Risk factor profile and angiography findings in military and non-military patients with coronary artery disease

Ramezan Bakhshian Kelarijani MD, Maryam Moshkani Farahani MD, Amir Bahrami Ahmadi MD

Abstract

Background- Military personnel come from the general population and have the same epidemiological style for coronary artery disease (CAD). There are two significant questions: Is there a higher rate of premature CAD in military personnel in comparison with general population and does the risk factor profile in military personnel differ from that of the general population? The present study was designed to answer these questions.

Methods- The present case control study was performed on all military and non-military patients referred to angiographic departments due to CAD symptoms between 2003 and 2005. We collected demographic data with major coronary risk factors such as diabetes mellitus, hyperlipidemia, hypertension, and smoking (cigarette or pipe). We divided the recruited patients according the angiographic findings and the number of involved vessels into three groups.

Results- Among the patients, 9709 (81%) were affected by CAD. From this total, 3586 (36.93%) were military and 6123 (63.07%) were non-military patients. Premature CAD in the military personnel (868, 24.21%) was significantly higher in the non-military (503, 8.3%) persons (P=0.00). Diabetes and hypertension were significantly lower in the military personnel in comparison with the non-military group. Smoking in the military personnel was significantly higher than in the non-military group. There was a significant association between the number of risk factors and involved vessels in our participants.

Conclusion- In light of the fact that the rate of premature CAD was higher in the military personnel in our study, we suggest that screening programs with sensitive tools might be necessary for an earlier detection of the military personnel at a higher risk of CAD***(Iranian Heart Journal 2011; 12 (4):16-21).***

Keywords: Coronary artery diseases■ Risk factor■ Military personnel

In developing countries, there has been epidemiologic transition to receding pandemic and degenerative diseases, and coronary artery disease (CAD) in these countries is becoming pandemic.[1] According to global reports, 80% of CAD-related deaths occur in developing countries, and CAD and myocardial infarction are responsible for nearly half of these cardiovascular deaths.[2-3] CAD exerts a negative impact on workforce and economy due to tendency to develop in young patients in developing countries.[4]

Family history of premature CAD, cigarette smoking, diabetes mellitus, dyslipidemia, hypertension, gender, and obesity have been reported as the independent risk factors of cardiovascular disorders.

Received May. 25, 2011; Accepted for publication Jan. 12, 2012
Department of Electrophysiology, Baqiatallah University of Medical Sciences
Department of Echocardiography, Baqiatallah University of Medical Sciences
Medical Research Department, Borhan Research Institute, Tehran, Iran
Department of Echocardiography, Baqiatallah Hospital, Baqiatallah University of Medical Sciences, Tehran-Iran
Correspondence: Maryam Moshkani Farahani, E-mail: info@borhanresearch.com Mobile: 00989124969707 Fax: 00982188276738

These risk factors have impacts on the complex and chronic pathway of atherosclerosis plaque.[5] In countries of South Asia, the prevalence of hypertension and diabetes is 3.2% and 2.6%, respectively. In these countries, the mean of serum cholesterol level is 180-200 mg/dl, frequency of obesity is 5-8%, and dietary fat intake accounts for 20-30% of the total calorie intake.[6]

CAD happens in the presence of risk factors. A large study on CAD patients of 52 countries reported the nine risk factors of cigarette smoking, abnormal blood lipid levels, hypertension, diabetes, abdominal obesity, lack of physical activity, low daily fruit and vegetable consumption, alcohol over consumption, and the psychosocial index as modifiable and easily measurable risk factors for CAD and especially myocardial infarction.[7]

Military personnel come from general population and have the same epidemiological style for CAD. They have some additive risk factors, however, by comparison with the general population. For example, in younger Indian military personnel, CAD was reported to be more frequent and had extensive angiographic involvement.[8] Some studies have evaluated premature CAD[9-11] and reported that the studied patients were more frequently male and had several coronary risk factors.[7, 12]

There are two significant questions: Is there a higher rate of premature CAD in military personnel in comparison with general population and does the risk factor profile in military personnel differ from that of the general population? The present study was designed to answer these questions.

