ORIGINAL ARTICLE

REDUCTION OF ST SEGMENT ELEVATION IN DIABETIC PATIENTS WITH MYOCARDIAL INFARCTION AFTER THROMBOLYTIC THERAPY

Uneeba Syed

Department of Endocrinology, Services Hospital Lahore-Pakistan

Background: Acute coronary artery disease (CAD) is one of the main causes of death in today's world. Myocardial infarction (MI) tends to be more common among diabetic patients. One of the most effective and used (in our settings) methods of resolution of MI is administration of streptokinase (SK). This study was conducted with the aim to determine the efficacy of thrombolytic therapy in reduction of ST segment elevation in acute MI patients presenting with diabetes. **Methods:** A descriptive case series with selection of 130 patients through non-probability purposive sampling was conducted at the Medical Departments of Services Hospital Lahore. The study was completed in 6 Months. Patients 18–80 years of age having either gender diagnosed with confirmed acute myocardial infarction were included in this study. All patients were then injected with streptokinase 1.5 mu. Pre S and Post SK ECGs were done and ST segment elevation measured also measuring reduction of ST segment. **Results:** The mean age of the patients was noted as 54.42±8.80 years. There were 62.31% males. Mean reduction in ST-segment elevation of the patients was noted as 58.53±26.01. The efficacy was achieved in 47.7% patients. **Conclusion:** It is concluded that SK can be effective in almost half of diabetic patients with myocardial infarction.

Keywords: Coronary artery disease; Myocardial infarction; Streptokinase; ST segment reduction

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INTRODUCTION

Acute coronary artery disease is a major killer in today's world. It is on the rise in developing countries like Pakistan as well, where estimated prevalence is at least 6.5% with high burden of risk factors.[1] STEMI results in most cases from thrombotic occlusion at the site of a pre-existing atherosclerotic plaque. ST elevation reflects an acute artery occlusion and warrants immediate reperfusion therapy.[2]

There is strong correlation between diabetes mellitus (DM) and cardiovascular disease. Adults with diabetes are two to four times more likely to have heart diseases than adults without diabetes.[3] The presence of elevated blood glucose levels, diabetes mellitus, or both contributes to more than 3 million cardiovascular deaths worldwide each year. With the increase in obesity, insulin resistance, and the metabolic syndrome, the worldwide prevalence of diabetes is expected to double by the year 2030. Diabetes is now considered to be a risk equivalent of coronary artery disease for future MI and cardiovascular death.[4] Individuals with insulin resistance and Type 2 Diabetes have elevated levels of plasminogen activator inhibitors and fibrinogen which enhances the coagulation process and impairs fibrinolysis, thus favouring thrombosis.[5]

It has been observed that in acute MI there is significantly reduced ST- segment resolution in diabetic patients.[6] Diabetes mellitus adversely affects the outcome of thrombolytic therapy in patients with ST elevation MI.[7] A study on effect of streptokinase in myocardial infarction patient states that ST segment resolution (≥70% ST segment reduction) occurred in 19.6% of diabetic patients.[8] Whereas another study states that successful reperfusion (≥70% ST segment resolution) occur in 49.1% of the diabetic patients.[7]

This study was conducted with the aim to determine the efficacy of thrombolytic therapy in reduction of ST segment elevation in acute MI patients presenting with diabetes in our setup.

MATERIAL AND METHODS

It was a descriptive case series conducted in the Medical Departments of Services Hospital Lahore. The total duration of the study was 6 months. A sample size of 130 was calculated using 95% confidence level, 7% margin of error and taking an expected percentage of ST segment resolution as 19.6%[7] after streptokinase in DM patients. Non-probability purposive sampling technique was used. All patients 18–80 years of age having either gender diagnosed with confirmed acute myocardial infarction and diabetic patients with ST segment elevation MI receiving streptokinase were included in the study. Patients with contraindications of streptokinase administration (on patients' history), patients with history of coronary artery bypass grafting (CABG) and percutaneous intervention (PCI) in previous MI, and patients with history of chronic diseases such as chronic renal failure (CRF),

chronic liver disease (CLD), congestive cardiac failure (CCF) were excluded.

MI was defined as: chest pain >30 min, new or presumably new ST-T changes, and creatinine kinase myocardial band (CKMB) more than 25 IU/L. Patients previously diagnosed as diabetics were included. Efficacy of SK was ST segment elevation of more than 70% calculated by subtracting pre SK ST elevation on ECG from post SK ST elevation (1hour after the start of SK infusion) divided by pre-SK ST elevation and multiply by 100.

Data was collected after taking an informed consent. Patients were administered injection of streptokinase 1.5 mu. Pre and Post SK ECG were done and ST segment elevation was measured. Reduction of ST segment was measured on ECG recorded before the administration of streptokinase and ECG recorded after full dose of streptokinase (1.5 mu). Efficacy of SK was measured as mentioned given before.

Data was analysed using SPSS ver. 20. The quantitative data like age, pre and post SK ST segment elevation were described as mean±standard deviation. Categorical data like gender and efficacy of treatment were described as frequencies and percentages. Data was stratified for efficacy in controlled and uncontrolled diabetic groups to address the effect modifiers. Post stratification chi-square test was used to determine the significant difference between both groups with p-value ≤ 0.05 considered as statistically significant.

RESULTS

In this study total 130 cases were enrolled. The mean age of the patients was noted as 54.42±8.80 years ranging from 40–68 years. There were 81 (62.31%) males.

