INCIDENCE OF VARIOUS ARRHYTHMIAS AND ITS PROGNOSIS IN DIFFERENT TYPES OF ST SEGMENT ELEVATION MYOCARDIAL INFARCTION IN FIRST 72 HOURS
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ABSTRACT

BACKGROUND
ST elevation myocardial infarction is an acute emergency, more than 50% of deaths due to STEMI occur within first 1 hour, mainly due to various arrhythmias. Various arrhythmia can complicate the course of STEMI. This study was done to access the incidence and pattern of arrhythmias complicating STEMI and the prognostic implications of these arrhythmias.

MATERIALS AND METHODS
100 patients were included in the study that fulfilled the required criteria. They underwent detailed history taking and systemic examination. Patients were monitored through cardiac monitor and serial ECG recording were taken specially if any rhythm disturbances were observed and data was entered in a pretested proforma.

RESULTS
Among 100 patients, 60 were male and 40 were female. Commonest arrhythmias noticed in this study were sinus tachycardia (31%), followed by bundle branch block (30%), ventricular arrhythmia (25%) AV blocks (20%) sinus bradycardia (18%), supraventricular arrhythmia (4%) and AIVR in 1%. Mortality was more in patients with ventricular tachycardia and complete heart block. Majority of arrhythmias (76%) occur during first hour of hospitalization.

CONCLUSION
The commonest arrhythmia encountered were sinus tachycardia followed by bundle branch block (BBB), AV block and sinus bradycardia, AV block and sinus bradycardia were common with IWMI and ventricular arrhythmia and bundle branch block were common with AWMI.

KEYWORDS
Arrhythmia, Thrombolysis, Ventricular Tachycardia.

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BACKGROUND
With the introduction of intensive care in the management of acute myocardial infarction, arrhythmias have become one of the most modifiable complications of AMI. Cardiac monitoring in immediate post myocardial infarction period has help in early diagnosis of dangerous and life-threatening arrhythmias. Cardiac arrhythmias routinely manifest during or following an acute coronary syndrome. Although the incidence of arrhythmia is directly related to the type of ACS the patients experiencing (high with STEMI and lower with non ST elevation myocardial infarction (NSTEMI) and unstable angina pectoris), the clinician needs to be cautious with all patients in the in these categories.1 The nature frequency as well as timing of arrhythmias are important factors in deciding the life expectancy and mortality of patients. There is increasing belief that less severe arrhythmias may serve as warning to herald the onset of complicated and potentially lethal arrhythmias. The vigorous treatment by means of drugs, DC shock or artificial pacemakers, if initiated early enough may prevent many catastrophic situations. Acute coronary syndrome patients particularly those with STEMI demand a rapid and multifaceted approach. Decision regarding reperfusion strategy (angioplasty versus thrombolysis), adjunctive medical therapy and management of complicating factors all complete for the clinician attention. Concomitantly the clinician has to be prepared to recognize arrhythmias and treat those that require intervention because they can exacerbate ischemia and lead to clinical instability. Further with administration of thrombolytic, the clinician should be aware of reperfusion arrhythmias and the potential significance.1
For these reasons, an attempt has been made in this study to collect specific information regarding the incidence, course and prognosis of arrhythmias in STEMI during the hospital stay of the patient especially in first 72 hours.

**MATERIALS AND METHODS**

The study was conducted in our hospital over a period of one year from November 2016 to December 2017. 100 patients admitted in coronary care unit (CCU) within the first 72 hours of onset of chest pain were selected to enter the study.

**Inclusion Criteria**
- Patients who were able to reach the hospital within 72 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 72 hours old or more.
- Previously known cases of conduction blocks.
- History of previous arrhythmia or drug intake causing arrhythmia.

**Study Population**
A total of 100 patients were recruited on admission to the intensive care unit at our hospital. In this study, we included 60 males and 40 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 standard WHO guideline. (Chest pain, ECG changes and increased cardiac enzyme).

**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 72 hours of hospitalisation.

Also, the patients were observed in the intensive care unit with multi parameter monitors to monitor the patients for the 72 hours and the pattern of arrhythmia.

**Statistical Analysis**
Continuous variables were presented as Mean±SD and frequency variables as percentages. Chi square and Fisher exact test were performed for statistical significance. P value of ≤0.05 was considered for statistical significance.

