

# Awareness of cardiovascular disease associated risk factors among Saudis in Riyadh City

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## ABSTRACT

**Objective:** The aim of this study was to estimate the awareness of Saudi population in Riyadh regarding cardiovascular diseases (CVDs) and their risk factors. **Methods:** This was a cross-sectional study that used self-administered questionnaires conducted in universities, primary care centers, and electronic copies distributed in social media websites. **Results:** Overall, 47.1% of the respondents had a good awareness of CVD and associated risk factors. However, awareness of the symptoms of stroke and heart attack was low. Pulmonary embolism and deep vein thrombosis were the most commonly identified types of CVD, with 39.2% aware of these conditions. The most well-known symptom of heart attack was shortness of breath (known by 54.4% of the respondents). In relation to stroke, the most commonly recognized symptom was “sudden dizziness, trouble walking, or loss of balance” (45.4%). Respondents’ awareness of CVD risk factors was moderate. The most common factors—identified by over two-thirds of participants—were unhealthy diet, smoking, dyslipidemia, and physical inactivity. Independent predictors of good CVD awareness were age 35–44 years, living in the north of Riyadh and following a healthy diet. **Conclusions:** The awareness of CVD and associated risk factors is insufficient among Saudis in Riyadh City. This study emphasizes the necessity for effective education to increase the awareness about CVD in Saudi Arabia. High awareness may lead to early recognition of the risk factors and lead to early implementation of primary prevention which the cornerstone of family medicine practice.

**Keywords:** Awareness, cardiovascular disease, heart attack, risk factors, Saudis

## Introduction

Cardiovascular diseases (CVD) are diseases that mainly affect heart and blood vessels including coronary (ischemic) heart disease (CHD), peripheral arterial diseases, rheumatic heart diseases, congenital heart diseases, cerebrovascular diseases, pulmonary embolism, and deep vein thrombosis.<sup>[1]</sup> Worldwide, CVD and CHD in particular—are major causes of morbidity and

mortality.<sup>[2]</sup> It is predicted that with the next years, CHDs will be the leading cause of mortality in undeveloped countries.<sup>[3,4]</sup> Currently, cerebrovascular diseases and CHDs are among the top 10 causes of death in the Arab world. For example, in Kuwait, CHDs are the major reason of mortality and morbidity, and CVDs have been reported to represent 46.0% of all mortalities. In Saudi Arabia, CVD is estimated to account for 42% of the total mortalities and CHDs are ranked as the second leading cause of death.<sup>[5,6]</sup>

There are a number of risk factors associated with CVDs, which can be broadly classified into two groups: modifiable factors such as obesity, dyslipidemia, diabetes, hypertension, and smoking;

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and nonmodifiable factors such as age, ethnicity, and family history.<sup>[7-9]</sup> The prevalence of modifiable risk factors is increasing globally and locally. For example, in Saudi Arabia 55.5% of the population are either hypertensive or prehypertensive and 20.2% of the population are diabetic.<sup>[10-14]</sup> Awareness of CVD and the associated risk factors is considered to be crucial in to encourage individuals to make changes toward a healthy lifestyle.<sup>[15,16]</sup> Indeed, it has been shown that most CVDs can be prevented by improving awareness about primary prevention or secondary, by modifying the risk factors such as tobacco use, obesity, physical inactivity, high blood pressure, and unhealthy diet, or using medication such as aspirin and blood pressure lowering agents.<sup>[17-20]</sup>

The awareness of CVDs and their risk factors was measured by many studies worldwide and few studies have measured that in the Saudi community.<sup>[6,15,21-33]</sup> Therefore, we conducted a community-based survey to determine the baseline awareness of CVD and associated risk factors in Riyadh City. To the best of our knowledge, this is the first study to investigate awareness of these issues, as well as the warning symptoms of stroke or heart attack, among the Saudi population in Riyadh City.

## Methods

This quantitative, observational, cross-sectional approach was carried out in Riyadh City, Saudi Arabia between January and March 2018. A self-administrated questionnaire was distributed in paper-based and electronic formats to Saudis in Riyadh City, who were 18–60 years old. Ethical approval for the study was obtained from the College of Medicine Research Center, King Saud University, Riyadh, Saudi Arabia. The sentence “completion of the following questionnaire will be taken as an indication of your consent to participate and please fill the questionnaire once” was added at the top of the questionnaire form as a method of obtaining consent and to avoid duplication of data and to ensure every participant fills up the questionnaire once.

