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Knowledge and Awareness Level of Cardiovascular Diseases and Their Risk Factors among The Saudi Population

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Abstract **Introduction:** This article discusses cardiovascular diseases and their risk factors. Cardiovascular diseases are a broad term that is involved in all diseases of the heart and blood vessels. For example, myocardial infarction, stroke and angina. Several studies have been done on this topic in Saudi Arabia covering Acute coronary syndrome and myocardial infarction in knowledge, awareness and attitude levels. There are many risk factors for cardiovascular disease, such as smoking, unhealthy food, hypertension, diabetes, poor exercise and obesity. Cardiovascular diseases are a worldwide issue, almost a third of all deaths globally from cardiovascular diseases. So, it is important to raise knowledge and awareness about cardiovascular diseases to reduce the number of deaths and increase life expectancy. **Objective:** The study aimed to assess the level of knowledge and awareness of cardiovascular diseases and their risk factors among the Saudi population. **Methodology:** This is an observational cross-sectional study conducted between July 2024 to February 2025 in Saudi Arabia. The study involved distributing the questionnaire form online to people in the Kingdom of Saudi Arabia to assess the population's knowledge and awareness of cardiovascular diseases and their risk factors. The inclusion criteria are males and females in the Kingdom of Saudi Arabia who are 18 years old or older. Excluded individuals who were younger than 18 years and not in Saudi Arabia. The Raosoft sample size calculator was used to calculate the sample size. The minimum target sample size that was determined is 384, with an indicator percentage of 0.50, a margin of error of 5% and a confidence interval (CI) of 95%. **Results**: The study included a sample of 432 Saudi participants. The findings indicate that 74.5% of respondents possess a high level of awareness regarding CVD, with 85.4% correctly identifying hypertension and 94.2% recognizing smoking as a risk factors. However, 26.4% were uncertain about diabetes' role, highlighting a knowledge gap. Additionally, nearly half (48.8%) exhibited high knowledge levels, yet 51.2% demonstrated moderate to low understanding, emphasizing the need for targeted educational interventions. Significant relationships were noted between awareness and educational levels, as well as knowledge and marital status. **Conclusion:** our study highlights crucial gaps in the knowledge and awareness of cardiovascular diseases among the Saudi population. Although awareness of certain risk factors appears high, the depth of knowledge remains insufficient to translate this awareness into effective personal health behavior modifications.

Key Words Knowledge, Awareness, Cardiovascular diseases, Risk factors, Saudi Arabia

INTRODUCTION

Cardiovascular disease is a general term that refers to all disorders affecting the heart and blood vessels, such as stroke, coronary artery disease or aortic disease [1]. Damage to the heart and circulatory system is the primary cause of cardiovascular diseases [2]. Cardiovascular conditions are the most common cause of mortality worldwide, contributing to roughly 30 percent of all fatalities [3]. Some conditions are known risk factors, including abnormal levels of lipids, high fasting plasma glucose level, systolic hypertension, kidney

dysfunction and an elevated BMI [4]. The main lifestyle risk factors such as eating unhealthy food, inactivity, smoking and heavy consumption of alcohol [5]. Saudi Arabia experienced substantial urbanization in the past few years, which has raised the CVD rate [6].

Cardiovascular disease (CVD) and related morbidity are becoming more common and this is increasingly seen as a global issue. Thirty percent of deaths globally are thought to be caused by cardiovascular diseases [7]. Globally, the prevalence of cardiovascular disease (CVD) has increased to epidemic proportions [8]. Sudden, often deadly, myocardial infarction and stroke are examples of life-threatening cardiovascular events [9].

A study with 1172 participants that took place in Hail, Saudi Arabia, was published in 2022. Regarding all types of CVDs, most participants recognized congenital heart disease (53.4%) and coronary heart disease (74.5%) but most did not associate rheumatic heart disease or deep vein thrombosis/pulmonary embolism with CVDs. Regarding the symptoms and signs of myocardial infarction, just over half of the participants correctly identified shortness of breath (59.8%) and chest discomfort and pain (65.7%) [10]. In 2019, a study was published in Riyadh, the capital of Saudi Arabia, involving 388 participants. 13.9% of those who participated were aware that cigarette smoking is an increased risk factor for cardiovascular disease, while 6.4% were familiar with elevated blood pressure as well as elevated blood cholesterol levels, 5.4% were aware of overweight and obesity and 4.1% were aware of DM and family history .When asked if not exercising was a risk factor, 72% of participants said "yes" [11]. A recent article with 395 participants was published in 2024 in Jeddah. The study's participants exhibited an impressive degree of knowledge of the risk factors associated with cardiovascular disease, such as smoking, obesity, high cholesterol, unhealthy eating patterns and a lack of physical activity. Nevertheless, there was a clear lack of knowledge about DM and anxiety. In general, the mean knowledge score was 16.33 out of 25 [12].

Our study aims to evaluate Saudi citizens' understanding of cardiovascular diseases and any shortcomings in public health policy and education.

Objectives

The study aims to assess the level of knowledge and awareness of cardiovascular diseases and their risk factors among the Saudi population.

METHODS

Study Design and Setting

This is an observational cross-sectional study was followed STROBE guidelines, conducted between July 2024 to February 2025 in Saudi Arabia. The study's population consisted of Saudi adults.