**RESULTS**
Among 100 patients included in the study, 60 were males and 40 were females. Age group ranged from 20 to 80 yrs. Majority of the patients belonged to the age group of 50-60 years in both male and female group. 46.66% in male and 47.55% in female group. Table 1.

| Sl. No. | Type of Arrhythmias/Site | Anterior | Inferior | Anterior + Inferior |
|---------|--------------------------|----------|----------|---------------------|
| 1.      | Sinus Tachycardia (n = 31) | 28       | 1        | 2                   |
| 2.      | Sinus Bradycardia (n = 18) | 1        | 17       | -                   |
| 3.      | Supraventricular Arrhythmias (n = 4) | 2         | 2        | -                   |
|         | a) PSVT                   |          | -        | -                   |
|         | b) Atrial fibrillation    | 2        | 1        | -                   |
| 4.      | Ventricular Arrhythmias (n = 25) | 21       | 3        | 1                   |
|         | a) Ventricular Premature Complex | 9     | 5        | 1                   |
|         | b) Ventricular Tachycardia | 6        | -        | 0                   |
|         | c) Ventricular Bigeminy   | 3        | -        | 1                   |
| 5.      | AV Blocks (n = 20)        | 7        | 12       | 1                   |
|         | a) First degree AV block  | 2        | 2        | -                   |
|         | b) Second degree AV block (type I) | 2     | 0        | 1                   |
|         | c) Third degree complete AV block | 3   | 9        | 1                   |

Table 1. Age and Gender
Table 2. Relationship of Type of Arrhythmia with Myocardial Infarction

| Sl. No. | Type of Arrhythmias | Total Cases | No. of Death | Percentage |
|---------|---------------------|-------------|--------------|------------|
| 1.      | Sinus Tachycardia   | 31          | 3            | 9.67%      |
| 2.      | Sinus Bradycardia   | 18          | 3            | 16.66%     |
| 3.      | Supraventricular Arrhythmias | 04 | 2 | 50.00% |
|         | a) PSVT             | 01          | 1            | 100%       |
|         | b) Atrial fibrillation | 03    | 1            | 33.33%     |
| 4.      | Ventricular Arrhythmias | 25 | 6 | 24.0% |
|         | a) Ventricular Premature Complex | 15 | 2 | 13.33% |
|         | b) Ventricular Tachycardia | 6  | 4 | 66.66% |
|         | c) Ventricular Bigeminy | 3  | -  | -          |
| 5.      | AV Blocks           | 20          | 3            | 15.00%     |
|         | a) First degree AV block | 10  | -  | -          |
|         | b) Second degree AV block (type I) | 04 | - | -          |
|         | c) Third degree complete AV block | 13  | 3 | 23.1%     |
| 6.      | Bundle Branch Blocks | 30 | 9 | 26.66% |
|         | a) LAHB             | 01          | -            | -          |
|         | b) RBBB             | 18          | 7            | 38.88%     |
|         | c) LBBB             | 3           | 1            | 33.33%     |
|         | d) RBBB + LAHB      | 3           | -            | -          |
| 7.      | AIVR                | 01          | 00           | 0.00       |

\[ x^2 = 50.17 \]
\[ p < 0.001 \] significant.

Above table shows that sinus tachycardia and RBBB were more common in anterior wall MI while sinus bradycardia and tendency to go in complete heart block predominate in inferior wall MI. Overall incidence of arrhythmia was more in anterior wall MI as compare to inferior wall MI.

Table 3. Occurrence of Mortality in Various Arrhythmias

| Sl. No. | Type of Arrhythmias | Total Cases | No. of Death | Percentage |
|---------|---------------------|-------------|--------------|------------|
| 1.      | Sinus Tachycardia   | 31          | 3            | 9.67%      |
| 2.      | Sinus Bradycardia   | 18          | 3            | 16.66%     |
| 3.      | Supraventricular Arrhythmias | 04 | 2 | 50.00% |
|         | a) PSVT             | 01          | 1            | 100%       |
|         | b) Atrial fibrillation | 03    | 1            | 33.33%     |
| 4.      | Ventricular Arrhythmias | 25 | 6 | 24.0% |
|         | a) Ventricular Premature Complex | 15 | 2 | 13.33% |
|         | b) Ventricular Tachycardia | 6  | 4 | 66.66% |
|         | c) Ventricular Bigeminy | 3  | -  | -          |
| 5.      | AV Blocks           | 20          | 3            | 15.00%     |
|         | a) First degree AV block | 10  | -  | -          |
|         | b) Second degree AV block (type I) | 04 | - | -          |
|         | c) Third degree complete AV block | 13  | 3 | 23.1%     |
| 6.      | Bundle Branch Blocks | 30 | 9 | 26.66% |
|         | a) LAHB             | 01          | -            | -          |
|         | b) RBBB             | 18          | 7            | 38.88%     |
|         | c) LBBB             | 3           | 1            | 33.33%     |
|         | d) RBBB + LAHB      | 3           | -            | -          |
| 7.      | AIVR                | 01          | 00           | 0.00       |

\[ x^2 = 6.598 \]
\[ p = 0.2523 \] not significant.

