Medical Science

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Coronary artery disease risk factors in Saudi Arabia: Knowledge, awareness and prevalence assessment

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ABSTRACT

Background: The group of disorders known as cardio vascular diseases (CVDs) severely impact the human circulatory system and are often regarded as the leading cause of disability and death. The main contributors to the higher morbidity and death associated with it were genetics and lifestyle variables. When people have a better grasp of the risks associated with CVDs, it makes it easier for them to assess their own risk appropriately, motivates them to change their behaviors and is associated with increased risk reduction efforts. This research aims to investigated Saudi Arabia's knowledge, awareness and prevalence of CVD risk factors. *Methods:* An electronic questionnaire was used to collect the data for this descriptive cross-sectional study, which involved 2397 Saudi citizens in Saudi Arabia. The information was then input and analyzed using IBM SPSS statistics. *Results:* A total of 2397 participants, 34.4% of whom were men and 65.7% of whom were women. They were 95.2% Saudi smokers made up 12.9% of all participants 3.6% were found to have cardiovascular disease. 82% of our participants know smokers have a higher probability to develop the cardiovascular disease, 72.8% said that not exercising regularly increases the incidence of cardiovascular disease also, 72.8% know that eating fast food elevates the risk of cardiovascular disease. Obesity, Anxiety and stress, High blood pressures were reported by 59.2%, 87.9%, 73%, 74.1% respectively as increasing the risk of cardiovascular disease. *Conclusion:* In conclusion, participants in our study show a level of knowledge about coronary artery disease risk factors that is generally unsatisfactory.

Keywords: Coronary Artery Disease, Risk Factors, cardiovascular disease, High blood pressure.

1. INTRODUCTION

Cardio vascular diseases (CVDs) are group of disorders that adversely affects the human circulatory system and it considered the primary cause of

disability and mortality globally in both developed and developing countries. Coronary artery disease (CAD) particularly is the main source of mortality in western communities (Awad & Al-Nafisi, 2014). The causes and development of CVD has been examined since the 1930s by Framingham study in the United States (Güneş et al., 2019). And the main causes to the increased morbidity and death linked with it were lifestyle factors and genetics (Khan et al., 2017). When people increase their understanding of the hazards of CHD helps them to evaluate their own risk properly, encourages them to improve behaviors and is linked to raise actions towards reducing the risks (Ammouri et al., 2016). The CAD prevalence has been shown to be around 5, 4% to 13, 4% in the Countries of the middle east, meanwhile in Saudi Arabia it was approximately 5% to 6% (Chowdhury & Chakraborty, 2017). In 2015 a study showed that our population appears to have a greater cardiovascular risk factors are prevalent than that measured in Western countries (Soofi & Youssef, 2015).

Several studies across the world have examined awareness and related risk factors and some have measured them in the Saudi community in specific cities in Saudi Arabia and indicate that people are not adequately aware of CVD risks. In Riyadh region they found that less than half the public were aware of CVDs and associated risk factors (Chowdhury & Chakraborty, 2017; Mujamammi et al., 2020). The insufficient knowledge and awareness among patients participated in study in Jeddah showed a poor public health education and an obvious needed action by the health authorities (Gopakumar & Sreedharan, 2019). Another study conducted in 2019 at Al-Qassim, Saudi Arabia, observed that there is a notable lack of awareness about the risk factors of coronary artery disease (Almalki et al., 2019). Reducing CAD and improving cardiovascular health requires a public knowledge and awareness of CAD implications, symptoms (Almalki et al., 2019) and risk factors (Muhihi et al., 2020). The previous studies that have been done in Saudi Arabia was confined to only certain cities Riyadh, Qassim, Hail, Jeddah and Rabigh. So we sought to apply this research on entire Saudi population. This study was conducted to assess knowledge awareness and prevalence of coronary artery disease risk factors among Saudi population in Saudi Arabia.

