



## Factors Affecting Cardiovascular Disease Risk Assessment in Middle-Aged Women in Kerman Based on the Health Belief Model in 2019

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### Abstract

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**Background:** This study aimed to investigate the factors affecting cardiovascular disease risk assessment (CVDRA) in middle-aged women in Kerman based on the health belief model, in 2019.

**Methods:** This cross-sectional study was conducted on 400 middle-aged women in Kerman. The women were selected using multi-stage random sampling. The data in this study were collected using a researcher-made questionnaire developed based on the constructs of the health belief model. Moreover, the risk assessment data were extracted from the ministry of health, Integrated Health System (SIB System). The collected data were analyzed using SPSS software (version 20).

**Results:** The mean age of the participants was 38.32±6.76 years. Most of the participants were married (87.8%) and 40% of them had a university education. Besides, 78% of middle-aged women had performed cardiovascular disease risk assessment (CVDRA). The results of the logistic regression analysis indicated the construct of perceived benefits was the main predictor of cardiovascular disease risk assessment in women (Odds ratio=1.02; P= 0.012). But, the other constructs of the health belief model were not significantly associated with cardiovascular disease risk assessment behavior in middle-aged women (P>0.05).

**Conclusion:** Given that the construct of perceived benefits is the strongest predictor of cardiovascular disease risk assessment behavior in middle-aged women, health promotion interventions need to be planned and performed for cardiovascular disease risk assessment in middle-aged women with an emphasis on its perceived benefits.

**Keywords:** Risk assessment, Cardiovascular disease, Middle-aged women, Health belief model



## Background

Cardiovascular diseases are a group of non-communicable diseases that remain the leading cause of death worldwide with an estimated 17.5 million deaths per year (1). In many countries, including Iran, non-communicable diseases follow an upward trend due to lifestyle changes (2) and the number of cardiovascular patients worldwide is increasing day by day. Thus, the number of deaths due to heart-related problems is projected to increase several times over the next few years (3). Cardiovascular disease is also one of the leading causes of premature death in the world (4). In the Eastern Mediterranean region, 54% of deaths from non-communicable diseases are related to cardiovascular disease (5). The burden of cardiovascular disease is high and rising in South Asian countries (6). The average age of onset of a heart attack in these countries is 10 years earlier than in other countries (7). In Iran, as in most West Asian countries, cardiovascular disease is the leading cause of death, accounting for 46% of deaths (8).

Risk assessment is a systematic approach for estimating the burden of disease and injury due to different risks (9). Cardiovascular disease risk assessment (CVDRA) is a goal-directed method for primary prevention, has a 10-year risk calculation approach for cardiovascular disease, and uses a risk assessment chart to place individuals in a 10-year risk classification (10, 11).

Cardiovascular disease risk assessment (CVDRA) is performed for the next ten years with the help of early diagnosis and treatment of risk factors such as hypertension, hyperlipidemia, and obesity in people of different age groups including middle-aged people. According to the Ministry of Health's Middle-aged Health Department, the middle-aged group is considered to include people aged 30 to 59 years (12). In the Framingham risk score (FRS), risk measures include age, total cholesterol, HDL cholesterol, smoking status, systolic blood pressure, fasting blood sugar, and body mass index (BMI) (13).

Collins et al. conducted a systematic review to identify and evaluate the impact of cardiovascular disease risk assessment on its early prevention. The findings of most

cardiovascular disease risk studies showed that performing cardiovascular disease risk assessment can increase risk perception (14).

According to Dabbak et al., the most frequent risk factors for cardiovascular disease (CVD) include smoking (47%), obesity (42.3%), high cholesterol (38.5%), high blood pressure (31.5%), genetics (25%), physical activity (25%), stress (24%), and old age (21%). Moreover, cardiovascular disease risk assessment falls under three categories: The low-risk category with an overall score of less than 10%, moderate risk category with an overall risk score equal to or greater than 10% to 20%, and high-risk category with risk score equal to or greater than 20% (13). Furthermore, using the Framingham global cardiovascular disease risk assessment model, Garg et al. identified a large number of patients (51.9%) with a high risk of cardiovascular disease (15). The New Zealand government made cardiovascular disease risk assessment a national priority, due to its importance, in 2011 and performed cardiovascular disease risk assessment for 90% of adults meeting the criteria set by primary health organizations (PHOs), by July 2014 (16).

