

# Awareness of Coronary Artery Disease among Population of Al-Qassim, Saudi Arabia: A Community-Based Study

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## ABSTRACT

**Introduction:** Recognition of Coronary Artery Disease (CAD) symptoms affects the time-sensitive benefits of reperfusion therapy in case of acute myocardial infarction.

**Aim:** To evaluate awareness of CAD symptoms and risk factors in population of Al-Qassim Region, Saudi Arabia.

**Materials and Methods:** A cross-sectional, hospital and community-based descriptive study was conducted from May to October 2018. Total of 3235 Saudi citizens, comprising of 3085 healthy participants (without documented CAD) and 150 patients (with documented CAD) participated in the study. A pre-piloted well-structured questionnaire was used. The questionnaire included questions about participants' demographic characteristics, CAD risk factors and symptoms. Data were analysed by using SPSS. Descriptive statistics (mean, standard deviation, percentage, Student's t-test, chi-square test) was applied.

**Results:** Participants' baseline data revealed 54.4% of healthy participants and 13.3% of patients had an education at a university or higher level ( $p < 0.001$ ). Out of overall score 22 points, mean  $\pm$  SD for CAD knowledge was  $12.62 \pm 5.1$  and  $13.59 \pm 4.8$  ( $p = 0.015$ ) for healthy participants and patients, respectively. For all study participants, total score for knowledge of CAD risk factors was  $6.73 \pm 2.4$  (out of 10), while total score for knowledge of CAD symptoms was  $5.07 \pm 3.1$  (out of 10). One remarkable finding was that only 37.8% of healthy participants and 16% of patients knew cardiopulmonary resuscitation.

**Conclusion:** This research revealed that general population in Al-Qassim Region showed a serious lack of knowledge about CAD symptoms when compared to CAD patients. Authorities should implement great efforts to improve public perception about CAD and its symptoms. This could support in diminishing the morbidity and mortality of the disease.

**Keywords:** Cardiovascular disease, Cross-sectional study, General population, Knowledge, Perception

## INTRODUCTION

The CAD is a leading cause of morbidity and mortality worldwide [1,2]. A statistical report from the American Heart Association showed that in USA the leading cause of death was CAD followed by the stroke, heart failure and high blood pressure [3]. Not only high-income countries but in developing countries, CAD is the leading cause of death [4]. In Saudi Arabia, the rise in the burden of cardiovascular diseases is one of the serious problems created by rapid industrialisation and urbanisation [5]. The prevalence of CAD risk factors is substantially higher in Saudi patients when compared to the Western population [6].

Atypical symptoms other than chest pain in patients with CAD make them more likely to face unfavorable prognoses such as under-treatment and poor clinical outcomes [7]. Early reperfusion in the setting of an acute myocardial infarction is of utmost importance for reducing myocardial damage, reducing infarct size, and decreasing morbidity and mortality [8-10]. Accordingly, recognition of heart attack warning symptoms and CAD's risk factors may influence an individual's, the family's, or bystander's decision time in accessing health care, which in turn, affects the time-sensitive benefits of reperfusion therapy [11].

An observed delay in presentation of patients with Acute Coronary Syndrome (ACS) to emergency services in Prince Sultan Cardiac Centre-Qassim (PSCCQ) is possibly because of inability to recognise the symptoms and lack of perception of their own risk factors, which influence their outcomes. Young individuals show a high prevalence of risk factors for cardiovascular disease, such as obesity, physical inactivity, and poor diet [12]. Recent study documented a 1.2% prevalence of CAD cases in the young-age group [13].

Knowledge about heart disease and its symptoms is necessary for patients so that they can promptly identify symptoms of ACS and take immediate action to pursue care [14]. To the best of our knowledge, no previous study has evaluated the knowledge and perception of CAD in patients with CAD and the general population in the Al-Qassim Region. The present study was designed with the aim to assess the level of awareness for CAD symptoms and risk factors in Saudi population in Al-Qassim Region, Saudi Arabia.

## MATERIALS AND METHODS

### Study Design and Population

A cross-sectional, hospital and community-based descriptive study was conducted from May 2018 to October 2018, in which 3235 Saudi citizens were recruited; comprising of 3085 subjects without documented CAD and 150 patients with documented CAD.

Recruitment of patients was from Cardiology Department and outpatient clinics at PSCCQ, King Fahd Specialist Hospital (KFSH). Eligible patients were those admitted with ACS, stable angina or a previous history of Coronary Artery Bypass Graft/ Percutaneous Coronary Intervention (CABG/PCI). Inpatients with life-threatening conditions were excluded. PSCCQ is the only specialised tertiary governmental centre for cardiovascular diseases in Al-Qassim Region.

