



# Clinical Profile of Young Acute Myocardial Infarction with Special Reference to Risk Factors

## KEYWORDS

YOUNG, MYOCARDIAL INFARCTION, RISK FACTORS, GMERS

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**ABSTRACT** A risk factor is a feature of individual/population that is present early in life & is associated with increase risk of developing disease in future. Risk factor of interest for Coronary Artery disease may be hypertension, Diabetes mellitus, smoking, Hyperlipidemia, obesity & physical inactivity. Fifty cases of Acute MI presented to Medicine department of GMERS Hospital, Dharpur were studied, if they satisfied the selection criteria. Maximum number of patient were in 35-40 years of age. Male were more affected than female. 90% of patient had more than 2 risk factors & 78% had more than 3 risk factors. 54% were smokers, most common modifiable risk factor was dyslipidemia (76%) The key to combating increase incidence of CAD among young Indian is control of known risk factor which are to be identified by a population based strategy. Life style modification like smoking cessation, changing of diet pattern, regular exercise and medication to cut down stress and pharmacotherapy for control of diabetes mellitus, hypertension and dyslipidemia are the mainstay for control of rising prevalence of coronary artery disease in young population.

## INTRODUCTION

The prevalence of Coronary Artery Disease (CAD) has progressively increased in India during the later half of last century. Projection based on global burden of disease study estimate that by the year 2020, the atheroembolic cardiovascular disease in India would surpass that in any other region in the world.

The risk of CAD in Indians is 3-4 times higher than white Americans and as much as 20 times higher than Japanese. Indians are prone as a community to CAD at younger age and also show higher incidence of morbidity and mortality than other ethnic groups.

Conventional risk factors are as important in determining the risk of CAD in Indian patients as they are in other population. In addition to these factors it is clear that other newer risk factors like Serum Homocysteine, Insulin level, S.Fibrinogen, CRP, lipoprotein (a) etc. which increases the predilection of Indians to develop premature and severe CAD.

The key to combat the increasing incidence of CAD among Indians is the control of various risk factors by population-based strategy. So by studying the role of risk factor, we can enhance our ability to institute effective preventive and control measures, by early detection and management of modifiable risk factor.

The present study is undertaken to find out the association of various risk factors and clinical profile of Acute Myocardial Infarction in young patients (<45 years), which constitute the most productive part of the total population.

## AIMS AND OBJECTIVES

1. To study the clinical profile of acute myocardial infarction in young patients <= 45 years of age.
2. To study the incidence of various risk factors (conventional and newer) in young patients with myocardial infarction.
3. To study the association and correlation of various risk factors (conventional and newer) and myocardial infarction in those patients.

4. To provide the guidelines for management of the modifiable risk factors.

## REVIEW OF LITERATURE

At the end of 19th century, the first edition of "Osler's textbook of Medicine" articulated rather fatalistic view of atheroma as an inevitable degenerative process that affected arteries. Over 100 years ago Virchow recognized atheroma as proliferative disease.

In the early part of 20th century Anitschkow and Chalutow identified cholesterol as culprit ultimately. These observations followed by characterization of human lipoprotein particles at mid-century promoted the concept of insulation of lipids as a cause of atherosclerosis.

## MODIFIABLE RISK FACTORS

### BY LIFE STYLE

- Smoking
- Obesity
- Physical inactivity

### BY PHARMACOTHERAPY AND LIFESTYLE

- Lipid disorders
- Hypertension
- Insulin resistance/diabetes mellitus

## UNMODIFIABLE RISK FACTORS

- Age
- Male gender
- Post-menopausal state in female
- Genetics/positive family history of premature CAD/CVA

## NOVEL RISK FACTORS:

- Hyperhomocysteinemia
- Hyperfibrinogenemia
- Lp(a)
- Psychosocial factors
- High sensitive c-reactive protein(hs-CRP)
- TPA or PAI-1 antigen

- Small dense lipoprotein

### CIGARETTE SMOKING

- Single most preventable cause of death
- Consumption of 20 cigarettes per day increases the risk for CAD 2-3 times.

### OBESITY

Obesity is associated with several cardiovascular risk factors like cholesterol disorders, hypertension, glucose intolerance and increase in left ventricular mass. Distribution of fat appears to be more important predictor than total amount of fat.

Waist hip ratio is viewed as more accurate predictor than body mass index (BMI).

Waist hip ratio: Desired in women is  $\leq 0.8$  and in male is  $\leq 1.0$

Risk increases if waist circumference is more than 90cm in male and more than 80cm in female in Indian population.

### WHO CLASSIFICATION OF OVERWEIGHT (BASED ON BMI (kg/m<sup>2</sup>))

Clinical description	BMI(kg/m <sup>2</sup> )	NOMENCLATURE
Thin	<18.5	Underweight
Healthy	18.5-24.9	Normal
Overweight	25.0-29.9	Grade 1 overweight
Obesity	30.0-39.9	Grade 2 overweight
Morbid obesity	>40	Grade 3 overweight

### DYSMETABOLIC SYNDROME (SYNDROME X)

Defined as combination of obesity, hypertension, impaired glucose tolerance with hyperinsulinaemia and hyperlipidaemia.

