

## PREMATURE CORONARY ARTERY DISEASE IN MILITARY AND NON-MILITARY INDIVIDUALS

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### Abstract

**INTRODUCTION:** Atherosclerotic coronary artery disease is a major cause of death all over the world. When the afflicted individual is under the age of 40, the tragic consequences for family, friends, and occupation are particularly catastrophic and unexpected.

**METHODS AND MATERIALS:** In a descriptive cross-sectional study, all of the 12010 patients with symptoms of coronary artery disease including chest pain, dyspnea, palpitation, dizziness and syncope were candidates for coronary artery angiography and hospitalized in Jamaran Heart Center or Baqiyatallah General Hospital between 2002 and 2004. Patients were divided into militarist and non-militarist.

**RESULTS:** Out of the total number of patients, 9663 (80.8%) were affected with coronary artery disease and the rest (19.2%) did not have any positive angiographic indication in favor of coronary artery disease. Fifty-five percent of coronary artery disease cases happened among under-55-year-olds in the military group while this figure was 32% in the non-military group ( $P=0.024$ ). So, military activity may reduce the age of coronary artery disease manifestations.

**CONCLUSION:** Considering the fact that the relative frequency of military personnel with coronary artery disease was higher compared with the non-military individuals below 45 years of age, and given frequency distribution of risk factors in the former being different from military personnel above 45 years of age, it seems that the management of cardiovascular disease prevention in military personnel should be different from other population groups; they in fact need earlier and more precise control.

**Keywords:** Coronary Disease, Premature Coronary Artery Disease, Military Personnel.

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### Introduction

Atherosclerotic coronary artery disease is a major cause of death all over the world.<sup>1</sup> South and west South Asians show increased risk for atherosclerosis and have the highest mortality rates due to coronary artery disease amongst all ethnic groups studied so far.<sup>1</sup> Coronary artery disease is a devastating disease

because an otherwise healthy person in the prime of life may die or become disabled without warning. When the afflicted individual is under the age of 40, the tragic consequences for family, friends, and occupation are particularly catastrophic and unexpected.<sup>1</sup>

The fact that clinically manifest coronary artery

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disease in the young adult is relatively uncommon implies that these patients are atypical of the general population. Because young, asymptomatic patients typically do not undergo medical investigations leading to the serendipitous discovery of coronary artery disease, the true prevalence of the disease has been grossly underestimated. Coronary artery disease has been predicted to assume epidemic proportions by the year in all over the world.

Coronary artery disease tends to occur at a younger age in Indian militarists than in other groups with more severe and extensive angiographic involvement.<sup>2</sup>

Many early studies<sup>1</sup> evaluating these patients labeled them as having "premature" coronary artery disease, but it is now better understood as a rapidly progressive form of the disease.<sup>3-5</sup> Subsequently, this subgroup has been the subject of numerous observational series seeking to identify what sets them apart.<sup>6</sup> It is well recognized that these patients are mainly male and have several coronary risk factors, but this is a statement easily made of many older coronary artery disease patients as well.<sup>7-8</sup>

Differences are observed in the clinical presentation, risk factor profile and coronary anatomy of young patients who develop coronary artery disease compared with those developing it at an older age.<sup>7, 9-10</sup> Moreover, there is a lack of uniformity with regard to the definition of coronary artery disease in the young.<sup>11-15</sup>

Fortunately, the incidence of myocardial infarction (MI) and symptomatic coronary artery disease in young adults is low; most studies show that only about 3% of all coronary artery disease cases occur in this age range.<sup>16-17</sup> Indeed, when a rigorous intravascular ultrasound-based investigation was undertaken in a cohort of transplanted hearts (mean donor age  $33.4 \pm 13.2$  years) by Tuzcu et al.,<sup>4</sup> the prevalence of disease was more than 50%, with one in six teenagers manifesting coronary disease.

The purpose of this cross sectional study was to find out the outbreak of premature coronary artery disease in military personnel and compare it with general population.

## Methods

In a descriptive, cross-sectional study, all of the 12010 patients with the symptoms of coronary artery disease including chest pain, dyspnea, palpitation, dizziness and syncope who were candidates for coronary artery angiography and were referred to Jamaran Heart Center or Baqiyatallah General Hospital between April 2002 and March 2004 were selected to participate in the present study.

Patients were divided into individuals with military history and ones without.

Premature coronary artery disease was defined to be proved coronary artery disease diagnosed by angiography in under-45-year-old patients.

