Determine the Prevalence of Coronary Artery Disease (CAD) Risk Factors in Depressed Retired population

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Abstract: Background: Coronary artery disease (CAD) accounts for nearly 50 percent of all deaths per year in Iran. **Method:** This study was performed to determine the prevalence of CAD risk factors in 300 Iranian depressed retired populations between ages of 50-70 years who were recruited with cluster random sampling. Demographic data and risk factors were determined by taking history, laboratory tests and physical examination. **Results:** Average age was 60.73. There was 162 females (54%) and 138 males(46%). 19(6.3%) of participants were diabetic, 36(12%) were smoker, and 63(21%) had positive familial heart disease history. 183(61%) had Total cholesterol level>200 mg/dl, 96 (32%) triglyceride>200 mg/dl, 142(47.3%) LDL-C>130 mg/dl, 16(5.3%) HDL-C<35 mg/dl, 41(13.67%) systolic blood pressure>140 mmHg, 27(9%) diastolic blood pressure>90 mmHg. **Conclusion:** The incidence of coronary artery disease is rapidly increasing, and risk factors such as Hypertension had the strongest association with CAD in our retired population. Medical treatment was recommended to the retired people.
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Introduction

80% to 90% of patients with coronary Heart Diseases (CHD) have conventional risk factors [1]. Novel and conventional factors play a crucial role in developing and progression of atherosclerosis [1, 2]. Frequency and distribution of known risk factors of CHD in younger patients (men≤55 years and women≤65 years) [1] and the older patients have been shown a different pattern [1]. On the other hand premature CHD is related to diabetes and cigarette smoking in woman and cigarette smoking in men [1]. Prevalence of the conventional risk factors of cigarette smoking, diabetes, dyslipidemia and hypertension are related to age [1]. 85% to 90% of patients with premature CHD have encompassed one conventional CHD risk factor [1]. It has been demonstrated an increasing trend in lacking any of these conventional risk factors in patients older than 65 years [1]. Screening and treatment of modifiable risk factors reduce mortality and morbidity related to CHD [1].

CAD is a leading cause of mortality, morbidity, and disability in Iranian population. It accounts for nearly 50 percent of all deaths per year. 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 be symptomatic or asymptomatic, may occur with exertion or at rest, and may culminate in a myocardial infarction, depending on obstruction severity and the rapidity of its development [3]. CAD is the most common form of cardiovascular disease with an estimated prevalence of CAD in men is 6.9% and 6% among women [3]. For people above 18 years of age prevalence estimates are: only 11.4 percent among whites. While 5.9 percents suffered from heart disease, 5.9 percent have hypertension and 2.3 percent have had a stroke [4].

Among African American black only, 9.9 percents had heart disease, 5.3 percents CHD,31.6 percents had hypertension and 3.5 percents had experienced a stroke [4]. Among Hispanics or Latinos, 7.7 percents had heart disease, 4.5 percents have CHD, 19.0 percents had hypertension and 2.2 percents had a stroke [4]. Among Asians, 5.6 percents had heart disease, 3.8 percents had CHD, and 16.1 percents had hypertension and 1.8 percents a stroke [4]. In South Asia the prevalence of hypertension is 3.2 percent, diabetes 2.6 percent, and CAD is 3.2 percent. However, in Urban and immigrant populations the prevalence rates are 12–20

percents, 6–8 percents and, 7–14 percents respectively. Mean serum cholesterol level is 180–200 mg/dl, frequency of obesity 5–8% and dietary fat intake contains 20–30% of total calorie intake [5]. Several subgroups of South Asia do have high smoking rates, especially in urban areas. The prevalence of cigarette smoking in Indians was 1.3% as compared with 27% in whites in the UK, cholesterol levels among Indians were found to be lower than the native population, while in the USA total cholesterol and LDL-C level among Indians and whites were similar. In a study of migrant Indians physicians to the USA, mean level of HDL-C level were significantly less in younger Indian men and women than their Western counterparts. Similar trends have been found for triglycerides as well [6]. Among the known risk factors, levels of HDL-C have been found to be inherently low in the normal South Asians population. Low HDL-C alone or in combination with high levels of LDL-C, insulin resistance and hypertension constitutes a very important intermediate phenotype for CAD. In a recent study on young myocardial infarction patients, 70.3% were found to have HDL-C lower than 40 mg/dl [7].

