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Research Article

Public Awareness of Coronary Artery Disease (CAD) Risk Factors among Adult Population Living in Arar City, Northern Saudi Arabia

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Abstract

Background: Coronary Artery Disease (CAD) is a serious cardiovascular disorder affecting middle-aged individuals. It is a major cause of death among adults over the age of 35 years. In Saudi Arabia, CAD is associated with a higher mortality rate, and Saudi patients are reported to have a significantly higher prevalence of risk factors for CAD than the Western population.

Objectives: This study aimed to investigate the public awareness of CAD risk factors among the adult population residing in Arar City, Northern Saudi Arabia. Methods: Leveraging a previously validated online questionnaire, the research design incorporates closed-ended questions to assess participants' socio-demographic characteristics, knowledge and awareness of CAD risk factors, and the prevalence of these risk factors within the population. Descriptive and inferential statistics were used to unveil patterns and associations within the dataset. A p – value ≤ 0.05 was considered statistically significant.

Results: The study recruited 584 participants. Most participants believed that smoking, lack of exercise, consumption of fast food, intake of soft drinks, age, family history of cardiovascular disease, high cholesterol, diabetes, obesity, anxiety, stress, and high blood pressure are all linked to an increased risk of cardiovascular disease. There was a slightly higher percentage of participants believing males to be more susceptible. Awareness about CAD risk factors has a significant relation to gender (p = 0.012), age (p = 0.0001), marital status (p = 0.001), and occupation (p = 0.029).

Conclusion: The study highlighted a strong foundation of knowledge and awareness among the Saudi population regarding CAD risk factors, indicating a positive starting point for preventive initiatives. However, targeted programs addressing regional variations and enhancing knowledge are recommended to improve early detection and treatment of coronary artery disease risk factors.

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Abbreviations

CAD: Coronary Artery Disease

Introduction

Coronary Artery Disease (CAD) stands as a pervasive health challenge on a global scale, significantly impacting public health systems and individual well-being [1,2]. Its relentless rise in prevalence necessitates a deeper exploration of awareness levels regarding CAD risk factors among diverse populations [3].

CAD remains a leading cause of mortality and morbidity worldwide, representing a considerable burden on healthcare systems and economies [4]. The intricate pathology of CAD, characterized by the build-up of plaque in coronary arteries, poses a complex challenge that transcends geographic boundaries [5,6]. Rapid urbanization, lifestyle changes, and an aging population contribute to the escalating prevalence of CAD globally. In Saudi Arabia, the burden of cardiovascular diseases, including CAD, is on the rise, demanding a comprehensive understanding of local factors influencing its trajectory [7-9].

Existing literature underscores the importance of public awareness in CAD prevention and management. Studies from various global contexts highlight the positive correlation between heightened awareness and healthier lifestyle choices [7,10-14].

Saudi arabia's cardiovascular health landscape

Saudi Arabia, like many countries, grapples with the growing impact of cardiovascular diseases. Sedentary lifestyles, changing dietary patterns, and a rising prevalence of risk factors such as obesity and diabetes contribute to the increasing incidence of CAD [15]. Urbanization and economic development have led to lifestyle shifts, further emphasizing the urgency of tailored research initiatives to address the specific dynamics within distinct regions of the country [1,14].

Arar City, situated in Northern Saudi Arabia, serves as a unique microcosm for studying CAD within a specific cultural and geographical context. The city's demographic profile, cultural nuances, and healthcare infrastructure contribute to a distinctive set of challenges and opportunities in managing cardiovascular health [16,17]. While urbanization brings about advancements, it also introduces lifestyle changes that can influence the prevalence of CAD risk factors among the adult population in Arar [18].

Significance of public awareness

Public awareness emerges as a pivotal factor in the prevention and management of CAD. Knowledge regarding risk factors empowers individuals to adopt healthier lifestyles, facilitating early detection and intervention. Effective public awareness programs play a vital role in reducing the burden of CAD by fostering a culture of proactive cardiovascular health management. Tailoring these initiatives to the specific needs and awareness gaps within populations is crucial for their success.

