CAHIERS MAGELLANES-NS
Volume 06 Issue 2
2024

ISSN:1624-1940
http://magellanes.com/

KNOWLEDGE AND ATTITUDE TOWARDS CARDIOVASCULAR DISEASE AND ITS RISK FACTORS AMONG THE SAUDI POPULATION: A CROSS-SECTIONAL SURVEY

Azzam Alqashami[1], Jorri A. Alfahad*[2], Abdulaziz A. Alharbi[3], Aryam A. Alqahtani[4], Liliyan M. Alturki[5], Reem W. Alsarahaid[5], Lian A. Alaufi[6], Basem M. Mufti[7], Abdulrahman F. Nawawi[8], Khames T. Alzahrani[9]

[1]Department of Pediatrics, College of Medicine, Majmaah University, Majmaah-11952, Saudi Arabia
[2]Medical student, Al-Baha University, Al-Baha, Saudi Arabia.
[3]Medical student, Shaqra University, Shaqra, Saudi Arabia.
[4]Medical student, King Abdulaziz University, Jeddah, Saudi Arabia.
[5]Medical student, King Faisal University, Al-Ahsa, Saudi Arabia.
[6]Medical student, University of Jeddah, Jeddah, Saudi Arabia.
[7]Medical student, Umm Al-Qura University, Makkah, Saudi Arabia.
[8]Medical intern, University of Jeddah, Jeddah, Saudi Arabia.
[9]BDS, PGD Endo from Stanford University, Saudi Board of Endodontic SR, King Faisal Specialist Hospital & Research Centre, Riyadh, Saudi Arabia.
***Corresponding author**: Jorri A. Alfahad; **Email**: Jorrialfahad@gmail.com

Abstract

Background: Cardiovascular diseases (CVDs) pose a significant health threat globally, particularly in developing nations like Saudi Arabia. Research indicates that 42% of deaths in Saudi Arabia are associated with CVD, and awareness of its risk factors among the population is alarmingly low. This study aimed to assess the knowledge and attitudes regarding cardiovascular diseases and their risk factors among the Saudi population to address the critical knowledge gaps identified in previous research.

Methods: A cross-sectional survey was conducted from July to November 2024, involving Saudi adults over the age of 18. Participants were recruited through a random sampling procedure via various online platforms. A structured questionnaire, designed to evaluate awareness and attitudes towards CVD and its risk factors, was administered. Data analysis included demographic profiling and comparison of knowledge and attitude levels among respondents.

Results: A total of 1,202 participants were surveyed, predominantly female (76.4%), with a mean age of 28.9 years. The majority (93.8%) recognized smoking as a CVD risk factor; however, only 14.8% correctly identified reduced physical activity as a risk. Awareness regarding obesity's association with CVD was high (96.0%), yet 83.4% misunderstood the implications of irregular eating habits. Symptoms of CVD showed varied recognition; 78.2% identified palpitations, while only 39.4% acknowledged excessive sweating as significant. Notably, 84.5% exhibited a positive attitude towards cardiovascular health, supporting regular physical activity and smoking cessation.

Conclusion: This study highlights significant gaps in knowledge about CVD risk factors within the Saudi population, despite a generally positive attitude towards healthy lifestyle practices. There is an

ISSN:1624-1940
http://magellanes.com/

urgent need for targeted educational interventions to improve awareness, particularly regarding lifestyle risk factors and less recognized symptoms of CVD. Enhanced public health strategies could mitigate the rising burden of cardiovascular disease in Saudi Arabia.

Keywords: Cardiovascular diseases, knowledge, risk factors, Saudi Arabia.

Introduction: A group of medical conditions affecting the heart and blood arteries, known as cardiovascular diseases (CVDs), including deep vein thrombosis, pulmonary embolism, coronary heart disease, and other diseases associated with the heart [1] . Non-communicable diseases (NCDs) pose a serious risk to public health in nations that are developing and are the primary cause of death globally [2]. The global problem of cardiovascular disease (CVD) mortality and morbidity is constantly increasing and affecting developing countries more than developed ones because of factors like pollution, low education, low resources, and socioeconomic stress [3]. CVD is now increasing steadily worldwide and has become a major public health problem of the 21st century [4]. Research indicates that 42% of deaths in Saudi Arabia are thought to be related to CVD [5]. Many CVD patients in KSA have at least 1 of the non-modifiable risk factors associated with cardiovascular diseases, indicating insufficient awareness of the disease [6].For instance, 55.5% of the Saudi Arabian population is either hypertensive or prehypertensive and 20.2% of the population is diabetic [7]. In 2024, a study conducted in the western region of KSA discovered that female participants knew more about Acute Coronary Syndrome (ACS) than their male counterparts [8]. Another study conducted in Hail showed disparities in the level of awareness regarding coronary artery disease risk factors with differing percentages in TV watching, smoking, lack of physical activity, and family history of coronary artery disease. However, there was a lack of awareness of factors such as diabetes, family history of hypertension, and hyperlipidemia [9]. One research released in 2019 in Saudia Arabia revealed that most of the participants were unaware that feeling faint, dizzy, and weak are typical signs of a heart attack [10]. The primary reason for conducting a study on knowledge and attitude regarding cardiovascular disease (CVD) and its risk factors among the Saudi population is to address the rising prevalence of CVD in Saudi Arabia due to the limitation of knowledge that was found in previous research that was done in Saudi Arabia.

Methodology**:**

Study design

This cross-sectional study was conducted between July 2024 –November 2024 among Saudi populations in Saudi Arabia

Subject: Participants, recruitment and sampling procedure:

Saudi adults over the age of 18 comprised the study's population. Participants were chosen from those who received the questionnaire between July and December 2024.