The average annual rate for the first major cardiovascular events rise from seven per 1000 men at 35–44 years of age to 68 per 1000 at 85–94 years of age. For women, comparable rates occur 10 years later in life [8]. Preliminary mortality data proved CVD as the underlying cause of death accounting for 37.3 percent of all deaths, or one of every 2.7, in the United States in 2003. CVD as an underlying or contributing cause of death accounted for about 58 percent of the deaths in 2002 [3]. Data from the 2003 BRFSS study of adults above 18 years of age showed the prevalence of respondents reporting two or more risk factors for heart disease and stroke increased among successive age groups. The prevalence of having two or more risk factors was highest among the blacks (48.7 percents) and American Indians/Alaska Natives (46.7 percents) and lowest among Asians (25.9 percents), the prevalence was similar in women (36.4 percents) and men (37.8 percents) were similar [3]. The estimated direct and indirect costs for coronary heart disease in 2006 are $142.5 billion [3].

CAD is a chronic process that begins during adolescence and slowly progresses throughout life. Independent risk factors include a family history of premature CAD, cigarette smoking, diabetes mellitus, hypertension, dyslipidemia, a sedentary life style, advanced age, gender and obesity. The risk factors accelerate or modify a complex and chronic inflammatory process that ultimately manifests as fibrous atherosclerotic plaque [1]. The Incidence of CAD is compatible with the pattern of the distribution of CAD risk factors, CAD occurs when its risk factors are present. According to a case-control study of 52 countries (Inter Heart), nine easily measured and potentially modifiable risk factors accounts for over 90 percent of the risk of an initial acute myocardial infarction (MI). The effect of these risk factors is consistent in men and women, across different geographic regions, and by ethnic group, making the study applicable worldwide. These nine risk factors include cigarette smoking, abnormal blood lipid levels, hypertension, diabetes mellitus, abdominal obesity, a lack of physical activity, low daily fruit and vegetable consumption, alcohol over consumption, and the psychosocial Index [9].

This study utilized a depressed retired population based survey to measure the prevalence of different CAD risk factors in an Iranian population sample where little is known about CAD, the disease burden, and risk factors.

Method

This study as a descriptive-cross sectional survey was performed to determine the prevalence of different CAD risk factors in Iranian depressed retired population, utilizing the medical history, physical examination and laboratory tests to consider known risk factors. In a population based survey among the Iranian retired population in Tehran, we applied cluster random sampling and calculated 300 for the sample population. We collected the data regarding risk factors for all depressed retired individuals (regarding to the public health school on London questionnaire) between age of 50-70 years. After completing the informed consent (verbal consent), all participants were given an interview, physical examination and blood sample tests.

Screening Protocol consisted of 3 stages:

1. Taking medical history (smoking cigarette and spout, hypertension), gathering such demographic characteristics as age, gender, marital status, educational level and employment position.
2. Physical examination by a measurement of blood pressure, weight and BMI.
3. Blood Tests: After 12 hours overnight fasting, blood samples were gathered to perform: complete blood cell counts, FBS (fasting blood sugar), urinalysis, lipid profile and creatinine.

Per protocol blood samples were obtained for FBS (Fasting Blood Sugar), TC (total cholesterol), LDL-C, HDL-C, and triglyceride (TG). FBS were detected at the enzymatic methodology via glucose oxidize kit with autoanalyzer BT3000

(Biotechnical, Italy) by locally generated kits (Pars Azmoon, Co Ltd.). Total cholesterol and TG (triglyceride) were measured by enzymatic method and HDL-C level was measured by poly cat++ precipitating method.

Statistical analysis

Descriptive analysis was used to process the outcomes in tables. Frequency tables were used to describe the categorical variables, and calculation of the means and SD (standard deviation) was performed to describe the continuous variables.

Results

Table 1 showed that the mean age of 300 depressed retired populations were 60.73. There was 162 female (54%) and 138 male (46%). According to age, 133 (44.33%) were between 50-60 years and 167 (55.67%) were between 60-70 years. According to marital status 290 (96.67%) were married and 10 (3.33%) were single and according to educational level, 178 (59.33%) had B.Sc. or B.A. degree, 90 (30%) had Masters', doctorate or higher degree (higher than B.Sc. or B.A. degree) and 32 (10.67%) had diploma or high school degree (under than B.Sc. or B.A. degree), and all of 300 (100%) participants were retired.

