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STUDY OF ASSOCIATED RISK FACTORS IN PATIENTS WITH ACUTE ST ELEVATION MYOCARDIAL INFRACTION AND COMPLICATIONS OF STREPTOKINASE THERAPY

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ABSTRACT

The aim of current work was to evaluate the adverse drug reaction (ADRs) induced by streptokinase and its related risk factors in acute ST elevation MI (STEMI) patient. In the present study period, 129 patients were taken for study who received streptokinase. The majority of patients (n = 125) were occur ADR and because of cardiac causes out of 129 patients 10 patients were died in-hospital. The most serious ADR was paralysis n= 24(7%) dyspnea = 12 (3%)**,** hemiplegia n = 9(3%)**,** aphasia n= 6(2%), and abdominal pain n = 56(16%). It is concluded that the history of smoking is the main risk occurring acute MI also higher rate of abdominal pain was related to streptokinase therapy in Indian population.

KEYWORDS: Streptrokinase, Adverse drug reaction, ST elevation myocardial infraction, Risk factors, myocardial infraction.

INTRODUCTION

Cardiovascular disease (CVD) is an abnormality of heart. It reduces the availability of oxygen to all parts of the body and causes serious problems. Due to the progression of atherosclerosis leads to the CVD and CHD.[4]

Myocardial infarction (MI) is the cause due to the atherosclerosis. Atherosclerosis is caused by deposition of cholesterol and fatty materials in arteries walls. These fatty plaques grow and harden the arteries lead to the narrowing the size. In myocardial Infarction necrosis of heart muscle occur due to the obstruction in the coronary artery. Further leads to heart attack and can be identified patient's history and ECG.[4]

In the worldwide the acute STEMI comprises 25% - 40% of MI a main causes of morbidity, mortality. Streptokinase is a metabolic product of beta-hemolytic streptococci which convert plasminogen to plasmin.[1] Streptokinase into the blood can be lead to severe anaphylactic responses mostly because of the level of the anti-streptokinase antibodies in blood.

Streptokinase is used as a thrombolytic drug and later was used in treatment of MI, pulmonary embolism and emphysema. Its low cost and affordability is used in developing country and whereas most of the developed country are presently using tissue plasminogen activator. Malaise, headache, arthralgia and febrile responses are the main side effects of streptokinase. Many study mention reduced mortality in MI patients when administered before 3 to 4 hours of onset of symptoms like chest pain and given by both route intravenously and intra coronary. STEMI is defined as ST elevation on ECG, that is the electrical manifestations of pathophysiological changes after thrombotic occlusion of an epicardial coronary artery.[3]

It is reported in studies that showed that streptokinase given to in MI preferred over coronary angioplasty for most patients because of short time in treatment. Moreover, it is reported that the protection of the left ventricular function can be done by administration of streptokinase before one hour onset of MI followed by angioplasty of the infarct artery. Worldwide anxiety, depression, stress, sleep disturbance and socioeconomic status in both sexes is the main risk factor of cardiac diseases. Health education and in the view of the importance of psychosocial risk factors can prevent the MI.[2]

Because of the severe condition in MI patient and complications of STK therapy, the present work was to determine the ADR induced by STK therapy and its associated risk factors in patients with STEMI.[1]

MATERIALS AND METHODS

Study design

- Six months cross sectional study on the patients with acute MI.

Source of study population

- The patients admitted in ICCU department or in wards of Medicine department, GMCH, Aurangabad.

Sample size

- 129

Inclusion criteria

- The patients age above18 years with a diagnosis of acute STEMI and receiving streptokinase.

Exclusion criteria

- Patients with the following conditions is excluded: congenital heart disease, acute or chronic kidney and liver disease, pregnant women and patients not able to continue the study, intracranial tumor, and prior intracranial hemorrhage, suspected aortic dissection, active internal bleeding.

STUDY PROCEDURE

The study was conducted in Medicine department of GMCH, AURANGABAD related risk factors in patients with acute STEMI and complications of streptokinase therapy. The study period was from Nov 2019 to Feb 2020. All the information of patients was kept confidential. 129 patients with aged between 30-80 years were prospectively enrolled with STEMI. All the selected study subject was informed and written consent was taken with no conflict of interests and no funding was received for this study.

