were analyzed using SPSS version 16 and correlation coefficient Pearson, linear regression, T-test and ANOVA. The significant level was set at α=0.05.

Results: Of the participants, 17% were male and 83% female with an overall mean age of 41.4±9.6 years. Also, 93.8% of the participants were married and most of them (67%) were housewives. Mean scores of knowledge was 24.05±7.83, perceived susceptibility 14.31±2.98, perceived severity 24.41±4.02, perceived benefits 30.32±3.45, perceived barrier 15.34±4.54, and perceived self-efficacy 13.50±2.93. Pearson correlation test showed a significant correlation between perceived benefits, perceived barriers, self-efficacy, knowledge and preventive behaviors. Linear regression test showed that self-efficacy had the greatest impact on preventive behaviors. The differences in knowledge, perceived sensitivity, and self-efficacy were significant across different educational levels (α=0.05).

Conclusions: With regards to the confirmed correlation between knowledge, perceived barriers, perceived benefits, perceived self-efficiency, and adoption of preventive behaviors, it seems that the mere understanding of risks and vulnerability does not suffice for adherence to health behaviors. Thus, consideration of barriers, benefits and self-efficacy in educational programs creates a higher level of adhesion to preventive behaviors against cardiovascular disease in people at risk

Keywords: Health Belief Model; Cardiovascular disease; Preventive behaviors

1. Introduction

Cardiovascular disease (CVD) is the most common cause of death in most countries and the leading cause of morbidity in Iran (1). CVD accounts for over 48% of deaths across the world (1). In our country, CVD is the leading cause of death and responsible for 39.3 percent of mortality (2). In Iran, 72 percent of deaths are caused by non-communicable diseases where CVD is responsible for 45 percent of the cases (3). CVD imposes enormous health and socio-economic burden on society and affects people when they are most efficient socially and economically (3). There are two categories of risk-factors associated with this disease including modifiable risk factors such as smoking, dietary habits, alcohol consumption and physical activity as well as non-modifiable factors such as age, gender, genetics and family history (1). Risk factors or underlying

contributors to CVD are in fact behaviors or conditions that increase the risk of the disease. Sedentary lifestyle, smoking and high-fat diet are recognized as the behavioral and main risk factors for developing CVD (4). In Iran, 22 percent of CVD occurs due to inactivity, 22 percent for smoking, 13 percent due to lack of fruits and vegetables in daily diet, 62 percent due to high blood pressure, and 18 percent for high blood fat (with some factors overlapping)(5).

Modifiable risk factors are responsible for more than three-quarters of ischemic heart diseases (3). These diseases can be prevented to a considerable extent, and premature mortality from CVD can be avoided by implementing effective interventions to reduce the associated risk factors (2). Lifestyle plays a key role in CVD prevention and treatment (3). Primary prevention can rescue from modifiable (behavioral) risk factors, which are responsible for more than 90% heart attacks, and subsequently prevent from CVD as much as 80 percent (2).

The Health Belief Model (HBM) is one of the first theories that consider individualistic factors important to the way individuals behave. This model is based on perceived susceptibility, perceived benefits, perceived barriers, perceived self-efficacy, and guidelines for action to predict behavior (6). HBM emphasizes how an individual's attitudes and personal beliefs in fear of a certain problem, and assessment of benefits of and barriers to preventive behaviors can lead to particular behaviors. Based on HBM, to adopt a preventive action, a person must first feel alarmed against the problem, sense the severity and seriousness of the effects of physical and mental consequences of the risky phenomenon, namely the perceived seriousness, and adopt preventive behavior upon positive assessment of benefits of the preventive behavior and lack of serious barriers (7).

Several studies have demonstrated the constructive role of HBM in the occurance of preventive behavior against various diseases (3). HBM contributes to numerous health promotion behaviors including nutritional behavior of the elderly (8), reduced risk in CVD patients (9), workplace nutritional interventions, and prevention of CVD incidence (10). This study was performed to determine the preventive behaviors against cardiovascular disease based on Health Belief Model among people at risk in Birjand City.

2. Methods

This cross-sectional study was conducted on 112 patients at risk for CVD who referred to Birjand-based health centers during the summer of 2016. The sample size was estimated 104 people based on the results of Baghiani moghadam et al's study (3) where the perceived susceptibility score was estimated and on the basis of mean estimation with s=2.6, power of 80%, d=0.05 and α= 0.05. To increase accuracy, however, 120 individuals were incorporated as the final sample. Eight of them were excluded as their questionnaires were not fully completed. Sampling was by cluster sampling method whereby Birjand was initially divided into regions geographically and socioeconomically. One health center was randomly selected from each region from which 30 individuals were subsequently selected via simple sampling method.

Inclusion criteria consisted of the absence of mental or psychological disorder, age between 20 and 65 years, having at least one major risk factor for CVD such as high blood pressure, diabetes, smoking and obesity, having finished at least the secondary school, and lack of CVD.

