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ORIGINAL ARTICLE

EVALUATION OF CORONARY RISK FACTORS IN PATIENTS WITH ACUTE MYOCARDIAL INFARCTION

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ABSTRACT: INTRODUCTION: Cardiovascular disease is the commonest cause of death globally. Acute myocardial infarction generally occurs when coronary blood flow decreases abruptly after thrombotic occlusion of a coronary artery causing focal or massive necrosis of cardiac muscle. The risk factor concept implies that a person with one risk factor is more likely to develop clinical atherosclerotic event and is more likely to do so earlier than a person with no risk factors. The presence of multiple risk factors further accelerates the atherosclerosis. Hence it is important to identify the major risk factors of coronary atherosclerosis in an individual with acute myocardial infarction so that further preventive measures can be taken in the form of lifestyle modification and pharmacotherapy. **MATERIALS AND METHODOLOGY:** This is a hospital based study. This study comprises of 100 cases of acute myocardial infarction admitted in ICCU under the department of medicine and 100 normal healthy controls in the age group of 29-85 years. Patients with the evidence of acute MI were diagnosed according to WHO criteria. Blood samples collected in vacutainers were analyzed for different biochemical parameters in the clinical biochemistry laboratory. **RESULTS:** Common risk factors have been evaluated in our study and we found that maximum MI patients were recorded in the age group of 51-60 years, with respect to other risk factors history like sex, majority of patients were males (82%), Sedentary life style (44%), Mixed dietary habits (84%), Family history of IHD (6%), Dyslipidemia and Smoking (46%), Hypertension (31%), Diabetes (37%), Obesity (18%). In our study we found that 81% of the patients of acute MI had multiple risk factors. **CONCLUSION:** Thus from the study we can conclude that risk factors play a major role in the genesis of coronary heart disease. Modification of these factors by pharmacotherapy, diet, physical exercises and behavioral therapy can improve the prognosis in these patients and also helps in reduction of incidence of CHD.

KEYWORDS: Acute MI (acute myocardial infarction), IHD (ischemic heart disease), CHD (coronary heart disease), Diabetes mellitus, Hypertension.

INTRODUCTION: Cardiovascular disease is the commonest cause of death globally. Acute myocardial infarction generally occurs when coronary blood flow decreases abruptly after thrombotic occlusion of a coronary artery causing focal or massive necrosis of cardiac muscle. The risk factor concept implies that a person with one risk factor is more likely to develop clinical atherosclerotic event and is more likely to do so earlier than a person with no risk factors. The presence of multiple risk factors further accelerates the atherosclerosis. Hence it is important to identify the major risk factors of coronary atherosclerosis in an individual with acute myocardial infarction so that further preventive measures can be taken in the form of lifestyle modification and pharmacotherapy. Atherosclerosis is a focal intimal disease of arteries ranging in size from aorta down to those of approximately 3mm diameter. The most commonly involved are aorta, coronaries, carotids, cerebral and femoral arteries. Branch points, curvatures, the sites of blood turbulence favour the development of atherosclerotic lesions.

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The earliest lesions are fatty streaks which consist of lipid engulfed macrophages (foam cells) and T- lymphocyte cells in the arterial intima. This progress to intermediate lesions composed of foam cells and smooth muscle cells migrating from intima to media. With time these develop into fibrous plaque with cap of connective tissue and smooth muscle cells overlying a core containing necrotic material and lipid, mainly cholesterol esters. Endothelial dysfunction is the first step in the development of atherosclerosis. Modified LDL-C, elevated plasma homocysteine concentration, diabetes mellitus, infections are the common cause of endothelial dysfunction. The dysfunctional endothelium undergoes a protective response that alters the normal homeostasis due to expression of adhesion molecules, growth promoting substances and activation of blood coagulation cascade. Monocytes and T-cells adhere to the activated endothelium and produce growth factors, cytokines, and chemo attractants etc., adherent cells migrate from media to intima. With repeated rounds of injury and repair, smooth muscle cells, foam cells, matrix proteins and T-cells accumulate to form atherosclerotic plaque. Rupture of plaque can trigger the thrombosis that precipitates clinical events. During the early phase plaque lesion grows away from the lumen, so affected vessel increase in diameter (compensatory enlargement) and will not cause flow-limiting stenosis and plaques of this type are not visible angiographically. When plaque size exceeds more than 40% of elastic lamina, artery cannot compensate by dilatation and the lesion begins to intrude into the arterial lumen thus becoming angiographically detectable.[1]

The risk factor concept implies that a person with one risk factor is more likely to develop clinical atherosclerotic event and is more likely to do so earlier than a person with no risk factors. Risk factor is a characteristic feature of an individual or population that is present early in life and is associated with an increased risk of developing future disease.[2] Coronary risk factors refer to conditions that have been demonstrated by statistical procedures to increase the morbidity and mortality of coronary atherosclerosis. The management of risk factors can improve the coronary endothelial function and stop the progression of atherosclerosis, prevent disruption and thrombosis of the vulnerable atherosclerotic plaques and reduce CHD morbidity and mortality. When risk factors co-exist they multiply the risk of CHD several folds.[3] Identification and management of risk factors are essential in preventing CHD in high risk asymptomatic individuals (primary prevention) and in preventing recurrent events in patients with established disease (secondary prevention). Coronary risk factors are broadly classified into classical (major) and novel risk factors. Classical risk factors have definite relationship with occurrence of CHD and are divided into non-modifiable and modifiable factors. Advancing age, sex (male) and genetic predisposition are non-modifiable and smoking, dyslipidemia, hypertension, diabetes mellitus, obesity and sedentary life style.[4]