Research gap and rationale

While numerous studies address CAD awareness on a broader scale, the unique characteristics of Arar City warrant dedicated research. The dearth of literature specifically focusing on this region underscores the need for a comprehensive inquiry into the awareness levels among its adult population. By identifying the existing gaps and building on global knowledge, this study aims to offer insights that can be instrumental in crafting contextually relevant public health campaigns and policies for CAD prevention and management in Arar City. Moreover, the literature gap is evident concerning the specific dynamics within Arar city. This study seeks to contribute to the academic discourse by delving into the awareness levels of CAD risk factors among adults in this region, providing a nuanced understanding that can inform targeted interventions [7,11].

Study aim

The primary aim of this cross-sectional study is to assess the level of public awareness regarding CAD risk factors among the adult population residing in Arar City, Northern Saudi Arabia. By exploring the socio-demographic characteristics, knowledge, and prevalence of CAD risk factors within this unique context, the study aims to contribute valuable insights to inform targeted interventions for cardiovascular health promotion.

Study objectives

1. To assess the knowledge and awareness of CAD risk factors among the adult population in Arar City, focusing on key factors such as smoking, physical activity, dietary habits, familial history, and other associated elements.
2. To determine the prevalence of CAD risk factors within the studied population, encompassing factors such as smoking, physical inactivity, dietary patterns, family history, cholesterol levels, diabetes, BMI, stress, and blood pressure.
3. To identify potential associations between socio-demographic variables and the level of awareness regarding CAD risk factors.

Methodology

Study design

This study adopted a cross-sectional research design to investigate the public awareness of CAD risk factors among the adult population residing in Arar City, Northern Saudi Arabia. The utilization of a cross-sectional approach enables the collection of data at a specific point in time, providing a snapshot of participants' knowledge and awareness levels.

Data collection tool

The data collection instrument for this study was a previously validated online questionnaire, as employed in a study by Odah, et al. [19]. This questionnaire, crafted in Arabic, encompasses three primary sections: socio-demographic data, knowledge and awareness about CAD risk factors, and

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the prevalence of CAD risk factors. The first section captures participants' socio-demographic details, including age, gender, nationality, education, marital status, and employment status.

The second section of the questionnaire focuses on assessing participants' knowledge and awareness of CAD risk factors. Comprising 12 yes/no questions, this section aims to gauge the participants' understanding of factors contributing to CAD. A scoring system was applied, where each correct response is assigned a score of one, and incorrect answers receive a score of zero. The cumulative score ranged from 0 to 12, providing a quantitative measure of participants' awareness levels.

The third section delves into the prevalence of CAD risk factors, with participants providing information on the presence or absence of specific factors associated with CAD. This section aimed to offer insights into the prevalence of these risk factors within the study population.

Data collection procedure

The data collection process was facilitated through the publication of the questionnaire on Google Documents, offering a user-friendly and accessible platform for participants. Electronic distribution of the questionnaire was conducted via popular social media applications to ensure a wide reach within the adult population of Arar City. This approach aligns with contemporary trends in survey administration and enhances the efficiency of data collection. The process of data collection was carried out between April and May 2024.

Subjects and methods

The sampling strategy for this study employed a purposive sampling technique. Factors such as age, gender, education, and employment status were considered to ensure a diverse and representative sample of the adult population in Arar city.

Sample size

We estimated a sample size using the Raosoft® calculator, with a 5% level of significance, 5% margin of error, 95% confidence, and expected response distribution of 50%. So, the calculated sample is 384 participants and by adding 10% to compensate for the missing and incomplete questionnaires, so, we need a minimum sample of 403 participants.

Inclusion criteria: Encompassed individuals aged 18 years and above who are residents of Arar city during the data collection period.

Exclusion criteria: Individuals who were unable to respond to the questionnaire and those who refused to participate in the study were excluded.