The validated questionnaire was obtained from a previous study,<sup>[6]</sup> and was used with permission of the principal investigator, Awad Abdemoneim. A sample size estimation was carried out using a single proportion sample size formula,  $n = z^2 p (1-p) / d^2$ , with a 95% confidence level and 3% margin of error. This indicated the minimum sample size for estimating significance to be 1067. Allowing for a 10% rate of uncompleted surveys, the required sample size was deemed to be 1167. The questionnaire was distributed conveniently in paper-based form on university students and faculty members, primary care center patients, and individuals who received the electronic version of the questionnaire via social media. Data were analyzed using Statistical Package for the Social Sciences (SPSS) software, version 22.0. Categorical data were compared using the Chi-square test. Some data were analyzed by binary and multiregression analyses.

## Result

There were 1642 responses, of which (15%) were electronic copies. Overall, 47.1% of the respondents had a good awareness of CVD and associated risk factors.

The demographic details of respondents are presented in Table 1. Respondents were predominantly males, with most attending university. A small proportion of respondents were pursuing postgraduate-level studies. Almost a quarter of respondents were current smokers or had smoked in the past, and a very small number reported that they exercised five or more times per week for at least 30 min. Furthermore, the percentage of participants that followed a healthy diet was less than 20%. A very small number of respondents had a history of CVD.

Respondents' awareness of CVD, including the diseases comprising this category, symptoms, and risk factors, are summarized Figure 1. The most commonly identified types of CVD were deep vein thrombosis and pulmonary embolism, followed by congenital heart disease, then CHD. The least well known was cerebrovascular disease. Over half of the respondents were aware that “difficulty in breathing” and “chest pain or discomfort” are symptoms of heart attack, with the next most well-known symptom being “pain or discomfort in arms or shoulder”. With regard to stroke, the most commonly identified symptoms were “sudden dizziness, trouble walking, or loss of balance or coordination” and “severe headache with no known cause”. “Sudden confusion or trouble speaking or understanding others” was also well reported, with just under 40% of respondents being aware of this symptom. Over two-thirds of respondents were aware that an unhealthy diet, smoking, dyslipidemia, and physical inactivity were risk factors for CVD. On the contrary, awareness of diabetes mellitus and family history as risk factors was low. Almost half of the respondents had a good awareness of CVDs and their risk factors.

Statistical analysis revealed that respondents aged between 35 and 44 years old had the highest awareness score, which was threefold higher than any other age groups [Table 2]. There was no significant difference in awareness between groups with different educational levels. Respondents who lived in the north of Riyadh City had an awareness score that was 1.7 times higher than people who lived in other areas, and the people who rarely eat healthy food is around the half of people who always do.

## Discussion

We determined that just under half of the study population had good awareness of CVDs and their risk factors. In our study, age, gender, eating healthy diet, and level of education were found to be significantly associated with CVD awareness, although a concerning finding was that a high number of respondents were not aware of any stroke warning symptoms or heart attack.

**Table 1: Sociodemographic characteristics of respondents (n=1642)**

Characteristic	Frequency (%)
Age	
18-24	1100 (67)
25-34	337 (20.5)
35-44	133 (8.1)
45-60	72 (4.4)
Area	
North	356 (21.7)
South	390 (23.8)
East	513 (31.2)
West	278 (16.9)
Middle	105 (6.4)
Gender	
Male	1141 (69.5)
Female	501 (30.5)
Educational level	
High school or less	318 (19.4)
University	1226 (74.7)
Postgraduate studies	98 (6)
Occupation	
Student	1171 (71.3)
Employee	362 (22)
Unemployed	109 (6.6)
Association to medical field	
Student	96 (5.8)
Worker	28 (1.7)
No association	1518 (92.4)
Are you a smoker?	
Yes	220 (13.4)
No	1272 (77.5)
previously smoker	150 (9.1)
If you are a past smoker, when did you stop smoking?	
Less than 6 months ago	28 (1.7)
in the last 6-12 months	40 (2.4)
more than 12 months ago	83 (5.1)
not applicable	1491 (90.8)
How many days do you do at least 30 minutes of exercise?	
0-2 times a week	893 (54.4)
3-5 times a week	610 (37.1)
5 times or more a week	139 (8.5)
How often do you eat healthy food?	
Always	282 (17.2)
Sometimes	1046 (63.7)
Rare	314 (19.1)
How do you describe your lifestyle?	
Very stressful	225 (13.7)
Stressful	1003 (61.1)
Free from stress	414 (25.2)
Do you have a history of cardiovascular disease?	
Yes	74 (4.5)
No	1433 (87.3)
I do not know	135 (8.2)
Has anyone of your immediate family members been diagnosed with a cardiovascular disease?	
Yes	351 (21.4)
No	1097 (66.8)
I do not know	194 (11.8)

