A study of arrhythmias during the first 48 hours of acute myocardialinfarction in rural population

**Dr. Dipak D. Bhangale, **Dr. S.N.Mahajan, ***Dr. Satish Varpe

*Postgraduate student, **Professor, ***Assistant Professor

Corresponding Author : Dr. Dipak D. Bhangale

Mail id :mahajandr99@rediffmail.com

Mobile No.: 8329937199

Address : Department of Medicine, Rural Medical College, Loni, Ahmednagar, Maharashtra

Abstract :

Aim : To study the patterns and course of electro cardiographic rhythm changes during and within 48 hours in patients of acute myocardial infarction patients admitted in tertiary care hospital.

Materials and Methods : This prospective study was undertaken in 100 patients. Patients of AMI based on the Third Universal Definition of Myocardial Infarction with arrhythmia within first 48 hours from initial symptoms, of age above 18 years of any gender and will be participate by signing written informed consent were included in the study. Patients previously known cases of conduction blocks, known cases of congenital heart block and congenital QT prolongation syndrome and whose death occurred within 48 hours were excluded from the study. The personal history, diagnosis, relationship of arrhythmia with site of AMI, timing was recorded.

Results : Among 100 cases, maximum incidence was found after 5th decade. Incidence of arrhythmias was higher in males (71%). Anterior wall infarcts (49%) were more common than inferior wall (39%). Ventricular Premature Contraction (VPC) (20.3%) was the commonest arrhythmia. Of the 79 patients who experienced arrhythmia, a large number of arrhythmias resolved spontaneously (55.6%) while other cases were terminated pharmacologically (22.7%) or electrically (8.8%) whereas 12.6 % of the arrhythmias persisted in spite of treatment. There was no significance association of history of smoking, drinking, hypertension and diabetes with occurrence of arrhythmia. However, there was significant increase in arrhythmia in thrombolysed cases. **Conclusion:** Older males are affected by AMI more commonly. Arrhythmias are more common in anterior wall with Ventricular Premature Contraction as the most common arrhythmia. Thrombolysis is associate with higher occurance of arrhythmia. While most arrhythmias can resolve spontaneously, intervention is needed in many cases. **Keywords:** Arrhythmia, Acute myocardial infarction, Location of infarct, Thrombolysis.

Introduction : Coronary artery disease is responsible for causing one in eight deaths world-wide. The risk of CAD in Indians is 3-4 times higher than White Americans and 6 times higher than Chinese. The prevalence of coronary artery disease in Asian Indians has to be viewed with concern. Indian sareproneasa community to CAD at a much younger age.[2]

During thelastfewdecades the care of acute cardiac emergencies has dramatically improved due to introduction of in tensive hemodynamic monitoring, immediate appropriate care in association with the use of cardi oversion,artificial pacemaker, anti-arrhythmic drugs and particularly thrombolytic therapy. The ICCUs have provided a wealth of new knowledge on the natural history, incidence of arrhythmias and the prognosis ofAMI in hospitalized patients [3-6].

A substantial number of patients with acute myocardial infarction have some cardiac rhythm abnormality, and approximately twenty-fivepercenthavecardiac conduction disturbance within 24 hours following infarct onset. Almost any rhythm disturbance can be associated with acute myocardial infarction, including brady arrhythmias, supraventricular tachyarrhythmias, ventricular arrhythmias, and atrio ventricular block7. With the advent of thrombolytic therapy, it was found that some rhythm disturbances in patients with acute myocardial infarction may be

related to coronary artery reperfusion.[8]

Reperfusion therapy has become the mainstay in the treatment of acute myocardial infarction with the goal of restoring flow in the occluded infarct-related artery and thus potentially salvaging ischemic myocardium.[9]

However, reperfusion has been referred as a double edged sword because reperfusion itself may lead to accelerated and additional myocardial injury beyond that generated by ischemia alone. This results in a spectrum of reperfusion associated pathologies, collectively called as reperfusion injury.[10]

The purpose of this study was to evaluate the incidence and profile of cardiac arrhythmias in acute myocardial infarction in the first 48 hours of hospitalization in rural population. As Indian data on this study is very scarce and those that have been done are in specialized urban care centre.

