Cardiovascular disease risk profile among young Saudi women of Al-Qassim, Saudi Arabia: A cross-sectional study

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Abstract:

Study Objective: The aim of the study was to assess the level of risk for cardiovascular diseases (CVD) among young Saudi women living in Al-Qassim, Saudi Arabia.

Methods: As part of "The Heart Protection Campaign" in the Al-Qassim region, data were collected from Saudi women using questionnaires as well as objective measurement of height, weight, blood pressure, and blood glucose. Data were analyzed using descriptive statistics.

Results: Only 15% of the sample were free of risk factors, the majority had either one (57.5%) or two (20.8%) risk factors. Additionally, 6.7% were considered to be at high-risk with three or more risk factors. The most common risk factors were physical inactivity (74%) and overweight/obesity, (25% / 29%). There was a significant increase in the number of risk factors across age groups. Women over the age of 30 were more likely to have a higher number of risk factors than the younger women (20-24 years).

Conclusions: Young women in Al-Qassim, Saudi Arabia have an unusually high risk for CVD. Since the number of risk factors increases substantially between the ages of 20 and 35, there is a need to develop prevention programs to lower the CVD risk through diet and exercise.

Keywords:cardiovascular risk factors, diabetes mellitus, hypertension, obesity, young women, Saudi Arabia.

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Introduction

Cardiovascular diseases (CVDs) are the primary cause of death, worldwide; and CVD accounts for 31% of all deaths (World Health Organization (WHO)) [1] More than 18 million people have CVD-related death annually. [1] CVDs are a growing health concern in the middle-eastern region and the Gulf Council Countries (GCC), specifically. [2-4] Among the six GCC countries, CVD was estimated to account for 45% of deaths, overall. Oman and Kuwait had the highest proportion of deaths attributed to CVD (49% and 46%, respectively); Saudi Arabia, United Arab Emirates, Bahrain, and Qatar (42%, 38%, 32%, and 23%, respectively) also had a significant proportion of CVD deaths (WHO country profiles). [5] Studies in Saudi Arabia estimated that the prevalence of hypertension is around 49%; while coronary heart disease is between 5-6%. [2] Efforts have been made, such as the Gulf Registry of Acute Coronary Events (Gulf RACE) and Saudi Project for Assessment of Coronary Events (SPACE), to understand the burden of disease as well as the associated risk factors. [6,7] The continuation of these projects in conjunction with research efforts will enable the improvement of prevention and treatment of CVD.

Both international studies (e.g INTERHEART and INTERSTROKE) [8,9] and regional studies (e.g. Gulf RACE) [2] have identified a set of common risk factors for CVD, which include the following: hypertension, diabetes, dyslipidemia, obesity, smoking, physical activity, poor diet, and alcohol consumption. Studies in Saudi Arabia suggest that the presence of these risk factors, particularly hypertension, obesity, and diabetes, continue to rise each consecutive year. [10-12] The CVD risk profile differs between men and women; for example men are more likely to smoke but women are more likely to be obese. [13,14] Also, men are more likely to have dyslipidemia but women are more likely to have type 2 diabetes. [15,16] Some of the gender differences may be explained by variations in study design and sample selection. In fact, men and women share some characteristics; they are similar regarding physical inactivity (75% in Saudi Arabia) and dietary habits (regular intake of high calorie and high fat foods). [17,18]

The study rationale is based on age and gender. First, many of the CVD risk factors are associated with age. [19] In order to develop strategies for primary prevention, research is needed on younger adult populations. [12]Second, the common CVD risk factors disease presentation at onset differ between women and men. [20, 21] For example, women are less physically active and men are more likely to smoke. Many women who die from CVD have had no prior symptoms. [22] Hence, the study objective was to develop the CVD risk profile of young Saudi women in the Al-Qassim region, Saudi Arabia. Specifically, we examine which risk factors are most prevalent among young women and to what extent the risk is elevated (i.e. number of risk factors).

