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Research Article

Health Beliefs and Cardiovascular Risk among Saudi Women: A Cross Sectional Study

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Abstract

Background: Several studies confirm the high prevalence of Cardiovascular Disease (CVD) risk among women in Saudi Arabia. Few have focused on the association between cardiovascular risk and health beliefs. The current study examined health beliefs of Saudi women related to CVD. **Methods:** A cross-sectional study was conducted on women attending the primary care clinics in a university hospital in Riyadh, Saudi Arabia. Health belief and sociodemographic data were collected, and Framingham Risk Scores was calculated. **Results:** A total of 503 Saudi females participated, the majority of whom significantly underestimated their actual risk of CVD as measured by their individual FRS. 43.4% had a high CVD risk but a low perception of susceptibility. 63.5% understood the severity of CVD, while 75.2% had a low to moderate perception of the benefits of healthy behaviors. 86.7% did not know how to perform CVD risk-reducing exercises, and 65.9% stated that they did not have access to exercise facilities. There was a significant relationship between the Framingham Risk Scores across income, marital status, education, and occupational status categories ($p \leq 0.001$). Significant differences were found when comparing perceived benefits of healthy behaviors with marital status; perceived severity and benefits with the level of education; perceived severity and benefits with occupation; and perceived severity and benefits with financial income. **Conclusions:** Majority of Saudi women did not feel susceptible to CVD, although multiple risk factors were found to be present. Successful public health policy may demonstrate a reduction in the population burden of CVDs among Saudi women is warranted.

Keywords: CVD risks; Health belief; Framingham risk assessment; Saudi Arabia; Women

Abbreviations: CVD: Cardiovascular Disease; FRS: Framingham Risk Score; PURE: Prospective Urban Rural Epidemiology; HBM: Health Belief Model; HBCVD: Health Belief-Cardiovascular disease; KSUMC: King Saudi University Medical City; FV: Fruit and Vegetable; PA: Physical Activity; WHO: World Health Organization; WHR: Hip and Waist Ratio; BMI: Body Mass Index; HbA1c: Hemoglobin A1c; HTN: Hypertension; DM: Diabetes Mellitus; PCC: Primary Care Centers

Introduction

Cardiovascular disease (CVD) is the leading cause of mortality worldwide, contributing to 31% of all deaths [1]. It is estimated that CVD accounts for >45% of all deaths in Saudi Arabia [2].

Lifestyles have changed dramatically in Saudi Arabia in response to rapid urbanization, with an increase in unhealthy diets and adoption of sedentary lifestyles [3]. The high prevalence of CVD risk factors among the Saudi population began to emerge before the turn of the century. Recently, the Prospective Urban Rural Epidemiology (PURE) study, performed from 2012 through 2015 and including 2,047 Saudi participants, reported a high prevalence of low physical activity (69.4%), obesity (49.6%), unhealthy diets (34.4%), dyslipidemia (32.1%), Hypertension (HTN) (30.3%), and Diabetes (DM) (25.1%) [3-5].

Reducing CVD risk factors is a well-established strategy that can reduce the risk of CVD [6]. Several tools are available to help identify high-risk patients. The Framingham Risk Score (FRS) is one of the most common tools used internationally [7], including in Saudi Arabia [8-10].

The Health Belief Model (HBM) has been used since its development in the 1950s to measure the impact of various psychosocial constructs upon a person's willingness to engage in and maintain health-related behaviours [11,12]. The HBM is a valuable tool for providing a theoretical framework for developing interventions to change behaviors [13]. It has been used in Saudi Arabia to assess beliefs and behaviours regarding cervical cancer [14], colorectal cancer [15], and obesity and exercise among women [16]. A validated health beliefs tool comprising 4 subscales related to CVD (HBCVD) was designed by Tovar et al. in 2010.[17] A modified HBCVD instrument was used to examine beliefs in female Saudi teachers; however, the final version used was not provided. Only 13.3% of 400 participating teachers believed they were susceptible to CVD [18].

The current study expanded use of the HBCVD model to analyse health beliefs regarding CVD of Saudi women attending general primary care clinics. The sample included women from the general population, university faculty and hospital staff, and their families. The association between the four health belief subscales and the presence of risk factors and status of sociodemographic variables was examined.

Materials and Methods

Study design and sample recruitment

A cross-sectional study was conducted among women (≥18 years) attending King Saudi University Medical City (KSUMC) in Riyadh, Saudi Arabia. Only women attending general Primary Care Clinics (PCCs) were included. The sample was collected from January to June 2016. Women with preexisting CVD or pregnant women were excluded. Using the Fluid Surveys© an online software to calculate the sample size, using a 95% Confidence Interval (CI) with an error margin of 0.05, the sample needed was 384 [19].