Characterized by elevated plasma triglyceride, low plasma HDL cholesterol and presence of dense atherogenic LDL.

### PHYSICAL INACTIVITY/SEDENTARY LIFE STYLE

Sedentary life style is associated with increased risk for CAD. It nearly doubles the risk of CAD death compared to active persons.

Sedentary life style is also associated with obesity, hypertension, type 2 DM and hypercholesterolemia.

### RISK REDUCTION: lifestyle modification

Even moderate physical activity provides a reduction of risk. Regular physical activity prevents obesity may reduce weight and promotes positive effects on blood pressure, LDL-C, HDL-C and TGL.

The AHA (American Heart Association) recommends 30 minutes or more of moderate intensity physical activity on most preferably all days of week.

### LIPID DISORDERS AND DYSLIPIDEMIAS

Except for age, dyslipidemia is the most important predictive factor for CAD. There is strong, independent, continuous relationship between total cholesterol especially or low density lipoprotein cholesterol level (LDL-C) and risk of CAD events.

### INSULIN RESISTANCE AND DIABETES MELLITUS

#### Diabetes Mellitus

- 80% of death in diabetes is due to coronary artery

disease.

- Diabetes mellitus increase future cardiovascular events to the extent of 2-4 folds with even higher extent in diabetic women (3-7 folds).
- Now DM is accepted as coronary artery disease equivalent that is, patient with DM is supposed to have undergone one attack of myocardial infarction even in the absence of such events.

### HYPERINSULINEMIA

- Clinically unrecognised but an independent risk factor for CAD.
- Promotes atherosclerosis even before it produced DM.
- Produces prothrombotic state due to increase level of plasminogen activator inhibitor-1 and also fibrinogen.

### NOVEL/EMERGING RISK FACTORS

#### HYPERHOMOCYSTEINEMIA

High levels >15 micromol/litre is associated with increased risk of coronary heart disease.

Relative risk for various vascular diseases is as follows (levels >15micromol/litre).

- Stroke 2.0
- Myocardial infarction 2.0
- Peripheral vascular disease 3.0

#### HYPERFIBRINOGENEMIA

- Major determinant of viscosity
- Plays major role in thrombosis
- Framingham study showed impressive relation between hyperfibrinogenemia (>350 mg%) and occurrence of CAD and stroke.

#### LIPOPROTEIN (A)

- Is an LDL subfraction.
- Homologous with plasminogen and inhibits intrinsic fibrinolytic activity and hence increase thrombogenicity. Levels of Lp(a) >30mg% increases the prevalence of coronary artery disease by three fold.

#### SMALL DENSITY LIPOPROTEINS

- LDL particles varies.
- Small dense Lp (phenotype B) is an independent risk for coronary artery disease.
- Its effects are greater at higher LDL levels and are common at TGL levels >200 mg%.

#### TYPE A AND TYPE B BEHAVIOUR PATTERNS

Type A behaviour is suffused with ambition, time urgency, and anger and hostility. They are excessively competitive and aggressive with extreme desire for achievement and recognition.

Type B individuals are relaxed, unhurried, less aggressive and do not get upset when thwarted.

#### PSYCHOSOCIAL FACTORS

A number of psychosocial, cultural and environmental factors increases the risk of coronary artery disease. These includes;

- Social isolation, lack of social support, social disruption.
- Life stress and job strain.
- Socio-demographic characteristics.

#### UNMODIFIABLE RISK FACTORS: AGE, MALE GENDER,

**POST MENOPAUSAL, FEMALE, AND FAMILY HISTORY:**

Risk of myocardial infarction increase with age. Mortality and Morbidity due to CAD also rises steeply with age will the rate of death increasing at least twice in people more than 75 years old compared to those with 65 years of age.

Males have higher coronary artery disease risk when compared to menstruating females. However the risk equalize in male and postmenopausal females.

Family history of premature atherosclerosis also is an important unmodifiable risk factor. Prevalence of hypertension, DM, hypercholesterolemia, which is influenced genetically, may contribute.

**MATERIALS AND METHODS**

Fifty cases of acute myocardial infarction presented to Medicine department of our hospital were studied if they satisfied the following selection criteria.

**SELECTION CRITERIA**

Patient less than 45 years of age presented with complain of chest pain, palpitation,(or) breathlessness,(or) a combination of this were subjected primarily to electrocardiographic studies to confirm myocardial infarction.

All patients having ST elevation (>1 mm in inferior oriented leads (or) >2mm in anterior oriented leads) in at least two consecutive leads were considered to have myocardial infarction and then included in the study.