Table 1: Demographic data of participants

Variables	Classes	Frequency	Percent
Age	50-60	133	44.33%
	60-70	167	55.67%
Gender	Male	138	46%
	Female	162	54%
Marital Status	Married	290	96.67%
	Single (or widowed)	10	3.33%
Employment Position	Retired	300	100%
Educational level	Masters' , doctorate or higher degree	90	30%
	B.Sc. or B.A. degree	178	59.33%
	Diploma, high school degree	32	10.67%

Table 2, demonstrate the prevalence of coronary artery disease risk factors among retired population under the study including, diabetes mellitus, Total Cholesterol (TC), Triglyceride (TG), LDL-C, HDL-C, Systolic Blood Pressures (SBP) and Diastolic Blood Pressures (DBP), family history of CAD, smoking (cigarette, spout) and physical inactivity.

Table 2: The prevalence of coronary artery disease risk factors among retired population

Risk factors	Frequency	Percent
History of Diabetes Mellitus	19	6.3%
Smoking (cigarette, spout)	36	12%
Family history of CAD in first degree relatives	63	21%
Systolic Blood Pressure	41	13.67%
Diastolic Blood Pressure	27	9%
Total cholesterol >200 mg/dl	183	61%
LDL-C >130 mg/dl	142	47.3%
HDL-C <35 mg/dl	16	5.3%
Triglyceride > 200 mg/dl	96	32%
Secondary life style	261	87 %

19 (6.3%) of participants were diabetic, 36 (12%) were smoker, and 63 (21%) had positive familial heart disease history. 183 (61%) had Total cholesterol level>200 mg/dl, 96 (32%) triglyceride>200 mg/dl, 142 (47.3%) LDL-C>130 mg/dl, 16 (5.3%) HDL-C<35 mg/dl, 41 (13.67%) systolic blood pressure>140 mmHg, 27 (9%) diastolic blood pressure>90 mmHg and 261 (87%) of them were physically inactive. The description of number, mean and standard deviation of the quantity of the risk factors is presented in Table 3.

Table 3: Distribution of coronary artery disease risk factors in all of participants

Risk factors	Mean	SD
TC (Total cholesterol) mg/dl	220.64	55.34
LDL-C (Low Density Lipoprotein) mg/dl	128.15	41.57
HDL-C (High Density Lipoprotein) mg/dl	41.68	13.24
TG (Triglyceride) mg/dl	196.83	92.29
FBS (Fasting Blood Sugar) mg/dl	113.98	37.02

Table 4, shows the prevalence of diabetes mellitus, smoking (cigarette, spout) and physical inactivity, blood pressure and dyslipedemia among male and female retired population.

Table 4: Prevalence of coronary artery disease risk factors among males and females retired population

Gender/ Risk factors	Diabetes mellitus	Smoking cigarette, spout	Physical inactivity	Systolic blood pressure>140 mmHg	Dyslipedemia
Male	2.97% (9)	11.33% (34)	39% (117)	5.67% (17)	26% (78)
Female	3.33% (10)	0.67% (2)	48% (144)	8% (24)	34% (102)
Total	6.3% (19)	12% (36)	87% (261)	13.67% (41)	60% (180)

Diabetes mellitus was more common within the age group of 50–60 years, and in individuals who were inactive (exercise less than 30 minutes, three times a week) in comparison with physically active retired persons (82.1% vs. 17.9%).

Prevalence of hypertension (blood pressure ≥ 140/90 mmHg) was higher in female than in male, and within 60–70 years age group of our sample of those who had a sedentary life style 82.2% suffered from hypertension among whom 17.8 percents did exercise (physical activity).

In this study, physical inactivity was found to be more common among the females and the retired persons with an educational level lower than B.Sc. or B.A. compared with retired persons with masters', doctorate or higher university degree (37% vs. 63%).

Females more than males were dyslipedemic, and the prevalence of physical inactivity was higher in patients with dyslipidemia in comparison with those of a normal level of lipids (75.3% vs. 24.7%).

Discussion

In our study the prevalence of conventional CAD risk factors were at such a high level, which can lead in convince authorities for developing control measures, for the most preventable disease of our time (CAD). Our observation of the CAD conventional risk factors showed that, smoking (cigarette, spout), SBP (systolic blood pressure), DBP (diastolic blood pressure), FBS (fasting blood sugar), TC (total cholesterol), TG (triglyceride), LDL-C, & ratio of TG/HDL-C were significantly higher in older individuals above 55 years.