Sample Size

To guarantee that the sample size is representative of the entire population, the bare minimum of responders was determined. The Raosoft sample size calculator was used to calculate the sample size .The sample size that was determined is, 384 with an indicator percentage of 0.50, a margin of error of 5% and a Confidence Interval (CI) of 95%.

Inclusion and Exclusion Criteria

The study involved distributing the questionnaire form online to people in the Kingdom of Saudi Arabia aged 18 years and above to assess the population's knowledge and awareness of cardiovascular diseases and their risk factors. Males and females in the Kingdom of Saudi Arabia from the age of 18 years and above were included. Individuals who were younger than 18 years and not in Saudi Arabia were excluded from this study.

Method for Data Collection and Instrument

A structured questionnaire has been used as a research tool. This tool was developed based on relevant Saudi studies [11,13]. The questionnaire has four sections and 34 statements in total. The first section is the demographic and clinical characteristics of participants and includes 17 statements. The second section is about awareness regarding risk factors of CVD and includes 9 statements. The third section, Knowledge regarding the clinical picture of CVD, includes 3 statements. The fourth section, Knowledge towards prevention of CVD, includes 5 statements.

Scoring System

In all, 34 statements served to evaluate the level of knowledge and awareness. 17 statements for demographics and clinical characteristics, 8 for knowledge and 9 for awareness. One point is given for correct answers and zero points are given for incorrect answers or “not sure”. We used the scoring system of the original Bloom's cut-off points. The participants were divided into three groups based on their scores.

Demographic and clinical characteristics: 17 statements given for them, 0 Points.

Knowledge score varied from 0 to 9points and was classified into three levels as follows: those with a score of 5 or below (≤5) were classified as having a low level of knowledge, those with scores 6 as having a moderate level of knowledge and those with scores 7 or above (≥7) as a high level of knowledge.

Awareness scores varied from 0 to 9 points and were classified into three levels as follows: those with a score of 5 or below (≤5) were classified as having a low level of awareness, those with scores of 6 as having a moderate level of awareness and those with scores of 7 or above (≥7) as having a high level of awareness.

Pilot Test

The questionnaire was delivered to 20 people and asked them to complete it. This was done to test the questionnaire's simplicity and viability for the study. The data from the pilot study was omitted from the study's results.

Analysis and Entry Method

Data was entered on a computer with the "Microsoft Office Excel Software" (2016) for Windows. The data was then transferred to the IBM SPSS Statistics for Windows, Version 20.0 (Armonk, NY: IBM Corp.) program for statistical analysis.

RESULTS

Table 1 displays various demographic parameters of the participants with a total number of (432). Notably, the mean age within the sample is 35.8 years, with a standard deviation of 14.0, suggesting a relatively diverse age range, which is further substantiated by the distribution where a significant portion of participants (27.5%) are over the age of 45, while 26.4% are under 23. Gender representation tilts considerably toward females, who constitute 69.9% of the sample, indicating a potential gender imbalance in the data collection process. In terms of marital status, the majority are married (53.7%), followed by singles (41.0%), which could influence the social dynamics within the group. The occupational landscape reveals that a substantial portion of participants are employed (40.5%), while a noteworthy segment identifies as students (32.4%). Educationally, the data highlights a predominance of individuals holding a bachelor's degree (67.1%), indicating a highly educated cohort, potentially influencing their socio-economic perspectives. Geographically, the distribution reflects a majority residing in the Eastern (41.2%) and Western (34.5%) regions, which could reflect regional socioeconomic factors impacting this group. Importantly, a significant 68.3% of participants categorize their daily life as moderate in terms of stress, underscoring the need to explore the implications of stress management within this demographic. Finally, the low prevalence of smoking (8.3% currently smoking and 3.5% being ex-smokers) suggests generally positive health behaviors in this population.

As shown in Figure 1, among the respondents, a significant portion, totaling 184 individuals, reported that they do not engage in any form of exercise, highlighting a concerning trend towards physical inactivity, which is a well-documented risk factor for cardiovascular conditions. In contrast, 102 participants indicated that they exercise once a week, while 106 individuals reported exercising 2 to 3 times a week and only 40 respondents claimed to engage in physical activity more than five times per week.

As illustrated in Table 2, the findings reveal significant insights into lifestyle habits and health conditions that could

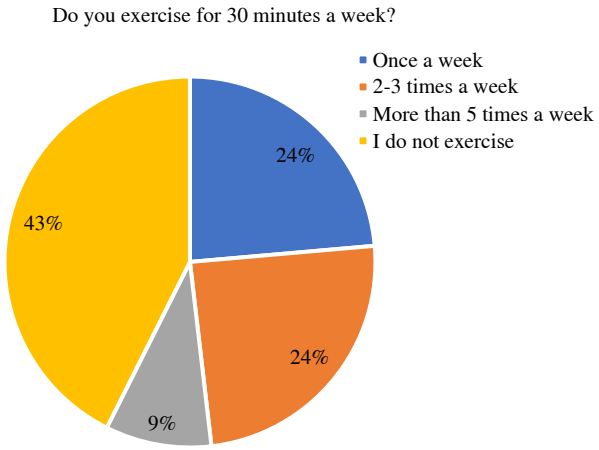

Figure 1: Illustrates exercise frequency among participants

Table 1: Sociodemographic characteristics of participants (n = 432)