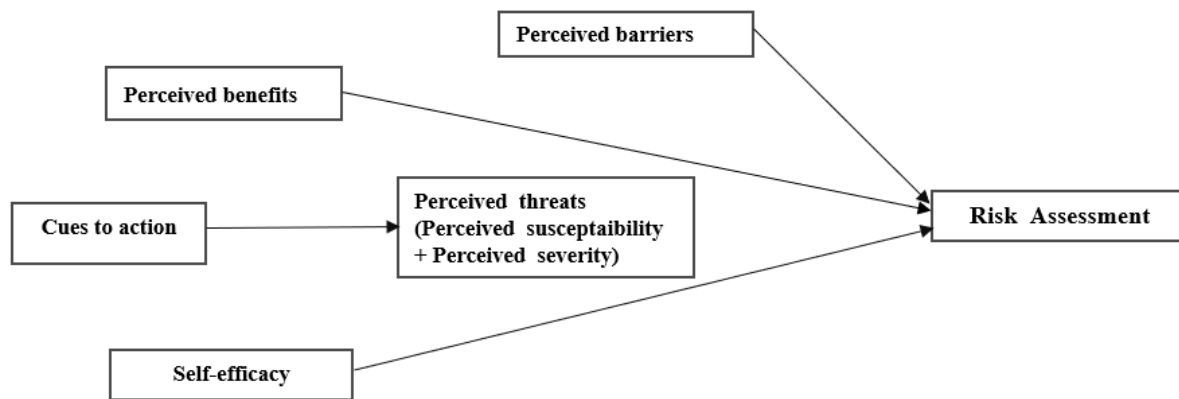
Motta Zanin et al. conducted a preliminary assessment of public perception of health risk related to COVID-19 in Italy and showed that public perception of health risk plays an important and key role in accepting programs as well as the decisions that people will make (17).

Dabbak et al. conducted a study on risk assessment and risk perception of cardiovascular disease, and found that 72% of the respondents (361 out of 501 respondents) including 169 women (46%) had taken cardiovascular disease risk assessment (13).

The health belief model is a special social cognitive model and a valuable predictor of individual health behaviors and behavior analysis, which has been used in many studies on health behaviors (18). The model includes six constructs of perceived severity (individual perception of risks and consequences), perceived susceptibility (individual assessment of the risk of disease or hazardous condition), perceived benefits (individual opinions on whether recommended behavior reduces risk or severity of impact), perceived barriers (individual assessment of problems and the

cost of accepting behaviors), cues to action (intrinsic and extrinsic motivations to do the behavior), and self-efficacy (individuals' belief in their ability to succeed in a new health

behavior). These six constructs provide a framework for conducting short-term and long-term interventions for health behavior (19). (Figure 1).



**Figure 1. The theoretical framework of the application of health belief model for cardiovascular disease risk assessment in middle-aged women in Kerman**

Following the Health Transformation Plan (HTP) which was launched in Iran in 2017, performing cardiovascular disease risk assessment is one of the new services in the field of health. However, there is no adequate information about cardiovascular disease and the factors affecting it in most parts of the country. Moreover, women as the cornerstone in the formation of behavior can play an effective role in the family and society and contribute to promoting family health and social development (20). Accordingly, the present study aimed to investigate the factors affecting cardiovascular disease risk assessment (CVDRA) in middle-aged women in Kerman based on the health belief model as one of the models explaining risk reduction behaviors in cardiovascular disease. The cardiovascular disease risk assessment data for the target group were extracted from the ministry of health, Integrated Health System (SIB System) in 2019. The findings of this study can contribute to developing effective strategies to encourage the target group to perform a timely cardiovascular disease risk assessment to prevent fatal or non-fatal heart attacks and improve the health of the community.

### Methods

This cross-sectional study was conducted in 2019 in the city of Kerman (the capital of Kerman province, the largest province of Iran)

located in southeastern Iran. Since more than 95% of people residing in Kerman have electronic records in the ministry of health, Integrated Health System (SIB System) databases, to select the participants through multi-stage sampling, first the city of Kerman was divided into 4 districts. Two health centers were then randomly selected from each district (a total of 8 health centers out of 50 health centers in Kerman).

According to the only study conducted in this field, the average perceived risk for cardiovascular disease in female students aged 19-40 was  $31.1 \pm 3.2$  (13). Considering  $\alpha = 5\%$  and using the sample size estimation formula, the sample size was estimated as 61 middle-aged women in this study. Furthermore, due to the multiplicity of the goals of the research project, 10 cases were added to the sample size for each goal. Thus, the sample size was estimated to include 240 middle-aged women. Given the multi-stage design of the study and taking the design effect as equal to 1.6, the final sample included 400 persons. To this end, a total of 400 middle-aged women were randomly selected from a list of households in health centers, i.e. 50 women were selected from each health center for the study.

