

Success of Streptokinase in Diabetic Smokers with ST-Elevation Myocardial Infarction (STEMI) with Absence of Other Factors

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ABSTRACT

Objective: The objective of this study was to find success of streptokinase in diabetic smokers with ST-Elevation Myocardial Infarction (STEMI) with absence of other factors.

Study Design: Experimental study

Place and Duration of Study: This study was conducted at the Punjab Institute of Cardiology, Lahore, Imran Idris Teaching Hospital Sialkot from Feb, 2018 to Aug, 2018.

Materials and Methods: A total of 382 cases meeting inclusion criteria were taken in this study after approval from hospital ethical committee. After taking informed consent all data was taken from Emergency department of emergency department of Cardiology, Punjab Institute of cardiology Lahore, Imran Idris Teaching Hospital Sialkot. Basic demographer information of all cases such as age and their address, contact details were taken. Streptokinase was given to each patient at a dose of 1.5 million units, diluted in 100 ml of normal saline, in 1 hour. Informed written consent of the patient/attendant was taken. Success of Streptokinase (SK) was determined on ECG after 90 min as per operational definition. All data was collected by researchers them self on attached Performa.

Results: The mean age of cases was 46.45 ± 11.44 years with minimum and maximum age as 25 and 65 years. There were 370(96.9%) male and 12(3.1%) female cases. According to operational definition, a total of 200(52.4%) cases had success while 182(47.6%) cases did not have success of medication.

Conclusion: The frequency of success of streptokinase in diabetic smokers with ST-Elevation Myocardial Infarction (STEMI) with absence of other factors is 52.4%. So the cases with these conditions must be managed accordingly and the treatment strategies must be revisited in order to improve the treatment outcome of these cases.

Key Words: Myocardial infarction, diabetes, smoking, Streptokinase, ST elevations, fibrinolysis

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INTRODUCTION

Infarction of Heart is the rapid development of necrosis of heart caused by a specific imbalance between oxygen supply and demand of heart.¹ The acute coronary syndromes include ST segment elevation myocardial infarction (STEMI), non-ST segment elevation myocardial infarction (NSTEMI), and unstable angina.

Diabetes mellitus is one of the six primary risk factors identified for myocardial infarction.² Certain risk factors predispose to acute myocardial infarction which are categorized as modifiable (smoking, hypertension, high blood cholesterol, obesity, physical inactivity and diabetes) and non-modifiable (age, sex and family history of heart disease)³.

Intravenous streptokinase during acute myocardial infarction is a well-recognized and effective treatment, which has beneficial effects on cardiovascular event related mortality⁴. Conceptually, therapeutic intervention for STEMI must minimize cell death by break the ongoing process of obstruction of the blood supply and attempt to reverse the restriction in blood supply metabolic derangement of still living cells. The aim of thrombolysis in acute myocardial infarction is early and complete reperfusion⁴. Recently it was published that ST resolution is not affected by the presence of diabetes. Although persons having diabetes have higher incidence of heart failure and in-hospital death after treatment of acute ST-elevation myocardial infarction with streptokinase, their poor outcome is most likely due to higher load of simultaneous coronary

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risk factors.⁵ Smoking is also a well-known risk factor for coronary artery disease, and is associated with increased rates of myocardial infarction and cardiovascular death⁶. In spite the fact that smoking is a well-established danger factor for the development of heart artery disease, some examiners have noted that hospital death after acute heart obstruction of the blood supply is lower in sick persons who smoke than in nonsmoking sick persons. There is some data showing lower mortality of smokers comparing to non-smokers in patients with ST-segment elevation myocardial infarction (STEMI) when treated with thrombolysis⁶.

MATERIALS AND METHODS

This study was conducted at emergency department of Cardiology, Punjab Institute of cardiology Lahore and Imran Idris Teaching Hospital Sialkot. The sample size is estimated as 382 cases, the sample size is calculated using success of streptokinase in diabetic smokers with STEMI with absence of other factors as 45% (results of pilot study, attached), we used 5% margin of error and 95% confidence level.