Parameter		Number	Percentage
Age (Mean:35.8, STD:14.0)	Less than 23	114	26.4
	23 to 35	106	24.5
	35 to 45	93	21.5
	More than 45	119	27.5
Gender	Female	302	69.9
	Male	130	30.1
Marital status	Single	177	41.0
	Married	232	53.7
	Divorced	14	3.2
	Widowed	9	2.1
Occupational status	Student	140	32.4
	Employed	175	40.5
	Unemployed	67	15.5
	Retired	50	11.6
Educational level	Primary school	1	.2
	Middle school	9	2.1
	High school	110	25.5
	Bachelor's degree	290	67.1
	Postgraduate degree	22	5.1
Region of residence	Northern region	32	7.4
	Southern region	5	1.2
	Central region	68	15.7
	Eastern region	178	41.2
	Western region	149	34.5
Daily life is considered	Stress-free	23	5.3
	Stressful	92	21.3
	Very stressful	22	5.1
	Moderate	295	68.3
Do you smoke?	Yes	36	8.3
	No	381	88.2
	Ex-smoker	15	3.5

Table 2: Parameters related to clinical characteristics of participants (n = 432)

Parameter		Number	Percentage
Do you exercise for 30 minutes a week?	Once a week	102	23.6
	2-3 times a week	106	24.5
	More than 5 times a week	40	9.3
	I do not exercise	184	42.6
Do you include vegetables and fruits in your daily diet?	Sometimes	287	66.4
	All the time	127	29.4
	I never eat vegetables or fruits	18	4.2
Do you eat fast food frequently?	Yes, I do	86	19.9
	Sometimes	248	57.4
	Rarely	58	13.4
	No, I don't	40	9.3
Family history of cardiovascular disease:	No	288	66.7
	Yes	144	33.3
Have you been diagnosed with hypertension?	No	370	85.6
	Yes	62	14.4
If yes, do you measure your blood pressure regularly?	No	88	20.4
	Yes	31	7.2
	I wasn't diagnosed with hypertension as I mentioned above	313	72.5
Have you been diagnosed with Diabetes?	No	385	89.1
	Yes	47	10.9
If yes, do you monitor your blood sugar regularly?	No	63	14.6
	Yes	41	9.5
	I wasn't diagnosed with diabetes as I mentioned above	328	75.9
Have you ever been diagnosed with the following conditions? *	Hypertension	56	12.9
	Diabetes Mellitus	43	9.9
	High Cholesterol	70	16.2
	Obesity	66	15.3
	Previous Heart Attack or heart disease	5	1.1
	Previous Stroke	1	0.2
	Never been diagnosed with any of the above	276	63.9

*Results may overlap

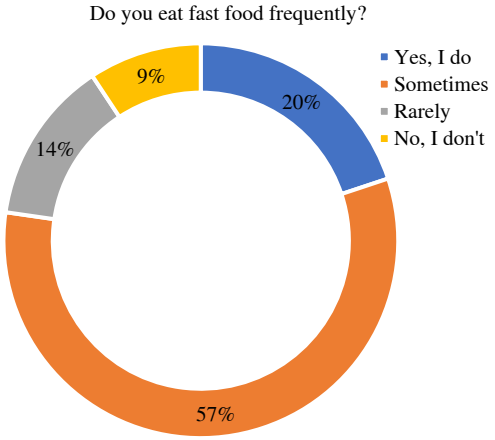

Figure 2: Illustrates fast food consumption among participants

potentially affect cardiovascular risk. Notably, a striking 42.6% of participants reported no engagement in exercise, while only a combined 24.5% exercised two to three times a week, indicating a prevalent sedentary lifestyle that warrants further investigation given its established correlation with various health ailments. Furthermore, dietary habits appear to be more favorable, with 66.4% consuming fruits and vegetables occasionally, although only 29.4% report including them in their daily diet, suggesting room for improvement in nutritional practices. Fast food consumption also presents a noteworthy concern; 57.4% of respondents indicated they consume fast food occasionally, highlighting a behavioral pattern that could contribute to obesity and other metabolic disorders. On the health front, a majority of participants (66.7%) reported no family history of cardiovascular diseases, which is a positive indicator; however, approximately 14.4% have been diagnosed with hypertension and 10.9% with diabetes. Alarmingly, among those diagnosed, regular monitoring of blood pressure and blood sugar levels is lacking, as indicated by the sobering statistic that 20.4% and 14.6% of these individuals do not engage in routine monitoring, respectively. Lastly, the high percentage (63.9%) of individuals reporting no prior diagnoses of hypertension, diabetes, high cholesterol, obesity, heart disease or stroke underscores a potentially healthy demographic, albeit one that may be at risk if prevailing lifestyle trends do not improve.

