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Research Article

A COMPARATIVE STUDY ON EFFICACY AND SAFETY OF STREPTOKINASE AND RETEPLASE IN PATIENTS WITH MYOCARDIAL INFARCTION IN A TERTIARY CARE TEACHING HOSPITAL

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ABSTRACT

Objectives: This study compares the efficacy, safety, and cost-effectiveness of streptokinase and reteplase in treating patients with acute myocardial infarction (AMI) at SRM Hospital. A total of 86 patients were divided into two groups, each receiving either streptokinase or reteplase, with outcomes tracked over a 3-month period.

Methods: Over the course of 3 months, the results of 86 patients who were split into two groups and given either reteplase or streptokinase were monitored.

Results: The duration of hospital stays (6.05 days vs. 9.79 days) and the time it took to relieve symptoms (4.58 h vs. 8.74 h for streptokinase) were both significantly shortened by reteplase, according to the results. However, streptokinase was found to be more cost-effective. Both treatments showed similar increases in creatine phosphokinase (CPK) and CPK-MB biomarkers post-thrombolysis, but reteplase demonstrated superior efficacy. While reteplase was associated with a higher incidence of bleeding, streptokinase had more cases of hypotension and hypersensitivity. No significant mortality or morbidity was observed during the study period.

Conclusion: This study highlights the clinical advantages of reteplase over streptokinase, despite its higher cost.

Keywords: Acute myocardial infarction, Streptokinase, Reteplase.

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INTRODUCTION

An acute myocardial infarction (AMI), sometimes referred to as a heart attack, is caused by total coronary artery blockage by a thrombus and is a major global health concern [1,2]. In India alone, cardiovascular diseases are thought to be the cause of 17.5 million deaths annually on a global scale. Approximately one-third of AMI patients die within the 1st h after symptoms, often from sudden ventricular fibrillation [3-6]. An acute coronary syndrome is made up of two conditions: Unstable angina and myocardial infarction (ST-Segment Elevation Myocardial Infarction [STEMI] and Non-STEMI). Unstable angina is distinguished from myocardial infarction by worsening or newly developing chest pain, whereas myocardial infarction is diagnosed by elevated cardiac biomarkers, electrocardiogram (ECG), and clinical history. Ischemia also results in the death of heart cells [7].

To treat STEMI, thrombolytic treatment is essential since it lyses thrombi, lessens myocardial damage, and increases survival. Thrombolytics such as streptokinase, urokinase, alteplase, reteplase, and tenecteplase are ideally administered within the 1st h but may be administered up to 6 h after the onset of symptoms. They are frequently used in conjunction with anticoagulants for improved efficacy and prevention [8-13]. While reteplase, a more recent medication with greater efficacy and fewer side effects, provides clinical advantages, streptokinase is still a reasonably priced treatment for acute AMI. Hence, this study was conducted to evaluate the efficacy, safety, and cost of streptokinase and reteplase in patients with AMI who were admitted to SRM Hospital.

METHODS

A total of 86 individuals with AMI were included in this prospective, interventional, comparative clinical investigation. The patients were split into two groups of 43 each. Based on the formula developed by Rama *et al*., the sample size was calculated, yielding roughly 43 patients per group. The subjects were admitted to the cardiology Intensive Care Unit at SRM Medical College Hospital and Research Centre using a non-randomized screening process. Group II received reteplase and Group I received streptokinase, with a 3-month follow-up. A history of cerebral hemorrhage, active bleeding, uncontrolled hypertension, and other diseases were among the exclusion criteria, whereas age >20 years, symptom onset <6 h, and specific ST-segment elevations were among the inclusion criteria. Institutional Ethical Clearance was obtained (868/IEC/2015). After obtaining written informed consent from the patients, demographics, medical history, blood pressure, blood tests, ECG changes, adverse reactions, symptom relief duration, medication costs, hospital stays, death, and recurrence rates were collected. Independent and paired t-tests were used in SPSS version 21.0 data analysis. Over the course of the 1½-year study, the pharmacovigilance center received reports of adverse medication responses. There was no conflict of interest, and the study was conducted at an appropriately equipped institution.