Tools for data collection involved a self-made questionnaire developed according to the objectives of the study. It covered demographics, knowledge, and HBM constructs including perceived susceptibility, perceived seriousness, perceived benefits, perceived barriers, and self-efficacy, as well as preventive behaviors against CVD. To determine face and content validity of the questionnaire, 10 professors of health education, epidemiology, cardiology and related health experts were consulted. As the content validity ratio (CVR) for the constructs were in the range of 0.63 to 0.68 and content validity index (CVI) in the range of 0.83 to 0.86, with both being in acceptable ranges, thus the validity of the questionnaire was confirmed.

To determine the reliability of the questionnaire, the instrument was completed by 20 individuals at risk for CVD who were not included in the sample. The Cronbach's alpha coefficient for the constructs ranged between 0.68 and 0.96, hence acceptable reliability of the instrument. Each sub-scale of HBM was covered by a set of items as follows: perceived susceptibility, 4 items; perceived seriousness, 6 items; perceived benefits, 7 items; perceived barriers, 6 items; and self-efficacy, 6 items. All the items were scored based on the 5-point Likert scale from strongly agree (5) to strongly disagree (1 point). Knowledge was covered by 38 items. The answers could be determined by "Yes", "No",

and "I do not know". A correct answer was scored 1, and a wrong answer or "I do not know" was scored zero. Scores less than 50% of the total score was considered weak, between 50% and 75% of the total score was considered moderate, and those greater than 75% were considered good.

The subscale on preventive behaviors against CVD covered exercise 30 minutes at least three days a week, refrainment from smoking and smoke exposure, blood pressure control in the normal range (i.e., less than 140/90 mm Hg), proper diet for good heart function (i.e., low calorie, low fat, low salt, and daily consumption of 3 to 5 servings of fruits and vegetables), and regular blood tests to check the normal state of blood sugar and cholesterol. The answers consisted of never, rarely, sometimes, often or always, and were scored from 1 to 5.

The collected data were analyzed using SPSS version 16. The Pearson correlation test was used to determine the association between health beliefs and preventive behaviors. To assess the effect of knowledge and the constructs of the model, linear regression was applied. Independent T-test, ANOVA, and LSD post hoc test were used to compare the status of the variables under study according to the demographic characteristics. The significant level was set at α=0.05.

3. Results

Of the 112 participants, 19 (17%) were male and 93 (83%) were female. The mean age of participants was 41.4±9.6 years. While 105 (93.8%) of the participants were married, 7 (6.2%) were either single or divorced or their spouse was deceased. In terms of employment, 75 (67%) were housewives, 20 (17.9%) were employees, 3(2.7%) were student or unemployed, and 14 (12.4%) were self-employed or alike.

Mean scores of knowledge was 24.05±7.83, perceived susceptibility 14.31±2.98, perceived seriousness 24.41±4.02, perceived benefits 30.32±3.45, perceived barriers 15.34±4.54, and perceived self-efficacy 13.50±2.93. The quality levels of the scores obtained for the measures are presented in Table 1. Pearson correlation test showed a significant correlation between CVD preventive behaviors and knowledge (P=0.002), perceived benefits (P≤0.001), perceived barriers (P≤0.001), and self-efficacy (P≤0.001). Linear regression test showed that self-efficacy had the greatest impact on preventive behaviors (P≤0.001) (Table 2).

Table 1: Mean scores and frequency distribution of knowledge and model construct

Construct	Weak Frequency (Percentage)	Moderate Frequency (Percentage)	Good Frequency (Percentage)	Mean and Standard Deviation	Range
Knowledge	20 (17.9)	48 (42.9)	44 (39.3)	24.05±7.83	0-38
Perceived susceptibility	6 (5.4)	48 (42.9)	58 (51.8)	14.31±2.98	5-20
Perceived seriousness	1 (0.9)	29 (25.9)	82 (73.2)	24.41±4.02	5-30
Perceived benefits	0 (0)	13 (11.6)	99 (88.4)	30.32±3.45	5-35
Perceived barriers	54 (48.2)	49 (43.8)	9 (8)	15.34±4.54	5-30
Preventive behavior	7 (6.3)	46 (41.1)	59 (52.7)	18.58±4.07	5-25
Self-efficacy	3 (2.7)	62 (55.4)	47 (42.0)	13.50±2.93	6-18

Table 2:. Correlation coefficient and regression model estimation of HBM, knowledge, and preventive behaviors against cardiovascular disease (behavior as the dependent variable)

Correlation			Regression				
Variable	**Correlation coefficient**	**P**	r^2	**B**	**SE**	**Beta**	**P**
Preventive behavior	--	-	0.44	-	-	-	-
Constant (a)	-	-	-	10.05	4.14	-	0.017
Perceived susceptibility	0.122	0.05	-	-0.108	0.110	-0.079	0.332
Perceived seriousness	-0.038	0.675	-	-0.165	0.079	-0.163	0.039
Perceived benefits	0.353	≤0.001	-	0.193	0.103	0.164	0.064
Perceived barriers	-0.311	≤0.001	-	-0.184	0.077	-0.205	0.019
Self-efficacy	0.576	≤0.001	-	0.650	0.108	0.469	≤0.001
Knowledge	0.122	≤0.013	-	0.095	0.044	0.182	0.034