Sample size:

To determine the bare minimum of responders required to form a representative sample for the entire population, sample size calculations were performed. The Raosoft sample size calculator was used to calculate the sample size. The sample size that was determined was 385, with an indicator percentage of 0.50, a margin of error of 5%, and a confidence interval (CI) of 95%. (Raosoft, Inc., Seattle, WA, USA) (22) used the following formula, applying means and standard deviation, to determine the sample size of 385 individuals. The maximum allowed marginal error (=0.05) and the standard deviation

ISSN:1624-1940
http://magellanes.com/

(=1.96) for the 95% Confidence interval are considered. That means n= (1.96) ^2X 0.50X 0.50/ (0.50) ^2= 385 participants is the estimated minimum sample size needed for this research.

Inclusion and Exclusion Criteria:
Participants in this study were Saudi men and women above the age of eighteen who volunteered to take part. Non-Saudis and those under the age of eighteen were excluded.

Method for data collection, instrument, and score system:
Data collection instrument (tool)
The study instrument was a structured, self-administered, and anonymous questionnaire in Arabic that was used in a previous study [11]. Our survey implemented a combination of closed-response questions and semantic differential scales to identify the knowledge and attitudes toward cardiovascular disease and its risk factors in the Saudi population. The survey consisted of 33 questions arranged into four sections. The assigned sections were sociodemographic and lifestyle characteristics, knowledge of cardiovascular disease risk factors, knowledge of symptoms associated with cardiovascular disease, and the fourth and last section was attitude regarding cardiovascular risk factors.
Data collection method (technique)
The data collection technique for this questionnaire applied a random sampling procedure to target the Saudi populace to collect data. To guarantee a broad reach across diverse demographics, the survey was created and distributed on various online platforms. Informed consent was obtained to emphasize the confidential and voluntary nature of their participation. Our approach guaranteed representative and diverse data on knowledge and attitudes toward cardiovascular disease and its risk factors.

Scoring system:
We used a questionnaire that included 26 items to assess knowledge and attitudes; 6 items for Sociodemographic and lifestyle, 18 for knowledge and 8 for attitudes; one point was given for each accurate response, zero for incorrect responses, and "I don't know." The maximum score was 58, and the scoring system was carried out as
Bloom's cut-off points, 80-100%, 60–79%, less than 59%, based on their scores, the participants were graded into three categories. The knowledge score ranged from 0 to 18 points. Individuals with a score of 10 or less were considered to have low
knowledge, individuals with a score between 11 and 13 were considered to have moderate knowledge, and individuals with a score of 14 or higher
were considered to have high knowledge. To assess people's attitudes toward cardiovascular diseases and its risk factors, a total of 8 statements have been used. A five-point Likert scale was used from 5-1 as strongly agree to disagree strongly, score
ranged from 1 to 40 points and was divided into three levels: individuals with a score of 23 points or less were considered to have negative attitude, individuals with a score between 24 and 31 points were considered to have a neutral attitude, and individuals with a score of 32 points or higher were considered to have a positive attitude.

Pilot test:
A pilot study involving 20 participants was conducted to evaluate its clarity and the study's feasibility. Data from the pilot study was excluded from the final analysis.
Analyzes and entry method:
The Microsoft Excel software (2021) for Windows was used to enter the acquired data into the

ISSN:1624-1940
http://magellanes.com/

computer. The Statistical Package of Social-Science Software (SPSS) application, version 21.0, was then used to import the data to carry out a statistical analysis.

Results:

Table (1) displays various demographic parameters of the participants with a total number of (1202). The mean age of participants is approximately 28.9 years, with a standard deviation of 12.0, indicating a diverse age range, predominantly skewed towards older age brackets, particularly those over 35 years, which constitute 28.5% of the sample. Gender distribution is heavily tilted towards females, comprising 76.4%, reflecting potential demographic or cultural patterns in the participant pool. A substantial majority are single (62.9%), with a small fraction identifying as divorced or widowed. Geographically, the largest contingent comes from the Western region (32.8%), highlighting potential regional disparities in experiences or perspectives among participants. Educational attainment is notably high, with 66.2% holding bachelor's degrees, which may correlate with occupational status, where over half are students. Financially, 65.1% report a monthly income of 4,000 or less, aligning with prevailing economic challenges.

Table (1): Sociodemographic characteristics of participants (n=1202)

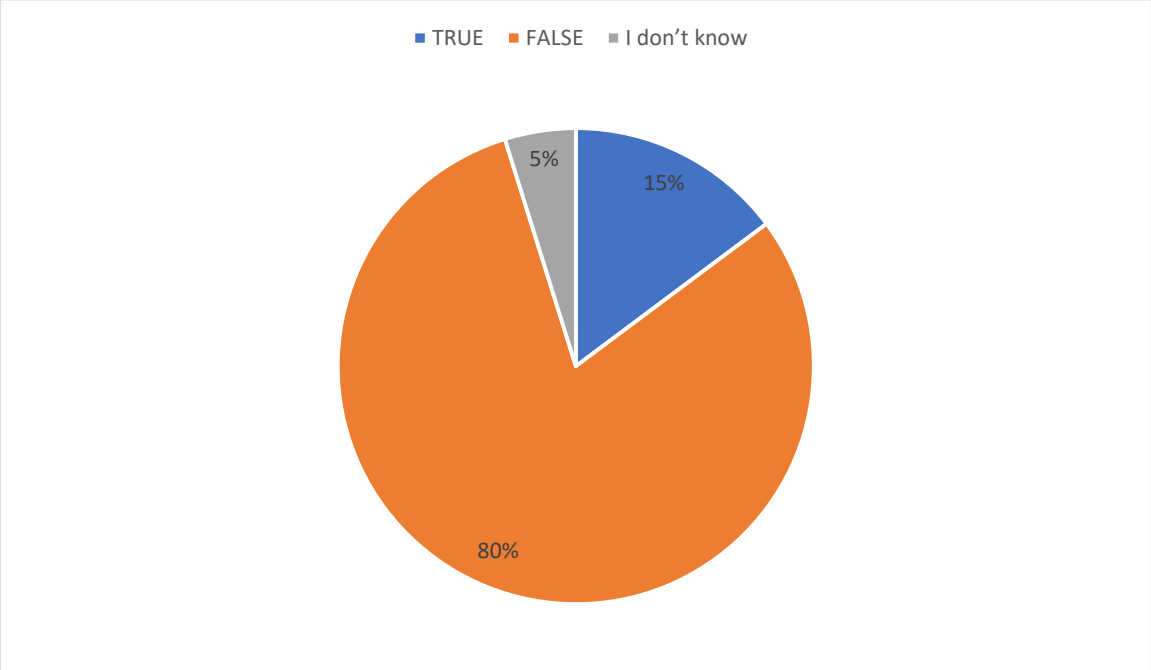
Parameter		***No.***	***Percent (%)***
Age (Mean: 28.9, STD:12.0)	less than 20 years	236	19.6
	20 to 21	284	23.6
	22 to 24	190	15.8
	25 to 35	150	12.5
	more than 35	342	28.5
Gender	Female	918	76.4
	Male	284	23.6
Marital status	Single	756	62.9
	Married	420	34.9
	Divorced	14	1.2
	Widowed	12	1.0
Residential region	Northern region	42	3.5
	Southern region	198	16.5
	Central region	238	19.8
	Eastern region	330	27.5
	Western region	394	32.8
Educational level	Middle school	12	1.0
	High school	336	28.0
	Bachelor’s degree	796	66.2
	Postgraduate degree	58	4.8
Occupational status	Student	678	56.4
	Health sector employee	44	3.7
	Non-health sector employee	252	21.0
	Freelancer	22	1.8