As shown in Figure 2, With a notable majority of respondents indicating that they consume fast food either frequently or sometimes-86 and 248 individuals, respectively-it raises pertinent questions about the impact of such dietary choices on cardiovascular health. The high prevalence of fast-food consumption suggests a potential gap in awareness regarding the nutritional implications and health risks associated with these dietary practices. Furthermore, the relatively low numbers of individuals who either rarely or do not consume fast food-58 and 40 respondents, respectively-may reflect a

Table 3: Participants knowledge and awareness regarding CVD and their risk factors (n = 432)

Parameter		Number	Percentage
Hypertension can be a major risk factor for CVD:	Not sure	58	13.4
	No	5	1.2
	Yes	369	85.4
Cigarette smoking is considered a risk factor for CVD:	Not sure	24	5.6
	No	1	.2
	Yes	407	94.2
Having a positive family history of CVD can be a risk factor for CVD:	Not sure	91	21.1
	No	22	5.1
	Yes	319	73.8
Elevated blood cholesterol is considered a risk factor:	Not sure	58	13.4
	No	6	1.4
	Yes	368	85.2
Diabetes is regarded as a major risk factor for CVD:	Not sure	114	26.4
	No	25	5.8
	Yes	293	67.8
Obesity is one of the main risk factors associated with CVD:	Not sure	43	10.0
	No	5	1.2
	Yes	384	88.9
Do you think that a poor exercise regimen increases the risk of cardiovascular disease?	Not sure	69	16.0
	No	24	5.6
	Yes	339	78.5
Do healthy foods aggravate CVD conditions?	Not sure	44	10.2
	No	311	72.0
	Yes	77	17.8
Proper exercise increases the risk of CVD:	Not sure	47	10.9
	No	357	82.6
	Yes	28	6.5
Is feeling weak, lightheaded, or fainting a common sign of a heart attack?	Not sure	233	53.9
	No	64	14.8
	Yes	135	31.3
Which of the following represents a CVD clinical picture? *	Breathlessness	204	47.2
	Chest, shoulder, jaw, neck, or back pain	346	80.1
	Discomfort in the upper abdomen	87	20.1
Do you think swelling in the lower extremities could be a clinical sign of heart failure?	Not sure	222	51.4
	No	29	6.7
	Yes	181	41.9
Walking is considered a sort of exercise that helps lessen the chance of developing heart disease.	Not sure	34	7.9
	No	5	1.2
	Yes	393	91.0
How often do you think a serum cholesterol checkup should be done regularly?	Once every year	286	66.2
	Every two years on average	53	12.3
	Not sure	85	19.7
	The Examination is not required.	8	1.9
Can a proper diet prevent CVD?	Not sure	23	5.3
	No	6	1.4
	Yes	403	93.3
Do you believe that proper hypertension management can minimize the risk of CVD?	Not sure	47	10.9
	No	6	1.4
	Yes	379	87.7
Do you believe that maintaining a normal blood sugar level can lessen the risk of CVD?	Not sure	69	16.0
	No	9	2.1
	Yes	354	81.9

subset of the population that is more health-conscious or better informed about the risks of poor dietary habits.

Table 3 reveals significant insights into the knowledge and awareness of cardiovascular disease (CVD) and its associated risk factors among the 432 participants surveyed. Notably, a robust majority (85.4%) of respondents correctly identified hypertension as a major risk factor, indicating a commendable understanding of blood pressure's role in cardiovascular health. Similarly, the recognition of cigarette smoking as a risk factor was exceptionally high at 94.2%, suggesting a strong awareness of the dangers associated with tobacco use. However, a closer examination reveals varying degrees of uncertainty regarding other risk factors; for instance, 26.4% of participants were not sure if diabetes is a significant risk factor, which highlights a critical gap in knowledge that could impact preventive health measures. The finding that over half (53.9%) were uncertain about whether feelings of weakness, lightheadedness or fainting are common signs of a heart attack further underscores the need for improved education around these symptoms.

Table 4: Shows awareness level of cardiovascular diseases and their risk factors score results

Awareness	Frequency	Percent
High level of awareness	322	74.5
Moderate level	46	10.6
Low level of awareness	64	14.8
Total	432	100.0

Table 5: Shows knowledge level of cardiovascular diseases and their risk factors score results

Knowledge	Frequency	Percent
High level of knowledge	211	48.8
Moderate level	114	26.4
Low level of knowledge	107	24.8
Total	432	100.0

Interestingly, the data also suggests that most participants (91.0%) recognize walking as beneficial for reducing heart disease risk, while an overwhelming majority (93.3%) believe a proper diet can prevent CVD. This demonstrates a positive inclination towards lifestyle changes that can mitigate risks.

The data presented in Table 4 provides a compelling insight into the awareness levels surrounding cardiovascular diseases and their associated risk factors within the surveyed population. Notably, an impressive 74.5% of respondents demonstrate a high level of awareness, indicating a robust understanding of cardiovascular health and the vital risk factors that contribute to disease prevalence. This substantial proportion suggests that effective educational programs, public health campaigns or community initiatives may have successfully disseminated crucial information, empowering individuals to make informed decisions regarding their health. In contrast, the data reveals that only 10.6% of participants possess a moderate level of awareness, while a concerning 14.8% reflect a low level of awareness concerning these critical health issues.

