Original Research Article　　　　　　　　**Volume 3, Issue 7 -2017**

Clinical profile of acute myocardial infarction in young patients

*N.S.Neki, **Jaswinder Singh,**Jitesh G,**Bhoj Raj Sharma,
Rohit Kumar Bhardwaj,Narendra Kumar Meena,
**Amandeep Singh Dhanju, **Deepali Kaushal, **Aarti Vaid

*Professor, **Junior Resident, Dept. of Medicine, Govt. Medical College/ Guru Nanak Dev Hospital, Amritsar, India, 143001

Corresponding Author: **Dr. Jaswinder Singh**, Junior Resident, Dept. of Medicine, Govt. Medical College/ Guru Nanak Dev Hospital, Amritsar, India, 143001

E-mail: *winjaz@gmail.com*

Abstract

Background: The incidence of coronary artery disease (CAD) and acute myocardial infarction (AMI) has been recognized more frequently in the young adults now as compared to the last decade. In addition these patients may differ from elderly patients in some aspects, like greater association with smoking, and higher prevalence among males. These patients may also have different clinical presentation as compared to elderly patients.

Material and Methods: It was a retrospective descriptive study involving review of case records of 40 young patients less than 45 years of age, who were admitted to Guru Nanak Dev hospital attached to Govt. Medical College, Amritsar and the diagnosis of AMI was established by world health organization (WHO) criteria.

Results: Of the study population 95% were males, 70% were smokers, and majority of them had high cholesterol levels. 62.5% of patients were engaged in lower level of physical activity (class I and II), chest pain was most common symptom (87.5%). Anterior wall was the most common site of infarction (67.5%), followed by the inferior wall. (32.5%)

Conclusion: AMI in young adults is much more common in males as compared to females. Smoking is the most important modifiable risk factor associated with AMI in young adults.

Keywords: Acute myocardial infarction; young adults; coronary artery disease

---

Introduction

Ischemic heart disease results from imbalance of myocardial oxygen demand and supply. This imbalance is usually because of coronary arteries, which are either not able to supply sufficient quantity of blood to the heart, or are not able to increase the blood supply as the demand of oxygen by the heart increases. Three common ways of presentation of coronary artery disease are acute myocardial infarction (AMI), sudden cardiac death and angina pectoris. (1, 2)

Initially AMI was considered a disease, occurring exclusively in elderly population. Prior to 1950s it was rare to see a case of AMI in less than 30 years of age, and it was uncommon between 30 and 40 years of age (3), but recently, the incidence of AMI in young patients has increased. It is estimated that the disease burden of AMI among young individuals is between 3 to 8%. 45 years is the age limit used by most studies to define young individuals with AMI. It is interesting to note that the mean age of being diagnosed with acute coronary syndrome among Indian population is 7 to 11 years younger than the western population. (4, 5) It is well established that ischemic heart disease is more common in people residing in urban areas as compared to rural population, probably due to higher level of stress, sedentary lifestyle and intake of high calorie diet. (6, 7) Previous research has suggested that AMI in young is more frequently seen in males as compared to AMI in elderly population. Moreover, AMI in young adults is more strongly associated with smoking and deranged lipid profile as compared to AMI in elderly individuals. Because of these demographic differences, it is possible that AMI in young may have slightly different risk factors as compared to elderly population. (2) Moreover AMI in young patients is a graver problem for the individual as well as the community because of greater loss of active life years, as well as a greater stain on healthcare. (8, 9)

Better screening and management has led to decreased incidence and death rate due to cardiovascular diseases (CHD) in the western world, but in developing countries including India, the incidence and mortality rate of CHD remains high. In fact, the developing countries are expected to witness a rise in incidence of CHD by 180% in men and 137% in women by 2020 as compared to 1990 levels. This shows the urgent need to invest on effective screening and management of this disease in developing nations(1)

Objective:

(1)   To study the clinical profile of AMI in young adults of age group less than 40 years of age.

(2)   To study the associated risk factors.
(3)   To study serum lipoprotein profile in young patients with AMI.