Data analysis

Descriptive statistics were employed to summarize socio-demographic characteristics, knowledge scores, and the prevalence of CAD risk factors. BMI is calculated as weight in kilograms divided by the height in metres squared. In adults, overweight, or pre-obesity, is defined as a BMI of 25-29.9 kg/m^2, while a BMI ≥ 30 kg/m^2 defines obesity. Normal blood pressure is <120/<80 millimeters of mercury. A total cholesterol level of less than 200 mg/dL (5.17 mmol/L) is normal. A total cholesterol level of 200 to 239 mg/dL (5.17 to 6.18 mmol/L) is borderline high. A total cholesterol level of 240 mg/dL (6.21 mmol/L) or greater is high.

Data analysis was done using Statistical Package for the Social Sciences (SPSS) version 25. The score of the levels of knowledge and awareness regarding CAD risk factors among the study population was calculated as follows; a high level of awareness was more than 10, while 9 and 10 displayed a moderate level of awareness below 9 indicates a low level of awareness.

The Chi-square test was used to explore potential associations between socio-demographic variables and awareness levels. Statistical significance was considered at $p \leq 0.05$.

Ethical considerations

Ethical considerations are paramount in this research. Local committee of bioethics (HAP-09-A-043) at Northern Border University. Decision no. 15/24/H on dated 19/02/2024

Ministry of higher education

Northern Border University

Deanship of Scientific Research

Local Committee of Bio-Ethics (LCBE)

Informed consent was obtained from each participant before their engagement in the study. Participants were provided with clear information about the study objectives, the voluntary nature of participation, and the assurance of the confidentiality and anonymity of their responses.

Results

Table 1 displays various demographic parameters of a group of people. In terms of age distribution, most participants are older than 40 years, accounting for 42.8% of the total sample, followed by those aged "less than 30" at 35.6% and individuals aged "30 to 40" at 21.6%. Gender-wise, there is a relatively balanced representation with females comprising 51.5% and males 48.5% of the participants. Most participants are of Saudi nationality, with only a small proportion being non-Saudi (97.4% and 2.6%, respectively).

Table 2 reveals that the majority of participants believe that smoking, lack of exercise, consumption of fast food, intake of soft drinks, age, family history of cardiovascular disease, high cholesterol, diabetes, obesity, anxiety, stress, and high blood pressure are all linked to an increased risk of cardiovascular disease. Additionally, the data suggests a relatively balanced perception regarding gender susceptibility to cardiovascular disease, with a slightly higher percentage of participants believing males to be more susceptible.

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As illustrated in Table 3, the findings reveal that a significant proportion of the respondents do not currently smoke, with 80.0% reporting as non-smokers. When it comes to physical exercise, a considerable number of individuals engage in less than 30 minutes of exercise per day, while a smaller percentage dedicate 30-60 minutes or more than 60 minutes to physical activity. Interestingly, a substantial portion of the participants consume fast food 1-2 times a week, with a smaller percentage indulging 3-4 times or 5 or more times weekly. Similarly, the frequency of soft drink consumption varies, with a notable number reporting rarely or never consuming them. A significant proportion of respondents have a family member diagnosed with cardiovascular disease, highlighting a potential genetic predisposition. Up to the participants' knowledge, Cholesterol levels among the participants predominantly fall within the normal range, with only a smaller percentage categorized as borderline high or high. The prevalence of diabetes or high blood sugar is relatively low among the respondents, with the majority reporting as non-diabetic. In terms of BMI, a considerable number of individuals thought they fell within the normal weight category, while a significant portion thought they were classified as overweight. The data also sheds light on the frequency of anxiety or stress experienced by the participants, with a majority reporting occasional occurrences.

An analysis of the data presented in Table 4 provides valuable insights into the levels of knowledge and awareness regarding CAD risk factors among the study population. The table indicates that out of the total sample size of 584 respondents, approximately 32.5% exhibited a high level of awareness about CAD risk factors, while 41.1% displayed a moderate level of awareness. In contrast, 26.4% of respondents were found to have a low level of awareness of the subject.

Table 1: Sociodemographic characteristics of participants (n = 584).