RESULTS

The average age of patients in Group 1 (streptokinase group) was 53.5 years, whereas in Group 2 (reteplase group), it was 51.6 years. The difference in age was not statistically significant (p=0.38). Both groups had identical gender distributions, with 83.7% males and 16.3% females. Group 1 had a mean body mass index (BMI) of 26.9, whereas Group 2 had a slightly higher mean BMI of 27.9. However, this difference was not statistically significant (p=0.21) (Table 1).

Table 2 outlines the past medical illnesses among study participants. The distribution of conditions is fairly similar between the two groups, with

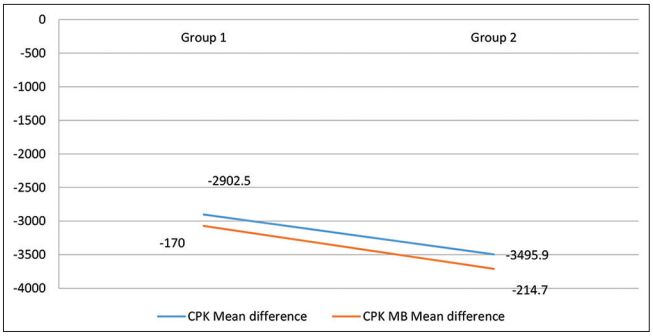

Fig. 1: Mean difference of creatine phosphokinase (CPK) and CPK-MB before and after thrombolysis (n=86)

Table 1: Background characteristics of the study population (n=86)

Background characteristics	Group 1	Group 2	p-value
Age in completed years (Mean±SD)	53.5±10.8	51.6±8.7	0.38
Gender			
Male (%)	36 (83.7)	36 (83.7)	0.61
Female (%)	7 (16.3)	7 (16.3)	
BMI (Mean±SD)	26.9±3.9	27.9±3.7	0.21

SD: Standard deviation

Table 2: Past medical illness among study participants (n=86)

S. No.	Past medical illness	Group 1 (n=43)	Group 2 (n=43)
1	None	4	2
2	Diabetes mellitus	6	5
3	Hypertension	3	6
4	Dyslipidemia	4	2
5	Diabetes mellitus with dyslipidemia	8	9
6	Diabetes mellitus with hypertension	5	7
7	Hypertension with dyslipidemia	3	1
8	Diabetes mellitus, dyslipidemia, and hypertension	10	11

Table 3: Cost-effectiveness, time for symptom relief, and duration of hospital stay among the study participants (n=86)

Variables	Group 1	Group 2	p-value
Cost of the drug (INR) Mean±SD	2,804.65±30.5	34,260.00±0.00	0.0001
Time for symptom relief (hours) Mean±SD	8.74±1.9	4.58±0.88	0.0001
Duration of hospital stay (days) Mean±SD	9.79±1.79	6.05±0.78	0.0001

SD: Standard deviation

both experiencing a mix of diabetes, hypertension, and dyslipidemia. Notably, Group 2 had slightly higher instances of combined diabetes, dyslipidemia, and hypertension (11 cases vs 10 in Group 1).

It shows that while reteplase is significantly more expensive (₹34,260 vs. ₹2,804.65), it provides faster symptom relief (4.58 h vs. 8.74 h) and reduces hospital stay (6.05 days vs. 9.79 days) ($p<0.05$) (Table 3).

Table 4 shows the changes in creatine phosphokinase (CPK) and creatine phosphokinase-MB (CPK-MB) levels before and after thrombolysis for two groups treated with streptokinase (Group 1) and reteplase (Group 2). The reteplase group showed a greater increase in both CPK and CPK-MB levels, indicating improved reperfusion compared to the streptokinase group ($p<0.05$).

The line graph (Fig. 1) shows that reteplase (Group 2) resulted in a greater reduction in CPK and CPK-MB levels, indicating more effective reperfusion. Specifically, the mean difference in CPK was −3495.9 for reteplase versus −2902.5 for streptokinase, whereas, for CPK-MB, reteplase had a mean difference of −214.7 compared to −170 for streptokinase.