ISSN:1624-1940
http://magellanes.com/

	Unemployed	162	13.5
	Retired	44	3.7
Monthly income	4000 or less	782	65.1
	5000 to 10000	140	11.6
	11000 to 15000	128	10.6
	More than 15000	152	12.6

As shown in figure 1, it appears that a majority of respondents (80.4%) correctly identified that reduced physical activity increases the risk of cardiovascular disease by selecting "FALSE." However, 14.8% of respondents mistakenly believe that reduced physical activity does not increase this risk by choosing "TRUE." Additionally, 4.8% of respondents indicated uncertainty with the "I don't know" option.

Figure (1): Illustrates if reduced physical activity does not increase the risk for CVDs according to participants.



As illustrated in table (2), The data presented, which examines parameters related to knowledge of cardiovascular disease (CVD) risk factors among 1,202 respondents, reveals significant insights into public awareness and understanding of these critical health issues. Notably, a large majority, 93.8%, recognize smoking as a risk factor, highlighting awareness surrounding this behavior. Conversely, only 14.8% correctly identify that reduced physical activity does indeed increases risk, indicating a potential gap in knowledge about lifestyle factors. Furthermore, the high percentage (96.0%) acknowledging the link between obesity and CVD underscores a strong understanding that excess weight is detrimental. However, even more concerning is the substantial lack of awareness regarding the impact of irregular eating habits, where 83.4% mistakenly view them as neutral to health outcomes. The perception of aging

ISSN:1624-1940
http://magellanes.com/

as a risk factor aligns with demographic realities; however, the mixed understanding of conditions like anemia and thyroid dysfunction as risk factors needs addressing.

Table (2): Parameters related to knowledge of cardiovascular disease risk factors (n=1202).

Parameter		***No.***	***Percent (%)***
Most cases of cardiovascular disease are inherited	True	456	37.9
	False	480	39.9
	I don't know	266	22.1
One of the risk factors for cardiovascular disease is smoking	True	1128	93.8
	False	44	3.7
	I don't know	30	2.5
Reduced physical activity does not increase the risk of cardiovascular disease	True	178	14.8
	False	966	80.4
	I don't know	58	4.8
Being obese elevates the risk of cardiovascular disease	True	1154	96.0
	False	12	1.0
	I don't know	36	3.0
Irregular eating habits don't negatively impact health	True	152	12.6
	False	1002	83.4
	I don't know	48	4.0
Growing older (over 45 for men and above 55 for women) is associated with increased risk factors for CVD	True	856	71.2
	False	102	8.5
	I don't know	244	20.3
Anaemia considered one of the CVD risk factors	True	566	47.1
	False	176	14.6
	I don't know	460	38.3
People with Diabetes mellitus have a higher risk of CVD than people who don't have	True	760	63.2
	False	100	8.3
	I don't know	342	28.5
Thyroid dysfunctions contribute to an increased risk of cardiovascular disease	True	526	43.8
	False	80	6.7
	I don't know	596	49.6
A history of stoke considered a risk factor for developing cardiovascular disease	True	762	63.4
	False	90	7.5
	I don't know	350	29.1
Having a history of cardiovascular disease increases the risk of future cardiovascular problems	True	996	82.9
	False	64	5.3
	I don't know	142	11.8

As shown in figure (2), The data indicates strong support for routine healthcare consultations to manage cardiovascular disease risk. A significant 67.2% of respondents selected "Strongest agree," reflecting

ISSN:1624-1940
http://magellanes.com/

widespread recognition of the importance of regular medical advice. Another 26.3% agreed, further emphasizing the majority's understanding of this practice's value. However, 5.2% of respondents are either neutral, with 5.2% choosing "Neither agree nor disagree," or in disagreement (1.1% combined for "Disagree" and "Strongly disagree").

Figure (2): Illustrates if routine consultation is important to manage cardiovascular disease risk among participants.

