Tachyarrhythmias in acute myocardial infarction: A study conducted in Aarupadai Veedu Medical College

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Abstract
Background: Acute myocardial infarction predisposes a patient towards arrhythmias, which occur mostly during or immediately after the event. ST elevation myocardial infarction is more frequently associated with arrhythmias than with NSTEMI. **Aims and Objectives:** To study the types of tachyarrhythmias occurring in acute myocardial infarction. **Materials and Methods:** The study was conducted on patients admitted to the intensive coronary care unit with acute myocardial infarction in Aarupadai Veedu Medical College, Pondicherry. The duration of the study was one year. A thorough case history, meticulous physical examination, serial ECGs, cardiac enzymes and echocardiogram were recorded during their ICU stay. **Results:** It was observed that 54.3% of patients had some form of tachyarrhythmia. Among the males 50% had tachyarrhythmia and among females, 71.4% had tachyarrhythmias. The risk factors associated were diabetes and hypertension. Common tachyarrhythmias observed in the study were VPDs (31.6%), sinus tachycardia (26.3%), ventricular tachycardia (26.3%), APCs (10.5%) and atrial fibrillation (5.3%). **Conclusion:** Ventricular premature depolarizations were the commonest tachyarrhythmia encountered in our study. Majority of these arrhythmias occurred in anterior wall myocardial infarction and in male patients with hypertension as a risk factor and females with diabetes as a risk factor.
Key Words: Tachyarrhythmia, Ventricular premature depolarizations, myocardial infarction.

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INTRODUCTION

Myocardial infarction is one of the major causes attributed to sudden death[3]. With the advent of intensive coronary care unit, the mortality due to arrhythmias has been reduced considerably[4]. In acute myocardial infarction severe metabolic and electrophysiological changes result in symptomatic and silent life threatening arrhythmias[5]. Ischemia of the myocardium leads to regional dispersion of repolarization, increased automaticity and tissue excitability[6]. The occurrence of arrhythmias after STEMI is more in patients during the early hours of admission. Contrary to the past belief, sustained ventricular tachycardia and ventricular fibrillation in acute myocardial infarction were noted to have early mortality, even in the era of thrombolytic therapy[7].

MATERIALS AND METHODS

Our study was conducted in Aarupadai Veedu Medical College, Puducherry. The study consisted of 35 cases admitted with acute myocardial infarction in intensive coronary care unit from January 2016 to December 2016. **Inclusion Criteria:** Patients admitted with acute ST elevation myocardial infarction from age group of 18 to 80 years.

Exclusion Criteria:
1. Recurrent myocardial infarction
2. MI in dilated cardiomyopathy
3. Chronic kidney disease
4. Valvular heart disease
5. Known case ofarrhythmogenic heart disease.
6. Congenital heart disease

All patients who fulfilled the inclusion criteria were subjected to a detailed history taking and a meticulous physical examination, cardiac enzymes and echocardiogram was done. Serial electrocardiograms were taken from the day of admission and till the end of ICU stay. All of our patients were treated in ICU for a period ranging of 3 to 10 days depending upon their general condition and they were shifted toward before discharge.

RESULTS

The study included total number of 35 cases of patients with Acute STEMI.

Distribution by Gender: The following table shows the distribution of patients according to their gender. It shows that the majority of patients were Males (80%). 20% of patients were Females.

Table 1: Distribution by Gender

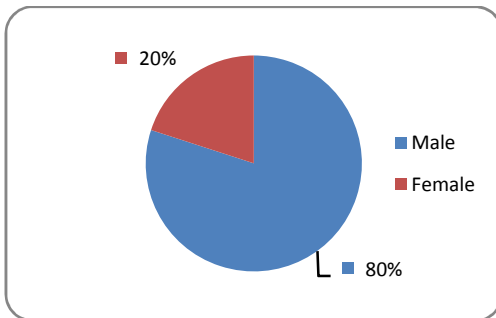| Gender	Frequency	Percentage
Male	28	80%
Female	7	20%

Figure 1:

Distribution by Tachyarrhythmia: The following table shows the distribution of patients according to the presence of tachyarrhythmia. In our study 19 patients (54.3%) had tachyarrhythmia and 16 patients (45.7%) did not have tachyarrhythmia.

