

EFFICACY OF THROMBOLYTIC THERAPY WITH STREPTOKINASE IN DIABETIC AND NON-DIABETIC PATIENTS AGED 40-70 YEARS PRESENTING WITH ACUTE ST-SEGMENT ELEVATED MYOCARDIAL INFARCTION IN TERTIARY CARE HOSPITALS KPK PESHAWAR.

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Abstract

Background: Myocardial infarction is one of the most prevalent types of coronary artery disease. It is the leading cause of mortality and morbidity worldwide. Myocardial infarction is classified into two types based on ECG findings that are ST ST-segment elevation myocardial infarction (STEMI) and non-ST-segment elevation myocardial infarction (NSTEMI). Among the risk factors for myocardial infarction, diabetes mellitus is one of the major factors showing a strong association with myocardial infarction.

Objectives: This study was conducted to study how diabetes mellitus affects the efficacy of streptokinase used for thrombolysis in a tertiary care hospital (STH Swat and LRH Peshawar).

Methods: This study was conducted in the Institute of Paramedical Sciences (KMU), Peshawar, and the Cardiology department of Tertiary Care Hospitals (Saidu Teaching Hospital and Lady Reading Hospital). The

research was carried out from June to November 2023. (6 months). This Descriptive

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cross-sectional study was conducted using a predesigned self-structured questionnaire. The gathered data were analyzed through SPSS version 22.

Result: Total 166 patients were studied n= 68(40.96%) were diabetic and n=98(59.0%) were non diabetics. Among the diabetics n=51(75%) streptokinase shows less than 50% depression and n=17(25%) shows greater than 50% depression. Among the non-diabetic n=70(71.4%) streptokinase shows Greater than 50% depression and n=28(28.5%) shows less than 50% depression. So the effectiveness of streptokinase in diabetics was 25% and those in non-diabetics were 71.4 %. Chi-square test shows a p-value of <0.001, which shows a significant difference between the efficacy of streptokinase in diabetic and Non diabetic patients.

Conclusion: This study shows that the efficacy of streptokinase in diabetic patients presenting with acute ST elevation myocardial infarction is less than in non-diabetic patients presenting with acute ST elevation myocardial infarction.

Introduction

Myocardial infarction (MI) is a clinical condition characterized by the irreversible necrosis of a segment of the myocardium due to prolonged ischemia, typically caused by the occlusion of a coronary artery. (1) Myocardial infarction is the most prevalent type of coronary heart disease. When a coronary artery is completely blocked or nearly blocked, it results in a substantial reduction in blood flow, which causes some of the heart muscle it supplies to become infarcted. (2) The most severe clinical manifestations of CAD and one of the life-threatening coronary events associated with SCD is myocardial infarction. (3) MI is the leading cause of mortality and morbidity in the globe. MI is now occurring more often in developing nations(4)

Every sixth mortality in the US in 2010 was attributed to CAD alone. A wide range of clinical entities known as atherosclerotic CAD, such as asymptomatic subclinical atherosclerosis and its medical consequences, such as angina pectoris, MI, and SCD (5). In addition to being the main cause of mortality and disability in Western culture, this illness is predicted to overtake all other causes of death(6)

The prevalence of CHD is rising globally, despite geographical differences brought on by economics, industrialization, and improvements in the healthcare system. According to American data, heart disease is thought to be a contributing factor in 25 percent of deaths there each year. Every 60 seconds, an American passes away from MI. MI is the second leading cause of death in China. The World Health Organization estimates that CHD caused 7.4million deaths worldwide in 2015. In low and middle-income nations, CHD is to blame for 80 percent of fatalities(2)

In the US, there are 550,000 new cases of MI per year, according to estimates. In 2013, 116,793 Americans experienced a fatal MI, with 57% of men and 43% of women being the victims. Men and women experience their first MIs on average at 65.1 and 72 years old age respectively. A MI with ST-segment elevation occurs in about 38% of patients with ACS who are admitted to the hospital(7)

Based on the electrocardiogram (ECG) findings, myocardial infarctions can be classified into two types: ST-segment elevation myocardial infarction (STEMI and non-ST-segment elevation myocardial infarction (NSTEMI).

