

# Awareness of cardiovascular diseases and their associated risk factors among the general population in Hail city, Saudi Arabia

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## Abstract

**Background:** Cardiovascular diseases are one of the major health problems and the leading cause of mortality and disability globally. CVDs are responsible for 17.3 million deaths annually. Epidemiological data on the knowledge and attitude towards cardiovascular diseases and risk factors among the general population in Saudi Arabia is lacking; therefore, assessing the public awareness of cardiovascular risk factors and diseases is critical.

**Methods:** This is a descriptive cross-sectional study that was conducted among 1,172 participants from the general population in Hail city. Using a self-administered questionnaire, the sample was selected at random from 18-60 years olds.

**Results:** A total of 1,172 participants responded to the survey. Participants who responded were mostly males (69.1%) and (30.7%) were females. Participants managed to recognize that coronary heart disease (74.5%), congenital heart disease (53.4%) are types of CVDs. The overall knowledge on cardiovascular disease was poor with mean score of 12.24 out of 25.0.

**Conclusion:** The available data indicate poor knowledge about cardiovascular diseases and associated risk factors; it's very important to establish more widespread awareness campaigns regarding CVDs awareness.

**Keywords:** Myocardial infarction, Acute coronary syndrome, Survey, Cardiovascular diseases, Ha'il, Saudi Arabia

## Introduction

Cardiovascular diseases are one of the most prevalent diseases and the leading cause of death in Saudi Arabia. Different studies have only focused on patients in developed countries such as the United Kingdom and the United States (1). Epidemiological data on the knowledge and attitude towards cardiovascular diseases and risk factors among the general population in Saudi Arabia is lacking; therefore, assessing the public awareness of cardiovascular risk factors and diseases is critical. The Kingdom of Saudi Arabia (KSA) has witnessed a surprising increase in cardiovascular diseases incidence and mortality (2). There are many risks for cardiovascular diseases such as high blood pressure, high cholesterol level, high blood glucose level, smoking, obesity, and lack of exercise that will increase the death rate, and it is expected that 23.3 million people will fall victim to cardiovascular diseases in the year 2030 (3). Many risk factors can contribute as a cause for cardiovascular diseases such as unhealthy diet, physical inactivity, smoking, drinking alcohol, high blood pressure, diabetes, high amounts of fat intake and overweight. Currently, cerebrovascular diseases and coronary heart diseases are within the top 10 causes of death in the Arabic world. For example, in Kuwait, congenital heart defects (CHDs) are the major reason of mortality and morbidity, and cardiovascular diseases (CVDs) have been reported to represent 46.0% of all mortalities. In Saudi Arabia, CVDs are estimated to account for 42% of the total mortalities and CHDs are ranked as the second highest cause of death (4). One of the foremost techniques generally employed for prevention and management of cardiovascular diseases has been educating patients and the public. Although this method does not assure change on how people behave, it's generally considered as a critical step in improving the public lifestyle to adapt to more healthy options.

## Methods

### Study design, setting, population and sampling

This descriptive cross-sectional study was conducted in Hail city, Saudi Arabia, from April 2 to May 26, 2022. Hail is a northern city with a recently updated population of 935,000. The minimum sample size was determined using the online sample size calculator, considering a population of 935,000 people, a confidence level of 95%, and a 0.03 margin of error, the estimated minimum sample size required is 1066 and the total number of participants was 1172.

### Study procedure and ethical issues

The study was ethically approved by the Ethics Committee of Hail University, College of Medicine. Those who agreed to take part in the study were given the questionnaires, which were completed anonymously and collected after completion. Confidentiality was maintained. The questionnaire was translated into Arabic and reverse translated. The accuracy and meaning of the translated version checked both forwards and backwards, and it was

discussed before finalized. It was adapted from previously validated published studies (4, 5).

A literature review of previous studies regarding CVDs knowledge was conducted to identify potential items for the study instrument. Based on the literature search, the study questionnaire was adapted from validated surveys that were previously used.

### Scoring of knowledge of participants

The questionnaire was composed of nine questions regarding knowledge of CVDs risk factors, six questions regarding types of CVDs, five questions regarding knowledge on signs and symptoms of stroke, and five questions regarding knowledge on signs and symptoms of myocardial infarction (MI), totaling a number of 25 questions. These questions were equally scored (one point for correct answers and zero for incorrect ones). We classified who obtained 13 or more correct responses as having "moderate to good knowledge", and those who scored 12 or less were classified as having "poor knowledge".