Detailed history and clinical examination was done in patients satisfying the selection criteria, special stress test was laid in the history on

- Occupation
- Socio economic status
- History of DM,PVD,HT or
- History of smoking or alcohol consumption, personality and life style.
- Family history of premature CAD or CVA in any of the first degree family members(male<55 years of age and female <65 years of age)

General examination included vital statistics and stigmata of atherosclerosis such as Xanthoma, xanthelasma were noted. They were screened for obesity by body mass index (wt/ht<sup>2</sup>)

A detailed CVS examination included presence of gallop, pericardial rub, end systolic murmur. RS examination was carried out for evidence of basal crepitations and rhonchi.

Patients having associated congenital or valvular heart disease were excluded.

All patients were subjected to the following laboratory investigations:

- Complete Hemogram, ESR,PCV,RFT,LFT
- Cardiac markers: CPK-MB, Trop-I
- Fasting lipid profile for Dyslipidemia
- Fasting blood sugar and post prandial blood sugar for diabetes mellitus. DM was defined as per WHO and modified ADA criteria for Diabetes Mellitus.
- Urine for sugar.
- ECG and chest X-ray PA view
- 2D ECHO cardiography for the assessment of left ventricular function and evidence.

Following tests were done whenever clinically indicated and financial condition of the patient permitted

- S. insulin level (fasting) for hyperinsulinemia
- Lp(a)
- S. homocysteine
- Coronary angiography due to economic constrains 40 patients (80%) underwent CAG. coronary lesions were consider significant if 70% or more of luminal diameter was occluded.
- Primary management was done to treat the patients in the form of thrombolysis (or) angioplasty and supportive treatment. All patients were given 325mg of aspirin and 600mg of Clopidogrel in emergency ward. Besides this other medicines in the form of ACE inhibitors, B blockers and statins were given. All the patients were observed for complications and treated accordingly.

**OBSERVATIONS****Sex distribution**

Gender	No. of patients	Percentage
Male	42	84
Female	8	16

**Prevalence of family history of coronary artery disease (CAD)**

Family history of CAD	No. of Patients	Percentage
Single parent	14	28
Both parent	4	8
Total	18	36

**Socioeconomic status of patients**

Socioeconomic Status	No. of Patients	Percentage
Upper class	10	20
Middle Class	14	28
Lower Class	26	52

**Prevalence of smoking**

Cigarettes/beedis (in pack years)	No. of patients	Percentage
0	23	46
1-5	10	20
6-10	8	16
11-15	6	12
16-20	2	4
>20	1	2
Total smokers	27	54

**Prevalence of obesity (by body mass index)**

BMI(W/Ht <sup>2</sup> )	Classification	No. of Patients	Percentage
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<25	Normal	16	32
25.0-29.9	Grade 1 over weight	24	48
30-39.9	Grade 2 over weight (obesity)	10	20
>40	Grade 3 over weight (or morbid obesity)	0	0

#### Prevalence of sedentary life habits

Sedentary life Habits	No. of Patients	No. of Patients
Absent	27	54
Present	23	46

#### Personality

Personality	No. of Patients	Percentage
Type A Personality (%)	25	50
Type B personality (%)	25	50

#### Prevalence of dyslipidemia

Type of Dyslipidemia	No. of Patients	Percentage
Normal		
Total cholesterol (>200mg%)	12	24
High LDL-C (>100mg%)	20	40
High Triglycerides (>200mg%)	29	58
Low HDL-C (<40mg%)	20	40
Combined phenotype	18	36
	26	52

#### Prevalence of Hypertension

Blood pressure	No. of patients	Percentage
Normal	38	76
Hypertension	12	24

#### Prevalence of diabetes mellitus

Diabetes Mellitus	No. of patients	Percentage
Present	10	20
Absent	40	80

#### Profile of fasting plasma insulin level in present study

Plasma insulin level (micro unit/ml)	No. of patients	Percentage
<35	26	52
>=35	8	16

#### Profile of serum homocysteine levels in present study

S. Homocysteine level	No. of patients	Percentage
0	22	44
10-14.9	12	24
>=15	16	32

#### No. of risk factors association

No. of risk factors	No. of patients	Percentage
0	0	0
1	2	4
2	3	6
3	6	12
4	11	22
5	12	24
6	6	12
7	6	12
8	1	2
9	3	6
10	0	0

#### Type of myocardial infarction

Type of MI	No. of patients	Percentage
Anterior wall MI	36	72
Inferior wall MI	11	22
Anterior + inferior wall MI	3	6

#### CONCLUSION

The key to combating the increasing incidence of CAD among young Indians is the control of known risk factors which are to be identified by a population based strategy.

Lifestyle modification like smoking cessation, changing of diet pattern, regular exercise and medication to cut down the stress and pharmacotherapy for control of diabetes mellitus, hypertension, and dyslipidaemia are mainstay for control of rising prevalence of coronary artery disease in young population.

The relatively low levels of conventional risk factors in rural population and the concurrent low prevalence of CAD in these communities present a window of opportunity for primordial and primary prevention of coronary artery disease.

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