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## ASSESSMENT OF RISK FACTORS AND OUTCOME IN YOUNG PATIENTS OF MYOCARDIAL INFARCTION

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ABSTRACT Objectives: To study profile of young patients (<40 years) with acute myocardial infarction with emphasis on: 1. Assessment of risk factors, 2. Mode of presentation, 3.Complications

Method: This was a prospective study carried out on 72 young person's below the age of 40 years admitted in ICCU for acute MI under Department of Medicine of M.L.B. Medical College, Jhansi over a period of 18 months, March 2017 to Oct 2018.

**Results:** Majority of the patients were male. The age distribution varied from 24 - 40 years. The most common presentation was chest pain. Smoking was found to be most common risk factor. The STEMI was the most common type of MI. Acute left ventricular failure was the most common complication.

**Conclusion:** Most common risk factor was smoking followed by obesity and physical inactivity. These are modifiable risk factors which could be reduced by preventive education and life style changes and can serve as primary prevention of the disease. Emerging risk factors like raised hs CRP and hyperhomocyteinemia are commonly associated with young MI patients.

**KEYWORDS**: Young patients, Myocardial infraction, Emerging risk factor, Complications, Clinical Presentation.

## INTRODUCTION

Cardiovascular disease (CVD) places a massive health burden on humanity and is a major global health problem reaching epidemic proportions.

Myocardial Infarction (MI) is a condition characterized by necrosis of the myocardium due to prolonged irreversible ischemia following coronary occlusion. It is an important disease entity in developed nations and recently in developing nations. It usually affects the middle and older age groups. It is an uncommon disease in young adults and its incidence varies between 2%-10% according to different survey. Moreover people in our part of the world suffer from CAD (coronary artery disease) at relatively younger age, i.e., about half of MI occurs under the age of fifty years. IHD may become a leading cause of death and disability in our country by the year 2025.

Acute myocardial infarction in young South Asians has not been extensively studied, and most of the existing data are on migrant South Asian populations.

Acute MI has been found in the young age groups (<40 years) more frequently in recent years. Briefly, 4-8% of the patients with acute MI are less than 40 years of age.

An acute myocardial infarction (MI) is a subset of a spectrum of Ischemic Heart Disease (IHD) that includes unstable angina and acute MI with or without ST elevation. The vast majority of young patients deny history of chest pain prior to MI. these patients may have different risk factor profiles, clinical presentations, and prognosis compared to older patients. Early recognition and risk factor modification in this population sub-set is of key importance.

Risk factors for an MI can be classified into three cate  $\neg$  gories :-

- a) Non-modifiable: age, sex, and family history,
- b) **Modifiable:** smoking, alcohol intake, physical inactivity, poor diet, hypertension, type 2 diabetes, dyslipidemias, and the metabolic syndrome; and

c) Emerging: C-reactive pro¬tein (CRP), fibrinogen, coronary artery calcification (CAC), homocysteine, lipoprotein(α), and small, dense low-density lipoprotein (LDL).

A growing number of studies suggest that hsCRP is an independent risk factor for atherosclerotic vascular disease. Homocysteine was also recognized as a significant independent risk factor for young MI patients, indicating the need to evaluate homocysteine in all young patients with MI, especially in the absence of traditional risk factors.

This study has planned to study the clinical profile of acute MI in young adults.

## AIMS AND OBJECTIVES

To study profile of young patients (<40 years) with acute myocardial infarction with emphasis on :-

- I. Assessment of risk factors
- ii. Mode of presentation
- iii. Complications during hospitalization and outcome

### MATERIALS AND METHODS

This was a prospective study carried out on 72 young person's below the age of 40 years admitted in ICCU for acute MI under Department of Medicine of M.L.B. Medical College, Jhansi over a period of 18 months, March 2017 to Oct 2018. The study was performed after approval by the institutional ethics committee and written informed consent was obtained from the participants. The study was done to evaluate the risk factors, presentation, outcome and complications developed after MI during the period of hospitalisation.

**Inclusion Criteria:** All patients aged ≤ 40 years and admitted to the hospital with a diagnosis of acute myocardial infarction (MI).