In case of missing data missing, we increase our target-included women to 600. Also, the participant was insured that the interviews will not exceed 10-20 min to assure them it is not time-consuming. All women who fulfil the inclusion criteria included in the study. The questionnaire used sequential steps, starting with a survey, followed by physical measurements, biochemical measurements, and a CVD score calculation using FRS.

Data collection instrument and process

A survey was conducted utilizing face-to-face interviews using a structured questionnaire, and individual medical records were reviewed. The questionnaire consisted of 40 questions divided into 4 parts: socio-demographic profile; healthy behavior; history of CVDs; and socio-cultural factors. The socio-demographic information included age, level of education, marital status, occupation, income, and behavioral habits, including tobacco use, Fruit and Vegetable (FV) consumption and Physical Activity (PA), using the World Health Organization (WHO) STEPS instrument version 3.1 to the behavioural risk factors including healthy diet and physical activity [20].

Data extracted from each participant's medical record included cardiovascular risk factor details and prescribed medication for blood pressure or cholesterol. A recent lipid profile was obtained and medical parameters such as blood pressure, height, weight, Hip and Waist ratio (WHR), Body Mass Index (BMI) and HbA1c were gathered. The participants' 10-year estimated risk was calculated based on the assumptions underlying the FRS [6].

Pictures were provided in the questionnaire, specifically in the FV question, to enrich the quality of the interviews by prompting the memory and reducing misunderstandings [21].

The Health Belief Related to CVD (HBCVD) Scale is a 25-item self-reported scale [17]. Each item includes five response options (strongly agree, agree, neutral, disagree, and strongly disagree) to measure the perceptions of susceptibility, severity, benefits and barriers. Item-response-weighted scores indicate the following: 0=neutral, 1=strongly disagree, 2=disagree, 3=agree and 4=strongly agree; higher scores indicate a higher level of perception.

Cronbach alpha scores for the health belief subscales were calculated to find the internal consistency of the instrument. Overall Cronbach alpha for the entire 25-item health belief questionnaire was 0.85. A score of more than 0.7 indicates that this instrument is reliable. A cross-cultural translation and adaptation process was used to translate the HBCVD questionnaire into Arabic and underwent back-translation to ensure the accuracy of the translation [22].

Inclusion/exclusion criteria and ethical considerations

The inclusion criteria were the following: (1) Saudi women, (2) aged 16 and above (3) attending the primary health care clinics (4) with regularly updated medical records (5) who expressed interest in participating in the study. Women with pre-existing CVD were excluded.

Ethical approval was obtained from the Institutional Review Board (IRB) of the university hospital. The participants signed an informed consent form. All information taken from the subjects was coded and kept confidential.

Data management and statistical analysis

Descriptive and inferential statistical data analyses were conducted using SPSS, version 25. Missing data were transcribed or excluded from the analysis. The study results were checked for normality of distribution and were found to be a symmetrical bell-shaped curve. Skewness was within the range of ±2 and kurtosis within the range of ±7. The Chi-Square test was used for categorical data, ANOVA and standard multiple regression were used for statistical analysis.

The data were sub-divided according to their Framingham scores into three categories: low-risk (<10%), intermediate (10-20%) and high-risk (>20%). Health beliefs about CVD were measured by 25 health belief questions divided into four subscales: perceived susceptibility (5 items), perceived severity (5 items), perceived benefits (6 items), and perceived barriers (9 items). The responses to the questions in the HBM subscales were combined into three groupings: Disagree (a combination of Strongly Disagree and Disagree), Neutral, and Agree (a combination of Agree and Strongly Agree) to determine the overall intensity of the pattern of responses. Perceived susceptibility measured participants' beliefs about their susceptibility to CVD; the higher the score, the greater the tendency to see themselves as susceptible to CVD. Perceived severity measured participants' beliefs about the seriousness of developing CVD; the higher the score, the greater the tendency to perceive CVD as serious. The perceived benefit scale measured participants' beliefs about the benefits of healthy behaviors to prevent CVD; the higher the score, the greater the tendency to perceive benefits in preventing CVD. Perceived barriers measured participants' beliefs about the barriers to health-promoting behaviors preventing CVD, the higher the score, the higher the barriers.

Results

Of the 503 participants, with a response rate of 83%, 480 were eligible to have their FRS calculated due to the availability of the information in their records. 62% of them were above the age of 45. Almost 74% were married, 66% had not reached high school, and approximately 75% were housewives. Mean systolic blood pressure of 130 mmHg (SD ±17) and mean diastolic blood pressure of 75 mmHg (SD ± 9.6). BMI and WHR results indicated that 64% were obese, with a mean BMI and WHR of 33 kg/m^2 SD± 6.7 and 0.948 SD± 0.063, respectively. More than 60% were physically inactive, and only 13.1% declared that they exercised more than three times per week. Only 7.6% engaged in daily exercise; 23.7% exercised one to two times a week; 5.6% three to four times; and 3.6 % once a month. However, 61% of the participants strongly disagreed that being able to drive on their own would motivate them to attend a gym or health club. All the participants reported that they had never smoked, while 0.6% were current smokers or ex-smokers. 97% of the participants reported eating 1-3 servings of FV daily. Just over 1% reported having 3-5 or more servings of FV per day. Half the participants reported that they watched TV for one hour or less, while the others watched TV for an average of three to five hours or more per day. The majority disclosed that there was no family history of DM (33.9%), HTN (41%) or hyperlipidemia (74.6%). 53% of the study participants had either intermediate or high FRS (Table 1).