Patients and Methods

The present case control study was performed on all military and non-military patients referred to angiographic departments due to CAD symptoms such as typical and atypical chest pain, exertional dyspnea, heart palpitation, vertigo, and syncope. The study hospitals are the main referral hospitals for military and non-military patients in the Iranian capital, Tehran. We included all patients (n=12010) who were referred for angiographic evaluations between 2003 and 2005. The present study was approved by the Ethics Committee, and informed consent was obtained from each patient.

We collected demographic data with major coronary risk factors such as diabetes mellitus (fasting blood sugar ≥ 126 mg/dl), hyperlipidemia (serum level of triglyceride or cholesterol ≥ 200 mg/dl), hypertension (blood pressure ≥ 140/90 mmHg), and smoking (cigarette or pipe). The patients were likely to have one or more than one of these major risk factors. We defined premature CAD as CAD in patients who were younger than 45 years of age.

We also assessed ectopic vessels, unusual left ventricle movement, and left ventricle size and ejection fraction. According to our assessments, we divided the final reports of the angiographic studies in our patients into the three groups: (1) with one involved vessel; (2) with two involved vessels; and (3) with three involved vessels.

Statistical analysis

The study data were analyzed with SPSS 16.0 software. We compared the frequency of risk factors between the military and non-military patients using the chi square test. We used the Student *t*-test and analysis of variance to compare the quantitative variables between the two study groups.

Results

A total of 12010 patients with a mean age of 56.8 ± 10.5 years were analyzed. The study population was comprised of 60.86% (7309) men and 39.14% (4701) women, and 80.84% (9709) of the patients were affected by CAD. Among them, 3586 (36.93%) were military and 6123 (63.07%) were non-military, respectively. Premature CAD in the military personnel (868, 24.21%) was significantly

higher than that in the non-military (503, 8.3%) patients (P=0.00). The baseline data in our participants in the military and non military groups are presented in Table I.

Table I. Age and sex distribution in military and non-military groups

Age groups (years)	Sex	Military personnel		Non-military patients	
		N	%	N	%
25-34	Male	50	4.4	16	0.4
	Female	-	-	-	-
35-44	Male	825	23.65	391	10.3
	Female	-	-	96	4.2
45-54	Male	1282	36.75	1069	28.2
	Female	-	-	432	18.8
55-64	Male	767	21.99	1199	31.6
	Female	62	63.26	862	37.6
65-74	Male	489	14.02	946	24.9
	Female	36	36.74	768	33.5
75-84	Male	78	2.23	176	4.6
	Female	-	-	136	5.9

Major risk factors, including diabetes and hypertension, were significantly lower in the military personnel than in the non-military patients (P=0.00). Smoking in the military personnel was significantly higher than in the non-military group (P=0.00). Hyperlipidemia and family history had no significant differences between the military and non-military participants. The details and frequency of these risk factors are presented in Table II.

Table II.Prevalence of risk factors in our study population

	Military	Non-military	P-value
Diabetes (N,%)	595 (17.2%)	1494 (24.4%)	0.002
Hypertension (N,%)	1038 (28.3%)	2875 (47%)	0.0012
Hyperlipidemia (N,%)	1271 (34%)	2107 (34%)	0.7
Smoking (N, %)	1422 (40%)	1547 (25.3%)	0.0015
Family history (N,%)	685 (29.5%)	1176 (19.2%)	0.65

There were some patients in the military and non-military groups with more than one risk factor. We compared the frequency of these risk factors between the study groups and found no significant differences between the study groups with respect to major risk factors.

