Comparison of Culprit Artery Patency Between Diabetic and Non-Diabetic Patients Undergoing Thrombolysis with Streptokinase for ST Elevation Myocardial Infarction

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ABSTRACT

Introduction
Myocardial Infarction is the leading cause of mortality and mortality globally. Thrombolysis with streptokinase is well established therapeutic intervention in Myocardial Infarction. Timely intervention with adequate myocardial reperfusion is associated with better clinical outcome whereas failed reperfusion due to incomplete or non-reopening of culprit artery is associated with complications. This study aims to compare diabetic and non-diabetic patients with acute myocardial infraction in term is culprit artery patency.

Methods
This analytical cross-sectional study was carried out in Cardiology Department, Collage of Medical Sciences, Bharatpur from 1⁰ June 2023 to 30⁰ October 2023. Total 80 patients with acute Myocardial Infarction were enrolled in the study. Blood sugar level and twelve leads ECG of each patients were recorded before giving intravenous 1.5 million units of streptokinase over one hour for acute ST elevation myocardial infarction. Coronary angiogram was done after 24 hours of thrombolysis. Patency of the culprit artery was assessed in each patients and compared between diabetics and non-diabetics.

Results
The study included 57.5 % (n=46) male and 42.5 % (n=34) female patients. Mean random blood sugar level was 160.87 ±40.8 mg/dl. Mean age of the study population was 52.9 ±10.8 years. 40 % (n= 32) of patients were diabetics. The percentage of culprit artery patency was lower in diabetic patients as compared to non-diabetic patients (43.75 % vs 75%).

Conclusions
Among both male and female patients the success of thrombolysis in term of culprit artery patency was higher in non-diabetic patients as compared to diabetic patients.

Keywords: ST elevation myocardial infarction; diabetes; streptokinase; culprit artery patency.

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INTRODUCTION
Acute myocardial infarction represents a medical emergency worldwide.1 Thrombolysis and Primary PCI being two standard modes of treatment in acute ST elevation myocardial infarction, streptokinase is still being used for around 500,000 patients per year and proven effective when used within six hours of onset of symptoms.2-3 However it has been proven less effective among diabetic as compared to non-diabetic patients.4-6 Poststreptokinase reperfusion failure on the basis of non-resolution of ST segment elevation in acute myocardial infarction is also seen more commonly seen in diabetics.7-9 Failure of achieving adequate myocardial reperfusion following therapeutic intervention in ST elevation myocardial infarction patients is associated with increased incidence of congestive cardiac failure, recurrent myocardial ischemia, arrhythmia and sudden cardiac death and even more common in diabetics.10,11 Diabetes and elevated blood glucose level at admission has been demonstrated as an independent predictor of impaired micro-vascular flow and epicardial flow among patients undergoing primary percutaneous coronary intervention (PCI) and no reflow phenomenon is seen even after thrombolysis in diabetics.12-14 This study was therefore conducted to see the comparison of thrombolytic success in patients undergoing reperfusion therapy with streptokinase for ST elevation myocardial infarction, in terms of culprit artery patency in diabetics versus the non-diabetics.

METHODS
This analytical cross-sectional study was carried out in Cardiology Department, Collage of Medical Sciences, Bharatpur from 1st June 2023 to 30th October 2023. Total 80 patients with acute ST elevation myocardial infarction were selected on using non-probability purposive sampling technique. Both males and females between the ages of 20-60 years presenting with acute myocardial infarction were selected. Patients with active bleeding status, recent surgeries within past 3 months, previous history of myocardial infarction or documented ischemic heart disease, those presenting later than 6 hours of chest pain and those not willing for coronary angiography were excluded from the study. Blood sugar level was checked at admission. 12 leads ECG was done at emergency. Streptokinase was given intravenous over one hour under hemodynamic monitoring. Coronary angiogram was done after 24 hours to check patency of the culprit artery. Patent culprit artery was defined as the establishment of blood flow in the coronary artery involved in myocardial infarction. Data was entered and analyzed using SPSS version 17.0. Numerical variable i.e. age was described as mean ± SD (standard deviation). Qualitative variables like gender and patency of culprit artery were described in the form of frequency and percentages. The frequency of culprit artery patency was compared between diabetic and non-diabetic patient.