Demographics										
Variables	**n**	**%**		**Variables**	**n**	**%**		**Variables**	**n**	**%**
Age				**Reported Chronic Disease**				**BMI**		
15-34	54	10.7		Hypertension	191	37.9		Underweight/ Normal	38	7.5
35-54	214	42.4		DM	275	54.6		Overweight	138	27.4
55 +	235	46.5						Obese	308	61.1
				150 min/wk of moderate PA or at least 75 min/wk						
Marital Status				YES	185	36.7		**Waist-to-hip ratio (WHR)**		
Married	371	73.5		NO	318	63.1		< 0.8	7	1.4
Never married	32	6.3						> 0.8	497	98.6
Separated/Divorced/ Widowed	100	19.9		**Smoking Status**						
				Never smoked	497	98.6		**Family history of DM**		
Educational Level				Ex-smoker	1	0.2		Yes	170	33.7
Elementary or less	251	49.8		Current smoker	2	0.4		No	332	65.9
Intermediate/ High School	129	25.6								
Diploma/College Degree or Postgraduate	123	24.4		**Daily servings of FV**				**Family history of HTN**		
				None	5	1		Yes	269	58.8
Employment Condition				1-3 servings	489	97		No	206	40.9
Government, Semi Government, Private	88	17.4		+3-5 servings	5	1				
Student, Retired, Not Working	59	11.7		more than 5 servings	2	0.4		**Framingham risk score classification**		

Housewife	356	70.5						Low	217	43.0
				Daily hours spent watching TV				intermediate	153	30.3
Monthly Income				1 hour or less	246	48.8		High	113	22.4
<2,000 - 4,999 SR	174	34.5		1-3 hours	145	28.8				
5,000 - 9,999	161	31.9		>3 to 5 hours	35	6.9				
10,000 - 17,999	120	23.8		more than 5 hours	74	14.7				
18,000 and above	48	9.5								
Medical Parameters										
Variables	**N**	**Mean**	**±SD**	**Variables**	**N**	**Mean**	**±SD**			
Systolic BP	492	130.86	17.39	HgbA1c	502	7.72	2.07			
Diastolic BP	492	72.54	9.64	HDL	500	1.53	5.36			
Weight	486	80.32	17.50	TG	503	1.45	0.85			
Height	484	155.60	7.49	LDL	500	2.91	0.93			
Waist	503	111.50	14.82	BMI	484	33.20	6.77			
Hip	503	117.51	13.54							

Legend: DM: Diabetes Mellitus, HTN: Hypertension, BMI: Body Mass Index, FV: Fruit & Vegetables, BP: Blood Pressure, HgbA1c: Hemoglobin A1c, HDL: High-Density Lipoprotein, LDL: Low-Density Lipoprotein, TG: Triglycerides, BMI: Body Mass Index

Table 1: Baseline Demographics and Medical Parameters.

General health beliefs of Saudi women regarding CVD

Overall, the lowest HBM subscale score was perceived susceptibility only 12.5% perceived they're at risk to CVD, while the highest was on the perceived benefit subscale 65.8%. (Appendix 1).

Perceived susceptibility

Perceived susceptibility measured participants' beliefs about their personal susceptibility to CVD; the higher the score, the greater the tendency to feel susceptible to CVD. Grand mean score on the perceived susceptibility subscale was 1.7 with the standard deviation of 0.93. This indicates that 79 % of the women did not feel themselves susceptible to CVD. Only 12.5% of the women participants believed that they are susceptible to CVD (Table 1a).

Item	SD n (%)	D n (%)	N n (%)	A n (%)	SA n (%)	Mean	SD
It is likely that I will suffer from a CVD in the future	180 (35.6)	222 (44.0)	39 (7.7)	33 (6.5)	30 (5.9)	1.67	0.93
My chances of suffering from a CVD in the next few years are great	172 (34.1)	217 (43.0)	39 (7.7)	32 (6.3)	29 (5.7)	1.67	0.93
I feel I will have a CVD sometime during my life	172 (34.1)	217 (43.0)	39 (7.7)	32 (6.3)	29 (5.7)	1.67	0.93
Having a CVD is currently a possibility for me	172 (34.1)	218 (43.2)	38 (7.5)	32 (6.3)	29 (5.7)	1.67	0.93
I am concerned about the likelihood of having a CVD in the near future	173 (34.3)	216 (42.8)	38 (7.5)	33 (6.5)	29 (5.7)	1.67	0.93
Note: SD (Strongly Disagree) = 1; D (Disagree) = 2; A (Agree) = 3; SA (Strongly Agree) = 4; Neutral (N) =0. Perceived Susceptibility Grand Mean Score = 1.7, Standard Deviation = 0.93. The higher the score, the greater tendency to feel susceptible to CVD. The perceived susceptibility to CVDs was low among all women mean 1.67.							