Maximum number of patients were addicted to tobacco 41% ((n=41), 30% (n=30) were addicted to smoking mainly in young population and 21% (n=21) to alcohol. All kind of addiction was much more prevalent in males as compared to females. Most common modifiable comorbid condition among cases was hypertension (31%) followed by diabetes mellitus (23%) both were more prevalent in females as compared to males.

Among all the patients, 73% presented with chest pain. Other significant complaints were breathlessness (49%), sweating (30%), palpitation (3%), syncope (13%) vomiting, (11%) epigastric pain (6%) & dizziness (5%). Overall incidence of anterior wall MI was 50%, Inferior wall MI was 43% and 7% had both anterior as well as inferior wall MI.

Most common arrhythmia in present study was sinus tachycardia which was observed in 31% patients. Higher incidence noted in anterior wall MI as compared to inferior wall MI. Sinus Bradycardia was observed in 18% of patients. It was predominantly seen in inferior wall MI. Overall incidence of ventricular arrhythmias was 25%. (Table 2)

VT was seen in 6 patients and ventricular premature complexes in 15 patients. Ventricular bigeminy was observed in 3. VT was more prevalent in anterior wall MI as compared to inferior wall. (Table 2)

AV Blocks were observed in 20 patients. Complete heart block was present in 5 patients. It was more commonly seen in inferior wall MI. BBB was seen in 30 of patients. Right bundle branch block was seen in 3 patients while left bundle branch block in 3 (25%) patients. 3 Patients had bifascicular block while 2 had LAHB. RBBB was more common in anterior wall MI as compared to inferior wall MI. Supraventricular arrhythmias were present in 4 patients. PSVT was seen in 1 patient. (Table 2)

Majority of arrhythmias (76%) occurred during first 18 hours of hospitalization. Mortality was more in first hours (31.2%). 8 Patients were treated by pharmacotherapy while...
cardio version was carried out in 5 patients. Among 100 patients, 14 patients expired with a mortality rate of 14%. Mortality was high in anterior wall MI as compared to inferior wall MI (22.5% vs. 12.5%). Mortality was higher in females (25%) as compared to males (19%). Patients of AMI with RBBB had high mortality. (Table 3) Thrombolysis done in 74% patients. Mortality was high in non thrombolysed group as compared to thrombolysed group (41% vs. 9.1%). Various complications seen were LVF (17%), cardiogenic shock (11%), VSD (4%) and papillary muscle dysfunction (1%). Tendency for cardiac failure was more common in VT and RBBB, while patients with complete heart block and VT more commonly developed shock.

**DISCUSSION**

In this study it was observed that there was an increased in the prevalence of STEMI patients with increasing age up to 60 yrs. In this study 46.66% in male group and 47.5% in female group fall in age group of 50 to 60 year. This was similar to the several studies conducted by Kumar V et al Int J Adv med 2017 and Cricri P et al (2012). Age incidence is probably more common because of life style, economic status, multiple risk factors and life expectancy.

In the present study 31% patients were hypertensive and 23% of patients were Diabetic. This finding supported by earlier studies by Ridkar et al. (2000) (DM 28% HTN 58%) and Mehta et al. (2001) (HTN 44.7% DM 16.3%). In present series Hypertension and Diabetes both were more prevalent in women as compared to men with myocardial infarction (46.6% Vs 31.4% and 23.3% Vs 22.8%).

In this study 41% patients were addicted to tobacco and 30 % were smoker and 23% patients were addicted to alcohol. This is comparable to study By Mehta et al. (2001) who found that 48.02% of patients with AMI smoked.

In the present study 50% of patients were having anterior wall myocardial infarction and 46% of patients were having inferior wall infarction and 4% of patients were having both anterior and inferior wall myocardial infarction. In a study by Cricri P et al (2012) in patients of STEMI, inferior wall MI was noted in 57% of patients while anterior wall MI and lateral wall MI was noted in 39% and 4% of cases respectively. In a study by Tippanavar et al (2012) most of the patients (83%) had STEMI of which 34% had extensive anterior wall MI, 23% had inferior wall MI 14% had anteroseptal wall MI, 6% had inferior wall MI with RV extension & 3% had lateral and anterolateral MI each.