The ECG trace is used to distinguish between A STEMI and NSTEMI . Trans mural ischemia or ischemia involving the entire thickness of the myocardium causes STEMI. In the majority of STEMI instances, a blood clot that formed on a coronary atherosclerotic plaque causes an epicardial coronary artery to completely occlude, resulting in transmural myocardial ischemia. When a patient has chest pain, discomfort, and persistent ST elevation in two or more contiguous leads, STEMI is suspected. (1)

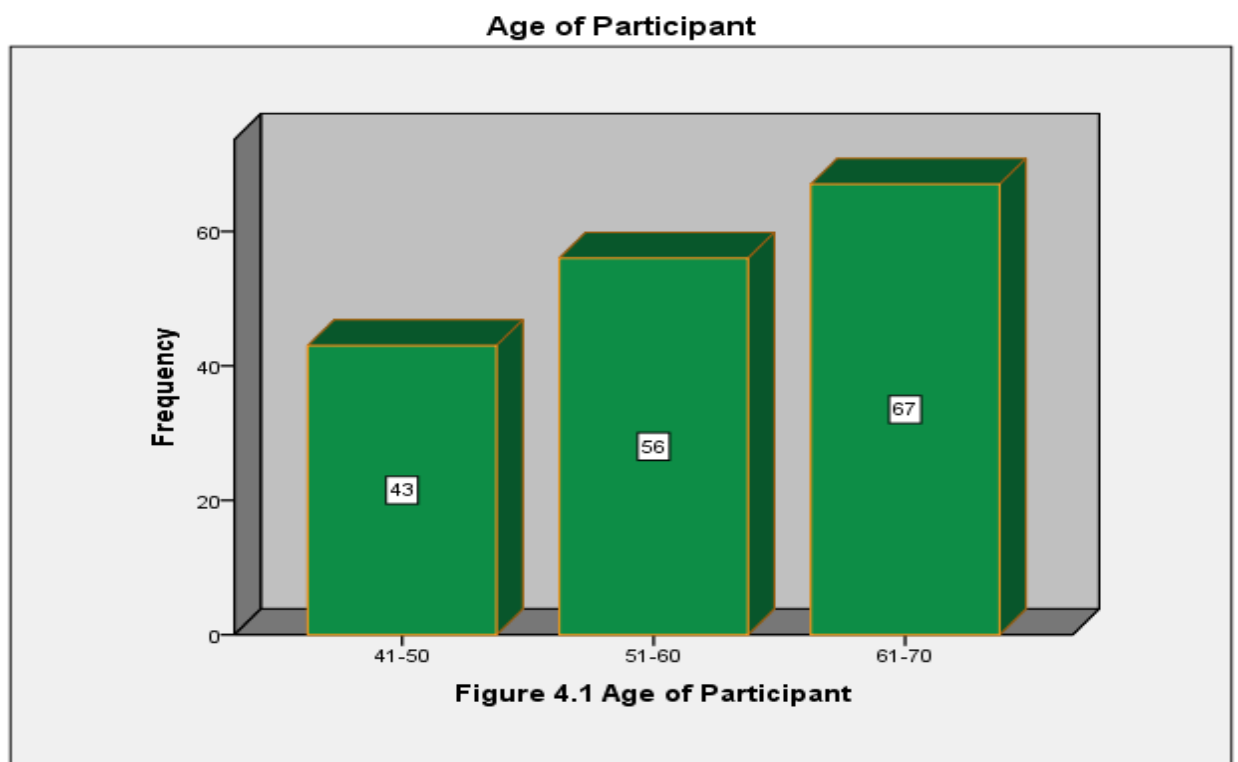
MATERIALS AND METHODS

The study was designed to assess the **Efficacy of Thrombolytic Therapy with Streptokinase in Diabetic And Non-Diabetic Patients Aged 40-70 Years Presenting With Acute segmental elevated Myocardial Infarction**. To avoid any kind of inconvenience, ethical approval was taken from the Clinical Research Ethics Committee of the Institute of Paramedical Sciences (KMU), Peshawar, which gave its approval to this study of Tertiary Care Hospital (LRH and Saidu Teaching Hospital) for the collection of data. The study was conducted from June 2023 to November 2023. (6) months. The data was collected from 166 patients. The sampling was conducted through non-probability convenience sampling. The sample size by open EPI www.openepi.com with: Confidence Interval = 95%, Level of significance = 5%, Anticipated frequency of ASTEMI = 12.4%. A questionnaire was used to gather the information. Patients with ASTEMI, both diabetic and non-diabetic, were included. Name, age, and gender were among the demographic details mentioned. We also took into account family history of MI, hyperlipidemia, obesity, and smoking as risk factors. Only patients between the ages of 40 and 70 were included in the study. The data was collected randomly from patients to abolish the bias and develop the study effectively.

The collected data were analyzed by using SPSS version 22. To calculate descriptive statistics, frequency, percentage, means, and standard deviation were used. Pie charts, frequency tables, and histograms were used to illustrate the data.

