# Prevalence of Cardiac Arrhythmia Disorders in Patients with Myocardial Infarction Admitted to CCU Ward in the Vasei Hospital of Sabzevar

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## Abstract

**Introduction**: Myocardial infarction is one of the most common diseases in Iran. Cardiac arrhythmia has been reported as the most common cause of death in patients with acute myocardial infarction. Given the importance of arrhythmias, this study aimed to determine the prevalence of cardiac arrhythmia in patients with acute myocardial infarction admitted to the CCU of Vasei hospital in Sabzevar, Iran

**Materials & Methods**: This cross-sectional study was conducted on 132 patients with myocardial infarction, which were admitted to the CCU of Vasei hospital in Sabzevar city during 24 months from 2009 to 2011. Patients were selected by convenient non- randomly sampling. Demographic data and medical history of patients were collected using a questionnaire. A check list was applied for recording infarction and arrhythmias diagnosed by electrocardiogram, the 24-hour monitoring of the patients and72 hours after hospitalization. Data was analyzed by SPSS ver11.5; descriptive and analytical statistics including Chi-square test, ANOVA and Kruskal-Wallis test were used for statistical purposes.

**Results**: A total number of 59.1% of patients had arrhythmia; where 19.6% of them had ventricular premature beats and 17.4% had episodes of ventricular tachycardia. The results showed that there was a significant relationship between the location of heart attack and type of arrhythmias ($\chi^2$ 14.4, p=0.002), there was no statically significance relationship between age, gender and type of arrhythmias (P> 0.05).

**Conclusion**: Because of the higher incidence of premature ventricular arrhythmia than others, hence, more awareness of the risk factors and treatment of these arrhythmias are necessary for medical and nursing staff.

**Keywords**: Acute myocardial infarction, Premature ventricular complexes, Arrhythmias

**Introduction**

Myocardial infarction is one of the most common diseases that most people are grappling with it across the world. Despite many advances in diagnosis and treatment of the disease over the past two decades, myocardial infarction remains a major cause of health problems in the world. Only in America every year about 1.1 million people are affected with myocardial infarction. Almost every 20 seconds a person with myocardial infarction is diagnosed. This disease will also lead to high mortality (3-1).

According to the third report of the World Health Organization (WHO), cardiovascular diseases cause the death of 12 million people worldwide annually. This disease causes about half the death of adult. Existing studies suggest that in the Mediterranean and Middle East countries including Iran, cardiovascular disease is a major health - social problem, and it is the cause for 25-45% of deaths (4). Based on data released from the Statistics and Information Center of Mashhad University of Medical Sciences, in 2003, 800 people in the country die every day, and total mortality in Khorasan province has been 5.3 person per a thousand people; and total mortality rate induced by myocardial infarction have been reported about 30%. In developing countries, about half of all deaths in adults are due to infarction. Despite the quick and extensive diagnostic advances, still 1.3% of patients who are suffering from infarction; will die (5, 2, 6). Studies have shown that cardiac arrhythmias are the most common cause of death during acute myocardial infarction (AMI) (7, 2).

The incidence of arrhythmias in America is 5.30%, which is equivalent to 14.4 million people.  About 7.0% of hospital consultations in England in 2002-2003 were devoted to flutter and atrial fibrillation and 78% of patients were hospitalized (8)

Arrhythmias are the most common complication of acute myocardial infarction, and responsible for 40-50% of mortality due to acute myocardial infarction. The possibility for incidence of arrhythmias after acute myocardial infarction during the first hour is about 15 times more than 12 hours after acute myocardial infarction (9-11). Incidence of bundle branch block and ventricular tachyarrhythmia in patients with myocardial infarction is high.  As reported in the researches, 13% of patients in the hospital are suffering from a branch block. The rate of the incidence of ventricular tachyarrhythmia  is 39% (22.6% premature ventricular contraction (PVC), 12% ventricular tachycardia and 4.4% ventricular fibrillation) respectively (12). Level of heart involvement by infarction is important in generating the arrhythmia. Studies have shown that the most common levels of myocardial involvement in patients with myocardial infarction were in lower and the anteroseptal parts. The most common arrhythmia after acute MI is 49.8% due to the premature ventricular contractions and 21.7% due to the sinus tachycardia (10). Conductive cardiac blocks are the causes of arrhythmias. Frequency of blocks after MI is as follow; 9.4% of AV block and 30.2% for branched block (7). Since the studies have shown that arrhythmia is the most common cause of

death after acute MI (7), the prevention and treatment of patients in the CCU is one of the most important duties of the medical team. The goal will be achievable if the hospital authorities can give necessary education on the incidence of arrhythmias after acute MI to the medical team especially nursing staff. This awareness allows them to get the sufficient knowledge on arrhythmia, and can conduct a timely treatment in coordination with the physician and prevent the general deterioration of the patient or the patient's possible death. Thus, knowledge of the characteristics of early myocardial infarction is initial prerequisite for treatment planning, and treatment strategy can help evaluate and improve it. The primary aim of this study was; to study disorders after acute MI in patients admitted to the CCU of Vasei Hospital.