The inclusion criteria were women aged 30-59 years, having electronic records, having no history of myocardial infarction, and giving oral consent to participate in the study. Before

conducting the study, the researcher provided some information about the significance and objectives of the study to the participants and ensured that their data would be kept confidential. The exclusion criteria were having a history of myocardial infarction and unwillingness to participate in the study.

To collect the data, the researcher made phone calls to randomly selected families, explained the objectives of the study, and invited only one person from each family to fill out a questionnaire and measure their height and weight by visiting the district health center, if they wanted. Besides, the data for the risk assessment behavior for each of the women in the sample were extracted through the Integrated Health System (SIB) and from their electronic health records.

Participation in the study was voluntary. The researchers provided the necessary information and ensured the participants that their data would be kept confidential. They also provided additional information for further clarification in response to participants' questions, that helped the invited people to decide about participating in this study. If a person was not willing to participate in the study, another person was randomly selected and replaced.

The data were collected using a researcher-made questionnaire. The items in the questionnaire were developed based on a review of similar studies in the literature. The content validity of the questionnaire was assessed using both qualitative and quantitative methods. In the qualitative assessment, the questionnaire along with a description of the objectives of the study and operational definitions of the content of the item was submitted to 10 subject-matter experts and they were asked to assess each item based on a three-point Likert scale (necessary, useful but necessary, and not necessary). The experts' feedback in terms of wording, word choice, the significance of items, and placement of items was applied and the questionnaire was revised accordingly. Moreover, to check the face validity of the questionnaire, it was administered to 10 women with different socioeconomic characteristics and they were

asked to fill out the questionnaire and report difficult words or any ambiguity in the items.

Furthermore, the content validity of the questionnaire was quantitatively assessed using the content validity ratio (CVR) and content validity index (CVI). The CVR scale was estimated using the formula  $CVR = [ne - (N/2)] / (N/2)$ , where  $ne$  represents the number of experts who rated an item as necessary and  $N$  is the total number of experts. The content validity index (CVI) was also estimated by calculating the average content validity ratio. Moreover, following Waltz and Bausell's (1981) method, to evaluate content validity, the questionnaire items were assessed in terms of clarity, simplicity, and relevance (21). In the present study, CVI and CVR were reported to be greater than 0.80 and 0.60, respectively. The reliability of the questionnaire was assessed by calculating its internal consistency and stability. Besides, the intraclass correlation coefficient (ICC) and Cronbach's alpha coefficient were assessed to check the internal consistency of the questionnaire (22). The reliability of the questionnaire was estimated using the test-retest method by administering it to 10 middle-aged women at 2-week intervals. Besides, the ICC and Cronbach's alpha values were calculated for the direct assessment of the constructs. The mean ICC was 0.79 and the Cronbach's alpha value was 0.89, confirming the reliability of the questionnaire. It should be noted that the people attending the pilot study to evaluate the validity and reliability of the instrument were excluded from the main study. The revised questionnaire contained two sections: The first section consisted of 14 items that measured the participants' demographic information including age, nationality, occupation, marital status, income, education, insurance status, medications taken for cardiovascular disease, history of any diseases, and medical conditions including high blood pressure, diabetes, hyperlipidemia, cardiovascular disease, heart attack, heart surgery, balloon angioplasty, angiography, smoking and a family history of cardiovascular disease, and a history of hospitalization due to cardiovascular disease. The second section of the questionnaire assessed 7 subscales including knowledge assessment and the constructs of the health belief model. The first subscale consisted of 11 items to assess the participants' awareness using questions such

as: "One of the risk factors for cardiovascular disease is high blood pressure". The total score on this subscale ranged from 0 to 11. The second subscale contained 7 items with a score range of 7 to 35 to measure perceived susceptibility using questions such as: "How likely are you to develop cardiovascular disease in the future?" The third subscale consisted of 8 items with a score range of 8 to 40 to assess perceived severity including questions such as: "How likely is for cardiovascular disease to lead to death?" The fourth subscale contained 4 items with a score range of 4 to 20 to measure perceived benefits using questions such as: "To what extent do you think cardiovascular disease risk assessment will prevent a heart attack in the future?" The fifth subscale contained 7 items with a score range of 7 to 35 to measure perceived barriers using questions such as: "How much does the cost affect cardiovascular disease risk assessment?" The sixth subscale measured perceived self-efficacy using 4 items (e.g. How likely are you to go to a health center for cardiovascular disease risk assessment?) with a score range of 4 to 20. Finally, the seventh subscale assessed cues to action using 11 items (e.g. Does the fear of developing complications of heart disease lead to follow-up cardiovascular disease risk assessment?). The total score on this subscale ranged from 0 to 11.