CAD is the epidemic of our time and set to remain the single most important disease in the world in the terms of mortality, morbidity, disability and economic loss until 2020 year [10]. This chronic disease has an enormous impact on quality of life. Its Risk factors accelerate or modify a complex and chronic inflammatory process that ultimately manifest as fibrous atherosclerotic plaque [3], the clinical coronary events follow plaque rupturing. This presence and the number of CAD risk factors predict the future cardiovascular events in individuals with such factors.

The present study we conducted a population based survey to determine the prevalence of different CAD risk factors in Iranian depressed retired population, which is the only study of this nature in Iran, and the results of the study revealed the high frequency of risk factors in our samples.

The development of the concept of risk factors and their relationship to the incidence of CAD evolved from prospective epidemiological studies in the United States and Europe [11-14]. The identification of risk factors provides a means for decreasing CAD risks, through the reduction of modifiable risk factors, and better treatment decisions, through more accurate determination of overall risk status [15]. Risk factors reduction is the primary clinical approach to preventing CAD morbidity and mortality [16]. Epidemiological studies have clearly demonstrated that, hypertension, use of tobacco and dyslipidemia are the major risk factors of CAD which act in a synergistic manner

[16]. With the prevalence of risk factors for CAD is increasing, and with the clinical and cost burdens mounting, identifying and treating those at risk remains a national priority [17, 18].

Comparison of the present study with KANALA in 2002 [19] and former research in US and Europe [9,11 ,12 ,16] revealed a similar pattern of the prevalence of a number of risk factors, so that our population have a much higher level in such risk factors as, total cholesterol, LDL-C and physical inactivity. Also in hypertriglyceridemia and low HDL-C frequency, we find out a different pattern [19].

A comparison between our study and that of heart disease and stroke statistics 2006 update [3], indicate that the prevalence of hypercholestrolemia, LDL-C equal than 130 mg/dl or higher and physical inactivity is significantly higher in our population. This huge difference might be addressed in the epidemic aspects of CAD arguments [3]. Results of this study and American heart association heart disease and stroke statistics report [3] demonstrate a similar prevalence of diabetes mellitus and smoking (cigarette, spout). Low level of HDL-C level is much more common in the 2006 report of heart disease and stroke statistics, than that in our population [3].

In the term of strength of associations ,the most related risk factors with age between 50-70 years in the order of odds ratios including: 19 (6.3%) of participants were diabetic, 36 (12%) were smoker, and 63 (21%) had positive familial heart disease history. 183 (61%) had Total cholesterol level >200 mg/dl, 96 (32%) triglyceride >200 mg/dl, 142 (47.3%) LDL-C >130 mg/dl, 16 (5.3%) HDL-C<35 mg/dl, 41 (13.67%) systolic blood pressure >140 mmHg, 27 (9%) diastolic blood pressure>90 mmHg and 261 (87%) of them were physically inactive.

With respect to the marital status of our subjects, the majority of the subjects were married (96.67%), all of male subjects were married and all of widowhood were female (3.33%). This finding seems reasonable on account of the fact that our female subjects were older than our male subjects and were thus more likely to be widowed.

Regarding the educational level of the subjects' population, the women were less educated than male subjects; this pattern echoes what was previously reported in the general population of Iran [20].

In the term of strength of associations ,the most related risk factors with gender indicated that diabetes mellitus was more common within the age group of 50–60 years, and in individuals who were inactive (exercise less than 30 minutes, three times a week) in comparison with physically active persons (82.1% versus 17.9%). Prevalence of hypertension (blood pressure ≥140/90 mmHg) was higher in female than in male, and within 60–70 age group of our sample. Of those who had a sedentary life style 82.2% suffered from hypertension among which 17.8 percents did exercise.

In this study, physical inactivity was found to be more common among the females and the retired persons with an educational level lower than B.Sc. or B.A. compared with retired persons with masters', doctorate or higher university degree (37% versus 63%) .Females more than males were dyslipedemic, and the prevalence of physical inactivity was higher in patients with dyslipidemia in comparison with those of a normal level of lipids (75.3% versus 24.7%).

