Prevalence of Coronary Artery Disease Risk factors in Teachers Residing in Shiraz-Iran 2009

Sh Khosropanah, J Tahmasebi, MJ Zibaeenezhad, ST Heydari, M Zamirian, K Aghasadeghi, AR Moaref, F Abtahi

Cardiovascular Research Center, Shiraz University of Medical Sciences, Shiraz, Iran

Background: Coronary artery diseases (CAD) are the leading cause of mortality, morbidity and disability with high health care cost in any countries including Iran. The prevalence of all CAD risk factors including hypertension, diabetes, lipid profile abnormalities and obesity is rising in the population of Iran. Knowing the population at risk would lead to proper education to decrease these risk factors and ultimately would reduce CAD.

Methods: This descriptive cross- sectional study was conducted in February to December 2009 and comprised a total of 3115 Shiraz educational staff, aged 21- 73 years. Questionnaires were applied to collect information including; demographic data, physical activity, history of CAD, hypertension, dyslipidemia, and smoking. In addition, waist circumference, height, weight, body mass index (BMI), and hip circumference (HC) were measured and serum biochemistry profiles were determined on venous blood samples. Such data helped identify the prevalence of diabetes, hypercholesterolemia, hypertriglyceridemia, hypertension, overweight and obesity, central obesity, and smoking.

Results: The mean age of 3115 participant was 42.7 and 41.5 years for men and women respectively**.** The prevalence of pre-diabetes, diabetes hypertension, hypercholesterolemia and hypertriglyceridemia were %10.2, %4, %18.2, %38.30 and %33.2 respectively.

Diabetes, hypertension and dyslipidemia were more prevalent among males and older subjects. The prevalence of central obesity was %75.05 (IDF criteria) and %40.64 (ATP- III criteria). The frequency of obesity, current smoking, ex-smoking and passive smoking were %12.1, %5.85 , %1.52 ,%7.9 respectively which were below the reported prevalence in Iran in previous studies, but physical inactivity was %73.3 which is very high in this study group.

Conclusion: Although CAD risk factors seem to be very common in the study population, clinical and para-clinical data indicated that teachers residing in Shiraz have a lower rate of CAD risk factors in comparison with previous studies done in general population of Iran. This may be related to high level of education, awareness and better lifestyle in the study group. But still further educating in regard to lifestyle modifications as well as dietary surveillance is needed in general population including those dealing with educating children and on a larger scale, the community as a whole.

Keywords: Risk Factors, CAD, Prevalence

Introduction:

Coronary artery diseases (CAD) are leading cause of mortality, morbidity and disability with high health care cost in Iran. It accounts for nearly 50 percent of all death per year.[1] In this setting recent report from population – based studies have shown that there is an increasing prevalence of all CAD risk factors including; hypertension, diabetes, lipid profile abnormalities and obesity in the population of Iran.[2-7] Chronic non-communicable Diseases including CAD and diabetes are leading causes of death worldwide, having comprised 60 percent of all death, in 2005.[8] Approximately %80 of non-communicable death occurs in low and middle-income countries.[9] The burden of non communicable diseases is rising globally. This trend seems to be faster in developing countries of the middle east[9]. In Iran, each year 90,000 people die from Cardiovascular Diseases.[11] The age- standardized death rate attributable to cardiovascular diseases and diabetes is estimated to be higher than 400 per 100,000 in Iran, one of the largest populations in the Middle East. The loss of the Iranian gross domestic product (GDP) due to heart diseases and diabetes, in 2015 is estimated to be %167 of that in 2006.[12]

Correspondence:
J Tahmasebi
Cardiovascular Research Center, Faghihi Hospital, Zand Street, Shiraz, Iran.
Tel/Fax: +98-711-2343529
E-mail: dr.tahmasebi.j@gmail.com