Inclusion criteria

- Diabetic smokers diagnosed of Acute Myocardial Infarction/ ST-Elevation Myocardial Infarction presented within 12 hours of chest pain
- Aged 25-65 years

Exclusion criteria

- History of previous myocardial infarction
- History of previous streptokinase (SK)

Data Collection Procedure: A total of 382 cases meeting inclusion criteria were taken in this study after approval from hospital ethical committee. After taking informed consent all data were taken from Emergency department of PIC. Basic demographer information of all cases such as age and their address, contact details were taken. Streptokinase was given to each patient at a dose of 1.5 million units, diluted in 100 ml of normal saline, in 1 hour. Informed written consent of the patient/attendant was taken. Success of SK was determined on ECG after 90 min as per operational definition. All data was collected by researcher himself on attached Performa.

Data Analysis: All collected data was entered and analyzed using statistical package for social science (SPSS) 22. Qualitative data like success of procedure was presented as frequency and percentage. Quantitative data such as age, duration of chest pain was presented as mean ± S.D. Data was stratified for age, gender and duration of chest pain to address effect modifiers. Post stratified Chi-square test was applied by taking p-value ≤ 0.05 as significant.

RESULTS

The mean age of cases was 46.45 ± 11.44 years with minimum and maximum age as 25 and 65 years.

Table -1

There were 124(32.5%) cases who were 25-40 years old and 258(67.5%) cases were 41-65 years old.

There were 370(96.9%) male and 12(3.1%) female cases.

The mean duration of chest pain was 6.78 ± 3.38 with minimum and maximum of 1 and 12 hours. **Table -2**

A total of 140(36.6%) cases had duration of chest pain as <6 hours and 242(63.4%) cases had duration as 6-12 hours.

According to operational definition, a total of 200(52.4%) cases had success while 182(47.6%) cases did not have success of medication.

When data was stratified for age, among 200 cases who had success there were 59(29.5%) cases who were 25-40 years old and 141(70.5%) cases were 41-65 years old. The frequency of success in both age groups was statistically same, p-value > 0.05. **Table -3**

On stratifying for gender, among 200 cases who had success there were 192 (96%) male and 8(4%) were female cases. The frequency of success in both genders was statistically same, p-value > 0.05. **Table -4**

When data was stratified for duration of chest pain, among 200 cases who had success there were 71(35.5%) cases who had chest pain <6hours and 129(64.5%) cases had duration as 6-12 hours. The frequency of success was statistically same in both groups of duration, p-value > 0.05. **Table -5.**

Table No.1: Descriptive statistics of age (years)

	Age (years)
Mean	46.45
S.D	11.44
Range	40.00
Minimum	25.00
Maximum	65.00

Table No.2: Descriptive statistics duration of chest pain

	Duration (hours)
Mean	6.78
S.D	3.38
Range	11.00
Minimum	1.00
Maximum	12.00

Table No.3: Comparison of success with respect to age groups (years)

		Success		Total
		Yes	No	
Age groups (years)	25-40	59(29.5%)	65(35.7%)	124(32.5%)
	41-65	141(70.5%)	117(64.3%)	258(67.5%)
Total		200(100%)	182(100%)	382(100.0%)

Chi-square = 1.67
p-value = 0.195

Table No.4: Comparison of success with respect to gender

		Success		Total
		Yes	No	
Gender	Male	192(96%)	178(97.8%)	370(96.9%)
	Female	8(4%)	4(2.2%)	12(3.1%)
Total		200(100%)	182(100%)	382(100.0%)

Chi-square = 1.01
p-value = 0.313

Table No.5: Comparison of success with respect to duration of chest pain

		Success		Total
		Yes	No	
Duration	Male	71(35.5%)	69(37.9%)	140(36.6%)
	Female	129(64.5%)	113(62.1%)	242(63.4%)
Total		200(100%)	182(100%)	382(100.0%)

Chi-square = 0.239
p-value = 0.625

DISCUSSION

Acute MI may be taken as a potential outbreak for human being. Incidence of coronary disease is increasing at an alarming rate not only in Pakistan but also in our region. Death rates from coronary heart disease in the UK were amongst the highest in the world but are falling now⁷. However, South Asians living in the UK and Canada who do not display high rates of smoking, hypertension, or elevated cholesterol still have higher rates of coronary artery disease compared with Europeans⁸.

The acute heart blood vessel syndromes include ST segment raised MI, non-ST segment raised MI, and unstable angina. Diabetes mellitus is one of the 6 primary danger factors detected for obstruction of blood vessels of heart, others are abnormal amount of lipids, high blood pressure, smoking, male sex, and family history of inside of an artery narrows arterial disease. Diabetes is a dyslipidemia disease and increases the rate of atherosclerotic progression of vascular occlusion⁹.

