Assessment of cardiovascular disease risk factors in an Iranian young population

Marziyeh Nikparvar[1]   Elham Boushehri [2]   Azadeh Azinfar [3]   Samaneh Parviz [3]   Reyhanealsadat Boozari, MD [3]

Assistant Professor Department of Internal Medicine [1] , Reserch Center for Cardiovascular Disease, Assistant Professor Department of Medical Education [2] , General Practitioner [3] , Hormozgan University of Medical Sciences, Bandar Abbas, Iran.

Original Article

Abstract

Correspondence:
Elham Boushehri, MSc.
Faculty of Health, Hormozgan
University of Medical Sciences.
Bandar Abbas, Iran
Tel:+98 9171632969
Email:
ehlamboushehri@yahoo.com

Introduction: The study was carried out to assess the incidence of cardiovascular risk factors in an Iranian young population.

Methods: This cross-sectional study was conducted on 137 students (42 male and 95 female, mean age: 21.99 ± 1.54) of Hormozgan University of Medical Sciences in Bandar Abbas, Iran from January 2008 to December 2009. A questionnaire was used to collect the data. Then height, weight, BMI, systolic and diastolic blood pressure were measured on all participants. Blood sample was also taken for the measurement of glucose and lipid profile. Finally, the incidence rate of cardiovascular risk factors among students were analysed by Chi-Square, ANOVA and t-test.

Results: It was observed that 21% of students (30 cases) expose at least one coronary artery disease risk factor. The prevalence of HDL, smoking, high total cholesterol, LDL, high body mass index, family history of early onset coronary heart disease, hypertension, inadequate physical activity and hypertension was 46.7%, 29.19%, 21.2%,19%, 17.5%, 14.6%, 10.9%,10.9%, respectively. There was no difference between sex and incidence rate of cardiovascular risk factors except hypertension. High blood pressure was more prevalent in men than women (P=0.01).

Conclusion: This study showed that the cardiovascular risk factors are common in young population; particularly of low HDL, smoking, and high total cholesterol. These findings imply that life style change should be considered via special training programs to decrease the high incidence rate of cardiovascular disease in the middle age.

Key words: Risk Factors - Young People - Dyslipidemias - Iran

Introduction:

Cardiovascular diseases (CVD) are the most common cause of death in the world which account for 40% of mortality (1-3). It is estimated that the diseases count one of the leading cause of disability and early death which reduce the efficiency of individual's activities. At present, the prevalence of CVD is increasing in developing countries (3,4) and about half of the individuals

initially diagnosed as suffering from CVD are asymptomatic. Studies provide evidences showing that change of life style and drug therapy may reduce cardiovascular accidents and mortality in asymptomatic patients if they are identified with the aid of risk factors before demonstration of symptoms. This prevents a significant number of deaths due CVD (1,3).

Epidemiological studies identify several risk factors for CVD. Although some of them are unchangeable, there are some other modifiable factors including increased blood lipids, hypertension, smoking, diabetes mellitus, obesity and sedentary lifestyle. Therefore, early identification of the risk factors and subsequent serious treatment may reduce the health burden of CVD (1-3).

Modifiable risk factors are a part of the lifestyle of individuals which appear after birth. Repeated constantly during lifetime, the factors ultimately change to a personal habit. High prevalence of CVD risk factors reported in studies deal with the prevalence of CVD in the young and adolescents confirm that the focal point for monitoring habits leading to disease should change to childhood ages (4-6). Since there is a simultaneity between the outcomes of the risk factors such as myocardial infarction and the risk factors in ages above 30 years, most of the studies report the prevalence of CVD in ages above 30 (1-6). So, there are limited studies dealing with the prevalence of risk factors in the young and adolescents (5,6). This study aimed to determine the prevalence of CVD risk factors in the students of Hormozgan University of Medical Sciences (HUMS) as a young population (20 to 27 years old) (7-15).

Methods:

This descriptive cross-sectional study was carried out on students (above 20 years old) selected by the use of stratified random sampling at HUMS during 2008 and 2009. Based on earlier studies on the prevalence of CVD in students, 14% of the students (137 cases) were studied with precision of 0.01 and confidence interval of 95% (4-6). The sample size was proportionately calculated with the frequency of students at the

schools of "Medicine" (SOM), "Nursing, Midwifery and Paramedical Sciences" (SONMPS), as well as Health" (SOH). The cases in each and every single school were determined with attention to the sex distribution of the students. The number of female and male cases at SOM, SONMP and SOH was determined as 25 and 14, 55 and 14; and 15 and 14, respectively. The cases were selected by simple sampling waiting for the specified sample size returns from each school.

Initially, after obtaining written consent form from the cases, the researchers collected required data related to age, sex, marital status, familial precedence of early CVD (incidence of CVD in first-degree relatives either female younger than 65 years old or male younger than 55 years old), taking oral contraceptives, smoking and the rate of physical activity.