TableIII. Frequency of more than one risk factor in the military and non-military groups

Risk factors	Military personnel		Non-military people		P-value
	N	%	N	%	
DM+HTN	75	2.09	368	6.01	0.17
DM+HLP	111	3.09	248	4.05	0.66
DM+Smoking	73	2.04	72	1.18	0.68
HTN+HLP	202	5.63	504	8.23	0.24
HTN+Smoking	172	4.8	272	4.44	0.87
HLP+Smoking	248	6.92	240	3.91	0.14
DM+HTN+HLP	155	4.32	424	6.92	0.25
DM+HTN+Smoking	47	1.31	40	0.65	0.76
DM+HLP+Smoking	36	1	72	1.17	0.94
HTN+HLP+Smoking	72	2	141	2.3	0.89
DM+HTN+HLP+Smoking	26	0.73	30	0.49	0.91
Total	3586	100	6123	100	-

The results of the angiographic studies in our patients showed that the number of patients with one-vessel involvement in the military patients (1081; 30.26%) was significantly higher than that in the non-military patients (1531, 25.1%; P=0.00). The frequency of two-vessel involvement in the military (906, 25.36%) and non-military (1632, 26.80%) patients had no significant difference (P=0.44). The number of non-military patients (2936, 48.10%) with three-vessel involvement was significantly higher than that of the military patients (1589, 44.48%; P=0.02). There was a significant association between the number of risk factors and involved vessels in our participants.

TableV. Frequency of risk factors in patients with vessel involvement

Involved vessels / Risk factor	One vessel		Two vessels		Three vessels	
	num	percentage	Num	percentage	Num	percentage
Without risk factors	592 (28.5)		564 (27.1)		923 (44.4)	
One risk factor	1093 (27.5)		1042 (26.2)		1841 (46.3)	
Two risk factors	677 (26.3)		690 (21.9)		1210 (47)	
Three factors	231 (23.4)		216 (8.4)		540 (54.7)	
Four factors	19 (33.9)		26 (46.4)		11 (19.6)	
P-value	0.00					

Discussion

Result of present study showed that 80.8% of our participants were affected by CAD. The rate of premature CAD in the military personnel was significantly higher than that in the non-military patients. According to known facts about CAD prevalence, we expected to have a lower frequency of CAD patients in the general population and especially in the military personnel. Nevertheless, the result of the present study was not consistent with our expectations. Given the fact that military personnel should be healthy to be able to offer their services, we think that stress played the main role in their CAD development. Sufficient heed should, therefore, be paid to military personnel and their medical examinations.

Chiming in with our study, Pettyohn et al. reported that 13% of military personnel were affected by CAD. In a subgroup analysis for age of CAD in military patients, 86.8% of military personnel were within the age range of 20 to 34 years. Screening programs with sensitive tools might by necessary for an earlier detection of military personnel at higher risk of CAD.

Diabetes and hypertension, as major risk factors, were significantly lower in our military personnel than in our non-military patients, whereas smoking was significantly higher in the former group. There was no significant difference between the two study groups in terms of the frequency of patients with more than one risk factor.

In the literature, we found no study comparing major risk factors between military and non-military people. Although this matter could potentially decrease the value of our discussion, it can be presented as one of the strengths of our study insofar as ours is the first study of its kind to compare the risk factors of CAD between military personnel and a group of the general population.

Smoking is one of the most important CAD risk factors and its role in CAD pathogenesis has been well documented by previous studies[6, 13] In a study performed in one of the Turkish military hospitals, among 7734 patients referred for coronary artery bypass grafting, hyperlipidemia, smoking, diabetes mellitus, and hypertension were reported as major CAD risk factors.[14] Control of smoking as a CAD risk factor is feasible in comparison with the other risk factors; consequently, by controlling smoking, it is possible to reduce the prevalence of CAD among our military personnel. In a study which carried out on Indian military personnel, the frequency of family history and smoking were significantly higher in premature CAD in comparing with older CAD patients. They reported the same pattern for hyperlipidemia.[15]

The results of our study showed that premature CAD in the military patients was significantly higher than that in our non-military patients. Hyperlipidemia and smoking are significantly higher in the premature CAD patients in comparison with patients with CAD at a higher age. One-vessel

involvement in the military personnel was seen significantly higher than in the non-military group. Three-vessel involvement in the non-military patients was more frequent than in the military personnel. There was a significant association between the number of risk factors and involved vessels. People younger than 45 years account for the majority of military forces, and the findings of our study have several indications for the assessment and control of the CAD risk factors in military personnel with respect to designing suitable screening and therapeutic methods for CAD.