Awareness about CVDs was significantly higher among men than women in this study, which is in contrast with the studies

of Awad and Al-Nafisi and Attachi *et al.*<sup>[6,21]</sup> Difficulty in breathing was the most well-known symptom of heart attack among our respondents, which is consistent with findings of studies on populations in Kuwait, Northern Ireland, Nepal, and Jordan,<sup>[6,15,22,23]</sup> although awareness of this symptom was found to be lower in studies carried out in Pakistan and Canada.<sup>[24,25]</sup> Chest pain was recognized by around half of the study population, a figure that is close to that of a similar study in Beijing,<sup>[26]</sup> but higher than that reported in Nepal and Pakistan.<sup>[23,24]</sup> On the contrary, awareness of heart attack symptoms as chest pain was found to be higher in previous studies from Northern Ireland, Canada, Jordan, and Iran, where chest pain was identified as a symptom by over 75% of respondents.<sup>[15,22,25,27]</sup> The symptom of pain in the arms or shoulders was recognized by 40% of respondents in this study, which is in line with studies from Kuwait, Jordan, and Canada,<sup>[6,15,25]</sup> but is higher than that reported in studies carried out in Nepal and Northern Ireland.<sup>[22,23]</sup> Light-headed, feeling weak, or faint were recognized as symptoms of heart attack by around one-third of respondents in this study, which is higher than the awareness reported in Kuwait, Northern Ireland, Nepal, and Canada.<sup>[6,22,23,25]</sup> Lack of successful identification of heart attack symptoms probably results in a delay in looking for medical care, which can lead to poor prognoses. The results of this study highlight the critical need to improve awareness of the Saudi population to the many symptoms of heart attack.<sup>[24,28]</sup>

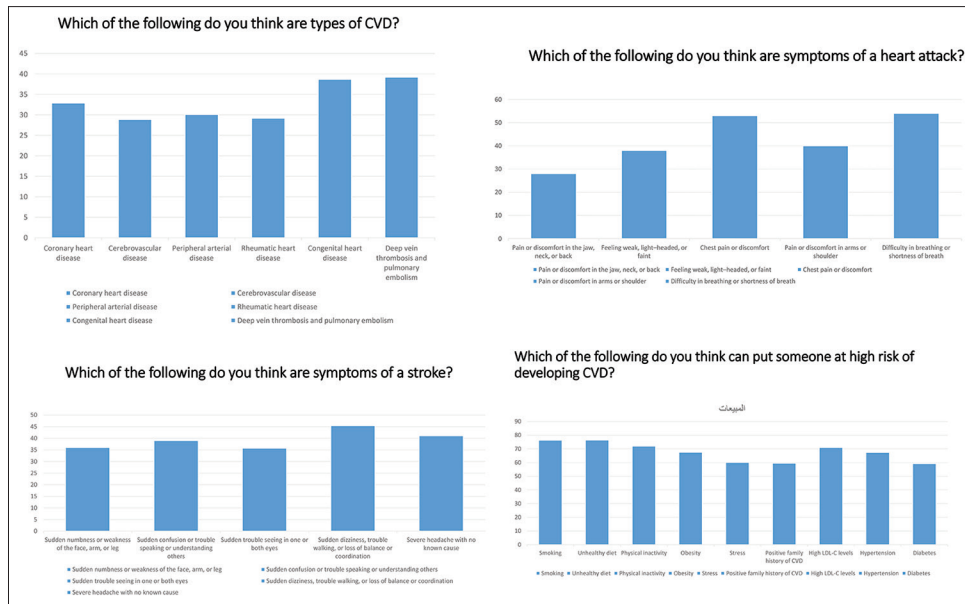
In this study, awareness of stroke manifestations was found to be low. Over half of the respondents could not identify any stroke manifestations. Among those that were identified, trouble walking, dizziness, or loss of balance or coordination was the most frequently identified, followed by “intense headache with not known cause,” then “confusion or trouble speaking or understanding others”. Awareness of these symptoms was higher in our study compared with studies conducted in Kuwait, Canada, Australia, and the Gulf countries.<sup>[6,25,29,30]</sup> However, a study in the USA showed a high level of awareness of “confusion or trouble speaking or understanding others” as a stroke symptom, with 65.6% of respondents identifying this manifestation.<sup>[31]</sup>