2. SUBJECTS AND METHODS
A descriptive cross-sectional study that was carried out during the period from 1st of august 2021 to July 2022 in Saudi Arabia we conducted an electronic questionnaire among random sample of Saudi male and female adults who lives in Saudi Arabia.

Sample size
A sample size of 384 which was determined by using the Qualtrics calculator with a 95 percent confidence level and a 5 percent margin of error

Formula would be used for calculating the adequate sample size in prevalence study:

$n = (z)^2 \, p \, (1 - p) / d^2$

n = sample size

z = Confidence level which is 1.96

p = Expected prevalence, which is 50%

d = Absolute error, which is 5%

The sample size is 384.

Inclusion criteria
We will include all Saudi citizens male and female adults who are 18 years or older and lives in Saudi Arabia.

Exclusion criteria
We will exclude any participants who lives outside Saudi Arabia, younger than 18 years and who refuse to participate in this study.

Method for data collection and instrument
The data was collected through an electronic questionnaire. Data collection involved the use of an electronic questionnaire. After doing a thorough literature analysis and consulting experts, the researchers created the study questionnaire to its final form. Knowledge, awareness and prevalence of coronary artery disease risk factors were all collected as part of the study questionnaire. The researcher and their data collectors in the Saudi Arabia kept posting the study questionnaire online via social media platforms until no fresh responses were received.

Data entry and analysis

Prior to entering the data into a personal computer, all acquired data were coded and checked. The Science (SPSS 23) software of Social Sciences was used for data entry and statistical analysis. Calculations were made for descriptive statistics, such as mean and frequency. For all variables, frequency and percent distribution were calculated and the Chi test was used. Statistics were considered significant for P-values under 0.05.

3. RESULTS

The study included 2397 participants, 34.4% of them were males and 65.7% were females. 95.2% of them were Saudi. 65.5% of participants aged between 18- 30 years old and 14.5% between 31- 40 years old. 56.6% of participants had bachelor degree and 29% had secondary school certificate. As for marital status, 59.8% were single and 37.6% were married as illustrated in Table 1.

Table 1 Socio-demographic characteristics of participants (n=2397)

Parameter	No		%
Gender	Male	822	34.3
	Female	1575	65.7
Age	18 - 30	1571	65.5
	31 - 40	348	14.5
	41 - 50	310	12.9
	51 - 60	147	6.1
	more than 60	21	.9
BMI	underweight	231	9.6
	healthy	1096	45.7
	overweight	656	27.4
	obese	414	17.3
Education level	non-educated	5	.2
	Preparatory	10	.4
	Intermediate	31	1.3
	secondary	696	29.0
	Bachelor	1356	56.6
	Diploma	217	9.1
	Master's	60	2.5
	PhD	22	.9
Nationality	Saudi	2281	95.2
	Non-Saudi	116	4.8
Living area	Eastern area	414	17.3
	Middle area	535	22.3
	Northern area	278	11.6
	Southern area	483	20.2
	Western area	687	28.7
Marital status	Married	901	37.6
	Single	1433	59.8
	Divorced	63	2.6
Functional status	Employee	725	30.2
	Student	1175	49.0
	Unemployed	497	20.7

In Table 2, 12.9% of all participants were smokers. 22.7% exercise regularly. 76.6% eat fast food and 65.3% drink soft drinks. 3.6% were diagnosed with cardiovascular disease while 25.7% have FH of cardio vascular diseases. 10.6% have high cholesterol levels while 41.7% have family history of high cholesterol levels. 5.7% were diabetics and 51% have diabetic family member (Figure 1). 7.5% were hypertensive and 51.4% have a hypertensive family member.