Parameter		No.	Percent (%)
Age	less than 30	208	35.6
	30 to 40	126	21.6
	more than 40	250	42.8
Gender	Female	301	51.5
	Male	283	48.5
Nationality	Saudi	569	97.4
	Non-Saudi	15	2.6
Education level	Less than high school	14	2.4
	High school graduate	102	17.5
	College/technical school	66	11.3
	Bachelor's degree	370	63.4
	Postgraduate degree	32	5.5
Marital status	Single	191	32.7
	Married	360	61.6
	Divorced	23	3.9
	Widowed	10	1.7
Occupation	Employed	356	61.0
	Unemployed	49	8.4
	Student	104	17.8
	Housewife	43	7.4
	Retired	32	5.5

Table 2: Participants' knowledge about coronary artery disease in Arar city in Saudi Arabia (n = 584).

Parameter	Yes	No
Do you think that smokers are more likely to have cardiovascular disease?	552 94.5%	32 5.5%
Do you think that not exercising at least 30 minutes of walking daily for 5 days increases the incidence of cardiovascular disease?	483 82.7%	101 17.3%
Do you think that eating fast food increases the risk of cardiovascular disease?	526 90.1%	58 9.9%
Do you think that soft drinks increase the risk of cardiovascular disease?	463 79.3%	121 20.7%
Do you think that age is linked to cardiovascular disease?	324 55.5%	260 44.5%
Do you think that having a family member with cardiovascular disease increases your risk of cardiovascular disease?	290 49.7%	294 50.3%
Do you think that high cholesterol in the blood increases the risk of cardiovascular disease?	545 93.3%	39 6.7%
Do you think that high blood sugar (diabetes) increases the risk of cardiovascular disease?	438 75.0%	146 25.0%
Do you think that obesity increases the risk of cardiovascular disease?	547 93.7%	37 6.3%
Do you think that anxiety and stress increase the risk of cardiovascular disease?	500 85.6%	84 14.4%
Do you think that males are more susceptible to cardiovascular disease than females?	307 52.6%	277 47.4%
Do you think that high blood pressure increases the risk of cardiovascular disease?	539 92.3%	45 7.7%

Table 3: Frequency distribution of coronary artery disease risk factors among the adult population in Arar City in Saudi Arabia (n = 584).

Parameter		No.	Percent (%)
Do you currently smoke?	No	467	80.0
	Yes	117	20.0
On average, how many minutes do you engage in physical exercise per day?	Less than 30 minutes	201	34.4
	30-60 minutes	167	28.6
	More than 60 minutes	38	6.5
	Rarely or never	178	30.5
How frequently do you consume fast food in a week?	1-2 times	231	39.6
	3-4 times	93	15.9
	5 or more times	31	5.3
	Rarely or never	229	39.2
How often do you consume soft drinks in a week?	1-2 times	173	29.6
	3-4 times	92	15.8
	5 or more times	70	12.0
	Rarely or never	249	42.6
Has a family member been diagnosed with cardiovascular disease?	Yes	229	39.2
	No	355	60.8
What do you think about your cholesterol level?	Normal	482	82.5
	Borderline high	73	12.5
	High	29	5.0
Do you have diabetes or high blood sugar?	Yes	86	14.7
	No	498	85.3
What is your body mass index (BMI)?	Underweight	38	6.5
	Normal weight	298	51.0
	Overweight	214	36.6
	Obese	34	5.8
How often do you experience anxiety or stress?	Rarely or never	112	19.2
	Occasionally	353	60.4
	Frequently	119	20.4
What is your blood pressure level?	Normal	514	88.0
	Low	22	3.8
	Hypertension	48	8.2

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Table (5) shows that the awareness level of Coronary Artery Disease (CAD) risk factors has a statistically significant relation to their gender (p value = 0.002), age (p value = 0.021), marital status (p value = 0.020), and occupational status (p value = 0.027). It also shows a statistically insignificant relation to nationality and education level.

Table 4: Levels of knowledge and awareness about CAD risk factors score results.

	Frequency	Percent
High level of Awareness	190	32.5
Moderate level of awareness	240	41.1
Low level of awareness	154	26.4
Total	584	100.0

Table 5: Relation between awareness level of CAD risk factors and their sociodemographic characteristics.

