International Journal of Advances in Medicine
Patil PR et al. Int J Adv Med. 2017 Aug;4(4):1144-1149
http://www.ijmedicine.com
pISSN 2349-3925 | eISSN 2349-3933
DOI: http://dx.doi.org/10.18203/2349-3933.ijam20173248

Original Research Article

Incidence of cardiac arrhythmias in patients with acute myocardial infarction during the first 48 hours of the onset of chest pain

Puneet Rajendra Patil[1]*, Pankaj Khatana[2], Dilip Ratan Patil[3]

[1]Assistant Professor, Department of General Medicine, ACPM Medical College, Dhule, Maharashtra, India
[2]Junior Resident, Department of General Medicine, ACPM Medical College, Dhule, Maharashtra, India
[3]Professor and Head, Department of General Medicine, ACPM Medical College, Dhule, Maharashtra, India

Received: 13 June 2017
Accepted: 07 July 2017

***Correspondence:**
Dr. Puneet Rajendra Patil,
E-mail: prpatilacpm@gmail.com

ABSTRACT

Background: It is predicted that there will be an increase of 111% in cardiovascular deaths in India by the year 2020 compared to the year 1990. This is much higher than that predicted in any other region both in Asia as well as outside Asia. The objective of this study was to study the incidence of cardiac arrhythmias in acute myocardial infarction during the first 48 hours.
Methods: The descriptive study was conducted over a period of two years from April 2016 to January 2017. A total of 102 patients were studied. They were admitted to ICU. Their admission was done as soon as they had chest pain. They were first confirmed to have acute myocardial infarction. All eligible study subjects as per inclusion and exclusion criteria were considered in the present study. Detailed history was taken. A thorough physical examination was done with emphasis on the cardiovascular system.
Results: Maximum number of patients was in the age group 51-60 years in both males (37.97%) and females (65.22%). Acute MI observed mostly in the postmenopausal age in all the females. Incidence of myocardial infarction was significantly more in men (77.50%) compared to women (22.50%). 52.90% were smokers. Almost half of the patients had shown anterior wall infarction. The incidence of cardiac arrhythmias was 78.70%. Arrhythmias were more common among elderly female. Maximum arrhythmias were observed in the age group ranging from 50 to 60 years (36.27%).
Conclusions: The incidence of cardiac arrhythmia was found to be 78.7% in the present study. The incidence of cardiac arrhythmia was more in the age group 50-60 years (36.27%).

Keywords: Acute myocardial infarction, Incidence, Symptoms

INTRODUCTION

Many reports point out towards the fact that coronary artery disease (CAD) is a rapidly emerging epidemic. It is affecting the young Indians. It is characterized by severe and diffuse lesions.[1] A coronary artery disease causes 3 million deaths per year, accounting for 25% of all mortality in India. Hospitals statistics reveal that 20-25% of all medical admissions are due to Coronary artery disease. According to the National Commission on Macroeconomics and Health (NCMH), there would be around 62 million patients with CAD by 2015 in India, and of these, 23 million would be patients younger than 40 years of age.[2]

It is predicted that there will be an increase of 111% in cardiovascular deaths in India by the year 2020 compared to the year 1990. This is much higher than that predicted

in any other region both in Asia as well as outside Asia.[3] Last decade witnessed that there has been much more research and advancement in the technology to save the life of patients having acute myocardial infarction. This is especially focused on saving the life of the patients within 24-48 hours of onset of chest pain. Some examples like coronary care units, reperfusion therapy and many more such innovations helped to reduce the death rates to a large extent.[4]

Reports on incidence of cardiac arrhythmias and its risk factors among patients with acute myocardial infarction especially after onset of chest pain within first 24-48 hours are relatively lacking in countries like India. In the present study, we tried to focus on the inclusion of patients who had been admitted with chest pain and were able to reach the hospital within 24-48 hours of their admission. This study was conducted to find out the incidence of cardiac arrhythmias and its risk factors among these patients.