Aim and Objective : To study the patterns and course of electro cardiographic rhythm changes during and within 48 hours in patients of acute myocardial infarction patients admitted in tertiary care hospital.

Materials & Methodology : The present study was carried out in Department of Medicine.

Study period:- 2 years

Sample Size:- 100 cases.

Study design:-Cross Sectional Analytical study.

Study population: Patients with diagnosis of acute myocardial infarction admitted in tertiary hospital and satisfying the inclusion and exclusion criteria were included in the study.

Inclusion criteria : Patients of AMI based on the Third Universal Definition of Myocardial Infarction10 with/without arrhythmia within first 48 hours from initial symptoms, of age above 18 years of any gender and will be participate by signing written informed consent were included in the study.

Exclusion criteria : Patients previously known cases of conduction blocks, known cases of
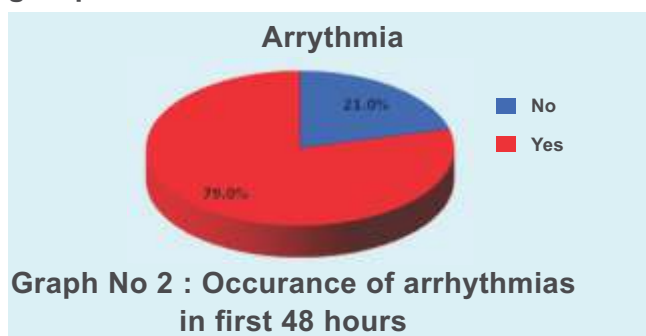
congenital heart block and congenital QT prolongation syndrome and whose death occurred within 48 hours were excluded from the study.

The study protocol is approved by the institutional ethics committee.All the cases were studied for detailed history, clinical examination, Twelve lead ECG changes at admission, 6 hours, 24 hours, 48 hours and at the time of arrhythmia and Troponin –T levels. The diagnosis of arrhythmia was made as per AHA guidelines. Alcohol use disorder as defined in DSM 5. 2D-Echocardiography was recorded where ever done.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 was considered significant. SPSS 16 was used to analyze the data.

Results : A total of 100 patients were included in the study, of which 71 patients among these were males.

Graph No 1 : Age wise Distribution of Cases
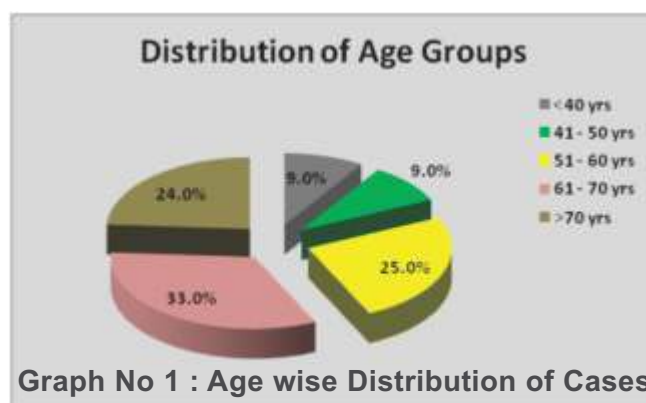
The most common age group affected was 61-70 years, followed by 51-60 and >70 years group.