The items on the awareness subscale were scored either 1 (for each Yes response) or 0 (for each response with No and I do not know). Furthermore, the items measuring the constructs of the health belief model were scored on a five-point Likert scale (1= strongly disagree, 2=disagree, 3= undecided, 4=agree, and 5= strongly agree) and the items assessing the cues for action were scored either 1 (Yes) or 0 (No). The second section of the questionnaire contained 52 items (66 items in total). The questionnaire items for illiterate participants were completed through interviews. To do so, the researcher read each item for them and then marked their responses.

This study was conducted with the approval of the Committee of Ethics in Research of Kerman University of Medical Sciences with code ID IR.KMU.REC.1399.167 and the confirmation of the Vice-Chancellor for Health and Kerman Health Center.

Before administering the questionnaires to the participants, the objectives of the study were explained and informed consent was obtained from the participants without any coercion, threats, temptations, and deceptions to persuade them to participate in the study. To keep the participants' data confidential, coded and anonymous questionnaires were used.

Participation in the study was voluntary. The researcher provided the necessary information and ensured the participants that their data would be kept confidential. The researcher also provided additional information for further clarification and helped the invited people to decide on participating in this study. If a person was not willing to attend the study for reasons such as not having enough time, workload, the spouse disagreement, a long distance to the health center, etc., another person would be randomly selected and replaced.

The data were summarized and described with SPSS-20 software using descriptive statistics such as mean, standard deviation, frequency, and percentage. First, the data distribution was checked for normality by the Kolmogorov-Smirnov test. Besides, to compare the scores of different constructs of the health belief model between the group that performed risk assessment and the group that did not perform risk assessment, the t-test was used for the variables with normal distribution, and the Mann-Whitney U test was used for data without normal distribution. The chi-square test was also run to determine the relation between the demographic variables and cardiovascular disease risk assessment. Finally, multivariate logistic regression was performed to investigate the relation between the constructs of the health belief model and cardiovascular disease risk assessment. For this purpose, variables that had a significance level of less than 0.2 ( $p < 0.2$ ) in the bivariate analysis were entered into the multivariate model and the model was simplified by the backward method. The significance level in this study was considered to be smaller than 0.05 ( $p < 0.05$ ).

## Results

A total of 312 women (78%) of 400 women participating in this study had performed a cardiovascular disease risk assessment and 88 women (22%) had not taken a risk assessment.



Most of the participants in the present study (95.8%) and had a university degree (40%) were married (87.8%) with Iranian nationality (Table 1).

**Table 1. The participants' demographic data**

Variable	Categories	Frequency (%)
Nationality	Iranian	383 (95.8)
	Afghan	17 (4.2)
Education	Illiterate	15 (3.8)
	Basic literacy/primary school	29 (7.2)
	Middle school	54 (13.5)
	High school	20 (5)
	Diploma	122 (30.5)
	University education	160 (40)
Occupation	Employed	90 (22.5)
	Unemployed	304 (76)
	Retired	6 (1.5)
Marital status	Single	16 (4)
	Married	351 (87.8)
	Divorced	17 (4.2)
	Widow	16 (4)
Income (Toman per month)	< 500000	37 (9.2)
	500000-1000000	66 (16.5)
	1000000-2000000	163 (40.8)
	> 2000000	134 (33.5)
Insurance coverage	Yes	365 (91.3)
	No	35 (8.7)
Type of insurance	Social security	267 (66.8)
	Treatment service	55 (13.7)
	Rural health insurance	4 (1)
	Other	39 (9.8)
Cardiovascular medication	Yes	26 (6.5)
	No	374 (93.5)
History of diseases/medical conditions	Diabetes	14 (3.5)
	Hypertension	40 (10)
	Hyperlipidemia	19 (4.8)
	Smoking	1 (0.3)
	Cardiovascular disease	9 (2.3)
	Myocardial infarction	1 (0.3)
	Cardiac surgery	0
Balloon angioplasty	0	
Family history of cardiovascular disease	Yes	142 (35.5)
	No	258 (64.5)
History of hospitalization due to cardiovascular disease	Yes	20 (5)
	No	380 (95)
BMI	26.76±4.51	
Age	38.32±6.76	

The mean age of all participants was 38.32±6.76 years (Table 1). The mean age for the participants who took the cardiovascular disease risk assessment was 38.40±6.80 years and that of the participants who did not take risk assessment was 38.01±6.67 years (Table 2). Besides, 35 participants (87.5%) with a history of hypertension had performed a cardiovascular disease risk assessment. Moreover, 16 persons (84.2%) with a history

of hyperlipidemia, 12 persons (85.7%) with a history of diabetes, 6 persons (66.7%) with a history of cardiovascular disease, 4 persons (100%) with a history of angiography, and 1 person (100%) with a history of heart attack had performed cardiovascular disease risk assessment (Table 2).

