Clinical and Etiological Profile of Acute Myocardial Infarction in Young

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Abstract- Acute myocardial infarction is the leading cause of death in both developed and developing countries like India. Myocardial infarction has been recognized among younger age group more frequently in recent years. The aim of this study was to provide an overview of the risk factors in patients presenting with acute myocardial infarction younger than 40 years. Out of the 50 patients analyzed, 44 were males and 6 females with the mean age of 36 ± 4.2 years. Dyslipidemia was the most prevalent risk factor at 82% followed by smoking (80%), family history (72%), low socioeconomic status (52%), hypertension (46%), sedentary life style (40%), psychological stress (38%), obesity (36%), and diabetes (14%). Most of patients had more than two risk factors. More common presenting symptom was chest pain (92%). All diabetic patients presented with angina equivalents. Hypertension was the most common finding (46%). Dyslipidemia, smoking, hypertension, and sedentary life style are the major modifiable risk factors in our young adults. Whenever young male who is smoker or obese presents in emergency room with chest pain, we have to suspect myocardial Infarction. Other conventional risk factors are also prevalent but alcohol and OCPs are not a major health problem for South Indians.

Index Terms- Acute myocardial infarction, Risk factors, Young patients.

I. INTRODUCTION

Acute myocardial infarction is a clinical syndrome that results from the abrupt cessation in blood flow following thrombotic occlusion of coronary artery previously narrowed by atherosclerosis with the resultant death of cardiac myocyte in that arterial territory[1].The pattern of Coronary artery disease is indeed changing in India in that it occurs a decade earlier than other countries. The risk in India is 3 - 4 times higher than in White Americans, 6 times higher than in Chinese, 20 times higher than in Japanese[2]. The 27th Bethesda conferences[3], conducted by the American College of Cardiology categorized the risk factors, modification of which will lower the incidence of coronary artery disease. As much as 90% of the risk of acute myocardial Infarction has been attributed to the modifiable risk factors in the INTER HEART study[1]. Advancing age is a well-recognized risk factor for acute myocardial infarction. The protection offered by young age is slowly being taken away by increased prevalence of risk factors for Coronary artery disease in the adolescents[4]. The presence of major risk factors leads to advanced coronary artery disease in 2% of 15 - 19 years old men and 0% in women. This figure increases to 20% and 8% respectively in the presence of these risk factors in 30 - 34 years of age[4].

II. MATERIALS AND METHODS

A total of 50 consecutive patients admitted with acute myocardial infarction were studied. The study was conducted in Government General Hospital, Guntur, Andhra Pradesh over a period of two years. Diagnosis of myocardial infarction was based on WHO criteria of chest pain, ECG changes and elevated cardiac enzymes CPK-MB, Troponin. All patients from 20 - 40 years of age presenting with acute myocardial infarction were included in the study.

Those patients with ECG criteria not fitting in to acute myocardial Infarction, those with stable or unstable angina or having old myocardial infarction, and those having age less than 20 or above 40 years were excluded from the study.

In this study, the clinical symptoms like chest pain and its association with sweating, nausea, vomiting, breathlessness and palpitations were taken into account. Physical signs like hypertension, raised JVP, edema, S_3, S_4 crackles and wheeze were looked for .Patients were grouped in to three categories according to their age as 20 - 28, 29 - 34 and 35 - 40 years. Personality traits were evaluated by interviewing the patient and the family members and categorized as type A and type B. Details about the amount of salt, fat and fiber in the diet was taken. Patients walking 4km/d for 5 times a week were taken as physically active and less than that as physically inactive or sedentary. A detailed family history of coronary artery disease in parents (myocardial infarction or sudden death before 55 years in father or 1st degree male relatives or in mother before age of 65 years or other 1st degree female relatives) was taken. Details of socioeconomic status, and occupation were obtained.

Body mass index[5] (BMI) was calculated by using Quetlet index (weight in kg /height in $m^{2)}$ and waist/hip ratio was calculated .Patients were categorized as those with (BMI < 24.9 as desirable, 25 - 29.9 as overweight, > 30 as obese). Waist circumference is the minimum circumference measured between costal margin and iliac crest and hip circumference is measured over the buttocks. Waist to hip circumference ratio more than 0.83 in females and 0.93 in males were taken as abnormal.

Patients were enquired about the type and amount of alcohol intake. Female patients were asked about the use of oral contraceptive pills (currently using or left less than 3 months of

diagnosis of MI).Smoking history in terms of pack years was taken (packs smoked per day x years as a smoker). Hypertension was considered either by documented history of hypertension on treatment or BP > 140/90 mm Hg at presentation. Diabetes mellitus was considered either by documented history of treatment or with fasting blood sugar level > 126 mg % and or postprandial blood sugar level > 200 mg% at presentation.