METHODS

The study was conducted in our hospital over a period of two years from April 2016 to January 2017. 102 patients admitted to intensive care unit within the first 48 hours of onset of chest pain were selected to enter the study. This was a descriptive study.

Inclusion criteria

- Patients who were able to reach the hospital within 48 hours of onset of chest pain
- Diagnosis of acute myocardial infarction based on ECG changes and raised CPK-MB levels
- Diagnosis of cardiac arrhythmias based on ECG.

Exclusion criteria

- Myocardial infarction 48 hours old or more
- Previously known cases of conduction blocks
- Known cases of congenital heart block and congenital QT prolongation syndrome.

Study population

A total of 102 patients were recruited on admission to the intensive care unit at our hospital. In this study, we included 79 males and 23 females. Patients with confirmed diagnosis of acute myocardial infarction and satisfying the inclusion and exclusion criteria were included in the study group.

Criteria for diagnosis

ST segment elevation Myocardial infarction was diagnosed upon the basis of following triad. Presence of 2 out of 3 criteria confirms the diagnosis of myocardial infarction.

Cardiac chest pain

The type of pain described by patient like deep, squeezing and crushing, stabbing or burning, feeling of heavy in the chest.

Electrocardiographic changes

ST segment elevation: any one of following:

a) New or presumably new Q waves (at least 30 ms wide and 0.20 mv deep) in at least two leads in any one of the following leads.

- II, III or avF
- Leads V1 through V6 or
- Leads I and avL.

b) New or presumably new ST-T segment elevation (>0.01 mv measured 0.02 s after J point in two contagious leads of previously mentioned lead combination) or

c) Complete left bundle branch block in appropriate clinical setting.

d) The ECG diagnosis of right ventricular (RV) infarction offers special challenges. Right ventricular infarction occurs in the presence of inferior left ventricular infarction, and the resulting ST elevation is usually overwhelmed in the conventional precordial leads overlying the right ventricle (V2, V3) by the ST elevation in the opposing LV myocardium on the inferior surface. ST elevation must be sought in the right chest leads, V1 and V3R through V6R; when found it provides reasonably strong evidence for the presence of RV infarction.

Serum cardiac biomarkers

Diagnostic rise in CPK-MB level (ratio >2.5 of CPK to MB).

Clinical data

A detailed history with special reference to the cardiovascular system was taken. A thorough physical examination was done with emphasis on the cardiovascular system.

Investigations

- Routine blood investigation: Hemogram, serum electrolytes, blood urea nitrogen, serum creatinine, blood sugar level, urine examination
- Electrocardiogram: 12 lead ECG taken at the time of admission, at 24 hours, at 48 hours and at the time of arrhythmia
- Chest X-ray

- CPK-MB, Lipid profile.
- 2D-Echocardiography whenever possible during the first 48 hours of hospitalisation.

Also, the patients were observed in the intensive care unit with multi parameter monitors to monitor the patients for the 48 hours and the pattern of arrhythmia.

Statistical analysis

The current study is hospital based descriptive study. The test of significance used between the associations of different characteristics was the Chi square test. For statistical significance, the p value was calculated and a value less than 0.05 considered significant. SPSS 16 was used to analyze the data.

RESULTS

Table 1 shows that 37.97% of males were in the 50-59 years age group while females were above the age of 40 i.e. postmenopausal with higher incidence in the 50-59 years age group. Table 2 shows that 52.90% were smokers followed by consumers of alcohol (39.20%). 38.2% were having hypertension. Diabetes was seen among 36.30%. Obesity was noted in 31.40% of the subjects.

Table 1: Age and sex wise distribution of patients.

Age group	Sex		
	Male	Female	Total
20-29	5.06%	0.00%	3.92%
30-39	5.06%	0.00%	3.92%
40-49	16.46%	8.70%	14.71%
50-59	37.97%	65.22%	44.12%
60-69	25.32%	8.70%	21.57%
70-79	10.13%	17.39%	11.76%
Total	100%	100%	100.0%

Table 2: Distribution of risk factors among the patients.