The final diagnosis of acute MI will be based on two out of three of the following criteria:

- Chest pain suggestive of MI.
- · Electrocardiogram (ECG) evidence typical of acute MI.
- Rise/fall of the cardiac biomarker troponin.

### Exclusion criteria:

- Patients of age more than 40 years
- Chronic stable angina and unstable angina
- Cardiovascular diseases resembling MI like pericarditis, aortic dissection

### RESULTS

The 72 young patients who had presented with acute MI fulfilling the criteria have been taken for the study. Majority of the patients were male i.e., 70 (97.2%) out of 72. Only 2 patients (2.7%) were females.

### Table 1: Distribution of cases according to their sex.

Sex	No. of patients (n=72)	Percentage (%)
Male	70	97.2%
Female	2	2.7%
Total	72	100%

### Table-2: Patients' distribution according to age.

Age (in years)	No. Of patients (n=72)	Percentage (%)
20-25	3	4.1%
26-30	11	15.2%
31-35	18	25.0%
36-40	40	55.55%
Total	72	100%

The age distribution varied from 24 - 40 years. The mean age was 35.7 years. The peak incidence of MI occurred between the age group 36-40 years around 58.3%, youngest patient presented with MI in our study was of 24 years. 3 (4.1%) patients were between the age group of 20-25 years ,11 (15.2%) patients were between 26-30 years, 18 (25%) patients were between 31-35 years, 40 (55.5%) patients were between age group of 36-40 years.

The most common presentation was chest pain in 71 (98.6%) patients out of 72 followed by profuse sweating in 38 (52.7%) patients , then anxiety/nervousness in 32 (44.4%) patients, radiation of chest pain in 24 (33.3%) , breathlessness in 23 (31.9%) patients , nausea/vomiting in 7 (9.8%) patients and atypical presentation of MI was present in only 1 (1.4%) patient.

# Table 3: Patients distribution according to their mode of presentation

Clinical symptoms	No. of patients	Percentage (%)
Chest Pain	71	98.61%
Profuse Sweating	38	52.77%
Anxiety/ Nervousness	32	44.4%
Radiation Of Chest Pain	24	33.3%
Breathlessness	23	31.9%
Nausea/Vomiting	7	9.8%
Atypical Presentation	1	1.4%

Smoking present in 61 (84.7%) patients which was found to be most common risk factor associated with MI in young patients. The second most common risk factor was obesity and 53 (73.6%) patients had BMI  $\geq$ 25. The third most common risk factor was physical inactivity which was observed in 35 patients (48.6%). Other significant risk factors were dyslipidemia present in 30 (41.6%) patients, diabetes mellitus in 14 (19.4%) patients, hypertension in 8 (11.1%) patients. Out of 72 patients, 6 (8.5%) patients had the family history of premature coronary artery disease.

### Table 4: Patients distribution according to risk factor

Risk factors	No. of patients	Percentage (%)
Smoking	61	84.7%

Dyslipidemia	30	41.6%
Diabetes mellitus	14	19.4%
Hypertension	8	11.1%
Obesity	53	73.6%
Physical inactivity	35	48.6%
F/h/o premature cad	6	8.344

All young patients presented with MI were having risk factors. Almost 2/3rd (49; 68%) of the patients were having atleast  $\geq$ 3 risk factors. Two risk factors were found in 16 (22.2%) patients and only one risk factor was present in 7 (9.7%) patients.

### Table 5: Patients distribution according to site of MI.

Type of MI	No. of pateints (n=72)	Percentage (%)
Anterior wall MI	27	37.5%
Inferior wall MI	8	11.1%
Anterior & lateral wall MI	11	15.2%
Anterior & inferior wall MI	1	1.3%
Inferior & rt ventrucular MI	2	2.7%
Inferior & posterior wall MI	3	4.1%
Non st elevation MI	20	27.7%
Total	72	100%