Methods

Overview: The study had a cross-sectional research design and was conducted from 2012 - 2014. Participants were recruited as part of "The Heart Protection Campaign" led by the Prince Sultan Cardiac Centre in Al-Qassim. The campaign was launched in the beginning of 2012; and the general objectives of the campaign were to increase public awareness of cardiovascular diseases and its risk factors, and to detect new cases in need of medical attention. The campaign organizers went to the malls, colleges, and governmental offices in three cities (Buraidah, Onaizah, and Medhnab) located in Qassim. The intervention methods included information booths, posters, pamphlets, and face-to-face interaction with the community members. CVD health education was done with individuals or small groups but did not include any large group lectures. The study sample was selected from the people who were exposed to the campaign. They were approached and recruited using a non-random procedure (i.e. convenience sampling). The inclusion criteria were the following: 1) Saudi national, 2) Female, and 3) Age between 20 and 40 years. An interview and assessment area was constructed using temporary wall dividers in the mall and college settings. Research assistants administered the interview and objective measures in the enclosed space.The study protocol was approved by the Scientific Research Committee in the Ministry of Health, Saudi Arabia.

Measurements: Trained cardiac nurses collected data using a structured questionnaire including demographic data, information on smoking, dietary habit and physical activity. The questionnaire was pre-tested on a small group of people from the community; only minor changes in terminology and question order were made as a result of pretesting. Objective measurement was used for body weight, height, blood pressure (digital sphygmomanometer), and random plasma glucose (RPG).Body mass index (BMI) was calculated and interpreted according to the WHO guidelines.

Risk Factor Definitions:

Hypertension. Hypertension was defined as having either systolic blood pressure (SBP) elevated above 140 and/or diastolic blood pressure above 90. [23]

Hyperlipidemia. Participants reported on the medical history form whether they had been told by a physician that they had any form of hyperlipidemia. Patients typically receive a diagnosis with the presence of elevated levels of cholesterol (total cholesterol greater than 240 mg/dL). [24] For this study data was only considered as yes/no for a previous diagnosis of hyperlipidemia.

Type 2 Diabetes. RPG level greater than or equal to 200mg/dL was considered to be suggestive of diabetes mellitus (American Diabetic Association), and a RPG level 140-199mg/dL suggestive of pre-diabetes. [25]

Obesity. BMI value greater than or equal to 30 was considered to be obese. Prevalence of normal (18 to 25) and overweight (25 to 30) BMI were also reported. [26]

Physical Inactivity. Being sedentary was defined as less than 40 minutes of activity per week (<2 weekly exercise sessions of at least 20 minutes each). In a context where nearly everyone is below the standard recommendation, [17, 27] we needed to make a further distinction of women who have extremely sedentary lifestyles; hence the cut-off to define sedentary behavior has been lowered.

Analysis: Descriptive statistics were calculated for the sample. Prevalence of each risk factor was calculated for the whole sample and according to four age groups (20-24, 25-29, 30-34, and 35-39). The number of risk factors per participant was calculated and the percentage according to the number of factors was considered the level of CVD risk. The level of risk was examined by age group. Chi-square statistics were used for statistical tests across the age groups; p-value < .05 was considered to be significant. All statistical analyses were conducted using SPSS© version 22 (SPSS IBM, New York, U.S.A).

Results

A total of 833 young Saudi women were enrolled in the study. Fifty percent were enrolled from malls and souks, 43% from colleges, and 7% from governmental organizations. The sample was selected from the three cities in Al-Qassim region with the largest population: Buraidah (70%), Onaizah (15%), and Medhnab (15%) (Table 1). Majority of the sample (54%) were between 20-24 years old; the mean age of the sample was 26. The age distribution for the remaining participants was as follows: 25-29 (15%), 30-34 (14%), and 35-39 (17%). We did not collect any further data on demographic characteristics of the participants (refer to discussion section).

The total prevalence of hypertension was 11.8% (Figure 1). After excluding women with known hypertension, 9.2% were identified as hypertensive. Among the 45 known hypertensive women, 20.0% reported taking medication and 46.6% had their blood pressure controlled. The total prevalence of hyperlipidemia was 2.8%, which was assessed by self-reported medical history. The total prevalence of type 2 diabetes was 2.9%. After excluding women with known type 2 diabetes, 7 new cases of type 2 diabetes were identified. Among the diabetic women, 37.5% reported taking medication and 58.3% had their blood sugar controlled. More than half of the sample (54%) was either overweight (25%) or obese (29%). The majority of the women (74%) reported physical inactivity. Smoking history was assessed but smoking was not present among the sample of young women; only 4 women reported having ever tried smoking but were not current smokers.

There were significant differences in risk factors by age group (Table 2). Obesity, type 2 diabetes, hyperlipidemia, and hypertension were significantly higher in the older age groups than the youngest age group. There

were no age differences for physical inactivity; inactivity was high in all women.