Among patients with an acute myocardial infarction, 10-25% have diabetes. Even when hourly receiving agents which cause clot to break up the outcome in diabetic person is still bad than non-diabetics, manifesting impaired after break down of clot left heart

function and prediction¹⁰. The aim of thrombolysis in acute myocardial infarction is early and complete myocardial reperfusion. Incomplete or failed restoring the flow of blood is associated with an increased danger of death and left heart abnormal functions. Currently available fibrinolytic agents that dissolve vascular thrombi are: a) n 0.1). Heart failure and in-hospital death were more common in persons having diabetes (twenty five point seven vs. 14.8%, p = 0.03 and 17.8% vs. 8.4%, p = 0.03, respectively). Diabetics were more likely to have three vessel disease in coronary angiography (23% vs. 8%, p < 0.001). After controlling for baseline finding, diabetes was not alone linked with restoring the flow of blood failure and major disadvantageous heart events, including heart failure and in-hospital death. Hence it can be concluded that ST resolution is not affected by the presence of diabetes. Although persons having diabetes have higher incidence of heart failure and in-hospital death after treatment of acute ST-elevation myocardial infarction with streptokinase, their poor outcome is most likely due to higher load of at the same time coronary risk factors¹⁷.

So, in current study the mean age of cases was 46.45 ± 11.44 years with minimum and maximum age as 25 and 65 years. There were 370(96.9%) male and 12(3.1%) female cases. According to operational definition, a total of 200(52.4%) cases had success while 182(47.6%) cases did not have success of medication. In another study thrombolytic effect of streptokinase infusion was compared between diabetic and non-diabetic myocardial infarction (MI) patients. In a probable interventional work, two hundred forty consecutive sick persons who were admitted to the emergency ward and diagnosed with ST-elevation MI were registered and classified into persons having diabetes (n = 85) and non-diabetics (n = 155). Streptokinase was given to each sick person at a dose of one point five million units in 1 h. Twelve-lead Electro Cardio Graphy was noticed immediately before the start of breakdown of clot treatment and at one hundred eighty min afterwards for the sick persons with acute ST-elevation myocardial infarction. The ST-segment elevation resolution was calculated and stratified as complete resolution (> 70% ST-resolution), partial resolution (30–70% ST-resolution), or failed resolution (< 30% ST-resolution). The main findings of the study showed that complete ST-resolution occurred in 31.6% of diabetic and 51.0% of non-diabetic patients, respectively (p < 0.001). The prevalence of partial ST-aim in diabetic and non-diabetic sick persons was forty point five percent and forty percent, whereas twenty seven point eight percent of sick persons in the diabetic group and nine percent of persons in the non-diabetic group showed failed ST resolution. ST-resolution was independent of the location of MI. two or more variable quantities investigation showed that

diabetes mellitus, as well as higher class and lower expressed as a percentage, of how much blood the left ventricle pumps out with each contraction, could effectively predict ST-resolution failure. Thus, Failure of ST-segment aim one hundred eighty min after streptokinase infusion is notably higher in diabetic vs non-diabetic sick persons. This failure rate is correlated with higher Killip class and lower ejection fraction^{18, 19}.

CONCLUSION

The frequency of success of streptokinase in diabetic smokers with STEMI with absence of other factors is 52.4%. So the cases with these conditions must be managed accordingly and the treatment strategies must be revisited in order to improve the treatment outcome of these cases.

Author's Contribution:

Concept & Design of Study:	Hasan Sohail
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Conflict of Interest: The study has no conflict of interest to declare by any author.