Table 2 Smoking, exercise and co morbidities among participants (n=2397)

Parameters	Yes	No
Smoking	310 12.9%	2087 87.1%
Exercise	545 22.7%	1852 77.3%
Eat fast food	1909 79.6%	488 20.4%
Drink soft drinks	1566 65.3%	831 34.7%
Family history of diabetes	1222 51.0%	1175 49.0%
Hypertension	180 7.5%	2217 92.5%
Family history of hypertension	1231 51.4%	1166 48.6%
Family history of cardiovascular disease	616 25.7%	1781 74.3%
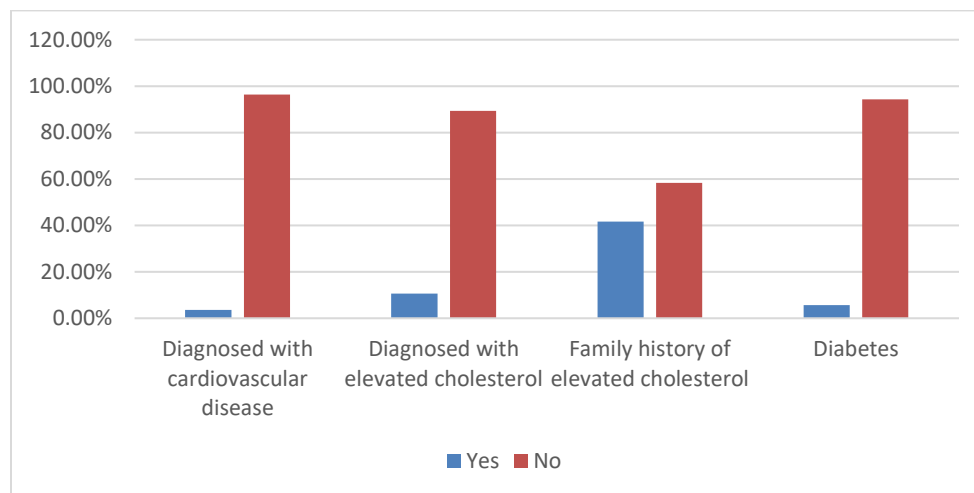
Figure 1 Diagnosed with cardiovascular disease, Diagnosed with elevated cholesterol, Family history of elevated cholesterol, Diabetes among participants (n=2397).

In (Table 3) 54.4% of all participants were chose Chest pain as symptom related to coronary artery disease (Bias occur) 47.2% chose shortness of breathing, 43.9% chose pain radiated of left arm and 35.8% chose do not know.

Table 3 Participants' knowledge of symptoms of coronary artery disease (n=2397)

Parameter		No	%
Symptom related to coronary artery disease (Bias occur)	Chest pain	1304	54.4
	Shortness of breathing	1131	47.2
	Pain radiated of left arm	1052	43.9
	I do not know	858	35.8

Table 4 shows that, 82% of our participants know the smokers are more likely to acquire cardio vascular disease, 72.8% said that not exercising regularly increases the incidence of cardiovascular disease also, 72.8% know that eating fast food elevates the risk of cardio vascular disease. 62.3% of cases reported that soft drinks increase the risk of cardiovascular disease, nearly half of cases (54.3%) said that age is related to cardiovascular disease. 54.8% reported family history with heart disease that increases their risk of cardiovascular disease and 78% said that High cholesterol elevates the risk of cardio vascular disease. High blood sugar (diabetes) (Figure 2), Obesity, Anxiety and stress, High blood pressure were reported by 59.2%, 87.9%, 73%, 74.1%, respectively as increasing the risk of cardiovascular disease. Only 27.9% said that males are further susceptible to generate cardiovascular disease than females. More than half 57.8% don't have knowledge about complication of coronary artery disease and 55% don't know the primary drugs used in CAD. However, 62.4% said that coronary artery disease patient's lives are threatened by the disease and 85.9% said that should be more education regarding about CAD.