More than 85% of the women had 1 or more risk factors indicating that only 15% of women were risk free (Figure 2). Majority of women had either 1 (57.5%) or 2 (20.8%) risk factors; physical inactivity and obesity were the most common. But a higher risk group (6.7%) was identified as having 3 or more risk factors. The percent of women with higher CVD risk increased incrementally with each age group (Figure 3). The oldest age group (35-39) had significantly more high risk (≥ 3 factors) women than the youngest age group (20-24), 15.1% versus 3.2%.

Table 1. Demographic Characteristics (n=833)

Characteristics	N (%)
Age Group (in years)	
20-24	447 (53.7%)
25-29	121 (14.5%)
30-34	120 (14.4%)
35-39	145 (17.4%)
Cities in Al-Qassim	
Buraidah	587 (70.5%)
Onaizah	125 (15.0%)
Medhnab	121 (14.5%)

Table 2. Prevalence of cardiovascular disease risk factors by age groups (n=833).

	Age Groups n (%)				
CVD Risk Factors	20-24 n=447	25-29 n=121	30-34 n=120	35-39 n=145	p-value
Hypertension	45 (10.1%)	11 (9.1%)	16 (13.3%)	26 (17.9%)	0.05
Hyperlipidemia	7 (1.6%)	3 (2.5%)	9 (7.6%)	4 (2.8%)	0.006
Type 2 Diabetes	3 (0.7%)	3 (2.5%)	8 (6.7%)	10 (6.9%)	<0.001
Obesity	62 (14.0%)	43 (36.8%)	57 (47.9%)	82 (56.9%)	<0.001
Physical Inactivity	339 (76.0%)	89 (73.6%)	85 (70.8%)	105 (73.4%)	0.67

Figure 1. Prevalence Estimates of Cardiovascular Disease Risk Factors

Footnote for figure 1: [a]Obesity (BMI > 30), [b] physical inactivity (less than 2 weekly exercise sessions of at least 20 minutes).

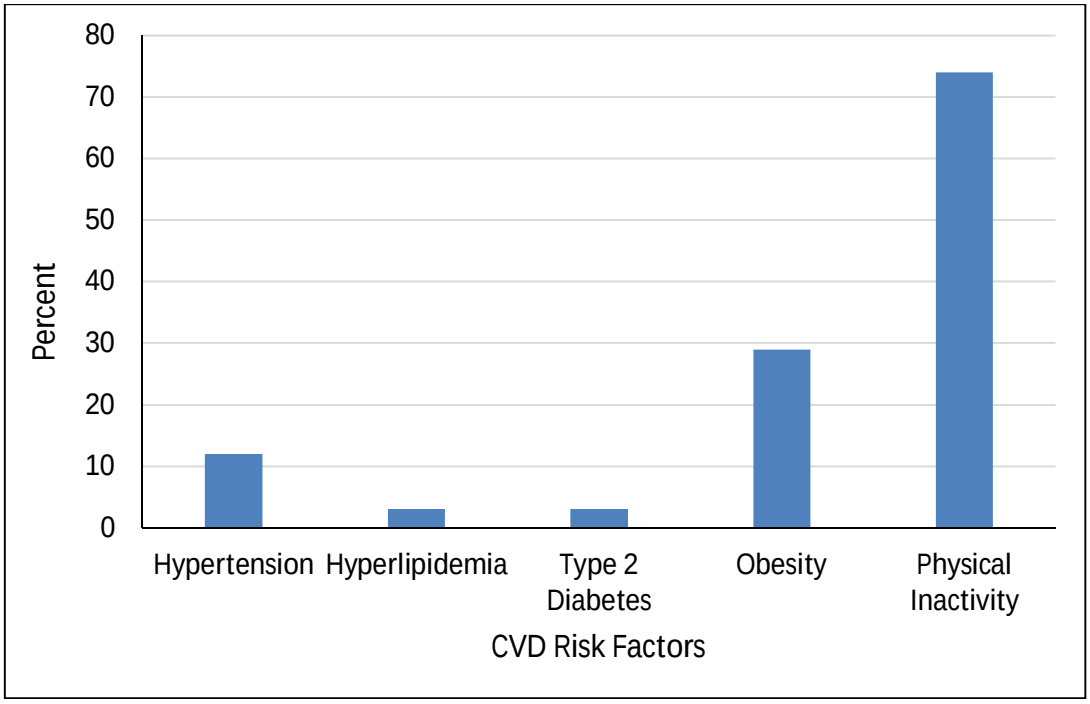


Figure 2. Percent by Number of Cardiovascular Disease Risk Factors.