CAD is the most common form of cardiovascular diseases with an estimated prevalence of 6.9% in men and 6% among women.[13] CAD is characterized by the presence of atherosclerosis in the epicardial coronary arteries. Atherosclerotic plaques, the hallmark of atherosclerosis, progressively narrow the coronary artery lumen and impair ante grade myocardial blood flow. The reduction in coronary artery flow may cause symptoms in the patients or remain asymptomatic. When symptomatic, chest pain may occur with exertion or at rest, and may culminate in a myocardial infarction, depending on obstruction severity and the rapidity of its development.[13] Atherosclerosis can no longer be just considered a disease of the developed world, because myocardial infarction and stroke are increasingly prevalent worldwide, across all socioeconomic strata.[14] One of the most important and well-known studies in the field of cardiovascular diseases is that of Framingham. This study played a vital role in defining the contribution of risk factors of CAD events in the general population of the USA.[15] Some of the well-known, conventional CAD risk factors include diabetes mellitus, hypertension, hyperlipidemia, smoking, obesity and physical inactivity.[14] High total cholesterol accounts for up to %14 and %15 CAD mortality and morbidity respectively.[16] Job-related stress has been considered to be potentially important CAD risk factor and consequently a bulk of recent investigations has focused on the detection of CAD risk factors in certain occupations.[17-19]

The aim of this study is to detect and determine the prevalence rate of CAD risk factors in teachers residing in Shiraz (southern Iran) and to provide a clear guideline for improving the health status of the group under study and the community as a whole.

Patients and Methods

This study was done in collaboration with the Ministry of education, Shiraz branch, and cardiovascular research center of Shiraz University of medical sciences.

This cross-sectional study was conducted from February to December 2009 and comprised 3115 Shiraz education staff, 1842 (%59.1) females and 1273 (%40.9) males, aged 21 and 73 years. Mean age of females was 41.5 and that of males 42.7 years. All eligible participants gave verbal informed consent. The participants were interviewed at Shiraz healthy heart house, by nursing staff that had undergone comprehensive training in cardiovascular research center of SUMS prior to initiation of the study. The questionnaires provided by inter-viewers were used to collect such data as demographic information, physical activity, tobacco use and any kind of addiction, history of hypertension or its treatment, histories of diabetes mellitus (DM) or its treatment, CAD, and dyslipidemia.

CAD was documented by histories of angiography, PCI or CABG. Demographic information comprised sex, age, race, second occupation, postal address and telephone number. History of DM and hypertension were positive if a participant has ever been told by a physician to have DM or hypertension or treated accordingly.

The participators were examined by interviewer with surveillance of cardiology resident.

Anthropometric features included weight, height, and body mass index (BMI). The circumference of waist (WC), and hip (HC) were measured by standard method. The weight of participants was determined with bare foot and light clothing by portable weight scale and the height accurately measured with inflexible bars.

Waist circumference was measured using tape in a horizontal plane around abdomen at the end of a normal expiration at the midpoint between highest point of hip and lower part of the lowest rib.

Similarly, hip circumference were also measured and recorded. Blood pressures (BP) of both arms were measured with a digital microlife sphygmanometer.

The average of three measurements, at five minutes intervals was used for final BP analysis. Venous blood samplings was taken in sitting and relaxed position. About 5cc of venous blood was drawn from antecubital vein, kept at 5º C and transferred immediately to SUMS-affiliated reference laboratory of Fars province health center.

Serum TC, LDL-c, HDC-c, and TG were measured by enzymatic method. Also FBS was measured by enzymatic colorimetric method using glucose oxidize test.

Variable and measurements

Hypertension was defined as systolic blood pressure (SBP) ≥ 140 mmHg or diastolic blood pressure (DBP) ≥ 90 mmHg or current use of anti-hypertensive therapy. Prehypertension was defined as SBP between 120-139 mmHg and DBP between 80-89 mmHg in non-hypertensive participants.[20]

In participants without known DM, FBS ≥ 126 mg/dl was regarded as newly diagnosed DM. In those without known DM, FBS ≥ 100 but <126 mg/dl was defined as impaired fasting glucose or prediabetes.[21] Hypertriglyceridemia was defined as TG≥

Table 1. Estimate of prevalence of prediabetes, diabetes, high TC, high TG and metabolic syndrome

Risk factor	Female (%)	Male (%)	P value
Prediabetes	167 (9.2)	147 (11.6)	0.063
DM	69 (3.8)	53(4.2)	0.063
TC>200 mg/dl	692 (37.9)	490 (38.8)	<0.001
TG>150 mg/dl	414 (22.7)	611 (48.3)	<0.001
Metabolic syndrome 1	548 (30.3)	273 (21.9)	<0.001
Metabolic syndrome 2	674 (37.3)	415 (33.3)	0.023

Metabolic syndrome 1: (WC ≥ 102cm for men and WC≥ 88cm for women); Metabolic syndrome 2: criteria for Asian person (WC >94 cm for men and WC >80 cm for women).