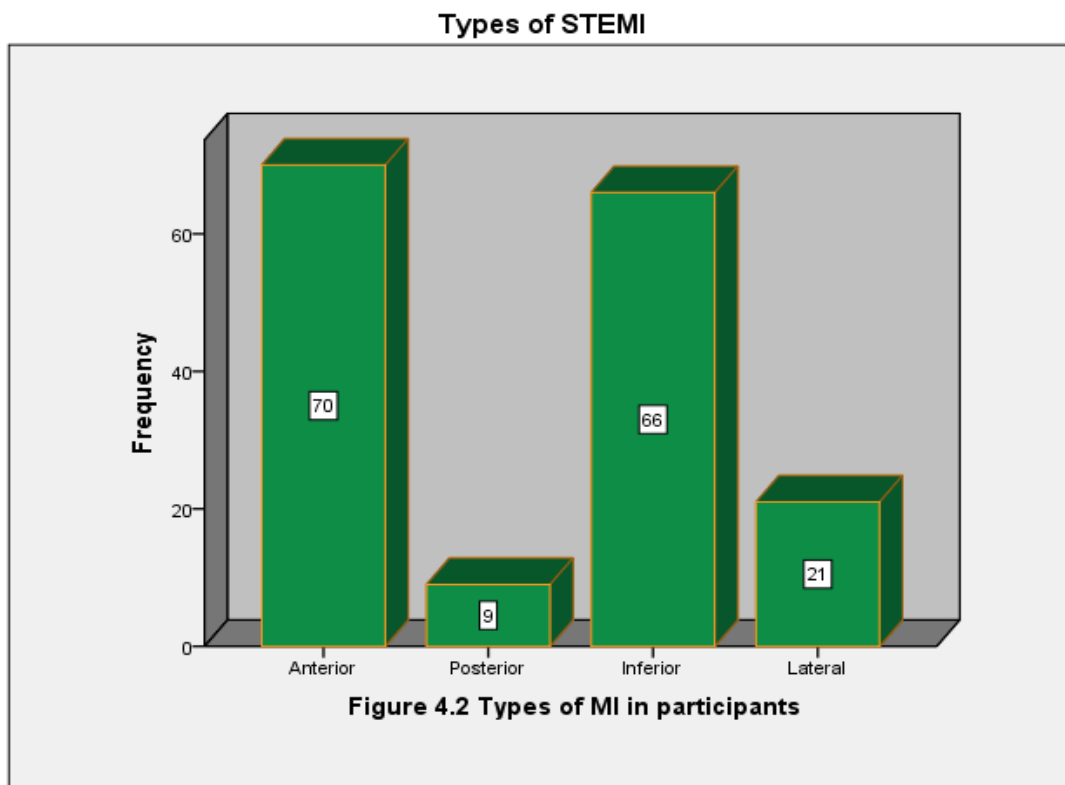
RESULTS

Variables from this study were entered into SPSS version 22 for analysis. 166 acute STEMI patients made up the study sample. Patients who met our inclusion criteria and were in the 40 to 70 years age range were selected for this study from Khyber Pakhtunkhwa Saidu Teaching Hospital. The ratio of men to women was high, with 69 women making up 41.6% of the total sample and 97 men making up 58.4%. We categorized age into three groups, i.e, 41 to 50 years n=43 (25.9%), 51 to 60 years n=56 (33.7%), and 61 to 70 years n=67 (40.4%) as shown in Fig. 4.1.



In the current study, 96 (57.8%) of the participants came from rural areas, while 76 (42.2%) came from urban areas. Of the total sample, n=68 (40.9%) were diabetic, while n=98 (59.03%) were non diabetic. The majority of patients with diabetes, n=51 (30.7%), were type 2 diabetics, whereas type 1 diabetics made up n=17 (10.2%). n= 42(25.5%) of the 166 people in the sample didn't have hypertension, while n=124 (74.7%) did have it. N=39 (23.5%) participants were smokers, whereas n=127 (76.5%) participants were nonsmokers. n=156 (94%) had a normal lipid profile, and n=10 (6%) had hyperlipidemia. The study sample consisted of n=127 (76.5%) without a family history of myocardial infarction and n=39 (23.5%) with myocardial infarction.

The data we collected were based on changes in ECG leads, which were categorized into four different types: anterior, posterior, inferior, and lateral STEMI. The number of patients with anterior STEMI was n=70 (42.2%), posterior STEMI was n=9 (5.4%), inferior STEMI was n=66 (39.8%), and lateral STEMI was n=21 (12.7%). The proportion of anterior STEMI patients was high among these four types, as shown in Figure 4.2.