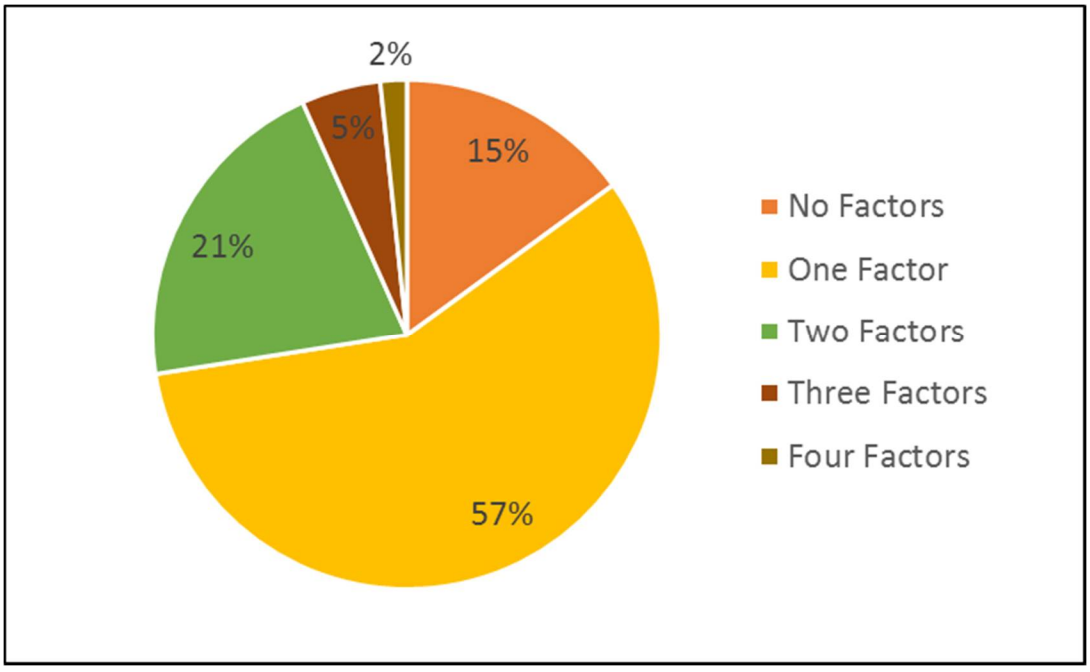
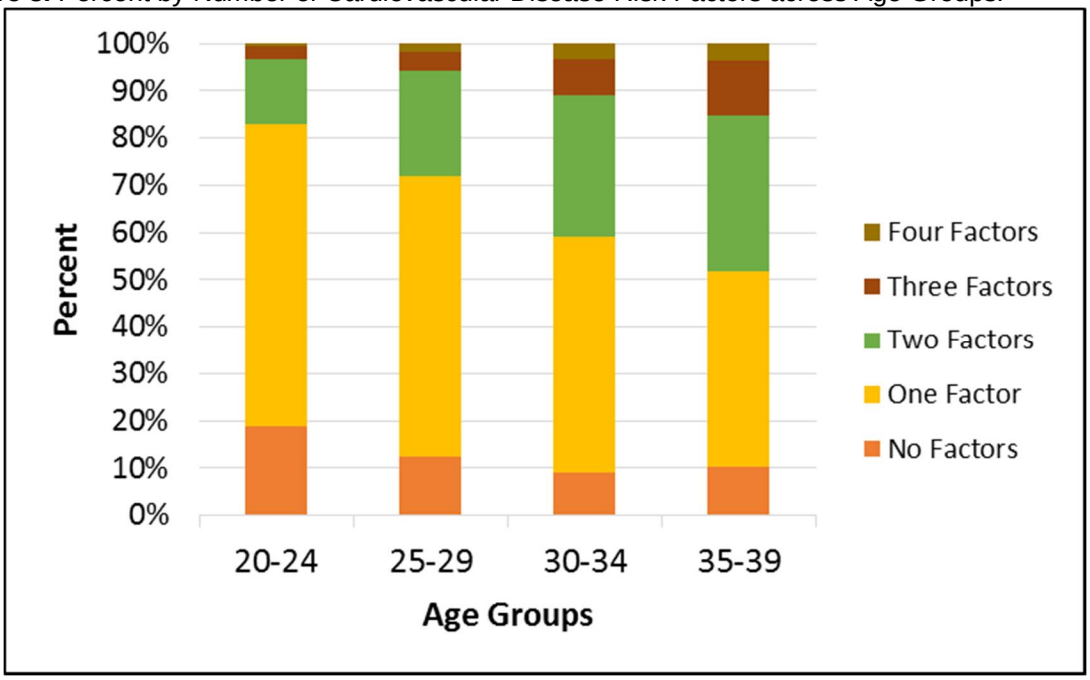