With regard to risk factors, around three-quarters of the study population knew that unhealthy diet, physical inactivity, and smoking were risk factors of CVD, whereas stress, diabetes, and family history of CVD were less frequently identified as risk factors. These results are compatible with those of studies conducted in Kuwait, Canada, Pakistan, Jordan, and Nepal, in which the most well-known risk factor was smoking.<sup>[6,15,23,25,32]</sup> However, awareness of these risk factors has been shown to be lower in populations of the Gulf countries.<sup>[30]</sup> Respondents of this study had higher awareness of diabetes as a risk factor compared with the Kuwait and Gulf country populations.<sup>[30]</sup> Stress was recognized as a risk factor by over half of our study population, in line with results of studies in Kuwait, South Africa, Jordan, and Iran.<sup>[6,15,27,33]</sup> Reports from studies in Nepal, North Ireland, Pakistan, and Canada indicate a lower level of awareness of this risk factor.<sup>[22,23,24,25]</sup> Family history of CVD was identified as a risk factor at a frequency in line with that reported in the

**Table 2: Results of multi-regression analysis of the association between CVD awareness and sociodemographic (n=1642)**

Characteristic	Good awareness	Poor awareness	Binary regression analysis				Multiregression analysis			
			P	Odds ratio	Lower CI	UpperCI	P	Odds ratio	LowerCI	Upper CI
Age										
18-24*	441 (57.7)	642 (75.1)		1				1		
25-34	200 (26.2)	132 (15.4)	.000	2.25	1.753	2.886	.000	2.35	1.724	3.195
35-44	85 (11.1)	47 (5.5)	.000	2.6	1.787	3.774	.000	2.9	1.792	4.649
45-60	38 (5.0)	34 (4.0)	.043	1.64	1.016	2.643	.281	1.4	.768	2.479
Gender										
Male*	518 (66.6)	623 (71.3)		1				1		
Female	255 (33.4)	246 (28.7)	.040	1.25	1.010	1.539	.123	1.21	.950	1.541
Area										
North	186 (24.0)	170 (19.8)	.028	1.64	1.054	2.554	.026	1.69	1.063	2.672
South	184 (24.0)	206 (23.7)	.191	1.34	.864	2.076	.202	1.35	.852	2.131
East	238 (30.9)	275 (31.1)	.231	1.3	.847	1.990	.170	1.37	.875	2.138
West	123 (15.7)	155 (18.0)	.455	1.2	.754	1.879	.393	1.23	.764	1.981
Middle*	42 (5.5)	63 (7.4)		1				1		
Educational level										
high school or less	171 (21.9)	147 (17.0)	.003	1.46	1.139	1.868	.083	1.28	.968	1.678
University*	544 (70.5)	682 (78.5)		1						
Postgraduate	58 (7.6)	40(4.6)	.005	1.82	1.196	2.762	.323	1.27	.792	2.027
Occupation										
Student*	510 (66.0)	661 (75.9)		1						
Employee	198 (25.7)	164 (18.9)	.000	1.57	1.235	1.983	.155	.77	.544	1.102
Unemployed	65(8.4)	44 (5.1)	.001	1.92	1.284	2.855	.627	1.13	.698	1.816
Are you a smoker?										
Yes	97 (12.4)	123 (14.2)	.501	.91	.679	1.208	.461	.89	.653	1.213
No*	592 (76.7)	680 (78.2)		1						
Previous smoker	84 (10.9)	66 (7.6)	.029	1.46	1.040	2.055	.697	1.23	.438	3.439
If you are a past smoker, when did you stop smoking?										
Less than 6 months ago	14 (1.7)	14 (1.6)	.685	1.17	.553	2.465	.888	1.1	.311	3.858
In the last 6-12 months	18 (2.4)	22 (2.5)	.886	.96	.508	1.795	.465	.64	.194	2.118
More than 12 months ago	53 (6.9)	30 (3.5)	.002	2.06	1.303	3.264	.398	1.57	.550	4.510
Not applicable*	688 (89.0)	803(92.4)		1						
Association with medical field:										
Student*	61 (8.0)	35 (4.1)		1						
Worker	17 (2.2)	11 (1.3)	.785	.89	.373	2.106	.227	.56	.223	1.427
No association	695 (89.8)	823 (94.6)	.001	.49	.316	.743	.000	.39	.252	.618
How often do you do at least 30 minutes of exercise?										
0-2 times a week	396 (50.9)	497 (57.1)	.919	1.02	.711	1.460				
3-5 times a week	316 (41.1)	294 (33.8)	.093	1.37	.949	1.991				
5 times or more a week*	61 (8.0)	78 (9.1)		1				1		
How often do you eat healthy food?										
Always*	146 (18.9)	136 (15.6)		1				1		
Sometimes	516 (66.7)	530 (60.8)	.467	.91	.697	1.180	.454	.9	.684	1.185
Rare	111 (14.4)	203 (23.6)	.000	.51	.367	.708	.000	.5	.354	.705
How do you describe your lifestyle?										
Very stressful	107 (13.9)	118 (13.2)	.892	.98	.734	1.309				
Stressful*	482 (62.4)	521 (59.9)		1						
Free from stress	184 (23.7)	230 (26.9)	.216	.87	.687	1.088				
Do you have a history of CVD?										
Yes	38 (4.8)	36 (18.8)	.483	1.18	.741	1.887				
No*	676 (87.7)	757 (67.8)		1						
I do not know	59 (7.5)	76 (13.3)	.440	.87	.609	1.241				
Has anyone of your immediate family member been diagnosed with a CVD?										
Yes	188 (24.5)	163 (4.1)	.014	1.35	1.062	1.721	.064	1.29	.986	1.657
No*	505 (65.1)	592 (87.0)		1				1		
I do not know	80 (10.5)	114 (8.9)	.216	.82	.604	1.121	.373	.86	.618	1.198