Healthy participants were recruited through convenience sampling from community and from patients' companions in non-cardiac clinics, KFSH. Inclusion criteria for the healthy participants were Saudi citizen, age >18-years-old, resident in Al-Qassim Region, with no documented CAD.

## Instrument: Questionnaire Structure

In collaboration with experts from PSCCQ, a pre-piloted well-structured questionnaire was applied after a comprehensive review of the literature [15-17]. The corresponding author translated and verified the questionnaire into Arabic. All the questions were closed-ended with the only responses of yes, no, or don't know.

The questionnaire was arranged into four sections. The first section comprised questions about participants' demographic and clinical data (including age, gender, education, marital status, working status, smoking status, and family history of CAD). The second and third sections queried each participant's knowledge about CAD risk factors and symptoms (10 questions each). Two questions in the fourth section asked about basic life support knowledge i.e., knowledge about Cardiopulmonary Resuscitation (CPR) and ambulance number. In addition, the resources of information on CAD for all participants were recorded. The alpha coefficient for the questions was 0.752. Participants responded 'yes', 'no', 'don't know' to whether a particular symptom or risk factor was associated with CAD; know cardiopulmonary resuscitation or ambulance number.

Each correct answer was evaluated by one point while false and 'don't know' answers were given a zero. The mean score for each section (second, third, and fourth) was calculated based on the total score in each; then it was expressed as mean±standard deviation. Well-trained research assistants, fourth-year medical students-Qassim University, administered the questionnaire to the patients with CAD through face-to-face interviews, and to the healthy participants through an online survey and face-to-face interviews.

## Ethics

The protocol of this study conformed to the Declaration of Helsinki. Participation was voluntary, and each participant gave a verbal consent following a thorough explanation of the study goals by the research assistants. It maintained confidentiality of all participants, as the study did not request the names of the participants. The Regional Research Ethics Committee, Al-Qassim Region, Saudi Arabia approved the study (No. 20180808).

## STATISTICAL ANALYSIS

IBM Statistical Packages for the Social Sciences (SPSS) version 23.0 software was used to analyse data. Results were presented as the mean±standard deviation or percentage where relevant. Difference between patients and healthy participants was tested for significance by a Student's t-test (for continuous data) or chi-square test (for categorical data). Value of  $p < 0.05$  was considered statistically significant.

## RESULTS

A total of 3235 Saudi citizens, comprising 3085 healthy participants (without documented CAD) and 150 patients (with documented CAD) agreed to participate in the study. The male to female ratios were 2.9:1 and 3.7:1 for the healthy participants and patients, respectively. A total of 54.4% of the general population and 13.3% of patients had an education at the university level or above. Students represented 19.5% of the general population; however, 38.7% of patients were retired. [Table/Fig-1] summarises the main characteristics of the patients and the general population.

As presented in [Table/Fig-2], the knowledge and perception about CAD risk factors was above average (i.e., more than 50% of respondents answered correctly for each risk factor) for almost all risk factors. However, levels of awareness for questions "incidence of CAD is increasing in young people" and "diabetes as a risk factor increases the chance of CAD" were 31.4% and 57.9% (respectively) among all participants.

[Table/Fig-3] illustrates the perception of CAD symptoms that showed a serious lack of knowledge among all participants. The perception of majority CAD symptoms was below average (less than 50%) among study participants.

Surprising finding [Table/Fig-4] was that only 36.8% of all participants knew CPR which is an emergency lifesaving procedure to save a cardiac patient's life while approximately half (50.1%) could report accurately the contact number of Emergency Medical Services (EMS) which is 997 in Saudi Arabia.

As documented in [Table/Fig-5], total score of CAD overall knowledge for general population was  $12.66 \pm 5.1$  and  $13.59 \pm 4.8$

Variable n, %		General population (n=3085)	Patients (n=150)	All (3235)	p-value Chi-square
Gender, Male		2296, 74.4%	119, 79.3%	2414, 74.7%	0.177
Age	15-24 years	860, 27.9%	00, 0%	860, 26.6%	<0.05*
	25-54 years	1950, 63.2%	51, 34%	2001, 61.9%	
	55-64 years	209, 6.8%	60, 40%	269, 8.3%	
	≥65 years	66, 2.1%	39, 26%	105, 3.2%	
Education	Illiterate	88, 2.9%	43 28.6%	131, 4.0%	<0.05*
	≤Secondary school	1026, 33.2%	78, 52.0%	1104, 34.1%	
	Diploma	293, 9.5%	10, 6.7%	303, 9.4%	
	≥University	1678, 54.4%	19, 13.3%	1697, 52.5%	
Marital status	Single	1324, 42.9%	06, 4.0%	1330, 41.1%	<0.05*
	Married	1697, 55%	140, 93.3%	1837, 56.8%	
	Divorced	39, 1.3%	02, 1.3%	41, 1.3%	
	Widowed	25, 0.8%	02, 1.3%	27, 0.8%	
Working status	Student	601, 19.5%	00, 0%	601, 18.6%	<0.05*
	Working	1617, 52.4%	48, 32%	1665, 51.4%	
	Not working	577, 18.7%	44, 29.3%	621, 19.2%	
	Retired	290, 9.4%	58, 38.7%	348, 10.8%	
Smoking status	Non smoker	2372, 76.9%	97, 64.7%	2469, 76.3%	<0.05*
	Smoker	553, 17.9%	23, 15.3%	576, 17.8%	
	Quit smoking	155, 05%	30, 20%	185, 05.7%	
Family history of CAD	Yes	892, 28.9%	37, 24.7%	929, 28.7%	<0.05*