The data presented in Table 5 elucidates the knowledge levels pertaining to cardiovascular diseases and their associated risk factors among the surveyed population, revealing significant insights that warrant thorough examination. A noteworthy observation is that nearly half of the respondents, accounting for 48.8%, exhibited a high level of knowledge, suggesting a commendable awareness and understanding of cardiovascular health and its implications. This is a promising indicator of public engagement with health education initiatives, which are crucial in mitigating the risks associated with these prevalent conditions. Conversely, the presence of 26.4% and 24.8% of respondents demonstrating moderate and low levels of knowledge, respectively, highlights an area of concern; it underscores the need for targeted educational interventions aimed at enhancing awareness among those less informed about cardiovascular diseases. The fact that nearly 51.2% of participants possess only moderate to low levels of understanding signals a critical gap in knowledge that could potentially result in adverse health outcomes.

Table 6 shows that the awareness level of cardiovascular diseases has statistically significant relation to educational level (p-value = 0.0001). It also shows statistically insignificant relation to gender, age, marital status, occupation, region of residence, daily life stress, smoking status, exercising, eating fruits and vegetables, eating fast food, family history of CVD, hypertension and diabetes.

Table 7 shows that the knowledge level of cardiovascular diseases has a statistically significant relation to marital status (p-value = 0.005), age (p-value = 0.024) and occupational status (p-value = 0.0001). It also shows a statistically insignificant relation to gender, educational level, region of residence, daily life stress, smoking status, exercising, eating fruits and vegetables, eating fast food, family history of CVD, hypertension and diabetes.

DISCUSSION

Cardiovascular diseases (CVD) show an alarming growth pattern in Saudi citizens due to cultural and lifestyle changes [14]. Researchers have developed this study to investigate Saudi citizens' understanding of cardiovascular diseases and their risk elements while filling gaps in public health awareness [15]. The purpose of such assessments becomes evident through past research because a thorough understanding of CVD risk factors remains crucial for disease prevention [16].

Studies showed that participants demonstrated solid awareness of CVD risk factors at 74.5% but their knowledge regarding diabetes management and symptom recognition specifically remained inadequate because only 48.8% achieved high scores [15]. Research by Issa et al. confirmed these findings by showing that numerous participants missed understanding the importance of coronary artery disease symptom identification [17]. The research by Albugami et al. strengthens our findings by demonstrating the major discrepancy between public awareness and hands-on knowledge, which poses greater health threats to community members [18].

The research discovered an important relationship that exists between educational attainment and cardiovascular health knowledge. According to Wahabi *et al.* [19] study on CVD awareness patterns by age and gender, participants with higher education achieved better results in understanding cardiovascular disease risks. Education programs specifically designed to reach lower-educated demographics should become a priority, given that numerous people were unaware of lifestyle changes that reduce cardiovascular risks [14].

Table 6: Relation between awareness level of cardiovascular diseases and sociodemographic characteristics

Parameters		Awareness level of cardiovascular diseases		Total (N = 432)	p-value*
		High awareness	Moderate or low		
Gender	Female	227	75	302	0.648
		70.5%	68.2%	69.9%	
	Male	95	35	130	
		29.5%	31.8%	30.1%	
Marital status	Single	133	44	177	0.940
		41.3%	40.0%	41.0%	
	Married	173	59	232	
		53.7%	53.6%	53.7%	
	Divorced	10	4	14	
		3.1%	3.6%	3.2%	
	Widowed	6	3	9	
		1.9%	2.7%	2.1%	
Age	less than 23	81	33	114	0.454
		25.2%	30.0%	26.4%	
	23 to 35	82	24	106	
		25.5%	21.8%	24.5%	
	35 to 45	66	27	93	
		20.5%	24.5%	21.5%	
	more than 45	93	26	119	
		28.9%	23.6%	27.5%	
Occupational status	Student	107	33	140	0.474
		33.2%	30.0%	32.4%	
	Employed	131	44	175	
		40.7%	40.0%	40.5%	
	Unemployed	45	22	67	
		14.0%	20.0%	15.5%	
	Retired	39	11	50	
		12.1%	10.0%	11.6%	
Educational level	Primary school	0	1	1	0.0001
		0.0%	0.9%	0.2%	
	Middle school	2	7	9	
		0.6%	6.4%	2.1%	
	High school	80	30	110	
		24.8%	27.3%	25.5%	
	Bachelor's degree	218	72	290	
		67.7%	65.5%	67.1%	
	Postgraduate degree	22	0	22	
		6.8%	0.0%	5.1%	
Region of residence	Northern region	26	6	32	0.391
		8.1%	5.5%	7.4%	
	Southern region	3	2	5	
		0.9%	1.8%	1.2%	
	Central region	45	23	68	
		14.0%	20.9%	15.7%	
	Eastern region	135	43	178	
		41.9%	39.1%	41.2%	
	Western region	113	36	149	
		35.1%	32.7%	34.5%	
Daily life stress is considered	Stress-free	16	7	23	0.706
		5.0%	6.4%	5.3%	
	Stressful	71	21	92	
		22.0%	19.1%	21.3%	
	Very stressful	18	4	22	
		5.6%	3.6%	5.1%	
	Moderate	217	78	295	
		67.4%	70.9%	68.3%	
Do you smoke?	Yes	25	11	36	0.437
		7.8%	10.0%	8.3%	
	No	284	97	381	
		88.2%	88.2%	88.2%	
	Ex-smoker	13	2	15	
		4.0%	1.8%	3.5%	
Do you exercise for 30 minutes a week?	Once a week	69	33	102	0.210
		21.4%	30.0%	23.6%	
	2-3 times a week	85	21	106	