The eligible patients received 1.5 million units of streptokinase intravenously in normal saline over one hour by doctors in the ward of GCHC. Patients were meticulously monitored during streptokinase administration. Blood samples were investigated for hematological and biochemical investigations by permission of doctors and nurses in the ward.

The laboratory tests results were recorded (BSL, BCL, raised cardiac enzymes) in patients with STEMI. The patients were discussion for detection of psychosocial risk factors leading to MI.

Depression is a state of low mood and aversion to activity that can affect a person's thought, behavior, feelings and physical well being. Generalized Anxiety Disorder is a psychological and physiological state characterized by somatic, emotional, cognitive and behavioral components. Smokers were those who smoked cigarettes, shisha (water-pipe) and/or cigars at least once a day were defined as smokers.[2]

7. RESULTS AND DISCUSSION

During the six month study period, 129 patients who received streptokinase were taken in the study. In the study, according to gender distribution the majority of patients were male (n = 102, 78%) and females are 22% (n=29). The gender distribution is shown in chart 1.

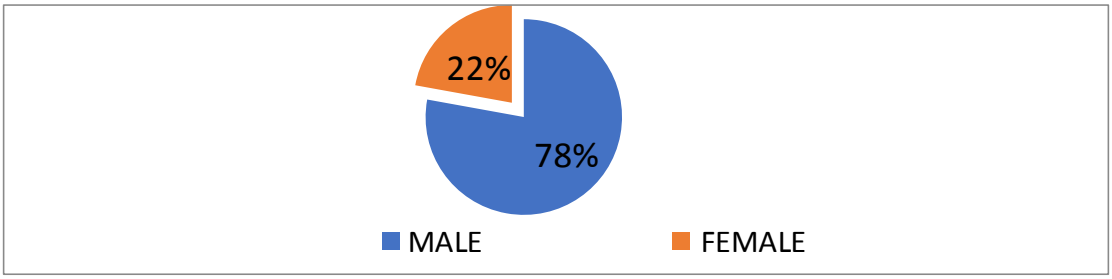


Chart 1: **Gender Wise Distribution.**

According to the age the maximum number of patients was between 60-69 age groups and older are shown in chart 2. From this report it observed that elder ages population are mainly affected with acute STEMI. In study, 60.5 ± 12 years was mean age of study population. In throughout the study around 20 patient's death is occurred and maximum were higher age.

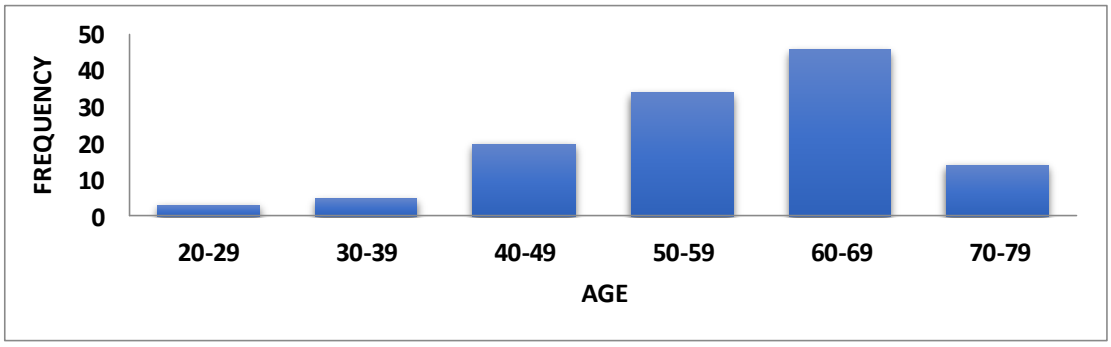


Chart 2: Age Wise Distribution.

In this study it was observed that 16 % of patients showed a anterior MI, 24 % Inferior MI, 3 % infero lateral MI, 23 % anterolateral MI, 18% anteroseptal, and others type of MI are 23%, respectively. The MI types obtained data are shown in chart 3.

