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# Risk profile of coronary heart disease among the staff members of Qassim University, Saudi Arabia

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## ABSTRACT

**Objective:** To estimate the risk profile of coronary heart disease (CHD) among the staff members of Qassim University and assess their knowledge in a screening campaign in Qassim region, Saudi Arabia.

**Methods:** A cross-sectional study was conducted among male and female staff at Qassim University campus. All employees of Qassim University were invited to participate in the study. Data were collected through a self-administered questionnaire. The study sample size was 233 staff and employees. The data were entered and analyzed using SPSS version 18. The data analysis focused on providing point estimates for the risk factors.

**Results:** The study found that 30% of participants have one or more risk factors for CHD, namely obesity 20.6%, diabetes 10.3%, hypertension 12.4%, dyslipidemia 10.7%, and smokers (11.6%). About 54% of the participants have a family history of at least one chronic disease as a risk factor for CHD.

**Conclusion:** The most common risk factor of CHD among the staff members is obesity by 20.6%. Risk factors for CHD are quite common among Qassim University staff. These findings need to increase the health education and disease promotion program as an important intervention to reduce the occurrence and severity of CHD risk factors and to improve the quality of the life of the staff members of Qassim University.

**Keywords:** Coronary heart disease, diabetes, dyslipidemia, hypertension, obesity, Saudi Arabia, smoking

## Introduction

One of the most major public health problems over the world is cardiovascular disease including coronary heart disease (CHD), peripheral vascular disease and stroke.[1] Countries in the Middle East bear a heavy burden from CHD. The prevalence of CHD is due to high rate of its risk factors, particularly obesity, smoking, hypertension (HTN), dyslipidemia, diabetes, and sedentary lifestyles. Patients in the Middle East present with myocardial infarction at a younger age, on average, compared with patients elsewhere. The projected future burden of mortality from CHD in the Middle East is set to outstrip that observed in other geographical regions.[2] Improved socioeconomic conditions in Saudi Arabia during the past few decades have been accompanied by rapid changes in the lifestyle of the people, particularly unhealthy dietary patterns, and physical inactivity. Consequently, chronic diseases commonly associated with affluent societies, such as CHD, diabetes mellitus (DM), obesity have become the dominant illnesses in Saudi Arabia. Hospital-based studies have shown that smoking, HTN, and DM are common risk factors among patients with acute myocardial infarction. A recent study on CHD mortality in the Eastern Province of Saudi Arabia, using proportionate mortality ratio, showed that 26% of deaths were caused by CHD (27.0% of male and 23.5% of female deaths).[3] In 2013, there was study on the prevalence of the obesity in Saudi Arabia which showed that 28.7% were obese (body mass index [BMI] >30). Obesity consider as an important risk factor of CHD.[4] One study in the East province of Saudi Arabia in 2008 showed that 21% was the prevalence of HTN in screening campaign and increase with age, lower educational level, and divorced women.[5] In 2009, there was study on the prevalence of DM in Saudi Arabia. The prevalence of DM was 30% and DM increase with obesity and female gender, who more than 50 years compare to male group.[6] A national study measured hyperlipidemia and 5-year risk of development of CHD among university and school workers in Jeddah, Saudi Arabia. About half of the participants were overweight, 18.8% were current cigarette smokers and 19.9% were hypertensive. Hyperlipidemia was present in 10.1% and was significantly related to older age (40 years and over) and place of work. According to the previous study, the estimated risk of CHD in the coming half-decade for those classified in the fifth quintile was 0.068.[7] The Government of Saudi

Arabia is becoming increasingly concerned about the high prevalence of CHD risk factors. Knowledge of the causative factors and methods of prevention of CHD are essential to reduce morbidity and mortality from them. The objective of this study is to determine the prevalence of CHD risk factors among the faculty and staff members of Qassim University and also to assess their knowledge of the risk factors of CHD and compare the result with other prevalence of risk factors in other area of Saudi Arabia.

## Methods

A cross-sectional study was conducted among the faculty and the staff members of Qassim University for male and female. All employees were invited to voluntarily participate in the study by advertisement through email and social network. Data were collected through a self-administered health risk assessment questionnaire, as well as through clinical screening that included measurement of blood pressure, fasting blood glucose (FBG) and lipid profile. The employees working under contract for an outsourcing company (for example, the housekeeping staff) were excluded. Participants were recruited through general announcements to staff, as well as among patients visiting the clinic. This sample is expected to provide sufficiently reliable estimates of the most common risk factors among university staff and faculty. A self-administered questionnaire was used to collect information on sociodemographic, biological, and behavioral risk factors. Information was collected on personal, past and family history of chronic diseases, cigarette smoking, and stress experienced in the workplace. Screening was conducted on all participants including measurement of FBG and fasting lipid profile. We also documented the level of willingness of the participants to engage in a behavior change program. Data were analyzed using SPSS for Windows, version 18. Data were focused on providing point estimates for the risk factors of CHD and testing hypotheses regarding expected correlations between these risk factors. The odd ratio and 95% confidence interval were calculated. $P < 0.05$ was considered as statistical significance.

