

Original Research Article


# A Comparative Prognostic Study of Acute Myocardial Infarction Thrombolysis in Diabetics Vs Non-Diabetics Using ECG as A Tool – A Hospital Based Study

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## Abstract

**Background:** Diabetes mellitus is one of the six primary risk factors identified for MI, others being dyslipidaemia, smoking, hypertension, male gender, and family history of atherosclerotic arterial disease. Diabetics have been shown to have poor outcome after post-thrombolysis in acute STEMI compared to non-diabetics.

**Objective:** To Compare, Post Myocardial Infarction in Hospital Patients Prognosis After Thrombolytic Therapy In Diabetics versus Non-Diabetics.

**Materials and methods:** This was a prospective cross sectional study done at Jhalawar Medical College and Hospital, Jhalawar on 139 patients from October 2016 to September 2017. Consecutive patients with ST segment elevation MI, who were not treated with primary angioplasty, but were thrombolysed with Streptokinase were recruited at the time of arrival in emergency department. ECG was taken at baseline and 2 hour after STK administration. Patients were divided in two groups A) Non-diabetics B) Diabetics. Total 139 patients 85 are diabetics and 54 are non-diabetics.

**Results:** In non-diabetic group (54), ST segment resolution occurred in 77.76 % patients as compared to diabetic group (85) in which only 31.76% patients had ST segment resolution. Diabetics had more complications such as recurrent chest pain, heart failure, arrhythmias, death as compared to non-diabetics.

**Conclusion:** Diabetics with acute myocardial infarction have worse prognosis as predicted by incomplete ST segment resolution in ECG after thrombolysis.

## Key words

Diabetes, Myocardial infarction, Thrombolysis.

## Introduction

Diabetes mellitus is one of the six primary risk factors identified for MI, others being dyslipidaemia, smoking, hypertension, male gender, and family history of atherosclerotic arterial disease. Diabetics have been shown to have poor outcome after post-thrombolysis in acute STEMI compared to non-diabetics [1]. Diabetes mellitus is a metabolic disorder which enhances the atherosclerotic rate of vascular occlusion [2]. In MI, for early and complete myocardial reperfusion, prompt thrombolysis is carried out [3]. After fibrinolytic therapy, coronary reperfusion can be assessed by noting ECG changes pre and post thrombolysis in the form of ST-segment resolution. Micro vascular reperfusion can be better judged by ST- segment resolution in ECG whereas epicardial reperfusion can be better judged by coronary angiogram. Therefore, ST segment is considered as a better prognostic tool, and it provides information which cannot be assessed by coronary angiogram alone [4-7]. In order to identify candidates for early invasive procedures like PTCA, ST segment non-resolution is considered as an important tool after thrombolytic therapy [8]. In a developing country like India, it becomes very important to establish the effectiveness and importance of ECG for assessing reperfusion as it is widely available everywhere. ECG will offer cheapest alternative for judging myocardial salvage and recovery.

## Materials and methods

This study was conducted at Jhalawar Medical College, Jhalawar from October 2016 to

September 2017. All cases of acute myocardial infarction with the diagnosis based on WHO criteria i.e. presence of any two of the following were included.

- Chest pain consistent with acute myocardial infarction less than 24 hours duration.
- ECG changes i.e. ST segment elevation >0.2 mm in at least two contiguous chest leads or > 0.1mm in at least two contiguous limb leads.
- New onset left bundle branch block on ECG.
- Raised levels of cardiac enzymes CK-MB more than double of reference value or positive Troponin T test done with commercially available Trop T Kit.

These patients came within 12 hours of chest pain and received Streptokinase (1.5 million IU) on presentation. Patients coming after 12 hours of chest pain are excluded from the study. The study population was divided into two groups:

GROUP-A: DIABETICS (n=85).

GROUP-B: NON-DIABETICS (n=54).

Only those patients who were known cases of diabetes or in whom it was established during hospital stay by repeated blood sugar estimation were included in GROUP B. Patients coming after 12 hours of chest pain and patients suffering from Type 1 diabetes mellitus were excluded.

Consecutive patients with ST elevation myocardial infarction, who were not treated with primary angioplasty but were thrombolysed

recruited at the time of arrival in the emergency department. Streptokinase was administered to all patients as the agent for thrombolysis. ECG was taken at baseline and at 2 hours post streptokinase administration.