The STEMI was the most common type of MI observed in 52(72.2%) young patients. In that majority of patients (27; 37.5%)had Anterior wall MI, 11(15.2%) patients had Anterolateral wall MI, 8 (11.1%) patients presented with Inferior wall MI, 3 (4.1%) patients had Infero-posterior wall MI, 2 (2.7%) patients had Inferior wall MI with right ventricular extension,1(1.3%) patient had Anterior with Inferior wall MI.Out of 72 pateints,20 (27.7%) patients had Non ST elevation MI. This was recognized by ECG, elevated cardiac markers

## Table 6: Distribution of patients according to emerging risk factor

Emerging risk factors	No. of patients (n=61)	Percentage (%)	
Hyper-homocysteinemia	55	90.1%	
Raised hs crp	57	93.4%	

Two emerging risk factors were studied, high sensitivity CRP level and serum homocysteine level but could be done in 61 pateints as it was costly investigations and were unaffordable to some patients. HsCRP was found increased in 55 (90.1%) patients, and homocysteine level was found increased in 57(93.4%) patients.

Table 7: Distribution	of patients	according	to developme	nt
of complication of MI.				

Complications	No. of Pateints (N=20)	Percentage (%)
Acute LVF	8	11.11%
CHF	6	8.33%
Cardiogenic shock	3	4.17%
Post MI Angina	2	2.78%
Arrhytmia	1	1.39%

Out of 72 patients, Only 20 patients had complications. Out of 20 patients, 8(11.1%) patients had acute left ventricular failure, 6 (8.3%) patients had congestive heart failure and 3(4.17%) patients were in cardiogenic shock, 2 (2.7%) patients had post MI angina ,1(1.3%) patient developed arrhythmia. Acute left ventricular failure was the most common complication. The complications were more common with patients who had STEMI.

Out of 72 patients, 64 (88.8%) patients improved with medical line of management. Five (6.9%) patients were referred for urgent angioplasty and 3 (4.2%) patients expired. 64 patients were discharged from hospital after recovery and were advised to undergo angiography to other hospital as it was unavailable at our setup

### DISCUSSION

Coronary atherosclerosis begins early in life, but acute STEMI in adults aged  $\leq 40$  years are exceptional. There are various mechanisms which have been found such as rupture of a vulnerable plaque or erosion of the endothelial layer, hypercoagulable states, coronary artery spasm, and inflammation, with atherosclerosis remaining the major cause. Atherosclerotic course begins at birth and considerable lesions in coronary arteries may be apparent as early as the age of 25 or 30 years.

The most consistent risk factor for coronary atherosclerosis seems to be the male sex. The protective effects of oestrogens in preventing atherosclerosis have been clearly demonstrated in epidemiologic studies. In our study male: female ratio was 36:1, which was much higher than all previous studies.

Among the many factors that have been shown to be important are cigarette smoking, hyperlipidaemia, family history of IHD, hypertension, the male sex and diabetes mellitus. These have generally been associated with an increased incidence of fibrous plaques and their sequelae.

Cigarette smoking is a well-known risk factor for the development of coronary artery disease in young patients. In our study 84.7% patients had cigarette/bidi smoking as one of the major risk factors. Out of the 61 patients who smoked, 23 (37.7%) patients used to smoke less than 0.9 pack year, 24 (39.3%) smoked 1-1.9 pack years ,12 (19.6%) smoked 2-2.9 pack years and 2 (3.2%) smoked 3-3.9 pack years. Smoking adversely affects all phases of atherosclerosis given that it hastens thrombotic process, instigates endothelial dysfunction, augments proinflammatory effects, and induces coronary vasoconstriction even in patients with normal coronary vasculature.

Obesity was the infrequent cause in some of the older studies 3.3–20%, but in our study it was 73.6%.

Hypertension (11.1%) was found to be less common in our study, in comparison to earlier studies. While Diabetes (19.4%) was comparable.

Physical inactivity was found in 48.6% of our patients while most other studies did not took it in consideration.

Dyslipidemia has been shown to be an important risk factor for CAD. Indians worldwide demonstrate a triad of high triglycerides, high LDL-C and low HDL-C levels. Our study also demonstrated presence of dyslipidemia in young patients as well. Since triglycerides bring change in LDL particle size, density, distribution and composition producing small dense LDL which is more atherogenic. Thus estimation of serum triglyceride levels is an indirect measurement of LDL particle.In our study dyslipidemia was present in 41.6% patients similar to previous studies.

