Original Article

A local Evaluation of Streptokinase Therapy in Acute Myocardial Infarction Patients at TMSS Medical College and Rafatullah Commnuity Hoppital

Islam MM[1*], Ali MY[2], Sunny MM[3], Rahim MMU[4]

1. Dr. Md. Mahfuzul Islam, Associate Professor, Department of Cardiology, TMSS Medical College, Bogura.
2. DR. Md. Younus Ali, Assistant Professor, Department. of Cardiology, TMSS Medical College, Bogura.
3. Dr. Md. Mugni Sunny, Associate Professor, Department of Cardiology, TMSS Medical College, Bogura.
4. Dr. Mohammad Mahbub Ur Rahim, Coordinator, Research, Planning and Development, Health Sector, TMSS.

***Corresponding Author**

Abstract

Introduction: Acute myocardial infarction (AMI) remains a significant public health concern, necessitating prompt diagnosis and treatment. This study aimed to evaluate the clinical characteristics and outcomes of patients with AMI treated with streptokinase therapy at TMSS Medical College & Rafatullah Community Hospital.

Objective: To analyze the demographic profile, clinical presentation, and treatment outcomes of patients with AMI undergoing streptokinase therapy.

Materials and Methods: A retrospective analysis was conducted on 140 patients admitted to the CCU from January to December 2022. Demographic data, clinical characteristics, and treatment outcomes were collected.

Results: The majority of patients were male (72.9%) with an average age of 52.5 years. Common comorbidities included diabetes mellitus (32.9%), hypertension (51.4%), and dyslipidemia (23.6%). Obesity (16.4%) and smoking (52.9%) were prevalent. Delays in hospital admission were observed in 86 patients (61%). Streptokinase therapy was administered to 54 patients, with 40 showing positive responses. Echocardiography revealed a normal LVEF in 52.6% of patients. A negative correlation was found between delayed treatment and LVEF, indicating a poorer prognosis with longer delays. The chi-square test and Cramer's V confirmed a strong association between streptokinase therapy and LVEF.

Conclusion: This study highlights the burden of AMI in the study population, emphasizing the importance of timely intervention. Streptokinase therapy demonstrated effectiveness in improving LVEF and reducing mortality. Addressing risk factors such as obesity, smoking, and chronic diseases is crucial for preventing AMI.

Keywords: Acute myocardial infarction, Streptokinase therapy, Left ventricular ejection fraction, Delay in treatment, Risk factors.

Introduction

Acute myocardial infarction (AMI) remains a leading cause of morbidity and mortality globally, necessitating prompt and effective therapeutic interventions. Among various treatment modalities, streptokinase (SK) has been widely utilized as a thrombolytic agent, particularly in settings where access to advanced interventions like percutaneous coronary intervention (PCI) is limited.

Streptokinase, a protein derived from β-hemolytic Streptococci, acts by activating plasminogen to plasmin, leading to the dissolution of fibrin clots.[1] Its efficacy in restoring coronary blood flow has been well-documented, particularly in ST-elevation myocardial infarction (STEMI) cases. Studies indicate that timely administration of SK can significantly reduce infarct size, preserve left ventricular function, and lower mortality rates.[2,3] The Fibrinolytic Therapy Trialists (FTT) have shown that thrombolytic therapy, including SK, can lead to a notable reduction in mortality, especially when administered within the first few hours of symptom onset.[4]

Clinical outcomes following streptokinase therapy can vary based on several factors, including patient demographics and comorbidities. For instance, the

presence of diabetes has been shown to influence the efficacy of SK, with diabetic patients exhibiting a higher risk of adverse outcomes compared to their non-diabetic counterparts.[5, 6] Furthermore, the degree of ST-segment resolution post-thrombolysis serves as a critical prognostic indicator, with complete resolution correlating with favorable outcomes.[7]

However, the administration of SK is not without risks. Hypotension is a common complication associated with SK therapy, potentially limiting the infusion rate and overall efficacy.[8,9] Research has indicated that the use of PAF antagonists may not sufficiently mitigate this risk, highlighting the need for careful monitoring during treatment.[8,9] Additionally, adverse events such as bleeding complications, including hematomas, have been reported, necessitating vigilant post-administration care.[10,11]

Current guidelines from the American College of Cardiology/American Heart Association (ACC/AHA) and the European Society of Cardiology (ESC) endorse the use of thrombolytic therapy, including streptokinase, in appropriate clinical scenarios.[12] The timing of administration is crucial; studies suggest that administering SK within the first five hours of symptom onset significantly reduces the risk of cardiac rupture and improves overall outcomes.[12]

One of the good indicators of myocardial function is ejection fraction. A normal EF is 50% or higher. Below 40% may indicate heart failure. Left ventricular ejection fraction (LVEF) is commonly assessed.[13] The left ventricular (LV) ejection fraction (EF) is known to be an independent predictor of late prognosis after acute myocardial infarction. Despite a previous report that early heart failure (evidenced only by advanced pulmonary rales in the hospital) can predict prognosis in the absence of severe depression of the LVEF at hospital discharge, the potentially strong influence of various measures of in hospital heart failure on the predictive ability of LVEF has not been generally appreciated.[14]

While the efficacy of streptokinase in acute myocardial infarction (AMI) is well-established, its real-world application and outcomes can vary across different healthcare settings. This study aims to provide a local perspective on the clinical profile, treatment outcomes, and potential predictors of mortality in AMI patients undergoing streptokinase therapy at TMSS Medical College & Rafatullah Community Hospital. By analyzing local data, we hope to contribute to a better understanding of the factors influencing patient outcomes and inform evidence-based clinical practice.