After designing a proper data sheet, information about age, gender, military history, past medical history, major risk factors of coronary artery disease (diabetes mellitus, hypertension, smoking, hyperlipidemia, family history), electrocardiographic and coronary artery angiography findings were collected.

Data analysis was performed using t-test, Mantel Hanzel and chi-square with SPSS software 11.5 (Chicago, Illinois, USA). Quantitative data were expressed as mean  $\pm$  SD.

The study protocol conforms to the ethical guidelines of the 1975 Declaration of Helsinki.

## Results

Out of the total number of the patients, 9663 (80.8%) cases were affected with coronary artery disease and the rest (19.2%) did not have any positive angiographic indication in favor of coronary artery disease (table 1).

**TABLE 1.** Demographic characteristics of patients

	Military	Non-military	P-value
Mean age (mean $\pm$ SD)	51 $\pm$ 9	58 $\pm$ 10.3	0.02
Male	3488 (47%)	3821 (53%)	0.625
Female	98 (2.9%)	3202 (97.1%)	0.001

One-thousand-three-hundreds and eighty-five individuals without coronary artery disease (59.2%) did not have any military service history and 962 individuals had such an experience.

Fifty-five percent of coronary artery disease cases happened among under-55-year-olds in the military group while this figure was 32% in the non-military group (P=0.024). So, military activity may reduce the age of coronary artery disease manifestations.

Considering the nadir female military population (98 cases) in comparison with female non-military population (3202 cases) and further due to their undefined military activity, females were excluded from the study. After this exclusion, 57% of coronary artery disease cases were estimated to affect under-55-year-olds in military group while this figure was 38% among under-55-year-olds in non-military population.

There was a significant statistical age difference in coronary artery disease involvement between military (51 $\pm$ 9 years) and non-military (58 $\pm$ 10.3 years) patients.(P=0.02)

Twenty-nine percent of coronary artery disease affected military patients were below the age of 45 while this figure was 8.3% among under-45-year-old non-military coronary artery disease affected patients. Risk factor analysis was performed in this study population. The most common risk factors, in order of frequency, were hypertension (40.3%), hyperlipidemia (34.8%) and smoking (30.6%). (Table 2)

**TABLE 2.** Relative frequency of risk factors in total Patient.

Risk Factors	No. (%)
Diabetes mellitus	2089 (21.5%)
Hypertension	3913 (40.3%)
Hypertension	3387 (28%)
Smoking	2969 (24%)
Family history	1888 (15.7%)

Smoking was significantly more prevalent in military population ( $P=0.015$ ) and hypertension was more

common in non-military group ( $P=0.012$ ).

There was one risk factor in 41.1%, two risk factors in 26.5%, three risk factors in 0.2%, and four risk factors in 0.6% of the sample population. There were not risk factors in 21.5% at all. Percentage of risk factors was not different between military group and the rest.

In military group, the most prevalent risk factors were smoking, hyperlipidemia, hypertension, and diabetes mellitus, respectively; but, in non-military group it was hypertension, smoking, hyperlipidemia, and diabetes mellitus. (Table 3)

Chief complaints of patients in this study were typical chest pain (77.5%), atypical chest pain (15.4%), dyspnea on exertion (5.9%), palpitation (0.7%), and dizziness and syncope (each one 0.3%).

The most prevalent electrocardiogram findings in our patients were ST segment changes (elevation or depression) in leads V1-V6 and Q pattern in leads V1-V4, aVF, I and II. (Table 4)

**TABLE 3.** Comparison of risk factors between military and non-military groups.

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

**TABLE 4.** Distribution of relative frequency of electrocardiogram changes in all patients with coronary artery disease.

	ST elevation (No. (%))	ST depression (No. (%))	Q-pattern (No. (%))	T-change (No. (%))
L1-avl	0	8 (1.1%)	20 (0.9%)	66 (2.8%)
L1-avl,v5-v6	8 (1.5%)	37 (5.1%)	16 (0.7%)	159 (6.7%)
L1-avl,v3-v6	32 (5.8%)	64 (8.9%)	29 (1.3%)	126 (5.3%)
L1-avl,v1-v6	27 (4.9%)	58 (8%)	46 (2%)	187 (7.9%)
V1-v4	86 (15.7%)	35 (4.8%)	841 (37.1%)	289 (12.2%)
v1-v6	315 (57.5%)	437 (60.5%)	405 (17.8%)	1153 (48.7%)
L2-L3,avf	67 (12.2%)	67 (9.3%)	869 (38.3%)	295 (12.5%)
Inferolateral	13 (2.4%)	16 (2.2%)	43 (1.9%)	91 (3.8%)

Stenotic coronary arteries as shown in angiography of our patients were as follows: single vessel stenosis (27%), two vessel stenosis (26.2%), and three vessel stenosis (46.8%).