CI=confidence interval, CVD=cardiovascular disease Continuous data are presented as frequency (%)



**Figure 1:** Respondents answers to questions regarding diseases, symptoms, and risk factors

Kuwait study, and was more commonly identified by this study respondents in comparing with previous studies from Canada, Northern Ireland, Pakistan, Jordan, and South Africa.<sup>[6,15,22,25,26,33]</sup> Finally, our results show that Saudis in Riyadh have more awareness of hypertension as a risk factor when compared with studies from Kuwait Pakistan, Northern Ireland, Canada, Iran, the Gulf area, Jordan, Nepal, and South Africa.<sup>[6,15,22-24,25,27,30,33]</sup>

This study also shows that the highest overall awareness of CVD is seen among participants aged 35–44 years. This is contrary to studies from Kuwait, Pakistan, Iran, and China, which show that participants aged 50–59 years are more aware of CVD compared with other age groups.<sup>[6,24,26,27]</sup> The low levels of awareness that we found among the older age group (45–60 years) may reflect a relatively reduced interest in mass media among this group.

This study had some limitations which should be acknowledged. The paper-based questionnaire represented a limitation as hard copies are susceptible to loss or damage. A number of returned questionnaires were not completed. However, this issue was overcome by the high response rate and large sample size. Furthermore, a proportion of the responses was collected via an electronic questionnaire, which was always completed and saved. The strengths of our study is the sample size, which enabled us to collect representative data of the population which allows generalization of the results to the entire population.

### Conclusion

The poor awareness regarding CVD among Saudi population in Riyadh could lead to inadequate preventative behaviors and poor patient outcomes. This study emphasizes the necessity for effective education about CVDs in Saudi Arabia. Improved awareness may lead to early recognition of CVD symptoms and

their risk factors and make patients aware of the importance of regular checks, even if he is healthy.

So high awareness implements the primary care physicians in the first line of the prevention of preventable diseases which desirable.

In addition, there is a need to sensitize low-awareness individuals through the establishment of expanded programs to enhance the capacities of targeted individuals.

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### Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient (s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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### Conflicts of interest

There are no conflicts of interest.

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