The results of the chi-square test indicated that the demographic variables (i.e. age, nationality, occupation, marital status, income,

education, insurance status), cardiovascular medication, a history of any of the diseases such as high blood pressure, diabetes, hyperlipidemia, cardiovascular disease, myocardial infarction, heart surgery, balloon angioplasty,

angiography, smoking, a family history of heart disease, and hospitalization due to cardiovascular disease had no significant relation with cardiovascular disease risk assessment behaviors ( $P>0.05$ ) (Table 2).

**Table 2. The relation between the demographic characteristics and cardiovascular disease risk assessment**

Variable	Categories	CVD risk assessment performed?		P-value
		Yes	No	
Nationality	Iranian	299 (78.1)	84 (21.9)	0.77
	Afghan	13 (76.5)	4 (23.5)	
Education	Illiterate	10 (66.7)	5 (33.3)	0.66
	Basic literacy/primary school	22 (75.9)	7 (24.1)	
	Middle school	46 (85.2)	8 (14.8)	
	High school	15 (75)	5 (25)	
	Diploma	90 (73.8)	32 (26.2)	
	University education	129 (80.6)	31 (19.4)	
Occupation	Employed	71 (78.9)	19 (21.1)	1.00
	Unemployed	236 (77.6)	68 (22.4)	
	Retired	5 (83.3)	1 (16.7)	
Marital status	Single	14 (87.5)	2 (12.5)	0.70
	Married	273 (77.8)	78 (22.2)	
	Divorced	12 (70.6)	5 (29.4)	
	Widow	13 (81.3)	3 (18.8)	
Income (Tomans)	< 500000	26 (70.3)	11 (29.7)	0.10
	500000-1000000	51 (77.3)	15 (22.7)	
	1000000-2000000	124 (76.1)	39 (23.9)	
	> 2000000	111 (82.8)	23 (17.2)	
Insurance coverage	Yes	287 (78.6)	78 (21.4)	0.39
	No	25 (71.4)	10 (28.6)	
Type of insurance	Social security	205 (76.8)	62 (23.2)	0.51
	Treatment service	49 (89.1)	6 (10.9)	
	Rural health insurance	4 (100)	0	
	Other	29 (74.4)	10 (25.6)	
Cardiovascular medication	Yes	17 (65.4)	9 (34.6)	0.13
	No	295 (78.9)	79 (21.1)	
History of diseases/medical conditions	Diabetes	12 (85.7)	2 (14.3)	0.74
	Hypertension	35 (87.5)	5 (12.5)	0.15
	Hyperlipidemia	16 (84.2)	3 (15.8)	0.77
	Smoking	0	1 (100)	0.22
	Cardiovascular disease	6 (66.7)	3 (33.3)	0.41
	Myocardial infarction	1 (100)	0	1
	Cardiac surgery	0	0	-
	Balloon angioplasty	0	0	-
	Angiography	4 (100)	0	0.58
Family history of cardiovascular disease	Yes	109 (76.8)	33 (23.2)	0.70
	No	203 (78.7)	55 (21.3)	
History of hospitalization due to cardiovascular disease	Yes	14 (70)	6 (30)	0.40
	No	298 (78.4)	82 (21.6)	
BMI		26.81±4.55	26.60±4.38	0.69
Age		38.40±6.80	38.01±6.67	0.62

To examine factors affecting cardiovascular disease risk assessment based on the health belief model, cardiovascular disease risk assessment was considered as a dependent variable and other variables such as awareness, perceived susceptibility, perceived severity,

perceived barriers, perceived benefits, perceived self-efficacy, and cues to action were taken as independent variables. The results of the t-test for the normally distributed variables (perceived susceptibility, perceived severity, and perceived barriers) and the results

of the Mann-Whitney U test for the data without normal distribution (awareness, perceived benefits, and self-efficacy) indicated

that perceived benefits were significantly associated with cardiovascular disease risk assessment (P = 0.01) (Table 3).

