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Public Awareness of Coronary Artery Disease and its Risk Factors Among Al-Qunfudah Governorate Population

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ABSTRACT

Background:

Coronary artery disease (CAD) is one of the considerable health hazards causing disability and burden globally and locally. Regardless of the significant reduction of cardiovascular disorders (CVD), mortality rate is yet still representing one-third of deaths over the age of 35 in developed countries, and in the Saudi Arabia is still the leading cause of mortality.

Aim of the study:

In this study, we aimed to measure the level of awareness and knowledge of coronary artery disease and its risk factors among the population in Al-Qunfudah governorate, Saudi Arabia.

Methods:

A cross-sectional study was conducted among Al-Qunfudah population, Saudi Arabia, during February, 2021. Data collection was performed through application of a validated questionnaire that was adapted from other studies and was prepared as an online google form and then distributed via different social media platforms. The questionnaire inquired about the sociodemographic data of the participants, awareness of the participants regarding CAD and its risk factors. The first section of the questionnaire explained the nature and purpose of the study before requesting the participants' informed consent.

Results:

A total number of 688 eligible individuals participated in the study. Most the participant were Saudi (99.3%). 84.2% of participants had good knowledge, where a 14.5% with fair knowledge and 1.3% had poor knowledge. About 23.8% of the participants were smokers, and 57.1% eat fast food.

Conclusions:

This study showed that the participants of Al-Qunfudah have a good level of knowledge and awareness regarding CAD. However, the prevalence of the risk factors among the population such as smoking and eating fast foods, require interventional health education programs that target such risk factors and emphasize their association with development of CAD and suggest healthier alternatives.

1. Introduction

Coronary artery disease (CAD) is one of the considerable health hazards causing disability and burden globally and locally affecting more than one third in middle-aged individuals (35–54 years) (1–4). Regardless of the significant reduction of cardiovascular disorders (CVD) mortality rate yet is still representing one-third of all deaths over the age of 35 in the developed countries; and in Saudi Arabia CAD is still the leading cause of mortality (3,5,6). The prevalence of CAD in the Middle Eastern region ranged from 5.4% to 13.4% with mean age of 10 years younger than the mean in the developed countries (7–9).

As for the local prevalence of CAD in Saudi Arabia no recent updated data but in a study conducted in 2004 the estimated reported cases were 5.5% among individuals aged 30-70 (10). There are current MoH data produced each year on mortality and morbidity for CHD

Prevention of CAD disease plays a major role to decrease CAD-related morbidity and mortality. Multiple risk factors for CAD have been known (14) and they are categorized into modifiable (related to

medical illnesses such as diabetes mellitus, dyslipidemia, hypertension, and obesity), and non-modifiable risk factors such as a previous family history of CAD, premature cardiac disease, old age, male gender and particular ethnicities (4).

Knowledge and awareness of the population regarding the CAD and its risk factors can play a paramount role in the prevention process of the disease (11).

A study that was performed in Pakistan showed that 80.7% of participants were aware that hypertension is one of the CAD risk factors, and about 82.8% wanted to increase their level of awareness by teachers and religious philosophers (12).

A study in the Middle East and North Africa noticed that the presence of three risk factors associated with developing CAD, were being diagnosed with hypertension (80%), diabetes mellitus in (50%), and being a current smoker in (50%); with at least presence of one uncontrolled risk factor (9).

Another study was done in Palestine showed that the associated risk factors with CAD were obesity and physical inactivity among nearly

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half of the participants, about hyperlipidemia in 40%, hypertension in 28%, diabetes Mellitus in 22%, and the smoking accounted for about 20%. (13).

In Saudi Arabia, a previous study showed that more than three risk factors had been identified among half of the studied sample; dyslipidemia was in about 75%, hypertension and obesity were found in nearly 50% (14).

Regarding the awareness of the Saudi population of the CAD symptoms and signs, a study that was conducted in Al-Qassim, Saudi Arabia asked about the symptoms of CAD, 50% of the participants answered correctly that CAD can cause pain in arms and shoulders, and 22.8% reported it can cause discomfort in the jaw (15).

Another study was done in Al-Qassim, Saudi Arabia and it found that about 40.6% of participants think that there's no relation between age and CVD, and 45.5% of participants don't think that high blood sugar will increase the risk to developing CVD (16).