Objectives

- The primary objective of this study is to evaluate the clinical outcomes of streptokinase therapy in patients with acute myocardial infarction at TMSS Medical College & Rafatullah Community Hospital.

Materials and Methods

This study aimed to analyze the demographic profile, clinical presentation, and treatment outcomes of patients with AMI undergoing streptokinase therapy. Specifically, it sought to determine the potential associations between delayed treatment, streptokinase therapy, and Left Ventricular Ejection Fraction (LVEF).

A retrospective cross-sectional study was conducted at the Department of Cardiology, TMSS Medical College and Rafatullah Community Hospital (TMC&RCH) from January 2022 to December 2022. A total of 140 adult patients (≥18 years) admitted to the Coronary Care Unit (CCU) with chest pain and discomfort were included in the study. Among the 140 admitted patients 54 patients were given streptokinase according to the streptokinase administration protocol. Data on demographics, clinical presentation, treatment details, and outcomes, including LVEF, were collected from hospital records.

Data analysis was performed using SPSS version 23. Descriptive statistics were employed to analyze demographic data, while correlation and Chi-Square tests were used to assess the relationship between delayed treatment, streptokinase therapy, and LVEF with a 95% confidence level. Ethical considerations were adhered to, ensuring patient confidentiality and data protection.

Results

A total of 140 patients admitted at CCU of TMSS Medical College & Rafatullah Community Hospitals from January – December 2022 was included in this study.

Table I: Demographic Profile of the Patients (n=140)

Demographic Profile of the Patients	Frequence	Percentage
Age	52.5 ±12.3 Years	
Age Group		
18-25 Years	1	0.7
26-35 Years	9	6.4
36-45 Years	35	25.0
46-55 Years	43	30.7
56 and above	52	37.1
Gender		
Male	102	72.9
Female	38	27.1
Obesity	23	16.4
Smoking Cigarette	74	52.9
Alcohol Consumption	1	0.7
Diabetes Mellitus	46	32.9
Hypertension	72	51.4
Dyslipidemia	33	23.6

Table I show that the key demographic findings of the admitted patients. The average age of the patients was 52.5 years with a standard deviation of 12.3 years. The majority of them (37.1%) fall into the age group of 56 years and above, followed by 30.7% in the 46-55 years age group. The patients were predominantly male, with 72.9% identifying as male and 27.1% as female. A significant portion of the patients (16.4%) were classified as obese. Suggesting a need for interventions to address public health concerns related to obesity. Smoking was prevalent in the patients, with 52.9% of individuals reporting smoking cigarettes. Alcohol consumption is relatively low, with only 0.7% of individuals reporting alcohol consumption.

Regarding the health conditions of the admitted patients, A significant number of individuals (32.9%) have diabetes mellitus, indicating a high prevalence of this chronic disease. Hypertension is another common health condition, affecting 51.4% of the population. Dyslipidemia, or abnormal cholesterol levels, was present in 23.6% of individuals.

Table II: Types of Myocardial Infarction of Admitted Patients (n=116)

Types of Acute MI	Frequency	Percent (%)
Inferior	58	50.0
Antero-septal	22	19.0
Anterior	20	17.2
Extensive Anterior	10	8.6
High Lateral	1	0.9
Antero Lateral	3	2.6
Infero Lateral	2	1.7
Total	116	100.0

Diagnosis and treatment.

In this study 140 patients who were admitted due to chest pain and discomfort, 116 were diagnosed with AMI. According to the findings, of these, 86 patients (61%) experienced delays in hospital admission, while 54 patients (39%) were admitted promptly. Out of 116 AMI patients, 54 were given STK infusion therapy treatment, and 40 of these patients showed a positive response to the treatment. ECG finding revealed 50% (58) had Inferior MI, 19% (22) had Antero-septal MI, 17.2% (20) had Anterior MI, 8.6% (10) had extensive Anterior MI, 2.6% (3) had Antero-lateral MI, 1.7% (2) had Infero-lateral MI and 0.9% (1) had High-Lateral MI (Table II).

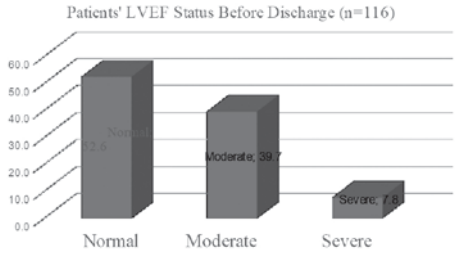

Figure 1: Patient's LVEF status before discharge in percentage (n=116)

Before discharge the patient, echocardiography was done to evaluate their cardiac function and prognosis. 52.6% (61) of patients Left Ventricular Ejection Fraction (LVEF) were normal, 39.7% (46) were moderate and 7.8% (9) were poor or severely downgraded (Figure 1).