Risk factors	Yes		No	
	N	%	N	%
Smoking	54	52.9%	48	47.1%
Alcohol	40	39.2%	62	60.8%
Hypertension	39	38.2%	63	61.8%
Diabetes	37	36.3%	65	63.7%
Obesity	32	31.4%	70	68.6%

Table 3 shows that chest pain was the most common symptom present in 88.20% of cases. Palpitation (23.50%), breathlessness (17.60%) and sweating (14.70%) were the other common symptoms seen in the cases.

Table 4 shows that the incidence of anterior wall myocardial infarction was 50.00% followed by inferior wall myocardial infarction (34.30%). 6 cases (5.9%) each had shown the inferior wall myocardial infarction with right ventricular involvement and lateral wall myocardial infarction.

Table 5 shows distribution of cases as per the presence of thrombolysis. It was found that majority of patients 69 (67.60%) were thrombolysed. A total of 33 cases were found to have no thrombolysis.

Table 3: Symptomatology of cases among the study subjects.

Symptomatology	Yes		No	
	N	%	N	%
Chest pain	90	88.2%	12	11.8%
Sweating	15	14.7%	87	85.3%
Breathlessness	18	17.6%	84	82.4%
Palpitation	24	23.5%	78	76.5%
Vomiting	12	11.8%	90	88.2%
Giddiness	14	13.7%	88	86.3%

Table 4: Site of infarction among the study subjects.

Site of Infarction	Frequency	Percentage
Anterior wall myocardial infarction	51	50.00%
Infero-lateral wall myocardial infarction	4	3.90%
Inferior wall myocardial infarction	35	34.30%
Inferior wall myocardial infarction with right ventricular involvement	6	5.90%
Lateral wall myocardial infarction	6	5.90%
Total	102	100%

Table 5: Distribution of cases as per the presence of thrombolysis.

Thrombolysis	Frequency	Percentage
No	33	32.40%
Yes	69	67.60%
Total	102	100%

Table 6 shows distribution of cases as per the arrhythmia occurrence. It has been observed that the incidence of arrhythmia during first 48 hours of acute myocardial infarction was 78.4%. 21.6% were not having arrhythmia.

Table 6: Distribution of cases as per the arrhythmia occurrence.

Arrhythmia	Frequency	Percentage
No	22	21.60%
Yes	80	78.40%
Total	102	100%

Table 7: Age distribution of cases with arrhythmia.

Age group	Arrhythmia		Total
	Yes	No	
20-29	1.96%	1.96%	3.92%
30-39	1.96%	1.96%	3.92%
40-49	12.75%	1.96%	14.71%
50-59	36.27%	7.84%	44.12%
60-69	17.65%	3.92%	21.57%
70-79	7.84%	3.92%	11.76%
Total	78.43%	21.57%	100.00%

Table 7 shows age distribution of cases with arrhythmia. It has been noted that among those who had arrhythmias, majority were in the 50-59-year group (36.27%) followed by 60-69-year group (17.65%). Younger age group was found to be less vulnerable to arrhythmias as they had only 1.96% of incidence. As the age increased the incidence of arrhythmia also increased till 60 years of age and then it decreased.

Table 8 shows sex wise distribution of cases of arrhythmia. It has been observed that, arrhythmias were more common in females than males. Three fourths of men had arrhythmias compared to 100% in women. Table 9 shows distribution of arrhythmia with thrombolysis. It has been found that arrhythmias occurred more in those who were thrombolysed (68.75%) than in those who were not thrombolysed (63.64%).

Table 8: Sex wise distribution of cases of arrhythmia.