Table 1a: Perceived susceptibility to CVDs.

Perceived severity

Perceived severity measured participant's belief about the seriousness of developing CVD; the higher the score, the greater tendency to perceive CVD as serious. Grand mean scores on the perceived severity subscale were 2.5 with the standard deviation of 1.4. Almost 65% of the women participants agreed or strongly agreed that they would die within ten years if they had a heart attack or stroke (Table 2a).

ITEM	SD n (%)	D n (%)	N n (%)	A n (%)	SA n (%)	Mean	SD
Having a heart attack or stroke is always fatal	24 (4.8)	60 (11.9)	93 (18.4)	185 (36.6)	128 (25.3)	2.47	1.4
Having a heart attack or stroke will threaten my relationship with my significant other	23 (4.6)	57 (11.3)	92 (18.2)	191 (37.8)	129 (25.5)	2.49	1.4
My whole life would change if I had a heart attack or stroke	24 (4.8)	56 (11.1)	93 (18.4)	190 (37.6)	129 (25.5)	2.48	1.4
Having a heart attack or stroke would have a very bad effect on my sex life	23 (4.6)	56 (11.1)	93 (18.4)	191 (37.8)	131 (25.9)	2.49	1.4
If I have a heart attack or stroke I will die within ten years	22 (4.4)	56 (11.1)	89 (17.6)	191 (37.8)	130 (25.7)	2.51	1.4
Note: SD (Strongly Disagree) = 1; D (Disagree) = 2; A (Agree) = 3; SA (Strongly Agree) = 4; Neutral (N)=0. Perceived Severity Grand Mean Score =2.5, Standard Deviation = 1.4. The higher the score, the greater tendency to perceive CVD as serious.							

Table 2a: Perceived severity to CVDs.

Participants Perceived Benefits

Perceived benefit measured a participant's belief about the benefits of healthy behaviours to prevent CVD; the higher the score, the greater tendency to perceive benefits as good for preventing CVD. As shown in Table 5.6. The overall grand mean score on the perceived benefit scale was 3.5, and the standard deviation was 0.9. Perceived benefit mean score was the highest among all the subscales (Table 3a).

Item	SD n (%)	D n (%)	N n (%)	A n (%)	SA n (%)	Mean	SD
Increasing my exercise will decrease my chances of having a heart attack or stroke	3 (0.6)	24 (4.8)	22 (4.4)	255 (50.5)	185 (36.6)	3.18	0.91
Eating a healthy diet will decrease my chances of having a heart attack or stroke	3 (0.6)	57 (11.3)	22 (4.4)	256 (50.7)	184 (36.4)	3.18	0.91
Eating a healthy diet and exercising for 30 minutes most days of the week is one of the best ways for me to prevent a heart attack or stroke	24 (4.8)	56 (11.1)	93 (18.4)	190 (37.6)	129 (25.5)	3.19	0.92
When I exercise I am doing something good for myself	3 (0.6)	24 (4.8)	22 (4.4)	257 (50.9)	185 (36.6)	3.18	0.91
When I eat healthy I am doing something good for myself	3 (0.6)	24 (4.8)	23 (4.6)	256 (50.7)	186 (36.8)	3.18	0.91
Eating a healthy diet will decrease my chances of dying from cardiovascular disease	3 (0.6)	24 (4.8)	22 (4.4)	258 (51.1)	184 (36.4)	3.18	0.90
Note: SD (Strongly Disagree) = 1; D (Disagree) = 2; A (Agree) = 3; SA (Strongly Agree) = 4. Neutral (N) =0. Perceived Benefits Grand Mean Score =3.2, Standard Deviation =0.93. The higher the score, the greater tendency to perceive benefits as good for preventing CVD.							

Table 3a: Participants Perceived Benefits regarding Cardiovascular Disease.

Perceived Barriers

Perceived barriers measured participants' beliefs about the barriers towards health promoting behaviours preventing CVD; the higher the score, the higher were the barriers. The mean score of all perceived barrier subscale was 2.6 and the standard deviation was 1.1. From the individual subscale barrier questions, most women 86.7%, agreed or strongly agreed that they do not know the appropriate exercises to perform to reduce the risk of CVD. Also, 65.9 % of participants disagreed and strongly disagreed they **have access to exercise facilities and equipment."** Interestingly, almost two third of the participants 66.8% agreed or strongly agreed that they could not afford to buy healthy foods (Table 4a).