## Results

We present the results of analysis of data from 233 faculty/staff members (157 males, 67%; 76 females, 33%). More than half of the participants were in the 30-49 year age group. 53.6% of study participants have family history of any of risk factor of CHD and 20.6% of the staff members and faculties were obese 10.3% were diabetic. 12.4% were hypertensive and 11.6% were current smokers. Sociodemographic data and risk factor status are shown in Table 1.

The most common age group for male who are overweight is more than 50 and for obese is between 30 and 50 years. For female gender we can find the most common age group for overweight and obese is between 30 and 50 years (35.7% and 30.2%), respectively (Table 2).

**Table 1:** Sociodemographic data and risk factor status

| Data | *n* (%) |
|---|---|
| Age group | |
| 20-29 | 61 (26.2) |
| 30-39 | 58 (24.9) |
| 40-49 | 67 (28.8) |
| >50 | 47 (20.2) |
| Gender | |
| Male | 157 (67) |
| Female | 76 (33) |
| BMI above 30 | |
| Normal | 48 (20.6) |
| Over weight | 85 (36.5) |
| Obese | 100 (42.9) |
| Family history of chronic diseases | 125 (53.6) |
| DM | 24 (10.3) |
| HTN | 29 (12.4) |
| High cholesterol | 25 (10.7) |
| Current smokers | 27 (11.6) |

BMI: Body mass index, DM: Diabetes mellitus, HTN: Hypertension

There were 16 of the staff members newly diagnosed to have impaired fasting glucose (13 male, 3 female). 20 of the staff members and faculties were found to have newly diagnosed DM. When the age increase in both gender, the chance of development of DM will be increase with no significant *P* value as shown in Table 3. Regarding the blood pressure, we found the blood pressure was increased with age and there was no significant difference between male and female (Table 3).

In Table 4, we found that the smoking behavior is among male gender only and there was no smoking behavior among female gender. The most common age group for male smokers was 30-39 by 29.2%.

Youngest age group <30 was expected to have increase in high-density lipoprotein (HDL) in both gender (male and female). Low-density lipoprotein (LDL) more than 190 mg/dl in age group more than 30 years for both genders (male and female) as shown in Table 5.

## Discussion

In our study, the prevalence of DM, dyslipidemia, and smoking was found to be lower than other studies.[8,9] According to the 2011 American Diabetic Association guidelines, based on FBG, 6.9% of the participants were found prediabetic and 8.6% having diabetes. FBG values were found significantly higher with increasing age especially among more than 50 years old. No statistically significant difference was found among males or females in the prediabetic category ($P = 0.441$). The LDL levels were found to increase with age with participants more than 50 years of age having LDL values >190 mg/dl ($P = 0.001$).

**Table 2:** Prevalence of obesity among male and female

| BMI | | | | Age group, *n* (%) | | | | *P* value |
|---|---|---|---|---|---|---|---|---|
| | | | | 20-24 | 25-29 | >30 | >50 | |
| Normal | Gender | Male | Count | 11 (37.9) | 5 (17.2) | 10 (34.5) | 3 (10.3) | 0.337 |
| | | Female | Count | 12 (63.2) | 3 (15.8) | 3 (15.8) | 1 (5.3) | |
| Over weight | Gender | Male | Count | 11 (15.5) | 19 (26.8) | 17 (23.9) | 24 (33.8) | 0.504 |
| | | Female | Count | 3 (21.4) | 4 (28.6) | 5 (35.7) | 2 (14.3) | |
| Obese | Gender | Male | Count | 16 (28.1) | 15 (26.3) | 19 (33.3) | 7 (12.3) | 0.432 |
| | | Female | Count | 8 (18.6) | 12 (27.9) | 13 (30.2) | 10 (23.3) | |

