

## Evaluation of fibrinolytic medical therapy for patients with acute myocardial infarction

**Ali Maleki<sup>(1)</sup>, Arman Shariari<sup>(2)</sup>, Masoumeh Sadeghi<sup>(3)</sup>, Negin Rashidi<sup>(4)</sup>, Farshid Alyari<sup>(5)</sup>, Saeid Foroughi<sup>(6)</sup>, Behjat Nabatchi<sup>(7)</sup>, Reza Ghanavati<sup>(8)</sup>**

### Abstract

**BACKGROUND:** Fibrinolytic therapy is the standard therapeutic method for patients with acute myocardial infarction (AMI). This study endeavored to assess the delay in arrival to the emergency department and door to needle time for thrombolytic therapy.

**METHODS:** This study was conducted on 80 patients with AMI whom referred to our clinic from January 2009 to January 2010. We measured time of arrival, needle time and door to needle time for all patients. Moreover, the relations of these times to some variables such as age, gender and the referred shift of emergency department personnel were calculated.

**RESULTS:** A total of 80 patients, 62 (77.5%) male and 18 (22.5%) female were evaluated for thrombolytic therapy. The arrival time of overnight shifts was  $14.59 \pm 1.23$  minutes shorter than other shifts. The median door to needle time was 46.56 minutes and the mean time of the onset of chest pain to arrival at the emergency department was 19.44 minutes. Seventy-two patients (90%) received fibrinolytic therapy within the first 30 minutes of arrival. The needle time was significantly longer in the night shift ( $P < 0.05$ ) (between 8 to 14 minutes), while the time of receiving Streptokinase therapy in the other shifts was not meaningfully different. Finally there was a statistically significant difference between the referred shifts and needle time ( $P < 0.05$ ).

**CONCLUSION:** Despite our good results for door to needle time, to improve and attain the gold standard's limits in administering fibrinolytic therapy, improvement of policies like training the personnel to shorten this time is recommend.

**Keywords:** Fibrinolytic Therapy, Door to Needle Time, Acute Myocardial Infarction.

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### Introduction

The incidence and prevalence of coronary heart disease (CHD) and acute myocardial infarction (AMI) among the Iranian population has increased. However, acute ST-elevation myocardial infarction (STEMI) is a cardiac emergency with a high early (first hour) mortality rate.<sup>1</sup> However, recently advancement in coronary interventional techniques and medical therapy has been introduced. For maintenance of the patency of STEMI in the patients, direct percutaneous recanalization and systemic anticoagulation following fibrinolytic therapy, is recommended.<sup>2,3</sup> The management of AMI patients at first time of referral is crucial. There are some care considerations for MI victims to minimize the

patients discomfort and distress. These methods include initial diagnosis and early risk stratification. Early care, subsequent care for latent complications and risk assessment prevent coronary artery disease (CAD) progression.<sup>4</sup> Patients with AMI, as diagnosed by clinical symptoms, and ST segment elevation must receive fibrinolytic medicines with the minimum of dosage. A realistic aim is to initiate fibrinolysis within 90 minutes of the moment patients call for medical treatment (needle time) or within 30 minutes of arrival at the hospital (door to needle time). Thrombolytic therapy should not be administrated to patients who arrive with infraction after more than 12 hours.<sup>5-8</sup> Streptokinase (SK) is one of fibrinolytic therapy regimes which has the advantages of low cost

1- Assistant Professor, Department of Cardiology, Lorestan University of Medical Sciences, Khorramabad, Iran.

2- General Practitioner, Lorestan University of Medical Sciences, Khorramabad, Iran.

3- Associate Professor, Cardiac Rehabilitation Research Center, Isfahan Cardiovascular Research Institute, Isfahan University of Medical Sciences, Isfahan, Iran.

4- Internist, Borujerd Hospitals, Borujerd University of Medical Sciences, Borujerd, Iran.

5- Pathologist, Imam Khomeini Hospital, Lorestan University of Medical Sciences, Khorramabad, Iran.

6- MSc, School of Nursing, Lorestan University of Medical Sciences, Khorramabad, Iran.

7- BSc, Nurse, Borujerd Hospitals, Borujerd University of Medical Sciences, Borujerd, Iran.

8- Cardiologist, Borujerd Hospitals, Borujerd University of Medical Sciences, Borujerd, Iran.

Correspondence To: Ali Maleki, Email: dralimaleki@yahoo.com

and availability in Iran. But this therapy consumption had the golden time of three hours; its efficacies decrease dramatically afterwards, and become absolutely useless after 12 hours. The aim of the present study was to evaluate the door to needle time and needle time due to the importance of timely diagnosis of AMI.