Inclusion criteria:

Patients of 45 years or less diagnosed to have AMI based on ECG changes or increased cardiac enzymes.

Exclusion criteria:

Those excluded from the study were of age >45 years, patients of chronic renal failure, systemic lupus erythromatosis (SLE), psoriasis, leukaemia and hypothyroidism.

Materials and Methods

It was a retrospective descriptive study conducted in Guru Nanak Hospital, attached to Govt. Medical College, Amritsar, India. Patient data was obtained from case records of 40 young patients of age less than equal to 45 years admitted in Guru Nanak Dev hospital in the year 2016, who were diagnosed to have AMI, and its associations were studied. Study of general and physical examination findings of case records were done. Data was scrutinized particularly for smoking, alcoholism, physical activity status, diabetic status, hypertension, obesity, socio-economic status, cholesterol levels, HDL cholesterol, LDL cholesterol, BMI.

Diagnostic criteria of AMI:

Diagnosis of myocardial infarction was made according to the world health organization (WHO) criteria which included

- Typical chest pain for >20 minutes
- ECG changes with development of Q waves, bundle branch block or ST elevation or depression of at least 0.1 mv for 24 hours, and
- Increased cardiac enzymes (Troponins, CPK)

Hyper acute phase of AMI was diagnosed by ST segment elevation in ECG, and broad T waves, along with reciprocal ST depression. Evolved phase was diagnosed by presence of Q waves in ECG, which were at least 0.04 sec in duration, or more than 25% of the concerned R waves.

Site of infarction was defined by ECG changes as defined below:

Antero-septal AMI: ST segment elevation in V1 to V4 leads
Antero-lateral AMI: ST segment elevation in I, avL, V5 and V6.

Extensive anterior wall AMI: Combination of antero-septal and antero-lateral AMI

Inferior wall AMI: ST segment elevation in leads II, III and Avf

Inferior wall plus posterior wall AMI: Inferior wall AMI changes along with ST segment elevation in posterior leads (V7, V8 and V9). Tall T waves, horizontal ST depression, tall and broad R waves in V1, V2 and V3 are some changes which AMI gives clue for posterior wall involvement in cases on inferior wall AMI.

Inferior wall AMI plus right ventricular infarction: Inferior wall AMI changes along with ST elevation in right sided leads (V3R to V6R). ST elevation in V1> V2, or ST elevation in V1 and ST depression in V2, or ST elevation in lead III> lead II were also looked for, because these changes many times accompany right ventricular infarction.

Results

In this study, out of 40 participants, 38 were males (95%) and 2 were females (5%). The maximum number of patients were in age group of 36-40 years (n=15, 37.5%), followed by age group of 31-35 years (n=12, 30%). (Table 1)

Table 1 Frequency distribution of age and sex

Age group (years)	Male	Female	Total	Percentage
16-20	1	0	1	2.5%
21-25	3	0	3	7.5%
26-30	9	0	9	22.5%
31-35	10	2	12	30%
36-40	15	0	15	37.5%
Total	38	2	40	100%

In this study, maximum number of patients presented with chest pain (n=35, 87.5%), followed by perspiration (35%, n=14), breathlessness (n=11, 27.5%), palpitation (n=9, 22.5%), vomiting (n=7, 17.5%), and syncope (n=5, 12.5%). (Figure 1) The most common sign seen in these patients was tachypnea (n=15, 37.5) followed by hypertension (n=10, 25%), tachycardia (n=6, 15%), raised JVP (n=6, 15%), cyanosis (n=2, 5%), and unrecordable BP (n=1, 2.5%). (Table 2)

Table 2 Clinical profile of study participants (n=40)