The mean value of pre SK ST-Segment elevation was noted as 4.34±2.63 ranging from 1–11. The mean value of post SK ST-Segment elevation was noted as 1.66±1.32 (range: 0–5). Mean reduction in ST-Segment elevation was noted as 58.53±26.01 (range: 0 and 100). Efficacy was achieved in 62 (47.7%) patients. The mean value of percentage reduction of the patients was noted as 58.53±26.01 percent (range: 0–100).

The mean value of pre SK ST-Segment elevation was noted as 4.34±2.63 whereas the mean value of post-SK ST-Segment elevation was noted as 1.66±1.32. There was statistically significant difference with $p<0.05$.

In this study total 81 patients were males in which 35 achieved the efficacy and 46 patients did not achieve efficacy, similarly 49 patients were females in which 27 achieved the efficacy and 22 did not achieve that with no statistically significant difference.

DISCUSSION

Our study results showed that mean value of pre SK of the patients was 4.34±2.63 and the mean value of post SK of the patients was noted as 1.66±1.32 with statistically significant difference.

In a study by Faruque Uddin *et al* to match impact on diabetic and non-diabetic patients with myocardial infarction of thrombolytic streptokinase, 67% subjects were non-diabetic and 33% diabetic but all of them showed acute ST segment elevation myocardial infarction. Following the injection of streptokinase, segmental function started to improve. More non-diabetic patients were effectively re-perfused when compared to diabetic. It can be concluded that diabetes has impact on thrombolytic outcome in acute myocardial infarction.

Marino *et al* reported that extent of regional wall motion irregularities was reduced, function of left ventricle was improved in myocardial infarction patients and also reduced post-infarction dilation of ventricle was found as a result of streptokinase therapy.

It was reported by Kloner *et al* that shortening of regional segment improves within 1–60 minutes afterwards a 5-minute ischemic episode, whereas, it doesn't improve after longer ischemic episodes. Further data propose that any immediate return of contractility after brief occlusions is transitory and rapidly deteriorates.

Previous studies suggest that it takes approximately 1–2 weeks for segmental function to return to normal with ischemic period of 2–3 hours, however, segmental function is recovered within 72 hours if ischemic episode is of 90 minutes. Contradictory results have been achieved with shorter episodes of ischemia.

On the other hand, Banka *et al* noticed improvement in the segmental function within 5 minute of reperfusion following 30–45 minute ischemic episode but not after an hour. Other studies have documented the acute kinetics of coronary thrombolysis after intravenous streptokinase a 50–60% reperfusion rate in the first hour has been consistently observed.

Our study results showed that the efficacy was achieved in 52.3% patients whereas it was not achieved in 47.7% patients. A researcher Gemmill reported that patients unexposed to streptokinase have a resistance titre which might be small yet it has significant negative effect on anistreplase and streptokinase. The abovementioned effect should be kept in mind while advising therapy of streptokinase.[9] A limitation of our study was a small sample size and

caution may be exercised in extrapolating results to the larger population of such patients. However, the rigor involved in data collection and analysis makes it a useful study.

CONCLUSION

Results of this study have revealed that SK is almost 50% effective in reduction of ST-segment elevations. We can recommend the use of SK confidently in diabetic patients. But for more precise results large sample size is recommended and further trial are required to get more precise results.

REFERENCES

1. Abbas S, Kitchlew AR, Abbas S. Disease burden of Ischemic Heart Disease in Pakistan and its risk factors. Ann Pak Inst Med Sci 2009;5(3):145–50.
2. Bashore TM, Granger CB, Patrick H, Patel RM. Heart diseases. In: McPhee SJ, Papadakis MA, editors. Current medical diagnosis & treatment 2012. 51st ed. New York: McGraw-Hill Medical; 2011.p.143–263.
3. American Heat Association. Cardiovascular disease and diabetes 2012. [Internet]. [cited 2014 Nov 10]. Available from: http://www/heart.org/HEARTORG/Conditions/Diabetets/WhyDiabetesMatters/Cardiovascular-Disease-Diabetes_UCM_313865_Article
4. Donahoe SM, Stewart GC, McCabe CH, Mohanavelu S, Murphy SA, Cannon CP, *et al*. Diabetes and Mortality Following Acute Coronary Syndromes. JAMA 2007;298(7):765–75.
5. Libby P, Ridker PM, Maseri A. Inflammation and atherosclerosis. Circulation 2002;105(9):1135–43.
6. Masoom M, Samadi S, Sheikvatan M. Thrombolytic effects of strptokinase Infusion assessed by ST segment resolution between diabetic and non-diabetic myocardial infarction patients. Cardiol J 2012;19(2):168–73.
7. Hafizullah M. Diabetes-A cardiovascualr disease. Pak Heart J 2013;46(4):720–24.
8. Uddin MF, Hoque AF. Impact of Diabetic Mellitus on the Effect of Streptokinase in Acute Myocardial Infarction Patients. Med Today 2013;24(1):16–9.
9. Gemmill JD, Hogg KJ, Dunn FG, Rae AP, Hillis WS. Pre-dosing antibody levels and efficacy of thrombolytic drugs containing streptokinase. Br Heart J 1994;72(3):222–5.

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Address for Correspondence:

Uneeba Syed, Department of Endocrinology, Services Hospital, Lahore-Pakistan
Email: uneeba.shah@gmail.com