Table 6: Continued

Parameters		Awareness level of cardiovascular diseases			
		High awareness	Moderate or low	Total (N = 432)	p-value*
		26.4%	19.1%	24.5%	
	More than 5 times a week	29	11	40	
		9.0%	10.0%	9.3%	
	I do not exercise	139	45	184	
		43.2%	40.9%	42.6%	
Do you include vegetables and fruits in your daily diet?	Sometimes	207	80	287	0.206
		64.3%	72.7%	66.4%	
	All the time	102	25	127	
		31.7%	22.7%	29.4%	
	I never eat vegetables or fruits	13	5	18	
		4.0%	4.5%	4.2%	
Do you eat fast food frequently?	Yes, I do	63	23	86	0.258
		19.6%	20.9%	19.9%	
	Sometimes	186	62	248	
		57.8%	56.4%	57.4%	
	Rarely	39	19	58	
		12.1%	17.3%	13.4%	
	No, I don't	34	6	40	
		10.6%	5.5%	9.3%	
Family history of cardiovascular disease:	No	211	77	288	0.390
		65.5%	70.0%	66.7%	
	Yes	111	33	144	
		34.5%	30.0%	33.3%	
Have you been diagnosed with hypertension?	No	274	96	370	0.573
		85.1%	87.3%	85.6%	
	Yes	48	14	62	
		14.9%	12.7%	14.4%	
Have you been diagnosed with Diabetes?	No	287	98	385	0.991
		89.1%	89.1%	89.1%	
	Yes	35	12	47	
		10.9%	10.9%	10.9%	

*p-value was considered significant if ≤0.05

Table 7: Relation between knowledge level of cardiovascular diseases and sociodemographic characteristics

Parameters		Awareness level of cardiovascular diseases			
		High awareness	Moderate or low	Total (N = 432)	p-value*
Gender	Female	149	153	302	0.754
		70.6%	69.2%	69.9%	
	Male	62	68	130	
		29.4%	30.8%	30.1%	
Marital status	Single	103	74	177	0.005
		48.8%	33.5%	41.0%	
	Married	97	135	232	
		46.0%	61.1%	53.7%	
	Divorced	5	9	14	
		2.4%	4.1%	3.2%	
	Widowed	6	3	9	
		2.8%	1.4%	2.1%	
Age	less than 23	61	53	114	0.024
		28.9%	24.0%	26.4%	
	23 to 35	58	48	106	
		27.5%	21.7%	24.5%	
	35 to 45	48	45	93	
		22.7%	20.4%	21.5%	
	more than 45	44	75	119	
		20.9%	33.9%	27.5%	
Occupational status	Student	85	55	140	0.0001
		40.3%	24.9%	32.4%	
	Employed	86	89	175	
		40.8%	40.3%	40.5%	
	Unemployed	22	45	67	
		10.4%	20.4%	15.5%	
	Retired	18	32	50	
		8.5%	14.5%	11.6%	

Table 6: Continued

Parameters		Awareness level of cardiovascular diseases		Total (N = 432)	p-value*
		High awareness	Moderate or low		
Educational level	Primary school	0	1	1	0.343
		0.0%	0.5%	0.2%	
	Middle school	2	7	9	
		0.9%	3.2%	2.1%	
	High school	55	55	110	
		26.1%	24.9%	25.5%	
	Bachelor's degree	141	149	290	
		66.8%	67.4%	67.1%	
	Postgraduate degree	13	9	22	
		6.2%	4.1%	5.1%	
Region of residence	Northern region	14	18	32	0.155
		6.6%	8.1%	7.4%	
	Southern region	1	4	5	
		0.5%	1.8%	1.2%	
	Central Region	26	42	68	
		12.3%	19.0%	15.7%	
	Eastern Region	95	83	178	
		45.0%	37.6%	41.2%	
	Western Region	75	74	149	
		35.5%	33.5%	34.5%	
Daily life stress is considered	Stress-free	9	14	23	0.072
		4.3%	6.3%	5.3%	
	Stressful	40	52	92	
		19.0%	23.5%	21.3%	
	Very stressful	16	6	22	
		7.6%	2.7%	5.1%	
	Moderate	146	149	295	
		69.2%	67.4%	68.3%	
Do you smoke?	Yes	15	21	36	0.295
		7.1%	9.5%	8.3%	
	No	191	190	381	
		90.5%	86.0%	88.2%	
	Ex-smoker	5	10	15	
		2.4%	4.5%	3.5%	
Do you exercise for 30 minutes a week?	Once a week	52	50	102	0.143
		24.6%	22.6%	23.6%	
	2-3 times a week	56	50	106	
		26.5%	22.6%	24.5%	
	More than 5 times a week	24	16	40	
		11.4%	7.2%	9.3%	
	I do not exercise	79	105	184	
		37.4%	47.5%	42.6%	
Do you include vegetables and fruits in your daily diet?	Sometimes	131	156	287	0.058
		62.1%	70.6%	66.4%	
	All the time	73	54	127	
		34.6%	24.4%	29.4%	
	I never eat vegetables or fruits	7	11	18	
		3.3%	5.0%	4.2%	
Do you eat fast food frequently?	Yes, I do	48	38	86	0.222
		22.7%	17.2%	19.9%	
	Sometimes	118	130	248	
		55.9%	58.8%	57.4%	
	Rarely	23	35	58	
		10.9%	15.8%	13.4%	
	No, I don't	22	18	40	
		10.4%	8.1%	9.3%	
Family history of cardiovascular disease:	No	132	156	288	0.077
		62.6%	70.6%	66.7%	
	Yes	79	65	144	
		37.4%	29.4%	33.3%	
Have you been diagnosed with hypertension?	No	177	193	370	0.307
		83.9%	87.3%	85.6%	
	Yes	34	28	62	
		16.1%	12.7%	14.4%	
Have you been diagnosed with Diabetes?	No	186	199	385	0.528
		88.2%	90.0%	89.1%	
	Yes	25	22	47	
		11.8%	10.0%	10.9%	