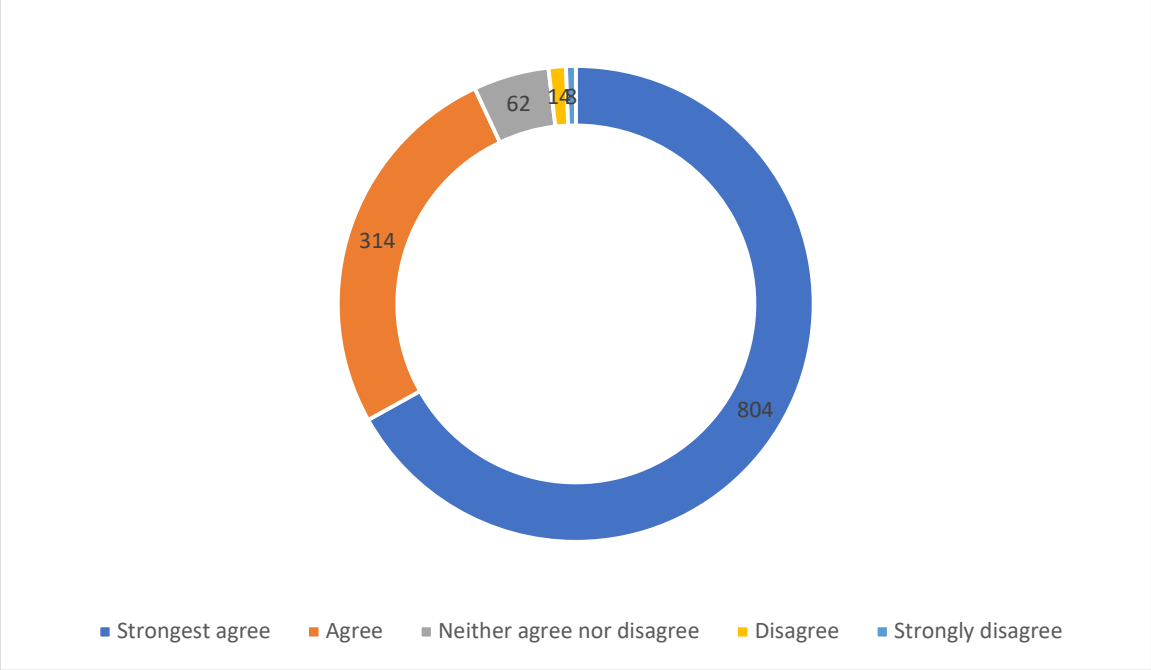


Table (3) reveals a comprehensive overview of participants' awareness regarding the symptoms associated with cardiovascular disease, revealing a significant disparity in knowledge levels across various symptoms. Notably, the highest percentage of accurate recognition was for palpitations, with 78.2% of respondents identifying them as a potential indicator of cardiovascular issues. Conversely, the perception of excessive sweating as a symptom appears to be markedly low, with only 39.4% of participants acknowledging its relevance. This suggests not only a critical gap in public knowledge but also highlights the urgent need for educational initiatives aimed at improving awareness of less commonly recognized symptoms. The relatively high percentage of respondents indicating uncertainty, particularly in connection with symptoms like notable weight gain and dizziness.

Table (3): Participants' knowledge of symptoms associated with cardiovascular disease (n=1202).

Parameter	***True***	***False***	***I don't know***
Experiencing pain in the chest, jaw, neck, or left shoulder is a sign of cardiovascular disease	768 63.9%	128 10.6%	306 25.5%

ISSN:1624-1940
http://magellanes.com/

shortness of breath, particularly when lying down, indicates a possible cardiovascular issue	820 68.2%	72 6.0%	310 25.8%
Can excessive sweating be a symptom of cardiovascular disease	474 39.4%	184 15.3%	544 45.3%
dizziness is a possible symptom of cardiovascular disease	666 55.4%	150 12.5%	386 32.1%
losing consciousness is a warning sign of cardiovascular disease	720 59.9%	126 10.5%	356 29.6%
Notable weight gain is a symptom that could be linked to cardiovascular disease	554 46.1%	220 18.3%	428 35.6%
One of the possible signs of cardiovascular disease is palpitations	940 78.2%	58 4.8%	204 17.0%

The data presented in Table 4 offers compelling insights into participants' attitudes regarding cardiovascular risk factors among a substantial cohort of 1,202 individuals. A notable majority of respondents, comprising 69.4%, strongly agreed that engaging in regular physical activity is crucial for lowering cardiovascular disease risk, underscoring a robust recognition of the importance of exercise in heart health. Similarly, 78.7% of participants strongly affirmed that quitting smoking is a key step in reducing cardiovascular disease risk, reflecting a clear understanding of smoking's detrimental impact. Additionally, the significant responses advocating for the management of body weight (67.9% strongly agree) and the necessity of routine consultations with healthcare providers (66.9% strongly agree) highlight the participants' awareness of lifestyle modifications as vital strategies in cardiovascular health management. Conversely, the lower agreement rates regarding traditional medicine approaches—such as acupuncture—suggest a need for further education on the complementary roles such practices might play.

Table (4): participants' attitude regarding cardiovascular risk factors (n=1202).

Parameter		***No.***	***Percent (%)***
Consuming foods low in fats is an effective strategy to reduce cardiovascular disease risk	Strongest agree	604	50.2
	Agree	482	40.1
	Neither agree nor disagree	102	8.5
	Disagree	12	1.0
	Strongly disagree	2	.2
Do you believe that engaging in regular physical activity is crucial for lowering the risk of cardiovascular disease?	Strongest agree	834	69.4
	Agree	318	26.5
	Neither agree nor disagree	44	3.7
	Disagree	2	.2
	Strongly disagree	4	.3
Is maintaining a normal body weight important for minimizing the risk of developing cardiovascular disease?	Strongest agree	816	67.9
	Agree	334	27.8
	Neither agree nor disagree	46	3.8
	Disagree	4	.3

ISSN:1624-1940
http://magellanes.com/

	Strongly disagree	2	.2
Do you think quitting smoking is a key step in reducing cardiovascular disease risk?	Strongest agree	946	78.7
	Agree	190	15.8
	Neither agree nor disagree	42	3.5
	Disagree	20	1.7
	Strongly disagree	4	.3
Should you routinely consult with a healthcare provider about your health and medications to manage cardiovascular disease risk?	Strongest agree	804	66.9
	Agree	314	26.1
	Neither agree nor disagree	62	5.2
	Disagree	14	1.2
	Strongly disagree	8	.7
Is traditional medicine, such as acupuncture, a valid approach to managing cardiovascular health?	Strongest agree	118	9.8
	Agree	112	9.3
	Neither agree nor disagree	596	49.6
	Disagree	266	22.1
	Strongly disagree	110	9.2
Is it essential to consistently monitor your blood pressure, blood sugar, and lipid levels to effectively manage cardiovascular health?	Strongest agree	812	67.6
	Agree	332	27.6
	Neither agree nor disagree	44	3.7
	Disagree	10	.8
	Strongly disagree	4	.3
Do you agree that staying informed about cardiovascular disease through media or electronic resources is important for health management?	Strongest agree	564	46.9
	Agree	414	34.4
	Neither agree nor disagree	182	15.1
	Disagree	28	2.3
	Strongly disagree	14	1.2