The systolic and diastolic blood pressure of the participants were measured in mm Hg by sphygmomanometer in a quiet and relaxed atmosphere and the following condition: 1) one hour before measuring blood pressure, the participants neither consumed food nor smoked, 2) measurement was performed after having a sitting position for 5 minutes on the right arm where the arm was on a support and in parallel with the heart. In case of any problem for blood pressure measuring, the measurement was repeated with at least a 3-minute interval.

To calculate Body Mass Index (BMI), the weight and the height of the participants were measured. For weight measurement, the students wore light clothes without shoes and standing position at the center of a digital scale (Seca Digital Scale, Made in Germany, with 100 gr error). Weight was recorded in kilograms (Kg). Height was measured while: 1) the participants had straight standing position, 2) the back side of their shoulders, buttocks and legs touched the vertical surface used for measuring the height; and 3) they were barefooted. Then the height was recorded in centimeters. Finally, BMI was calculated based on the weight and the height recorded for each case as per: Weight in Kg divided by Height in meters to the power of two (Kg/m^2).

At the end, to measure fasting blood sugar and lipid profile (total cholesterol, high density lipoprotein (HDL), low density lipoprotein (LDL)

and triglyceride), blood sample was collected after 12 hours fasting.

In this study, based on smoking the participants were divided as: A) smokers, B) non-smokers and C) passive smokers.

A) Smokers

Smokers are defined as those who smoked daily or occasionally at the time of this study. They were divided into two subgroups: 1) smokers who smoked at least one cigarette daily and 2) occasional smokers who sometimes smokes

B) Non-smokers

Non-smokers are those who did not smoke at the time of the study. They were divided into three subgroups: 1) former smokers who used to smoke daily before the current study, 2) never- smoked participants were those who either had never smoked or used to smoke but not daily and the total number of cigarettes ever smoked has been less than 100 cigarettes, and 3) former occasional smokers used to smoke occasionally but not daily and the total number of cigarettes ever smoked was more than 100 numbers.

C) Passive smokers

Passive smokers were those who did not smoke, but they were exposed to the smoke either at home or workplace.

Adequate physical activity was defined as at least a 30-minute hiking daily repeated 5 times a week. Other CVD risk factors considered in this study include BMI ≥ 25 Kg/m^2, impaired fasting blood sugar ≥ 110 mg/dl, total cholesterol ≥ 200 mg/dl, LDL ≥ 160 mg/dl, HDL ≤ 40 mg/dl for men and HDL ≤ 45 mg/dl for women, blood pressure $\geq 140/90$ mmHg after at least measuring two times and taking antihypertensive drugs.

At the end, the prevalence of CVD related risk factors was investigated using SPSS statistical software (version 15). The collected data were analyzed by the use of descriptive statistical formula including frequency, percentage, mean and standard deviation. The comparison of the incidence rate of the risk factors by sex was performed by Chi-Square, t-test and ANOVA. The values less than 0.05 were considered as statistically significant.

Results:

This study investigated 137 students at HUMS (69.3% girls and 30.7% boys). Mean age of the students was 21.99 ± 1.54 years old (from 20 to 27 years old). The mean age of the boys and the girls was 22.16 ± 1.6 and 2.92 ± 1.5, respectively. There was not statistically significant difference between them. One hundred twenty-two students (89.1%) were single and 15 (10.9%) were married. It is to note that just 3 students (3.1%) reported taking contraceptive pills. Demographic and laboratories information is shown in table 1.

Table 1. Demographic information and laboratory findings obtained from the studied population

Mean age (years old)		21.99±1.54
Familial precedence of CVD		20 (14.6%)
Takimg oral contraceptive pills		3 (3.1%)
Smoking	Smokers	3 (2.2%)
	Passive smoker	37 (27%)
	Non-smokers	97)70.8%)
Adequate physical activity	Yes	122 (89.1%)
	No	15 (10.9%)
Hypertension	Mean of systolic blood pressure	112.87±15.07
	Mean of diastolic blood pressure	75.5±8.91
Laboratory findinga (Mean±SD)	Fasting blood sugar (mg/dl)	81.94±10.79
	HDL (mg/dl)	47.64±9.49
	LDL (mg/dl)	102.47±29.95
	Total cholesterol (mg/dl)	167.08±33.68
	Triglyceride (mg/dl)	78.07±30.64
BMI	Less than normal range (20>)	31 (22.6%)
	Normal	81 (59.1%)
	Overwight	22 (16.1%)
	Obese	3 (2.2%)
	Pathological obesity	0 (0.0%)

Table 2. Frequency distribution of CVD related risk factors by sex

Risk factors	Men (%)	Women (%)	Total (%)	significance
Familial precedence of CVD	7 (16.7)	13 (13.7)	20 (14.6)	0.41
Smoking or being exposed to smoking	26 (61.9)	14 (14.7)	40 (29.2)	0.001
Inadequate physical activity	5 (7.24)	10 (23.8)	15 (10.9)	0.01
BMI $\geq$ 25 Kg/m^2	10 (23.8)	15 (15.7)	25 (18.3)	0.14
Blood pressure $\geq$ 140/90 mmHg	9 (21.4)	6 (6.3)	15 (10.9)	0.01
Total cholesterol $\geq$ 200 mg/dl	6 (14.3)	23 (24.2)	29 (21.2)	0.13
Impaired HDL*	15 (35.7)	49 (51.6)	64 (46.7)	0.13
LDL $\geq$ 160 mg/dl	8 (19)	18 (18.9)	26 (19)	0.58
Triglyceride $\geq$ 200 mg/dl	0 (0.0)	1 (1.1)	1 (0.7)	0.69
Fasting blood sugar $\geq$ 110 mg/dl	0 (0.0)	1 (1.1)	1 (0.7)	0.69

* HDL > 40 mg/dl and HDL < 45 mg/dl are considered as impaired for men and women.

