The Journal of Cardiovascular Diseases
J Cardiovasc Dis 2023;19(4):125 - 129
ORIGINAL ARTICLE
DOI: 10.55958/jcvd.v19i1.115

FREQUENCY OF HYPOTENSION AFTER INTRAVENOUS STREPTOKINASE IN PATIENTS PRESENTING WITH ST ELEVATION MYOCARDIAL INFARCTION

Fizza Mobasher Butt[a], Mahrukh Mansoor Khosa[a], Ali Nasir[a], Sana Sehar[a], Hurmah Shoaib[a], Syed Ali Hamza[a]

[a]Punjab Institute of Cardiology, Lahore.

Date of Submission: 29-09-2022; Date of Acceptance: 16-02-2023; Date of Publication: 29-03-2024

ABSTRACT:

BACKGROUND: *One of the primary causes of death and disability worldwide is Acute Myocardial Infarction. Streptokinase is still widely used in many countries for its treatment, despite percutaneous advancements in the field. This study was conducted to appraise the incidence with which hypotension occurred by streptokinase in patients suffering from acute ST-elevation Myocardial Infarction (STEMI) due to the significance of this disease and the potential side effects of streptokinase to the patient.*

AIMS & OBJECTIVE: *The purpose of this study was to ascertain the frequency of hypotension in patients presenting with ST Elevation Myocardial Infarction, who are being administered streptokinase.*

MATERIAL & METHODS: *The study was conducted at the Emergency Department of Punjab Institute of Cardiology, Lahore from August 25, 2020 to February 25, 2021. A total 280 patients with STEMI were enrolled in the study. Electrocardiographic diagnosis of ST Elevation Myocardial Infarction was performed by a consultant cardiologist. Bedside echocardiography was also performed by a consultant cardiologist. Manual blood pressure recording of the patients was carried out every five minutes during administration of Streptokinase Injection and every hour and three hours after completion. Data was input and analysed using SPSS v25.0. To account for these impact modifiers, we stratified the data according to age, gender, diabetes status, family history, smoking status, and hypercholesterolemia. The chi-square analysis will be performed when the stratification process is complete. A p-value of 0.05 or below was taken to be of statistical significance.*

RESULTS: *A total of 280 patients with STEMI were selected for this study. There were 165(58.9%) males and 115(41.1%) females. Mean age was 38.46±9.81 year. Among 280 patients with STEMI, 39(13.9%) patients had hypotension.*

CONCLUSION: *Streptokinase, given intravenously, has lower but a significant incidence of cardiovascular complications like hypotension.*

KEY WORDS: *ST-Segment Elevation Myocardial Infarction, Hypotension.*

Correspondence : Fizza Mobasher Butt, Punjab Institute of Cardiology, Lahore. Email: fizza.mobasher@gmail.com

Author's Contribution: FM: Article writing, data collection, literature search. MMK: Study design and concept, data collection. AN: Data analysis. SS: Questionnaire design. HS: Data collection, proof reading. SAH: Proof reading.

INTRODUCTION

The World Health Organization has deemed cardiovascular disease as the single greatest cause of non-communicable disease in the world, at over 50% annually. Out of this, an ischemic heart disease accounts for approximately 13.2% of the total. ST elevation myocardial infarction is a time sensitive acute emergency that is part of the acute coronary syndrome spectrum of ischemic heart disease. The role of streptokinase and other plasminogen activators in the management of acute ST elevation myocardial infarction is well documented. Early streptokinase administration offers 18% survival benefit in ST elevation MI patients along with reduction of mortality and preservation of left ventricular function.[1-2]

Despite both primary percutaneous intervention and tissue Plasminogen Activators rendering superior clinical outcomes, streptokinase remains a popular treatment modality of ST elevation myocardial infarction, especially in developing countries. This is due to its cost effectiveness and ease of availability. Streptokinase is in fact a fibrinolytic protein secreted by beta hemolytic streptococci. It forms a complex with circulating plasminogen that converts additional plasminogen to plasmin. The fibrin degradation that ensues, paves the way for reperfusion in the occluded culprit artery that caused acute myocardial infarction.[3-5]

Streptokinase has a number of known adverse effects such as hypotension, allergy, arrhythmias, tachycardia, bradycardia, phlebitis and bleeding.[6-7] Owing to the potential hypotensive effect of streptokinase a fixed dose of 1.5 million units infused over 60 minute has become the standard.[8] Incidence of hypotension was 20%.[9] The rationale for this study is that streptokinase is a popular treatment regime in in the setting of acute ST elevation MI, especially in Pakistan. With hypotension being one of its most frequently encountered adverse effects, a study is yet to be done that ascertains the frequency of this adverse effect and determines the factors that may contribute to it. This study will also help determine whether hypotension is frequent enough to warrant the slow one-hour infusion of streptokinase, that is the norm.