*p-value was considered significant if ≤0.05

Lifestyle practices displayed significant differences in our study results because 42.6% of participants lacked enough physical exercise and 57.4% regularly consumed fast food, which potentially leads to obesity and other CVD risk factors [15]. The data compiled by Alzahrani *et al.* [20] confirms that Saudi Arabia experiences widespread obesity alongside sedentary behaviors across different population segments, suggesting Saudi Arabia needs to evaluate and enhance behavioral change interventions. Research has established an essential link between poor dietary choices and non-communicable disease development, especially for cardiovascular diseases [21].

Our research revealed that numerous participants lacked any family history of cardiovascular diseases but the investigation uncovered concerning patterns of rising hypertension (14.4%) and diabetes (10.9%) rates in young adults [15]. The findings of this study confirm the research findings by Alhejely *et al.* [14], who warned about how lifestyle modifications affect health results while demonstrating the importance of creating public health strategies to manage these new risk factors. The primary care system fails to provide sufficient preventive care for diabetes management according to Al-Daghri *et al.* [22], which leads to increased cardiovascular burden for whole populations.

The study contained certain limitations during its execution. An assessment performed at one point in time hinders researchers from determining whether knowledge influences CVD risk factors among participants [19]. The participants could have displayed response bias regarding their lifestyle habits because they tended to report fewer negative behaviors than beneficial ones through the social desirability effect [23]. Additional studies should investigate cardiovascular disease knowledge among males because the current sample primarily consists of women, which might produce inaccurate results [15].

CONCLUSIONS

The research reveals important knowledge and awareness deficiencies regarding cardiovascular diseases among Saudi citizens. Several risk factors receive high levels of recognition from the population, yet the current level of understanding falls short of enabling proper changes in personal health conduct. Public health programs of the future should implement educational programs that both teach and provide tools that will help people master cardiovascular health management through lifestyle changes. Specific interventions designed for at-risk populations have the potential to lower cardiovascular disease frequency as well as related mortality and morbidity rates within this population segment. Healthier living environments need to be developed through extensive community outreach efforts to fight the increasing cardiac disease prevalence in Saudi Arabia.

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Conflicts of Interest

The authors declare no conflict of interest.

Ethical Approval

After fully explaining the study and emphasizing that participation is optional, each participant gave their informed consent. The information gathered was safely stored and utilized exclusively for study.

REFERENCES

[1] Jose, Akshaya *et al.* "Cross-sectional study to assess the knowledge regarding cardiovascular disease risk factors among adults." *IDC International Journal,* vol. 10, no. 3, July 2023, pp. 34-38. https://idcinternationaljournal.com/February-April-2023/Article_8_IDC_May_July_2023_Dr_Vinoli_et_al_full.pdf.

[2] Swed, Sarya *et al.* "Syrians' awareness of cardiovascular disease risk factors and warning indicators: a descriptive cross-sectional study." *Scientific Reports,* vol. 13, no. 1, April 2023. https://www.nature.com/articles/s41598-023-32026-4.

[3] Sulaiteen, Fahad Mohammad *et al.* "Awareness of cardiovascular disease risk factors by community pharmacists in saudi arabia." *Healthcare,* vol. 11, no. 2, January 2023. https://www.mdpi.com/2227-9032/11/2/151.

[4] Cammalleri, Vittoria *et al. Cardiovascular risk knowledge and related behaviors among youths: a cross-sectional study in a sample of Italian undergraduates* 2023, https://link.springer.com/article/10.1007/s10389-023-02133-7.

[5] Eromon, Pauline Etuajie *et al.* "Knowledge of common cardiovascular diseases and its risk factors among members of a community in South-South Nigeria." *Nigerian Journal of Medicine,* vol. 32, no. 1, May 2023, pp. 44-48. https://www.ajol.info/index.php/njm/article/view/246865.

[6] Alsaab, Saad M. *et al.* "Awareness of myocardial infarction symptoms and risk factors in Saudi Arabia: a cross-sectional study." *Cureus,* vol. 15, no. 12, July 2023.

[7] Bakhit, Mina *et al.* "Cardiovascular disease risk communication and prevention: a meta-analysis." *European Heart Journal,* vol. 45, no. 12, March 2024, pp. 998-1013. https://academic.oup.com/eurheartj/article/doi/10.1093/eurheartj/ehae002/7578334.