Additionally, a study that was conducted in Jeddah, Saudi Arabia, showed that fast food intake is the most frequent risk factor that had been chosen by the participants (74.8%) as a risk for developing CAD (11).

The governorate; therefore, in this study we aimed to investigate the level of awareness and knowledge of CAD published each yeaware MoH dith its risk factors among the population in Al-Qunfudah governorate, Saudi Arabia, 2021.

2. Subjects and Methods:

A cross-sectional study was conducted among Al-Qunfudah residents, Saudi Arabia, during the period from 14th till 21st of February, 2021.

A validated questionnaire was adapted from other study and used after obtaining consent (16). The questionnaire was in English and it was translated into Arabic, since the majority of Al-Qunfudah population's native language is Arabic. the translation process was done under supervision of professional and academic specialist at translation as well as two senior medical supervisors. Moreover, the developed final version of the questionnaire was distributed among 30 volunteer individuals to examine its clarity understandability, correctness as well as its validity; and the Cronbach's alpha was calculated at 0.76. Then, their data were excluded from the data collection file. Further, an online version of the questionnaire was prepared on google forms and was distributed among the public through the available social media platforms.

The sample size calculated by Rao-soft calculator by considering a margin of error 5%, and 95% confidence interval, resulting in a sample of 385 respondents are enough for this cross-sectional study. However, during the data collection week, we received 688 eligible responses.

During the one-week period -from February 14th till 21st, 2021- that we specified for data collection, the online questionnaire was distributed and kept available to receive responses. By the end of the data collection week, a total of 706 participants responded and shared in the study. We excluded 18 respondents from this study since 16 respondents were living outside Al-Qunfudah governorate, and two of them were under the age of 18 years. Finally, the statistical analysis was performed on the 688 eligible participants.

The questionnaire included the following sections:

The first section included the socio-demographic profile: age, gender, nationality, social status, residence, employment status and educational level. The second section inquired about awareness of the participants regarding CAD by asking 12 questions that assess the level of knowledge. The third section of the questionnaire came in 12 questions that asked the participants about their awareness of the risk factors for CAD.

The participants' awareness of CAD risk factors was assessed through yes/no answers for 12 questions asking whether the participant knows or not about each of the mentioned 12 CAD risk factors. Each participant was given an awareness score that was calculated from the number of CAD risk factors he/she knew. One point was assigned for awareness of each of the 12 mentioned risk factors; thus, the total score ranged from 0 (for participants who did

not believe or know any of the 12 risk factors) to 12 (for participants who were aware of all the questioned risk factors).

Then, the awareness score was presented as mean \pm Standard deviation (SD). The participants' awareness of each of the questioned risk factors as well as their sociodemographic data and reported CAD risks were studied in comparison with the mean awareness score. The awareness score was categorized by taking the scores below the mean \pm 2SD as "Poor", then scores from the mean score \pm 2SD to the scores that matches the mean as "Fair", and all the scores that came above the mean as good to excellent awareness regarding CAD risk factors.

3. Ethical considerations:

Prior to data collection the study protocol was evaluated and an approval was obtained from the biomedical research ethics committee of Umm Al-Qura University; (Approval number: HAPO-02-K-012-2021-03-589).

During the course of this research, all data was kept totally protected for confidentiality. The purpose of the study was explained at the first introduction of the questionnaire and the participants were asked to voluntarily participate in the study according to their own and full will only after reading the information and consenting for participation. They had the right to quit filling the online questionnaire whenever they wanted. They were confirmed that their information will be kept confidential and will never be used for purposes other than scientific ones.

4. Statistical analysis:

The Collected data was sent by the participants to an excel sheet on excel, 2016 and all data analyses were performed by using Statistical Package for Social Sciences (SPSS) software, version 25. Frequency distribution, descriptive statistics were performed and statistical significance were examined by student's t-test, Chi-squared test and Pearson correlations. P-values of 0.05 were considered statically significant.

