ORIGINAL ARTICLE

EVALUATION OF PATIENTS WITH CORONARY ARTERY DISEASE FOR MAJOR MODIFIABLE RISK FACTORS FOR ISCHEMIC HEART DISEASE

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Background: Incidence of cardiovascular diseases is on the rise in developing countries. Deaths due to ischemic heart disease can be reduced by modifying the risk factors. The present study was conducted to evaluate the patients scheduled for Coronary Artery Bypass Surgery for the presence of major modifiable risk factors for ischemic heart disease (IHD). **Methods:** It was a descriptive study. All patients who underwent elective Coronary Artery Bypass cardiac surgery between November 1, 2008 and February 28, 2009 at Rehman Medical Institute, Peshawar, were included in the study. Presence of Diabetes, Hypertension, Smoking, Dyslipidemia, Sedentary life style, and Obesity was looked for in these patients. **Results:** A total of 104 patients were studied during this period. Majority (97.11%) of patients had at least one major modifiable risk factor for IHD. Sedentary life style (53.84%) was the most common risk factor present in these patients followed by hypertension and dyslipidemia (47.11% each), smoking (43.27%), diabetes (35.57%), and obesity (9.61%). Multiple risk factors (two or more) were found in 78 (75.0%) of patients. **Conclusion:** Most of the patients with coronary artery disease, severe enough to warrant coronary artery bypass grafting, have at least one of the major modifiable risk factors for IHD. Modification of these factors may well reduce the disease burden of CAD and reduce the cardiovascular mortality.
Keywords: Coronary Artery Bypass Surgery, Ischemic Heart Disease, Major Modifiable Risk Factors, Hypertension, Smoking, Diabetes, Dyslipidemia, Sedentary Life Style, Obesity

INTRODUCTION

Cardiovascular disease is estimated to be the leading cause of death and loss of disability-adjusted life-years worldwide.[1] Incidence of cardiovascular disease has risen greatly in low-income and middle-income countries[1,2] with about 80% of the burden now occurring in these countries. People of Sub-continent origin have one of the highest susceptibilities to coronary artery disease (CAD) in the world.[3,4] CAD is now the leading cause of death in the Indo-Pak subcontinent.[5]

Appreciation of the crucial role of risk factors in the development of CAD is one of the most significant advances in the understanding of this important disease.[6] Smoking,[7] Diabetes,[8] Hyper-lipidemia[9] and Hypertension[10] have been established independent risk factors for CAD. These risk factors are modifiable by means of adopting healthy life-style or medication.[11] The death rate due to heart disease in US has been decreasing since 1950 due to reduction in cigarette smoking and hypertension.[12]

Since incidence of cardiovascular diseases is on the rise in the under-developed and developing countries[1,2] and deaths due to ischemic heart disease can be reduced by modifying the risk factors,[12] it is important that we know about the magnitude of these factors in our patient population with ischemic heart disease.

MATERIAL AND METHODS

The study was carried out by the Department of Cardiac Surgery at Rehman Medical Institute (RMI) Peshawar from November 1, 2008 to February 28, 2009. It was a descriptive study, including all the patients admitted to the unit for elective coronary artery bypass surgery during the study period. The AHA/ACC guidelines for secondary prevention 2006 update,[13] were used for various definitions and laboratory values.

Total 104 patients, who underwent Elective Coronary Artery Bypass Grafting cardiac surgery for coronary artery disease, were included in the study. No patient was excluded on the basis of age, sex, nationality or co-morbidity. Patients coming for emergency coronary artery bypass were not included in the study.

A pre-designed Performa was filled in for all the patients. Data were also entered into a register and then transferred to a computer for analysis in SPSS-15. In all the patients a thorough history was taken and proper examination was done. In particular the history of smoking, diabetes, hypertension, previous MI, dyslipidaemia and life style was recorded. Height and weight of all the individual patients were measured and Body Mass Index (BMI) calculated accordingly for classification into BMI groups based on AHA guidelines 2006.[13] Laboratory investigations on admission included Complete Blood Count, Erythrocyte Sedimentation Rate (ESR), Blood Urea/Serum

Creatinine, Serum Electrolytes, Random Blood Sugar, Liver Function Tests, Coagulation profile, Lipid Profile, Urine Routine Examination and virology for Hepatitis B Surface Antigen, Anti HCV Antibodies and anti HIV antibodies. ECG, Chest X-Ray, Echocardiography and Angiography were also performed in all the patients. All the patients included were studied for the presence of Diabetes, Hypertension, Smoking, Dyslipidemia, Sedentary life style and Obesity.

Data were analysed using SPSS-15. Qualitative variables were analysed for frequencies and percentages, while quantitative ones were analysed for Mean and SD. The χ^2 test was used for comparisons of qualitative data sets. Student's *t*-test and one-way ANOVA were used for comparisons of means and $p \leq 0.05$ denoted significance.