Graph No 2 : Occurance of arrhythmias in first 48 hours
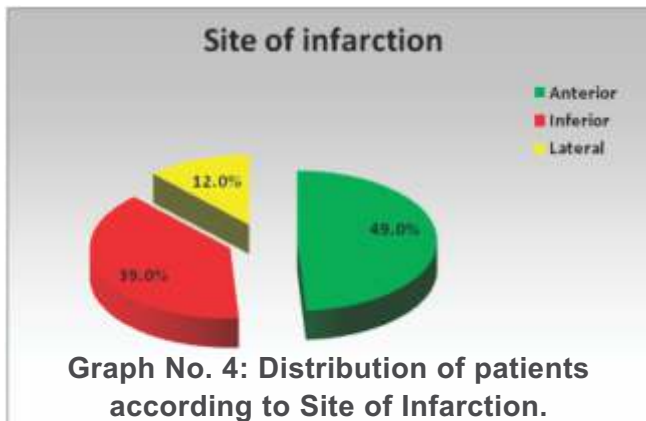
In this study 79% of Acute myocardial infarction patients developed arrhythmias in first 48 hours.
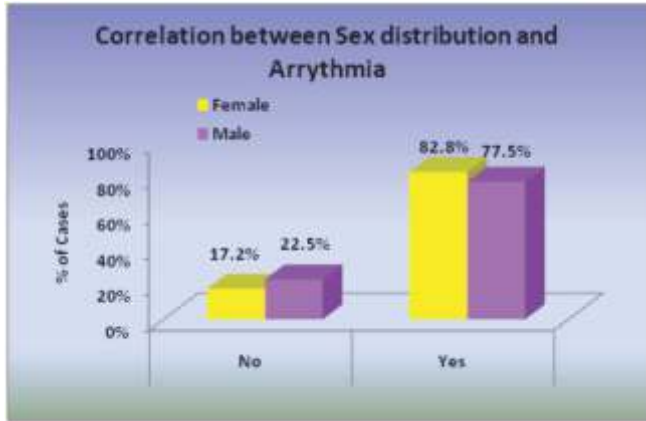

Graph No 3. Sex wise occurance of arrhythmia in patients of AMI within 48 hours.

Shows that in total female patients (29), 82.8% developed arrhythmias and in total male patients (71) 77.5% developed arrhythmias.


Graph No. 4: Distribution of patients according to Site of Infarction.

Graph No. 4Shows that majority of cases had anterior wall myocardialinfarction (49.00%) followed by inferior wall myocardial infarction (39.00%).
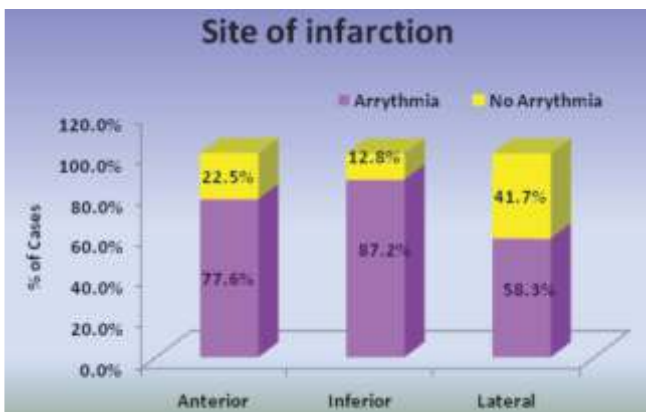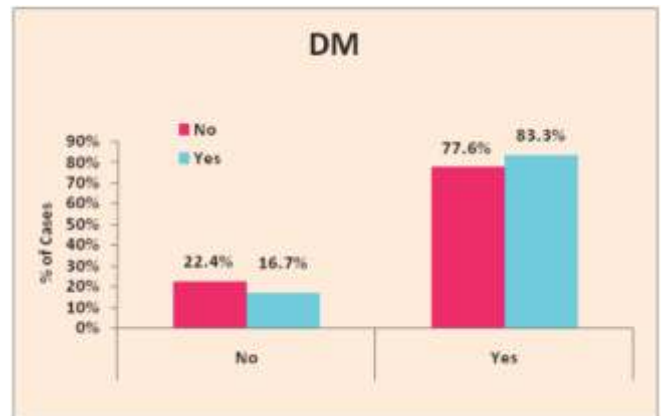

Graph No 5:Occurrence of arrhythmia according to site of infarction.