Table 1: Numbers (percentages) of Socio-demographic characteristics of the studied participants 10 (N=688) tables

Characteristics	Numbers (percentages)
Age, mean \pm SD	38.52 \pm 10.521
Sex • Male • Female	499 (72.5) 189 (27.5)
Nationality • Saudi • Non-Saudi	683 (99.3) 5 (0.7)
Level of education • Postgraduate • University • Diploma • Secondary school • Intermediate school • Primary school	45 (6.5) 469 (68.2) 46 (6.7) 101 (14.7) 18 (2.6) 9 (1.3)
Marital status • Single • Married • Divorced • Widow	148 (21.5) 528 (76.7) 9 (1.3) 3 (0.4)
Employment status • Employed • Unemployed • Student • Retired	470 (68.3) 108 (15.7) 82 (11.9) 28 (4.1)

Table 2: Awareness of risk factors for coronary artery disease of all respondents presented as frequencies and percentages

Awareness of CAD risk factors	Awareness	Numbers (percentages)
Do you think smokers are more likely to develop the cardiovascular disease?	No	25 (3.6)
	Yes	663 (96.4)
Do you think that not exercising regularly (at least 30 minutes of walking a day for 5 days) increases the incidence of cardiovascular disease?	No	77 (11.2)
	Yes	611 (88.8)
Do you think eating fast food increases the risk of cardiovascular disease?	No	32 (4.7)
	Yes	656 (95.3)
Do you think that soft drinks increase the risk of cardiovascular disease?	No	103 (15)
	Yes	585 (85)
Do you think age is related to cardiovascular disease?	No	265 (38.5)
	Yes	423 (61.5)
Do you think that having a family member with heart disease increases your risk of cardiovascular disease?	No	260 (37.8)
	Yes	428 (62.2)
Do you think that high cholesterol increases the risk of cardiovascular disease?	No	28 (4.1)
	Yes	660 (95.9)
Do you think high blood sugar (diabetes) increases the risk of cardiovascular disease?	No	74 (10.8)
	Yes	614 (89.2)
Do you think obesity increases the risk of cardiovascular disease?	No	19 (2.8)
	Yes	669 (97.2)
Do you think that anxiety and stress increase the risk of cardiovascular disease?	No	38 (5.5)
	Yes	650 (94.5)
Do you think that males are more likely to develop cardiovascular disease than females?	No	339 (49.3)
	Yes	349 (50.7)
Do you think that high blood pressure increases the risk of cardiovascular disease?	No	36 (5.2)
	Yes	652 (94.8)

Table 3: Frequencies and percentages of the risk factors for coronary artery disease among the respondents from Al-Qunfudah population (total 12 risk factors) (N = 688).

CAD Risk Factors	Response	Numbers (percentages)
Are you a smoker?	No	524 (76.2)
	Yes	164 (23.8)
Do you exercise regularly?	No	427 (62.1)
	Yes	261 (37.9)
Do you eat fast food?	No	295 (42.9)
	Yes	393 (57.1)
Do you drink soft drinks?	No	308 (44.8)
	Yes	380 (55.2)
Have you ever been diagnosed with cardiovascular disease?	No	660 (95.5)
	Yes	28 (4.1)
Do you suffer from high cholesterol (diagnosed by a doctor)?	No	593 (86.2)
	Yes	95 (13.8)
Is there a patient with high cholesterol in the family (father-mother - brothers)?	No	399 (58)
	Yes	289 (42)
Are you diabetic?	No	611 (88.8)
	Yes	77 (11.2)
Is there a diabetic patient in the family (father-mother - brothers)?	No	250 (36.3)
	Yes	438 (63.7)
Do you have high blood pressure?	No	589 (86.9)
	Yes	90 (13.1)
Is there a hypertensive patient in the family (father-mother- brothers)?	No	258 (37.5)
	Yes	430 (62.5)
Is there a member of your family (father-mother-brothers) that has already been diagnosed with cardiovascular disease by a doctor?	No	462 (67.2)
	Yes	226 (32.8)

Table 4: Relationship between mean awareness score and the participants' response regarding prevalence of coronary artery disease risk factors

