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Original Research Article

Comparison of In Hospital Outcomes in ST-Elevation Myocardial Infarction Patients with and Without Streptokinase Therapy

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Abstract: *Background*: ST-Elevation Myocardial Infarction (STEMI) is a life-threatening condition that demands immediate medical attention. Streptokinase (STK) is a cost-effective thrombolytic agent frequently used to restore blood flow to the heart muscle, especially in settings with limited resources. Although Tenecteplase therapy has shown superior efficacy, STK remains the preferred thrombolytic treatment in our country due to the economic challenges faced by many families. *Objective:* To evaluate and compare in-hospital mortality, complications, and recovery outcomes between STEMI patients receiving Streptokinase and non-thrombolytic therapy. *Method and Materials:* This prospective observational study was conducted from January to June 2024 in the Coronary Care Unit of North East Medical College and Hospital, Sylhet. A total of 101 STEMI patients were included, grouped into STK (n=63) and Non-STK (n=38) categories. Data on demographics, clinical history, ECG findings, and outcomes were collected and analyzed statistically. Ethical approval and informed consent were obtained prior to the study. *Results:* In the STK group, 93.7% were male, with a mean age of 49.84 years, compared to 73.7% male and a mean age of 57.05 years in the Non-STK group. Mortality was 15.9% in the STK group and 23.7% in the Non-STK group. Mechanical complications like ALVF occurred in 38 STK patients and 26 Non-STK patients. Electrical complications included 4 cases of third-degree AV block in the STK group versus 2 in the Non-STK group. *Conclusion:* This study highlights the critical impact of streptokinase (STK) administration on in- hospital outcomes in patients with ST-segment elevated myocardial infarction (STEMI).

Keywords: ST-Elevation Myocardial Infarction (STEMI), Streptokinase (STK), Acute left ventricular failure (ALVF), Atrioventricular block (AV block).

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Introductions

ST-Elevation Myocardial Infarction (STEMI) is a life-threatening manifestation of acute coronary syndrome (ACS) that requires prompt management to restore myocardial perfusion and reduce morbidity and mortality[1]. Streptokinase (STK), a thrombolytic agent, has long been a cornerstone therapy for reperfusion in STEMI

patients, particularly in resource-limited settings where primary percutaneous coronary intervention (PCI) may not be readily available[2]. However, while STK administration is effective in reducing infarct size and mortality, it is associated with risks such as bleeding, mechanical complications, and electrical disturbances[3,4]. The evaluation of STK's impact on in-hospital outcomes is critical for optimizing STEMI management strategies, especially in settings with diverse patient profiles and varying levels of care[5].

This study compares in-hospital mortality, complications, and recovery between STEMI patients treated with STK and those managed without thrombolytic therapy. Previous studies have highlighted the benefits of STK in reducing mortality in STEMI patients but also underscore its potential to increase complications such as cardiogenic shock, arrhythmias, and left ventricular dysfunction[6,7]. Furthermore, electrical complications like atrioventricular block and ventricular tachycardia are known challenges associated with STEMI and its management[8,9]. The Killip classification and time to hospital presentation have been shown to influence outcomes significantly, with delayed presentations leading to higher mortality and worse recovery[10,11]. Mechanical complications such as acute left ventricular failure (ALVF) and acute mitral regurgitation (MR) are also prevalent in STEMI patients, emphasizing the need for careful monitoring and timely intervention[12]. In addition, electrical complications like cardiac arrest, atrial fibrillation, and left bundle branch block (LBBB) often exacerbate the clinical course, contributing to increase in-hospital mortality[13,14]. Understanding the comparative outcomes in patients receiving STK and those who do not can guide clinical decision-making and resource allocation[15].

Methods and Materials

Study Design
This is a prospective observational comparative study aimed at assessing the impact of Streptokinase (STK) administration on in-hospital outcomes in patients diagnosed with ST-Elevated Myocardial Infarction (STEMI). The study was conducted in the Coronary Care Unit (CCU) of North East Medical College and Hospital, Sylhet, from January 2024 to June 2024.

Study Procedure
Patients who presented with STEMI were evaluated using standardized protocols. Those who met specific inclusion criteria were consented to participate in the study. Data on demographics, clinical history, time to CCU arrival, ECG findings, and outcomes were collected through medical records and interviews conducted by trained medical staff. Patients were then categorized into two groups: those who received STK (n=63) and those who did not (n=38).