**Table 3. The relation of the health belief model constructs with the cardiovascular disease risk assessment**

Variable	CVD risk assessment performed?				Score range	P-value
	Yes		No			
	Mean	SD	Mean	SD		
Knowledge	72.5	20.8	70.4	21.3	0-100	0.39*
Perceived susceptibility	39.5	17.8	39.5	19.4	0-93	0.98**
Perceived severity	42.3	21.4	40.5	21.1	0-100	0.48**
Perceived barriers	57.8	21.3	54.9	24.1	0-100	0.28**
Perceived benefits	67.6	25.6	59.6	26.8	0-100	0.01*
Perceived self-efficacy	54.9	22.7	50.3	23.0	0-100	0.06*

\*: Mann-Whitney U test, \*\*: t-test.

The mean score of awareness for participants who had taken cardiovascular disease risk assessment was more than the mean of other health belief model constructs. Besides, the mean score of awareness was greater for the participants who had taken cardiovascular disease risk assessment compared to those who had not taken it (Table 3).

In this study, The mean score of awareness was also higher than that of other independent

variables, and this probably caused a higher frequency of the participants doing cardiovascular disease risk assessment.

The participants in this study reported that they obtained information about cardiovascular disease risk assessment mostly through family, relatives, and friends, and interaction with people suffering from complications of heart disease (heart failure, heart attack, cardiac arrest). (Table 4).

**Table 4. The sources of information about performing cardiovascular disease risk assessment**

Information sources	(%)
Family, friends, & relatives	81.8
Interacting With CVD Patients	81.3
Physicians and medical staff	81.0
Patients With CVD	80.8
Internet	79.8
CVD risk assessment	79.5
People died due to CVD	79.2
Newspapers, books, & ...	78.9
Media (Radio & TV)	78.2
Hospitals and Healthcare Centers	77.6

The results of multivariate logistic regression analysis indicated that after controlling for other variables, perceived benefits served as an independent predictor of cardiovascular disease risk assessment, so that for each unit increase in the score of perceived benefits, the

chance of performing the risk assessment increases by 1%, and this increase was statistically significant. However, other constructs were not significantly associated with cardiovascular disease risk assessment (Table 5).

**Table 5. The relation of independent variables with the cardiovascular disease risk assessment**

Variable	Odds ratio	P-value	Adjusted odds ratio in the final model (Enter method)	P-value
Knowledge	1.001	0.87	-	
Perceived susceptibility	0.99	0.51	-	
Perceived severity	1.00	0.98	-	
Perceived benefits	1.01	0.05	1.02	0.012
Perceived barriers	0.99	0.75	-	

\*: Mann-Whitney U test, \*\*: t-test



## Discussion

The results of the present study showed that about 78% of middle-aged women aged 30 to 59 years had performed cardiovascular disease risk assessment based on the data from the integrated health system (SIB). In New Zealand, 90% of adults were screened for cardiovascular disease at the national screening program from 2011 to 2014 (16). Furthermore, a study by Dabbak et al. on risk assessment and perception of cardiovascular disease on a population of students in Palestine showed that about 46% of women had done a cardiovascular risk assessment (13).

Following the Health Transformation Plan (HTP) which was launched in Iran in 2017, performing cardiovascular disease risk assessment is one of the new services in the field of health. The present study indicated that the frequency of cardiovascular disease risk assessment was favorable among women in Kerman. This could be attributed to extensive information provided by Kerman University of Medical Sciences and the active call by health centers to encourage women to perform a cardiovascular disease risk assessment.

The data in this study showed no significant relation between the participants' demographic characteristics with cardiovascular disease risk assessment. However, some studies (13, 23) have reported that demographic variables such as age, sex, education, history of diabetes, and smoking were correlated with cardiovascular disease risk assessment. On the other hand, another study found no relation between age as a demographic variable and preventive behaviors of cardiovascular disease (24). These conflicting findings could be attributed to differences in the samples used in these studies.

The findings of the present study indicated the mean score of the awareness for the participants who had taken cardiovascular disease risk assessment was more than the mean of other health belief model constructs. Additionally, the mean score of the awareness was greater for the participants who had taken cardiovascular disease risk assessment

compared to those who had not taken it. Similarly, most studies have highlighted the association of people's awareness and knowledge with preventive behaviors of cardiovascular disease (24-26). In contrast, Tran et al. found despite college students' high level of knowledge, they did not have a good understanding of the risk of cardiovascular disease (27).