**Materials and Methods**

This cross-sectional study was conducted in 24 months (from June 2009 to June 2011) on 132 patients with MI who admitted to CCU of Vasei Hospital in Sabzevar and had inclusion criteria for the study. Sampling was performed by non-probability convenient sampling method.

Inclusion criteria included patients with a diagnosis of myocardial infarction. Myocardial infarction diagnosis was according to WHO criteria and the cardiologist's diagnosis. Data was collected using a questionnaire, a checklist and medical records.

Researcher checked patients with MI in hospital and assessed them for the arrhythmia after MI. Demographic form was completed by the researcher; and the diagnosis of arrhythmia and myocardial infarction was confirmed by a cardiologist. Other information, including demographic data, medical history, history of cardiovascular medications, as well as levels of cardiac enzymes, administration of streptokinase for patients and existence any arrhythmias due to that were recorded. Within 72 hours after hospitalization, all patients underwent the continuous monitoring of cardiac arrhythmias, and any arrhythmia was recorded by staff of the CCU. Arrhythmias in this study include sinus, nodal ventricular, ventricular bundle branch block, and atrioventricular block. All types of arythmias were recorded by a cardiologist according to the standard criteria.

The validity of the questionnaire was confirmed by five expertise. For ethical considerations, permission was obtained from the hospital officials to conduct the study and review the medical records in the unit. The verbal consent was obtained from patients.

SPSS software ver 16 was used for statistical analysis, and Chi-square test was used to examine relationships between variables and $p=0.05$ was considered significant.

**Results**

Among 132 patients with myocardial infarction, 25% were female and 75% were male. Most patients (31.8%) were 61 to 70 years, and two patients were under 30 years and Maximum age was $62.7\pm 3$ years. The majority of patients (90.2%) were married. Distribution of infarction site in patients is shown in Table 1. The most common site of myocardial infarction in men and women was lower part of heart (46.5% and 44% respectively).There was not any significant difference regarding the

location of heart attack between men and women (p>0.05). Also there was not any significant correlation between gender and type of arrhythmia. One-way Analysis of Variance (ANOVA) did not show a significant correlation between the involvement sites of the MI with patients' age (F=0.793, p=0.577). Kruskal - Wallis test showed a significant correlation between the cardiac infarction and arrhythmias (p=0.002, $\chi^2$=14.4). In all age ranges; most site of infarction was  in the lower part of heart which its rates in people under 60 years, 60 to 71 years and more than 70-year were 45.6%, 47.65% and 33.3% respectively. Almost half of patients (40.9%) did not show any arrhythmias after a heart attack, and  had a normal sinus rhythm. After infarction, 59.1% of the patients were affected by arrhythmia which 19.6% of them had ventricular premature beats, and 17.4% had ventricular tachycardia attacks. Other arrhythmias in order of frequency

was including; sinus bradycardia, sinus tachycardia, junctional arrhythmias, atrial fibrillation, AV-Block  Grades 2 and 3 , AV conduction disturbances, intra-ventricular rate and premature atrial beats (Table 2). In terms of hospitalization, 63% patients had no history of hospitalization, and among patients who have been hospitalized, 67.4% have a history of hospitalization in the heart ward, 42% of cases were hospitalized due to chest pain, and 38% admitted because of hypertension. After infarction, 47% of patients received streptokinase. In terms of arrhythmia center, 54 (40.9%) had normal sinus rhythm, 12(9.1%) were with atrial arrhythmia; 7(5.3%) diagnosed with atrial ventricular arrhythmias and 51(38.6%) were affected with ventricular arrhythmia. Chi-square test showed no significant relationship between arrhythmia and myocardial infarction's location (p =0.564).

Table 1: Distribution of infarction location in patients with myocardial infarction

| Infarction center | Numbers | Percentage |
|---|---|---|
| Lower part of heart | 75 | 43.2 |
| Interior part of heart | 23 | 17.4 |
| Broad heart | 14 | 10.6 |
| Anteroseptal of heart | 23 | 17.4 |
| Anterolateral of heart | 4 | 3 |
| Right ventricle of heart | 2 | 1.5 |
| Infarction without rising ST segment | 9 | 6.8 |
| Total | 132 | 100 |

Table 2: Distribution of cardiac arrhythmias generated after myocardial infarction

| Rhythmia | Numbers | Present |
|---|---|---|
| Sinus rhythm | 54 | 40.9 |
| Sinus tachycardia | 4 | 3 |
| Sinus bradycardia | 7 | 5.3 |
| Atrial Fibrillation | 4 | 3 |
| Atrial premature beats | 2 | 1.5 |
| Junctional Arrhythmias | 5 | 3.8 |
| Ventricular premature beats | 26 | 19.6 |
| Ventricular tachycardia | 23 | 17.4 |
| Ventricular fibrillation | 1 | 0.8 |
| Atrioventricular block grade 2 and 3 | 3 | 2.2 |
| Intraventricular conduction disturbance | 3 | 2.2 |

**Discussion**

Myocardial infarction is one of the most common diseases that most people are grappling with it around the world. The aim of this study was to determine the prevalence of heart rhythm disorders in patients with acute myocardial infarction admitted to the CCU in Vasei hospital of Sabzevar.