## Results

1172 participants responded to the survey. The age of participants was (44.3%) aged 18-24, (20.8%) aged from 25-34, (16.8%) aged from 35-44, and (18.0%) aged between 45-60. The participants who responded were mostly males (69.1%) and (30.7%) were females. Most of the participants had college educational level (59.9), while (24.1%) had postgraduate education and (15.8%) had high school or less. Regarding the employment status, (35.6%) are students, (46.7%) are employees while (17.5%) are unemployed. (22.7%) are currently smokers while (4.6%) were previously smokers, but the majority were non-smokers (72.5%). As for exercising, (39.8%) reported exercising one to two times per week, (17.9%) reported exercising three to five times per week, (8.0%) reported exercising 5 times or more per week, while (34.2%) didn't practice exercising. As for eating healthy food only (8.7%) of the participants claimed they are always doing it and (66.1%) are eating healthily sometimes, while (25.0%) rarely eat healthily. (56.7%) perceived their lifestyle as stressful and (22.1%) perceived it as very stressful while (21.0%) reported their lifestyle as free of stress. When asked for their cardiovascular diseases history, (84.7%) denied any issues and (10.3%) had history of cardiovascular diseases; only (4.9%) didn't know. As for family history of cardiovascular diseases (36.8%) had a positive family history and (55.2%) had a negative family history while (7.8%) didn't know for sure (Table 1).

Table 1: Frequency of the Socio-demographic Characteristics of the Sample: (N=1172)

Category		Count	Column N %
Age	18-24	520	44.4%
	25-34	244	20.8%
	35-44	197	16.8%
	45-60	211	18.0%
Gender	MALE	811	69.2%
	FEMALE	361	30.8%
Educational level	High school or less	186	15.9%
	University	703	60.0%
	Postgraduate studies	283	24.1%
Employment status	STUDENT	418	35.7%
	EMPLOYEE	548	46.8%
	UNEMPLOYED	206	17.6%
Are you a smoker?	Yes	267	22.8%
	No	851	72.6%
	Previously smoker	54	4.6%
How many days do you do at least 30 minutes of exercise?	1-2 times a week	467	39.8%
	3-5 times a week	210	17.9%
	5 times or more a week	94	8.0%
	I do not exercise	401	34.2%
How often do you eat healthy food?	Always	102	8.7%
	Rare	294	25.1%
	Sometimes	776	66.2%
How do you describe your lifestyle?	Free from stress	247	21.1%
	Stressful	666	56.8%
	Very stressful	259	22.1%
Do you have a history of cardiovascular disease?	Yes	121	10.3%
	No	994	84.8%
	I do not know	57	4.9%
Have any of your immediate family members been diagnosed with a cardiovascular disease?	Yes	432	36.9%
	No	648	55.3%
	I do not know	92	7.8%

Concerning the types of cardiovascular diseases, participants managed to recognize coronary heart disease (74.5%), congenital heart disease (53.4%) as types of CVDs, but the majority thought stroke, peripheral arterial disease, rheumatic heart disease, and deep vein thrombosis / pulmonary embolism aren't related to CVDs.

As for risk factors for CVDs, the participants successfully identified (72.8%) smoking, (51.4%) physical inactivity, (64.3%) obesity, (52.1%) stress, and (57.7%) high levels of bad cholesterol as risk factors for CVD. Interestingly, more than half of the people couldn't identify (49.0%) high blood pressure as well as (33.7%) diabetes mellitus as risk factors.

Regarding signs and symptoms of myocardial infarction, only (65.7%) recognised chest pain and (59.8%) shortness of breath correctly. It's worth mentioning that women were more aware of pain in neck or jaw and feeling weak, dizziness, or faint as signs and symptoms of myocardial infarction more than men ( $p = 0.03$ ) and ( $p = 0.035$ ) respectively.

Regarding symptoms of stroke, the overall, 59.2, 65.6, 43.1, 51.9 and 37.8% knew that sudden numbness / weakness in head, arm, or leg, sudden poor vision, sudden confusion, trouble talking and understanding others, sudden dizziness, difficulty walking or imbalance and severe headache with unknown cause respectively, were symptoms of stroke (Table 2).