Inclusion Criteria
Patients included in the study were those who were adults aged 18 years and above. Were diagnosed with STEMI based on clinical evaluation and ECG findings. Were admitted to the CCU within 24 hours of symptom onset. Provided informed consent to participate in the study.

Exclusion Criteria
Patients were excluded from the study if they had a history of prior myocardial infarction or thrombolytic therapy. Presented within 24 hours of symptom onset contraindications to STK therapy (e.g., active bleeding, recent surgery, or known allergy to STK).

Statistical Analysis
Data were analyzed using appropriate statistical software. Descriptive statistics were computed, including means, standard deviations, and frequencies. Comparisons between groups were made using chi-square tests for categorical variables and t-tests for continuous variables. A p- value of <0.05 was considered statistically significant.

Ethical Consideration
The study was conducted following the ethical principles outlined in the Declaration of Helsinki. Ethical approval was obtained from the Institutional Review Board of North East Medical College and Hospital prior to the commencement of the study. Informed consent was secured from all participants, ensuring confidentiality and the right to withdraw from the study at any time without any consequences to their medical care.

Results

Table 1: Demographic and Clinical Characteristics

Characteristic	STK (n=63)	Non-STK (n=38)
Gender		
Male	59 (93.7%)	28 (73.7%)
Female	4 (6.3%)	10 (26.3%)
Age Distribution		
< 55 years	40	13
55-75 years	40	25
> 75 years	3	1
Mean Age	49.84	57.05
Diabetes Mellitus (DM)	21	14
Hypertension (HTN)	17	16
Smoking Status		
Smoker	48	23
Non-smoker	15	15
History of IHD	7	7
Killip Class		
Class I	21	11
Class II	12	9
Class III	7	8
Class IV	23	10

Table 1 presents the demographic and clinical characteristics of patients grouped into STK (n=63) and Non-STK (n=38) categories. Among the STK group, 93.7% were male, compared to 73.7% in the Non- STK group. The mean age was lower in the STK group (49.84 years) than in the Non-STK group (57.05 years). A higher proportion of patients under 55 years were in the STK group, while more patients aged 55–75 years were in the Non-STK group. Diabetes mellitus and hypertension were comparably prevalent in both groups. Notably, smoking was more frequent among STK patients (48 smokers) than Non-STK patients (23 smokers). Both groups had similar proportions of ischemic heart disease (IHD) history. Regarding Killip classification, Class I was the most common in both groups, though the STK group had a higher percentage of severe cases (Class IV) compared to the Non-STK group.

Table 2: Time from Symptom Onset to CCU Arrival

Time Interval	STK (n=63)	Non-STK (n=38)
< 6 hours	25	8
6-12 hours	38	7
> 12 hours	N/A	23

Table 2 shows the time intervals from symptom onset to arrival at the CCU for STK and Non-STK patients. Most STK patients (38) arrived within 6–12 hours.

Table 3: ECG Findings

ECG Finding	STK (n=63)	Non-STK (n=38)
Anterior wall MI	37	20
Inferior wall MI	19	14
Inferior with posterior wall MI	7	2
Left Bundle Branch Block (LBBB)	N/A	2

Table 3 presents ECG findings for STK and Non-STK groups. Anterior wall myocardial infarction (MI) was most common in both groups, with 37 cases in STK and 20 cases in Non-STK. Inferior wall MI was observed in 19 STK and 14 Non-STK patients. Additionally, 2 Non-STK patients had left bundle branch block (LBBB), a finding not seen in the STK group.

Table 4: In-Hospital Mortality

Variable	STK (n=63)	Non-STK (n=38)
In-hospital Mortality	10 (15.9%)	9 (23.7%)
Cause of Death		
ALVF	8	7
RV Infarction	1	1
Arrhythmia	1	1
Time of Death After Admission		
1st 24 hours	3	6
24-48 hours	4	2
> 48 hours	3	1

Table 4 presents in-hospital mortality rates for STK and Non-STK groups. Mortality was higher in the Non-STK group (23.7%) than in the STK group (15.9%). Acute left ventricular failure (ALVF) was the main cause of death in both groups. The Non-

STK group had more early deaths (within 24 hours), while the STK group experienced more deaths between 24-48 hours and slightly higher mortality beyond 48 hours.