Table 4 Knowledge of participants of Coronary Artery Disease Risk Factors (n=2397)

Parameters	Yes	No	I do not know
Smokers are more at danger of developingthe cardiovascular disease	1965 82.0%	116 4.8%	316 13.2%
No exercising regularly (at least 30 minutes of walking a day for 5 days) increases the incidence of cardiovascular disease	1745 72.8%	257 10.7%	395 16.5%
Eat fast food elevates the risk of cardio vascular disease	1831 76.4%	242 10.1%	324 13.5%
Soft drinks increase the risk of cardiovascular disease	1494 62.3%	393 16.4%	510 21.3%
Age is related to cardiovascular disease	1301 54.3%	755 31.5%	341 14.2%
Your risk of cardiovascular disease rises if your family has a history of the condition	1313 54.8%	548 22.9%	536 22.4%
High cholesterol elevates the risk of cardio vascular disease	1870 78.0%	138 5.8%	389 16.2%
Do regular check-up include cholesterol level	500 20.9%	1897 79.1%	0 0%
High blood sugar (diabetes) elevates the risk of cardio vascular disease	1419 59.2%	262 10.9%	716 29.9%
Obesityelevates the risk of cardio vascular disease	2108 87.9%	105 4.4%	184 7.7%
Anxiety and stress increase the risk of cardiovascular disease	1751 73.0%	212 8.8%	434 18.1%
Males are more likely to develop cardio vascular disease than females	668 27.9%	578 24.1%	1151 48.0%
High blood pressure elevates the risk of cardio vascular disease	1775 74.1%	154 6.4%	468 19.5%
Have knowledge about complication of coronary artery disease	462 19.3%	1385 57.8%	550 22.9%
Coronary artery disease patient's lives are threatened by the disease	1495 62.4%	162 6.8%	740 30.9%
Know the primary drugs used in CAD	320 13.4%	1318 55.0%	759 31.7%
There should be more education regarding about CAD	2060 85.9%	68 2.8%	269 11.2%
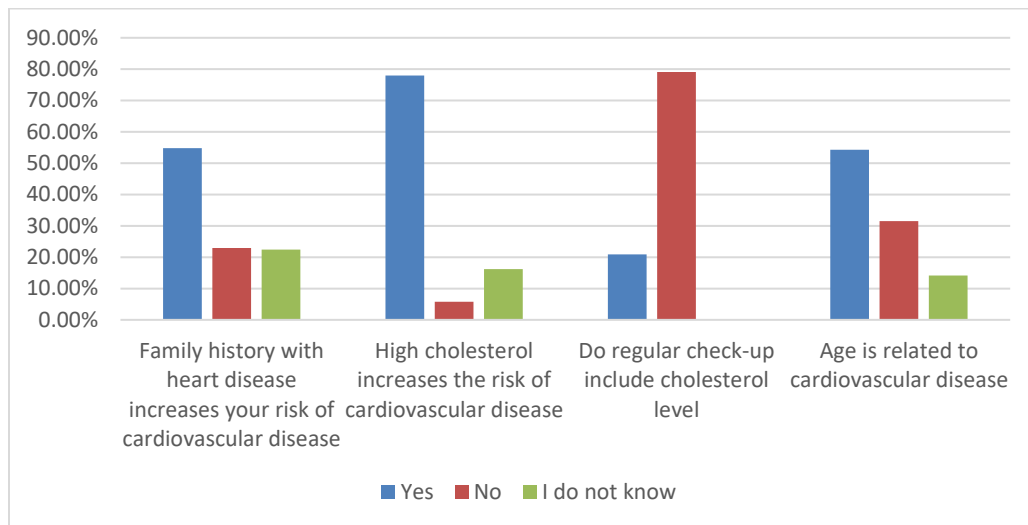
Figure 2 Knowledge of participants of Coronary Artery Disease Risk Factors (n=2397).