Table 2: Distribution by Tachyarrhythmia

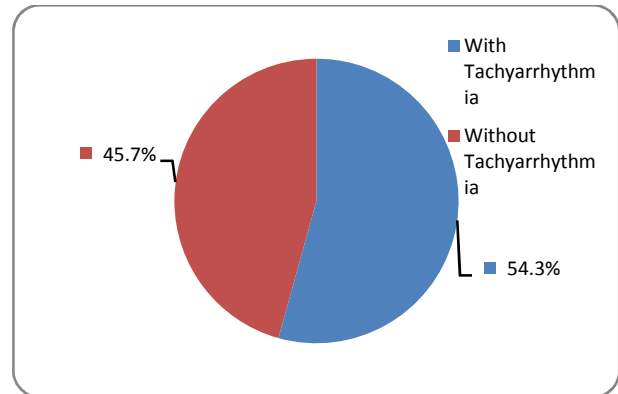| Tachyarrhythmia	Frequency	Percentage
With Tachyarrhythmia	19	54.3%
Without Tachyarrhythmia	16	45.7%
Total	**35**	**100%**

Figure 2:

Distribution of Males and Females With tachyarrhythmia

The following table shows the distribution of males and females with the presence of tachyarrhythmia. Among 28 males, half of the males had tachyarrhythmia (50%) and the other half of the males didnot have tachyarrhythmia (50%). Among females, majority of them had tachyarrhythmia (71.4%). 28.6% of females did not have tachyarrhythmia.

Table 3: Distribution of Males and Females by Tachyarrhythmia Presence

Tachyarrhythmia Presence	Male	Female
With Tachyarrhythmia	14 (50%)	5 (71.4%)
Without Tachyarrhythmia	14 (50%)	2 (28.6%)
Total	**28 (100%)**	**7 (100%)**

X^2 = 1.0361, P Value = 0.3087, Not Significant

The 'p' value 0.3087 which is determined from chi-square test shows that there is no significant correlation between the presence of tachyarrhythmia and gender.

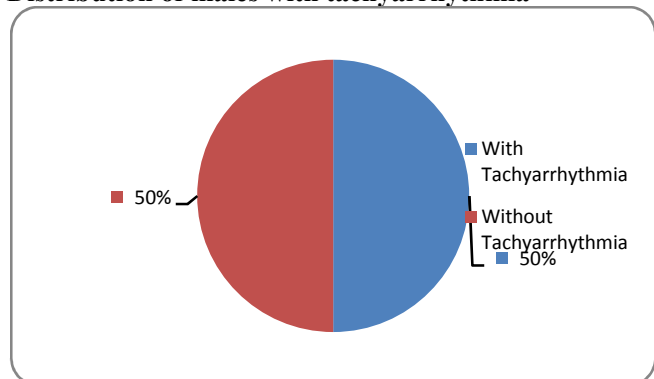**Distribution of males with tachyarrhythmia**

Figure 3:

Distribution of females with tachyarrhythmia

- With Tachyarrhythmia
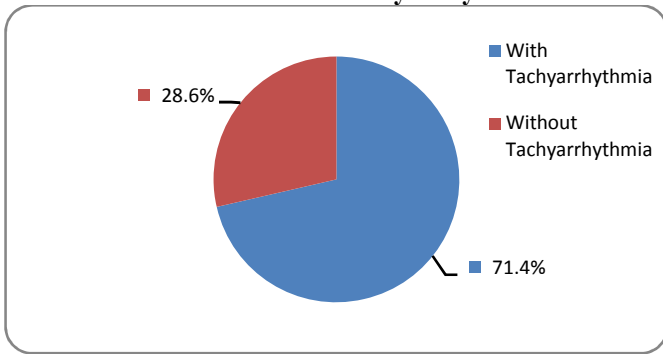- Without Tachyarrhythmia

28.6%

71.4%

Figure 4:

Distribution by Age: The following table shows the distribution of patients according to their age. In the present study, incidence of tachyarrhythmia was highest in 6th decade (51-60 years). 9 patients (47.3%) were between 51-60 years of age. Youngest patient was 28 years old with immune thrombocytopenicpurpura while the oldest was 75 years old.

Table 4: Distribution by Age

Age in Years	Frequency	Percentage
20-30 Years	1	5.3%
31-40 Years	1	5.3%
41-50 Years	1	5.3%
51-60 Years	9	47.3%
61-70 Years	5	26.3%
>70 Years	2	10.5%
Total	**19**	**100%**

- 20-30 Years
- 31-40 Years
- 41-50 Years
- 51-60 Years
- 61-70 Years
- >70 Years

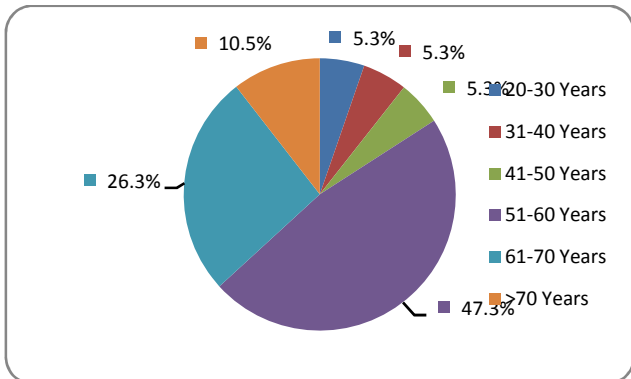10.5% 5.3% 5.3% 5.3% 26.3% 47.3%

Figure 5:

Distribution by Comorbidities: The following table shows the distribution of patients according to the comorbidities. Out of 14 males, majority of them had hypertension (64.3%). All females with tachyarrythmia had diabetes mellitus as a risk factor.