[Table/Fig-1]: Characteristics of the study participants.

\* $p < 0.05$ , compared patients with CAD to general population

CAD Risk factor, N, % correct responses	General population (n=3085)	Patients (n=150)	All (n=3235)	p-value Chi-square
The incidence of CAD is increasing in young people	939, 30.4%	78, 52.0%	1017, 31.4%	<0.05*
Stress increases the chance of CAD	1745, 56.6%	98, 65.3%	1843, 57.0%	0.034*
Smoking increases the chance of CAD	2784, 90.2%	129, 86.0%	2913, 90.0%	0.090
CAD is often associated with a raised blood cholesterol	2431, 78.8%	115, 76.6%	2546, 78.7%	0.796
CAD is often associated with a lack of exercise	2565, 83.1%	108, 72.0%	2673, 82.6%	<0.05*
CAD is often associated with an increased blood pressure	2220, 72.0%	111, 74.0%	2331, 72.1%	0.587
Family history of CAD increases the chance of CAD	1581, 51.2%	70, 46.7%	1651, 51.0%	0.273
Old age increases the chance of CAD	2104, 68.2%	97, 64.7%	2201, 68.0%	0.365
Diabetes increases the chance of CAD	1761, 57.1%	111, 74.0%	1872, 57.9%	<0.05*
Obesity increases the chance of CAD	2578, 83.6%	120, 80.0%	2698, 83.4%	0.252

**[Table/Fig-2]:** Percent of correct responses for CAD risk factors in study participants. \*p<0.05, compared patients with CAD to general population

CAD symptoms, N,% correct responses	General population (n=3085)	Patients (n=150)	All (n=3235)	p-value Chi-square
CAD causes chest discomfort/burning sensation of the chest	1597, 51.9%	121, 80.7%	1718, 53.2%	<0.05*
CAD causes pain in the arms/shoulders	1543, 50.0%	114, 76%	1657, 51.2%	<0.05*
CAD causes fatigue	2211, 71.7%	116, 77.3%	2327, 71.9%	0.132
CAD causes upper back discomfort	1101, 35.7%	81, 54.0%	1182, 36.5%	<0.05*
CAD causes discomfort in the jaw	703, 22.8%	48, 32.0%	751, 23.3%	0.074
CAD causes shortness of breath	2284, 74.0%	116, 77.3%	2400, 74.2%	0.654
CAD causes sweating	1865, 60.5%	106, 70.7%	1971, 60.9%	0.043*
CAD causes nausea and vomiting	1299, 42.1%	85, 56.7%	1384, 42.8%	0.002*
CAD causes dizziness and collapse	1882, 61.0%	96, 64.0%	1978, 61.1%	0.748
CAD causes indigestion or upper gastric discomfort	883, 28.6%	60, 40.0%	943, 29.2%	0.029*

**[Table/Fig-3]:** Percent of correct responses for CAD symptoms in study participants. \*p<0.05, compared patients with CAD to general population

Positive responses, N, %	General population (n=3085)	Patients (n=150)	All (n=3235)	p-value Chi-square
Do you know cardiopulmonary resuscitation (CPR)	1167, 37.8%	24, 16%	1191, 36.8%	<0.05*
Do you know the contact number of emergency medical service (EMS)	1587, 51.4%	35, 23.3%	1622, 50.1%	<0.05*

**[Table/Fig-4]:** Basic life support knowledge.

\*p<0.05, compared patients with CAD to general population

for patients (p=0.015). No significant difference in total score knowledge of CAD risk factors between the two groups was recorded. However, patients had statistically significant higher total score for knowledge of CAD symptoms when compared to healthy participants.

	General population (n=3085)	Patients (n=150)	All (n=3235)	p-value t-test
Total score for knowledge of CAD risk factors, mean±SD (out of 10)	6.72±2.4	6.91±2.7	6.73±2.4	0.373
Total score for knowledge of CAD symptoms, mean±SD (out of 10)	5.01±3.1	6.29±2.7	5.07±3.1	<0.05*
Total score of CAD overall knowledge, mean±SD (out of 22)	12.62±5.1	13.59±4.8	12.66±5.1	0.015*

**[Table/Fig-5]:** The mean CAD overall knowledge score, and the mean scores for CAD risk factors and CAD symptoms in Al-Qassim Region (values expressed as mean±SD).