[8] Dhanya, Prajnya Elinar Digal *et al.* "Assess the knowledge and perception of risk factors of cardio vascular disease in hypertensive clients attaining medicine OPD of IMS and sum hospital." *International Journal of Trend in Scientific Research and Development,* vol. 8, no. 2, July 2024, pp. 123-127. https://paper.researchbib.com/view/paper/400515.

[9] Hassan, Mohamed Omar *et al.* "Exploring myocardial infarction knowledge, attitudes and practice among mogadishu's somali residents." *Vascular Health and Risk Management,* vol. 20, January 2024, pp. 13-20. https://www.tandfonline.com/doi/abs/10.2147/VHRM.S448220.

[10] Alasiri, A. S. and Mohammed Rubayyi Alruwaytie. "Awareness of cardiovascular diseases and their associated risk factors among the general population in Hail city, Saudi Arabia." *World family medicine journal,* vol. 20, no. 12, December 2020, pp. 72-78.

[11] Khalifa, Ammar *et al.* "General public awareness about symptoms and risk factors of cardiovascular diseases in Riyadh city, Saudi Arabia." *IJMDC,* vol. 3, 2019, pp. 1014-1021.

[12] Ghamri, Ranya Alawy. "Knowledge of cardiovascular diseases and associated risk factors in the general adult population of Jeddah, Saudi Arabia: A cross-sectional study examining gender disparities." *Medicine,* vol. 103, no. 24, June 2024. https://journals.lww.com/md-journal/fulltext/2024/06140/knowledge_of_cardiovascular_diseases_and.43.aspx.

[13] Ahmed, Shereen Helmy *et al.* "Public knowledge of cardiovascular diseases and its risk factors in Jeddah City, Saudi Arabia." *International Journal of Innovative Research in Medical Science,* vol. 6, no. 9, August 2021, pp. 506-511. https://www.academia.edu/download/73348103/891.pdf.

[14] Alhejely, Mahamad M. Munawir *et al.* "Influence of lifestyle changes on cardiovascular diseases in Saudi Arabia: A systematic literature review." *Cureus,* vol. 15, no. 6, July 2023. https://www.cureus.com/articles/159124-influence-of-lifestyle-changes-on-cardiovascular-diseases-in-saudi-arabia-a-systematic-literature-review.pdf.

[15] Abazid, Rami *et al.* "Analysis of three risk stratification systems in a Saudi population." *Journal of the Saudi Heart Association,* vol. 29, no. 2, April 2017, pp. 96-101. https://www.sciencedirect.com/science/article/pii/S1016731516301221.

[16] Almalki, Mohammed Ali *et al.* "Population awareness of coronary artery disease risk factors in Jeddah, Saudi Arabia: a cross-sectional study." *International Journal of General Medicine,* vol. 12, January 2019, pp. 63-70. https://www.tandfonline.com/doi/full/10.2147/IJGM.S184732.

[17] Issa, Lotfi Fahmi *et al.* "Coronary artery disease risk factors in Saudi Arabia: Knowledge, awareness and prevalence assessment." *Medical Science,* vol. 26, no. 129, November 2022, pp. 1-9.

[18] Albugami, Saad *et al.* "The perception of coronary artery disease and cardiac catheterization in Saudi Arabia:"What the public know"." *Cureus,* vol. 12, no. 1, July 2020. https://assets.cureus.com/uploads/original_article/pdf/26380/20211206-18451-1pd7yjr.pdf.

[19] Wahabi, Hayfaa *et al.* "Age and gender-specific pattern of cardiovascular disease risk factors in Saudi Arabia: a subgroup analysis from the heart health promotion study." *Healthcare,* vol. 11, no. 12, June 2023. https://www.mdpi.com/2227-9032/11/12/1737.

[20] Alzahrani, Abdullah Mousa *et al.* "Prevalence of preexisting cardiovascular diseases in prostate cancer patients and cardiac risks of hormonal therapy." *Saudi Journal of Medicine & Medical Sciences,* vol. 12, no. 1, March 2024, pp. 60-64. https://journals.lww.com/sjmm/fulltext/2024/12010/prevalence_of_preexisting_cardiovascular_diseases.9.aspx?context=latestarticles.

[21] Alshaikh, Mashael K. *et al.* "Women in Saudi Arabia and the prevalence of cardiovascular risk factors: a systematic review." *Journal of Environmental and Public Health,* vol. 1, September 2016. https://onlinelibrary.wiley.com/doi/abs/10.1155/2016/7479357.

[22] Al-Daghri, Nasser M. *et al.* "Diabetes mellitus type 2 and other chronic non-communicable diseases in the central region, Saudi Arabia (Riyadh cohort 2): A decade of an epidemic." *BMC Medicine,* vol. 9, June 2011. https://link.springer.com/article/10.1186/1741-7015-9-76.

[23] Ahmed, Shereen Helmy *et al.* "Public knowledge of cardiovascular diseases and its risk factors in Jeddah City, Saudi Arabia." *International Journal of Innovative Research in Medical Science,* vol. 6, no. 9, August 2021, pp. 506-511. https://www.academia.edu/download/73348103/891.pdf.