BMI: Body mass index

**Table 3:** Prevalence of DM and HTN according to the gender and age group

| Diabetes | | | | Age group, *n* (%) | | | | *P* value |
|---|---|---|---|---|---|---|---|---|
| | | | | 20-29 | 30-39 | 40-49 | >50 | |
| Gender*age group diabetes | | | | | | | | |
| Diagnosed DM | Gender | Male | Count | 0 | 1 (6.3) | 5 (31.3) | 10 (62.5) | 0.619 |
| | | Female | Count | 0 | 1 (14.3) | 1 (14.3) | 5 (71.4) | |
| Not diagnosed DM | Gender | Male | Count | 1 (7.7) | 1 (7.7)) | 4 (30.8) | 7 (53.8) | 0.669 |
| Impaired fasting | | Female | Count | 1 (3.3) | 0 (0) | 1 (3.3) | 1 (3.3) | |
| Diabetic | Gender | Male | Count | 1 (7.1) | 2 (14.3) | 4 (28.6) | 7 (50) | 0.827 |
| | | Female | Count | 0 | 1 (16.7) | 1 (16.7) | 4 (66.7) | |
| HTN | | | | | | | | |
| Diagnosed HTN | Gender | Male | Count | 0 | 1 (5.3) | 8 (42.1) | 10 (52.6) | 0.434 |
| | | Female | Count | 1 (10) | 0 | 5 (50) | 4 (40) | |
| Not diagnosed HTN | Gender | Male | Count | 6 (16.2) | 5 (13.5) | 17 (45.9) | 9 (24.3) | 0.510 |
| 120-139/80-89 | | Female | Count | 1 (16.7) | 1 (16.7) | 1 (16.7) | 3 (50) | |
| 140-159/90-99 | Gender | Male | Count | 1 (8.3) | 2 (16.7) | 6 (50) | 3 (25) | 0.388 |
| | | Female | Count | 1 (33.3) | 1 (33.3) | 0 | 1 (33.3) | |

DM: Diabetes mellitus, HTN: Hypertension

**Table 4:** Relation of gender, age group, and smoking status

| Smoking status | | | | Age group, *n* (%) | | | |
|---|---|---|---|---|---|---|---|
| | | | | 20-29 | 30-39 | 40-49 | >50 |
| Yes | Gender | Male | Count | 6 (25) | 7 (29.2) | 5 (20.8) | 6 (25) |
| No | Gender | Male | Count | 32 (24.1) | 32 (24.1) | 41 (30.8) | 28 (21.1) |
| | | Female | Count | 23 (30.3) | 19 (25) | 21 (27.6) | 13 (17.1) |

A study carried out among Saudi diabetic patients attending primary health-care (PHC) service concludes that uncontrolled diabetes was found to be the common risk factor followed by uncontrolled lipid profile, obesity, uncontrolled systolic blood pressure, and smoking. The result of study revealed that seven percent (7%) of male group felled in highest risk group in comparison with 1% in female group ($P < 0.05$), while 31% in male group felled in mild risk group in comparison with 90% in female group ($P < 0.05$). 62% in male group felled in high-risk group in comparison with 9% in female group ($P < 0.05$).[10] The Directorate of Scientific Research at King Abdul Aziz city for science and technology recognized that there is a major transition going on in the Kingdom in terms of lifestyle, featuring a more sedentary lifestyle, increased consumption of fast food and unhealthy diet. These changes were associated with rapid socioeconomic development, urbanization, and increased purchasing power of the population.[2] Various other studies in the Kingdom have similarly indicated a rise in the lifestyle-related risk factors.[11,12] Moreover, DM and obesity are the leading risk factors associated with CHD. Their study done in King Faisal Specialist Hospital in 2011 showed the prevalence of DM was 30%.[6] While the prevalence of obesity is 64% and 70% among males and females, respectively.[13] Our study aimed to estimate the prevalence of risk factors of CHD among Qassim University's staff/employees. The overall prevalence of these risk factors (DM, dyslipidemia, obesity and overweight, smoking, and sedentary lifestyle) which is found to be 30% in our study was similar to several other studies done elsewhere in similar setups in educational institutions,[12] but was significantly lower than the general population in Saudi

**Table 5:** Prevalence of hyperlipidemia according to the age and gender

| Lipid profile | | | | Age group, *n* (%) | | | | *P* value |
|---|---|---|---|---|---|---|---|---|
| | | | | 20-24 | 25-29 | >30 | >50 | |
| LDL <130 | Gender | Male | Count | 6 (66.7) | 1 (11.1) | 2 (22.2) | 0 (0) | 0.392 |
| | | Female | Count | 2 (28.6) | 1 (14.3) | 3 (42.9) | 1 (14.3) | |
| 130-159 | Gender | Male | Count | 21 (39.6) | 13 (28.1) | 10 (18.9) | 9 (17) | 0.798 |
| | | Female | Count | 3 (21.4) | 4 (14.6) | 5 (21.9) | 2 (9.4) | |
| 160-189 | Gender | Male | Count | 13 (40.6) | 9 (28.1) | 7 (21.9) | 3 (9.4) | 0.926 |
| | | Female | Count | 4 (20.5) | 4 (20.5) | 4 (20.5) | 4 (20.5) | |
| >190 | Gender | Male | Count | 3 (5.4) | 15 (26.8) | 21 (37.5) | 17 (30.5) | 0.320 |
| | | Female | Count | 4 (9) | 5 (23.8) | 7 (33.3) | 5 (23.8) | |
| HDL | | | | | | | | |
| <40 | Gender | Male | Count | 6 (14.5) | 16 (26.3) | 20 (37) | 12 (22.2) | 0.645 |
| | | Female | Count | 1 (11.1) | 7 (29.6) | 7 (29.6) | 2 (22.2) | |
| 40-60 | Gender | Male | Count | 26 (5.9) | 16 (41.2) | 22 (41.2) | 16 (11.8) | 0.771 |
| | | Female | Count | 6 (22.2) | 6 (22.2) | 8 (29.6) | 7 (20) | |
| >60 | Gender | Male | Count | 6 (26.1) | 7 (30.4) | 4 (17.4) | 6 (26.1) | 0.256 |
| | | Female | Count | 22 (50.) | 13 (18.8) | 10 (18.8) | 10 (12.5) | |