In our study only 8.5% of patients had a positive family history of IHD which was consistent with other studies.

In our study all young patients presented with MI were having risk factors. Almost 2/3rd (49;68%) of the patients were having atleast  $\geq$ 3 risk factors. Two risk factors were found in 16 (22.2%) patients and only one risk factor was present in 7 (9.7%) patients.

The most common presentation was chest pain (98.6%) in our study. Profuse sweating was found in 52.7%, anxiety/nervousness in 44.4%, radiation of chest pain in 33.3%, breathlessness in 31.9% patients. One of our patient did not presented with chest pain. The STEMI (72.2%) was the most common type of MI observed in young MI patients . 27.7% of our patients had Non ST elevation MI. Anterior wall MI was present in 36.1% patients; 15.28% patients had Antero-lateral wall MI , 12.5% patients presented with Inferior wall MI, 4.2% patients had Inferoposterior wall MI , 2.8% patients had Inferior wall MI with right ventricular extension and 1.4% patient had Anterior with Inferior wall MI.

Homocysteine is an emerging new risk factor for cardiovascular disease. Hyperhomocysteinemia is associated with an increased risk of several complex diseases, including CVDs.

There is increasing evidence that inflammation plays an important role in pathogenesis of atherosclerosis and its complications. It has been suggested that hs-CRP may not only be a marker of generalized inflammation but directly and actively participate in atherogenesis

These two emerging risk factors were studied in our study, hs-CRP level and serum homocysteine level but could not be done in all patients due to financial constraints. These investigations were done in 61 patients. hs CRP was found to be increased in 55 (90.1%) patients. The homocysteine level was increased in 57 (93.4%) patients.

Out of 72 patients, 20(27.8%) patients had complications. Acute left ventricular failure was the most common complication in our study found in 8(11.11%) patients, 6(8.33%) patients had Congestive heart failure and 3(4.2%) patients were in cardiogenic shock, 2(2.8%) patients had post MI angina, 1(1.39%) patient developed arrhythmia. In our study 4.1% patients had expired. Some patients (6.9%) were referred for urgent angioplasty due to unavailability at our setup. Rest all patients improved with medical management.

Limitations: Although this study has effectively highlighted the clinical profile of young MI patients, there were few limitations. This study was conducted in a single center, which may not be representative of whole population. In this study, as no control group was used, the risk of each factor could not be analyzed statistically. Larger studies involving multiple centers are required focusing on the risk factors and management of young MI.

### CONCLUSION

In young patients with MI majority of patients belong to the age group 36-40 years followed by 31-35 years. Youngest patient presented was of 24 years. MI at early age raises the disturbing potential of atherosclerosis disease and subsequent adverse prognosis. Almost all patients were males. All patients were having risk factors. Almost 2/3<sup>rd</sup> of our patients had at least  $\geq$ 3 risk factors which might be a reason for greater percentage of complications. Most common risk factor was smoking followed by obesity and physical inactivity. These are modifiable risk factors which could be reduced by preventive education and life style changes and can serve as primary prevention of the disease.

In contrast to previous studies done on elderly patients, there were common risk factors were Diabetes and Hypertension, but in our study Diabetes and hypertension were found to be less common risk factors.

Emerging risk factors like raised hs CRP and hyperhomocyteinemia are commonly associated with young MI patients confirming the previous trends.

The majority of patients with MI at young age were hemodynamically stable and had anterior wall MI(37.5%).

STEMI(72.2%) was more common than NSTEMI.In our study 27.7% patients had NSTEMI.

In our study, Acute LVF (11.1%) was the most common complication followed by CHF (8.3%) then cadiogenic shock (4.1%), then Post MI angina(2.7%), then Arrythmia(1.3%). Early diagnosis and early interventions are essential for young MI patients to reduce mortality.

This was a prospective study, with small sample size and conducted at a single centre. Further larger studies involving multiple centres are required focusing on risk factors, emerging risk factors and management of young MI patients.