## Results

A total of 139 patients were taken as a study population, out of them 85 were found diabetic and 54 were non-diabetic. Out of 139 patients investigated, 69 patients showed resolution of ST-segment elevation and remaining 70 patients

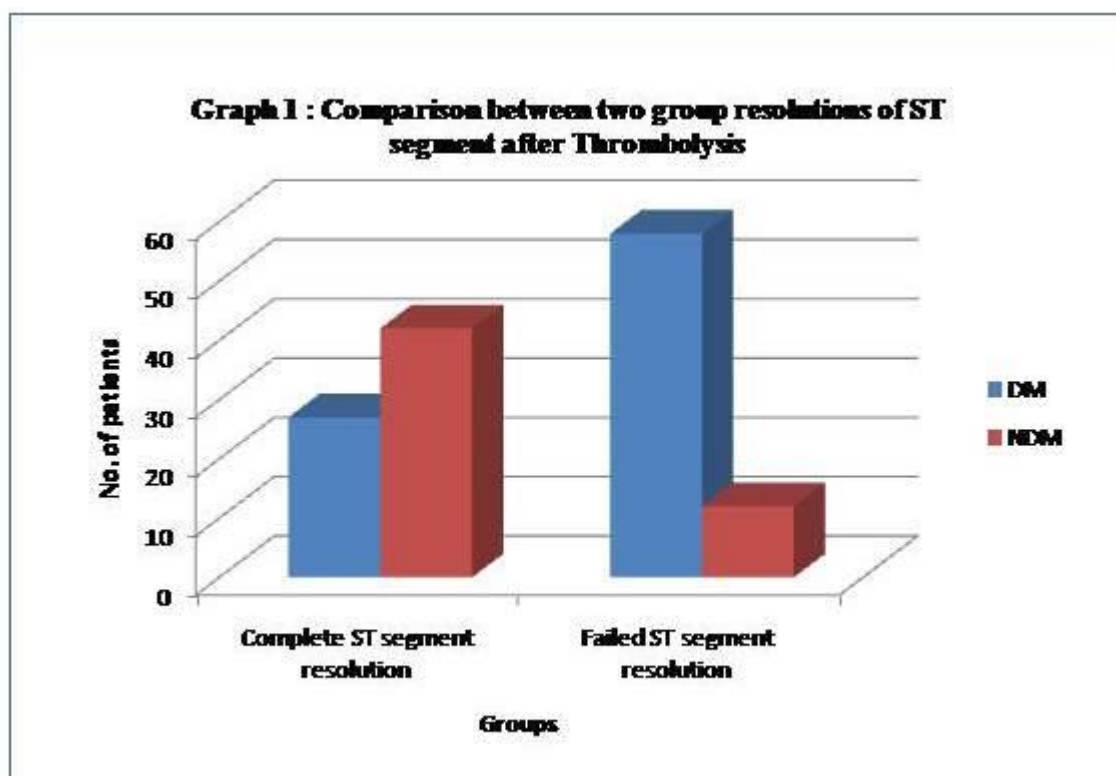
showed non resolution of ST- segment elevation (**Table – 1, Graph - 1**). These are the patients who were thrombolysed within about 6 hours on arrival by streptokinase. Complete ST-segment resolution was seen in 27 diabetic patients and in 42 non diabetic patients. Failed ST-segment resolution in diabetics was 58 patients (68.23%) whereas in non-diabetics it was 12 patients (22.23%) the above data indicates a remarkable difference in the patient’s recovery without diabetes as compared to those with diabetes.

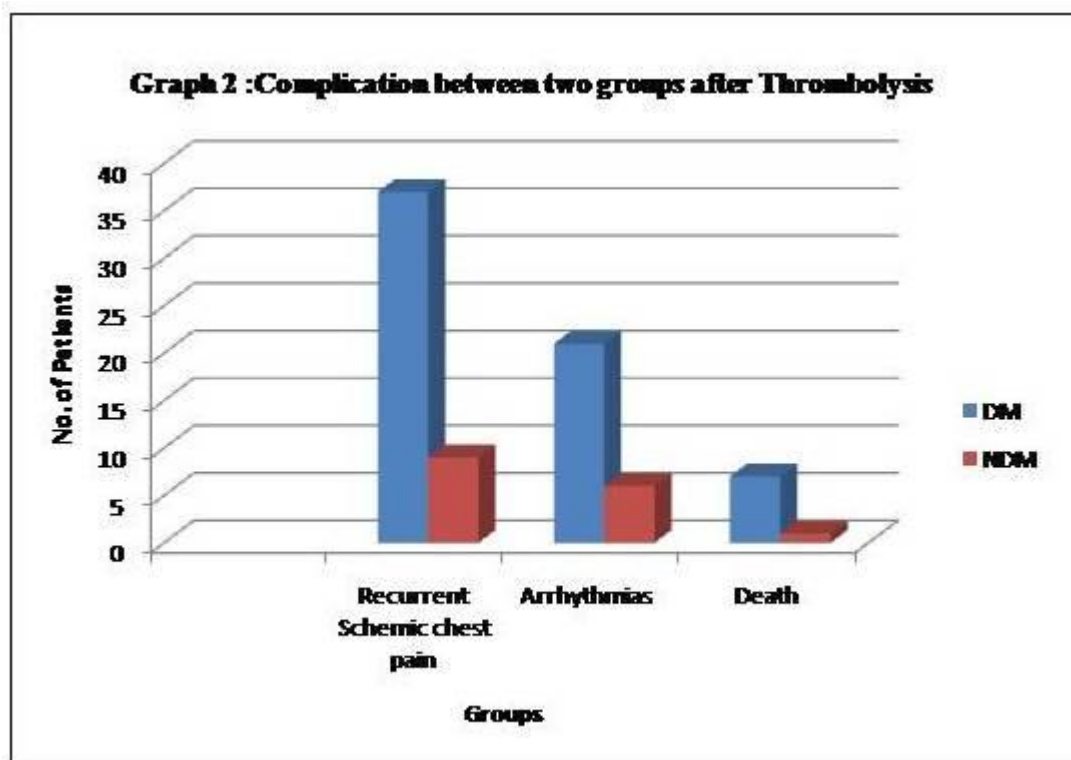
**Table - 1:** Comparison between two group resolutions of ST segment after Thrombolysis.