CAD risk factors	Awareness of the risk	Knowledge Mean ± SD	p-value
Do you smoke?	No	9.84 ± 2.027	0.786
	Yes	9.88 ± 1.520	
Do you exercise regularly?	No	9.77 ± 1.865	0.206
	Yes	9.93 ± 1.509	
Do you eat fast food?	No	9.89 ± 1.644	0.700
	Yes	9.84 ± 1.669	
Do you drink soft drinks?	No	9.78 ± 1.730	0.092
	Yes	9.99 ± 1.549	
Have you ever been diagnosed with cardiovascular disease	No	10.25 ± 1.555	0.217
	Yes	9.86 ± 1.657	
Do you suffer from high cholesterol (diagnosed by a doctor)?	No	10.18 ± 1.429	0.051
	Yes	9.82 ± 1.683	
Is there a patient with high cholesterol in the family (father-mother - brothers)?	No	9.90 ± 1.690	0.745
	Yes	9.85 ± 1.629	
Are you diabetic?	No	10.13 ± 1.559	0.147
	Yes	9.84 ± 1.664	
Is there a diabetic patient in the family (father-mother - brothers)?	No	9.96 ± 1.559	0.076
	Yes	9.72 ± 1.801	
Do you have high blood pressure?	No	10.16 ± 1.506	0.081
	Yes	9.83 ± 1.672	
Is there a hypertensive patient in the family (father-mother- brothers)?	No	10.01 ± 1.422	0.006
	Yes	9.65 ± 1.964	
Is there a member of your family (father-mother- brothers) who has already been diagnosed with cardiovascular disease by a physician?	No	9.88 ± 1.540	0.013
	Yes	9.87 ± 1.708	

Table 5: Relationship between CAD awareness level (poor, fair and good) and sex, age, marital status and education level of the participants

Awareness score categories		Poor (n=9)	Fair (n=100)	Good (n=579)	P-value
Sex	Male	8 (1.6%)	63 (12.6%)	428 (85.8%)	Chi=6.33 P=0.042
	Female	1 (0.5%)	37 (19.6%)	151 (79.9%)	
Age	Below 30 years	8 (4.8%)	36 (21.4%)	124 (73.8%)	Chi=30.36 P=0.001
	30 years & above	1 (0.2%)	64 (12.3%)	455 (87.5%)	
Marital status	Married	3 (0.6%)	62 (11.7%)	463 (87.7%)	Chi=25.1 P=0.001
	Singles-divorced	6 (3.8%)	38 (23.8%)	116 (72.5%)	
Education level	Below university	2 (1.1%)	34 (19.5%)	138 (79.3%)	Chi=4.71 P=0.095
	University & above	7 (1.4%)	66 (12.8%)	441 (85.8%)	

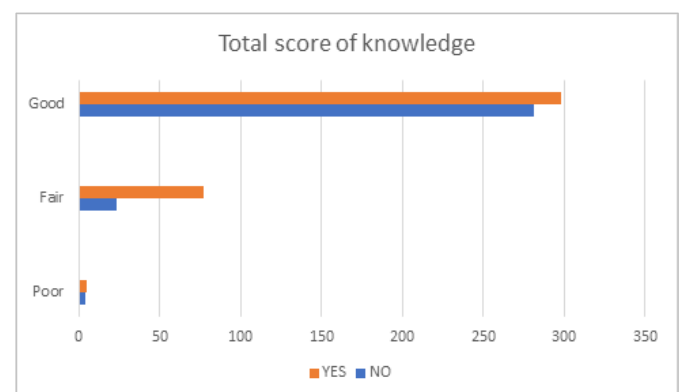


Figure 1: Mean awareness scores that soft drinks are associated with developing coronary artery disease

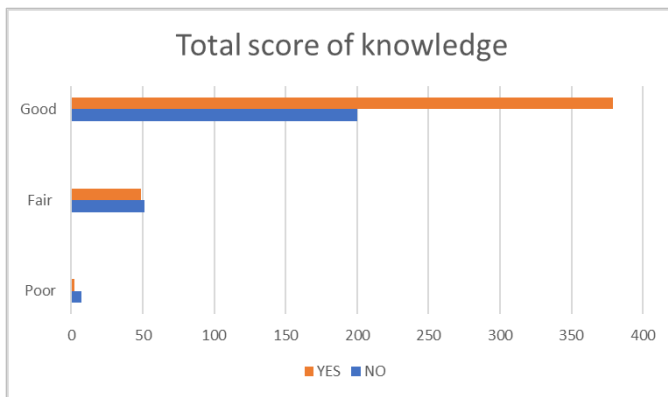


Figure 2: Mean awareness scores that males are more likely to develop coronary artery disease than females

5. Results:

In this study, we aimed to measure the level of awareness and knowledge of CAD among the population in Al-Qunfudah governorate, Saudi Arabia. The participant's ages ranged from (18-67) years old, with a mean age of (38.55 ± 10.52) years. About 81.4% of participants had an academic education level, 68.2% of them were university students or graduates, 76.7% were married, and 68.3 were employed (Table 1).