MATERIAL AND METHODS:

From August 25, 2020, to February 25, 2021, researchers gathered data in the Emergency Room of the Punjab Institute of Cardiology in Lahore. We included a total of 280 individuals who had had a STEMI. The participants gave their informed permission. A total of 280 participants was deemed necessary to draw reliable conclusions, given a 5% margin of error, a 95% confidence interval, and an estimated proportion of hypotension of 20%.9 The inclusion criteria was patients belonging to both genders aged between 18 to 65 years presenting with acute STEMI, while exclusion criteria was presenting blood pressure $\leq$ 90 mmHg, LBBB on ECG and absolute contraindication to Streptokinase.

Electrocardiographic for the diagnosis of STEMI was performed by a consultant cardiologist. Bedside echocardiography was also performed by a consultant cardiologist. Manual blood pressure recording of the patients was carried out every five minutes during administration of Streptokinase Injection and every hour and three hours after completion.

Hypotension was defined as a systolic blood pressure $\leq$ 90 mmHg. Hypotension was measured every 5 minutes till 1 hour and then every hour till 3 hours. Intravenous Streptokinase was defined as intravenous administration of 1.5 million units of Injection streptokinase infusion over 60 minutes. STEMI was defined as new ST

elevation at the J point in two contiguous leads of >1 mm in all leads other than leads V2-V3 and > 2mm in men and > 1.5 mm in women for leads V2-V3.

Data was input and analysed using SPSS v25.0. Statistics, such age distributions, were shown with means and standard deviations. Diabetes, smoking, and hypercholesterolemia were examples of qualitative data that were given in the form of frequency and percentages. To account for these impact modifiers, we stratified the data according to age, gender, diabetes status, family history, smoking status, and hypercholesterolemia. The chi-square analysis will be performed when the stratification process is complete. A p-value of 0.05 or below was taken to have statistical significance.

RESULTS:

A total of 280 people who had experienced a STEMI were chosen for this investigation. There were 165 men (58.9%) and 115 females (41.1%). They averaged 38.4 years old. Distribution by age showed that 27.5% were between the ages of 18 and 30, 42.1% were between the ages of 31 and 45, and 30.4% were older than 45.(Table-1)

After using streptokinase, 11 (9.5%) female patients and 28 (17%) male patients experienced hypotension; the p-value was 0.078. In terms of age, individuals older than 45 years experienced the majority of hypotensive events (p-value = 0.045). Patients with diabetes experienced 23 events (24.7%) compared to 16 occurrences (8.6%) for non-diabetic patients (p-value 0.00001). Likewise, a higher number of patients experienced hypotension (p-value 0.00001) and those who smoked as well as those with a positive family history. The hypotension 5 (14.7), p-value 0.889, was unaffected by hypercholesterolemia. (Table-2)

Table-1: Base line demographic characteristics.

		Number	Percentage
Gender	Male	165	58.9
	Female	115	41.1
	Total	280	100.0
Age groups	**18-30 years**	77	27.5
	31-45 years	118	42.1
	>45 years	85	30.4
		280	100.0
Diabetes mellitus		93	33.2
Smoking		86	30.7
		280	100.0
Family history		118	42.1
		280	100.0
Hypercholesterolemia		34	12.1
		280	100.0
Hypotension		39	13.9
		280	100.0

Table-2: Hypotension in patients receving streptokinase.

Gender		Hypotension		Total	p-value
		Yes	No		
	Male	28 (17.0%)	137(83.0%)	165(100.0%)	0.078
	Female	11(9.6%)	104(90.4%)	115 (100.0%)	
	Total	39(13.9%)	241(86.1%)	280(100.0%)	
Age groups	18-30 years	5(6.5%)	72(93.5%)	77(100.0%)	0.045
	31-45 years	17(14.4%)	101(85.6%)	118(100.0%)	
	>45 years	17(20.0%)	68(80.0%)	85(100.0%)	
	Total	39(13.9%)	241(86.1%)	280(100.0%)	
Diabetes mellitus	Yes	23(24.7%)	70(75.3%)	93(100.0%)	0.00001
	No	16(8.6%)	171(91.4%)	187(100.0%)	
	Total	39(13.9%)	241(86.1%)	280(100.0%)	
Smoking	Yes	24(27.9%)	62(72.1%)	86(100.0%)	0.00001
	No	15(7.7%)	179(92.3%)	194(100.0%)	
	Total	39(13.9%)	241(86.1%)	280(100.0%)	
Family history	Yes	28(23.7%)	90(76.3%)	118(100.0%)	0.00001
	No	11(6.8%)	151(93.2%)	162(100.0%)	
	Total	39(13.9%)	241(86.1%)	280(100.0%)	
Hypercholesterolemia	Yes	5(14.7%)	29(85.3%)	34(100.0%)	0.889
	No	34(13.8%)	212(86.2%)	246(100.0%)	
	Total	39(13.9%)	241(86.1%)	280(100.0%)	

DISCUSSION

Streptococci produce the enzyme streptokinase. Myocardial infarction patients were the first to benefit from this thrombolytic medication. Research and proof of the relevance of risk factors are mostly taken from industrialised nations, even though low- and middle-income countries contribute more than 80% of the worldwide distribution of cardiovascular disease. Thus, in most parts of the world, we do not know how much these variables raise the risk of Myocardial infarction. Investigations on the effects of streptokinase over time were also necessary.[10-11]

