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A STUDY OF FACTORS INFLUENCING THE OUTCOME OF THROMBOLYSIS IN ACUTE MYOCARDIAL INFARCTION

General Medicine

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ABSTRACT

Background and Objectives: Coronary heart disease is defined as "heart function impairment caused by insufficient blood flow to the heart compared to its needs, caused by obstructive changes in the coronary circulation to the heart." It is the cause of 25-30% of deaths in the majority of developed countries. **Material And Methods:** The study was carried out in the coronary care unit of a tertiary care centre. The study was done over a period of one year from 2019 to 2020. This is an observational prospective cohort study of streptokinase-treated patients with acute myocardial infarction. **Results:** A total of 80 cases were analysed and their ages raged from 31 to 76. 20 were hypertensives and 20 were diabetics. There were 68 men and 12 women. 44 patients were smokers, 29 were alcoholic. Pre-infarction angina affected 23 patients. There were 47 cases with anterior wall infarction and 33 cases with inferior wall infarction. **Conclusion:** The overall success rate of thrombolysis in this study was 53%. Cases with anterior wall myocardial infarction exhibited a statistically significant higher success rate than inferior wall myocardial infarctions. Smokers had a lower success rate than nonsmokers, although the difference was not statistically significant.

KEYWORDS

Thrombolysis, myocardial infarction, streptokinase

INTRODUCTION

Coronary heart disease can be defined as an impairment of heart function due to inadequate blood flow to the heart, caused by obstructive changes in the coronary circulation. It is responsible for around 25 and 30 percent of all deaths across the board in most affluent countries [1, 2]. In addition, it poses a significant threat to the nation's overall public health. The World Health Organization has identified it as a "modern epidemic. The rising incidence of coronary heart disease can be partially attributed to a number of factors, including an increasingly sedentary lifestyle, diet high in saturated fat and meat, an aging population, and the comforts of modern life [3-5].

In 1912, Herrick was the first person to postulate that thrombotic occlusion of the coronary artery was the cause of downstream necrosis of heart muscle. His groundbreaking autopsy work on persons who had suffered from Acute Myocardial Infarction(AMI) provided the basis for this hypothesis and was supported by the findings of angiographic examinations that were carried out within the first few hours following an acute coronary episode [6, 7].

This ushered in a new era of thrombolytic therapy for acute myocardial infarction, pushing researchers to study various thrombolytic approaches for treatment. Many successful treating medications were obtained from large-scale studies conducted at multiple centres which included use of streptokinase, recombinant tissue plasminogen activator (rtPA), Reteplase (rPA), urokinase and APSAC (Anisoylated plasminogen streptokinase activator complex). In both the GISSI and the ISIS-2 investigations, researchers discovered that early administration of streptokinase resulted in lower rates of fatality. Intravenous streptokinase in Acute Myocardial Infarction(ISAM) study group, is yet another trial that demonstrates the efficacy of thrombolytic drugs in reducing mortality rates [8-10].

The success rates of thrombolysis, and consequently the overall mortality is variable owing to different factors. Thrombolytic therapy has contributed to a significant advancement in the treatment of acute myocardial infections in recent years. The GUSTO angiographic sub study indicated that after 90 minutes of treatment with IV streptokinase and Heparin, there was a success rate of 54% [11, 12].

Thrombolytic therapy is successful in lowering both death and morbidity rates. Despite this, thrombolytic therapy has proven fruitless for a sizeable portion of the individuals who have undergone it. It is crucial to have a solid understanding of what factors contribute to unsuccessful thrombolysis.[13]In light of the aforementioned information, we have conducted a study in AMI patients who were receiving streptokinase in the coronary care unit. The objective of this study was to ascertain the influence of various factors on success of effective thrombolysis procedures and establish whether or not these factors determine the efficacy of thrombolysis.

MATERIALS AND METHODS

This is an observational prospective cohort study carried out in coronary care unit in a tertiary care unit over a period of one year from 2019 to 2020 and included a total of 80 patients.

Inclusion Criteria

- Patients with ECG findings of acute myocardial infarction;
- The requirement for thrombolysis is 2 mm;
- The time window for initiating thrombolysis is 12 hours.

Exclusion Criteria

- Recurrent Myocardial infarction cases.
- Patients with Bundle branch block.
- Patients with pericarditis

RESULTS

80 cases were analysed and their ages raged from 31 to 76. 20 were hypertensives and 20 were diabetics, and there were 68 men and 12 women. 44 patients were smokers, 29 were alcoholic. Pre-infarction angina affected 23 patients. There were 47 cases with anterior wall infarction and 33 cases with inferior wall infarction. Statistical analysis was done and odds ratio with logistic regression and 95% Confidence interval(C.I) was calculated. Statistical significance was assessed using fisher's exact test and Chi square (X^2) test to calculate the P value.

