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# CORONARY ARTERY DISEASE;
## FREQUENCY OF RISK FACTORS AMONG HEALTHY MALE PARAMEDICAL STAFF

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**ABSTRACT... Objectives:** To determine the frequency of risk factors of coronary artery disease (CAD) in healthy male paramedical staff of our hospital. **Study Design:** Descriptive study. **Place and Duration of Study:** Armed Forces Institute of Cardiology and National Institute of Heart Diseases, Rawalpindi, from January 2009 to June 2009. **Methodology:** Three Sixty Three (363) healthy male paramedical staff members were studied. Patients with heart disease, chronic liver and kidney diseases were excluded. Presence of hypertension, diabetes, smoking, dyslipidemia, physical activity, a family history of (CAD) and medication was documented. Fasting blood glucose, lipid profile, uric acid levels were done. Body mass index and waist circumference were measured and Waist to Hip ratio calculated. Data was analysed using SPSS-20. Ten year risk was calculated using Heart Score software. **Results:** Mean age of subjects was 31.85 ± 8.10 years. Maximum number of patients (152, 41.9%) aged between 31 to 40 years. Smoking was documented in 76 (20.9%), hypertension in 26 (7.2%), diabetes in 27 (7.4%) and a family history of premature CAD was recorded in 26 (7.2%) persons. Eighty (22.01%) patients were overweight (BMI = 25-29.9) while 26 (7.2%) were obese (BMI >30). Waist circumference > 94 cm was found in 79 (21.8%). High cholesterol (>200 mg/dl) was documented in 33 (9.1% ) , high LDL( >100 mg/dl ) in 68 (18.7% ), low HDL in 92 (25.4%) and high triglycerides (>150 mg /dl) in 116(32%) persons. **Conclusions:** Dyslipidemia, obesity, smoking, hypertension and diabetes were most frequent risk factors. Public awareness to control risk factors can reduce the prevalence of CAD.

**Key words**: Coronary artery disease, risk factors, dyslipidemia, smoking

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## INTRODUCTION

Cardiovascular disease (CVD) has become a major health problem all over the world especially in developing countries. In 2008, CVD caused 17.3 million deaths, accounting for 30% of all deaths globally and more than half these deaths were in developing countries[1]. Among who died, around 7.3 million were due to coronary artery disease (CAD) and 6.2 million were due to stroke[2]. If the risk factors associated with CVD are not properly checked, then by the year 2030, the number of people who die from CVD, will increase to 23.3. Millions[3]. In South Asia, which represents more than quarter of the world population, a steady rise in the incidence of CVD has been registered. This shows a dangerous trend and brings many challenges for health professionals and policy makers[4].

Multiple risk factors are associated with CAD. Modern lifestyle has brought in smoking, cholesterol rich diets and decreased physical activity which greatly increase the prevalence of CVD. Rapid urbanization may also partly explain the escalation of CAD in South Asian region. There has been a great stress to modify these risk factors associated with CVD since the Framingham heart study in 1960s[5,6]. Modifiable risk factors of CVD are diabetes, smoking, hypertension, hyperlipidemia, sedentary life style, obesity, alcohol, and psychosocial risk factors[7,8,9]. Non-modifiable factors are advancing age, male gender, family history of premature CAD, while menopause, and personality type are considered partly modifiable risk factors. Among the novel risk factors are high-sensitivity C-reactive proteins (hsCRP)[10], homocysteine, lipoprotein (a), fibrinogen,D-dimers,Interleukin 6

and myeloperoxidases[11], [12].

Cardiovascular risk means the likelihood of a person developing an atherosclerotic cardiovascular event over a defined time period. In Europe, Heartscore chart is being used extensively to estimate the risk of CVD in healthy subjects and it has been validated in many studies in Europe[13]. The Score system estimates the 10-year risk of fatal atherosclerotic event, whether heart attack, stroke, aneurysm of the aorta by using age, gender, smoking status, systolic blood pressure and total cholesterol. The Score system is available on internet at www.heartscore.org. In US , ATP risk calculator is used to calculate 10 year risk of having a heart attack and it also includes HDL-C for risk calculation.It is available at the official website of NIH[14].