**Table 2: Assessment of knowledge about the types of CVD and risk factors, as well as symptoms of both myocardial infarction and stroke according to gender: (N=1172) (continued next page)**

Category	Question	Answer	Male	Female	Total	p-value
Types of Cardiovascular disease	Coronary heart disease	Yes	603 (74.4%)	270 (74.8%)	873 (74.5%)	.802
		No	3 (7.8%)	31 (8.6%)	94 (8.0%)	
		I don't know	145 (17.9%)	60 (16.6%)	205 (17.5%)	
	Stroke	Yes	179 (22.1%)	61 (16.9%)	240 (20.5%)	.093
		No	217 (26.8%)	111 (30.7%)	328 (28.0%)	
		I don't know	415 (51.2%)	189 (52.4%)	604 (51.5%)	
Peripheral arterial disease	Yes	178 (21.9%)	67 (18.6%)	245 (20.9%)	.414	
	No	171 (21.1%)	81 (22.4%)	252 (21.5%)		
	I don't know	462 (57.0%)	213 (59.0%)	675 (57.6%)		
Rheumatic heart disease	Yes	363 (44.8%)	161 (44.6%)	524 (44.7%)	.996	
	No	84 (10.4%)	37 (10.2%)	121 (10.3%)		
	I don't know	364 (44.9%)	163 (45.2%)	527 (45.0%)		
Congenital heart disease	Yes	437 (53.9%)	189 (52.4%)	626 (53.4%)	.267	
	No	194 (23.9%)	77 (21.3%)	271 (23.1%)		
	I don't know	180 (22.2%)	95 (26.3%)	275 (23.5%)		
Deep vein thrombosis & pulmonary embolism	Yes	300 (37.0%)	158 (43.8%)	458 (39.1%)	.089	
	No	51 (6.3%)	21 (5.8%)	72 (6.1%)		
	I don't know	460 (56.7%)	182 (50.4%)	642 (54.8%)		
Risk factors for cardiovascular disease	Family history of cardiovascular disease	Yes	402 (49.6%)	177 (49.0%)	579 (49.4%)	.747
		No	128 (15.8%)	52 (14.4%)	180 (15.4%)	
		I don't know	281 (34.6%)	132 (36.6%)	413 (35.2%)	
	Smoking	Yes	582 (71.8%)	271 (75.1%)	853 (72.8%)	.355
		No	32 (3.9%)	16 (4.4%)	48 (4.1%)	
		I don't know	197 (24.3%)	74 (20.5%)	271 (23.1%)	
	Unhealthy diet	Yes	388 (47.8%)	181 (50.1%)	569 (48.5%)	.756
		No	85 (10.5%)	35 (9.7%)	120 (10.2%)	
		I don't know	338 (41.7%)	145 (40.2%)	483 (41.2%)	
	Lack of exercise	Yes	419 (51.7%)	183 (50.7%)	602 (51.4%)	.951
No		199 (24.5%)	91 (25.2%)	290 (24.7%)		
I don't know		193 (23.8%)	87 (24.1%)	280 (23.9%)		
Obesity	Yes	525 (64.7%)	229 (63.4%)	754 (64.3%)	.901	
	No	14 (1.7%)	6 (1.7%)	20 (1.7%)		
	I don't know	272 (33.5%)	126 (34.9%)	398 (34.0%)		
Stress	Yes	417 (51.4%)	194 (53.7%)	611 (52.1%)	.637	
	No	166 (20.5%)	75 (20.8%)	241 (20.6%)		
	I don't know	228 (28.1%)	92 (25.5%)	320 (27.3%)		
High levels of LDL cholesterol	Yes	468 (57.7%)	208 (57.6%)	676 (57.7%)	.997	
	No	44 (5.4%)	20 (5.5%)	64 (5.5%)		
	I don't know	299 (36.9%)	133 (36.8%)	432 (36.9%)		
High blood pressure	Yes	401 (49.4%)	173 (47.9%)	574 (49.0%)	.814	
	No	37 (4.6%)	15 (4.2%)	52 (4.4%)		
	I don't know	373 (46.0%)	173 (47.9%)	546 (46.6%)		
Diabetes mellitus	Yes	287 (35.4%)	108 (29.9%)	395 (33.7%)	.176	
	No	96 (11.8%)	49 (13.6%)	145 (12.4%)		
	I don't know	428 (52.8%)	204 (56.5%)	632 (53.9%)		

Table 2: Assessment of knowledge about the types of CVD and risk factors, as well as symptoms of both myocardial infarction and stroke according to gender: (N=1172) continued...