Table 1: Thrombolysis Outcome Of Study Population In Relation To Clinical Details

Sr. No.	Variables	Success	Failed
1.	Total Number	42	38
2.	Males	35	33
3.	Females	8	4
4.	Hypertension	12	8
5.	Diabetes	11	9
6.	Smoking	23	21
7.	Drinking	21	8
8.	Preinfarction angina	10	13
Time window			
9.	0 - 4 hrs	20	11
10.	4 - 8 hrs	21	19
11.	8 - 12 hrs	1	8
Age group			
12.	< 60 yrs	29	17
13.	> 60 yrs	14	20
Infarct location			
14.	Anterior wall infarct	21	26
15.	Inferior wall infarct	25	8

Table 2: Analysis Of Affecting Factors Using A Single Variable

Sr. No.	Variables	Odds Ratio (OR)	95% C.I
1.	Age < 60 years	2.4	0.9-6.04
2.	Gender	1.8	0.5-6.8
3.	Pre infarction angina	0.6	0.2-1.5
4.	Diabetes	1.1	0.4-3.15
5.	Hypertension	1.5	0.5-4.19
6.	Smoking	0.9	0.4-2.3
7.	Drinking	3.75	1.39-10.06
8.	Infarct location	0.25	0.96-0.69

Table 3: Chi square (X^2) Test And P Value

Sr. No.	Variables	P value	Comment
1	Age < 60 yrs	0.70	Not significant
2	Gender (female)	0.36	
3	Pre infarction angina	0.3	
4	Diabetes	0.79	
5	Hypertension	0.4	
6	Smoking	0.96	
7	Drinking	0.008	Significant (P <0.05)
8	Infarct location(anterior wall)	0.006	

DISCUSSION

Success of thrombolysis was found to be more likely in patients with anterior wall MI compared to those with inferior wall MI. Similar findings were noted by Peter Berger and Thomas Ryan et al in their study and they found that patients with inferior infarction complicated by heart block, concomitant precordial ST-segment depression, and RV involvement have larger infarctions and a worse prognosis than patients without these features. The effect of thrombolysis on these high-risk groups is not well known, however larger infarctions benefit the most from acute re-perfusion and patients in these high risk subgroups may be particularly good candidates for thrombolytic therapy[13, 14]. This could be attributed to physiology of right coronary artery , which receives blood flow during both the systolic and diastolic phases and blood flow in the left coronary artery during systole is minimal. In cases with increased micro vascular tone and left ventricular hypertrophy, this may be reversed[15, 16].

Myocardial oedema is also greater in anterior infarctions due to the greater amount of necrosis and low perfusion rate in the anterior wall. This could be reduced by improved medication delivery to the right coronary artery and increased fibrinolysis by extended contact between streptokinase and thrombus [17, 18].

Positive results from thrombolytic therapy have been seen in alcoholic patients in our study. Researchers Eric. B. Rimm, Paige William, Kerry Fosher, et al. conducted a meta-analysis assessing the effects of moderate alcohol intake on concentrations of HDL cholesterol, apolipoprotein A1, fibrinogen, triglycerides, and other biological markers and found that drinking 30g of alcohol per day would reduce the risk of coronary artery heart disease by an estimated 24.7%. [19-21].

The impact on platelets has also been demonstrated and platelet aggregation in response to agonists such as thrombin, ADP, epinephrine, and collagen is inhibited by alcohol. In contrast, those who engage in binge drinking or who are recovering alcoholics show a dramatically enhanced reaction to aggregation, particularly that caused by thrombin. Blood fibrinogen levels are known to drop after ethanol use.[22, 23].

The success rate of thrombolysis was not different between the diabetic and non-diabetic populations in this investigation. The re-perfusion rates of thrombolysed diabetic patients were reported to be lower by Gray RP, Yudkin JS et al. Increased fibrinogen, factor VII, and Von Willebrand factor levels in the blood indicate that diabetes is a pro-thrombotic state. [24, 25].

However, fibrinolysis is severely suppressed in people with type II diabetes, as they have elevated levels of plasminogen activator inhibitor I. Despite this, diabetics with Acute Myocardial Infarction should undergo thrombolytic therapy. Patients with Acute Myocardial Infarction who had pre infarction angina within seven days of the acute event responded more quickly to thrombolysis, as shown by angiographic evidence by Andreoti, Felicita; Vincenzo, P. et al. [25-27].

Pre infarction angina patients may require continuous ST segment monitoring to prove early patency. Smoking has no bearing on how well thrombolysis works. At 90 minutes, the patency rates of smokers and nonsmokers were found to be equivalent. Young smokers were more likely to have thrombosis of a less significant atherosclerotic plaque, inducing a hypercoagulable condition that promotes coronary thrombosis, by raising blood haematocrit, fibrinogen, and platelet levels. Fibrinolytic activity is also reported to be lower in smokers compared to non-smokers [26, 27].

Better patency rates were seen in the evening, as shown by Eugene Braunwald et al., suggesting a diurnal shift in the efficacy of thrombolytic therapy. This occurs because PAI-I levels in the blood rise to their maximum point of the day around sunrise. Patients who had thrombolysis within 4 hours of experiencing symptoms had a 64% success rate. When thrombolysis was performed after 4 hours but before 8 hours following the beginning of symptoms, the success rate dropped to 55%. When streptokinase was given after 8 hours but before 12 hours, the success rate dropped to 30% [27-29].

CONCLUSION

Overall, thrombolysis was shown to have a 53% success rate in this study. Myocardial infarctions in the anterior wall responded better than those in the inferior wall in this study. There was more success rate in patients who were alcoholic compared to those who dint drink. There was lower success rates among those who smoke and hypertensive. Those above the age of 60 had a slightly lower response rate, yet this finding lacked statistical significance. The presence of angina prior to the infarction did not decrease the effectiveness of thrombolysis.

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Conflict Of Interest
None

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