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# Comparison of Outcome and Complications of Myocardial Infarction with and without Streptokinase Therapy

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**Abstract**
**Background**
Myocardial infarction is a life-threatening condition which needs to treat on emergency basis. Percutaneous coronary angioplasty is the treatment of choice but if the situation is not favorable then fibrinolysis is the best option for myocardial infarction. Streptokinase is the most commonly used fibrinolytic agent worldwide. The aim of the current study was to compare the outcome and complications of myocardial infarction with and without streptokinase therapy in a tertiary care hospital of Karachi
**Methods**
A descriptive cross-sectional study was conducted in National Institute of Cardiovascular diseases (NICVD), Karachi from May to October 2021. Study participants were divided into two groups; Group-I with streptokinase therapy and Group-II without streptokinase therapy. A self-designed proforma was used. Laboratory investigations carried out were complete blood count, fasting blood sugar, CK-MB level, serum urea, creatinine, lipid profile, chest x-ray, ECG's and echocardiography. The complications with and without streptokinase therapy and mortality rate was also noted on proforma. Data was analyzed by using Statistical Package for Social Science (SPSS) version-20.
**Results**
The mean age of the study participants was 49.5±8.7 years. Majority of study participants were male (76.4%) and were smoker (40.2%). The most common co-morbidity among study participant was hypertension (79%) followed by diabetes (38.6%). About 32.1% of the patients were having family

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history of ischemic heart disease. The most common complication after streptokinase therapy was hypotension (32.7%) while left ventricular failure was most common without streptokinase therapy. Mortality rate was lower with streptokinase therapy (8.6%) as compared to without streptokinase therapy (40.6%), reporting strong association with significant p-value.

**Conclusion**

It can be concluded that Streptokinase is a best option as a reperfusion therapy in the patients of myocardial infarction as it lowers the mortality rate and the post MI complications.

**Keywords:** Ischemic heart disease, Myocardial infarction, Streptokinase therapy.

## Introduction

Myocardial infarction (MI) is globally considered as one of the most common emergency condition and is the leading cause of death worldwide specially in the individuals older than 60 years of age (1, 2). It usually occurs as a result of prolonged ischemia due to either thrombus formation or atherosclerotic plaque in the coronary artery. The prevalence of MI is increasing day by day because of multiple modifiable and non-modifiable factors like sedentary life style, unhealthy diet, genetics, increasing age hypertension and diabetes. Mortality rate due to MI is decreased 15-30% because of initiating coronary care units (CCU), it is further reduced up to 5-7% by using thrombolytic agents. Immediately reparses the blocked coronary artery either by percutaneous angioplasty or by thrombolytic agents can decrease the mortality rate (3, 4).

Myocardial infarction is a life-threatening condition which needs to treat on emergency basis. Percutaneous coronary angioplasty is the treatment of choice but if the situation is not favorable then fibrinolysis id the best option for myocardial infarction (5). Streptokinase is the most commonly used fibrinolytic agent worldwide because of its easy availability and ability to decrease the risk of serious morbidity and the mortality rate (6-8). Streptokinase as a thrombolytic agent is widely studied and there are multiple evidence to support its use but still many of the patients fail to get timely streptokinase reperfusion therapy and the most common reason behind this, is the delay in consulting physician after the occurrence of symptoms (9).

The effectiveness of thrombolytic therapy depends upon the time of presentation from the onset of symptoms like chest pain to the starting of treatment (10). Literature review revealed the effectiveness of streptokinase therapy if given in initial hours of the onset of symptoms without wasting time (8). Some of the side effects of streptokinase therapy has been also noted. The aim of the current study was to compare the outcome and complications of myocardial infarction with and without streptokinase therapy in a tertiary care hospital of Karachi.

## Material and Methods

A descriptive cross-sectional study was conducted in National Institute of Cardiovascular diseases (NICVD), Karachi from May to October 2021. Sample size was calculated by using OpenEpi

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calculator and was 400. All the patient of myocardial infarction within the age range of 30-70 years were included in the study. Myocardial infection was diagnosed on the basis of cardiac enzymes and elevated ST segment on ECG. Those patients were excluded who either have non-ST elevated MI or congestive cardiac failure or renal failure or past history of arrhythmias. Study participants were divided into two groups; those patients who presented within 6-hours of appearance of symptoms were included in Group-I and streptokinase (1500000/U) therapy was given while those in whom either streptokinase was contraindicated or presented late, were included in Group-II and no streptokinase therapy was given.

A self-designed proforma was used, consisting of demographic variables, history, physical examination and laboratory findings. Laboratory investigations carried out were complete blood count, fasting blood sugar, CK-MB level, serum urea, creatinine, lipid profile, chest x-ray, ECG's and echocardiography. The complications with and without streptokinase therapy and mortality rate was also noted on proforma. Patients were kept under observation till discharge or death.

Data was analyzed by using Statistical Package for Social Science (SPSS) version-20. Mean and standard deviation was calculated for numerical variables while frequency and percentages for categorical variables. Chi-square was used to find out the association of complication between two groups. p-value less than 0.05 was considered as significant.