Item	SD n (%)	D n (%)	N n (%)	A n (%)	SA n (%)	Mean	SD
I do not know the Appropriate exercises to perform to reduce my risk of developing CVD	4 (0.8)	24 (4.8)	23 (4.6)	255 (50.5)	183 (36.2)	3.17	0.91
It is painful for me to walk for more than 5 minutes	189 (37.4)	57 (11.3)	12 (2.4)	149 (29.5)	59 (11.7)	2.11	0.91
I have access to exercise facilities and/or equipment	251 (49.7)	82 (16.2)	12 (2.4)	149 (29.5)	58 (11.5)	2.88	0.92
I have someone who will exercise with me	252 (49.9)	82 (16.2)	12 (2.4)	151 (29.9)	58 (11.5)	2.88	1.12
I do not have time to exercise for 30 minutes a day on most days of the week	3 (0.6)	24 (4.8)	23 (4.6)	256 (50.7)	186 (36.8)	2.10	1.31

I do not know what is considered a healthy diet that would prevent me from developing cardiovascular disease	189 (37.4)	81 (16.0)	13 (2.6)	149 (29.5)	58 (11.5)	2.79	1.31
I do not have time to cook meals for myself	45 (8.9)	67 (13.3)	38 (7.5)	171 (33.9)	168 (33.3)	2.79	1.12
I cannot afford to buy healthy foods	45 (8.9)	68 (13.5)	39 (7.7)	169 (33.5)	168 (33.3)	2.78	1.22
I have other problems more important than worrying about diet and exercise	47 (9.3)	68 (13.5)	42 (8.3)	175 (34.7)	172 (34.1)	2.77	1.23
Note: SD (Strongly Disagree) = 1; D (Disagree) = 2; A (Agree) = 3; SA (Strongly Agree) = 4. Neutral (N)=0. Perceived Barriers Grand Mean Score = 2.6, Standard Deviation =1.1. The higher the score, the more are the barriers to participating in healthy behaviours.							

Table 4a: Participants Perceived Barriers regarding Cardiovascular Disease.

Appendix 1: General health beliefs of Saudi women regarding CVD.

Almost 65% of the participants either agreed or strongly agreed that they would die within ten years if they had a heart attack or stroke. Most of the women 86.7% agreed or strongly agreed that they did not know the appropriate exercises to perform to reduce the risk of CVD. Also, 65.9% of participants disagreed or strongly disagreed that they had access to exercise facilities and equipment. Interestingly, slightly over two-thirds of the participants, 66.8%, agreed or strongly agreed that they could not afford to buy healthy foods.

A significant relationship was found between FRS and perceived susceptibility scores (Chi-Square ($\chi 2$) = 11.777, p=0.05). Women with a high FRS were more likely to report low perceived susceptibility scores than women with a low or intermediate FRS. No significant results were found in perceived severity (p=0.12). Women with a high FRS reported moderate perceived benefits of diet and/or exercise (Chi-Square (χ^2) = 11.202, p=0.05). No significant difference was found between the FRS and the perceived barrier (p=0.23) (Table 2).

Variables	**Framingham Risk Scores**								
	Low (N=217)		Intermediate (N=153)		High (N=113)		**d.f.**	χ^2	*p*-value
	N	%	N	%	N	%			
Perceived Susceptibility									
Low	77	35.5	52	34.0	49	43.4	4	11.78	.019*
Intermediate	108	49.8	63	41.2	38	33.6			
High	32	14.7	38	24.8	26	23.0			
Perceived Severity									
Low	67	30.9	58	37.9	51	45.1	4	7.13	0.12
Intermediate	92	42.4	57	37.3	35	31.0			

High	58	26.7	38	24.8	27	23.9			
Perceived Benefits									
Low	21	9.7	24	15.7	15	13.3	4	11.20	0.02*
Intermediate	107	49.3	73	47.7	70	61.9			
High	89	41.0	56	36.6	28	24.8			
Perceived Barrier									
Low	83	38.2	50	32.7	33	29.2	4	5.3	0.25
Intermediate	70	32.3	54	35.5	34	30.1			
High	63	29.5	49	32.0	46	40.7			
Chi-Square test, d.f: degrees of freedom									

Table 2: The association between Health Belief Subscales and Framingham Risk Scores.

Table 3 shows the difference between the mean of each health belief subscale and personal socioeconomic variables. There was a statistically significant difference between the mean of the groups' perceived severity and perceived benefits. The highly educated women reported a higher mean of perceived severity (p-value <0.001), while low-income women reported a lower mean on both perceived severity and perceived benefits, with statistical significance (p values 0.02 & 0.01, respectively). Women with high levels of education and income reported higher perceived severity and perceived benefits. Homemakers reported the lowest severity score from the occupation category.