150mg/ dl and hypercholesterolemia ≥ 200 mg/ dl. Central obesity was defined by international diabetes federation (IDF) criteria (WC ≥ 94cm in men and ≥ 80 cm in women).[22] The body mass index (BMI) was calculated as weight in kilograms divided by height in meters squared (W/h2). Overweight was defined as BMI ≥ 25 kg /m2 and < 30 kg/m2 and obesity as BMI ≥ 30.[23] Central obesity criteria also defined by ATP- III (WC ≥ 102cm in men and ≥ 88 in women) as one of the clinical criteria for metabolic syndrome.[23] Since there is no criteria for identifying central obesity in Iran, we used both IDF and ATP-III criteria for assessing our study population for central obesity. Participants are classified as having the metabolic syndrome if they had three or more of the following features: waist size ≥ 102 cm for men or ≥ 88 cm for women, systolic blood pressure ≥130 mm Hg or on antihypertensive medications or diastolic blood pressure≥85 mm Hg, HDL ≤ 40 mg/ dl for men or ≤50 mg/dl for women, TG ≥ 150 mg/dl, FBS ≥ 100 mg/dl. A lower waist circumference cut

point (≥ 94 cm in men and ≥ 80 cm in women) appears to be appropriate for person of Asian origin.[24]

Smoking including cigarette and waterpipe was classified as current – ex and passive smoking.

Physical activity was defined as at least 30 minute moderate level of exercise per day, and more than three day per week.

Statistical analysis

The data were processed using the method of mathematics. All the calculations were performed with the Statistical Package SPSS, version 15. Pearson Chi-square test was applied to identify relationship between CAD risk factors and demographic data. A p value of less than 0.05 was considered statistically significant.

Results

This study was performed on 3115 Shiraz educational staff from southern Iran. There were 1842 %59.1) women and 1273 (%40.9) men. Mean age

Table 2: Estimate of prevalence of hypertension, central obesity, overweight, obesity, smoking and physical inactivity

Risk factor		Female (%)	Male (%)	P value
Prehypertension		711 (38.8)	607 (48.1)	
HTN	**Stage 1**	225 (12.3)	194 (15.4)	<0.001
	Stage 2	72 (3.9)	74 (5.9)	
Central Obesity 1		1114 (60.7)	144 (11.4)	
Central Obesity 2		1577 (86)	715(56.7)	<0.001
Overweight		848 (46.2)	557 (44)	
Obesity		298 (16.2)	76 (%6)	<0.001
Smoking	**Current**	28 (1.5)	153 (12.1)	
	Ex	6 (0.3)	41 (3.2)	<0.001
	Passive	201 (11)	46 (3.6)	
Physical inactivity		1402 (76.4)	866(68.6)	<0.001

Central obesity 1: WC≥102 cm and ≥ 88cm in male and female respectively (ATP – III); Central obesity 2: WC≥94 cm and ≥ 80cm in males and females respectively (IDF); BMI= 18.5- 24.9, 25-29.9, and ≥ 30 were considered as normal, overweight and obese respectively; *Smoking including cigarette and waterpipe

of women was 41.5 and that of men 42.7 years. The questionnaires were filled out by interviewer under supervision of cardiology residents.

The total prevalence of diabetes was estimated to be %4 (%4.2 and %3.8 in males and females respectively) and prediabets or impaired fasting glucose (IFG) was %10.2 as shown in Table 1.