Hypertriglyceridaemia is a significant risk factor of CVD, but this association is not as strong as for high cholesterol levels[15]. At present, fasting triglycerides >150 mg/dl is considered a marker of increased risk for CVD. Low concentrations of HDL cholesterol (<40 mg /dl ) is associated with higher CVD risk, therefore HDL cholesterol is also included in new risk assesement charts and scoring system[16]. High Triglyceride and low HDL levels are both essential components of metabolic syndrome which also predisposes to the development of CVD and type 2 diabete[17].

The aim of this study was to document the frequency of various conventional risk factors of CAD in otherwise healthy male paramedical staff and calculate 10 years risk of few with high cholesterol level through the Score system to know their risk for any fatal cardiovascular event.

## PATIENTS AND METHODS

It was a descriptive study, conducted at Armed Forces Institute of Cardiology and National Institute of Heart Diseases, Rawalpindi, from Jan 2009 to Jun 2009. Non probability convenient sampling technique was used to select otherwise healthy 363 male paramedical staff members of the hospital. Persons with history of Ischemic and valvular heart disease, chronic kidney and liver disease and person on lipid lowering drug were excluded from the study. All participants were informed about the study and a verbal consent was taken from them. This study was approved by the Ethical Committee of the hospital.

Hypertension (HTN) was defined as systolic blood pressure (SBP) more than 140 mmHg and/or diastolic blood pressure (DBP) more than 90 mmHg or patient on antihypertensive drugs. Persons were diagnosed as diabetic if fasting plasma glucose level was more than 126 mg/dl or having hypoglycemic drugs. Patients were labelled as dyslipidemic if total serum cholesterol level was more than 200 mg/dl or HDL less than 40 mg/dl or LDL more than 100 mg/dl and triglycerides higher than 150 mg/dl.[18]. Current smokers were defined as individuals who smoked any form of tobacco in the previous 12 months. Former smokers were defined as those who had quit more than a year earlier. A body mass index (BMI) of 25 or more was taken as being overweight and more than 30 as obesity[19]. Waist circumference (WC) upto 94 cm was taken as upper normal (males) where no further weight should be gained and WC higher than 102 cm needs weight reduction.[20] Waist to Hip ratio upto 0.90 was taken as normal for males and above 0.90 was taken as abnormal. A family history for premature CAD was taken as positive if any of the male first degree relatives suffered from CAD before 55 years and female before 65 years of age.

Participants were called in batches, one batch of 20 daily. History was obtained from each subject regarding presence of diabetes, smoking, hypertension, dyslipidemia, a family history for premature CAD. Intake of any medication especially anti hypertensives, hypoglycemics and lipid lowering agents was documented. Blood pressure was measured by using a standard mercury sphygmomanometer after the subjects had rest for 15 minutes and the mean value of two measurements was taken as final. Waist circumference (WC) was measured at highest point of iliac crest. .Waist to Hip ratio (WHR) was also calculated. Body mass index was calculated after recording height in meters and weight in Kgs

[kgs /height (m)$^2$ ]. Fasting blood samples were drawn for glucose, lipid profile (total cholesterol, LDL, HDL and triglycerides ) and uric acid. Ten year risk of a fatal cardiovascular event of subjects with more than 40 years age with higher cholesterol level was calculated by Heart Score software available on internet.

The data was collected on a pre-designed Performa and variables were entered on SPSS version 20. Frequencies and percentages were computed for qualitative variables like presence of DM, HTN and smoking. Means and standard deviations were calculated for quantitative variables like age, weight and blood pressure.