Figure 3. Percent by Number of Cardiovascular Disease Risk Factors across Age Groups.



Discussion

The main finding of this study is that the majority of young Saudi women are obese and physical inactive, which significantly elevates their risk for CVD. The other risk factors, hypertension, hyperlipidemia, and type 2 diabetes, had lower prevalence; but still they are of concern given the young age of the sample. This study has identified a high risk group among these young women, those with 3 or more risk factors, and the prevalence of this group ranges of 3% to 15%. The findings of this study have been corroborated by earlier studies that have shown that Saudi women have high prevalence of obesity, [28] low prevalence of smoking, [29] but overall an elevated CVD risk. [30] Further, prevalence of obesity and self-reported physical inactivity among Saudi women has increased significantly over a period of ten years. Obesity went from 23.6% to 44.0% and physical inactivity went from 84.7% to 98.1%. [31] The large change in CVD risk among young women has been attributed to unhealthy dietary habits and sedentary lifestyle. [17,19,32]

The study also showed that the level of risk significantly increased incrementally by the age groups. The percent of women at high risk was higher in women over 30 years than in those between 20-24 years. The high level of risk in young women is consistent with the reports from SPACE and Gulf RACE, which indicated that the mean age of CVD incidence was approximately ten years younger in the Gulf region compared to the European countries. [7,33] Given the high risk level and the earlier age of CVD development, the Saudi health authorities will have to develop better strategies and earlier intervention for prevention and treatment, respectively.

Although, it was not a primary objective; the study findings showed that neither hypertensive nor diabetic patients had their disease in control. Despite taking medication, many hypertensive women had elevated blood pressure (53%) and many diabetic women had elevated RPG (40%) in our study. The percent of uncontrolled disease in Saudi adult populations has been reported previously for hypertension [10] and type 2 diabetes. [34] Approximately, 20% of hypertensive patients and 20% diabetic patients are treated but uncontrolled. The lower estimates in the previous studies are likely attributed to having a large, national database; our study estimates are based on very small numbers.

The study has several identifiable strengths. The study included a large sample and used

objective measurement for obesity, blood pressure, and blood glucose. Second, the study involved community participation which raised awareness and CVD knowledge in the population as well as provided physician referral to new diagnosed cases of hypertension or type 2 diabetes. Examining level of CVD risk and identifying young women at high risk for CVD is a relatively new area of research in Saudi Arabia.

Limitations

The sample was not randomly selected and therefore, the representativeness is unknown. Second, the demographic data was limited and participant refusal data was not collected because the study was part of a public health campaign. The campaign organizers' focus was primarily on promoting CVD awareness in order to benefit the community. Also, some of the CVD factors may be subject to information and/or recall bias since the data were self-reported. Other factors may have inter-rater reliability bias since more than one person was involved in data collection; we tried to minimize this by working in groups of twos and through employing standardized training sessions as one group. Finally, this was a cross-sectional study and does not have any follow-up data.

The conclusion of the study is that CVD risk is high at young ages in Saudi Arabia, particularly in women. CVD prevention campaigns and interventional research studies need to be undertaken. Specific studies or programs are needed to help women become more active (i.e. more walking), aid them in weight loss or weight maintenance, and identify CVD cases in the earliest possible stage.

Conflict of Interest

The authors have no competing interests to declare.

Author Contributions

All authors were involved in the design of the study, data collection and analysis plan. HK, AM and TS assisted with the data collection plan and supervised field data collection. ARM, MO and WL conducted the data analysis and drafted the initial manuscript. All authors reviewed, edited and approved the final the manuscript.

Acknowledgements

We thank Dr. Juliann Saquib for the editorial assistance to the manuscript preparation.

Funding

This work was supported by Prince Sultan Cardiac Centre in Al-Qassim, Saudi Arabia.

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