DISCUSSION

Among the 86 myocardial infarction patients in our study, those between the ages of 41 and 60 made up the largest group (60.5%), followed by those over 60 (26.7%), and those under 40 (12.7%). Higher incidences were observed in older age groups by similar research, including Doughty *et al*. and Shah *et al*. (2009) [14,15]. Myocardial infarction onset median age was found to be 64–66 years for men and 70 years for women, according to research by Wilson *et al*. [16]. In terms of sex distribution, 83.7% of cases were in men, who were the majority afflicted (Table 1). This is consistent with research by Canto *et al*., which found that males – especially younger ones – had a greater incidence [17]. Pramod *et al*. have mentioned how estrogen shields women in their reproductive years from myocardial infarction [18].

With mean BMIs of 26.88 and 27.93 in the two groups, respectively, our study showed that among overweight people, myocardial infarction occurs more frequently (Table 1). 24.4% of patients had diabetes, hypertension, and dyslipidemia, indicating a high prevalence of co-existing conditions. These illnesses, either by themselves or in combination, have been shown to be substantial risk factors by Pramod *et al*. [18].

As for personal behaviors, the most common risk factor was smoking (Von Eyben *et al*., 91% of young myocardial infarction patients) [19].

The choice of thrombolytic medication in our study was influenced by cost, with streptokinase being chosen over reteplase because of its lower cost. Reteplase (mean time of 4.58 h) relieved symptoms more quickly than streptokinase (8.74 h), which is in line with research by Pelluri *et al*. [20] The reteplase group's shorter hospital stay (6.05 days vs. 9.79 days) was consistent with the results reported by Kumolosasi *et al*. [21,22] (Table 3).

Table 4: CPK and CPK MB before and after thrombolysis (n=86)

Biomarker	Paired T-test	Group 1	Group 2	Independent T-test (Mean difference with CI)	p-value
CPK (Mean±SD)	Before thrombolysis	387±145.7	323.2±58.9	63.7 (16.1–113.4)	0.000
	After thrombolysis	3289.4±1042.5	3819.2±647	−529.8 (−901.9–−157.6)	0.005
P-value		0.00			
CPK MB (Mean±SD)	Before thrombolysis	51.3±13.4	48±8.1	3.32 (−1.41–8.1)	0.166
	After thrombolysis	221.3±72.9	262.6±56.7	−41.3 (−69.3–−13.3)	0.004
p-value		0.00			

SD: Standard deviation, CI: 95% Confidence interval

Following thrombolysis, biomarker analysis revealed a significant rise in CPK and CPK-MB levels in both groups, with greater levels seen in the reteplase group, suggesting improved reperfusion (Table 4 and Fig. 1). The two groups experienced different adverse effects: bleeding was more common with reteplase, and hypotension and hypersensitivity reactions were more common with streptokinase.

Three months of follow-up revealed no morbidity or mortality in either group. A long-term safety evaluation of the medications was not possible because of the study's short duration (1.5 years) and the restricted usage of reteplase due to its higher cost.

CONCLUSION

This study concludes that while both streptokinase and reteplase are effective in treating AMI, reteplase offers superior efficacy in terms of faster symptom relief and shorter hospital stays. However, its higher cost may limit its widespread use, especially in resource-constrained settings where streptokinase remains a more affordable alternative. Both treatments demonstrated acceptable safety profiles, though the choice of thrombolytic therapy should balance cost considerations with clinical outcomes. It is recommended that reteplase be considered for AMI patients requiring rapid symptom relief and shorter hospital stays, whereas streptokinase remains a cost-effective option for broader use in resource-limited settings.

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AUTHOR CONTRIBUTIONS

The authors confirm their contribution to the paper as follows:

Dr. Muthulakshmi R: Study concept and design, literature search, data acquisition, analysis, interpretation of results, manuscript preparation, and manuscript editing. Dr. Jamunarani R: Study concept and design, data acquisition, manuscript editing, and review. Dr. Janani L: Data analysis, interpretation of results, manuscript preparation, and editing. Dr. Sowmini K: Manuscript preparation, editing, and review.

CONFLICT OF INTEREST

None.

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