



## **Comparison of the Time Interval between the Onset of Clinical Symptoms and Receiving Streptokinase in Patients with Acute Myocardial Infarction (AMI) at Amir Hospital in Zabol, Iran, 2013**

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### **Abstract**

Myocardial infarction (MI) or acute myocardial infarction (AMI) is known as heart attack. MI occurs when blood stops flowing properly to a part of the heart. MI occurred when one of the coronary arteries develops a blockage due to an unstable buildup of with blood, cholesterol and fat. This study aimed to determine the time interval between the onset of clinical symptoms and receiving streptokinase inpatients with acute myocardial infarction (AMI) at **Amir Hospital** in Zabol city in 2013. This was a cross-sectional-descriptive study. In total 72 patients were selected from all patients with chest pain and who referred to the emergency of Amir Hospital during 2013 in Zabol located in southeast of Iran. All patients were diagnosed with AMI. The instrument used for data collection was a questionnaire including demographic characteristics, record of exact location of infarction, ECG, the time of patients' arrival to the emergency department (ED), and the time of receiving streptokinase. According to the obtained results of this study, the mean of onset to call, call to door, and door to needle times were 269.29±197.33, 34.02±12.32, and 96.33±49.95, respectively. The comparison of onset to call, and call to door and age, education and place of residence variables showed that there was a significant difference between these variables. In addition, the comparison of door to needle time and age, sex, education and place of residence variables showed that there was no significant difference between these variables. Delay in treatment of patients with STEM I is caused as a result of several factors including rate of patient's awareness and emergency status. We need to provide opportunities to treatment of MI by emergency and outpatient centers. To reducing in-hospital delay, we must teach physicians and emergency personnel to rapid diagnosis of MI.

**Keywords:** Myocardial infarction, Onset to Call, Call to door, Door to needle.

### **Introduction**

Myocardial Infarction (MI), commonly known as heart attack, includes a permanent and irrevocable cellular death in part of the heart muscle that results from the

blocked blood flow or a severe ischemia. In MI, it is likely that the blood flow stops suddenly or it may occur without any previous symptoms or after several

angina attacks. Medicine, balloon angioplasty, and open-heart surgery are used for unblocking the obstruction. The predisposing factors of MI include diabetes, high blood pressure, high blood cholesterol, over-smoking and overdrinking, lack of physical activity, stress, age, and family history (1). Acute MI is one of the most common causes of hospitalizing the patients in the hospitals, and has been reported to be one of the most important causes of mortality in Iran and the world (2, 3). In 2002, more than 150,000 people lost their lives in the US due to this disease. Nearly 30 percent of those suffering from MI die in the first hour when the symptoms start to emerge and before they arrive at hospitals (1). Numerous studies have indicated that the prevalence of coronary artery disease increase with the increase of age. Moreover, regardless of the age, men are more likely to suffer from coronary artery disease than women. On average, this illness tends to occur later in women than men (4). Since acute MI involve people when they are middle years of their lives causing harmful psychological, social, and economic effects (5). If the complete stopping of the blood flow lasts for more than 20 minutes, it will result in myocardial necrosis in the subendocardial area that progresses gradually toward the epicardial area; it will then cover the entire thickness of wall of heart (6). Since the most important prognostic factors of acute MI is the area of necrotic tissue, the recreation of the blood flow of the obstructed coronary and preventing the progress of necrotic tissue in the first 6 hours especially the first three hours of the emergence of symptoms are of great importance in reducing the mortality and promoting the quality of life in acute MI patients (7). The possible factors that can delay the patient's decision-making include high age, being female, low economic and social status, the patient's lack of knowledge, previous Angina history, diabetes, and counselling with the family members (8). More than half of the MI mortality are related to the first half of emerging the symptoms; when the patient has not arrived at the hospital yet (9). The mortality arising from acute MI reduce significantly in patients who undergo the standard in the first 2 or 3 hours (10). In general, two main time interval must elapse before the acute MI patient arrive at the hospital. The first time interval before arriving at the hospital includes the interval between Onset to call and call to door time interval. The second time interval refers to the time the patient receives medication (Door to needle). The reduction of time in either of these phases can accelerate the process of treatment. Given this, AHA/ACC1 and BHF2 have recommended to start thrombolytic therapy within 90 minutes after the patient calls

the ambulance. As for patients unable to arrive at the hospital within 90 minutes, thrombolytic therapy must start before they arrive at the hospital; this is possible through getting the patient's electrocardiogram before they arrive at the emergency department, training the doctors about AMI diagnosis and evaluation, and prescribing thrombolytic medication for these patients (11). Given the importance of time for the effective use of medicine, the present research aims at studying the onset of clinical symptoms and receiving *streptokinase* in patients with acute MI at Amir Hospital in Zabol, in 2013.