Variables		Frequency (f)	Percentage (%)
Age of participants	41-50 years	43	25.9
	51-60 years	56	33.7
	61-70 years	67	40.4
Gender of participants	Male	97	58.4
	Female	69	41.6
Location	Urban	70	42.2
	Rural	96	57.8
Diabetes	Yes	68	40.9
	No	98	59.03
Types of diabetes	DM type 1	17	10.2
	DM type 2	51	30.7
	NO	98	59.03

Hypertension	Yes	124	74.7
	NO	42	25.3
Smoking	Yes	39	23.5
	NO	127	76.5
Hyperlipidemia	Yes	10	6.0
	NO	156	94.0
Family history of MI	YES	39	23.5
	NO	127	76.5

Table 4.1 Baseline characteristics of study participants: their frequencies and percentages.

The patients n=166 were presented with acute STEMI who were diagnosed based on ECG following the administration of streptokinase therapy (no contraindication for SK therapy) repeat ECG was performed after 60 minutes. The changes observed in patients n=79 (47.6 %) show less than 50% ST segment depression, and n=87 (52.4%) show greater than 50% depression.

We use the chi-square test ($X^2=34.695$, $P < .01$) to determine the association between two categorical variables, diabetes (independent variable) and streptokinase (dependent variable) gives a noteworthy outcome. Among diabetics, n=51 (75%) show less than 50% depression, while n=17 (25%) show greater than 50% depression. Of those without diabetes, n=28(28.5%) have a depression level lower than 50% while n=70 (71.4%) had a depression level higher than 50% as shown in Table 4.2, and for more details, see Figure 4.3:

Diabetes		ST-segment depression		X^2	P value
YES	68(40.9%)	>50%	17(25%)		
		<50%	51(75%)		
NO	98(59.03%)	>50%	70(71.4%)		
		<50%	28(28.5%)		

Table 4.2 ST-segment depression on ECG in diabetic and non-diabetic participants

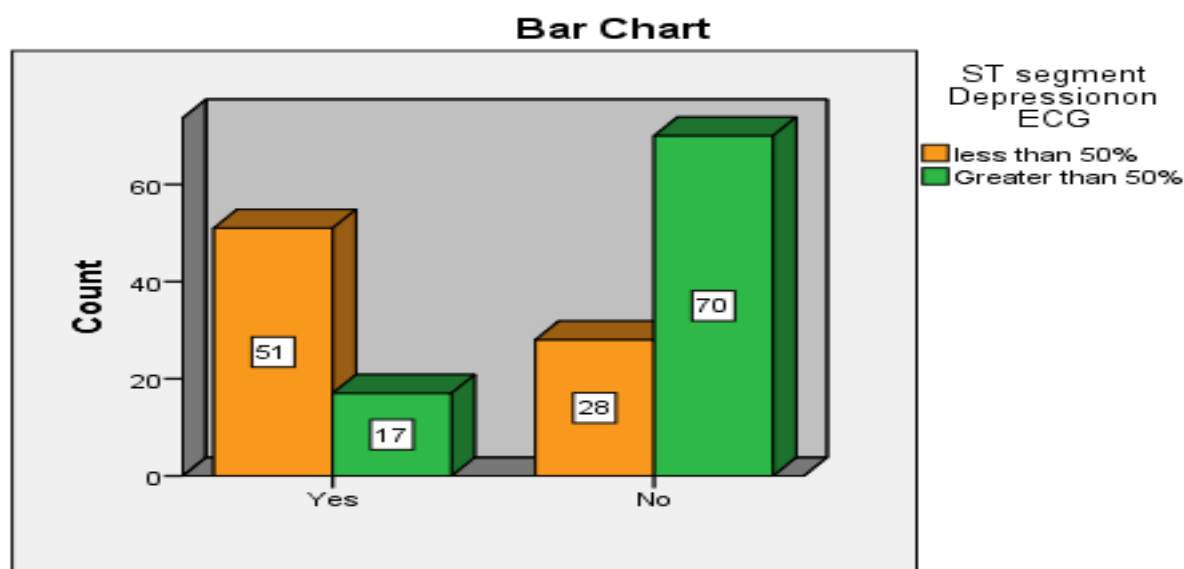


Figure 4.3 ST segment depression on ECG in diabetic and non diabetic participants

DISCUSSION

One of the leading causes of mortality and morbidity in the globe is acute myocardial infarction (AMI). Every year, a heart attack is identified in 10% of patients who are hospitalized with chest symptoms in emergency rooms. (8) The sudden ischemic death of cardiac tissue is known as a myocardial infarction. In a clinical setting, thrombotic blockage of a coronary channel brought on by the rupture of a weak plaque typically results in myocardial infarction (9)