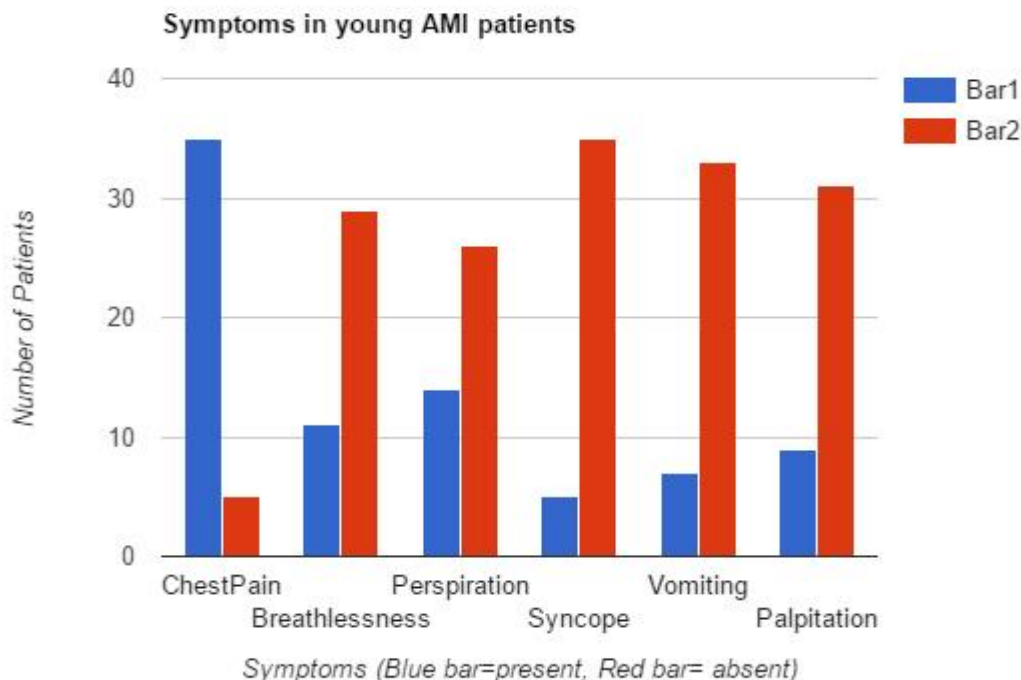| Profile	Number	Percentage
Signs		
Tachycardia	6	15%
Bradycardia	3	7.5%
Tachypnea	15	37.5%
Hypertension	10	25%
Non recordable BP	1	2.5%
Raised JVP	6	15%
Cyanosis	2	5%

Figure1: Symptoms in young patients with AMI

In our study, patients were classified into 4 groups according to the levels of physical activity they were engaged in. Class I represented physically inactive patients, class IV were manual labourers, Class II had sendentary lifestyle, while those belonging to class III were engaged in moderate physical activity. Maximum number of patients in our study belonged to class II group, with sedentary lifestyle (n=16, 40%), followed by class III (n=10, 25%), class I (n=9, 22.5%), and class IV (n=5, 12.5%). (Table 3)

Table 3 Physical activity of study participants

Grades of physical activity	Number	Percentage
I	9	22.5%
II	16	40%
III	10	25%
IV	5	12.5%

Out of 40 patients, 28 patients were smokers (70%), 19 patients were chronic alcoholics (47.5%), 11 patients had body mass index (BMI) more than 25 (27.5%), 10 patients had high blood pressure (25%), 7 patients were known cases of diabetes (17.5%), and 6 patients had a family member who was diagnosed with myocardial infarction in early age (15%). High serum cholesterol (>200 mg%) was seen in 22 patients (55%), increased LDL cholesterol value (>130mg%) was noted in 21 patients (52.5%), low HDL cholesterol levels (<35 mg%) were seen in 10 patients (25%), while increased triglyceride levels (>200 mg%) were seen in 12 patients (30%). (Table 4). In our study, maximum number of patients belonged to Killip class I (n=24, 60%), followed by Killip class II (n=10, 25%). (Table 5)

Table 4 Frequency distribution of underlying co-morbidity (n=40)