## RESULTS

A total of 363 subjects were studied with a mean age of 31.85± 8.104 years (range 18 to 50 years). Maximum number of patients, 152 (41.9 %), were seen in the age group 31- 40 years. Baseline charateristics are given in table I. Diabetics were 27 (7.4%) , hypertensives were 26 (7..2%) and 76 (20.9%) participants were found to be smokers. Analysis of lipids showed that majority of participants had normal lipid levels. Total cholesterol (TC) was normal (< 200 mg /dl) in 330 (90.9%) while 33 (9.1%) had higher total cholesterol (>200 mg/dl). LDL was higher (>100 mg /dl) in 68(18.7%) and HDL was abnormally low (<40 mg/dl) in 92 (25.4%) persons. Majority of dyslipidemia was seen in Triglycerides (TG) level where 116 (32%) participants had levels above 150 mg /dl. Further detail of Lipids is given in table-II. As far as BMI was concerned, 257 (70.8%) had normal BMI while 80 (22.1%) were overweight (BMI 25-30) and 26 (7.1%) were obese (Table-III). Majority 284(78.3%) had normal (< 94 cm) waist circumference while WHR was normal (≤ 0.90) in 235 (64.8%) persons and higher WHR (> 0.90) was seen in 128 (35.2%) persons indicating central obesity. (Table-III). Ten participants between the age group 40- 50 having higher cholesterol (> 200 mg / dl ) were selected and their risk for fatal cardiovascular event (heart attack or Stroke) over next 10 years was calculated by Heart Score software available on wesite www.heartscore.org. Detail of their five parameters used and risk calculated is given in Table-IV. Diabetics were not included in this calculation as they already stand in high risk zone and their risk of cardiovascular event in next 10 years is more than 10%.

| Variables | Values |
|---|---|
| Age (years) | 1.85 ± 8.10 |
| Age groups | |
| 41- 50 years | 68 (18.7%) |
| 31-40 years | 152 (41.9 %) |
| 21-30 years | 117 (32.3%) |
| 18 -20 years | 26 (7.1%) |
| Diabetics | 27 (7.4%) |
| Impaired Fasting Glucose | 15 (4.2%) |
| Hypertensives | 26 ( 7.16%) |
| Smokers | 76 (( 20.9%) |
| Family Hx of CAD | 26 (7.16%) |
| Sedentary life style | 38 (10.5%) |
| Obesity (BMI >25) | 26 (7.1%) |
| Central Obesity (WC >94 cm) | 79 (21.7%) |
| Blood sugar fasting ( mg/dl) | 83.11 ± 21.31 |
| TC (mg/dl) | 153.88 ± 30.87 |
| HDL (mg/dl) | 41.91 ± 4.21 |
| LDL (mg/dl) | 84.12 ± 25.31 |
| TG ( mg/dl) | 140.86 ± 94.68 |
| TC:HDL | 3.68 ± 0.74 |
| BMI | 23.79 ± 5.29 |
| Waist Circumference | 84.97 ± 0.85 |
| Systolic BP (mmHg) | 122.58 ± 6.53 |
| Diastolic BP ( mm Hg) | 81.78 ± 7.85 |
| Waist to Hip Ratio | 0.8817 ± 0 .06 |
| Uric Acid (mg / dl) | 5.84 ± 9.851 |

**Table-I. Baseline characteristics of participants under study (n = 363).**

*CAD= Coronary artery disease, TC=Total cholesterol, BMI = body mass index BP= Blood pressure*

## DISCUSSION

In our country billions of rupees are spent every year on the treatment of Coronary artery disease (CAD) both in public and private health sector. Unfortunately primary and secondary prevention of CAD has been badly neglected by our health professionals and policy makers. Awareness in general public about the risk factors of CAD is negligible and our curriculum both in school and colleges does not carry any information and

| Variables | Values |
|---|---|
| Total Cholesterol | |
| Less than 200 mg /dl (Normal) | 330 (90.9%) |
| more than 200 mg /dl | 33 (9.1%) |
| LDL levels | |
| Less than 100 mg/dl (Normal) | 295 (81.3%) |
| More than 100 mg /dl | 68 (18.7%) |
| HDL levels | |
| More than 40 mg / dl (normal) | 271 (74.6%) |
| Less than 40 mg / dl | 92 (25.4%) |
| Triglycerides level | |
| Less than 150 mg / dl | 247 (68%) |
| 150 - 200 mg / dl | 51(14.1%) |
| 200 - 300 mg / dl | 27 (7.4%) |
| 300- 500 mg/ dl | 33 (9.1% |
| More than 500 mg / dl | 05 (1.4%) |
| TC / HDL | |
| less than 05 | 344 (94.8%) |
| More than 05 | 19 (5.2%) |

**Table-II. Measuring Dyslipidemia (n=363)**

*TC= Total Cholesterol*

| Variables | Values |
|---|---|
| Body Mass Index | |
| 18 – 25 | 257 (70.8%) |
| 25 -30 | 80 (22.1%) |
| 31 -35 | 26 (7.1%) |
| Waist circumference | |
| ≤ 94 cm | 284 (78.3%) |
| 94 – 102 cm | 57 (15.7%) |
| ≥ 102 cm | 22 ( 6.0%) |
| WHR | |
| ≤ 0.90 | 235(64.8%) |
| ≥ 0.91 | 128 (35.2%) |

**Table-III. Measures of Obesity (n=363)**

knowledge about this fatal disease.