**Materials and Methods**

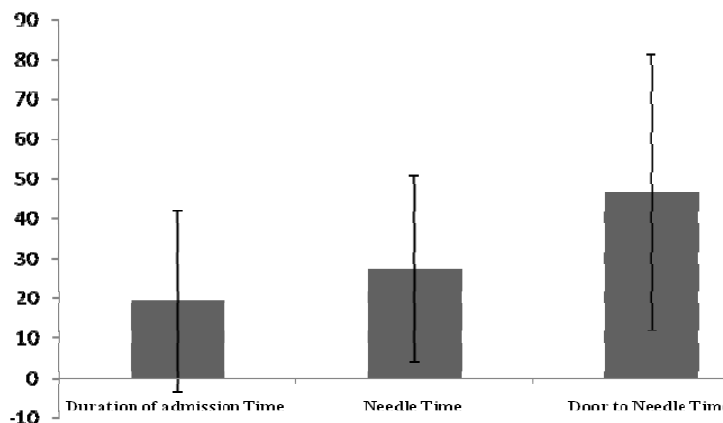
In this descriptive study eighty patients with acute ST elevation MI (aged  $59 \pm 10.85$ , male = 62) referred to the emergency heart clinic from January 2009 to January 2010. Diagnosis of acute myocardial infarction was confirmed via ST segment elevation in initial EKG and cardiac enzymes measurement. All these patients were qualified for SK therapy. Furthermore, due to the importance of early fibrinolytic therapy in prognosis of the patients with AMI, the time of arrival, needle time and door to needle time were recorded. In addition, the relations of these times to some other variables such as age, referred shift and gender were calculated. We used SPSS for Windows, version 11.5 (SPSS Inc., Chicago, IL, USA) for all statistical procedures. Data were expressed as mean  $\pm$  SD or as proportions of the sample size. Differences in proportions were judged by  $\chi^2$  test. A two-tailed P-value of smaller than 0.05 was considered statistically significant.

**Results**

In this study 62 (77.5%) males and 18 (22.5%) females were evaluated for SK therapy. Most of these patients (63) had between 50 to 69 years of age. Our studied patients referred to our clinic during different shifts. 23 (28.8%), 21 (26.3%), 14 (17.5%) and 22 (27.5%) patients referred in the morning (7 am -1 pm), noon (1pm-7 pm), afternoon (7pm-12 am) and night (12 am-7 am) shifts, respectively. There was no significant difference between our studied individuals in various shifts ( $P > 0.05$ ). The arrival time at night was  $14.59 \pm 1.23$  minutes shorter than other shifts. Door to needle time was equal between different gender and different shifts. Evaluation of our patients' showed that the shortest SK therapy was in the morning (42.62 minutes), and then the noon shift (43.33 minutes). Seventy-two patients (90%) received fibrinolytic therapy within the first 30 minutes of arrival time. In addition; we observed a maximum of 180 minutes for arrival time. The needle time was significantly longer in the night shift ( $P < 0.05$ ) (between 8 to 14 minutes), while receiving SK therapy, in the other shifts did not show a meaningful difference (Table 1). The longest delay for administration of fibrinolytic therapy was related to the ages between 40-49 years. Finally there was a statistically significant difference between different referred shifts and needle time ( $P < 0.05$ ). (Figure 1).

**Table 1.** Evaluation of the measured duration related to gender and referred shift

Variable	Gender (Mean $\pm$ SD)		Referred shift (Mean $\pm$ SD)			
	Male	Female	Morning	Noon	Afternoon	Night
Arrival time	17.45 $\pm$ 20.49	26.28 $\pm$ 29.37	20.33 $\pm$ 2.38	21.86 $\pm$ 2.45	19.57 $\pm$ 2.61	14.59 $\pm$ 1.23
Needle Time	27.27 $\pm$ 24.27	27.28 $\pm$ 20.10	22.62 $\pm$ 1.65	21.71 $\pm$ 1.52	27.57 $\pm$ 1.40	35.45 $\pm$ 3.60
Door to Needle Time	44.53 $\pm$ 32.69	53.56 $\pm$ 40.71	42.62 $\pm$ 3.41	43.33 $\pm$ 3.43	47.14 $\pm$ 3.48	50.05 $\pm$ 3.64



**Figure 1.** Measured duration related to fibrinolytic therapy in this study

## Discussion

The results of this study showed that fibrinolytic therapy was administered to the majority of patients with AMI within 46 minutes of arriving at the hospital. Comparing the duration of our door to needle time with the other study centers revealed that our center's records was markedly shorter.<sup>8-10</sup> This finding could be emphasizing not only our health center workers' talent but also the general population's eagerness to reduce the delay in referring to the hospital after onset of the chest pain. There are many factors associated with prolonged delay for fibrinolytic therapy like age, sex and having symptoms during different shifts. Some previous studies identified gross waiting time for fibrinolytic agent to arrive from the pharmacy, but they could not find any data to support their observation.<sup>11</sup>

Abba et al. reported the mean door to needle time to be 95 minutes, and the mean time of onset of chest pain to arrival ED to be 5 hours.<sup>8</sup> Sherry evaluated door to needle time of seventeen hospitals in the USA and found that admission time to the emergency department lasted 12 minutes and only 48.8% of studied patients received fibrinolytic therapy within the first 30 minutes.<sup>12</sup> Moreover only 12% of studied individuals in the study of Bates reported the same amount of time until receiving fibrinolytic therapy.<sup>13</sup> Sherry found the longest prolonged door to needle time within female patients of more than 75 years of age.<sup>12</sup> Furthermore, our study supported their findings and reported a significantly higher needle time for female patients however, we found this delay to be maximum (59.73 minutes) for ages between 40 to 49 years. Moreover, the door to needle time in patients of higher than 70 years of age (39.11 minutes) was second in rank after patients with lower than 40 years of age (27.6 minutes). This difference is probably related to the different cultural backgrounds of the study participants. In addition, our results indicated that our patients experience shorter delay in ED for diagnosis and initiation of the first therapeutic interventions by the emergency personnel (physicians, nurses or cardiology consultants).

Even though, our records were close to those of approved global records, we are still far from the gold standards, which need more hard work. It is known, that to improve the administration of fibrinolytic therapy in time, a center should set well-established policies like training the personnel and/or re-evaluating the processes and steps of admission and diagnosis of the patients.

## Conflict of Interests

Authors have no conflict of interests.

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