RESULTS

Out of the total 104 patients, 89 (85.6%) were males and 15 (14.4%) were females [M/F=5.93:1]. Seventy five patients (72.12%) were Pakistanis while 29 patients (27.88%) were Afghan nationals. Age groups of patients are shown in Table-1. Youngest patient in this study was 35 years of age and the eldest patient was aged 80 years while the mean age was 55.80±8.72 years.

Presence of individual risk factors (alone or in combination) is shown in Table-2. A sedentary life style was the most common risk factor found in 56 (53.84%) patients, followed by hypertension and dyslipidemia found in 49 (47.11%) patients each; smoking, diabetes and obesity were found in 45 (43.27%), 37 (35.57%) and 10 (9.61%) of patients respectively. Obesity was never found as a lone risk factor, but in 10 patients it was found in combination with other risk factors. The obese patients had BMI of more than 30, while 38/104 (36.54%) were overweight with a BMI of 25–29.9.

Gender distribution of risk factors revealed significant differences in the smoking and sedentary life style categories (*p*<0.001). Moreover males were 5.83 times more likely to have a risk factor than females (210:36).

Thirty of the 49 (61.2%) known hypertensive patients had uncontrolled hypertension. Seven patients who were not known hypertensive had a blood pressure of more than 140/90 mmHg. Seventeen out of the 37 (45.9%) diabetic patients had poor control of Diabetes Mellitus (Random Blood Sugar of more than 200 mg/dl) on admission.

Only 79/104 (75.9%) of the patients were on Statins (lipid lowering agents) and 49/104 (47.11%) had dyslipidemia (LDL-C >100 g/dl and/or if TGs≥200 mg/dl then non-HDL-C >130 mg/dl)[13], 36/104 (34.6%) patients had an LDL value of more than 100 mg/dl and 26 of these patients were already on lipid lowering agents with deranged lipid profile according to AHA guidelines[13]. Thirty-two of the total (30.8%) patients

also had raised triglycerides. Details of the deranged lipid profiles are shown in Table-3.

Data for combined risk factors are shown in Table-4. A total of 78 (75.0%) patients had two or more risk factors. Analysis for the three less modifiable risk factors of Diabetes, Hypertension and Dyslipidaemia showed that 21 (20.2%) patients had these risk factors alone (13/21, 61.9%) or in combination with each other (8/21, 38.1%). The three more modifiable risk factors of Smoking, Sedentary Lifestyle and Obesity were found in 15 (14.42%) patients either alone (10/15, 66.67%) or in combination with each other (5/15, 33.33%). Two risk factors in any combination were most frequent (35, 33.65%), followed by three risk factors in any combination (27, 25.96%).

Table-1: Demograp hic data of patients (n=104)

Demographic variables	Number	Percentage
Gender		
Males	89	85.6
Females	15	14.4
Age groups (years)		
35–49	25	24.0
50–64	58	55.8
65–80	21	20.2

Table-2: Presence of modifiable risk factors in patients (n=104)

Risk Factor	No. of Cases (%)		Total Cases No. (%)
	Men (n=89)	Women (n=15)	
Smoking	45 (43.27)*	0 (0)	45 (43.27)
Diabetes	33 (31.73)	4 (3.85)	37 (35.57)
Hypertension	40 (38.46)	9 (8.65)	49 (47.11)
Dyslipidemia	42 (40.38)	7 (6.73)	49 (47.11)
Sedentary Life Style	41 (39.42)*	15 (14.42)	56 (53.84)
Obesity	9 (8.65)	1 (0.96)	10 (9.61)
Total	**210**	**36**	**246**

*p<0.001 as compared to females

Table-3: List of deranged lipid profile

Type of Lipid	Cut of Value	n/%
Low Density Lipoprotein	>100 mg/dl	36/104 (34.6 %)
Triglycerides	>200 mg/dl	32/104 (30.8 %)
Non HDL Cholesterol	>130 mg/dl	26/04 (25.0 %)

Table-4: Distribution of number of risk factors present in patients

Number of Risk factors present	Number of patients (%)		Total (n=104)
	Males (n=89)	Females (n=15)	
No Risk Factor	3 (2.88)	0 (0)	3 (2.88)
One Risk Factor	21 (20.19)	2 (1.92)	23 (22.11)
Two Risk Factors	28 (26.92)	7 (6.73)	35 (33.65)
Three Risk Factors	22 (21.15)	5 (4.8)	27 (25.96)
Four Risk Factors	9 (8.65)	1 (0.96)	10 (09.61)
Five Risk Factors	5 (4.80)	0 (0)	5 (4.80)
Six Risk Factors	1 (0.96)	0 (0)	1 (0.96)

DISCUSSION

Although the importance of conventional risk factors is well established it is usually suggested that more than 50% of the patients with coronary artery disease do not have the conventional risk factors for the disease.[14,15] In our study group sixty eight patients (65.4%) had one/or combination of the four modifiable risk factors, that is, Diabetes, Hypertension, Dyslipidaemia or smoking. When sedentary life style and obesity were added to the

risk factors, 101 out of 104 patients (97.11%) included in the study had at least one of the modifiable risk factors for CAD. The prevalence of risk factors appears to be higher in our patients. But there are studies which have shown much higher prevalence (80–85%) of the conventional risk factors. The prevalence of the risk factors was even higher in younger patients,[6] which is higher than the prevalence of 65.4 % for the four risk factors in our patients.