Twenty-one percent of the students (30 students) possessed at least a CVD related risk factors at young age. The most frequent such factors in the order of the most to the least were as HDL less than normal (46.7%), exposure to cigarettes smoke and smoking habit (29.2%), high total cholesterol (21.2%), impaired LDL (19%), abnormal BMI (18.3%), familial precedence of early CVD (14.6%), inadequate physical activity (10.9%) and blood pressure higher than normal (10.9%) (table 2).

The prevalence of CVD related risk factors based on the sex was also investigated in this study (Table 2). 21.4% of the boys and 6.3% of the girls showed high blood pressure. It was significantly more in boys than the girls (P=0.01). The most observed risk factor in the population was impaired HDL which found in 35.7% of the boys and 51.6% of the girls. There was not statistically significant difference in terms of the rates of the incidence. Significant difference was observed between the two genders regarding other risk factors including smoking and inadequate physical activity.

Conclusion:

Based on the results of this study, it can be concluded that the most important CVD related risk factors were low HDL, cigarettes smoke, high cholesterol, impaired LDL, high BMI, inadequate physical activity, high blood pressure and family history. The results of this study are similar to the demographic studies by Rafei et al (16) and Azizi et al (17). In these studies, low HDL was also reported as the most common risk factor in Iran. In the demographic study of Mahmood et al (18) this factor was the second most common one. But the most common risk factors reported in studies out of Iran comprise high blood pressure, inadequate physical activity, abdominal obesity and abnormal BMI (19-24). In a study by Gholipour et al on university students, the most common CVD related risk factors were hypertension and low HDL (7). Heidari in a study on the prevalence of CVD related risk factors in the adolescents in Tehran showed that exposure to cigarettes smoke was the most common factor (25). The prevalence of daily cigarette smoking between the university students in Poland was estimated as 75% (26). Khodaveisi et al reported inadequate physical activity (59%) and obesity (10%) as the most common risk factors among adolescents in Hamadan (27).

Nilsaz studying the lifestyle of the university students in Dezful showed that 11.3% and 54% of the students respectively had unfavorable and to some extent favorable lifestyle (8). Samimi et al in a deeper study of the lifestyle dimensions of university students showed that the lifestyle of the students of Iran University of Medical Sciences in the dimensions of sports (28%), nutrition (72%) and smoking (12) were either to some extent unfavorable or completely unfavorable (15).

In this study, the prevalence of CVD related risk factors was investigated based on gender. It was observed that the incidence rate of impaired blood pressure in boys was significantly higher than girls, however, other factors were not significant. Nussinovitch et al (24) aiming to screen blood pressure among high school students studied on 3073 boys and 3209 girls 13 to 17 years old. They

found that the blood pressure in boys was significantly higher than girls. In a study by Stojanovic et al (17) – in 2009 – on 824 medical students in the last semester at the medical school at the University of Nice to determine CVD related risk factors among the pupils; and also, another study by Prentice et al in 2008 (19) no significant difference was observed between the incidence rate of blood pressure disorder from the view point of sex. However, in a demographic study by Sadeghi et al on 12494 people to determine the prevalence of hypertension in Isfahan, it was observed that higher blood pressure than normal was relatively higher in women than men.

Contrary to the results obtained from the present study, Magda et al (18) in a study evaluating the prevalence of risk factors between university students in Budapest in 2006 found that the prevalence of HDL in boys was more than the girls. Although we found no significant difference between boys and girls from the view point of physical activity, some other studies reported that inactivity of girls was more than boys (19,20).

In our study, the frequency of BMI was not significant while comparing the genders, however, Agheli (28) observed that obesity of women was more than men.

As the current prevailing cultural values and beliefs in the country, smoking was observed less in girls compared to boys and more in married men than the single ones. It is of high importance since smoking was the second most common risk factor in the population of the study. Although a low percentage of the population reported smoking in a direct manner, a remarkable number of whom were exposed to the smoke of cigarettes in an indirect manner.

It seems that training to modify the lifestyle and also regular screenings may affect the reduction of CVD incidence in the middle ages. On the other hand, considering the remarkable prevalence of the risk factors in the young population, it seems that the target population for the screening of CVD related risk factors should change from the middle-aged to young population and even to children. Because modifying habits leading to disease in childhood is more convenient and the population interventions are more effective in this age group.

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