Age is strong and independent risk factor and risk increases linearly upto 65 yrs. The increase risk of CAD in elderly persons should trigger more intense management of modifiable factors. CHD risk is more in males compared to females in the premenopausal age group, but after menopause the risk accelerates. Estrogen plays an important role in protecting premenopausal females. There is a association with CAD and history of first degree relative with early onset of CAD. Familial predisposition can be attributed to the inheritance of the risk factors such as hypertension, diabetes, platelet adhesiveness, increased thrombogenecity, and decreased fibrinolytic activity, endothelial and smooth muscle dysfunction.[5] Smoking accelerates the atherosclerosis process by enhancing oxidation of LDL-C, reducing the HDL-C levels, impaired endothelium dependant coronary artery dilatation, increases inflammatory markers such as CRP, soluble intracellular adhesion molecules-1 [ICAM-1] and

fibrinogen and also increases platelet aggregation and increases monocyte adhesion to endothelial cells.[6,7,8] Dyslipidemia may be inherited genetically or secondary to hypothyroidism, diabetes, nephritic syndrome, chronic alcoholism and drug induced (thiazides, beta blockers, retinoic acid, HIV protease inhibitors). Dyslipidemia is characterized by elevated cholesterol, LDL-C, triglycerides, VLDL-C, small dense LDL-C, chylomicrons with decreased HDL-C levels in the body.[5] Hypertension has proinflammatory actions increasing the formation of hydrogen peroxide and free radicals which reduces the formation of nitric oxide by the endothelium and also increases the leukocyte adhesion and peripheral resistance.[9]

Patients with diabetes mellitus will have 3 to 5 fold increased risk of future cardiovascular events with even higher rates reported among diabetic women.[10,11] Persistent proteinuria is a strong predictor of CHD in diabetic patients.[12] Insulin resistance stimulates increased glucose intake with compensated hyperinsulinemia leading to metabolic derangements which acts as a base for the development of coronary risk factors. Hyperinsulinemia may raise BP through sympathetic stimulation and renal sodium retention. Metabolic syndrome is characterized by presence of abnormal obesity, peripheral insulin resistance, high blood pressure and dislipoproteinemia with elevated plasma triglycerides and decreased HDL-C levels. Individuals with this condition are prone for developing CHD.[1,13] Regular physical exercise reduces myocardial oxygen demand, increases the myocardial efficiency and electrical stability, HDL-C levels and fibrinolysis, and also reduces BP, obesity, platelet aggregation, improves insulin sensitivity and endothelial function thus reducing the risk of CHD.[3] Obesity is state of excessive adipose tissue mass resulting from imbalance between energy intake and expenditure which is measured by BMI (body mass index). BMI >30 is used as the threshold for obesity in both sexes. Specifically the intra-abdominal and abdominal wall fat has more significance than the subcutaneous fat present in other parts of the body. This distinction is easily made by determining the waist to hip ratio, with the ratio >0. 9 in female and >1in males being abnormal.[2]

MATERIALS AND METHODOLOGY: Thisis a hospital based study. This study comprises of 100 cases of acute myocardial infarction admitted in ICCU under the department of medicine and 100 normal healthy controls in the age group of 29-85 years. Patients with the evidence of acute MI were diagnosed according to WHO criteria. Patients with coagulation disorders, collagen vascular disease, thyroid disorder, valvular heart disease and congenital diseases of heart were excluded from the study. After obtaining the consent from subjects and institutional ethical committee clearance, overnight fasting blood samples collected in vacutainers under sterile measures were analyzed for different biochemical parameters like blood sugar levels (FBS and PPBS by GOD-POD method),[14] lipid profile (cholesterol,[15,16] triglycerides,[17,18,19] HDL-C[20,21,22] by precipitation method, LDL-C by calculation method), cardiac enzymes (CK-MB[23] immune inhibition test, LDH[24] and SGOT[25] in the clinical biochemistry laboratory.

RESULTS AND DISCUSSION: The results are depicted in the tabular column. Table. 1 showing the percentage of patients having the number of risk factors and table. 2 showing the percentage of risk factors in these patients. CAD is a multifactorial in etiology and its incidence increase with age. The risk factors lead to CAD mainly by accentuating the process of coronary atherosclerosis. Common risk factors have been evaluated in our study and we found that maximum MI patients were recorded in

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the age group of 51-60 years, with respect to other risk factors history like sex, majority of patients were males (82%), Sedentary life style (44%), Mixed dietary habits (84%), Family history of IHD (6%), Dyslipidemia and Smoking (46%), Hypertension (31%), Diabetes (37%), Obesity (18%). In our study we found that 81% of the patients of acute MI had multiple risk factors. This correlates with the observation made by H. S. Wasir and A. K. Bharani et al., study.[26]

Sl. No.	No. of Risk factors	Percentage
1	None	7
2	One risk factor	12
3	Two risk factor	26
4	Three risk factor	20
5	Four risk factor	18
6	Five or more risk factor	17

Table no. 1: Showing the presence of number of risk factor in patients of this study

Sl. No.	Coronary risk factor	Present study Percentage (%)	H. S. Wasir and A. K. Bharani et al., study percentage (%)
1	Age < 40yrs. > 40yrs.	15 85	20 80
2	Sex (male)	82	93
3	Family history	6	38
4	Smoking	46	32
5	Hypertension	31	26
6	Diabetes	37	16
7	Obesity	18	15
8	Hypercholesterolemia	35	42
9	Hypertriglyceridemia	41	55
10	High LDL-C	24	-
11	Low HDL-C	51	64
12	Sedentary physical activity	44	-

Table no. 2: Showing the percentage of risk factors associated with the patients in this study

CONCLUSION: The present study shows that coronary risk factors play a major role in the CHD. Modification of these factors by pharmacotherapy, diet, exercise and behavioral therapy can improve the prognosis in these patients and also helps in reducing the incidence of CHD.

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