4. DISCUSSION

Cardiovascular diseases (CVD) adversely affect the human circulatory system, among all CVDs, coronary artery disease is most severe (Almas et al., 2008; Nabi et al., 2019). Coronary artery disease (CAD) is a major public health problem worldwide and considered as one of a serious cardio vascular disorder that affecting approximately men and women in developed countries (Hajar et al., 2017; Tarver et al., 2014). In developed countries, coronary artery disease (CAD) is a genuine cardio vascular entanglement, which influences roughly 50% of moderately aged men and right around 33% of moderately aged ladies (Centers for Disease Control and Prevention (CDC) et al., 2011; Sanchis Gomar et al., 2016). These diseases are the main cause of death in the Unites states and each year about 30% of deaths in this country occur due to these diseases (Winham & Jones, 2011). This is a descriptive cross-sectional study carried out among 2397 Saudi population in Saudi Arabia.

The study aimed to assess knowledge awareness and prevalence of coronary artery disease risk factors among Saudi population in Saudi Arabia. The prevalence of CVD risk factors has increased significantly throughout the Middle East. (Fahs et al., 2017), in Saudi patients, as well as the prevalence of CAD related risk factors with recognized CAD is concerning (Al-Habib et al., 2011; Traina et al., 2017). Enhanced knowledge about the disease may result in an earlier contribution to medical care and better patient outcomes individuals necessary to know and be aware of the consequences of CVD, its symptoms and risk factors to enable proactive diminishing of risk (Mukattash et al., 2012).

Our study participants show relatively unsatisfactory level of knowledge regarding risk factors of CVD. Compared with a community based cross sectional study in the Western region of Saudi Arabia, the majority (80%) indicated lack of exercise, stress, and obesity as the most important risk factors. 77% of participants reported hypertension as a risk factor of CAD, 75.2% for smoking, 73.7% for family history of cardiovascular diseases, 72% Unhealthy diet, 70.4% Previous heart attack and 79.3% know that high level of LDL Cholesterol as a risk factor of CAD (Alghamdi et al., 2021).

The overall level of knowledge related to CVD risk factors was weak, only 18.5% were knowledgeable about the risk factors (Alghamdi et al., 2021). In the Hail region, Saudi Arabia a cross sectional study carried out among 537 participants revealed that Awareness of TV watching (88.5%), smoking (87.9%), lack of physical activities (78.4%) and family history of CAD (74.7%) as the leading cause of CAD has a distinguished higher percentage among the studied population however the family history of diabetes mellitus (51.6%), having diabetes mellitus (57.7%), family history of hypertension (65.7%) and family history of hyperlipidemia (69.1%) have the lowest percentages (Shahid et al., 2020) In Medina, Saudi Arabia. A descriptive cross-sectional community-based study was conducted among 222 of the women aged 40 years and above who are current employees at Taibah University; the results show that participants shown knowledge about unhealthy (Diabetic, 61%), (stress/anxiety, 67%), (lack of exercise, 71%), (hypertension, 80%), (overweight, 79%), (smoke, 77%), (high cholesterol, 75%) and (diet 85%) as a most common CVD risk factor (Qasem Surrati et al., 2021).

In Jeddah, Saudi Arabia: A cross sectional study was carried out among 468 participants reported that fast food intake was found to be the risk factor that the respondents were most frequently (74.8%) aware of followed by soft drinks (64.3%), family history of diabetes (47.2%) and personal history of stroke was the least known CAD risk factor (0.9% respondents were aware of it)

(Gopakumar & Sreedharan, 2019). The findings of a cross sectional descriptive research on a random sample of Tabuk city population demonstrate that the commonest risk factors of CAD known by the participants were smoking (81%), hypertension, obesity, smoking and diabetes mellitus were known by 65.9%, 77.8%, 81.0% and 37.3% of participants respectively. Less than two thirds (64.3%) of individuals could identify stress as a risk factor and less than half (44.4%) could identify the genetic tendency as a risk factor of CAD. Most participants (72.2%) know that lack of exercise or the sedentary lifestyle is a risk factor for CAD (alwakeel et al., 2018).