The data presented in Table 5 offers a comprehensive overview of the knowledge levels regarding cardiovascular disease and its associated risk factors among a sample population of 1,202 respondents. Notably, the results reveal a concerning distribution of knowledge levels, with 34.4% of participants demonstrating a high level of understanding, while a nearly equivalent portion, 34.8%, fell into the low knowledge category. The moderate knowledge level, encompassing 30.8% of the sample, further underscores the mix of awareness present within the population.

Table (5): Shows knowledge towards cardiovascular disease and its risk factors score results.

	Frequency	**Percent**
High knowledge level	414	34.4
Moderate level	370	30.8
Low knowledge level	418	34.8
Total	1202	100.0

The data presented in Table 6 encapsulates a comprehensive assessment of attitudes towards

ISSN:1624-1940
http://magellanes.com/

cardiovascular disease and its associated risk factors among a sample population of 1,202 individuals. A striking 84.5% of respondents demonstrated a positive attitude, indicating a substantial recognition of the importance of cardiovascular health and a proactive stance towards mitigating associated risks. Conversely, the neutral attitude category comprises 14.6%, reflecting a segment of the population that may require further education to foster a more engaged outlook toward cardiovascular health. Notably, a mere 0.8% of respondents harbored a negative attitude, which could signal a skewed perception or misunderstanding of cardiovascular health implications.

Table (6): Shows attitude towards cardiovascular disease and its risk factors score results.

	Frequency	**Percent**
Positive Attitude	1016	84.5
Neutral attitude	176	14.6
Negative attitude	10	.8
Total	1202	100.0

Table (7) shows that knowledge level towards cardiovascular disease and its risk factors has statistically significant relation to age (P value=0.0001), occupational status (P value=0.003). It also shows statistically insignificant relation to gender, marital status, residential region, educational level, and monthly income.

Table (7): Relation between knowledge level towards cardiovascular disease and its risk factors and sociodemographic characteristics.

Parameters		***Knowledge level***		***Total (N=1202)***	***P value****
		High or moderate level	**Low knowledge level**		
Gender	Female	612	306	918	0.059
		78.1%	73.2%	76.4%	
	Male	172	112	284	
		21.9%	26.8%	23.6%	
Age	Less than 20 years	134	102	236	0.0001
		17.1%	24.4%	19.6%	
	20 to 21	194	90	284	
		24.7%	21.5%	23.6%	
	22 to 24	156	34	190	
		19.9%	8.1%	15.8%	
	25 to 35	78	72	150	
		9.9%	17.2%	12.5%	
	More than 35	222	120	342	
		28.3%	28.7%	28.5%	
Marital status	Single	508	248	756	0.239
		64.8%	59.3%	62.9%	
	Married	258	162	420	

ISSN:1624-1940
http://magellanes.com/

		32.9%	38.8%	34.9%	
	Divorced	10	4	14	
		1.3%	1.0%	1.2%	
	Widowed	8	4	12	
		1.0%	1.0%	1.0%	
Residential region	Northern region	32	10	42	0.236
		4.1%	2.4%	3.5%	
	Southern region	132	66	198	
		16.8%	15.8%	16.5%	
	Central region	156	82	238	
		19.9%	19.6%	19.8%	
	Eastern region	222	108	330	
		28.3%	25.8%	27.5%	
	Western region	242	152	394	
		30.9%	36.4%	32.8%	
Educational level	Middle school	6	6	12	0.732
		0.8%	1.4%	1.0%	
	High school	218	118	336	
		27.8%	28.2%	28.0%	
	Bachelor's degree	522	274	796	
		66.6%	65.6%	66.2%	
	Postgraduate degree	38	20	58	
		4.8%	4.8%	4.8%	
Occupational status	Student	458	220	678	0.003
		58.4%	52.6%	56.4%	
	Health sector employee	38	6	44	
		4.8%	1.4%	3.7%	
	Non-health sector employee	156	96	252	
		19.9%	23.0%	21.0%	
	Freelancer	12	10	22	
		1.5%	2.4%	1.8%	
	Unemployed	92	70	162	
		11.7%	16.7%	13.5%	
	Retired	28	16	44	
		3.6%	3.8%	3.7%	
Monthly income	4000 or less	516	266	782	0.299
		65.8%	63.6%	65.1%	
	5000 to 10000	82	58	140	
		10.5%	13.9%	11.6%	
	11000 to 15000	88	40	128	
		11.2%	9.6%	10.6%	
	More than 15000	98	54	152	
		12.5%	12.9%	12.6%	

P value was considered significant if ≤ 0.05.

ISSN:1624-1940
http://magellanes.com/

Table (8) shows attitude level towards cardiovascular disease and its risk factors has statistically significant relation to age (P value=0.011), marital status (P value=0.016), occupational status (P value=0.023). It also shows statistically insignificant relation to gender, residential region, educational level, and monthly income.

Table (8): Attitude level in association with sociodemographic characteristics.