Variables		Perceived susceptibility Mean Score (±SD)	Perceived Severity Mean score (±SD)	Perceived Benefits Mean score (±SD)	Perceived Barriers Mean score (±SD)
Marital status	Married (N=371)	8.49 (±4.70)	12.58 (±6.84)	19.63 (±4.92)	30.18 (±6.72)
	Never married (N=32)	8.17 (±4.32)	13.17 (±6.95)	18.70 (±5.07)	29.18 (±6.62)
	Widow/divorced/separated (N=100)	7.94 (± 4.71)	11.06 (±7.99)	16.63 (±7.38)	31.41 (±5.09)
	***p* value**	0.63	0.182	0.0001*	0.146

Level of education	Elementary or less (N=251)	8.30 (±4.97)	11.32 (±7.60)	17.93 (±6.36)	30.18 (±6.82)
	Intermediate /High School (N=129)	8.45 (±4.15)	13.06 (±6.7)	20.01 (±4.34)	31.88 (±5.54)
	Diploma, Degree, Post Graduate (N=118)	8.42 (±4.52)	14.03 (±5.76)	20.47 (±3.77)	30.1 (±6.78
	***p* value**	0.951	0.001*	0.0001*	0.173
Occupation	Gov., Semi Gov., Private (N=84)	8.29 (±4.22)	14.35 (±5.46)	20.3 (±3.94)	24.21 (±7.92)
	Student, Retired, Not Working (N=58)	9.55 (±4.64)	14.31 (±5.31)	19.16 (±5.06)	30.70 (±7.11)
	Housewife (N=346)	8.19 (±4.74)	11.66 (±7.49)	18.78 (±5.79)	30.43 (±6.92)
	***p* value**	0.117	0.001*	0.073	0.30
Monthly income	<2,000-4,999 SR (N=174)	8.44 (±4.75)	11.42 (±7.74)	17.79 (±6.72)	30.6 (±6.33)
	5,000-9,999 (N=161)	8.72 (±4.65)	13.62 (±6.58)	19.95 (±3.91)	30.41 (±7.04)
	10,000-17,999 above (N=168)	7.79 (±4.77)	12.36 (±6.73)	19.62 (±4.99)	30.04 (±6.57)
	***p* value**	0.442	0.02*	0.01*	0.69
ANOVA Test, *$p \leq 0.05$, % are within the Framingham risk group; Gov.: Government					

Table 3: The difference in the mean of each health belief construct and sociodemographic variables.

In Table 4, standard multiple regression analyses were utilized in determining the relationship of how sociodemographic variables such as age, frequency of exercise, family history of HTN, DM and hyperlipidemia, body mass index and television consumption predicted the scores on the various sub-scales of HBM.

- Perceived susceptibility: No significant differences were found between the women with different social demographic variables and perceived susceptibility.
- Perceived severity: Women on age-between 15-34 years old, on average, had 0.63 points higher score than those aged 55+ with a *p*-value=0.001 with β-coefficients equal to 2.78 and 1.32, respectively. Women who were employed reported higher scores of perceived severities than those who were homemakers (*p* value=0.001). Women who had a tertiary Education had significantly higher β-coefficient than women with the lower education (*p* value = 0.01).
- Perceived benefits: Among employed women significantly higher compared to homemakers with *p* value =0.01 as well as women with moderate income had higher perceived benefits (*p* value =0.03).
- Perceived barrier: women who affirmed in participating in PA had higher scores than women who did not engage in PA, with p value=0.01.

Variables	Perceived Susceptibility Score		Perceived Severity Score		Perceived Benefits Score		Perceived Barrier Score	
	β(95% CI)	*p*-value	β(95% CI)	p-value	β(95% CI)	*p*-value	β(95% CI)	*p*-value
Age	8.79 (6.39 to 11.19)		17.663 (15.10-20.23)		23.77 (21.26-26.27)		29.403 (26.62-32.19)	
55 year and older (ref.)	-		-		-		-	
35-54 years	-0.76 (-1.86 to 0.35)	0.18	1.315 (0.14-2.49)	0.03*	1.29 (-0.60 to 3.17)	0.18	-1.42 (-2.70-(-0.13)	0.03*
15-34 years	-1.63 (-3.43 to 0.02)	0.08	2.78 (0.86-4.71)	0.01*	0.62 (-0.53 to 1.78)	0.29	-1.65 (-3.74-0.44)	0.12
Marital status								
Married (ref.)	-				-		-	
Never Married	-1.04 (-3.09 to 1.01)	0.32	0.66 (-1.512 to 2.84)	0.55	-1.50 (-3.62 to 0.62)	0.16	-0.99 (-3.37 to 1.38)	0.41
Sep/Divorced	0.37	0.74	2.10 (-.18 to 4.38)	0.07	-0.27 (-2.49 to 1.95)	0.81	2.13 (-.36 to 4.62)	0.09
Widowed	-0.01	0.99	-0.18 (-1.72 to 1.35)	0.82	-2.22 (-3.71 to -0.73)	0.01*	0.86 (-.81 to 2.53)	0.31
Income								
<5000 (ref.)	-				-		-	