Fasting lipid profile was performed for all patients within 48 hrs of acute myocardial infarction because lipid profile is altered by acute myocardial infarction (tends to lower HDL, raises triglycerides). LDL, HDL and Triglycerides levels were taken in to study. HDL level was graded as > 40 mg/dl, < 40 mg/dl.LDL level was graded as < 130mg/dl, 130 - 160mg/dl, > 130 mg/dl.

III. RESULTS AND OBSERVATIONS

Table 1: Characteristics of clinical variables

[1] **Variables**	[2] **Number (n = 50)**	[3] **%**
[4] Age: Mean (SD)	[5] 36.66	[6]
[7] Gender – Male	[8] 44	[9] 88%
[10] Gender – Female	[11] 6	[12] 12%
[13] Male/Female ratio	[14] 44/6	[15] 7.33 : 1
[16] Dyslipidemia	[17] 41	[18] 82%
[19] Smoking	[20] 40	[21] 80%
[22] Family History	[23] 36	[24] 72%
[25] Low Socio Economic status	[26] 26	[27] 52%
[28] Hypertension	[29] 23	[30] 46%
[31] Sedentary Life style	[32] 20	[33] 40%
[34] Psychosocial stress	[35] 19	[36] 38%
[37] Obesity	[38] 18	[39] 36%
[40] Waist to Hip ratio - Male (44)	[42] 30	[44] 68%
[41] Waist to Hip ratio - Female (6)	[43] 5	[45] 83%
[46] Diabetes Mellitus	[47] 7	[48] 14%

The Median age was 36.66 ± SD of 4.17 years. 88% were male patients, 12% female, 82% had dyslipidemia, 80% of the study population were smokers, 72% had family history of coronary artery disease, 52% belong to low socio economic status,46% had hypertension, 40% had sedentary life style, 38% had type A personality, 36% were obese, among these 83% of women and 68% of men had waist to hip ratio above the desired level, 14 % were diabetics, 3%were alcoholics, none of the patients were taking oral contraceptive pills.

92% of the patients had chest pain. 66% presented with history of excessive sweating, 18% had history of nausea, vomiting and 18% associated with breathlessness. All the diabetic patients presented with angina equivalents. The character of chest pain was assessed to be squeezing, crushing or compressing in nature with radiation in 52% of cases. The radiation was mainly to the left arm, jaw, epigastric region. 5

patients presented with only breathlessness without chest pain. 3 patients had epigastric pain and hiccups, one of the patient presented with transient ischemic attack. One patient had cardiogenic shock at the time of presentation.

One risk factor was present in two patients, two risk factors were present in one patient, three risk factors were present in four patients, four risk factors were present in nine patients, five risk factors were present in twelve patients, six risk factors were present in eight patients, seven risk factors were present in eight patients, eight risk factors were present in five patients, nine risk factors were present in one patient.

IV. DISCUSSION

Coronary artery disease remains a leading cause of death and exerts a heavy social and economical toll[4]. Although mortality rates of coronary artery disease are declining overall in affluent world, this is not true for younger individuals.

Male gender itself is an important non modifiable risk factor for coronary artery disease especially at a younger age[5], significantly low in premenopausal women because of cardio protective effect of estrogen. Life time risk of developing coronary artery disease at 40 years of age is 50% for men and 33% for women[2]. In our study 88% of patients were males, 12% were females (Male and female ratio is 7.3:1). Similar observations have been made in other studies also i.e. Dwivedi[7] et al (4:1), Bikanes[8] study (8:1), VNS[8] study (8.3:1) and Old Delhi study[8] (9:1).

Increasing age is a strong non modifiable risk factor. According to the results of this study, there is a linear relation between age and coronary artery disease risk, as only 4 patients were in age group 20 - 28 years (all were males) 8 patients in 29 - 34 years age group (7 were males, one female) as opposed to 38 patients in 35 - 45 years age group (33 were males, 5 females).