REFERENCES

- Sulehria SB, Nabeel M, Awan A. Failure of Streptokinase Therapy in Diabetic and Non-Diabetic Patients Presenting with ST Elevation Myocardial Infarction. *Pak J Med Health Sci* 2014;8(3):750-2.
- Bueno H, Bugiardini R, Carerj S, Casselman F. 2015 ESC Guidelines for the management of acute coronary syndromes in patients presenting without persistent ST-segment elevation. *Europ Heart J*. 2015;37:267-315.
- Saleem S, Khan A, Shafiq I. Post thrombolytic resolution of ST elevation in STEMI patients. *Pak J Med Sci* 2016;32(1):201-5.
- Khan I, Ali S, Uddin M, Biswas H, Khan M, Khanam S, et al. Thrombolytic Effect of Streptokinase Infusion Assessed by ST Segment Resolution between Diabetic and Non Diabetic Myocardial Infarction Patients. *Dinajpur Med Col J* 2015;8(1):34-43.
- Pourmousavi MM, Tajlil A, Rahimi Darabad B, Pourmousavi L, Pourafkari L, Ghaffari S. The impact of diabetes on electrocardiographic ST resolution and clinical outcome of acute ST elevation myocardial infarction following fibrinolytic therapy. *Cor et Vasa* 2016;58(6):e584-e90.
- Rakowski T, Siudak Z, Dziewierz A, Dubiel JS, Dudek D. Impact of smoking status on outcome in patients with ST-segment elevation myocardial infarction treated with primary percutaneous coronary intervention. *J Thromb Thrombolysis* 2012;34(3):397-403.
- Raz I, Wilson PW, Strojek K, Kowalska I, Bozikov V, Gitt AK, et al. Effects of prandial versus fasting glycemia on cardiovascular outcomes in type 2 diabetes: the HEART2D trial. *Diabetes Care* 2009;32(3):381-6.
- Siegelaar SE, Kerr L, Jacober SJ, Devries JH. A decrease in glucose variability does not reduce cardiovascular event rates in type 2 diabetic patients after acute myocardial infarction: a reanalysis of the HEART2D study. *Diabetes Care* 2011;34(4):855-7.
- Organization WH. Diabetes fact sheet No. 312. Geneva, Switzerland URL: <http://www.who.int/mediacentre/factsheets/fs312/en/index.html> [accessed 2013-02-].
- Preiss D, Sattar N, McMurray JJ. A systematic review of event rates in clinical trials in diabetes mellitus: the importance of quantifying baseline cardiovascular disease history and implications for clinical trial design. *Am Heart J* 2011;161(1):210-9. e1.
- Barkoudah E, Skali H, Uno H, Solomon SD, Pfeffer MA. Mortality rates in trials of subjects with type 2 diabetes. *J Am Heart Assoc* 2012;1(1):e000059.
- Schramm TK, Gislason GH, Køber L, Rasmussen S, Rasmussen JN, Abildstrøm SZ, et al. Diabetes patients requiring glucose-lowering therapy and nondiabetics with a prior myocardial infarction carry the same cardiovascular risk: a population study of 3.3 million people. *Circulation* 2008;117(15):1945-54.
- Bulughapitiya U, Siyambalapatiya S, Sithole J, Idris I. Is diabetes a coronary risk equivalent? Systematic review and meta-analysis. *Diabet Med* 2009;26(2):142-8.
- Tamita K, Katayama M, Takagi T, Yamamuro A, Kaji S, Yoshikawa J, et al. Newly diagnosed glucose intolerance and prognosis after acute myocardial infarction: comparison of post-challenge versus fasting glucose concentrations. *Heart* 2012;98(11):848-54.
- Chowdhury A, Hossain M, Dey SR, Akhtaruzzaman A, Islam N. A comparative study on the effect of streptokinase between diabetic and non-diabetic myocardial infarction patients. *Bangladesh J Pharmacol* 2008;3:1-7.
- Masoomi M, Samadi S, Sheikvatan M. Thrombolytic effect of streptokinase infusion

- assessed by ST-segment resolution between diabetic and non-diabetic myocardial infarction patients. *Cardiol J* 2012;19(2):168-73.
17. Ishihara M. Acute hyperglycemia in patients with acute myocardial infarction. *Circ J* 2012;76(3):563-71.
 18. Sanjuán R, Núñez J, Blasco ML, Miñana G, Martínez-Maicas H, Carbonell N, et al. Prognostic implications of stress hyperglycemia in acute ST elevation myocardial infarction. Prospective observational study. *Rev Esp Cardiol* 2011;64(3):201-7.
 19. Jensen LO, Maeng M, Thayssen P, Tilsted HH, Terkelsen CJ, Kaltoft A, et al. Influence of diabetes mellitus on clinical outcomes following primary percutaneous coronary intervention in patients with ST-segment elevation myocardial infarction. *Am J Cardiol* 2012;109(5):629-35.