5,000 - 9,999SR	0.04(-1.18 to 1.25)	0.95	1.168 (-.12 to 2.46)	0.07	1.42 (0.16 to 2.69)	0.03*	0.18 (-1.39 to 1.75)	0.82
10,000 - 18,000SR and above	-0.76(-1.96 to 0.4)	0.22	0.13 (-1.15 to 1.4)	0.84	1.07 (-0.18 to 2.32)	0.09	-0.69 (-2.33 to 0.96)	0.41
Occupation								
Homemakers (ref.)	-		-		-		-	
Not Working (student, retired)	.77 (-0.78 to 2.34)	0.33	1.33 (-0.45 to 3.12)	0.14	0.96 (-.78 to 2.71)	0.28	1.70 (-.27 to 3.67)	0.09
Private Employment	-.77 (-4.33 to 2.79)	0.67	2.20 (0.67 to 3.73)	0.01*	2.65 (1.16 to 4.14)	0.01*	-0.30 (-1.98 to 0.38)	0.72
Government - Employment	-.73 (-2.11 to 0.66)	0.31	1.71 (0.41 to 2.99)	0.01*	1.78 (.52 to 3.04)	0.01*	0.21 (-1.22 to 1.62)	0.78
Education level								
Low level of Education (ref.)	-		-		-		-	
Intermediate Education	-0.09 (-1.79 to 1.60)	0.92	1.46	0.08	0.32 (-1.31 to 1.95)	0.70	0.34 (-1.48 to 2.15)	0.72
High School Education	-0.46 (-1.91 to 0.98)	0.53	-1.19	0.54	0.51 (-3.212 to 4.23)	0.79	-2.63 (-6.77 to 1.52)	0.21
Tertiary Education	-0.72 (-1.94 to 0.51)	0.25	1.936	0.01*	0.83 (-.623 to 2.28)	0.26	-0.34 (-1.95 to 1.28)	0.68
Family history of hypertension								
No (ref.)	-	-	-	-	-		-	
Yes	1.68 (0.51 to 2.86)	0.06	-.76 (-2.01-.49)	0.24	-0.40 (-1.62-0.08)	0.53	0.33 (-1.04-1.69)	0.64
Family history of DM			-	-				
No (ref.)	-	-	1.70 (0.36-3.02)	0.01*	1.32 (0.02-2.61)	0.05	0.82 (-0.618-2.26)	0.26
Yes	0.19 (-1.05 to 1.43)	0.76						
Family history of hyperlipidaemia								

No (ref.)	-	-	-	-				
Yes	0.01 (-1.23 to 1.24)	0.99	-1.44 (-2.76-(-0.12)	0.03*	-.77 (-2.07-0.52)	0.24	-0.353 (-1.79 to 1.08)	0.63
Body Mass Index			-	-				
Underweight/Normal (ref.)			0.19 (-1.27-3.15)	0.84	1.39 (-0.77-3.55)	0.21	1.51 (-0.90 to 3.91)	0.22
Overweight	0.91 (-1.16 to 2.99)	0.39	-0.58 (-1.65-2.63)	0.50	1.04 (-1.05-to -3.13)	0.33	1.26 (-1.07 to 3.59)	0.28
Obese	0.51 (-1.50 to 2.51)	0.62						
Frequency of Exercise								
No Exercise (ref.)	-		-		-		-	
1-2 times per week	0.78 (-0.47 to -2.02)	0.22	.073 (-1.26-1.40)	0.91	1.32 (0.02-2.62)	0.05*	2.00 (0.56 to 3.45)	0.01*
3-4 times per week or daily	-1.37 (-2.94 to -0.20)	0.09	.085 (-1.59-1.76)	0.92	1.24 (-0.41-2.87)	0.14	2.98 (1.16 to 4.81)	0.01*
Model summary	F, (11, 458) = 1.874, $p < 0.05$, $R^2 = .043$		, F, (11, 458) = 1.908, $p< 0.05$, $R^2 = .044$		F, (11, 458) = 2.2, P<.05 R2 = .050.		F, (11, 458) = 2.209, $p < 0.05$, $R^2 = .050$.	

Table 4: Standard Multiple Regression analysis: Health Belief Subscales and Sociodemographic variables.