Family history of coronary artery disease is also one of the non-modifiable risk factors. Our study showed that 72% of patients had family history of premature coronary artery disease. Similar observations have been made in other studies i.e. Marty AK Das[2] et al (28%), Dwivedi[7] et al (42.8%), VNS[8] study (25%), Rhotak study[8] (55%). PK Biswas A Dasbiswas S Roy[9] et al (11.3%),

Dyslipidemia is one of the major modifiable risk factor. In our study 82% were found to have dyslipidemia. 36 of them had a HDL < 40 mg, interestingly 10% of the subjects had HDL ≥ 50 mg%. Triglycerides were raised in 23 patients. It can be seen that the incidence of myocardial infarction increased with increasing levels of LDL Cholesterol. Similar observations have been made in other studies i.e. VNS[8] study (92.9%), BOM[8] study (7%). PK Biswas A Dasbiswas S Roy[9] et al (30.6%), David[10] JE et al (68%), Hypercholesterolemia accelerates the atherosclerotic process. In addition dyslipidemia patients who are associated with obesity, insulin resistance also produce a prothrombotic state due to increased level of Plasminogen Activator Inhibitor - 1 and Fibrinogen[6].

Smoking is the most important modifiable risk factor of coronary artery disease. In our study 80% of patients were smokers. Out of the 40 smokers, 34 of them had HDL level lower than 40 mg/dl. The probable reason being the atherosclerotic process accelerated by enhanced oxidation of LDL and reduced

the levels of HDL. Smoking impairs endothelial integrity; increases inflammatory markers and fibrinogen; cause platelet aggregation and increases monocyte adhesion to endothelial cells. Smoking also causes coronary vasospasm. Similar observations have been made In earlier studies i.e. Dwivedi[7] et al (61.42%), Jeyachandran[11] et al (53%), Gupta[12] et al, Bergstrand R[13] et al, Gower MC[14] et al (89%),

Out of 50 patients, 26 patients (52%) belonged to low socio economic group, while 20 patients (40%) came from middle income group and only 4 patients (8%) were from upper group.

Hypertension is firmly established as a modifiable risk factor for coronary artery disease. In our study 46% of the patients were found to have high blood pressure, the probable reason being the accelerated atherosclerosis, increased left ventricle mass, left ventricle tension and stroke work. Other reasons like left ventricular hypertrophy, abnormal coronary flow reserve and abnormal vasomotor response and micro vascular dysfunction also contribute[5,6]. Similar observations have been found in other studies also i.e. Marty[2] AK Das et al (28%), Dwivedi[7] et al (51.42%), Nitter Haugh[15] et al (24%).

In our study 40% are having sedentary life style. Regular physical activity has been shown to reduce the risk of coronary artery disease in a number of observational and epidemiological studies. A Meta-analysis of studies showed the relative risk of coronary artery disease death was 1.9% in sedentary as compared to active subjects.

Type A personality is also considered to be a modifiable risk factor for coronary artery disease. In our study 38% of patients were found to have psychological stress. They were all type A personalities with an evidence of stressful environment, depression, job stress, social isolation. Similar observations have been made in other study also i.e. Marty AK Das[2] AK et al (40%). Increasing level of education and socioeconomic status are making more and more patients with type A personality but its strong correlation with myocardial infarction is yet to be proven.

Obesity is an independent and modifiable risk factor for coronary artery disease in both men and women. In our study 36% of patients were found to have obesity. Similar observations have been made in other studies also i.e. Dwivedi[7] et al (35.71%), PK Biswas A (9.7%), VNS[8] study (35.7%), Old Delhi[8] study (11%), Rhotak[8] study (15%), BOM[8] study (23.5%).

It is well known that the risk factors synergize the effect of each other, and clustering of risk factors is important in causing premature coronary artery disease. Therefore we conclude that as the number of risk factors increase in an individual, the risk also increases and the patient develops coronary artery disease at an early age.

When the additional effects of hypertension and glucose intolerance and dyslipidemia are added, the adverse impact of obesity is even more evident (table 2).

Table 2: Combination of risk factors

[49] Risk factors	[50] No. of patients
[51] Obesity + Diabetes mellitus + Dyslipidemia+ Hypertension	[52] 5
[53] Obesity + Diabetes mellitus+ Dyslipidemia	[54] 5
[55] Obesity + Hypertension	[56] 26
[57] Obesity + Diabetes Mellitus	[58] 5
[59] Obesity + Dyslipidemia	[60] 30

Central obesity is associated with an atherogenic lipid profile. Out of 44 men, thirty patients (68%) had waist to hip ratio > 0.8. Out of 6 women, five patients (85%) had waist to hip ratio > 0.8.

Diabetes mellitus is also a major coronary artery disease risk factor. In our study 7 patients (14%) were found to have diabetes. similar observations have been made in other studies also i.e. Marty[2] AK Das AK et al (18%), Dwivedi[7]et al (7.14%), Chennai[8] study (18%).VSN[8] study (3%), PK Biswas[9] (9.7%). Diabetic patients have markedly impaired endothelial and smooth muscles function and appear to have increased leukocytes adhesion to vascular endothelium, a critical early step in atherogenesis.