Co-morbidity	Yes		No	
	number	percentage	Number	percentage
Smoking	28	70%	12	30%
Diabetes mellitus	7	17.5%	33	82.5%
Hypertension	10	25%	30	75%
alcoholism	19	47.5%	21	52.5%
Mean BMI>25	11	27.5%	29	72.5%
Family history	6	15%	34	85%
Cholesterol>200 mg%	22	55%	18	45%
HDL<35 mg%	10	25%	30	75%
LDL>130 mg%	21	52.5%	19	47.5%
Triglycerides	12	30%	18	70%

Table 5 Killip classification

Killip's classification		
I	24	60%
II	10	25%
III	3	7.5%
IV	3	7.5%

Based on ECG, out of 40 patients, 36 patients had ST elevation MI (90%), and 4 patients had non-ST elevation MI (10%). Anterior wall MI was the commonest presentation (67.5%), 19 patients had anterolateral MI (47.5%), and 15 patients (37.7%) had anteroseptal MI. Inferior wall MI was diagnosed in 37.5% of the patients, Inferior wall with posterior wall MI was seen in 3 patients (7.5%), while inferior wall MI with right ventricular extension was seen in 2 patients (5%). (Table 6)

Table 6: Site of infarction, ST segment presentation

Presentation	Number	Percentage
Anterolateral	19	47.5%
Anteroseptal	15	37.5%
Inferior	15	37.5%
Inferior + Posterior	3	7.5%
Inferior + Right ventricular	2	5%
ST Segment		
ST segment elevation AMI	36	90%
ST depression AMI	4	10%

Discussion

AMI is more common after fourth decade of life, and age is the most strongly associated risk factor of ischemic heart disease, yet its incidence in the young patients has been increasing for the last few years. (11, 12) This study conducted in young patients, showed that the prevalence of AMI is more in males as compared to females (95% vs. 5%), which is in concordance with the previous studies.(11,12) The lesser disease burden in females could be due to protective effect of estrogens in pre-menopausal women. (13)

In this study 62.5% of patients belonged to lesser physical activity groups (class I and II) and 37.5% of the patients belonged to moderate to high physical activity groups (class III and IV). These findings are also in concordance to the well known fact that sedentary lifestyle predisposes to the risk of coronary artery disease. Here it is important to mention that in cases of AMI in young and physically active individuals, coronary artery spasm may have an important role to play, which occurs commonly at the time of extreme physical activity. (14)

Among various risk factors studied, smoking was found to have strongest association with AMI, which was present in 70% of the patients. Smoking of 20 cigarettes a day or more is associated with two folds increase in risk of AMI. Tobacco smoking is thought to bring out more of thrombotic changes than atherogenic changes. Smoking increases inflammatory markers CRP, and fibrinogen, causes platelet aggregation and causes endothelial dysfunction. (11, 15, 16, 17, 18) Our study has thus confirmed the findings of previous studies that smoking is the most important modifiable risk factor for AMI in young adults. Other important associations with AMI in young individuals, in our study included chronic alcoholism, hypercholesterolemia, hypertension, diabetes and obesity. Similar findings were reported by the earlier studies too. (19)

In this study, chest pain was the most common symptom, followed by perspiration, breathlessness and palpitation. In our study, the most common type of infarction was anterior wall MI followed by inferior wall MI. Similar trends were reported by other researchers in earlier studies. (12, 20, 21, 22, 23)

Conclusion

The incidence of AMI among young individuals is more in the age group of 36-40 years, and it is more commonly seen in males as compared to females. While smoking is the most commonly associated risk factor in young individuals with AMI, other important modifiable associated risk factors are alcohol consumption, obesity, hypertension and high cholesterol levels. Type A personality is an important non- modifiable risk factor. Site of myocardial infarction is anterior wall in majority of these patients. Although chest pain is present in majority of the patients, about 12.5% of the cases may not be associated with chest pain. In these cases, other symptoms and signs including breathlessness, sweating, palpitation, tachypnea, hypertension, bradycardia/ tachycardia etc. are important in suspecting diagnosis of AMI, especially in the presence of risk factors of cardiovascular disease. People should be educated about the increasing incidence of AMI in young individuals and about the role of smoking cessation, lowering cholesterol levels, blood pressure control and diabetic control as possible measures of primary prevention of this disease.