The most severe form of coronary artery disease, which accounts for more than 2 million fatalities yearly in the USA, more than 4 million deaths annually in Europe and northern Asia, and more than a third of deaths worldwide, is acute myocardial infarction. The mortality rate from coronary heart disease has significantly decreased in recent decades as a result of increased use of evidence-based medicines and lifestyle modifications. However, myocardial infarction continues to have a significant impact on global health, impacting more than 7 million people annually. Congruently, it has a significant economic impact; in 2010, myocardial infarction caused more than 1 million hospital admissions in the US, with estimated direct expenses of at least US\$450 billion. (10)

Pakistan is a South Asian nation in development with a population of more than 187 million. Pakistan's rural residents, who make up the majority of the country's population (67.5%), are the ones who suffer from heart disease the most. According to the Framingham research, smoking, diabetes mellitus, hypertension, and hypercholesterolemia were the main risk factors for the development of CHD. Another study revealed that Pakistan had a significant incidence of MI risk factors, with the disease affecting more than 30% of the population over the age of 45. (11)

One of the most common chronic non-communicable diseases, type 2 diabetes mellitus (T2DM), has seen a considerable rise in prevalence throughout the world. Adults with adult T2DM made up 8.8% of the global population as of 2017, and this percentage is anticipated to rise to 9.9% by 2045. T2DM and its consequences are having a substantial impact on human life and have emerged as a significant global public health issue due to the rise in cases.

The main cause of death in T2DM patients is myocardial infarction (MI), and those with T2DM who have never had coronary artery disease (CAD) have the same risk of major coronary events as those who have CAD, with a >20% risk of having their first MI within 10 years of developing T2DM and a risk of having their second MI within 10 years in non-T2DM patients with a history of MI. (12)

The discovery that acute myocardial infarction (AMI) is usually accompanied by thrombotic coronary artery blockage in its early stages is the basis of current treatment for AMI with ST-segment elevation. Plasminogen activators, which activate the fibrinolytic system, are administered intravenously as part of one method of treating occlusive thrombosis. This method involves pharmacologically dissolving the blood clot. Plasminogen is converted by fibrinolytic agents into the active enzyme plasmin, which then breaks down fibrin into soluble breakdown products. (13)

According to (14), A study was conducted to examine the thrombolytic effects of streptokinase in myocardial infarction patients with and without diabetes. Among the 187 study participants who were hospitalized in the coronary care unit with an acute ST-segment elevation myocardial infarction, 126 patients did not have diabetes, while 61 patients did. All patients received streptokinase treatment. After 90 minutes of streptokinase injection, the raised ST segment was assessed for resolution (reduction). Non-diabetic patients had significantly greater rates of successful reperfusion (70% ST resolution) than diabetic patients (p 0.001), whereas diabetic patients had significantly higher rates of failure reperfusion (30% ST resolution). (44) According to our study, we examined 166 patients. After administering streptokinase therapy,

ST-segment depression less than 50% was noted in n=79(47.6%) and greater than 50% was noted in n=87(52.4%) participants. Among the diabetic n=17(25%) shows greater than 50% depression and n=51(75%) shows less than 50% depression. Among the non-diabetics n=70(71.4%) shows greater than 50% depression and n=28(28.5%) shows less than 50 % depression.

In light of this, it can be inferred that diabetes mellitus may affect how well patients with acute myocardial infarction respond to thrombolysis.

STUDY LIMITATIONS

The first limitation of this study was a small sample size, primarily stemming from resource and time constraints. It was conducted within a hospital setting, which inherently restricts its ability to generalize to the broader population. Secondly, some of the data were gathered by fellow researchers as part of a collaborative effort. The third limitation was the exclusive use of data from a single hospital for the study.

CONCLUSION

This study found that the streptokinase was less effective in diabetic patients compared to non-diabetic patients when treating acute STEMI. Additionally, the study observed that streptokinase therapy resulted in similar complications in both diabetic and non-diabetic patients.

RECOMMENDATION

In the context of our research, it is highly advisable to delve into contemporary methodologies, specifically focusing on metabolic control in diabetic patients and primary percutaneous intervention. By conducting investigations in these areas, we can contribute to the enhancement of post-myocardial infarction and thrombolysis outcomes for individuals with diabetes. These strategies represent innovative pathways that hold the potential to significantly improve patient prognosis, and therefore, they warrant exploration in our study's recommendations.

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