Discussion

The present study finding showed that 79% of the participating women did not feel themselves susceptible to CVD. Our results agree with the findings of Al-Tamimi, et al., who showed that only 13.3% of Saudi women felt themselves susceptible to CVD [18]. This finding may be due to socio-economic or literacy levels, which may be influenced by cultural factors arising from religious beliefs and practices. In terms of perceived severity, 65% of women affirmed that heart disease would have a negative impact on their lives and conceded that they would die from CVD within ten years if they had a heart attack or stroke. This is in congruent with other published studies on HTN and DM that showed a significant relationship between perceived severity and adopting healthy behaviors in diabetic and hypertensive patients; the anxiety of associated consequences drives them to control their blood pressure and blood sugar, respectively, on a regular basis [23,24].

The current study found that 89% of the participants knew that eating healthily and exercising regularly were beneficial in preventing the development of CVD, yet they were not actively participating in healthy behaviors, such as increased FV consumption and regular physical exercise. Nevertheless, most of the women stated that they felt good when they exercised and ate healthily. These results are consistent with other studies, which also show that majority of women knew about obesity, and physical inactivity and unbalanced dietary habits were the risk factors [25,26]. In terms of perceived barriers, almost 90% of the women participants affirmed that they did not know the appropriate exercises to perform to reduce the risk of CVD, and more than half confirmed that they had no "access to exercise facilities and equipment". This is an important element in determining behavior. In this study, 93.8% were aware that engaging in regular physical activity could help lower the risk of CVD, but few (24%) engaged in such behavior and a very small proportion (9.5%) engaged in all five of the benchmarked activities allocated for health-promoting behavior [18]. Similar study concluded that perceived barriers were among the most prominent factors concerning self-care behaviours [27]. Majority of participants shared the view that regular physical activity and eating a low fat diet prevents or reduces the risk for

CVD. This finding also revealed that women's perception of benefits in engaging in health-promoting behavior increased as their general knowledge about CVD was increased.

Remarkably, almost one-third of the women were in the intermediate FRS risk category and a quarter were in the high-risk category, yet they did not perceive themselves susceptible to CVD. A low perception of susceptibility has been reported not only in this study but among women with multiple risk factors, and most individuals tend to underestimate their susceptibility to heart disease [28]. In a study conducted in 26 Danish PCCs, found that patients who perceived themselves at low risk of cardiac disease were estimated to be at high risk by their physicians [29]. Likewise, a study conducted among black women in the USA reported that even with multiple CVD risk factors, they still considered themselves to be at low or no risk for heart disease [30]. This observation raises important issues for public policymakers, who need to consider creating effective health awareness, intervention, and related communications materials and messaging themes.

In this study, there is no association between different socio-demographic variables and the perceived susceptibility score. This is similar to published studies investigating health beliefs in Saudi Arabia for breast cancer, cervical cancer and osteoporosis, and in the UAE for awareness of heart disease, which showed a very low perceived susceptibility among women regardless of their socio-demographic variations [14,31]. There was a significant difference between the age groups and perceived severity. Women aged between 15 to 54 perceived more severity than those aged 55 and older. The difference may lie in the educational level, as low literacy rates were more common among the older Saudi population. Women with higher education have a better level of severity perception. Thus, there is a need for innovative educational strategies to increase knowledge about risk factors and awareness levels among at-risk individuals, especially among women over age 40. Likewise, this study found that women who engage in PA have a higher mean perceived severity score than women not engaged in PA (p=0.005). This is comparable to another study that reports that higher perceived CVD severity was associated with a greater level of PA [32].

Moreover, there was a statistically significant result in perceived benefits (P= 0.01) among Saudi women who engaged in PA compared to those who did not partake in it. This indicates that those who were physically active had a higher level of perception of benefit. Likewise, majority of these women did not know what was considered a healthy diet for CVD prevention. This suggests that addressing the knowledge gap regarding FV daily consumption may contribute positively to an adequate intake of FV for the prevention of CVD. Research participants involved in an interventional study reported that they had benefited from the intensive education program with resulting improvements in blood sugar, PA and healthy behaviours [33].

Furthermore, the participants with elementary or basic education were less likely to report access to exercise facilities as a PA barrier. It suggests that women with higher education may identify the barriers more effectively due to cognitive skills that are acquired through academic study [34]. This study found that women between the ages of 35 and 54 were more likely to report that not being able to drive represented a barrier to access exercise facilities. This is due to the driving restrictions in the past; however, the ban was lifted in June 2018. This recent change will provide more access to transportation, and they will now be able to access venues for PA.

This study was conducted in Riyadh, in a tertiary hospital outpatients' primary care clinic, which can limit the generalizability of the findings. Another limitation is the recall bias that could have occurred, especially in measuring behaviors like FV consumption. Many responses depended on the participant's memory. Nevertheless, responder bias can be unintentional due to poor or incomplete memory recall.

Conclusion

Majority of Saudi women did not feel susceptible to CVD; however, they were with multiple risk factors. Hence, there is an urgent need to increase awareness of CVD risk factors due to the perceived susceptibility gap and for creating public policy specific to women. Successful public health policy that will demonstrate a reduction in the population burden of CVDs among Saudi women is needed.

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