## Materials and Methods

The present study is a cross-sectional descriptive-analytical study. The statistical populations of the study were all the patients with chest pain that referred to the emergency department of Amir Hospital during 2013 in Zabol and they were diagnosed to suffer from acute MI and were supposed to receive streptokinase. In total, 72 patients were selected using census method to participate in the present study. The tool used for data collection was a questionnaire including demographic characteristics, record of exact location of infarction, ECG, the time of patients' arrival to the emergency department (ED), and the time of receiving streptokinase. Clinical history, ECG, and interview were used to collect the data. In the present study, ECG was taken from all the patients referring to the emergency department with MI symptoms including chest pain or other similar symptoms and they were diagnosed with the likelihood of suffering from MI based on the clinical history and physical examination. The diagnosis of MI was conducted by a cardiologist or the doctor of the emergency department. STEMI (ST-Elevation Myocardial Infarction) was diagnosed with the increase of ST piece for more than 0.5 millimeter in the organic leads and more than 1 millimeter in the precordial leads. When the patients did not have absolute and relative contraindications for using streptokinase, they underwent streptokinase treatment in less than 12 hours after the onset of pain. Finally, the acquired data were analyzed after the conducting the final study through SPSS-18 and using descriptive and analytical statistics, independent t-test, and one-way analysis of variance. The level of significance was determined to be 0.05 in the present study (12).

## Findings

The participants of the present study were 72 patients; %58.3 was male and %41.7 was female. Fifty percent of the participants were urban inhabitants, and 50 percent were inhabitants of the rural areas. With respect to the educational level, the patients were divided into three groups: illiterate, lower than high school diploma, and higher than high school diploma. With respect to age, %30.6 of the patients were under 50, %25 were between 50-60 years old, %44.4 were over 60 years old. The mean of onset to call was 269.29±197.33; the highest was 60 minutes, and the lowest was 960 minutes. The comparison of onset to call mean conducted based on the age factor indicated that given  $F=5.36$ , there is significant statistical difference between the under 60, 50-60, and over 60 age groups ( $p=0.007$ ). The onset to call mean of the illiterate individuals, individuals with the educational level of lower than high school diploma, and individuals with the educational level of higher than high school diploma were 343.65±218.48, 187.87±111.69, and 112.85±43.09 respectively. The comparison of onset to call mean based on the educational level indicated that there was a significant difference between the groups (illiterate group, lower than high school diploma group, and higher than high

school diploma group) ( $P<0.0001$ ). The comparison of onset to call mean indicated that it was 267.47±207.15 for the men, and 271.83±186.15 for the women ( $P=0.927$ ). On average, the Call to Door mean was 34.02±12.32; the highest was 10 minutes, and the lowest was 60 minutes. The Onset to Call mean was 183.47±135.12 for the rural inhabitants, and 355.11±213.49 for the rural areas inhabitants ( $P<0.0001$ ). The Call to Door mean was 28.18±10.86 for the individuals who were under 50 years old, 35.0±11.24 for the individuals who were 50-60 years old, and 37.5±12.70 for the individuals who were over 60 years old ( $P=0.02$ ). The Call to Door mean of the illiterate individuals, individuals with the educational level of lower than high school diploma, and individuals with the educational level of higher than high school diploma were 36.40±11.53, 26.87±7.3, and 21.42±6.26 respectively ( $P<0.0001$ ). The Call to Door mean was 32.85±10.88 in men, and 35.66±14.12 in women ( $P=0.344$ ). The Door to Needle mean was 96.33±49.95; the highest was 20 minutes, and the lowest was 180 minutes. There was not a significant statistical difference between the Door to Needle interval and the participants' age (table 1) ( $P=0.78$ ). Moreover, there is a significant statistical relationship between the Onset to Call and Call to Door intervals ( $P<0.05$ ) (table 2).