LDL: Low-density lipoprotein, HDL: High-density lipoprotein

Arabia. CHD in Saudi Arabia study found a high prevalence of HTN (26%) and diabetes (22%), together with a prevalence of CHD of 6%, once again higher in the urban setting. Urban location, age, male gender, BMI, HTN, smoking, high serum cholesterol, and triglycerides were significant risk factors for CHD.[14] In a similar study carried out in Jeddah in 2007 among university employees and school teachers estimated the prevalence of HTN, smoking, dyslipidemia, and overweight to be 19.9%, 18.8%, 10.1%, and ~50%, respectively.[15] A study at Qassim University conducted in 2007 estimated the prevalence of low HDL was 73.6% and increased total cholesterol and triglycerides 60.0% and 46.4%, respectively.[16] Another study among attendees of a PHC center in South-west region of Saudi Arabia found the prevalence of risk factors as follows: Diabetes (28.2%), obesity (37.9%), and physical inactivity (68.3%). DM was the most prevalent risk factor among males (55.6%). Less than half of the study participants knew about these risk factors and their importance as preventive measures for noncommunicable diseases. Knowledge of risk factors and prevention was significantly associated with educational level.[17] A study in Al-Rabhwa PHC center, Riyadh in 2004 among diabetic patients found increased cholesterol (≥5.2 mmol/l) was 49.5% in males versus 68.5% in females. High triglyceride (≥1.7%) was 50% in both genders; 13.4% of males were hypertensive as against 44.3% females. 19.5% of the males smoked. There was no significant difference between risk factors for CHD and duration of diabetes except that there were more smokers among those who had diabetes for <10 years. Most of the diabetics with poor glycemic control (fasting blood sugar >8.3 mmol/l) tended to be smokers, were more obese, had high triglyceride and high total cholesterol.[18] The current focus of services at most PHC centers and hospitals is curative, not preventive. Health promotion and health education are currently mostly missing from the health-care system of Saudi Arabia. PHC centers can fill this gap by providing health promotion and education programs, which have been found to play a significant role in improving lifestyle practices. This could significantly reduce the burden of chronic noncommunicable disease.[19]

### Limitations of study

Our study has a number of limitations. It was conducted in a university setting and so the results may not be generalized to the population. Furthermore, the study sample includes only those employees who opted for medical checkup, further restricting the generalizability of our results. The health risk assessment relied on self-report. In our study, interviewing onsite might have caused limitation in the study as it might have resulted in underestimation in one or overestimation of the figures in other areas. It is emphasized that only those subjects, who were interested in knowing about their health status might have participated in the study resulting in overestimation of the general health status of the university employees.

## Conclusion and Recommendations

The population risk for the development of CHD in the coming decades is not trivial. Short-and long-term strategies are recommended to decrease the risk of CHD and improve the quality of life. Health education and disease promotion program as worksite wellness program is now recognized almost universally as an important intervention to reduce the occurrence and severity of diabetic complications, and also in reducing the delays to seek care when the first signs and symptoms of a complication are noticed by the patient. Qassim University's employees' worksite wellness program is already in place, although it needs to be up scaled and expanded to

other universities in Saudi Arabia Mandatory maintenance of a personal health profile, at within the campus clinic with periodic checkups linked with some incentives and gifts are some of the options that could also be used to combat with the situation. Moreover, the university also has the responsibility to develop interventions to be implemented at the community level. Prevention research is needed to help design health promotion and disease prevention programs to be implemented through PHC centers; in this regard, a number of studies are already going on with assistance from Qassim University's faculty. Further research studies are required to find out the exact current status and how and what are the best available measures and strategies that can be adapted and could be found useful in combating the situation and improving the health status of the Qassim University's staff. Research studies at the community and mass scale level are also required to find out the current status of chronic diseases as risk factors for CHD and the best behavioral modification, health educational, and other strategies to address the current situation in the general local population.

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