## Results

The mean age of the study participants was 49.5 years with standard deviation of 8.7 years. The age range of study participants was 30-70 years. Majority of study participants were male (76.4%) and were smoker (40.2%). The most common co-morbidity among study participant was hypertension (79%) followed by diabetes (38.6%). About 32.1% of the patients were having family history of ischemic heart disease as mentioned in Table 1.

| Table 1 Characteristics of study participants | |
|---|---|
| Variables | n=420 (%) |
| Gender | |
| Male | 321 (76.4) |
| Female | 99 (23.6) |
| Co-morbidities | |
| Diabetes | 162 (38.6) |
| Hypertension | 332 (79) |
| Smoking | 169 (40.2) |
| Family history of heart diseases | 135 (32.1) |

Out of total 400 patients of ischemic heart disease, the 220 patients received streptokinase therapy and the most common complication after that was hypotension (32.7%) while 180 of the patients

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could not receive streptokinase therapy and the most common complication was left ventricular failure. Mortality rate was lower with streptokinase therapy (8.6%) as compared to without streptokinase therapy (40.6%), reporting strong association as p-value was significant as presented in Table 2.

| Table 2 Patients outcome with and without Streptokinase therapy | | | |
|---|---|---|---|
| Complications | Streptokinase group (n=220) | Non-Streptokinase group (n=180) | p-value |
| Left ventricular failure | 22 (10) | 49 (27.2) | 0.002* |
| Mitral regurgitation | 5 (2.3) | 11 (6.1) | 0.56 |
| Ventricular fibrillation | 9 (4.1) | 19 (10.6) | 0.49 |
| Atrial fibrillation | 3 (1.4) | 5 (2.7) | 0.27 |
| Complete heart block | 8 (3.6) | 13 (7.2) | 0.61 |
| Post MI angina | 6 (2.7) | 23 (12.7) | 0.001* |
| Re-infarction | 4 (1.8) | 7 (3.9) | 0.21 |
| Cerebrovascular accidents | 2 (0.9) | -- | 0.92 |
| Ventral septal defects | -- | 9 (5.0) | 0.03* |
| Hypotension | 72 (32.7) | 17 (9.4) | 0.005* |
| Death in hospital | 19 (8.6) | 73 (40.6) | 0.000* |

*significant p-value

## Discussion

The mean age in the current study was 49.5 ±8.7 years. Studies done previously by Taheri et.al. and Uddin F, having age range of 56.63 ±11.04 years and 55.79±13.11 years respectively (11, 12). The variation in the mean age of the study participants shows that the ischemic heart disease is switching to early age in the current region and this justification is favored by Sadegi et.al (13). Current study found male predominance (76.4%) which is also favored by Taheri et.al and Uddin F by reporting 61.67% and 75.0% respectively, of male patients of ischemic heart disease (11, 12). Current study found 32.1% cases with positive family history of ischemic heart disease while Uddin F reported 33.2% cases with acute myocardial infarction (12). Hypertension was the most common co-morbidity (79%) in the current study, followed by diabetes (38.6%). This is favored by Muhammad et.al by reporting 73.34% of hypertension and 36.67% of diabetes (9). Taheri et.al found decrease prevalence of co-morbidities in association with ischemic heart disease but still hypertension was more common (14.7%) than diabetes (8.7%) and hyperlipidemia (1%) (11). In contradictory to current finding, Uddin F et.al. reported that diabetes is more prevalent (40.6%) than hypertension (37.1%) in association with ischemic heart disease (12). About 40.2% of patients with ischemic heart disease, were smoker, other studies found 35% and 59.4% smokers (9, 12).

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Current study reported lower mortality rate with streptokinase therapy (8.6%) as compared to without streptokinase therapy (40.6%), having significant p-value. Similar results have been reported by Muhammad et.al, he found 6.6% deaths in patients after streptokinase therapy and 31.6% without streptokinase therapy (9) while Uddin F et.al. reported 8.7% and 20.5% with and without streptokinase therapy respectively (12). Current study also reported that the most common complication after streptokinase therapy was hypotension (32.7%) while those who could not receive streptokinase therapy, the most common complication was left ventricular failure (27.2%). Same findings are reported by Rahman et.al (14). Literature review revealed that hypotension is the side effect of streptokinase therapy in patients of ischemic heart disease (15). Multiple studies have been going on since 1970 to find out the underlying mechanism of streptokinase induced hypotension. The postulated hypothesis for streptokinase induced hypotension is decreased total peripheral resistance and vasodilation by complement activation. Another theory states that streptokinase increases the anaphylatoxin level which leads to decrease in blood pressure. Few other mechanisms are also under consideration including streptokinase directly induce the hypotension or Plasmin activated the factor XII which further activates the prostaglandin-kallikerin system or endothelial lining secretes prostacyclin under the influence of FDP or immune reaction against antigenic property of streptokinase (16).

Current study reported a strong association of streptokinase therapy with left ventricular failure, post-MI angina and ventral septal defect with significant p-values. The current finding is also favored by other studies (9, 12). One of the most common side effect noted in literature is hemorrhage after streptokinase therapy but in the current study the bleeding disorders were not reported. The reason behind this might be the younger age group patients in the current study, secondly the bleeding disorders are more common in the combination therapy, including heparin and streptokinase (14). Studly limitations include small sample size and a single-centered study.

## Conclusion

It can be concluded that Streptokinase is a best option as a reperfusion therapy in the patients of myocardial infarction as it lowers the mortality rate and the post MI complications.

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