A comparison of the constructs of the health belief model in the present study suggested the perceived benefits were significantly associated with cardiovascular disease risk assessment and this construct was the strongest predictor of middle-aged women's referral to receive risk assessment services. Overall, it seems that in most studies, perceived benefits have been the most important predictor of health and preventive behaviors (24, 28). However, Moshki et al. reported the construct of perceived barriers and Baghiani Moghadam et al. reported the construct of perceived self-efficacy as the strongest predictors of preventive behaviors of cardiovascular disease (2, 26). Accordingly, it can be argued that in different societies, different constructs of the health belief model may predict preventive behaviors. Since the findings of the present study indicated that perceived benefits were the strongest predictor of cardiovascular disease risk assessment, health service providers in healthcare centers can highlight the benefits of cardiovascular disease risk assessment and encourage middle-aged women to perform this type of risk assessment. Besides, officials of medical and healthcare centers are advised to overcome barriers to risk assessment and facilitate cardiovascular disease risk assessment for middle-aged women.

One of the limitations of the present study was that it used cross-sectional data. Thus, the findings of this study have limited generalizability to all women in the Iranian community.

## Conclusion

Given that perceived benefits as a construct of the health belief model is the strongest predictor of cardiovascular disease risk assessment behavior in middle-aged women, health education and health promotion

interventions can be developed and organized to increase the frequency of cardiovascular disease risk assessment in middle-aged women in Kerman with an emphasis on this construct.

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### Conflict of interest

The authors reported no conflict of interest.

### References

- World Health Organization. Cardiovascular diseases (CVDs); 2016: Available from: [https://www.who.int/news-room/fact-sheets/detail/cardiovascular-diseases-\(cvds\)](https://www.who.int/news-room/fact-sheets/detail/cardiovascular-diseases-(cvds)).
- Moshki M, Mojadam M, Dusti Irani A. Associated factors for preventive behaviors of cardiovascular diseases in employees of Khuzestan province health center utilizing the health belief model. *j.health*. 2015; 6(4):367-77.
- Khazaei H, Komasi S, Zakiei A, Rezaei M, Hatamin P, Jashnpor M, et al. Design and standardization of tools for assessing the perceived heart risk and heart health literacy in Iran. *Ann Card Anaesth*. 2018; 21(1):46-52. doi: 10.4103/aca.ACA\_136\_17.
- World Health Organization. Cardiovascular diseases (CVDs); 2017 Available from: [http://www.who.int/news-room/fact-sheets/detail/cardiovascular-diseases-\(cvds\)](http://www.who.int/news-room/fact-sheets/detail/cardiovascular-diseases-(cvds)).
- World Health Organization. Regional office for the eastern mediterranean: Cardiovascular-diseases; 2020. Available from: <http://www.emro.who.int/healthtopics/cardiovascular-diseases/index.html>. Cardiovascular diseases.
- Gaziano TA, Bitton A, Anand S, Abrahams Gessel S, Murphy A. Growing epidemic of coronary heart disease in low- and middle-income countries. *Curr Probl Cardiol*. 2010; 35(2):72-115. doi: 10.1016/j.cpcardiol.2009.10.002.
- Siegel KR, Patel SA, Ali MK. Non-communicable diseases in south Asia: Contemporary perspectives. *Br Med Bull*. 2014; 111(1):31-44. doi: 10.1093/bmb/ldu018.
- Fahimfar N, Khalili D, Sepanlou SG, Malekzadeh R, Azizi F, Mansournia MA, et al. Cardiovascular mortality in a Western Asian country: Results from the Iran Cohort Consortium. *BMJ Open*. 2018; 8(7):e020303. doi: 10.1136/bmjopen-2017-020303.
- World Health Organization. World Health Report:2002; 2012. Available from: <https://www.who.int/publications/i/item/9241562072>
- World Health Organization. Package of Essential Noncommunicable (PEN) Disease Interventions for Primary Health Care in Low-Resource Settings. Switzerland: World Health Organization; 2010.
- Koosha A NM, Mahdavi Hazaveh A, Moghisi A, Ghanbari Motlagh A, Yarahmadi S, et al. Package of essential non-communicable (PEN) disease interventions for primary health care in Iran (Irapen). implementation tools for general practitioners. Tehran: Mojassameh; 2017. [In Persian]
- Shiani M, Jalili Z, Shojaeizadeh D. The effect of education based on the precede-proceed model on the mental health of middle-aged women referred to municipal health houses of Tehran. *Iran J Health Educ Health Promot*. 2020; 8(4):309-23. [In Persian]. doi:10.29252/ijhehp.8.4.255.
- Dabbak H, Arafa M. Risk assessment and risk perception of coronary heart disease in Gaza Strip, palestine. *Health*. 2014; 6(21):2883-93. doi: 10.4236/health.2014.621327.
- Collins DR, Tompson AC, Onakpoya IJ, Roberts N, Ward AM, Heneghan CJ. Global cardiovascular disease risk assessment in the primary prevention of cardiovascular disease in adults: A systematic review of systematic reviews. *BMJ Open*. 2017; 7(3):e013650. doi: 10.1136/bmjopen-2016-013650.
- Garg N, Muduli SK, Kapoor A, Tewari S, Kumar S, Khanna R, et al. Comparison of different cardiovascular risk score calculators for cardiovascular risk prediction and guideline-recommended statin uses. *Indian Heart J*. 2017; 69(4):458-63. doi: 10.1016/j.ihj.2017.01.015.
- Manatu Hauora Ministry of Health. Heart and diabetes checks; 2014. Available from: <https://www.enigma.co.nz/predict-medical/predict-cvd-diabetes-management/more-heart-and-diabetes-checks/>
- Motta Zanin G, Gentile E, Parisi A, Spasiano D. A preliminary evaluation of the public risk perception related to the covid-19 health emergency in Italy. *Int J Environ Res Public Health*. 2020; 17(9):3024. doi: 10.3390/ijerph17093024.
- Khalilipour Darestani M, Komeili A, Jalili Z. The effect of educational intervention based on the health belief model on improvement of preventive behaviors towards Premenstrual Syndrome (PMS) among girls of preuniversity in Tehran. *Iran J Health Educ Health Promot*. 2017; 5(3):251-59. [In Persian]. doi: 10.30699/acadpub.ijhehp.5.3.251.
- Laranjo L. Social media and health behavior change. *Participatory Health Through Social Media*. 2016; 83-111. doi: 10.1016/B978-0-12-809269-9.00006-2.
- Heidari F, Mohammad Khan Kermanshahi S, Vanaki Z, Kazem Nejad A. A survey of the effect of a planned program of health promotion on stress