**Table 1.** The mean of Door to needle time based on education, age, sex, and place of residence

Variables		Mean	SD	P-Value
Educational level	<b>Illiterate</b>	92.04	52.58	0.539
	<b>Lower than high school diploma</b>	98.37	51.37	
	<b>Higher than high school diploma</b>	96.33	21.43	
Age	<b>Under 50</b>	93.59	40.11	0.78
	<b>Between 50-60 years old</b>	103.55	57.53	
	<b>Over 60 years old</b>	94.15	52.63	
Sex	<b>Male</b>	89.61	50.0	0.179
	<b>Female</b>	105.73	49.18	
Place of residence	<b>City</b>	102.69	47.71	0.28
	<b>Village</b>	89.97	51.98	

**Table 2.** The relationship between Onset to Call, Call to Door, and Door to Needle times

Time	Onset to Call		Call to Door		Door to Needle	
	<b>R</b>	<b>p-value</b>	<b>R</b>	<b>p-value</b>	<b>R</b>	<b>p-value</b>
Onset to Call	1	-	0.0348	0.003	-0.103	0.391
Call to Door	0.348	0.003	1	-	0.231	0.051
Door to Needle	-0.103	0.391	0.231	0.051	1	-

## Discussion

Making decision for minimizing the complications arising from acute MI and giving information to the emergency department are the most important measures that should be taken immediately by the patients' families (13). Thus, it seems necessary to promote the awareness of the individuals at risk of MI including the diabetics, individuals with high blood pressure, and individuals with Angina history. The patient as well as his family and friends are recommended to immediately refer to the emergency departments when symptoms such as chest pressure, fatigue, shortness of breath with sweating, lightheadedness, and heart palpitations occur, since reducing the interval between the occurrence of warning symptoms and the onset of treatment is an important factor in reducing the mortality arising from MI (14). The present research studied the time interval between the onset of clinical symptoms and receiving streptokinase inpatients with acute myocardial infarction (AMI) at **Amir Hospital** in Zabol city in 2013. The findings of the present study indicate that Onset to Call mean was higher in patients from the rural areas, patients who were 50-60 years old, and patients with the educational level of lower than high school diploma. However, the Onset to Call interval time did not show a significant difference between the men and women. The Call to Door men was higher in patients who were over 60 years old, illiterate patients, and patients of urban areas. There was no significant relationship between sex and call to door interval time. Moreover, the door to needle interval time was not higher in individuals with low educational age, high age, and inhabitants of the rural areas. The study by Ting et al (2008) conducted in the US indicated that the use of thrombolytic therapy depends on the onset of symptoms to the patients' referral time; the longer this interval, the less likely it is to use fibrinolytic drugs, and the DTN increases with the same ratio, ranging from 32 minutes to 46 minutes (15). In another study, it has been claimed that the door to needle interval time was around 60-90 minutes; this interval can be minimized to 30 minutes through making changes in the intra-hospital structures such as equipping the emergency department, training the personnel, and giving permission to the emergency department doctors to treat the patients with fibrinolytic drugs (16). In another study conducted on 271 AMI patients, the mean of door to needle interval as well as the onset of chest pain and the patients' arrival were 95 and 300 minutes respectively (17). Moreover, in the study of Muqueet et al (2006) conducted in Bangladesh on 195 patients who had

applied to receive *streptokinase*, 156 patients received thrombolytic therapy; the mean of door to needle interval was 147 minutes that was much higher than that of the present study. In this study, Muqueet et al (2006), 80 patients received streptokinase in the first 90 minutes, 9 patients received it in the second 90 minutes, and 6 patients received it after 180 minutes (18). In another study conducted in Iran on 150 patients with STEMI, around %90 of the patients' Door to Needle time was more than 30 minutes (19). Moreover, in other studies conducted in Iran and South Africa, the mean of Door to needle time were less than 30 minutes and 55.13 minutes respectively (20, 21). The findings of another study conducted in Japan on 155 AMI hospitalized patients indicate that the mean of Door to needle time was around 19 minutes (22), and it is much lower than that of the present study. In the present study, the mean of door to needle time was  $96.33 \pm 49.95$  minutes; the mean is almost twice as much as that of the studies conducted in Europe and Japan. This difference is possibly owing to the lack of public knowledge as well as lack of sufficient skill and training needed for the quick transfer of the patient to the healthcare centers and hospitals. In the study conducted by Hosseinian et al (2012), unlike the findings of the present study, the educational level, age, and MI history did not have any relationship with the onset of treatment (23). In fact, given the ACC/AHA statement, the door to needle interval time should not be more than 30 minutes (24). However, the mean of the intra-hospital delay was several times more than the standard door to needle time.

## Conclusion

Based on the findings of the present study, the early and on-time referral of the patients to the healthcare centers and quick and appropriate treatment can be referred to as the most important issues in treating these patients. Delays in the treatment of STEMI patients include such factors that have to do with the patients, emergency department system, and the centers for providing the primary cares. It is recommended to promote the pre-hospital care system and treatment, the facilities provided, and the educated human resources in the pre-hospital centers.

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