#### REFERENCES

- Anand SS, Yusuf S, Vuksan V, et al. Differences in risk factors, atherosclerosis, and cardiovascular disease between ethnic groups in Canada: the study of health assessment and risk in ethnic groups (SHARE). Lancet 2000;356:279–84.
- Bobak M, Hertzman C, Skodova Z, et al. Own education, current conditions, parental material circumstances, and risk of myocardial infarction in a former communist country. J Epidemiol Community Health 2000;54:91–6.
  Gaeta G, De Michele M, Cuomo S, Guarini P, Foglia MC, Bond MG, Trevisan
- Gaeta G, De Michele M, Cuomo S, Guarini P, Foglia MC, Bond MG, Trevisan M. Arterial ab¬normalities in the offspring of patients with premature myocardial infarction. N Engl J Med 2000; 343: 840-6.
- Summary of the third report of the National Cholesterol Education Program (NCEP). Expert Panel on Detection, Evluation, and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel III). JAMA 2001; 285:2486-97.
- Tuzcu EM, Kapadia SR, Tutar E, Ziada KM, Hobbs RE, McCarthy PM, et al. High prevalence of coronary atherosclerosis in asymp¬tomatic teenagers and young adults: Evidence from intravas¬cular ultrasound. Circulation 2001;103(22):2705–10.
- Doughty M, Mehta R, Bruckman D, et al. Acute Myocardial infarction in the young-The University of Michigan experience. Am Heart J. 2002; 143:56-62
- Enas EA, Senthilkumar A. Coronary Artery Disease in Asian Indians: An Update and Review. Int J Cardiol. 2002; 1(2):1-34.
- Sinha R. Fisch G, Teague B, et al. Prevalence of impaired glucose tolerance among children and adolescents with marked obesity. N Engl J Med 2002;346:802–10.
- Wald DS, Law M, Morris JK. Homocysteine and cardiovascular disease: Evidence on causality from a meta-analysis. BMJ2002;325:1202.
  Espliguero R.A., Avanzas P., Sales J.C., Aldama G., Pizzi C., Kaski J.C. C-
- Espliguero R.A., Avanzas P., Sales J.C., Aldama G., Pizzi C., Kaski J.C. Creactive protein elevation and disease activity in patients with coronary artery disease. Eur Heart J. 2004;25:401–408.
- Fournier JA, Cabezon S, Cayuela A, Ballesteros SM, Cortacero JA, Diaz De La Llera LS. Long-term prognosis of patients having acute myocardial infarction when 40 years of age. Am J Cardiol 2004;94:989–92.
- Ismail J, Jafar TH, Jafary FH, White F, Faruqui AM, Chaturvedi N. Risk factors for non-fatal myocardial infarction in young South Asian adults. Heart 2004;90:259–263.
- J.A. Fournier, S. Cabezon, A. Cayuela, S.M. Ballesteros, J.A. Cortacero, L.S.Diaz De La Llera Long-term prognosis of patients having acute myocardial infarctionwhen r40 years of age Am. J. Cardiol., 94 (2004), pp. 989–992
- Yusuf S, Hawken S, Ounpuu S, Dans T, Avezum A, Lanas F, et al. Effect of potentially modifiable risk factors associated with myocardial infarction in 52 countries (the INTERHEART STUDY).Lancet 2004; 364: 937-52.
- Yusuf S, Vaz M, Pais P. Tackling the challenge of disease burden in developing nations. Am Heart J. 2004; 148:1.
- Butler R, Webster MW, Davies G, Kerr A, Bass N, Armstrong G, Stewart JT, Ruygrok P, Ormiston J. Spontaneous dissection of native coronary arteries. Heart 2005; 91: 223-4.
- Kip KE, Marroquin OC, Shaw LJ. Global inflammation predicts cardiovascular risk in women: A report from the Women's Ischemia Syndrome Evaluation (WISE) study. Am Heart J 2005; 150: 900-05
- F.B. Sozzi, G.B. Danzi, L. Foco, M. Ferlini, M. Tubaro, M. Galli, et al. Myocardial infarction in the young: a sex-based comparison Coron. Artery Dis., 18 (6)(2007), pp. 429–431
- Colkesen AY, Acil T, Demircan S, Sezgin AT, Muderrisoglu H. Coronary lesion type, location, and characteristics of acute ST elevation myocardial infarction in young adults under 35 years of age. Coron Artery Dis 2008;19(5):345–7.
- Jneid H, Fonarow GC, Cannon CP, Hernandez AF, Palacios IF, Maree AO, et al. Sex differences in medical care and early death after acute myocardial infarction. Circulation 2008;118(25): 2803–10.
- Sharma SB, Garg S, Veerwal A, Dwivedi S. Hs-CRP and oxidative stress in young CAD patients: A pilot study. Indian J Clin Biochem. 2008 Oct; 23(4): 334–336.
- Bhagwat VR, Yadav AS, Rathod IM. Homocysteine, lipid indices and antioxidants in patients with ischaemic heart disease from Maharashtra, India. Singapore Med J 2009;50:418-24.
- Bhalwar R. Ischaemic Heart Disease (IHD). In: Text Book of Public Health and Community Medicine. 1st ed. Bhalwar R, Vaidya R, Tilak R, Gupta R, Kunte R (Eds.). New Delhi: Department of Community Medicine, AFMC, Pune; 2009. pp. 1201–12.
- Malinowska A, Chmurzynska A. Polymorphism of genes encoding homocysteine metabolism-related enzymes and risk for cardiovascular disease. Nutr Res 2009;29:685-95
- Alizadehasl A, Sepasi F, Toufan M. Risk factors, clinical mani¬festations and outcome of acute myocardial infarction in young patients. J Cardiovasc Thorac Res 2010;2(1):29–34.
- 26. Kumar A, Khan SA, Parvez A, Zaheer MS, Rabbani MU, Zafar L. The