Parameters		***Attitude level***		***Total (N=1202)***	***P value****
		Neutral or negative attitude	**Positive Attitude**		
Gender	Female	152	766	918	0.062
		81.7%	75.4%	76.4%	
	Male	34	250	284	
		18.3%	24.6%	23.6%	
Age	Less than 20 years	44	192	236	0.011
		23.7%	18.9%	19.6%	
	20 to 21	26	258	284	
		14.0%	25.4%	23.6%	
	22 to 24	30	160	190	
		16.1%	15.7%	15.8%	
	25 to 35	30	120	150	
		16.1%	11.8%	12.5%	
	More than 35	56	286	342	
		30.1%	28.1%	28.5%	
Marital status	Single	114	642	756	0.016
		61.3%	63.2%	62.9%	
	Married	66	354	420	
		35.5%	34.8%	34.9%	
	Divorced	6	8	14	
		3.2%	0.8%	1.2%	
	Widowed	0	12	12	
		0.0%	1.2%	1.0%	
Residential region	Northern region	4	38	42	0.320
		2.2%	3.7%	3.5%	
	Southern region	30	168	198	
		16.1%	16.5%	16.5%	
	Central region	36	202	238	
		19.4%	19.9%	19.8%	
	Eastern region	44	286	330	
		23.7%	28.1%	27.5%	
	Western region	72	322	394	
		38.7%	31.7%	32.8%	
Educational level	Middle school	0	12	12	0.118
		0.0%	1.2%	1.0%	

ISSN:1624-1940
http://magellanes.com/

	High school	54	282	336	
		29.0%	27.8%	28.0%	
	Bachelor's degree	118	678	796	
		63.4%	66.7%	66.2%	
	Postgraduate degree	14	44	58	
		7.5%	4.3%	4.8%	
Occupational status	Student	102	576	678	0.023
		54.8%	56.7%	56.4%	
	Health sector employee	6	38	44	
		3.2%	3.7%	3.7%	
	Non-health sector employee	32	220	252	
		17.2%	21.7%	21.0%	
	Freelancer	6	16	22	
		3.2%	1.6%	1.8%	
	Unemployed	26	136	162	
		14.0%	13.4%	13.5%	
	Retired	14	30	44	
		7.5%	3.0%	3.7%	
Monthly income	4000 or less	122	660	782	0.067
		65.6%	65.0%	65.1%	
	5000 to 10000	12	128	140	
		6.5%	12.6%	11.6%	
	11000 to 15000	24	104	128	
		12.9%	10.2%	10.6%	
	More than 15000	28	124	152	
		15.1%	12.2%	12.6%	

P value was considered significant if ≤ 0.05.

Discussion:

Cardiovascular disease continues to be a leading cause of mortality worldwide [12], contributing significantly to the disease burden in various populations globally. According to studies on the global burden of disease, there were approximately 422.7 million cases of CVD, leading to 17.92 million deaths globally in 2015. Developing nations bear a considerable burden of CVD, yet awareness of the disease and its risk factors remains limited [13]. Individuals living in poverty, particularly those in low-income countries, are disproportionately affected by CVD. Additionally, evidence indicates that the prevalence of CVD is on the rise, presenting a public health challenge in these regions. The American Heart Association assesses cardiovascular health based on seven key factors: physical activity, smoking habits, blood sugar levels, body weight, cholesterol levels, blood pressure, and diet [14]. Non-modifiable risk factors include age, sex, family history, and race, while modifiable risk factors encompass high blood pressure, dyslipidemia, smoking, diabetes, obesity, lack of physical activity, unhealthy dietary habits, and stress [15]. These risk factors can lead to a variety of complications, including coronary artery disease, cardiac dysrhythmias, cerebrovascular disease, cardiomyopathies, and peripheral vascular disease [16], highlighting the critical need to manage modifiable risk factors. Therefore, the purpose of this study was to identify the public's knowledge and attitude in Saudi Arabia regarding cardiovascular diseases and their risk factors.

ISSN:1624-1940
http://magellanes.com/

Our study on knowledge and attitudes towards cardiovascular disease (CVD) among the Saudi population contributes to the growing body of literature highlighting significant gaps in awareness of CVD risk factors. Although an impressive 93.8% of our participants identified smoking as a risk factor, we observed a concerning lack of awareness regarding other lifestyle factors, with only 14.8% recognizing the increased risk associated with reduced physical activity. This finding resonates with a systematic review indicating similarly low levels of knowledge and awareness of CVD and its risk factors among populations in Sub-Saharan Africa, where many adults are unable to identify any cardiovascular risk factors [17]. Notably, a study by Lemma B Negesa et al. [18] reported only suboptimal knowledge regarding CV risk factors among CVD patients, with a mean knowledge score of 70.5%. This is corresponding to findings from studies in India and the United Arab Emirates, suggesting a widespread issue with knowledge deficits across diverse populations [19, 20]. In contrast, Wang et al. [21] demonstrated that a targeted rehabilitation and health education program significantly improved knowledge and attitudes within their CVD cohort, reaching a positive attitude level of 93.94%, which was considerably higher than their non-CVD counterparts. This suggests that enhancing education could potentialize improvements, similar to the positive attitudes observed in our Saudi participants, where 69.4% supported regular physical activity and 78.7% endorsed smoking cessation. Moreover, Marc Machaalani et al. [22] noted a strong willingness among patients to adopt healthier lifestyle choices, contrasting with the noteworthily lower attitudes reported by Koohi and Khalili in their cohort [23]. Further illustrating the variability in knowledge, a 2024 study by Workina et al. [24] on diabetes patients found that only 62.3% possessed good knowledge of modifiable CVD risk factors, while Muhihi et al. reported a troublingly low knowledge score of just 25.4% among young adults [25]. This discrepancy highlights the inconsistent understanding and awareness of CVD risk factors within various demographic groups. In regions such as Sub-Saharan Africa, knowledge remains alarmingly deficient, with nearly half of adults in Nigeria unable to name a single CV risk factor [26], and a striking 36% of adults in Cameroon also lacking awareness of CVD risks [27]. Conversely, South Africa reflects a more positive trend, as the majority of adults acknowledge smoking and excessive alcohol consumption as significant risk factors for CVD [28]. Additionally, the findings of Waśniowska et al. corroborated our results by indicating insufficient knowledge of cardiovascular risk factors in the residents of Małopolska Voivodeship [29]. Further emphasizing this issue, Rosediani et al. pointed out that only a minority of women in North-Eastern Malaysia were aware of atypical CVD symptoms, such as nausea and pain in the jaw and left shoulder [30]. In contrast, studies conducted by Nursyafiza et al. and Koohi et al. reported satisfactory levels of knowledge among their participants in Kuantan and Tehran, respectively, suggesting that contextual factors may influence awareness levels significantly [31, 32].