<b>Symptoms of myocardial infarction</b>	Pain in the neck, jaw or back	Yes	349 (43.0%)	150 (41.6%)	499 (42.6%)	<b>.030**</b>
		No	65 (8.0%)	15 (4.2%)	80 (6.8%)	
		I don't know	397 (49.0%)	196 (54.3%)	593 (50.6%)	
	Feeling weak, light-headed or faint	Yes	330 (40.7%)	173 (47.9%)	503 (42.9%)	<b>.035**</b>
		No	44 (5.4%)	23 (6.4%)	67 (5.7%)	
I don't know		437 (53.9%)	165 (45.7%)	602 (51.4%)		
Chest pain or discomfort	Yes	519 (64.0%)	249 (69.0%)	768 (65.7%)	.237	
	No	10 (1.2%)	3 (0.8%)	13 (1.1%)		
	I don't know	282 (34.8%)	109 (30.2%)	391 (33.2%)		
Pain or discomfort in arms or shoulder	Yes	188 (23.2%)	97 (26.9%)	285 (24.3%)	.233	
	No	138 (17.0%)	67 (18.6%)	205 (17.5%)		
	I don't know	485 (59.8%)	197 (54.6%)	682 (58.2%)		
Shortness of breath	Yes	475 (58.6%)	226 (62.6%)	701 (59.8%)	.292	
	No	45 (5.5%)	14 (3.9%)	59 (5.0%)		
	I don't know	291 (35.9%)	121 (33.5%)	412 (35.2%)		
<b>Symptoms of Stroke</b>	Sudden numbness/ weakness in face, arm, or leg	Yes	485 (59.8%)	209 (57.9%)	694 (59.2%)	.801
		No	36 (4.4%)	18 (5.0%)	54 (4.6%)	
		I don't know	290 (35.8%)	134 (37.1%)	424 (36.2%)	
	Sudden confusion, trouble talking and understanding others	Yes	526 (64.9%)	243 (67.3%)	769 (65.6%)	.680
		No	22 (2.7%)	8 (2.2%)	30 (2.6%)	
		I don't know	263 (32.4%)	110 (30.5%)	373 (31.8%)	
Sudden poor vision	Yes	348 (42.9%)	157 (43.5%)	505 (43.1%)	.058	
	No	49 (6.0%)	10 (2.8%)	59 (5.0%)		
	I don't know	414 (51.0%)	194 (53.7%)	608 (51.9%)		
Sudden dizziness, difficulty walking or loss of balance	Yes	426 (52.5%)	182 (50.4%)	608 (51.9%)	.772	
	No	79 (9.7%)	35 (9.7%)	114 (9.7%)		
	I don't know	306 (37.7%)	144 (39.9%)	450 (38.4%)		
Severe headache	Yes	303 (37.4%)	140 (38.8%)	443 (37.8%)	.898	
	No	164 (20.2%)	71 (19.7%)	235 (20.1%)		
	I don't know	344 (42.4%)	150 (41.6%)	494 (42.2%)		

\*\* Statistically significant association between gender in knowledge.

The overall knowledge on cardiovascular diseases was determined to be low with mean score of 12.24 out of 25.0. The women's knowledge of signs and symptoms of myocardial infarction was better than men ( $p = 0.006$ ) (Table 3).

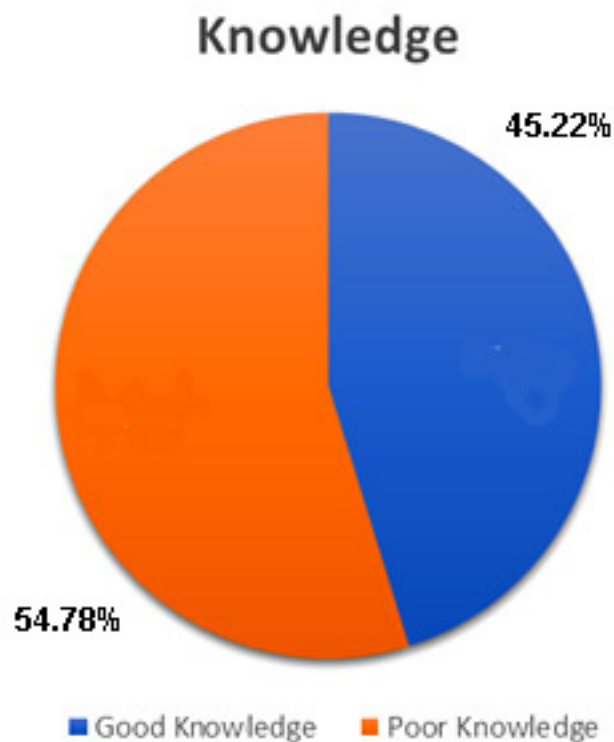
**Table 3: Comparison of public mean knowledge scores for types of cardiovascular disease, their risk factors, symptoms of both myocardial infarction and stroke, as well as the total CVD knowledge according to gender: (N=1172)**