Graph No 5 shows that occurrence of arrhythmias was maximum in Inferior wall (87.2%) followed by anterior wall (77.6%) and minimum in lateral wall MI (58.3%) which was statistically insignificant by Chi square test (p=0.094).
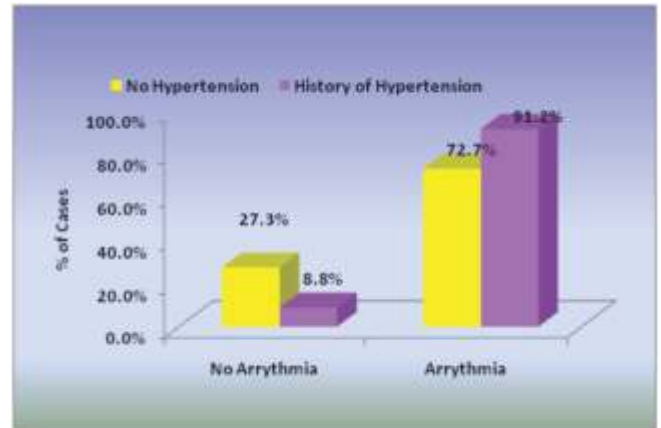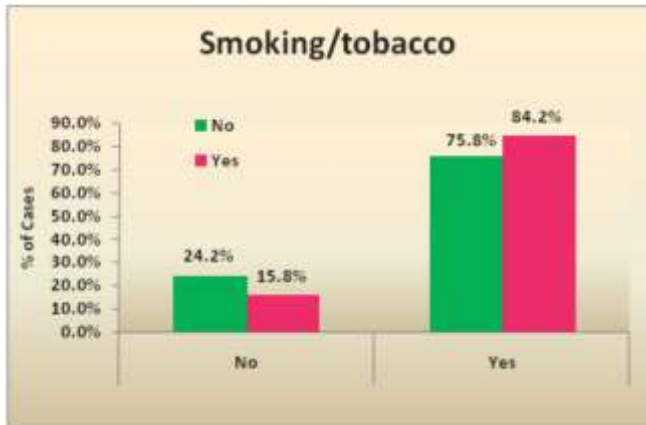

Graph no 6: Occurrence of arrhythmia according to history of hypertension.

Graph no 6 shows that 91.2% of hypertensive patients had arrhythmias in 48 hours of arrhythmias. Odds of having arrhythmias in hypertensive patients is 3.875 times greater than non-hypertensive patients (P= 0.039).
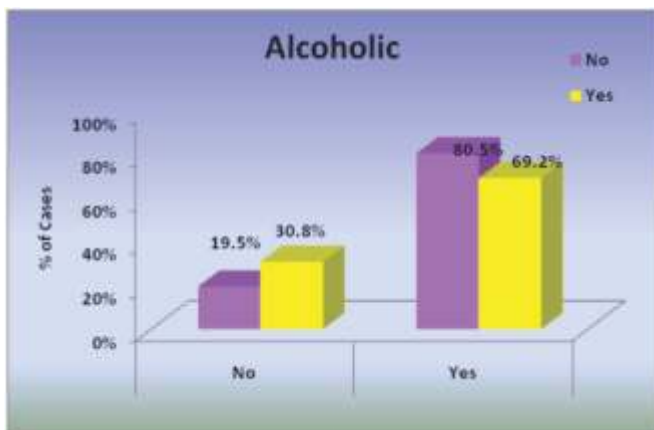