In Qassim, SaudiArabia, another study carried out among, 1041 respondents reported; smoking, obesity, hyperlipidemia and fast-food intake were the most identified risk factors, reported as 95.1%, 94%, 87.8%and 87.1% of participants (Almalki et al., 2019). However, in Dawadmi, Riyadh province: Another study found the large majority of people (82%) had never heard of CAD and 26.4% were ignorant of any risk factors (Abdulmgeed et al., 2017). In the United States, of 1, 702 participants, half had adequate knowledge of CVD, the questionnaire asked the sample to identify 7 risk factors for (CVD) and 37% of the group who responded correctly, identified all seven risk factors, with a mean of 4.9 risk factors (Wartak et al., 2011). Among the Kuwaiti cohort (Awad & Al-Nafisi, 2014), Smoking, being overweight, eating poorly and not exercising frequently were reported, but high cholesterol, Hypertension, diabetes mellitus, anxiety and a family history of CVD were less frequently mentioned as CAD risk factors.

In Jordon, another study reported; 75.7% of cases said that Smoking was the most reported risk factor of CAD following by diet with (high fat) (62.0%) and overweight (71.2%) (Mukattash et al., 2012) based on a survey of the Lebanese population, they were least aware of diabetes and were most aware of tobacco as a CVD risk factor (Fahs et al., 2017). This discrepancy in results may be caused by regional differences in the frequency of public health issues and information from the media. Understanding CVD symptoms and indications is crucial for promoting early intervention and a better result. In Singapore, a patient's failure to recognize the symptoms and signs of a myocardial infarction is the main reason for a delayed in an intervention (Quah et al., 2014). Regarding to knowledge of symptom related to coronary artery disease (Bias occur) our study found that 54.4% of cases reported Chest pain, 47.2% for Shortness of breathing, 43.9% for Pain radiated of left arm and 35.8% do not know the symptoms of coronary artery disease.

In the Western region of Saudi Arabia, another study found that the majority (87.6%) listed chest pain or discomfort as symptoms of CAD. Other symptoms reported were shortness of breath, feeling weak, light headed or faint, pain or numbness in the arm, loss of consciousness, excessive sweating, the pain increased with exertion, neck pain, jaws or back, fast heartbeats after high intensity exercises, pain relieved with rest or nitroglycerin and abdominal pain (Alghamdi et al., 2021). Generally, results of previous study show that the majority (58.5%) had inadequate understanding of the signs of cardio vascular illness, compared to 20% who had adequate knowledge and 19.3% who had strong knowledge. It is concerning that the majority was not aware of the CVD symptoms (Alghamdi et al., 2021).

Regarding prevalence of coronary artery disease risk factors, our study reported; only 3.6% of participants had been diagnosed with cardio vascular disease, 5.7% diabetic, 7.5% have high blood pressure and 10.6% suffer from high cholesterol. The majorities 79.6% eat fast food followed by 65.3% drink soft drinks, 51.4% had hypertensive patient in the family 51% had diabetic patient in the family and 41.7% had a patient with high cholesterol in the family. However, only 12.9% were smokers and 22.7% do exercise regularly. 25.7% of cases have a member of their family (father mother brothers) that has already been diagnosed with cardiovascular disease by a doctor. In contrast to our results, another study reported that a third (32%) of the sample was diagnosed with CVD, a quarter (25.2%) smoked, the most frequent co morbidities were hypercholesterolemia (15.4%), hypertension (11.7%), diabetes (11.5%) and a history of CVD (7%), (Alghamdi et al., 2021).

In Jeddah, another study reported that negative dietary behaviors (such as fast-food intake and soft drink intake) were the most prevalent risk factors among the study participants. Only 12%, 26% and 39% of participants, respectively, indicated diabetes mellitus, smoking and inactivity (Gopakumar & Sreedharan, 2019). Another study demonstrated that only 9.3% of the participants had a family history of CAD, 79.1% were physically inactive, 33.4% of the participants consumed fast food at least three times a week and (24.1%) were smokers (Abdulmgeed et al., 2017). In Lebanon, another study found that Overweight and obesity were the most common risk factors among participants, while heavy drinking was less common. A doctor had previously diagnosed dyslipidemia, hypertension and diabetes in 29.8%, 22.8% and 22.5% of reported cases, respectively (Fahs et al., 2017).