In this study, patients were given streptokinase within two hours of experiencing chest pain, which helped alleviate their symptoms. In contrast to this, a study carried out in the United States depicted patients presenting to hospitals in a mean time of 1.21 hours, and their treatment beginning in a mean time of 2.77 hours after the onset of symptoms; 86.7% of patients were re-perfused initially, and 2 were found re-occluded.[12] The research carried out on individuals suffering from myocardial ischemia revealed that 20% of patients had re-occlusion.[13]

In this study, 280 people who had acute MI with ST-elevation were given streptokinase, and they were examined. The frequency of hypotension brought on by streptokinase administration was the most important conclusion made by this study. Our research found that streptokinase was responsible for 13.9% of cases of hypotension. This statistic is considerably lower than what has been found in prior studies. In the studies that were carried out in the coronary care unit (CCU), both the retrospective cohort research by Devi et al. and the prospective study by Mohebbi et al. found that streptokinase caused the

most severe hypotension in around 30% of patients.[14-15]

CONCLUSION:

Streptokinase, given intravenously, has lower but a significant incidence of hypotension. Hypotension is impacted by diabetes mellitus, smoking, and family history, but not by hypercholesterolemia.

References:

1. McAloon CJ, Boylan LM, Hamborg T, Stallard N, Osman F, Lim PB, Hayat SA. The changing face of cardiovascular disease 2000–2012: An analysis of the world health organisation global health estimates data. Int J Cardiol. 2016;224:256-64.
2. Rentrop KP, Feit F. Reperfusion therapy for acute myocardial infarction: Concepts and controversies from inception to acceptance. Am Heart J. 2015;170(5):971-80.
3. Tourani S, Bashzar S, Nikfar S, Ravaghi H, Sadeghi M. Effectiveness of tenecteplase versus streptokinase in treatment of acute myocardial infarction: a meta-analysis. Tehran Univ Med J. 2018;76(6):380-7.
4. Ahmed F, Rahman MA, Ahmed M, Ananya KF, Alamgir MH, Rahman MM. Pharmaco-invasive therapy as a reperfusion strategy–a practical alternative of primary percutaneous coronary intervention. Invasive and Clinical Cardiology. 2019;1(1):45-53.
5. Aslanabadi N, Safaie N, Talebi F, Dousti S, Entezari-Maleki T. The streptokinase therapy complications and its associated risk factors in patients with acute ST elevation myocardial infarction. Iranian J Pharmaceutical Res. 2018;17(1):53.
6. Afzal S, Khan MA, Muhammad H, Ashraf A, Afzal M. Psychosocial risk factors of myocardial infarction and adverse effects of streptokinase in public sector hospitals. Pak J Med Sci. 2015;31(4):821.
7. Taheri L, Zargham-Boroujeni A, Jahromi MK, Charkhandaz M, Hojat M. Effect of streptokinase on reperfusion after acute myocardial infarction and its complications: an ex-post facto study. Global J Health Sci. 2015;7(4):184.
8. Bendary A, Tawfik WA, Mahrous M, Salem M. P6436 Fibrinolytic therapy in patients with ST-segment elevation myocardial infarction: Accelerated versus standard Streptokinase infusion regimen; a randomized clinical study. Eur Heart J. 2018;39(1):566-9.
9. He J, Li J, Wang Y, Hao P, Hua Q. Neutrophil-to-lymphocyte ratio (NLR) predicts mortality and adverse-outcomes after ST-segment elevation myocardial infarction in Chinese people. Int J Clin Exp Pathol. 2014;7(7):4045-56.
10. Rabijns A, DeRanter C, DeBondt HL. Three dimensional structure of streptokinase, a plasminogen activator with therapeutic potential. J Am Cardiol. 1997;4(5):357–360.
11. Bunker SJ, Colquhoun DM, Esler MD, Hickie IB, Hunt D, Jelinek VM. Stress and coronary heart disease: psychosocial risk factors. Med J Aust. 2003;178(6):272–276.
12. Kostić T, Perisić Z, Milić D, Apostolović S, Martinović SS, Bozinović N, et al. Coronary flow and hemorrhagic complications after alteplase and streptokinase administration in patients with acute myocardial infarction. Vojnosanit Pregl. 2009;66:218–222.
13. Mayer G, Story WE, Seco JE, Nocero MA, Jr, Shaskey DJ, Black MA. Intravenous streptokinase in acute myocardial infarction. Ann Emerg Med. 1985;14(5):410–415.
14. Devi P, Kamath DY, Anthony N, Santosh S, Dias B. Patterns, predictors and preventability of adverse drug reactions in the coronary care unit of a tertiary care hospital. Eur J Clin Pharmacol. 2012;68:427–33.
15. Mohebbi N, Shalviri G, Salarifar M, Salamzadeh J, Gholami K. Adverse drug reactions induced by cardiovascular drugs in cardiovascular care unit patients. Pharmacoepidemiol. Drug Saf. 2010;19:889–94.