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A COMPARATIVE STUDY OF IN HOSPITAL OUTCOME OF PATIENTS WITH ST-SEGMENT ELEVATION MYOCARDIAL INFARCTION WITH AND WITHOUT DIABETES MELLITUS, AFTER THROMBOLYTIC THERAPY IN A TERTIARY CARE CENTRE IN EASTERN BIHAR.

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ABSTRACT

INTRODUCTION: Diabetes mellitus is considered as a major health problem and an epidemic throughout the world. The mortality of patients with diabetes is almost twice that of non-diabetic. The outcome of in-hospital patients with myocardial infarction with and without diabetes after thrombolytic therapy is presented here.

AIMS AND OBJECTIVES: To compare the outcome of patients with myocardial infarction after thrombolysis in diabetics and non-diabetics in patients of Medicine Department of Jawahar Lal Nehru Medical College and Hospital, Bhagalpur, Bihar.

MATERIAL AND METHODS: A retrospective, observational study was carried out at Medicine Department of Jawahar Lal Nehru Medical College and Hospital, Bhagalpur, Bihar between the period of October 2016 to September 2018. Patients who presented with acute myocardial infarction having ST-elevation as MI picture, were treated with streptokinase as a thrombolytic agent. Baseline ECG was taken on admission and the one after 60 minutes of thrombolysis. The study group involved two types: (i) diabetic (ii) nondiabetics.

RESULTS: A total of 790 patients were included in the present study. Out of them around 208 were females and 582 were males. ST-segment resolution in non-diabetic patients was found in 360 patients out of 372 and in diabetics it was found in 348 patients out of 416. Complications related to post fibrinolytic therapy was more prevalent in diabetics 296 patients (71.15%) as compared to those in non-diabetics 94 patients (25.26%). Mortality was observed only with diabetics (23.52%) as compared to no mortality in non-diabetics.

CONCLUSION: Overall, morbidity and mortality of diabetic patients with Acute Myocardial Infarction was found to be greater as compared to non-diabetics, post thrombolysis.

KEYWORDS : Myocardial Infarction, ST segment, ECG, Thrombolysis, Diabetes.

INTRODUCTION:

Coronary heart disease (CHD) has been the leading cause of mortality worldwide for over 25 years,[1,2] and was estimated to be the cause of 17% of deaths globally in 2016 [3]. Acute myocardial Infarction is considered as one of the major epidemic of mankind. In a developing country like India, coronary artery disease incidence is rising. There is an entity called Acute Coronary Syndrome which includes various conditions like: unstable angina, non ST- segment elevation MI (NSTEMI) and ST segment elevation MI (STEMI). Apart from other conditions like dyslipidaemia, smoking, hypertension, any suggestive family history of atherosclerotic disease in the family, Diabetes Mellitus is considered as one of the major risk factor leading to MI. Diabetes Mellitus is a metabolic disorder which enhances the atherosclerotic rate of vascular occlusion.[4]

Even after prompt thrombolysis, outcome of patients with diabetes is worse as compared to those without diabetes indicating impaired cardiac function post thrombolysis and of course, the prognosis.

In Myocardial Infarction, for early and complete myocardial reperfusion, prompt thrombolysis is carried out. [5]Chances of complications increases when there is incomplete or failed reperfusion. 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 whereas epicardial reperfusion can be better judged by coronary angiogram. Although epicardial reperfusion serves as a good marker for prognosis, micro vascular flow correlates more strongly with good clinical outcome. Therefore, ST segment is considered as a better prognostic tool, and it provides information which cannot be assessed by coronary angiogram alone[6,8].

In one of the study done by Schroeder et al [7] , it was reported that absence of ST- segment resolution is one of the powerful predictor of early mortality. In order to identify candidates for early invasive procedures like PTCA, ST- segment non-resolution is considered as an important tool after thrombolytic therapy [9] . 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. This study aims at establishing correlation between post thrombolytic complications with diabetics when the diagnosis is made by ST- segment elevation found on ECG in patients with Acute Myocardial Infarction (AMI) then in those with non-diabetics.