Arrhythmia	Sex				Total
	Female		Male		
	Frequency	Percentage	Frequency	Percentage	
No	0	0.00%	22	27.85%	22
Yes	23	100.00%	57	72.15%	80
Total	23	100.00%	79	100.00%	102

DISCUSSION

In this present study, myocardial infarction was more common with the age group 50-59 years (44.10%). Overall incidence of myocardial infarction was more i.e. 77.50% over the age 50 years. As per the observation of American Heart Association there is more incidence of AMI among the old age population. The incidence of AMI is more likely among the population aged 45 years and more.[5]

Deshpande JD et al, in their study observed that, the incidence of AMI was highest i.e. 31% among the study subjects with 51 to 60 years.[6]

This study showed males (77.50%) predominance over the females (22.50%). Acharya LD et al, also reported similar findings in accordance with the findings of the present study.[7]

Siddique MB et al, also observed males (67%) predominance over the females (33%).[8]

In the present study, smoking and alcohol were the major risk factors in accordance with Deshpande JD et al study.[6]

Majority of patients of myocardial infarction in present study were presented with chest pain (88.20%) followed by palpitation (23.50%), breathlessness (17.60%) and sweating (14.70%).

Chowta KN et al found that 80% of patients presented with chest pain followed by breathlessness (28.30%).[9]

In the present study, anterior wall myocardial infarction was the most common infarction and had incidence of 50% followed by inferior wall infarction (34.30%). Yadav P et al, in 2010, conducted a study of 200 cases of acute coronary syndrome in Indore and showed that anterior wall myocardial infarction as common site of presentation (54%) while inferior wall 41%.[10]

Out of 102 patients in our study, 69 (67.60%) patients were thrombolysed while 33 (32.40%) not thrombolysed. In the present study, arrhythmia was detected in 80 (78.40%) of the patients with majority of arrhythmias occurred in the age group of 50-59 years (36.27%).

Stock E et al, studied 200 patients of myocardial infarction and found that thirty-five patients (17.5%) maintained sinus rhythm; the remaining 165 (82.5%) had arrhythmias. Gurpal Singh et al, studied 50 patients of myocardial infarction and found that overall incidence of arrhythmia was 93%.[11,12]

Yadav P et al in 2010 conducted a study of 200 patients for the clinical profile and risk factors in the patients of acute coronary syndrome. They found that majority of the patients had arrhythmias (60%) during their hospitalization.[10]

The majority of arrhythmias (90%) in our study occurred during the first 24 hours of symptoms with maximum were within the first hour in the both males (46.25%) and females (18.75%).

Aufderheide TP et al noted that 90% were having abnormality of cardiac rhythm.[13] 25% had cardiac conduction disturbance within 24 hours following infarct onset.[13]

In the present study, most of the arrhythmias occurred in the AWMI (42.50%) followed by the IWMI (40.00%). Ventricular premature complex (13.75%) and sinus tachycardia (10%) were the most common arrhythmia in AWMI while sinus bradycardia (17.5%) and atrio-ventricular blocks (15%) were more common in IWMI.

Hreybe H et al, in 2009 conducted a study on incidence of cardiac arrhythmias by site of AMI consisting of 21,807 patients of AMI.[14] They found that incidence of arrhythmias is more common with anterior or lateral wall MI (30.2%) than inferior or posterior wall MI (29%).[14]

In the present study, arrhythmias occurred more in those who were thrombolysed (68.75%) than in those who were not thrombolysed (63.64%). During thrombolysis, ventricular premature complexes (10; 14.49%) and accelerated idioventricular rhythm (5; 7.25%) found as a commonest arrhythmia while 46 (66.67%) not developed any arrhythmias during thrombolysis.

Maggioni AP et al found that majority of the patients treated with thrombolytic agents like streptokinase and tissue plasminogen activator developed more ventricular arrhythmias (above 60%).[15]

Hohnloser SH et al concluded that ventricular arrhythmias particularly accelerated idioventricular rhythms and single ventricular premature beats occur more frequently in patients with a patent infarct artery within the first 24 hours after thrombolysis.[16]

In a study by Solimene MC et al, reperfusion arrhythmias observed in 75% patients and consisted of ventricular arrhythmias and/or sinus bradycardia.[17] This study group was compared to another group with AMI treated conventionally and there was no difference between both groups about the incidence and type of ventricular arrhythmia.[17]