References

1. Andrew G. Bostrom, et al: Elevated Lp (a) coronary heart disease in men aged 55years and younger. JAMA. 1990; 276:544-548.
2. Vaidya CV, Majmudar DK. A study of acute ST elevation myocardial infarction in young patients from government teaching hospital Sudan Med. Monit. 2015: 10; 45-9.
3. 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.
4. Budaj A, Brieger D, Steg PG, Goodman SG, Dabbous OH, Fox KA, *et al.* Global patterns of use of antithrombotic and antiplatelet therapies in patients with acute coronary syndromes: Insights from the Global Registry of Acute Coronary Events (GRACE). Am Heart J. 2003; 146: 999-1006.
5. Xavier D, Pais P, Devereaux PJ, Xie C, Prabhakaran D, Reddy KS, *et al.* Treatment and outcomes of acute coronary syndromes in India (CREATE): A prospective analysis of registry data. Lancet. 2008; 371:1435-42.
6. Bansal NC et al. Precocious Myocardial infarction, IHJ, 1978; 31:200.

7. Baunwald E. Autman M: Acute myocardial infarction, textbook of Cardiovascular Medicine. 2001; 1114- 1219.

8. Chouhan L, Hajar HA, Pomposiello JC. Comparison of thrombolytic therapy for acute myocardial infarction in patients aged <35 and >55 years. Am J Cardiol. 1993; 71:157-9.

9. Hoit BD, Gilpin EA, Henning H, Maisel AA, Dittrich H, Carlisle J, *et al.* Myocardial infarction in young patients: An analysis by age subsets. Circulation. 1986; 74:712-21.

10. Murray CJ, Lopez AD. Alternative projections of mortality and disability by cause 1990-2020: Global burden of disease study. Lancet 1997; 349:1498-504.

11. 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 Medicie, AFMC, Pune; 2009. pp. 1201–12.

12. Pramod M, Surekha M , Milind H. Acute Myocardial Infarction among Young Adults in India: Clinical Profile and Risk Factors. International Journal of Innovative Research in Medical Science. 2016; 01(9): 366-371.

13. James TM. Post HW. Smith FJ: Myocardial infarction in young woman, Arhc. Int. Med.1955; 43:153-164.

14. Braunwald Heart disease, 6th edition, 2001; Chapter 31: page 1010-1039.

15. Alizadehasl A, Sepasi F, Toufan M. Risk factors, clinical manifestations and outcome of acute myocardial infarction in young patients. J Cardiovasc Thorac Res. 2010; 2(1):29–34.

16. Zimmerman FH, Cameron A, Fisher LD, Ng G. Myocardial infarction in young adults: Angiographic characterization, risk factors and prognosis (coronary artery surgery study registry). J Am Coll Cardiol. 1995; 26(3):654–61.

17. 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.

18. Memon AG, Shaikh FH, Shaikh MK. Myocardial infarction in young patients. J Liaquat Med Health Sci. 2016; 15(04): 164-7.

19. Wolfe MW, Vacek JL. Myocardial infarction in the young. Angiographic features and risk factor analysis of patients with myocardial infarction at or before the age of 35 years. Chest. 1988; 94(5):926–30.

20. Gurpaal Singh, Arava I S et al: Myocardial infarction in young population. Indian Heart Journal. 2002; 15-4, 587- 596.

21. Shah V, Jain U. Clinical profile of acute myocardial infarction in young adults. Int J Med Sci Public Health. 2016; 5:1709-1713.

22. Al-Khadra AH. Clinical profile of young patients with acute myocardial infarction in Saudi Arabia. Int J Cardiol. 2003; 91:9-13.

23. Goornavar SM, Pramiladevi R, Biradar Satish B, Sangamesh M. Acute myocardial infarction in young. J Pharm Biomed Sci. 2011; 8:1-5.

Access this Article in Online	
Quick Response Code	Website: www.ijcrims.com
	Subject: Medical Sciences