Table 5: Distribution by Co morbidities

Co morbidities	Male (14)	Female (5)
DM	1 (7.1%)	5 (100%)
HTN	5 (35.7%)	0 (0%)
DM+HTN	4 (28.6%)	0 (0%)
No co morbidities	4 (28.6%)	0 (0%)
Total	**14 (100%)**	**5 (100%)**

X^2 = 14.7023, P value = 0.002, Significant

The 'p' value 0.002 which is determined from chi-square test shows that there is significant correlation between the presence of co morbidities and gender. We concluded that diabetes mellitus was significantly higher in females when compared to males. And also hypertension was significantly higher in males when compared to females.
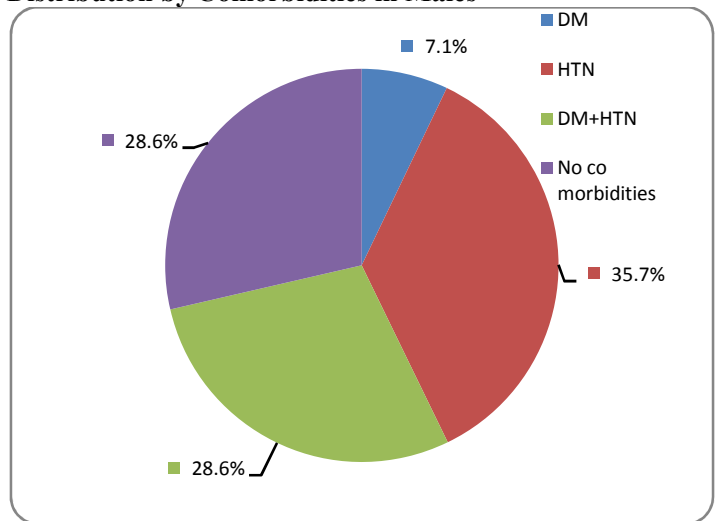
Distribution by Comorbidities in Males

- DM
- HTN
- DM+HTN
- No co morbidities

7.1% 28.6% 35.7% 28.6%

Figure 6:

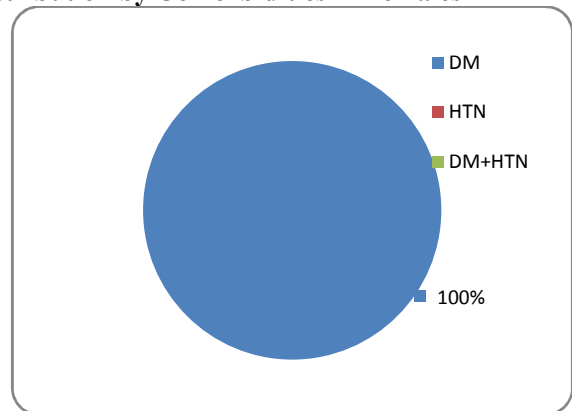**Distribution by Comorbidities in Females**

- DM
- HTN
- DM+HTN

100%

Figure 7:

Distribution by Type of Arrhythmia: The following table shows the distribution of types of arrhythmia among patients. The majority of patients have ventricular premature depolarization (31.6%). 26.3% of patients have ventricular tachycardia and 26.3% of patients have sinus tachycardia.

Table 6: Distribution by Type of Arrhythmia

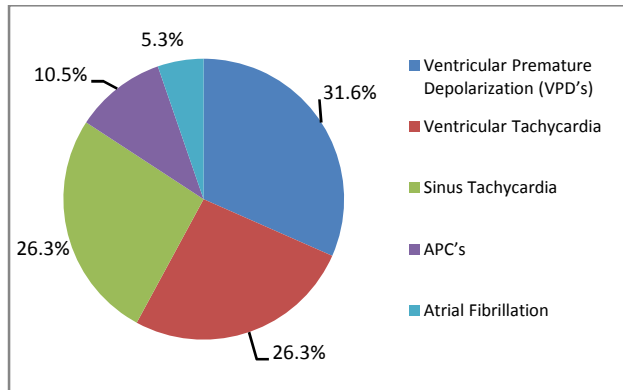| Type of Arrhythmia	No. of patients	Percentage
Ventricular Premature Depolarization (VPD's)	6	31.6%
Ventricular Tachycardia	5	26.3%
Sinus Tachycardia	5	26.3%
APC's	2	10.5%
Atrial Fibrillation	1	5.3%
Total	19	100%

Figure 8:

Distribution by Type of MI: The following table shows the distribution of type of MI among patients. It shows that majority of patients have anterior wall myocardial infarction (84.2%). 5.3% of patients have inferior wall myocardial infarction and 10.5% of patients have both anterior wall myocardial infarction and inferior wall myocardial infarction.