Table III: Correlation between delay in treatment and prognosis of cardiac function (LVEF)

Correlations

		Delay (After 12 hours) Causes	LVEF
Delay (After 12 hours) Causes	Pearson Correlation	1	-.188*
	Sig. (2-tailed)		.041
	N	140	116

*. Correlation is significant at the 0.05 level (2-tailed).

There was a negative correlation between the delayed treatments of MI with Left Ventricular Function (LVEF). Which indicated that longer delays in the treatment of MI are associated with lower LVEF values (Table III) and which is statistically significant (p=0.05).

Table IV: Association between streptokinase therapy and cardiac function (n=54)

Streptokinase given * LVEF Level Crosstabulation					
		LVEF			Total
		1 (Normal)	2 (Moderate)	3 (Poor)	
Streptokinase given	yes	34	4	2	40
	no	0	12	2	14
Total		34	16	4	54

Chi- Square Test		
Value	df	Asymptotic Significance (2-sided)
33.171	3	0.000

Cramer V Test	
Value	Approximate Significance
0.784	0.000

The chi-square test and Cramer's V tests provided compelling evidence of a strong association between streptokinase therapy and LVEF (Table IV), which statistically highly significant with p value 0.000.

Discussion

A significant portion of the patients (16.4%) were classified as obese, suggesting a need for interventions to address public health concerns related to obesity.

Smoking was prevalent in the patients, with 52.9% of individuals reporting smoking cigarettes. This highlights the need for tobacco control programs to reduce smoking rates.

A significant number of individuals (32.9%) have diabetes mellitus, indicating a high prevalence of this chronic disease.

Hypertension is another common health condition, affecting 51.4% of the population. Dyslipidemia, or abnormal cholesterol levels, was present in 23.6% of individuals.

The demographic profile presented several key characteristics of the patients. The relatively high average age, obesity and prevalence of chronic diseases such as diabetes, hypertension, dyslipidemia are the contributing and risk factors for the development of Cardiovascular Accidents, specifically Myocardial Infarction which mentioned by other studies also.[15,16]

Furthermore, lifestyle factors such as physical inactivity are also critical; sedentary behavior has been linked to increased cardiovascular risk, with exercise being a protective factor against MI.[17] Dietary habits play a significant role as well. A better diet quality has been associated with decreased mortality among MI survivors, emphasizing the importance of nutrition in cardiovascular health.[18] Additionally, psychosocial factors, including stress and depression, have been shown to exacerbate the risk of MI, particularly in individuals with pre-existing conditions such as diabetes. [19, 20]

Comorbid conditions such as diabetes mellitus significantly elevate the risk of myocardial infarction. Studies have shown that diabetic patients have a two to fourfold increased risk of MI compared to non-diabetic

individuals.[21] This relationship underscores the importance of managing diabetes and its associated risk factors, such as obesity and hypertension, to mitigate the risk of cardiovascular events.

The delay in treatment for acute myocardial infarction (MI) significantly impacts patient prognosis, underscoring the critical need for timely medical intervention. The prognosis of patients suffering from MI is closely linked to the speed of diagnosis and treatment initiation. Studies have shown that rapid transport and early hospital admission are essential for improving outcomes after MI, as delays can lead to increased myocardial injury and mortality.[22-24] Specifically, the time from symptom onset to first medical contact (FMC) and the subsequent time from FMC to reperfusion therapy are crucial determinants of survival, particularly in cases of ST-segment elevation myocardial infarction (STEMI).[25-27] This study also revealed that there was negative correlation between the delayed treatment of MI with Left Ventricular Function (LVEF). Which indicated that longer delays in the treatment of MI are associated with lower LVEF values means poor prognosis (p=0.05, Table III).

Streptokinase (STK) remains a significant therapeutic option for the management of acute myocardial infarction (AMI), particularly in settings where advanced interventions like percutaneous coronary intervention (PCI) are not readily available. Its role as a fibrinolytic agent is well-documented, with numerous studies demonstrating its efficacy in restoring coronary blood flow and improving patient outcomes. For instance, the administration of SK has been shown to facilitate the recanalization of the infarct-related artery, leading to a reduction in mortality rates associated with AMI when given promptly after symptom onset.[2,27,28] This is particularly critical as the timing of thrombolytic therapy is a key determinant of prognosis; early intervention within the first hour can significantly lower mortality rates.[4] This study also found there was a very strong association between streptokinase therapy and left ventricular function ie. LVEF (p=0.000).

Conclusion

Streptokinase therapy remains a cornerstone in the management of acute myocardial infarction, particularly in resource-limited settings and in poor patients. Early treatment of AMI and initiation streptokinase infusion therapy can increase the rate of prognosis of AMI case and can decrease the morbidity due to MI.

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TMSS Medical College Journal 2024; 23(39-45):