CAD is a chronic process of lipid deposition that begins during early life and continues throughout the life. The risk factors can modify this chronic inflammatory process that ultimately manifests as fibrous atherosclerotic plaque[21]. The identification of risk factors provides means for decreasing CAD risk, through more accurate determination of overall risk status[22]. Risk factors control is mandatory to prevent CAD morbidity and mortality.

Mutiple studies have clearly demonstrated that presence of diabetes, hypertension, smoking and dyslipidemia are the major risk factors of CAD which act in a synergistic manner thus increasing the risk many folds[23].

Results of our study are consistent with a study conducted by Hatimi et al. in Iran which was a population based study. It showed that 6.3% population was diabetic, 21.6% smoker and 13.7% were hypertensives[24]. Our results are somewhat lower as compared to INTERHEART study which studied patients of acute myocardial infarction along with normal control population[25]. Reason for this difference being this study was done in Military hospital setup in which only physical fit people are inducted and great stress is given on daily exercise and weight reduction. In another study by Reddy et al in India in Andhra Pradesh, 440 men and 210 women were studied for risk factors of CAD. It was concluded in this study that the prevalence of obesity was 14.37%, hypertension 13.13%, hypercholesterolemia 18.56%, hypertriglyceridemia 45.98% and low HDL-C 31.01%[26]. In our study 7.1% were obese, 18.7% were having hypercholesterolemia (LDL) and 32% were having hypertriglyceridemia which are in line with above study except obesity which was lower in our case as only male were studied in our setup with fitness background.

In our region cholesterol levels are much lower as compared to European and American population[27]. However, other lipid abnormalities, such as high TG and low HDL with normal LDL values, are common. In a local study by Samad *et al*. mean TC in adults was 180 + 54.5 mg/dl and 31% individuals had TC above 200 mg/dl[28]. HDL-C level stands an important parameter in risk calculation of CAD in Framingham risk scoring.

According to the current ATP III guidelines, determining fasting lipid levels together with the presence of other known risk factors would generate an estimated 10 year risk for CAD either through ATP risk calculator or Heart Score both available (free) online. On the basis of this risk assessment, individuals with higher

| gender | Age | Smoking status | SBP mmHg | Cholesterol mg/ dl | 10 year risk of fatal CVD event |
|---|---|---|---|---|---|
| Male | 49 | smoker | 150 | 280 | 7% |
| Male | 50 | smoker | 140 | 249 | 5% |
| male | 49 | smoker | 138 | 236 | 4% |
| Male | 45 | smoker | 150 | 220 | 3% |
| Male | 46 | smoker | 130 | 233 | 3% |
| Male | 48 | Non-smoker | 130 | 270 | 2% |
| Male | 45 | smoker | 130 | 202 | 2% |
| Male | 46 | Non-smoker | 130 | 208 | 1% |
| Male | 45 | Non-smoker | 130 | 201 | 1% |
| male | 43 | Non-smoker | 110 | 205 | 1% |

**Table-IV. 10 - Year risk calculation using Heart Score**

*SBP= systolic blood pressure, CVD= cardiovascular disease*

10 year risk should be actively pursued for risk factor modifications to reduce the risk of future cardiovascular events.

## CONCLUSIONS

The rising prevalence of CAD in our country can effectively be checked by controlling its risk factors. Persons in high risk category should be advised for life style modifications and change in their dietary habits. Smoking is the most easily preventable risk factor. Screening for hypertension, diabetes and hyperlipidemia can detect patients at earlier stage and fatal cardiovascular events can be prevented.



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## AUTHORSHIP DECLARATION

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| 2 | Lalbadshah | Article Writing | |
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