Regarding the awareness of the participants about 96.4% of the participants think that smokers tend to be more likely to develop CAD, in contrast, 38.5% think that age isn't related to increasing the risk of CAD. Nearly, 49.3% of the respondents believe that being a male won't put the males at higher risk more than females, in contrast, 50.7% believe the opposite way (Table 2).

About 23.8% of the respondents were smokers, and 57.1% of them eat fast food. Among the participants 4.1% were previously diagnosed with CAD, 13.8% were diagnosed with hyper-cholesterolemia, 11.2% were diabetics, 13.1% reported having hypertension. Moreover, about 42% of the participants had a family history of high cholesterol levels, 63.3% with a family history of diabetes mellitus, 62.5% with a positive family history of hypertension and 32.8% with positive family history of CAD (Table 3).

Regarding the awareness score, about 84.2% of participants had good knowledge, while 14.5% with fair knowledge, and only 1.3% of the participants had poor knowledge (Table 4). The mean score was 9.87 ± 1.65 .

There was a significant weak correlation between the total score of knowledge and sex of the participants ($r=0.105$, $p=0.006$), and their age ($r=0.131$, $p=0.001$).

There was a significant relationship between the participants total score of knowledge and having a family history of hypertension ($p=0.001$).

Table 5 shows the cross tabulation between the awareness score of CAD categorized as poor, fair and good with sex, age, marital status and educational level of the participants. The results indicate that males and those who are 30 years of age and above as well as the married responders have good awareness level about CAD than their counterparts.

The majority of the participants showed a good score of knowledge regarding the excessive use of soft drinks as a risk factor for developing CAD, (Figure 1).

Additionally, they had a good awareness that males are more likely to develop CAD than females, (Figure 2).

6. Discussion:

This study measured the level of awareness and knowledge of CAD among the Saudi population in Al-Qunfudah, Saudi Arabia. The results showed that the mean score of knowledge and awareness of the participants regarding CAD was 9.87 ± 1.65 out of 12; and about 84.2% of the participants had good to excellent awareness score, with only 1.3% had poor knowledge. In contrary to our findings, a study that was conducted in Al-Qassim, Saudi Arabia, showed that the respondents had poor knowledge regarding CAD (12.66 ± 5.1 out of

22), (15). On the other hand, a study that was done in Cameroon, Aminde showed that 53% of 1,162 responders had a noticeable lack of knowledge regarding CAD-related risk factors (16). Moreover, another study was done in the United States 1,702 responders had good knowledge regarding CAD (17).

Our results showed no significant difference between those who have history of CAD and those without CAD regarding their awareness score. However, In Al-Qassim study, the patients who were diagnosed previously with CAD had a better level of knowledge than who were not (13.59 ± 4.8 vs. 2.62 ± 5.1 , $p=0.015$), (15).

In contrast to our study, 70.1% of the participant in a different study that was conducted in Al-Qassim by Albadrani et al., 2020, Saudi Arabia, don't think that being a male will increase the chance of having CAD more than the opposite gender (18), however, in our study almost half of the participants believe that male sex increases the risk of developing CAD.

Our results showed that 89.2% of the participants are aware that high blood sugar levels and diabetes mellitus are risks for developing CAD. However, a study that was conducted at a tertiary hospital in Rawalpindi, Pakistan found that diabetes mellitus and old age were not recognized as risk factors for developing CAD among patients.

In our study, we found that obesity was the most recognizable risk factor for developing CAD by 97.2% of the participants. In parallel to this, a study that was conducted in the United States, reported that the most common recognizable risk factor for CAD was obesity, while hypertension and dyslipidemia were recognized by nearly a half of the participants, however, 65% of the respondents recognized diabetes mellitus, dietary habits, and lack of exercise as risks for CAD (17).