The mean age of prediabetics and diabetics were 44.4 and 47.3 years respectively, as opposed to normal individuals (42.6 years). Diabetes was more prevalent among males and elderly. Prediabetes state was more frequent than diabetes. The prevalence of prehypertension and hypertension (stage 1 and 2) was estimated to be %42.6 and %18.2 respectively as shown in Table 2. The mean age of hypertensive subjects was 42.6 years in contrast to 41.9 years for normal individuals. Hypertension was more prevalent among men and elderly. The prevalence of hypertriglyceridemia and hypercholesterolemia were 33.2% and 38.3% respectively. Dyslipidemia was more common in males and older subjects (Table 1). The estimated prevalence of central obesity was shown in Table 2 according to both IDF and ATP-III criteria. The total prevalence of central obesity was %75.05 (IDF criteria) and %40.64 (ATP-III criteria). As presented in Table 2, central obesity was significantly more prevalent among women.

The estimated prevalence of smoking was shown in Table 2. All kinds of smoking (current- ex–passive) were significantly more prevalent among men. (Table 2)

Discussion

CAD has an enormous impact on quality of life. Risk factors can accelerate or modify a complex and chronic inflammatory process that ultimately manifest as fibrous atherosclerotic plaque.[13] This disease is epidemic in developing countries and remains the single most important disease in the world in terms of mortality, morbidity, disability and economic loss until 2020 year.[14] The identification of risk factors provides a mean for decreasing CAD risks, through reducing modifiable risk factors, and better treatment decisions, through more accurate determination of overall risk status.[1] Our study is a descriptive cross-sectional survey of teachers, as they are one of the largest occupational groups with high level of education. We tried to evaluate CAD risk factors in individuals engaged in this profession, because occupational stress has been considered to be a potentially important CAD risk factor. Consequently a bulk of recent investigations

has focused on the detection of CAD risk factors in certain jobs.[17-19] The present study indicated that prevalence of different CAD risk factor are somewhat different from previous reports from Iran. Third national survey of risk factors of non-communicable diseases (SuRFNCD 2007) in Iran reported the prevalence of DM, as %8.7 which was more common among women.[10] According to another survey the prevalence of DM was reported to be %6.3 in Iranian population.[1] The prevalence of DM in our study was estimated to be %4 which is lower than the two previous reports in general population of Iran (%8.7 and %6.3). SuFNCD–2007 reported the prevalence of hypertension as %26.6 which was more common among women.[10] Another study in Iran in 2007 reported systolic hypertension as %13.7.[1] Our study indicated that the prevalence of hypertension between two recent studies were %18.7, while men have been more hypertensive than women. Also SuRFNCD-2007 reported the prevalence of hypercholesterolemia, hypertriglyceridemia, central obesity, obesity, recent and current smoking as %42.9, %36.4, %53.6(IDF criteria), %22.3, %12.5 and %11.3. This survey showed that men had higher TG and women had higher TC.[9,25] Another study reported the prevalence of hypercholesterolemia, hypertriglyceridemia, smoking, physical inactivity as %61, %32, %21.6 and %87 respectively.[1] In our survey we estimated the prevalence of hypercholesterolemia, hypertriglyceridemia, central obesity, current and ex-smoking, physical inactivity as %38.3- %33.2, %74.07 (IDF criteria), %5.9- %1.5 and %73.3 respectively. High TC and high TG were more common among men. According to our study and to ATP –III criteria, the prevalence of obesity was 5 times more in women than in men.

Also current and ex-smoking rates (%5.9 and %1.5) were lower than SuRFNCD survey (%12.5 and %11.3). By and large, our study indicated that, the prevalence of DM, smoking, high TC, high TG, and physical inactivity were lower, while central obesity was higher than and hypertension was the same as those previously reported.[1,10]

Also women were more diabetic than men who were more hypertensive than women.

Central obesity was about 5 times more prevalent in women, indicating that this group needs particular attention to prevent obesity, as one of the important CAD risk factors.

The reason for lower rate of DM, high TG, high TC, smoking can be related to awareness and high level of education, and lifestyle in this occupational

group. Also higher rate of DM in women may be related to high frequency of central obesity in this group, which is an alarming signal.

Although teachers have a lower rate of some CAD risk factors compared to the general population of Iran, its frequency is still high. Our study showed that teachers, based on their prevalence of CAD risk factors, are at increasing risk of CAD. However, considering the level of education and motivation in this population, promoting preventive strategies and lifestyle modifications might have favorable short term outcome and positive impact on the community as a whole through involving students in the process in the long run.

Acknowledgement

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