Graph no 7. Occurrence of arrhythmia according to history of Diabetes

Graphno 7 shows that 83.3% of diabetic patients developed arrhythmias in first 48 hours of AMI compared to 77.6% of non diabetic patients.Odds of having arrhythmias in Diabetic patients is 1.441 times greater than non-diabetic patients, which is statistically insignificant (p=0.775).
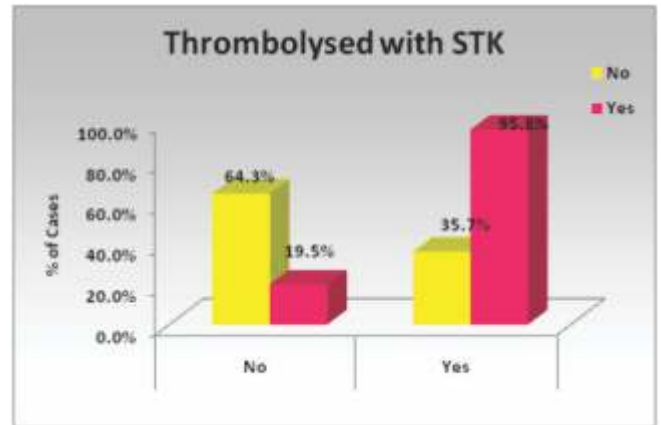
Graph no 8: Occurrence of arrhythmia according to history of smoking.

Graph no 8 shows that 84.2% of tobacco consumer patients developed arrhythmias in first 48 hours of AMI compared to 75.8% of non tobacco consumer patients.Odds of having arrhythmias in tobacco cosumer patients is 1.702 times greater than non-tobacco consumer patients (p=0.317).

Graph no 9: Occurrence of arrhythmia according to history of Alcohol drinking.

Graph no 9shows that 69.2% of alcoholics patients (13) developed arrhythmias in first 48 hours of AMI compared to 80.5% of non alcoholic patients (87). There was no statistical significance by odds ratio ie, OR= 0.546 (p=0.464).


Graph no.10: Thrombolysation therapy and Occurrence of Arrhythmias

Graph no.10shows that 95.8% of thrombolysed patients developed arrhythmias in first 48 hours of AMI compared to 37.5% of non-thrombolysed patients.Odds of having arrhythmias in thrombolysis patients is 41.4 times greater than non-tobacco consumer patients. There was statistical difference in patients with respect to occurance of arrhythmia (p<0.001).

Time of appearance of Arrythmia	No of patients developed arrythmias	Arrythmia	
		No	Yes
0-6	53	1.9%	98.1%
6 to 24	23	4.3%	93.7%
24 to 48	5	0.0%	100.0%

Table no. 1: Time of arrhythmias appearance and Occurrence of Arrhythmias

Table No. 1 show that chances of having arrhythmias in First 6 hours were maximum (98.1%) & gradually chances decreases in 6-24 hours (93.7%) & 24-48 hours (100%)
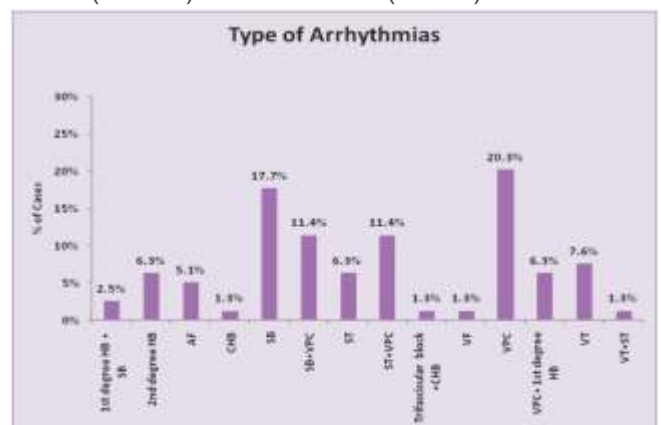
Graph no 11: Type of Arrhythmias & frequency

Graph no 11Shows that most common arrhythmia is Ventricular premature complex (20.3%) followed by sinus bradycardia (17.7%). Ventricular premature complex was also associated with other arrhythmias. The arrhythmias resolved spontaneously in most cases (44 cases of 79), while it required pharmacological and electrical intervention in 18 and 7 cases respectively. The arrhythmias were persistent in 10 cases.