Results of this study showed that incidence of infarction were higher in male patients. Parsa's study (2004) in Yazd, showed that about two-thirds of patients with heart attack were male (10). Furthermore, the study of Hosseinian et al. in Ardebil showed that most patients with a heart attack were men (13), which is consistent with the findings of the present study. Most patients who afected with MI were in their seventies. In the study of Parsa (2004) in Yazd, the mean age was 60.6 years (10) and in the study of Hosseinian et al. in Ardebil, the mean ages were reported 60 and 70 years (13) which show that age range for MI is between 60-65 years. Despite the overall decline in mortality from cardiovascular disease during the past 25 years, age of acute MI still remains one of the major causes of death, especially in the elderly (13).

There was no significant relationship between gender and types of arrhythmias in the present study. According to the previous studies, a mortality rate in men of the age range 25-34 years were more than in the women .However this rate decreases in the age 75-84 to 1.6 times, which it shows that; the mortality rate with increasing age will increase in women. In the present study, most common involvement site of the heart were lower part, following the anteroseptal infarction and mid-anterior. Parsa in Yazd reported most common involvement of the heart were lower and anteroseptal site respectively (10). But the study of Hosseinian et al. in Ardebil reported anterior myocardial infarction in 43.71% cases (7), possibly this study considered all anterior sites of the heart including, mid-anterior, anteroseptal, anterolateral, and broad anterior and our study also showed the sum of the sites as well as 49.1%. Cardiac infarction without Q-Wave had affected 6.8% of patients with myocardial infarction. In the study of Parsa in Yazd this rate was also 9% myocardial

infarction without Q-Wave (10), which showed a higher incidence of myocardial infarction with the Q-Wave. In the present study, less than half of the patients had normal sinus rhythm and the remaining had arrhythmia. In line with our results, Parsa in Yazd reported 71% of patients with MI had arrhythmia.

In terms of arrhythmias' location, the majority of patients had ventricular arrhythmias, among the ventricular arrhythmias, premature ventricular beats affected nearly one-fifth of patients. This is an important arrhythmia because it can convert into the life- threatening arrhythmias such as ventricular tachycardia and ventricular fibrillation and cause to death. Small percentages of patients (17.4%) of patients also had ventricular tachycardia attacks. Nough et al, in Rafsanjan also reported that prevalence of premature ventricular beats close to a quarter   and ventricular tachycardia as 12% that is in line with our study (12). In Parsa's study,    also premature ventricular beats with the incidence of 49.8% was the most common arrhythmia after anterior myocardial infarction, and then sinus tachycardia with a rate of 17.2% (10). In another study, ventricular arrhythmias was reported in 64.1% of patients which monitored with Holter and; demonstrated more than 10 premature ventricular contractions per hour in the 19.7 % of the patients, and unstable tachycardia was observed in 6.8% of patients. Ventricular arrhythmias in patients with left ventricular damage were much greater (15). The reason for the high rate of premature beats in the mentioned study may be due to apply the Holter monitoring that can record all arrhythmias. Incidence of ventricular tachycardia in the above mentioned study was 6.8%, and this

is also in line with our study. The rates of atrioventricular block grade 2 and 3 and the impaired intraventricular conduction (bundle branch block) were each 2.2% that is lower than that rate reported in the study of Fall (13%) (16).

Bundle branch blocks are seen often due to the increased age and infarction in the specific site of the heart particularly ventricles. In this study, a significant relationship was found between the myocardial infarction and arrhythmia, which represents types of arrhythmias, may be different from each other in the different locations of infarction. Although in this study no significant relationship was found between age, gender and type of arrhythmia, but more extensive study is needed to prove this matter. The small sample size is a limitation in this study and to generalize the findings to other populations, studies with larger sample size are needed.

## Conclusions

The results showed that the most common arythemia among patient with myocardial infarction are ventricular arrhythmias, especially ventricular premature beats and ventricular tachycardia. Ventricular arrhythmias are considered as life threatening complications; and it is recommended that all medical staff, especially nurses have enough knowledge about predisposing factors and have enough education to be qualify to treat of these arrhythmias..

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