Our study had some strengths: first our sample size was higher than that in a previous study which had been performed on CAD patients referred to hospitals. This higher sample size helps us better interpret our findings with regard to the target population. Second, although these people are not representative of CAD cases in the general population, we had a suitable sample of non-military people as the control group. Our study had some limitations; first we evaluated only major risk factors and some other minor risk factors might be responsible for significant differences. Second, we did not select our control group with random sampling and these patients were not suitable and a representative control group.

Refferences

1. Omran A. Changing patterns of health and disease during the process of national development. In: Albrecht G, Higgins P, editors. Health, Illness and Medicine: A Reader in Medical Sociology. Chicago,: Rand McNally; 1979.

2. Reddy KS. Cardiovascular disease in non-Western countries. N Engl J Med. 2004 Jun 10;350(24):2438-40.

3. Preventing chronic disease: a vital investment: WHO global report. Geneva, Switzerland: World Health Organization2005.

4. Leeder S, Raymond S, Greenberg H. A Race Against Time: The Challenge of Cardiovascular Disease in Developing Economies.: Earth Institute at Columbia University.; 2004 [September 17, 2009.]; Available from:http://www.earth.columbia.edu/news/2004/images/raceagainsttime_FINAL_051104.pdf.

5. Heart Disease and Stroke Statistics.2006. Update.

6. Sing R, Tomlinson B, Neil Thomas G, Sharma R. Coronary Artery Risk Factors : The South Asia Paradox. Journal Of Nutrition and Environmental Medicine 2001;11:43-51.

7. Chen L, Chester M, Kaski JC. Clinical factors and angiographic features associated with premature coronary artery disease. Chest. 1995 Aug;108(2):364-9.

8. Enas EA, Yusuf S, Mehta JL. Prevalence of coronary artery disease in Asian Indians. Am J Cardiol. 1992 Oct 1;70(9):945-9.

9. Jalowiec DA, Hill JA. Myocardial infarction in the young and in women. Cardiovasc Clin. 1989;20(1):197-206.

10. Tuzcu EM, Kapadia SR, Tutar E, Ziada KM, Hobbs RE, McCarthy PM, et al. High prevalence of coronary atherosclerosis in asymptomatic teenagers and young adults: evidence from intravascular ultrasound. Circulation. 2001 Jun 5;103(22):2705-10.

11. Yater WM, Traum AH, et al. Coronary artery disease in men 18 to 39 years of age; report of 866 cases, 450 with necropsy examinations. Am Heart J. 1948 Sep;36(3):334; passim.

12. Klein LW, Agarwal JB, Herlich MB, Leary TM, Helfant RH. Prognosis of symptomatic coronary artery disease in young adults aged 40 years or less. Am J Cardiol. 1987 Dec 1;60(16):1269-72.

13. Yusuf S, Hawken S, Ounpuu S, Dans T, Avezum A, Lanas F, et al. Effect of potentially modifiable risk factors associated with myocardial infarction in 52 countries (the INTERHEART study): case-control study. Lancet. 2004 Sep 11-17;364(9438):937-52.

14. Demirkilic U, Bolcal C, Kucukarslan N, Bingol H, Oz BS, Kuralay E, et al. [Middle and late-term results of coronary artery bypass graft surgery in very young (20-29 years) patients]. Anadolu Kardiyol Derg. 2004 Mar;4(1):25-9.

15. Tewari S, Kumar S, Kapoor A, Singh U, Agarwal A, Bharti BB, et al. Premature coronary artery disease in North India: an angiography study of 1971 patients. Indian Heart J. 2005 Jul-Aug;57(4):311-8.