MATERIALS AND METHODS:

This retrospective study was done at Medicine Department of Jawahar Lal Nehru Medical College and Hospital, Bhagalpur, Bihar between the period of October 2016 to September 2018. All cases with ST-Elevation acute myocardial infarction were included. Following factors were considered in diagnosis: (i) ECG changes i.e.ST-elevation >0.2mv in atleast two contiguous chest leads or >0.1mv in atleast two contiguous limb leads. (ii) Elevated CPK-MB levels more than twice the reference values (iii)Positive trop-t test done from kits available commercially. These patients were presented within 12 hours and were given streptokinase as a thrombolytic agent.

The exclusion criteria followed were those patients presented after 12 hours of chest pain and those suffering from diabetes mellitus type-1. The study population was divided in 2 groups. (i)Group-A :- Diabetic (ii) Group-B :- Non-diabetic . Group B included only those patients who were known cases of diabetes or who were declared diabetic after repeated glucose testing or random blood sugar tests, during their in-hospital stay. History, in detail was taken regarding age, sex, address, smoking history , any family history of atherosclerotic disease, hypertension. Pulse and blood pressure were noted on admission of patient to the emergency ward along with the entire clinical check-up. Daily follow-up was done. Any complications, ECG changes or pulse abnormalities were noted and checked regularly till discharge or death of the patient.

Exact time of onset of chest pain, its presentation and nature were noted through the history. Patients' ECG were recorded and looked for ST- segment elevation. The segment showing maximum elevation was recorded in millimetres and treatment of thrombolysis was started. Streptokinase injection was given to all patients with the dose of 1.5 million units, diluted in 100 ml normal saline, over one hour.

ECG was repeated after almost 60 minutes of thrombolytic therapy by streptokinase and the lead with the maximum ST- segment elevation was observed for ST- resolution. Here we define resolution of ST segment when the elevation has reduced to >50%. Informed written consent was obtained from all the patients included in the present study. Routine follow-up and check-up of all the vitals and RBS was

done daily and noted, as far as the in hospital patients were concerned. In order to differentiate between stress hyperglycaemia and nondiabetic, fasting blood sugar was done in stable condition at the time of discharge.

Assessment related to complications was also made, which mainly included: hypotension due to streptokinase, arrhythmia, chest pain-non relieving type and sometimes death.

RESULTS:
A total of 790 patients were taken as a study population, out of them 416 were found diabetic and 372 were non - diabetic. Smoking was the most common associated risk factor found to be involved according to this study, even hypertension was also associated with increased co-morbidity. The average age group involved in case of diabetics was about 54-56 years whereas in case of non-diabetics was around 60-62 years. Average time taken to thrombolyze all these patients presented at the emergency department from the time of onset of chest pain to thrombolysis was around 7 hours and 6.8 hours from the onset of chest pain in diabetics and non-diabetic, respectively.

Out of 790 patients investigated, 710 patients showed resolution o f ST - segment elevation and remaining 80 patients showed non resolution of ST- segment elevation. These are the patient who were thrombolyzed within about 60-180 minutes on arrival by streptokinase. Out of these 790 patients, 416 patients were found diabetic, either a known case or diagnosed by continuous blood glucose monitoring inward and remaining 372 were non-diabetic.

Complete ST-segment resolution was seen in 348 diabetic patients and in 360 non diabetic patients. Failed ST-segment resolution in diabetics was 68 patients (16.34%) whereas in non-diabetics it was 12 patients (3.22%) the above data indicates a remarkable difference in the patients' recovery without diabetes as compared to those with diabetes. On analysing the complications related to post thrombolisation, most common complication encountered was recurrent ischaemic chest pain of acute onset, few days after the discharge. Apart from it, heart failure and various types of arrhythmias were also noted as complications.

In the present study, we found that in diabetic population about 172 (41.34%) patients suffered from chest pain, whereas in nondiabetic population the figure reduced to 42 (11.29%). Similarly, second most common complication encountered in both group of population was arrhythmias of different types, where again affection rate of diabetics was 20.19% whereas that of nondiabetics was 11.82%. Incidence of arrhythmias in diabetics was more (16.09%) as compared to other related complications. Overall mortality post-thrombolysis is very much less. In the present study, mortality is seen in diabetics only (23.52%).