RESULTS
The study included 57.5 % (n=46) male and 42.5 % (n=34) female patients. Mean random blood sugar level was 160.87 ±40.8 mg/dl. Mean age of the study population was 52.9 ±10.8 years. 25%(n=20) of patients were under 40 years of age and 75%(n=60) of patients were over 40 years of age (Table 1).

| Table 1. Age of the patients. (n=80) |
|-----------------|-----------------|
| Age             | Frequency (%)   |
| < 40 years      | 20 (25%)        |
| > 40 years      | 60 (75%)        |
| Mean = 52.9 ±10.8 years |

40 % (n= 32) of patients were diabetics and 60 % (n=48) of patients were non-diabetic. Culprit arteries causing acute myocardial infarction was left anterior descending (LAD) in 49% cases, right coronary artery (RCA) in 27% cases
and left circumflex artery in 24% of cases. The percentage of culprit artery patency was lower in diabetic patients as compared to non-diabetic patients (43.75% vs 75%) (Table 2).

| Patency | Diabetes Mellitus | | | |
|---------|------------------|---|---|
| Yes     | 14(43.75)        | 36(75) |
| No      | 18(56.25)        | 12(25) |

The result was further stratified based on age and gender. In less than 40 years age group, the culprit artery patency was 62.5% among diabetics and 83.3% among non-diabetics. In more than 40 years age group, the culprit artery patency was 37.5% among diabetic and 61.1% among non-diabetics. So in the younger patients below 40 years of age the patency rate of culprit artery following thrombolysis was found to be better in both diabetic and non-diabetic patients as compared to older patients. In males, culprit artery patency was found in 47.3% of diabetics and 74% of non-diabetic subjects. In females, culprit artery patency was recorded in 38.5% of diabetic patients and 71.43% of non-diabetic subjects (Table 3).

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<th>Variables</th>
<th>Patency</th>
<th>Diabetes Mellitus</th>
<th>Chi-square</th>
<th>P-value</th>
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<td>3(37.5)</td>
<td>2(16.7)</td>
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<td>22(61.1)</td>
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<td>15(62.5)</td>
<td>14(38.8)</td>
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**DISCUSSION**

Management of STEMI requires the rapid reperfusion of the culprit artery such that the myocardium under hypoxic stress is reperfused. Despite advances in revascularization strategies, and to reduce the ischaemic adverse outcomes, medical revascularization with fibrinolytic agents remains a necessary modality. Although most effective reduction of mortality in golden first hour of the event, the thrombolysis shows similar results when done in three hours of event. A major contributor, diabetes is not only a risk to the development of, but also to outcome of coronary artery disease. Studies show significant effects on the efficacy of diabetes in patient administered streptokinase when they present with acute ST elevation myocardial infarction. A statistically indifferent post thrombolysis coronary artery patency of 40.3% vs 37.6% in diabetic vs non diabetic was respectively shown in 1996 by Woodfield et.al. In contrast to this current study showed a significant difference in patency of 47.3% vs 74% in diabetics and non-diabetics respectively. In TIMI trials a similar but early approach of angiography after 90 minutes following the thrombolysis was studied which showed 8.9% of the patients had an infarct-related artery luminal diameter stenosis

<table>
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<td>6(28.57)</td>
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of <50% or a persistent 91% patient showing significant stenosis. They further attributed the early angiographic assessment as a reason for such findings, which might be the reason for the finding of significant reduction in stenosis in our study. In further analysis in our study the demographic determinant of age showed the culprit artery patency was 62.5% among diabetics and 83.3% among non-diabetics in less than 40 years patients. Similarly, the culprit artery patency was 37.5% among diabetic and 61.1% among non-diabetics in more than 40yrs old patients. This result was also seen in the study in TIMI trials where 87% of non-diabetics had >50% patency after thrombolysis who had the mean age of 58.6 ± 11 whereas higher age group 59.1 ± 11 had arterial occlusion even after the thrombolysis. No difference in between gender in the infarct related artery patency was shown in a study by Woodfield et. al. where 69% versus 66.5% of differences were seen in women vs men with p-value of 0.46. In contrast current study showed culprit artery patency of 47.3% of diabetic males and 74% non-diabetic males. Whereas, in females, culprit artery patency was recorded in 38.5% of diabetic and 71.43% of non-diabetic.

CONCLUSIONS

This study shows that thrombolysis with streptokinase was efficacious in maintaining the patency in the culprit artery in patients presenting with acute ST elevation myocardial infarction and was significantly more efficacious in non-diabetics as compare to diabetic patients. Furthermore, the lower age group and non-diabetic patient of both gender showed the better culprit artery patency as compared with diabetics.

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Conflict of Interest: None

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