- management in middle-aged women. *Iran J Nurs Midwifery Res.* 2011; 6(22):16-23. [In Persian]
21. Squires A, Bruyneel L, Aiken LH, Van den Heede K, Brzostek T, Busse R, et al. Cross-cultural evaluation of the relevance of the HCAHPS survey in five European countries. *Int J Qual Health Care.* 2012; 24(5):470-5. doi: 10.1093/intqhc/mzs040.
  22. Arabi S, Rezaee M, Sahaf R, Rassafiani M, Hosseini H, Mirzakhany N, et al. Validity and reliability of the Persian version of measurement of the quality of life of people with disabilities. *Pejouhandeh.* 2014; 19(2):91-8.
  23. Wells S, Rafter N, Kenealy T, Herd G, Eggleton K, Lightfoot R, et al. The impact of a point-of-care testing device on cardiovascular disease risk assessment completion in New Zealand primary-care practice: A cluster randomized controlled trial and qualitative investigation. *PLoS One.* 2017; 12(4): e0174504. doi: 10.1371/journal.pone.0174504.
  24. Sharifzadeh GR, Moodi M, Mazhari Majd H, Musaei I. Application of health belief model in predicting preventive behaviors against cardiovascular disease in individuals at risk. *J Health Sci Technol.* 2017; 1(2):64-9. [In Persian]
  25. Shojaei S, Rahimi T, Mousavi Miyandashti Z, Jafary Nodoushan Z, Farahabadi M. Predictors of preventive behaviors of cardiovascular diseases: Based on health belief model in women referred to health treatment centers in Qom City, 2014, Iran. *Qom Univ Med Sci J.* 2016; 9(11):51-9. [In Persian]
  26. Baghiani Moghadam MH, Mirzaei M, Rahimdel T. Role of health beliefs in preventive behaviors of individuals at risk of cardiovascular diseases. *Health System Research.* 2012; 8(7):1151-8. [In Persian]
  27. Tran DT, Zimmerman LM, Kupzyk KA, Shurmur SW, Pullen CH, Yates BC. Cardiovascular risk factors among college students: Knowledge, perception, and risk assessment. *J Am Coll Health.* 2017; 65(3):158-67. doi: 10.1080/07448481.2016.1266638.
  28. Tol A, Esmaili Shahmirzadi S, Shojaeizadeh D, Eshraghian MR, Mohebbi B. Determination of perceived barriers and benefits of adopting health-promoting behaviors in cardiovascular diseases prevention: Application of preventative behavior model. *J Payavard Salamat.* 2012; 6(3):204-14. [In Persian]