However, the conventional CAD risk factors still remained at high level of prevalence and, it is compatible with the epidemic situation in our population. Comparison of the pattern of CAD risk factors between female and male demonstrated that, diabetes mellitus, physical inactivity, systolic blood pressure>140 mmHg, dyslipedemia were significantly higher in females than males, and smoking (cigarette, spout), was significantly greater in males than females. Comparison of our study of the population based depressed population individuals with hospital based investigation among patients with CHD [1] demonstrated explicit different patterns of the risk factors, especially between women and men.

Results of this study similarity to the other studies findings [21-23]. Study findings indicated that advancing age and diabetes are independent predictors for development of coronary artery disease in this group of overweight and obese Iranian women. The high proportion of low educated people in these patients with coronary artery disease implicates an important public health message for targeted preventive measures in lower social groups [21].

Another research found that among traditional CAD risk factors (excluding cigarette smoking) were more frequent in female patients. Hypertension and diabetes mellitus were the most important risk factors. However, the role that hypertension played as a risk factor among the female CAD patients was much stronger than what was previously reported. The female patients reported less severe symptoms than did the males and invasive procedures were most frequently recommended treatment modality to male and female patients with extensive CAD. However medical treatment (as sole treatment) was frequently recommended for females. There was no gender preference in coronary artery vessel involvement [22].

Some studies have shown that age, diabetes, and levels of certain lipoproteins are stronger risk factors in women [23]. In our subjects, except for cigarette smoking, all the traditional risk factors were seen in the females more frequently. Amongst the risk factors that were more prevalent in our female subjects, hypertension and physical inactivity and dyslipidemia had the highest ratio.

Beyond the role of these conventional risk factors that is common and consistence with development of CAD and plaques formation [24], the risk assessment of the population at risk for CHD, needs for additional cumulative effect of the novel risk factors including: inflammatory markers [2, 25-27], homeostasis markers [2, 28-30], and lipid related factors [2, 31-34]. Development of national risk education program upon present situation and the results of our investigation should be addressed. Recent evidences have been shown; there is no doubt that management of the modifiable and life style related CHD risk factors lead in reduces future cardiovascular events. Wise investigator may consider the impact of these programs much larger than commonly considered, just for individuals with CHD risk factors. The offspring of people with risk factors either in primary prevention and/ or secondary prevention may enjoy the implementing of the result of the modification of CHD risk factors [35, 36].

A high prevalence of CAD risk factors, as expected, exist which is in line with economic development. The presence of a high level of most risk factors along with the absence of national and local area control measures in our population, strongly predicts the epidemic status of CAD in this population in the next future. The results of this study may lead to a decision made to address the issue at a national level. Control programs regarding CAD, via modifying the modifiable risk factors are envisaged.

According to the current ATP III guidelines, determining fasting lipid levels together with the presence of clinical signs and other known risk factors would generate an estimated 10 year risk for CAD. On the basis of this risk assessment, aggressive life style and treatment guidelines are recommended [17].

This study concluded according to the prevalence of risk factors, which 6.3% of the study population was diabetic, 21.6% were smoker, and 15% had a positive familial heart disease. 61% had total cholesterol level >200 mg/dl, 32% triglyceride >200 mg/dl, 47.5% LDL-C >130 mg/dl, 5.4% HDL-C <35 mg/dl, 13.7% systolic blood pressure >140 mmHg, 9.1% diastolic blood pressure >90 mmHg and 87% of them were physically inactive.

Recent scientific evidence [37-41] together with the joint AHA/CDC guidelines [17], however, strongly recommends that in performing a global risk assessment for CAD, new risk factors to measure heart attack risk such as circulating markers of inflammation like C-reactive protein (CRP) should be used. Such augmentation provides the best method of determining the global risk assessment for CAD. In concordance with the results of an international large study in 44 countries reported that the conventional CHD risk factors are mainly under controlled in many part of the universe [42], our finding confirmed that the CHD risk factors are under detected, non-treated and non-controlled in our population.

The researchers strongly recommend whole population strategy of primary prevention of the cad to be designed and practiced. Managing this burden of risk factors can prevent the following cardiovascular event rates, and should assist managing the future CAD. For primary prevention purposes individuals with documented risk factors should actively pursue risk factor modifications to reduce the risk of future cardiovascular events. Life style modifications with guidance and strong encouragement of the physician-led health care team can make a significant positive impact on the future cardiovascular and vascular events rate.

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