Diet is also an important but less well recognized risk factor[3]. Diet predisposes to atherosclerosis not only directly but also indirectly through obesity, hypertension, glucose intolerance and dyslipidemia. There is no concept of balanced diet in our population. We found out that 66% of our patients were not taking risk free diet, and most of them (56%) were taking ghee regularly in excessive amounts.

Alcohol and oral contraceptive pills intake are not important risk factors in South Indian society and our study proves it to be so.

Table 3 compares our study with other similar studies regarding risk factor analysis in myocardial infarction in young.

Table 3: Risk factor analysis Indian scenario, Modified from Dwivedi[7], et al, 1997

Risk factors	VNS 1971 n=28	BOM 1970 n=17	Rhotax 1978 n=65	Old Delhi 1986 n=80	Bikanes 1995 n=45	Chennai 1991 n=217	PK Biswas 1994	Dwivedi 2000 n=70	As per the present study n=50
Male: Female	8.3:1	All males	NR	9:1	8:1	-	NR	4:1	7.3:1
Family History %	25	12	55	30	29	-	13.3	42.8	72
Smoking %	32	70	70	63	22	10	56.4	61.42	80
Hypertension %	21.4	23.5	15	13	16	24	11.3	51.42	46
Obesity %	35.7	23.5	15	11	NR	NR	9.7	35.71	36
High WHR %	NR	NR	NR	NR	NR	NR	NR	NR	70
Diabetes Mellitus %	17.8	NR	NR	3	11	18	6.5	7.14	14
Dyslipidemia %	92.8	70	30	5	3.3	NR	30.6	41.66	82

V. CONCLUSION

Dyslipidemia, Smoking, sedentary life style, psychosocial stress, obesity and diabetes are the major modifiable risk factors in our young adults, evident more among men as compared to women. The incidence of diabetic mellitus in young myocardial infarction patients was comparatively less than the incidence of other risk factors.

Preventive strategies focused on risk factor reduction, by life style modification especially smoking cessation, reduction of salt intake, weight reduction, increase physical activity, dietary control, and control of psychosocial stress should be implemented to protect young adults in the most productive years of their life. The lack of warning signs stresses the need for primary preventive measures.

REFERENCES

[1] API Text book of Medicine,9th edition, chapter 19,Author Gurpreet Singh Wander, Naved Aslam pg.

[2] Marty A.K. Das et al prognostive significations of risk factors in AMI in young. Indian Heart Journal, 1991. 13, 108-111.

[3] 27th Bethesda cardiology conference Risk factor categorization

[4] ENAS EA, Dhawan J, Petkar S et al. study on coronary artery disease in Asian Indians.

[5] Harrison principles of International Medicine. 18th Edition.

[6] Eugene braunwald heart diseases.

[7] Coronary artery disease in the young; Heredo familial or faulty life style or both by : S Dwivedi, Girish Dwivedi, A Chaturvedi, Sanjiv Sharma, Journal Indian academy of clinical medicine Vol. No.3, Oct-Dec 2000.

[8] Dwivedi S, Anupam P, Chaturvedi A, Cardiovascular risk factor in young coronary artery heart disease patient around East Delhi. South Asian Journal preventive Cardiology 1997. 1, 21-26.

[9] PK Biswar, A Dasbiswas S Roy et al risk factors and angiographic profile of coronary artery disease of young JIMA, 1992. 22-26.

[10] David JE Mallal FJ Cheitlinm ND Coronary artery disease in young patients. Arteriographic and clinical review of 40 cases aged 35 and under American heart journal 1977. 74, 318-31.

[11] Jeyachandran R Sathayamathy I, Subramanyan K et al. Coronary artery disease in found Indian Heart Journal 1996. 37,112-118.

[12] Gupta SR, Gupa SK, Reddy KN et al. Coronary artery disease in young Indian subjects Indian Heart Journal 1996.48, 241-45.

[13] Bergstrand R Vedin A wilhensson C et al Myocardial infarction among men < 40 British heart journal, 1989. 41, 715-22.

[14] Gower MC et al Myocardial infarction before age 30 risk factor and angiographic analysis "American Journal of Cardiology" 1993. 328, 538-45.

[15] Nitter Hauge S Erickssen J Thawlol E et al. "Angiographic and risk factor characteristic of subjects with early onset of ischemic heart disease" British heart journal, 1987. 114, 4477-82.

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