Parameters		Awareness level of CAD risk factors		Total (N = 584)	p - value*
		High	Moderate or low		
Gender	Female	80	221	301	0.002
		42.1%	56.1%	51.5%	
	Male	110	173	283	
		57.9%	43.9%	48.5%	
Age	less than 30	80	128	208	0.021
		42.1%	32.5%	35.6%	
	30 to 40	30	96	126	
		15.8%	24.4%	21.6%	
	more than 40	80	170	250	
		42.1%	43.1%	42.8%	
Nationality	Saudi	186	383	569	0.623
		97.9%	97.2%	97.4%	
	Non-Saudi	4	11	15	
		2.1%	2.8%	2.6%	
Education level	Less than high school	5	9	14	0.134
		2.6%	2.3%	2.4%	
	High school graduate	34	68	102	
		17.9%	17.3%	17.5%	
	College/technical school	13	53	66	
		6.8%	13.5%	11.3%	
	Bachelor's degree	124	246	370	
		65.3%	62.4%	63.4%	
	Postgraduate degree	14	18	32	
		7.4%	4.6%	5.5%	
Marital status	Single	77	114	191	0.020
		40.5%	28.9%	32.7%	
	Married	105	255	360	
		55.3%	64.7%	61.6%	
	Divorced	4	19	23	
		2.1%	4.8%	3.9%	
	Widowed	4	6	10	
		2.1%	1.5%	1.7%	
Occupation	Employed	109	247	356	0.027
		57.4%	62.7%	61.0%	
	Unemployed	11	38	49	
		5.8%	9.6%	8.4%	
	Student	47	57	104	
		24.7%	14.5%	17.8%	
	Housewife	12	31	43	
		6.3%	7.9%	7.4%	
	Retired	11	21	32	
		5.8%	5.3%	5.5%	

*p value was considered significant if ≤ 0.05.

Discussion

Coronary Artery Disease (CAD) is a serious cardiovascular disorder affecting almost half of middle-aged men and approximately one-third of middle-aged women in developed countries [20]. Despite the notable reduction in coronary heart disease-associated mortality, it remains one of the major causes of death in adults over the age of 35 years [21]. In the Middle Eastern region, the prevalence of CAD has been reported to range from 5.4% to 13.4% [22]. There is a lack of data regarding the actual prevalence of CAD in Saudi Arabia specifically, but a prevalence of 5.5% was reported in 2004 among individuals between 30 and 70 years [23]. To date, despite the existence of highly effective therapies for CAD, all of them should be taken for life and a curative agent remains elusive, therefore, prevention is the cornerstone of efforts to reduce CAD-associated morbidity and mortality. For the prevention of CAD, tight control of risk factors is critical. Several risk factors for CAD have been identified. They are either modifiable risk factors (such as hypertension, hypercholesterolemia, smoking, diabetes mellitus, lack of physical activity, obesity, and psychological stress) or non-modifiable risk factors (such as old age, male gender, family history of CAD, and certain ethnicities) [24]. It should be noted that the burden of CAD risk factors is significantly high in the Middle Eastern region, including Saudi Arabia. The mean age for CAD in the Middle East has been found to be 10 years younger than the mean age for the disease worldwide. It was also noted that patients in the Middle East have at least three risk factors for the disease. In addition, hypertension was prevalent in >80% of these patients, diabetes and smoking were prevalent among approximately half of the patients, and dyslipidemia was prevalent among at least one-third [10]. Furthermore, the vast majority of those patients had at least one uncontrolled risk factor reflecting poor awareness about the disease. A study in Saudi Arabia reported similar findings and data, where approximately half of patients had at least three risk factors, hypertension and obesity were found in half of the patients, and three-quarters had dyslipidemia [25]. Thus, we aimed in this study to assess the level of public awareness regarding Coronary Artery Disease (CAD) risk factors among the adult population residing in Arar city, Northern Saudi Arabia.