Category	Male (N = 811) Mean $\pm$ SD	Female (N = 361) Mean $\pm$ SD	Total (N = 1172) Mean $\pm$ SD	p-value
Knowledge about CVD types (out of 6)	2.54 $\pm$ 1.12	2.50 $\pm$ 1.13	2.53 $\pm$ 1.12	.670
Knowledge about CVD risk factors (out of 9)	4.79 $\pm$ 1.44	4.77 $\pm$ 1.50	4.78 $\pm$ 1.46	.831
Knowledge about symptoms of myocardial infarction (out of 5)	2.29 $\pm$ 1.06	2.47 $\pm$ 1.04	2.35 $\pm$ 1.05	.006**
Knowledge about symptoms of stroke (out of 5)	2.57 $\pm$ 1.13	2.57 $\pm$ 1.09	2.57 $\pm$ 1.12	.951
Total CVD knowledge (out of 25)	12.20 $\pm$ 2.35	12.34 $\pm$ 2.49	12.24 $\pm$ 2.39	.361

\*\* Statistically significant association between gender in knowledge score.

Good knowledge was observed in (45.22%) of the participants of our study while (54.78%) had poor knowledge in cardiovascular diseases (Figure 1).

**Figure 1**



## Discussion

The overall results in the study have demonstrated a lack in the overall knowledge about cardiovascular diseases in the general public of Hail city, Saudi Arabia. About 45.22% of the public have good knowledge overall, while 54.78% have less than the adequate level of knowledge. Awareness about the types of CVDs was relatively good compared to risk factors and the signs and symptoms of myocardial infarction and stroke. Only 20.5% and 20.9% have recognized stroke and peripheral

arterial disease respectively as types of CVDs, which was also seen in a similar study in Cameroon (5). On a positive note, a strong number from different parts of the globe have identified coronary artery disease as a type of CVDs (4, 5). Regarding the signs and symptoms of myocardial infarction and stroke, over two thirds of the participants were able to correctly identify the major symptoms for myocardial infarction and stroke, including chest pain and sudden numbness in the arm respectively. Ideally, it's best for the community to have a better awareness towards more characteristic features of myocardial infarction such as radiating pain to the arm and shoulder. Chest pain was the highest identified symptoms (65.7%), which is higher than other cities, for example, Riyadh, Kuwait and Buea (4, 5, 6). The awareness about stroke manifestation was found to be low in this study with nearly less than half of participants correctly pointing out the major symptoms of stroke. Therefore, not being aware of such symptoms for both myocardial infarction or stroke could lead to a delay in seeking professional medical help in such diseases where time is a strong prognostic factor.

As for risk factors, the community of Hail city have an adequate knowledge regarding them, some of whom had more than 50% answered correctly and going as high as 75.1% in correctly identifying smoking as a risk factor, except for Diabetes Mellitus, which was surprisingly low. Paradoxical results about Diabetes Mellitus being a risk factor was seen in many studies (4, 5, 6, 7, 8, 9, 10). A decent number of participants knew smoking, unhealthy diet and physical inactivity were CVDs risk factors, which is in line with studies from Riyadh and Kuwait (4, 6).

Regarding the demographic characteristics, the majority were college students and almost three-quarters of them have reported not being a smoker, which is a positive note to point out in the community. With that being said, in this study we unfortunately witnessed a worrisome high number of participants reporting living a stressful lifestyle. Stress shouldn't be ignored as it has shown a strong association with heart diseases according to WHO. Strong countermeasures should be taken against stress as it will help the community in improving their daily life and nonetheless help in reducing heart diseases. Two-thirds have reported eating healthy sometimes, the reasoning for that was due to low income, which was believable since the majority are unemployed, and this is yet to be investigated in future studies.

## Conclusion

The available data indicates poor knowledge about cardiovascular diseases and the associated risk factors. It is very important to establish more widespread awareness campaigns and effective prevention strategies to minimize the risk of CVDs mortality in the coming years. There is need for increasing awareness among the population utilizing community-based education programs. Poor knowledge among Saudi people on risk factors for cardiovascular diseases, which are major health challenges in Saudi Arabia, requires more research and health campaigns targeting awareness of cardiovascular diseases and the risk factors, especially in the young generation.

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