Groups	DM (85)	NDM (54)	Total (139)
Complete ST segment resolution	27	42	69
Failed ST segment resolution	58	12	70

**Table - 2:** Complication between two groups after Thrombolysis.

Groups	DM (N=85)		NDM (N=54)		Total (139)
	No.	Percentage	No.	Percentage	
Recurrent Schemic chest pain	37	43.52	9	16.66	46
Arrhythmias	21	24.65	6	10.8%	27
Death	7	8.23	1	1.85	8





On analysing the complications related to post thrombolysis, most common complication encountered was recurrent ischaemic chest pain, few days after the discharge (**Table – 2, Graph - 2**). Apart from it, heart failure and various types of arrhythmias were also noted as complications. In this study, we found that in diabetic population about 37 (31.45%) patients suffered from recurrent ischaemic chest pain, whereas in non-diabetic population the figure reduced to 9 (16.66%). Similarly, second most common complication encountered in both group of population was arrhythmias of different types, where again affection rate of diabetics was 21 (24.65%) whereas that of non-diabetics was 6 (10.80%). Incidence of arrhythmias in diabetics was more as compared to other related complications. Overall mortality post-thrombolysis is very much less. In this study, mortality is seen in diabetics 7 (12.75%) compared to non-diabetic 1 (0.54%).

### Discussion

One of the well-recognized and effective treatments apart from percutaneous intervention

for STEMI is Thrombolysis. The aim of thrombolysis in STEMI is early and complete reperfusion. Post myocardial infarction, congestive heart failure remains one of the most important prognostic factor, lead to excessive short term mortality of diabetic patients [8, 9]. Our observation is in concordance with that of Goyal A, et al., who concluded from their study that reperfusion failed in 68.2% of diabetic patients with STEMI in comparison with 22.3% in non-diabetic group [10]. The reasons for the higher risk of failure were the diffuse and multiple small vessel diseases in diabetic patients, which did not respond well to streptokinase. Diabetic patients usually present to the hospital later, due to their impaired sensation in myocardial ischaemic pain. In addition diabetic patients have a lower ejection fraction.

Streptokinase is the first generation thrombolytic agent. It acts by complexing with plasminogen and it is not fibrin specific. Eventually there is depletion of plasminogen, known as "plasminogen steal", which will limit the fibrinolytic action accounting partly for the

thrombolysis failure [11]. Diabetics have less complete resolution of ST elevation than the non-diabetics [12]. This significant difference in ST-resolution between non-diabetics and diabetics was similar with the study done by Zairis, et al. who showed significant difference between diabetic and non-diabetic patients in relation to complete (34.1% vs. 68.2%;  $p < 0.001$ ) and incomplete (65.9% vs. 31.8%;  $p < 0.001$ ) resolution [13]. This can be explained by the fact that diabetics have increased levels of plasminogen activator inhibitor-1 and a procoagulant milieu that reflects poorer response of diabetics to thrombolysis [14].

### Conclusion

Frequency of failed ST segment resolution in acute STEMI after thrombolysis (Streptokinase) is more in Diabetics compared to non-diabetics. Failed ST segment resolution is associated with more in hospital complications in both diabetics and non-diabetics. ST segment resolution in ECG can be used as a tool to identify candidates for early invasive procedures such as PTCA, who are at risk of developing complications because of failed ST segment resolution after initial thrombolytic therapy.

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