Discussion : Four distinct reperfusion associated pathologies pose a direct threat to the myocardium: reperfusion induced arrhythmias; myocardial stunning; reversible microvascular injury (endothelial stunning); and irreversible cell damage.[11]

This study showed a preponderance among males(71%) patients ie, male to female ratio of 2.44. Similar results were seen in the Framingham Heart study[12] and Shah etal[13].

The reason of this being protection conferred by oestrogen in women till the age of menopause, after which the prevalence becomes equal in both males and females[14].

There was no difference in occurrence of arrhythmia in patients with or without history of hypertension, diabetes, habit of smoking and alcohol drinking. However patients who were thrombolysed were more prone to arrhythmia. 95.8% experienced arrhythmia as compared to 37.5 in non thrombolysed patients. Reperfusion arrhythmias are an important noninvasive marker of successful recanalization of infarction related coronary artery. However they are also a sign of reperfusion injury and a finding which may limit the favorable effect of reperfusion. Reperfusion arrhythmia originates as a consequence of the complex of cellular and humoral reactions accompanying the opening of coronary artery. As the primary cause of their generation are considered the chemically defined substances that are produced and accumulated in myocardium during reperfusion.The key role is ascribed to free oxygen radicals but of importance are also other substances such as calcium, thrombin, platelet activation factor, inositol triphosphate, angiotensin II and others. These chemical mediators of reperfusion arrhythmia operate as modulators of cellular electrophysiology causing the complex changes at the level of ion channels. It is supported in the genesis of automacy and triggered activity due to after depolarizations.[15] The most frequently observed arrhythmias that are defined as reperfusion arrhythmias are ventricular premature complexes, sustained or nonsustained episodes of ventricular tachycardia, accelerated idioventricular rhythm, atrial fibrillation, and ventricular fibrillation. These arrhythmias are thought to be indicators of successful reperfusion. However, some studies have shown that these arrhythmias may be due to ongoing myocardial cell damage and ischemia.[16] Accelerated idioventricular rhythm is often observed shortly after successful reperfusion has been established with fibrinolysis therapy with about equal frequency in anterior and inferior infarctions.[17]

In our study, 49% cases experiencing arrhythmia were suffering from anterior wall infarct, followed by 39% and 12% from inferior and lateral wall respectively. There was no statistical significance towards preference in the sites for occurrence of arrhythmia. However, in the study by Shah etal[13], out of 100 cases of AMI with arrhythmia, 69% of them had anterior wall MI, while 26% had inferior wall MI, whereas 5% had inferior plus posterior wall involvement. The study by H. B. Lal18 showed anterior wall involvement in 46% and inferior wall in 12.8% and anterior with inferior wall in 35%.

In the present study, Ventricular premature contractions was seen in 20.3 of cases. VPC was associated with Sinus tachycardia and Sinus bradycardia in 6.3% and 11.4% cases respectively. This amounts to total of 32% of VPC cases. Our study data correlates with that of was 31%, 36% and 90%in the study by Shah etal [13] (31%) and VolpiAetal (36%)[19].

In the present study, VT alone occurred in 7.6%, while it was associated with sinus tachycardia in 1.3% of cases. In the study by Shah et al[13], VT occurred alone in 12% of the patients.

In our study, ventricular fibrillation occurred only in 1.3% of patients. In previous studies, it has been

proven that the incidence of ventricular fibrillation is highest during first 24 to 48 hours, particularly within the first 4 hours after the acute event, and may occur in up to 5% of patients[20].

Conclusion : Older males are affected by AMI more commonly. Arrhythmias are more common in anterior wall with Ventricular Premature Contraction as the most common arrhythmia. Thrombolysis is associate with higher occurance of arrhythmia. While most arrhythmias can resolve spontaneously, intervention is needed in many cases.

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