CONCLUSION

The incidence of cardiac arrhythmia in patients of acute myocardial infarction was 78.70%. The incidence of cardiac arrhythmia is more in the age group 50-60 years (36.27%). The most common arrhythmia observed in the patients of acute myocardial infarction is ventricular premature complex (37.50%). Sinus bradycardia (22.50%) is the second most common arrhythmia observed. Atrial flutter, multifocal atrial tachycardia and atrio-ventricular nodal re-entrant tachycardia are not observed in any patients of acute myocardial infarction.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the institutional ethics committee

REFERENCES

1. Rissam HS, Kishore S, Trehan N. Coronary artery disease in young Indians: the missing link. J Ind Acad Clin Med. 2001;2(3):128-32.
2. Clinical Management Guidelines for Coronary Artery Disease for National Programme for Prevention and Control of Diabetes, Cardiovascular Disease and Stroke. Department of Cardiology and Community Medicine, Post-Graduate Institute of Medical education and Research, Chandigarh, India. 2008-2009.
3. Grover G, Dutta R, Gadpayle AK, Saha S. Changing patterns of cardiovascular risk factors and heart related sickness in relation with acute myocardial infarction in Delhi, India. J Ind Med Assoc. 2009;107(9):636-8.
4. Boersma E, Mercado N, Poldermans D, Gardien M, Vos J, Simoons ML. Acute myocardial infarction. The Lancet. 2003;361(9360):847-58.
5. Heart Disease and Stroke Statistics. American Heart Association. 2008:1-40.
6. Deshpande JD, Dixit JV. Risk factors for acute myocardial infarction: a hospital based case control study. health and population: Perspectives and Issues. 2008;31(3):164-9.
7. Faizal P, Acharya LD, Padmakumar R, Boppanna K, Pandey S. Evaluation of risk factors and in-hospital outcomes in patients with coronary artery disease in a tertiary care teaching hospital. Int J Pharm Tech Res. 2009;1(4):1378-86.
8. Muhammad BS, Fazal I, Ejaz A, Awan ZI. Frequencies and patterns of arrhythmias in anterior and inferior myocardial infarction. Pakistan Armed Forces Med J. 2009;59(4).
9. Chowta KN, Prijith PD, Chowta MN. Modes of presentations of acute myocardial infarction. Indian J Crit Care Med. 2005;9(3):151-4.
10. Yadav P, Joseph D, Joshi P, Sakhi P, Jha RK, Gupta J. Clinical profile and risk factors in acute coronary syndrome. National J Comm Med. 2010;1(2):150-1.
11. Stock E, Goble A, Sloman G. Assessment of arrhythmias in myocardial infarction. Br Med J. 1967;2:719-23.
12. Singh G, Shergill CS. Clinical profile of Q-wave and non-Q wave myocardial infarction. J Indian Academy Clin Med. 2004;5(1):24-6.
13. Aufderheide TP. Arrhythmias associated with acute myocardial infarction and thrombolysis. Emerg Med Clin North Am. 1998;16(3):583-600.

14. Hreybe H, Saba S. Location of acute myocardial infarction and associated arrhythmias and outcome. Clin Cardiol. 2009;32(5):274-7.
15. Maggioni AP, Zuanetti G, Franzosi MG, Rovelli F, Santoro E, Staszewsky L, et al. Prevalence and prognostic significance of ventricular arrhythmias after acute myocardial infarction in the fibrinolytic era. GISSI-2 results. Circulation. 1993;87(2):312-22.
16. Hohnloser SH, Zabel M, Olschewski M, Kasper W, Just H. Arrhythmias during the acute phase of reperfusion therapy for acute myocardial infarction: Effects of β-adrenergic blockade. Am Heart J. 1992;123(6):1530-5.
17. Solimene MC, Ramires JF, Bellotti G, Tranchesi B, Pileggi F. Reperfusion arrhythmias in acute myocardial infarction: fact or coincidence?. Int J Cardiol. 1988;20(3):341-51.

Cite this article as: Patil PR, Khatana P, Patil DR. Incidence of cardiac arrhythmias in patients with acute myocardial infarction during the first 48 hours of the onset of chest pain. Int J Adv Med 2017;4:1144-9.