prevalence of hyperhomocysteinemia and its correlation with conventional risk factors in young patients with myocardial infarction in a tertiary care centre of India. Biomed Res 2011;22:225-9

- S.K. Hosseini, A. Soleimani, M. Salarifar, H. Pourhoseini, E. Nematipoor, S.H. Abbasi, A. Abbasi Demographics and angiographic findings in patients under 35 years of age with acute ST elevation myocardial infarction J. Tehran Univ.Heart Cent., 6 (2) (2011), pp. 62–67
- T. Christus, A.M. Shukkur, I. Rashdan, T. Koshy, M. Alanbaei, M. Zubaid, N.Hayat, A. Alsayegh Coronary artery disease in patients aged 35 or less — a different beast? Heart Views, 12 (2011), pp. 7–11
- Bangalore S, Fonarow GC, Peterson ED, Hellkamp AS, Hernandez AF, Laskey W, et al. Age and gender differences in quality of care and outcomes for patients with ST-segment eleva¬tion myocardial infarction. Am J Med. 2012;125(10):1000–9.
- Jamil G, Jamil M, Alkhazraji H, Haque A, Chedid F, Balasubramanian M, Khairallah B, Qureshi A. Risk factor assessment of young patients with acute myocardial infarction. Am J Cardiovasc Dis 2013;3(3):170-174.
- Akram MV, Zaidi F, Bansal S, Kishore K. A study of risk factors in young patients of myocardial infarction. Int J Res Med Sci. 2015 Oct;3(10):2677-2681.
- Alappatt NJ, Sailesh KS, Mukkadan JK. Clinical profile of acute coronary syndrome in young adults. J Med Sci Health 2016;2(1):5–10.
- 2016 Boateng S, Samborn T. The cardiovascular system. In: Conn's Current Therapy 2016. Bope ET, Kellerman RD (Eds.). New York: Elsevier Inc.; 2016. pp. 439–518.
- Jakkal DP. Clinical profile of acute myocardial infarction in young patients. Paripex-Indian J Res 2016;5(3):205–7.
- Mulay PP, Mulay SP, Hanchate MS. Acute Myocardial Infarction among Young Adults in India: Clinical Profile and Risk Factors. Int J Innov Res Med Sci 2016;01(09):366-371.
- Shah V, Jain U. Clinical profile of acute myocardial infarction in young adults. Int J Med Sci Public Health 2016;5:1709-1713.