5. CONCLUSION

Our study participants show relatively unsatisfactory level of knowledge regarding risk factors of coronary artery diseases. Campaigns and health promotion preferences should be conducted to increase general population awareness of risk factors and symptoms of coronary artery disease.

Ethical considerations

Prior to start of data collection, all necessary official approvals were secured from the research ethics committee of Taif University, southern Saudi Arabia, with letter number (43-770). All physicians were informed that their participation is optional. All collected data were kept confidential.

Recommendations

We recommend that further educational campaigns should be inaugurated to raise awareness about Coronary Artery Disease Risk Factors.

Conflict of interest

The authors declare that there is no conflict of interests.

Data and materials availability

All data sets collected during this study are available upon reasonable request from the corresponding author.

REFERENCES AND NOTES

1. Abdulmgeed Fahhad H Alruways, Nemer Abdulaziz Alotaibi, Mohammad Azhar Rashikh AAA, Yosef Jazza D. Alshammari, Majed Rashed Alharthy FJMA. Awareness and prevalence of coronary artery disease risk factors among Saudi adults in Dawadmi, Riyadh province: A cross sectional study. JFam Med Prim Care 2017; 6(2):169–70.

2. Alghamdi AS, Alzahrani MS, Alsolami BM, Thabet SA, Alghamdi BS, Kinsara AJ. A Community Based, Cross Sectional Study Assessing the Level of Awareness and Insight Related to Cardio vascular Diseases. Cureus 2021; 13(6).

3. AlHabib KF, Hersi A, Al-Faleh H, Al-Nemer K, Al-Saif S, Taraben A. Base line characteristics, management practices and in hospital outcomes of patients with acute coronary syndromes: Results of the Saudi project for assessment of coronary events (SPACE) registry. J Saudi Hear Assoc 2011; 23(4):233–9.

4. Almalki MA, Al MNJ, Khayat MA, Bokhari HF, Subki AH, Alzahrani AM. Public Awareness of coronary artery disease risk factors in Qassim, Saudi Arabia: A cross sectional study. Int J Gen Med 2019; 12:63–70.

5. Almas A, Hameed A, Sultan FAT. Knowledge of coronary artery disease (CAD) risk factors and coronary intervention among university students. J Pak Med Assoc 2008; 58(10): 553–7.

6. Alwakeel A Abdulaziz, Alshehri RA, Alshehri RA, Merghani T. Evaluation of knowledge, attitudes and practice of coronary artery disease risk factors among general population in Tabuk City, Saudi Arabia. Egypt J Hosp Med 2018; 73(7):7064–8.

7. Ammouri AA, Tailakh A, Isac C, Kamanyire JK, Muliira J, Balachandran S. Knowledge of coronary heart disease risk factors among a community sample in Oman: Pilot study. Sultan Qaboos Univ Med J 2016; 16(2):189–96.

8. Awad A, Al-Nafisi H. Public knowledge of cardio vascular disease and its risk factors in Kuwait: A cross sectional survey. BMC Public Health 2014; 14:1131.

9. Centers for Disease Control and Prevention (CDC). Recommendation of the Advisory Committee on Immunization Practices (ACIP) for use of quadrivalent meningococcal conjugate vaccine (MenACWY-D) among children aged 9 through 23 months at increased risk for invasive meningococcal disease. MMWR Morb Mortal Wkly Rep 2011; 60(40):1391–2.

10. Chowdhury S, Chakraborty P pratim. COVID-19 pandemic has taken away focus, resources from cancer patients needing palliative care. JFam Med Prim Care 2017; 6(2):169–70.

11. Fahs I, Khalife Z, Malaeb D, Iskandarani M, Salameh P. The Prevalence and Awareness of Cardio vascular Diseases Risk Factors among the Lebanese Population: A Prospective Study Comparing Urban to Rural Populations. Cardiol Res Pract 2017.