Table 3: Mean score of knowledge and health belief model constructs in terms of educational level of the participants

Education Construct	< high school diploma (Mean±SD)	high school diploma (Mean±SD)	Associate (Mean±SD)	Bachelor or above (Mean±SD)	P-value
Knowledge	21.58±8.57	24.61±6.85	27.83±6.58	27.40±6.67	0.018
Perceived susceptibility	13.52±3.13	14.61±2.77	14.83±3.43	15.75±2.42	0.035
Perceived seriousness	24.10±4.45	24.03±3.35	23.50±3.78	26.15±4.05	0.204
Perceived benefits	29.89±3.48	30.16±3.50	30.66±3.77	31.75±3.17	0.240
Perceived barriers	15.64±4.45	16.22±4.91	12.16±3.97	13.80±3.69	0.077
Self-efficacy	13.20±2.50	12.97 ±2.70	14.66±1.63	15.05±4.71	0.042
Behavior	18.64±3.79	17.94±4.85	18.66±3.77	19.80±3.30	0.454

Table 4: Mean score of preventive behaviors against cardiovascular disease in the participants

Preventive behavior	Mean±SD	Range
Exercise 3 times a week, 30 minutes a session	2.87±1.24	1-5
Periodic blood test	3.51±1.26	1-5
Refrainment from smoking and passive smoking	4.53±1.02	1-5
Blood pressure control in the normal range (<14.90 mm Hg)	3.88±1.14	1-5
Proper diet for good heart function (low-fat, low-salt, low-calorie, fruits and vegetables, 3-5 servings per day)	3.76±1.11	1-5

There was no significant correlation between age and CVD preventive behaviors, while the association between age and knowledge was significant (P=0.028). Preventive behaviors did not differ across occupation groups. The differences between educational level and knowledge (P=0.018), perceived sensitivity (P=0.023), and self-efficacy (P=0.042) were significant for which LSD test showed a significant difference between educational degrees of high school diploma and bachelor or above (Table 3).

The mean score and standard deviation for each preventive behavior against CVD is displayed in Table 4. These data show that most of the participants considered smoking and passive smoking as risk factors for CVD

4. Discussion

The aim of this study was to investigate the extent to which preventive behaviors are utilized by individuals at risk of CVD according to HBM. Findings of the study showed that the participants were of a moderate level of knowledge which corresponds with findings from Rahimi et al's study (11) in Qom and Baghiani moghadam et al's study (3) in Yazd. Since in this study and other studies, including Baghiani moghadam et al (3), a significant relationship is found between knowledge and preventive behaviors against CVD, administration of educational training and awareness-raising programs for people at risk of CVD can be very beneficial.

The results of this study showed that there is a significant correlation between perceived benefits and adoption of preventive behaviors against CVD. This finding corresponds with the results from Babaei et al's study on preventive behaviors against brucellosis (12), the study of Tol et al (13) in terms of the association between perceived benefits and adopting preventive behaviors against CVD, the study of Alatawi et al in Saudi Arabia (14) in relation to use of prescribed drugs among diabetic patients, and the study of Sireewat et al in Thailand (15) concerning the physical activity of students. When people have a better understanding of behavioral benefits, the probability of adopting health behaviors would increase.

The study findings indicate that there is significant, reverse correlation between perceived barriers and preventive behavior. This is in line with the results of Didarloo et al's study about preventive behaviors against breast cancer (16), Mirghaforvand et al's study about the status of physical activity among university students (17), and Jinzhu Zhao's study in China in relation to condom use among prostitutes (18). Understanding the potential negative contributors to a specific health action such as costs, risks and the time-consuming nature of the action cannot be a barrier to the adoption of health behaviors. Thus, it is possible to increase adoption of health behaviors by reducing the barriers.

The results of the current study demonstrated a significant correlation between perceived self-efficacy and

utilization of preventive behaviors against CVD, and this finding is consistent with those of numerous studies, including Baghiani moghadam et al (3), Babaei et al (12) and Aljasem et al in Kuwait (19). Based on linear regression analysis, the perceived self-efficacy and perceived barriers to adopting preventive behaviors were identified as predictive factors for adoption of preventive behaviors against CVD. In a study by Black and colleagues (20), perceived barriers were predictors of preventive behaviors against CVD. In the study of Jinzhu Zhao et al (18), perceived barriers and self-efficacy were identified as predictors of adopting healthy behavior. Self-efficacy has been considered as an important prerequisite for self-management to change behavior, which can subsequently elevate health behaviors. In this study, there was no significant correlation between perceived susceptibility, perceived seriousness, and preventive behaviors. While good scores were obtained by participants in the seriousness construct, making this result unexpected, these findings were consistent with results from Mahdavifar et al's study (21) where Pap smear tests by participants was focused on.

5. Conclusion

With regards to the confirmed correlation between knowledge, perceived barriers, perceived benefits, perceived self-efficiency and adoption of preventive behaviors, it seems that the mere understanding of risks and vulnerability does not suffice for adoption of health behaviors. Thus, consideration of barriers, benefits and self-efficacy in educational programs creates a higher level of preventive behavior against CVD in people at risk.

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