Regarding the level of knowledge in the Middle East countries such as Oman and Saudi Arabia, the level of knowledge about CAD and its related risk factors was poor in both countries, however, the level of awareness in Saudi Arabia seems to be poorer in contrast to Oman, for example about 98.3% of Participant in Study was done in Oman identified that smoking is a risk factor for CAD, (19-20) however, that was the opposite in study was done in Jeddah were 26.1% only knew that smoking is a risk for CAD (11,20). Our results from Al-Qunfudah, shows that the awareness of CAD risk factors among Saudi citizens is getting improved and about 96.4% of participants think that smoker tends to be more likely to develop CAD.

When asking the participants about eating fast food, in our study about 57.1% replied that they do, while in a previous study in Saudi Arabia, 84% of the respondents reported that they eat fast food (18).

The Source of obtaining knowledge regarding CAD could vary, greatly. In a tertiary hospital in Rawalpindi, Pakistan a study on hospitalized CAD patients reported that about 84.8% of those patients gain their awareness about CAD from their treating physicians (12). In contrast, a study that was conducted in Al-Qassim in which the participants reported that previous experience was the main bulk source of their knowledge about CAD, or having a previous experience or family history may increase the level of awareness of symptoms of CAD among patients (21). However, this is not always the case; in a hospital-based cross-sectional study to measure the risk factor of MI in Taif, Saudi Arabia, more than half of the patients ($n=39$) with a poor level of knowledge about risk factors for developing such a condition (22). However, in our study, the awareness of CAD and its risk factors was good among those who have a family member who was diagnosed with CAD as well as those who are hypertensive or with a family history of hypertension.

In this study, we found that the total knowledge and awareness was good, however, there are some issues we need to focus on such as modifying some risk factors in the future. This is a cross-sectional study and comes with limitations regarding the study design, moreover, the data collection was via an online questionnaire which may not reach out to the population living in small villages with a poor internet connection. Additionally, in our study, most of the respondents are the younger generations since we may couldn't reach to the older generation due to depending mainly on the online google form questionnaire distributed via the social media platforms. Due to the COVID-19 pandemic, we couldn't distribute or administer a paper form questionnaire to the public, therefore it was done via online

google approach. However, our study is the first report that discuss the awareness of Al-Qunfudah population regarding CAD and its related risk factors.

7. Conclusions:

This study measured the level of knowledge and awareness of CAD among the Saudi citizens of Al-Qunfudah governorate and found that they have a good level of CAD awareness and knowledge. However, the prevalence of some risk factors among Al-Qunfudah population e.g., smoking and eating fast foods, requires implementing health education intervention programs that target such risk factors and emphasize their association with development of CAD and suggest healthier alternatives.

Conflict of interest

The authors declare that there is no conflict of interest regarding the publication of this article.

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References:

- [1] Sanchis-Gomar F, Perez-Quilis C, Leischik R, Lucia A. Epidemiology of coronary heart disease and acute coronary syndrome. *Ann Transl Med.* 2016;4(13):1–12.
- [2] 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* [Internet]. 2011;60(40):1391–2. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/21993344>
- [3] Benjamin EJ, Blaha MJ, Chiuve SE, Cushman M, Das SR, Deo R, et al. Heart Disease and Stroke Statistics'2017 Update: A Report from the American Heart Association. Vol. 135, *Circulation.* 2017. 146–603 p.
- [4] Burtcher M. Lifetime risks of cardiovascular disease [4]. *N Engl J Med.* 2012;366(17):1642.
- [5] Cardiovascular diseases (CVDs) [Internet]. [cited 2020 Aug 9]. Available from: [https://www.who.int/news-room/fact-sheets/detail/cardiovascular-diseases-\(cvds\)?utm_medium=email&utm_source=transaction](https://www.who.int/news-room/fact-sheets/detail/cardiovascular-diseases-(cvds)?utm_medium=email&utm_source=transaction)
- [6] Tyrovolas S, El Bcheraoui C, Alghnam SA, Alhabib KF, Almadi MAH, Al-Raddadi RM, et al. The burden of disease in Saudi Arabia 1990–2017: results from the Global Burden of Disease Study 2017. *Lancet Planet Heal.* 2020;4(5):e195–208.
- [7] Mohannad N, Mahfoud Z, Kanaan MN, Balbeissi A. Prevalence and predictors of non-fatal myocardial infarction in Jordan. *East Mediterr Heal J.* 2008;14(4):818–30.
- [8] Zeidan RK, Farah R, Chahine MN, Asmar R, Hosseini H, Salameh P, et al. Prevalence and correlates of coronary heart disease: First population-based study in Lebanon. *Vasc Health Risk Manag.* 2016;12:75–84.
- [9] 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.
- [10] Al-Nozha MM, Arafah MR, Al-Mazrou YY, Al-Maatouq MA, Khan NB, Khalil MZ, et al. Coronary artery disease in Saudi Arabia. *Saudi Med J.* 2004 Sep;25(9):1165–71.
- [11] Almalki MA, Al MNJ, Khayat MA, Bokhari HF, Subki AH, Alzahrani AM, et al. Population awareness of coronary artery disease risk factors in Jeddah, Saudi Arabia: A cross-sectional study. *Int J Gen Med.* 2019;12(December 2019):63–70.
- [12] Rasheed K, Hussain S, Alam M. Awareness of coronary artery risk factors among patients at a tertiary care hospital in Rawalpindi Pakistan. *Pak J Public Health.* 2019; 9(1) :12–14.
- [13] Shahwan AJ, Abed Y, Desormais I, Magne J, Preux PM, Abovans V, et al. Epidemiology of coronary artery disease and stroke and associated risk factors in Gaza community -Palestine. *PLoS One.* 2019;14(1):1–11.
- [14] Ahmed AM, Hersi A, Mashhoud W, Arafah MR, Abreu PC, Al Rowaily MA, et al. Cardiovascular risk factors burden in Saudi Arabia: The Africa Middle East Cardiovascular Epidemiological (ACE) study Cardiovascular risk factors burden in Saudi Arabia. *J Saudi Hear Assoc* [Internet]. 2017;29(4):235–43. Available from: <http://dx.doi.org/10.1016/j.jsha.2017.03.004>
- [15] Ahmad F, Abazid RM, Allihimy AS, Aldrewesh DA, Alkuraydis SA, Alharb SA, et al. Awareness of Coronary Artery Disease among Population of Al-Qassim, Saudi Arabia: A Community-Based Study. *J Clin Diagnostic Res.* 2020;14(1):10–4.
- [16] Aminde LN, Takah N, Ngwasiri C, Noubiap JJ, Tindong M, Dzudie A, et al. Population awareness of cardiovascular disease and its risk factors in Buea, Cameroon. *BMC Public Health.* 2017;17(1). <https://doi.org/10.1186/s12889-017-4477-3>
- [17] Wartak SA, Friderici J, Lotfi A, Verma A, Kleppel R, Naglieri-Prencod D, et al. Patients' knowledge of risk and protective factors for cardiovascular disease. *Am J Cardiol.* 2011;107(10):1480–8. <https://doi.org/10.1016/j.amjcard.2011.01.023>
- [18] Albadrani A, Al-Ajlan S, Alharbi A, Alharbi A, Alharbi S. Public Awareness of coronary artery disease risk factors in Qassim, Saudi Arabia: a cross-sectional study. *Int J Med Dev Ctries.* 2020;4(3)(2020):593–9. <https://doi.org/10.1016/j.amjcard.2011.01.023>
- [19] Fahs I, Khalife Z, Malaeb D, Iskandarani M, Salameh P. The prevalence and awareness of cardiovascular diseases risk factors among the lebanese population: a prospective study comparing Urban to rural populations. *Cardiol Res Pract.* 2017;2017(3):1–10.
- [20] 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):e189–196.
- [21] Magri CJ, Fava S. Should diabetes still be considered a coronary artery disease equivalent? *J Cardiovasc Med (Hagerstown).* 2012;13(11):760–65. doi:10.2459/JCM.0b013e3283577295.
- [22] Ahmed ET, Youssif MA, Ayasreh IR, Al-Mawajdeh NA. Assess the risk factors and knowledge on modification of lifestyle among patients who have experienced Acute Myocardial Infarction in Taif. *International Journal of Medical Science and Public Health.* 2013;2:354–59.