12. Gopakumar A, Sreedharan J. Population awareness of coronary artery disease risk factors in Jeddah, Saudi Arabia:

A cross sectional study (Letter). Int J Gen Med 2019; 12:185–6.

13. Güneş FE, Bekiroglu N, Imeryuz N, Agirbasli M. Awareness of cardio vascular risk factors among university students in Turkey. Prim Health Care Res Dev 2019; 20: e127.

14. Hajar R. Risk factors for coronary artery disease: Historical perspectives. Hear Views 2017; 18(3):109.

15. Khan NS, Shehnaz SI, Guruswami GK, Ibrahim SAM, Mustafa SAJ. Knowledge of warning signs, presenting symptoms and risk factors of coronary heart disease among the population of Dubai and Northern Emirates in UAE: A cross sectional study. Nepal J Epidemiol 2017; 7(2):670-680.

16. Muhihi AJ, Anaeli A, Mpembeni RNM, Sunguya BF, Leyna G, Kakoko D. Public knowledge of risk factors and warning signs for cardio vascular disease among young and middleaged adults in rural Tanzania. BMC Public Health 2020; 20(1):1–12.

17. Mujamammi A, Alluhaymid Y, Alshibani M, Alotaibi F, Alzahrani K, Alotaibi A. Awareness of cardio vascular disease associated risk factors among Saudis in Riyadh City. JFam Med Prim Care 2020; 9(6):3100.

18. Mukattash TL, Shara M, Jarab AS, Al-Azzam SI, Almaaytah A, Al-Hamarneh YN. Public knowledge and awareness of cardio vascular disease and its risk factors: A cross sectional study of 1000 Jordanians. Int J Pharm Pract 2012; 20(6):367–76.

19. Nabi R, Alvi SS, Saeed M, Ahmad S, Khan MS. Glycation and HMG-CoA Reductase Inhibitors: Implication in Diabetes and Associated Complications. Curr Diabetes Rev 2019; 5(3):213–23.

20. Qasem Surrati AM, Mohammedsaeed W, Shikieri ABE. Cardiovascular Risk Awareness and Calculated 10 Year Risk Among Female Employees at Taibah University 2019. Front Public Heal 2021; 9:1–10.

21. Quah JLJ, Yap S, Cheah SO, Ng YY, Goh ES, Doctor N. Knowledge of signs and symptoms of heart attack and stroke among Singapore residents. Biomed Res Int 2014.

22. Sanchis Gomar F, Perezuilis C, Leischik R, Lucia A. Epidemiology of coronary heart disease and acute coronary syndrome. Ann Transl Med 2016; 4(13):1–12.

23. Shahid SMA, Ginawi TAN, Kausar MA, Kuddus M, Alenazi FSH, Alreshidi AH. Public awareness of the coronary artery disease and its risk factors in the population of Hail region, Saudi Arabia: A cross sectional study. Adv Life Sci 2020; 8(1):89–92.

24. Soofi MA, Youssef MA. Prediction of 10 year risk of hard coronary events among Saudi adults based on prevalence of heart disease risk factors. J Saudi Hear Assoc 2015; 27(3):152–9.

25. Tarver T. Heart disease and stroke statistics: A report from the American Heart Association. Circulation 2014; 29(3): e28-e292.

26. Traina MI, Almahmeed W, Edris A, Murat Tuzcu E. Coronary Heart Disease in the Middle East and North Africa: Current Status and Future Goals. Curr Atheroscler Rep 2017; 19(5):1–6.

27. Wartak SA, Friderici J, Lotfi A, Verma A, Kleppel R, Naglieri-Prescod D. Patients' knowledge of risk and protective factors for cardio vascular disease. Am J Cardiol 2011; 107(10):1480–8.

28. Winham DM, Jones KM. Knowledge of young African American adults about heart disease: A cross sectional survey. BMC Public Health 2011; 11.