Table 5: Complications of the study population.

Complications	STK (n=63)	Non-STK (n=38)
Mechanical Complications		
ALVF	38	26
Cardiogenic Shock	30	13
Acute MR	0	1
Electrical Complications		
1/2* AV block	2	2
3* AV block / CHB	4	2
Cardiac Arrest / Asystole	2	1
AF/SVT	3	2
VT/VF	1	1
LBBB	1	1

Table 5 outlines the mechanical and electrical complications observed in the STK and Non-STK groups. intracerebral haemorrhage- 1(STK). Among mechanical complications, acute left ventricular failure (ALVF) and cardiogenic shock were notably more prevalent in the STK group (38 and 30 cases, respectively) compared to the Non-STK group (26 and 13 cases, respectively). Acute mitral regurgitation (MR) was rare, occurring only in one Non-STK patient. Electrical complications were less common overall, with similar rates of 1/2° AV block in both groups (2 cases each). Third-degree AV block (CHB) was twice as frequent in the STK group (4 cases) compared to the Non-STK group (2 cases). 1 case of STK patients developed intracerebral haemorrhage.

Discussion

This study highlights significant differences in demographic characteristics, clinical presentations, in- hospital complications, and mortality rates between patients treated with streptokinase (STK) and those managed without thrombolytic therapy. The STK group comprised predominantly younger male patients, with a lower mean age (49.84 years) compared to the Non-STK group (57.05 years). A similar trend has been observed in studies that report younger STEMI patients are more likely to receive thrombolytic therapy due to fewer contraindications and better hemodynamic stability[16,17]. Regarding time to CCU arrival, the majority of STK patients presented within the critical 6–12 hours after symptom onset, while a significant proportion of Non-STK patients presented after 12 hours. Early presentation is a well-known factor influencing the success of thrombolysis and overall outcomes in STEMI patients[18]. Studies have shown that delayed CCU arrival leads to poorer prognosis, as myocardial salvage is time-sensitive[19]. This finding aligns with prior research emphasizing the importance of prompt reperfusion therapy to reduce infarct size and mortality[20].

Electrocardiographic (ECG) findings demonstrated that anterior wall MI was the most common type in both groups, though the STK group had a higher frequency of such cases. Anterior wall MI is associated with a larger infarct size and worse prognosis, and thrombolytic therapy has been shown to significantly improve outcomes in these cases[21]. Notably, the presence of left bundle branch block (LBBB) in the Non-STK group reflects delayed or incomplete reperfusion, corroborating findings from earlier studies[22]. In-hospital mortality was lower in the STK group (15.9%) compared to the Non-STK group (23.7%), underscoring the efficacy of thrombolytic therapy in reducing mortality. Acute left ventricular failure (ALVF) was the leading cause of death in both groups, consistent with prior studies identifying ALVF as a critical determinant of early mortality in STEMI patients[23]. Moreover, the Non-STK group showed a higher frequency of deaths within the first 24 hours, a pattern also reported in studies where delayed or absent reperfusion therapy resulted in rapid hemodynamic deterioration[24].

Mechanical complications, particularly ALVF and cardiogenic shock, were more prevalent in the STK group, likely due to a higher proportion of severe cases (Killip Class IV). Similar findings have been reported, where thrombolytic therapy increases the risk of complications like ALVF in patients with large infarcts[25]. Electrical complications, including complete heart block (CHB) and ventricular arrhythmias, were slightly higher in the STK group, aligning with previous reports indicating transient reperfusion arrhythmias after thrombolytic therapy[26].

Conclusion

This study highlights the critical impact of streptokinase (STK) administration on in-hospital outcomes in patients with ST-segment elevated myocardial infarction (STEMI). The findings demonstrate that STK therapy is associated with a lower mortality rate and improved early reperfusion outcomes compared to the Non-STK group. Additionally, patients receiving STK therapy presented earlier to the CCU and were predominantly younger males with severe infarcts, emphasizing the importance of early and targeted thrombolytic intervention.

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Conflict of Interest

The authors declare no conflicts of interest related to this study.

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