Sedentary life style is the most common (53.84%) risk factor present in our patients. The risk of developing coronary heart disease due to being physically inactive is comparable to that of smoking.[16,17] Active people have lower rates of coronary heart disease (CHD) and cardiovascular disease than inactive ones.[18,19] In the systematic evidence review supporting the 2008 Guidelines, the expert panel concluded that compared with the least active subjects, the most active people had median risk reductions of about 30–35% for developing CHD.[18] Other prospective cohort studies have observed a median risk reduction for CHD/CVD comparing the most active with least active subjects of 25–50%.[20–22] A minimum of 30–60 minutes of moderate intensity aerobic activity, such as brisk walking minimum 5 days per week is recommended in the AHA/ACC guidelines for secondary prevention for patients with coronary and other atherosclerotic vascular disease (2006 update).[13]

Blood pressure control has been described as a blood pressure of less than 140/90 mmHg, or BP of less than 130/80 mmHg in Diabetic patients or patients with chronic kidney disease.[13] In our study, 47.11% of the total patients were known hypertensive and about 60% of these had uncontrolled hypertension. In the Framingham Heart Study, even high-normal blood pressure (defined as a systolic blood pressure of 130–139 mm Hg, diastolic blood pressure of 85–89 mmHg, or both) increased the risk of cardiovascular disease 2-fold compared with healthy individuals.[23] In our study, 7/104 (6.73%) patients who were not known hypertensive had a blood pressure of more than 140/90 mmHg. In some studies about 32% of the hypertensive patients are unaware that they are hypertensive.[24] The relative risk of death from coronary heart disease was observed to rise continuously with increasing levels of systolic and diastolic blood pressure in a study done in 2000 on 12,031 initially middle-aged men from all over the world observed over a 25 year period.[25] The rate of death due to heart disease in the US has been decreasing since 1950 because of reduction in cigarette smoking and hypertension.[12]

Cigarette smoking is an important modifiable risk factor for CAD. Incidence of MI is increased six fold in women and three fold in men who smoke at least 20 cigarettes per day compared to the people who never smoked.[26] The risk increases with tobacco users in both men and women, and is higher in inhalers compared to non-inhalers.[27] Almost 30% of all coronary heart disease deaths each year, in the US, can be attributed to cigarette smoking; the risk increases with increasing number of cigarettes smoked.[7,28] Smoking acts synergistically with other risk factors, substantially increasing the risk of CHD.[29] Cessation of smoking leads to diminution in risk of mortality from CHD soon after cessation.[30] It is estimated that exposure to passive smoking causes almost 40,000 deaths from heart disease each year in the united states and increases the risk of coronary disease by approximately 20%.[31,32]

Consistent with the epidemiologic observations, clinical trials have demonstrated a strong graded relationship between serum LDL cholesterol and coronary events.[33] Eskimos and other civilizations not exposed to the diet and life styles of modern industrialized world have quite low cholesterol (LDL-Chol; in the range of 50–70 mg/dl), and clinical and post-mortem studies show an absence of both early indications of chronic disease seen in young people in Western societies and the atherosclerosis seen in older people.[34,35]

Patients with diabetes are 2–8 times more likely to experience future cardiovascular events than age and ethnically-matched individuals without diabetes.[36] There is strong evidence that tight control of glucose in type-1 diabetes mellitus reduces the risk of developing nonfatal myocardial infarction, stroke, and CVD by up to 57%.[37] The evidence for the effectiveness of tight glucose control with regard to primary CVD prevention is negative for type-2 diabetes mellitus and may even be associated with increased risk.[38,39]

Obesity is associated with elevated vascular risk in population studies. In addition, obesity has been associated with glucose intolerance, insulin resistance, hypertension, physical inactivity, and dyslipidemia.[40] It has long been recognised that BMI is a predictor of the morbidity and mortality that are due to numerous chronic diseases, including type-2 diabetes, CVD, and stroke.[41,42] Lean body mass is negatively associated with all-cause mortality.[43]

CONCLUSION

Most of the patients with coronary artery disease, severe enough to warrant coronary artery bypass grafting, had at least one of the major modifiable risk factors for IHD, many of these patients have a combination of two or more of them. The burden of CHD can be reduced by addressing the major modifiable risk factors in terms of primary and secondary prevention.

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