Conclusion:

In conclusion, this study underscores significant gaps in knowledge and awareness regarding cardiovascular disease (CVD) and its risk factors among the Saudi population. While a commendable 93.8% of participants recognized smoking as a key risk factor, alarming deficits were evident concerning other lifestyle factors, with only 14.8% acknowledging the risks associated with reduced physical activity. Moreover, despite a positive attitude toward key health behaviors, such as engaging in regular exercise and smoking cessation, nearly 34.8% of participants fell within the low knowledge category. These findings suggest an urgent need for comprehensive educational initiatives aimed at enhancing awareness and understanding of CVD risk factors, particularly among younger age groups and less educated populations. Addressing these gaps can empower individuals to adopt healthier

lifestyles, ultimately contributing to the reduction of CVD prevalence in Saudi Arabia. Further targeted research is essential to monitor the efficacy of these educational interventions over time.

Ethical approval

An informed consent was obtained from each participant after explaining the study in full and clarifying that participation is voluntary. Data collected were securely saved and used for research purposes only.

Funding

There was no external funding for this study.

Conflict of interests

The authors declare no conflict of interest.

Informed consent:

Written informed consent was acquired from each individual study participant.

Data and materials availability

All data associated with this study are present in the paper.

Reference**:**

1. Tharu RP, Rawal S. Assessment of Knowledge and Attitude Regarding Risk Factors of Cardiovascular Disease among General People Residing in Nepalgunj. Am J Public Heal Res [Internet]. 2021;9(4):130–41. Available from: http://pubs.sciepub.com/ajphr/9/4/2
2. Budhathoki R, Thulung B. Awareness regarding Cardiovascular Disease Risk Factors among Adults attending at a Teaching Hospital, Bharatpur. 10(4):1–8. Available from: www.iosrjournals.org
3. Jilani UA, Iqbal M, Jilani SA. Cardiovascular Disease Risk Factors' Awareness and Prevalence among College Students in Karachi City. Pakistan J Public Heal [Internet]. 2021;11(2):87–94. Available from: https://pjph.org/pjph/article/view/718
4. Yang X, Qin Q, Wang Y, Ma Z, Li Q, Zhang F, et al. Knowledge, attitudes, and practices regarding cardiovascular disease prevention among middle school students in China: a cross-sectional study. Front Public Heal. 2024;12(January):1–11.
5. Ghamri RA. Knowledge of cardiovascular diseases and associated risk factors in the general adult population of Jeddah, Saudi Arabia A cross-sectional study examining gender disparities. Med (United States). 2024;103(24).
6. Alzahrani S, Alosaimi ME, Bin Oways FF, Hamdan AO, Suqati AT, Alhazmi FS, et al. Knowledge of Cardiovascular Diseases and Their Risk Factors among the Public in Saudi Arabia. Arch Pharm Pract. 2019;10(3):47–51.
7. Mujamammi A, Alluhaymid Y, Alshibani M, Alotaibi F, Alzahrani K, Alotaibi A, et al. Awareness of cardiovascular disease associated risk factors among Saudis in Riyadh City. J Fam Med Prim Care. 2020;9(6):3100.
8. Alkalash SH, Alfaqih AH, Alsohabi ER, Al-faqih AH, Al-hayli AA. Public Knowledge and

ISSN:1624-1940
http://magellanes.com/

Attitude Regarding Symptoms of Acute Coronary Syndrome and Its Related Risk Factors in Western Region , Saudi Arabia. 2024;16(6).
9. Elsheikh EA, Alqahtani OH, Aljedani HM, AlKulayb SM, Bamousa OM, Althobaiti RM, et al. Assessment of Knowledge and Awareness Regarding Coronary Artery Disease Risk Factors Among the Saudi Arabian Population: A Cross-Sectional Study. Cureus. 2024;16(1):5–11.
10. Khalifa A, Alotaibi A, Albahlal A, Alotaibi F, Alkurdi F, Atef M, et al. General public awareness about symptoms and risk factors of cardiovascular diseases in Riyadh city, Saudi Arabia. Int J Med Dev Ctries. 2019;3(July):1014–21.
11. AlShehri H, Alqahtani A, Al Mansour A, Alwadei R, Abuanq L, Alkhazaim S, et al. Knowledge and Attitudes Toward Cardiovascular Diseases and Their Risk Factors Among the Najran Population in Saudi Arabia. Cureus. 2023;15(10).
12. Roth GA, Johnson C, Abajobir A, Abd-Allah F, Abera SF, Abyu G, et al. Global, Regional, and National Burden of Cardiovascular Diseases for 10 Causes, 1990 to 2015. J Am Coll Cardiol. 2017;70(1):1–25. Epub 2017/05/22. 10.1016/j.jacc.2017.04.052 . [DOI] [PMC free article] [PubMed] [Google Scholar]
13. Andhuvan G, Ayyappan P, Sahana C, Poovizhi S, Sivasakthi K. Knowledge of modifiable risk factors of heart disease among patients with cardiovascular risk. Asian J Pharm Clin Res. 2017;10(1):99–102. 10.22159/ajpcr.2017.v10i1.14180 [DOI] [Google Scholar]
14. Akintunde AA, Akintunde T, Opadijo OG. Knowledge of heart disease risk factors among workers in a Nigerian University: A call for concern. Niger Med J. 2015;56(2):91–5. Epub 2015/04/04. 10.4103/0300-1652.150688 . [DOI] [PMC free article] [PubMed] [Google Scholar]
15. Yeates K, Lohfeld L, Sleeth J, Morales F, Rajkotia Y, Ogedegbe O. A Global Perspective on Cardiovascular Disease in Vulnerable Populations. Can J Cardiol. 2015;31(9):1081–93. Epub 2015/09/01. 10.1016/j.cjca.2015.06.035 . [DOI] [PMC free article] [PubMed] [Google Scholar]
16. Tsega TA, Demissei BG. A systematic review of epidemiology, treatment and prognosis of heart failure in adults in Ethiopia. J Cardiovasc Med (Hagerstown). 2018;19(3):91–7. Epub 2018/01/13. . [DOI] [PubMed] [Google Scholar]
17. Boateng D, Wekesah F, Browne JL, Agyemang C, Agyei-Baffour P, Aikins AD, et al. Knowledge and awareness of and perception towards cardiovascular disease risk in sub-Saharan Africa: A systematic review. PLoS One. 2017;12(12):e0189264 Epub 2017/12/13. 10.1371/journal.pone.0189264 . [DOI] [PMC free article] [PubMed] [Google Scholar]
18. Negesa LB, Magarey J, Rasmussen P, Hendriks JML. Patients' knowledge on cardiovascular risk factors and associated lifestyle behaviour in Ethiopia in 2018: A cross-sectional study. PLoS One. 2020 Jun 4;15(6):e0234198. doi: 10.1371/journal.pone.0234198. PMID: 32497079; PMCID: PMC7271995.
19. Burger A, Pretorius R, Fourie CMT, Schutte AE. The relationship between cardiovascular risk factors and knowledge of cardiovascular disease in African men in the North-West Province. Health SA Gesondheid. 2016;21:364–71. 10.1016/j.hsag.2016.07.003. [DOI] [Google Scholar]
20. Chinju G, Andhuvan G. A population—based study on Awareness of Cardiovascular Disease Risk Factors. Indian J Pharm. 2014;7(2):23–5. [Google Scholar]
21. Wang J, Chen L, Yu M, He J. Impact of knowledge, attitude, and practice (KAP)-based rehabilitation education on the KAP of patients with intervertebral disc herniation. Ann Palliat Med. 2020; 9: 388–93. DOI: 10.21037/apm.2020.03.01 [DOI] [PubMed] [Google Scholar]
22. Machaalani M, Fakhry B, Zwaideh M, Mendelek K, Mahmoud N, Hammoud T, Chahine MN. Knowledge, Attitude, and Practice Toward Cardiovascular Diseases in the Lebanese Population. Glob Heart. 2022 Jul 29;17(1):47. doi: 10.5334/gh.1138. PMID: 36051313; PMCID:

PMC9336688.
23. Koohi F, Khalili D. Knowledge, Attitude, and Practice Regarding Cardiovascular Diseases in Adults Attending Health Care Centers in Tehran, Iran. Int J Endocrinol Metab. 2020; 18: e101612. DOI: 10.5812/ijem.101612 [DOI] [PMC free article] [PubMed] [Google Scholar]
24. Workina A, Habtamu A, Diribsa T, Abebe F. Knowledge of modifiable cardiovascular diseases risk factors and its primary prevention practices among diabetic patients at Jimma University Medical Centre: a cross-sectional study. PLOS Glob Public Health. 2022;2(7):e0000575. doi: 10.1371/journal.pgph.0000575 [DOI] [PMC free article] [PubMed] [Google Scholar]
25. Muhihi AJ, Anaeli A, Mpembeni RN, et al. Public knowledge of risk factors and warning signs for cardiovascular disease among young and middle-aged adults in rural Tanzania. BMC Public Health. 2020;20(1):1–2. doi: 10.1186/s12889-020-09956-z [DOI] [PMC free article] [PubMed] [Google Scholar]
26. Akintunde AA, Akintunde T, Opadijo OG. Knowledge of heart disease risk factors among workers in a Nigerian University: A call for concern. Niger Med J. 2015;56(2):91–5. Epub 2015/04/04. 10.4103/0300-1652.150688 . [DOI] [PMC free article] [PubMed] [Google Scholar]
27. Aminde LN, Takah N, Ngwasiri C, Noubiap JJ, Tindong M, Dzudie A, et al. Population awareness of cardiovascular disease and its risk factors in Buea, Cameroon. BMC Public Health. 2017;17(1):545 Epub 2017/06/07. 10.1186/s12889-017-4477-3 . [DOI] [PMC free article] [PubMed] [Google Scholar]
28. Surka S, Steyn K, Everett-Murphy K, Gaziano TA, Levitt N. Knowledge and perceptions of risk for cardiovascular disease: Findings of a qualitative investigation from a low-income peri-urban community in the Western Cape, South Africa. Afr J Prim Health Care Fam Med. 2015;7(1):891 Epub 2016/02/05. 10.4102/phcfm.v7i1.891 . [DOI] [PMC free article] [PubMed] [Google Scholar]
29. Waśniowska A, Kopeć G, Szafraniec K, et al. Assessment of knowledge on cardiovascular disease risk factors by postal survey in residents of Małopolska Voivodeship. Małopolska CArdiovascular PReventive Intervention Study (M-CAPRI). Ann Agric Environ Med. 2017; 24: 201–6. DOI: 10.5604/12321966.1228400 [DOI] [PubMed] [Google Scholar]
30. Muhamad R, Yahya R, Yusoff HM. Knowledge, attitude and practice on cardiovascular disease among women in North-Eastcoast Malaysia. Int J Collab Res Intern Med Public Heal. 2012; 4: 0. [Google Scholar]
31. Mohammad NB, Rahman NAA, Haque M. Knowledge, attitude, and practice regarding the risk of cardiovascular diseases in patients attending outpatient clinic in Kuantan, Malaysia. J Pharm Bioallied Sci. 2018; 10: 7–14. DOI: 10.4103/jpbs.JPBS_227_17 [DOI] [PMC free article] [PubMed] [Google Scholar]
32. Koohi F, Khalili D. Knowledge, Attitude, and Practice Regarding Cardiovascular Diseases in Adults Attending Health Care Centers in Tehran, Iran. Int J Endocrinol Metab. 2020; 18: e101612. DOI: 10.5812/ijem.101612 [DOI] [PMC free article] [PubMed] [Google Scholar]