In regards to the knowledge and awareness of participants towards CAD risk factors, we have found that the majority of participants believe that smoking, lack of exercise, consumption of fast food, intake of soft drinks, age, family history of cardiovascular disease, high cholesterol, diabetes, obesity, anxiety, stress, and high blood pressure are all linked to an increased risk of cardiovascular disease. Particularly noteworthy is the high percentage of participants who associate smoking, obesity, high cholesterol, and high blood pressure with an elevated risk of cardiovascular disease, indicating a strong awareness of these well-established risk factors within the community. Additionally, the data suggests a relatively balanced perception regarding gender susceptibility to cardiovascular disease, with a slightly higher percentage of participants believing males to be more susceptible. This was found to be consistent with the study by Akintunde, et

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al. in which (79.6%) of the participants were oriented about the increased risk of CAD with smoking [26]. Cardiovascular disease incidence increases with a residential lifestyle with a lack of exercise for five consecutive days; this statement was agreed on by the majority (82.7%) of the participants. The vast majority (88.5%) of the participants think eating fast foods increases the risk of cardiovascular diseases. Soft drinks were believed to be a risk factor for cardiovascular diseases by (76.5%) of the participants. More than half (55.5%(of the participants think that age is linked to cardiovascular diseases. About half (52.6%) of the participants think that a family member with a cardiovascular disease increases the risk of cardiovascular disease in the family. The vast majority of the participants (88.7%) think that high cholesterol level increases the risk of cardiovascular disease. More than two-thirds (76.8%) of the participants think that having high blood levels of sugars increases the risk of cardiovascular diseases. Obesity was believed by the majority (90.9%) of the participants to be one factor that increases the risk of cardiovascular disease. Most (84.7%) of the participants think that anxiety and stress increase cardiovascular disease risk. Slightly less than half (45.9%) think that males are more susceptible to cardiovascular diseases than females. High blood pressure increases the risk of cardiovascular diseases, as reported by (88.3%) of the participants. Similar findings were reported in the parallel study by Awad and Al-Nafisi, in which most participants were aware that smoking, obesity, unhealthy diet, and physical inactivity were associated with an increased risk of coronary artery disease [27]. However, in Riyadh Province of Saudi Arabia, a study reported poor knowledge among respondents regarding both coronary artery disease risk factors and preventive measures [9]. Likewise, in Tabuk City, Saudi Arabia, there was a prevalence of poor knowledge regarding significant coronary artery disease risk factors [28]. On the other hand, Aminde et al, in their study of 1,162 participants from Cameroon, reported a significant lack of knowledge among more than half of the recruited participants (53%) which is inconsistent with our results [29]. Another study conducted in the United States reported that, among 3,226 American–Indian participants, awareness about risk factors for CAD was as high as 90% for many risk factors which is consistent with our results [30]. While the general knowledge and awareness of CAD risk factors appear to be very poor among Middle Eastern and African countries, reports from Western countries and the United States are different [31-33]. In a study conducted on 1,702 American citizens, approximately half of the participants had adequate knowledge about CAD. The survey included questions about seven risk factors for CAD, and 37% of respondents could identify all seven risk factors; average participants could identify 4.9 factors [34].

Limitations of the study

The study had a few limitations in the measures used to collect the data and limited access, the small sample size, lack of available data, lack of prior research studies on the topic and measures used to collect the data, and limited access to self-reported data.

Conclusion

In conclusion, the study highlighted a high level of awareness among participants regarding coronary artery disease (CAD) risk factors. The majority of participants demonstrated knowledge about various factors such as smoking, lack of exercise, unhealthy diet, age, family history, and stress contributing to an increased risk of cardiovascular disease. These findings suggest a strong understanding of CAD risk factors within the community, indicating the potential for targeted interventions to promote cardiovascular health. A comparative analysis with studies from other regions underscores the importance of tailored educational initiatives to enhance public awareness and preventive measures against CAD. The results of this study contribute valuable insights that can guide future interventions aimed at reducing the burden of CAD in the region.

Recommendations

More studies are needed to assess all risk factors for CAD and more awareness of preventive measures.

Acknowledgement

To all participants.

Consent for participation

Written informed consent was obtained from all the participants

Ethical approval

Ethical approval was granted by the local Committee of Bioethics (HAP-09-A-043) at Northern Border University, dated: 19/02/2024.

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