In this study 18% had sinus bradycardia out of which 17 cases were purely in inferior wall MI. Similar observation were made by Philip J Pondrid et al (1997) were 16% to 25% patients had sinus bradycardia particularly of inferior wall MI and posterior wall MI.

In the present study sinus tachycardia was observed in 31% patients and it was most commonly associated with anterior wall MI (28% of cases) than inferior wall MI (1% case). Similar observation was made by Tippanavar et al (2012). It represents an appropriate physiological response to left stimulation and over activity of the symptomatic nervous system.

In the present study total of 4% of patients had supraventricular tachycardrhythms with PSVT (1 case) and atrial fibrillation in 3 cases. Incidence of atrial fibrillation very well correlates with study done by Novaro GM et al (2008) with incidence of 4.7%. In a study done by Tippanavar et al (2012) atrial fibrillation and flutter had increased mortality not because of arrhythmias itself, but to factors associated with it, particularly LV dysfunction and shock.

Overall incidence of complete (III°) AV block in present study was 13 cases, out of which 9 cases in inferior wall MI, 3 cases in anterior wall MI. Almost similar observation was made by Ben Amour Yet al (2009) of incidence of CHB in inferior wall MI being 21.7%. In this study overall mortality was 23.1% in CHB patients which is very well comparable to 20% mortality as shown by Bates et al (1997) in their study. In the present study, the combined incidence of I°and II° AV Block was 9%, comparable to study done by Majumder AA et al (1996) showing 15% incidence.

In the present study, BBB was present in to 32% of patients, comparable to study done by Tippanaver et al (2005) which show 20% with bundle branch block.

2 patients in the present study developed left anterior hemiblock (LABH), which is comparable with 4.7% reported by James Atkins et al (1973). None of the patients in present study developed left posterior hemiblock (LPHB). It is usually rare.

In the present study, overall ventricular arrhythmias were seen in 27% patients, of which VT 37.1% were, VPB 51.8% and 11.1% had ventricular bigeminy. The frequency of VT was seen more in anterior MI than IWMI which compares well with study done by Horvat D et al in 2008.

In this study patients who developed ventricular premature complexes were asymptomatic. 3 cases developed VT along with ventricular premature complex die. In another study done by Lhuran AV et al (2011) VPCs are usually asymptomatic and their presence in the infarction period regardless of frequency of its complexity has no relation to the mortality.

In the present study mortality seen in VT patients was 66.66% whereas study done by Gibson et al (2008) and Al Khattib SM et al (2003) Shows mortality of 25.2% and 24% respectively. This discrepancy could be explained by larger infarct and older age in our study.

In this study most of the arrhythmias occurred first in 18 hours (48%). In the study by Aufedheidet et al. (1998) 90% of patients with acute MI have some cardiac rhythm abnormality within 24 hrs.

Among 100 patients, 14 patients (14.0% expired) incidence of mortality was highest in patients with ventricular arrhythmias (66.66%) followed by RBBB (38.88%). No mortality was noted in patients with AV blocks (I degree or II degree) which is supported by the study by K J Raihanauthul et al (2009). Mortality rate was higher among females (30% vs. 10%).

In this study Mortality rate was higher in Anterior wall MI as compared to inferior wall MI (19.5% vs. 13.5%) which is comparable to the study done by Vesijilevis et al (2008) with mortality rate 21.4% vs. 12.2%. Right ventricular...
infarction and conduction system abnormalities encountered in many patients with inferior wall MI might explain this disparity in the mortality rates.

In the present study total 74 patients received thrombolysis and 26 did not. Mortality among patients who received thrombolysis was 9.4% and patients who did not receive thrombolysis mortality were 41%. Feirrer C et al (2003) showed that mortality was 4.6% and 11% for thrombolysed and non thrombolysed patients. Arslan Masood et al (2009) also observed similar results. In their study mortality among thrombolysed and non thrombolysed mortality was (6% vs. 14%).

In this study total 11% patient developed Cardiogenic shock, 17% developed Left ventricular failure, 4% had papillary muscle dysfunction and 1% presented with septal wall rupture. Tendency to go in shock was more common in CHB and VT, which is comparable to studies done by Beher et al (1993) and Goldberg RJ et al (1992) where they found cardiogenic shock in CHB patients, 23% and 23.4% respectively.

CONCLUSION
This study highlights development of various patterns of arrhythmias during the course of ST elevation myocardial infarction, especially during first 72 hrs. They had varied impact on the outcome following myocardial infarction. Arrhythmias were associated with higher in-hospital mortality and morbidity. These findings highlight the importance of careful monitoring and early recognition of arrhythmias. More attention should be given to these patients to improve their treatment and prognosis.

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