\*p<0.05, compared patients with CAD to general population

As displayed in [Table/Fig-6], for general population media represented the major source of information on CAD (22.8%) while newspaper was the least source (8.7%). However, self-previous experience was the major tool for educating patients with CAD about the disease (58%).

Source	General population	Patients	p-value
Media	962, 22.8%	20, 13.3%	<0.05*
Newspaper	368, 8.7%	09, 6.0%	0.085
During study	817, 19.4%	08, 5.3%	<0.05*
Friend/Relative	783, 18.6%	54, 36.0%	0.004*
Health sector	516, 12.2%	27, 18.0%	0.899
Social media	770, 18.3%	25, 16.7%	0.066
Self-previous experience	0	87, 58.0%	--

**[Table/Fig-6]:** Participants' source of information for CAD in Al-Qassim Region (values expressed as number, %).

## DISCUSSION

Making a lifestyle change in patients is difficult with inadequate knowledge about CAD, which may increase mortality and morbidity [18]. Data from this study displayed a lack of knowledge and perception about CAD among all participants (12.66±5.1 out of 22). However, patients with CAD have better overall knowledge of the disease when compared with general population (13.59±4.8 vs. 12.62±5.1, p=.015) although education at university level or above was represented in 54.4% of general population and 13.3% in patients. This may reflect the experience of the patients from the disease itself. To support this, patients reported that self-previous experience was their major source of information about CAD disease. A history of CAD in patients or family members could increase the awareness of patients about symptoms of CAD [19].

Although all participants had a score above average (6.73±2.4) for knowledge of CAD risk factors, there was a lack of knowledge regarding some risk factors. Only around one-third (31.4%) of the study sample perceived that the incidence of CAD is increasing in young people. Diabetes is a well-established cardiovascular risk factor [20]. Cardiovascular disease causes most death in patients with type 2 diabetes [21]. The Kingdom of Saudi Arabia has a high prevalence of diabetes, which is considered one of the highest worldwide; however, only 57.9% of participants knew that diabetes increases the chance of CAD. In a hospital based cross-sectional study to evaluate the risk factors for myocardial infarction in Taif region, Saudi Arabia; Ahmed ET et al., reported that more than half of patients (n=39) had a low level of knowledge about risk factors [22]. In other studies, it was found that most participants could not identify personal cardiovascular risk factors and that the risks identified were considerably fewer and differed from those documented in the medical record [23-26]. Another cross-sectional study conducted among the Saudi general population in Tabouk city showed critical deficiencies in CAD risk factors knowledge and perception [26]. In addition, a descriptive cross-sectional pilot study in Oman showed



a low level of knowledge for CAD risk factors [27]. Another study, indicates that high TG, low HDL, high Lp(a) and the presence of small, dense LDL may contribute to the incidence of coronary heart disease and that TC was not significantly associated with incidence of coronary heart disease in the Saudi population [28].

On the other hand, participants showed very shallow knowledge regarding CAD symptoms. Neither the general population nor patients with CAD could have good knowledge about most CAD symptoms. Less than 50% of participants in the study identified CAD symptoms. However, 33% of heart attack sufferers may not experience classic chest symptoms during the attack [29]; therefore, knowledge and recognition of all symptoms of the heart attack by the public is a crucial issue in reducing presentation delay time [8,11].

Sudden cardiac death is a catastrophic sequela of CAD [30]. Effective CPR as a Basic Life Support (BLS) is a critical component of initial care. Only 38.7% from the general population knew what CPR is and the percentage was far less among patients (16%). Worryingly, around half of the general population (51.4%) and less than quarter of patients (23.3%) could tell the ambulance number. In Jeddah, recent study demonstrated that the theoretical knowledge level of BLS among the general population was below average [30]. BLS education, training programs and CPR public awareness campaign are critically needed.

In this study the awareness of CAD risk factors and the perception of CAD symptoms showed a lack of knowledge among all participants. The population in Jeddah, Saudi Arabia also showed an evident lack of awareness of CAD risk factors [6,30].

Public awareness campaigns, creation of a series of social media graphics and improving patient and family education should be implemented to improve public awareness about CAD.

## Limitation(s)

The participants in this study were selected based on a convenience sampling method. Sample size was not calculated. This limitation was reflected by the non-equitable balance between female and male participants.

## CONCLUSION(S)

This study revealed that the general population in Al-Qassim Region showed a lack of knowledge in CAD symptoms. The question in the study questionnaire that affects the most on the CAD was "Does CAD causes chest discomfort/burning sensation of the chest?" which only 51.9% of participants knew the information.

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