Coronary artery disease pattern was single vessel stenosis in both military (48%) and non-military (52%) groups in patients below 45 years of age and in patients above 45 years of age this pattern was three

vessel stenosis in both groups (49.7% in military group and 49.9% in non-military group). So, it does not seem that involvement in a military service would affect the number of stenotic coronary arteries.

The most prevalent recommended therapy in two groups (military and non-military) was coronary artery bypass graft (43.8%). In patients below 45 years of age, military personnel were more commonly treated

by coronary artery bypass graft (34.1%) and percutaneous transluminal coronary angioplasty (32.7%) while in non-military group the most common therapies were percutaneous transluminal coronary angioplasty (34.8%) and drug therapy (25.4%). coronary artery bypass graft had the second score (20.7%).

In patients above 45 years of age the most recommended therapies were the same in both military and non-military groups: coronary artery bypass graft (46% in both groups), drug therapy (17.7% in military group and 19.6% in non-military group), and percutaneous transluminal coronary angioplasty (14.3% in military group and 12.3% in non-military group).

### Discussion

This study is of importance particularly considering the fact that these two hospitals are among the most important military referral hospitals in Iran.

The percentage of military patients younger than 45 years of age was higher in comparison with non-military ones in the present study. On the other hand, we expect to see lower prevalence rate of coronary artery disease in younger cases. Therefore, we should pay more than usual attention to military patients. We must start screening programs to find cases that are at risk for coronary artery disease earlier and with the use of more sensitive tools.

Pettyohn et al. illustrated that 89% of military personnel in whom 13% had cardiac disease were affected by coronary artery disease. Coronary artery disease was found in 86.6% of the personnel within the age range of 20 to 34 years; it manifested the necessity of implementing tight programs of cardiovascular disease prevention.<sup>18</sup>

Smoking is one of the most important preventable risk factors for coronary artery disease in all people. This is one of the most important etiologies of coronary artery disease with completely documented role. By influencing endothelial cell function, smoking decreases the vasoactivity of vessels; it also increases blood carbon mono-oxide level and causes increment in blood pressure.

In this study smoking was more prevalent in military group; this was especially more prevalent in military patient group who were doing non-classic military activities as compared with those doing classic military activities. It seems that risk factor distribution pattern in military groups is different than other population groups.

In a study conducted in a Turkish military hospital on 7734 patients referred for coronary artery bypass graft, it was illustrated that the most prevalent risk

factors of coronary artery disease in patients within the young age range were hyperlipidemia, smoking, diabetes mellitus, alcohol, obesity, and hypertension. So, life style modification which can affect incidence of cardiovascular diseases should be further considered.<sup>19</sup>

Smoking cessation may be one of the most beneficial methods for both primary and secondary prevention of coronary artery disease considering its cost effectiveness.

In this study, we found that diabetes mellitus and hypertension were more prevalent in old patients with coronary artery disease as compared to the young patients.

In a study on 1971 Indian military personnel Tewari et al. compared three groups of patients with coronary artery disease (above 55 years old, 41-55 years old, and below 40 years old). They showed that family history and smoking were more prevalent in young patients as compared with old ones ( $P < 0.001$ ). This finding was true for hyperlipidemia as well.<sup>20</sup>

In our study, hyperlipidemia was more prevalent in young patients with coronary artery disease as compared to patients older than 45 years of age (44% vs. 32.5%,  $P = 0.04$ ).

These differences may have fundamental role in pathogenesis of atherosclerosis in young population.

Our sample size is larger than previous studies and our hospitals are referral centers for military personnel in Iran. Non-military coronary artery disease cases are selected from the same hospitals. It has caused a suitable control group. However, these are not representative of the coronary artery disease cases in the total population. Historical cohort studies can help us complete this study and reinforce our results with more confidence.

We found that premature coronary artery disease is not so non-prevalent among young individuals and middle-aged ones. Smoking and hyperlipidemia were more prevalent in patients with premature coronary artery disease, despite the lower prevalence of hypertension and diabetes mellitus in this age group.

Coronary artery involvement pattern was different between young patients and older ones. Number of risk factors was a strong predictive factor for three-vessel disease in older patients.

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