DISCUSSION:
The time taken for reperfusion after presentation and complete reperfusion plays a key role in fibrinolysis. In cases of STEMI, ST-segment resolution indicates reperfusion. Its importance as a good prognostic tool cannot be denied. It is mostly hypothesized that type-2 diabetes interferes with the effectiveness of thrombolysis intravenously, which may be established by ECG or angiographic findings.

In the present study, we observed that in non - diabetic patients with acute myocardial infarction, complete ST- resolution was seen in 360 patients and 12 patients' showed failed resolution of STsegment; and in case of diabetics 348 patients' showed complete resolution and 68 patients' showed failed ST- resolution.

Onset of complications postthrombolysis was observed more in diabetics (71.15%) as compared to those in non-diabetics (25.26%).This is in support of one study which stated that complications were more prevalent in diabetics as compared to non-diabetics.[10]

As shown in another study, there was a positive correlation between diabetic patients with increased morbidity as well as mortality after thrombolization. In context of ischemia, there is one another study mentioning the residual lesion in the infarct related artery was greater in diabetics post fibrinolytic therapy; thereby leading to higher rate of recurrent ischemia.[11]

Post myocardial infarction, heart failure remains one of the most important prognostic factor. Here in the present study, heart failure is found to be associated with diabetic to a greater extent than non-diabetic. Any patient showing signs of heart failure post thrombolysis are considered in the category. In one of the study, it was found that in-hospital heart failure among diabetics was more common [12]. In that study, heart failure developed in 9% diabetics and 4.3% non-diabetics (p=0.001).

Arrhythmias are also found to be associated with post fibrinolytic therapy. Their incidence is more in case of diabetics (20.2%) as compared to non-diabetic (11.82%). It indicates that arrhythmias are more common in diabetics than in non-diabetics, which is supported by another study which also showed positive correlation between arrhythmias and diabetics [13].

In the present study, mortality associated with diabetics, post fibrinolytic therapy was found to be about 3.8% of total diabetic population.it was associated with failed ST- resolution post therapy. No mortality was observed in non diabetic population. The study has limitations due to small sample size and inadequate and irregular follow-up after discharge of the patient. As hospital is equipped with the equipment to deal with various medical emergencies, in-hospital death ratio is overall less. The results of the study are supported by another similar study carried out by Muhammad AK et al [10], their study also indicated significant correlation between mortality and failed ST- resolution in diabetics (7.4%) as compared to non-diabetics with failed STresolution. In another study, carried out by Timmer JR et al, [14] it was found that diabetes is associated with increased 30-day mortality.

In previous study, it was shown that there was a close negative association of diabetes with outcome of STEMI patients as diabetes is associated with increased mortality after thrombolysis in case of ST segment Elevation Myocardial Infarction, there arises a necessity to revise new treatment modalities and revised reperfusion methods.[15] In another study it was proved that fibrinolysis may be less effective in diabetic patients.[16] Angeja et al [17] showed that micro vascular flow reduced in diabetic patients post-fibrinolytics therapy. May be, it is due to increased aggregation of platelets and its reduced ability to induce endothelium –mediated vasodilation.[18] There is a possibility that PCI can be a better option of treatment in diabetics presenting with ST- segment elevation MI. Moreover, other associated risk factors and recovery at the left ventricular level are also to be considered as far as long term outcome for diabetics is talked about. Several preventions like vigorous glycaemic control, strict management of hyperlipidaemia also plays a vital role in good prognosis of diabetes patients'.

In the present study, we have our own limitations regarding age, sex, geographical location and other risk factors, which could not be assessed properly in order to clearly point out the cause leading to mortality, [19] for that multi-variate analysis is to be performed. During acute phase of myocardial infarction, there are chances of stress hyperglycemia, which may give misleading records of hyperglycemia, but it can be certainly differentiated after the acute phase of infarction passes, which takes almost 7 days and by that time the patient is discharged from the hospital. This comes as a major limitation of the study. Moreover our study is a single centre study with limited sample size.

CONCLUSION:
In the present study, morbidity and mortality of diabetic patients with Acute Myocardial Infarction was found to be greater as compared to nondiabetics, post thrombolysis. Post thrombolization, frequency of various complications are more in failed ST-resolution then successful reperfusion, in both diabetic and non - diabetic populations. In diabetes with acute myocardial infarction, abnormality in vascular flow may contribute to the poorer outcome.

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