Table 7: Distribution by Type of MI

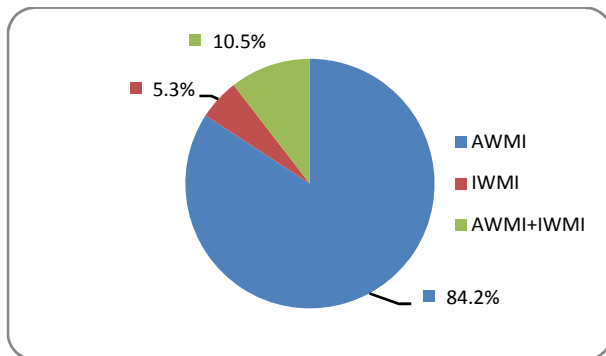| Type of MI	No. of Patients	Percentage
AWMI	16	84.2%
IWMI	1	5.3%
AWMI+IWMI	2	10.5%
Total	19	100%

Figure 9:

DISCUSSION

In the present study, the age of distribution ranged from 28 to 75 years in which the maximum number of patients (47.3%) were in the age group of 51 -60 years. This was consistent with the study done by Toshniwal et al[8] and Yadav et al[9] who have quoted a similar incidence in this age group. The male to female ratio observed in the study was 2.8:1.This was consistent with studies done by Nagabhusana et al[10]. In our study the majority of our patients had anterior wall myocardial infarction (84.2%), followed by both inferior wall and anterior wall MI (10.5%). A Similar incidence was seen in studies done by Mohit Shah et al[11]. Most of the males (35.7%) had hypertension as a risk factor for developing tachyarrhythmia, followed by both (26.8%) hypertension and diabetes. All female patients had diabetes as risk factor for developing tachyarrhythmia. A study done by Yildirir et al[12] suggested that diastolic filling of the left ventricle, left atrial size and functioning, and left ventricular hypertrophy are risk factors for supraventricular and ventricular arrhythmias in hypertensive patients. One study conducted by Buelent Koektuerk et al[13] has shown that atrial fibrillation and ventricular arrhythmias were the most common form of tachyarrhythmias, which lead to cardiovascular complications in diabetic patients. A study done by BM Patil et al[14] suggested that 36% of patients with tachyarrhythmia had hypertension, and 20% of them had diabetes mellitus as a risk factor. In the present study, the most commonly occurring tachyarrhythmia was Ventricular Premature Depolarization (VPD). 31.6% of the patients had VPDs. In a study done by Mohit et al[11] VPDs were observed in 31% of patients. In a study conducted by Campbell RW et al[15], 90 % of cases had VPDs. Incidence of VPDs varies from 21.6 -56% in various studies[16,17,18]. Sinus tachycardia occurred in 26.3% of patients. In a study conducted by Sangita et al[19], sinus tachycardia occurred in 68% of cases of which 42 occurred with AWMI. Ventricular tachycardia occurred in 26.3% of patients, five cases had VT. In a study done by Marangmei et al[20] observed that 7% of them had VT. Atrial premature contractions occurred in 10.5% of patients. This correlated well with varies studies[10,11,19,21-22]. In a study done by Saurabh et al[23], Atrial premature contractions occurred in 4% of patients. In the present study, Atrial fibrillation occurred in 5.3% of our patients. Studies indicate that Atrial fibrillation complicates around 6–28% of myocardial infarctions and is frequently associated with severe LV damage and congestive cardiac failure.[24] Transient AF complicating AMI is associated with an high risk of ischaemic stroke and TIA, particularly in patients treated with antiplatelet agents alone[25]

CONCLUSION

Among the 35 patients, 19 patients developed tachyarrhythmia. Incidence of tachyarrhythmia observed in the study was 54.3%.Tachyarrhythmia was more common in AWMI. Among the various tachyarrhythmias, Ventricular premature depolarisations were the most common(31.6%) to occur. 50% of males and 71.4% of females developed tachyarrhythmia. Majority of the males had hypertension as risk factor and all the females had diabetes as risk factor.

LIMITATIONS

Our study included only a small number of patients; further large scale studies are warranted.

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