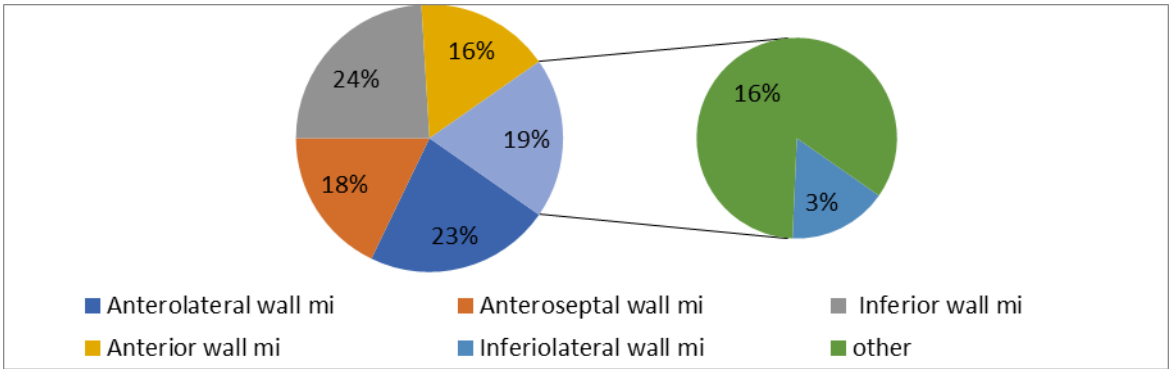


Chart 3: Type Wise Distribution.

Further, the number of ADRs experienced by patients was between 0 and 9. In average, each patient experienced 3.18 ± 1.2 ADRs. Furthermore, the incidence of ADRs between females and males were 3.06 versus 3.27 indicating the higher rate of ADR (0.20 times more) among male patients.

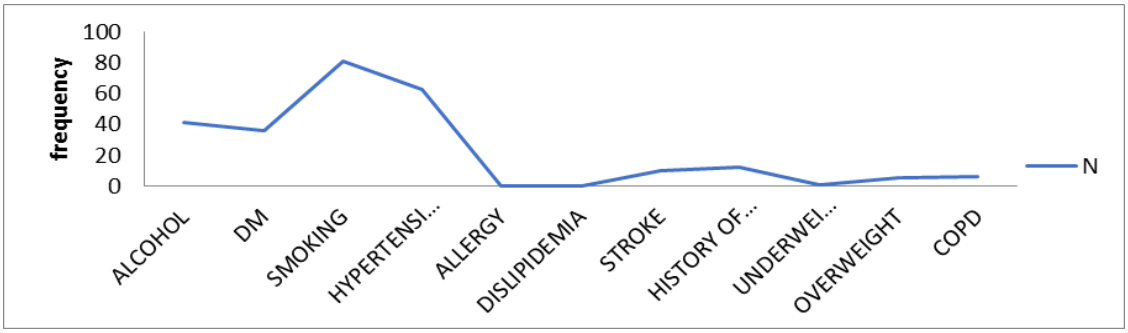


Chart 4: Risk factors.

In the study it was observed that the main risk factor was smoking 32 % (n=81), 25 % hypertension 25 % (n=63), alcohol 16 % (n=41), and 14 % DM (n=36) are shown in the chart 4. From data it observed that due to the smoking there may be the risk of MI. Therefore here it requires the good counselling to the patient regarding the risk of smoking on the health.

The occurrence of streptokinase induced ADRs are studied it was observed that the most common ADRs were abdominal pain 16% (n=**56)**, 11 % body pain (n= **38)**, 10 % coughing (n=**36), and 9 %** vertigo (n=**31)**. The detail frequency of Streptokinase induced adverse drug reactions are enlisted in Table 1.

Table 1: The frequency of Streptokinase induced adverse drug reactions.

Characteristics	**N (%)**
Abdominal Pain	56(16%)
Chest pain	19(5%)
Dyspnea	24(7%)
Paralysis	12(3%)
Hemiplegia	9(3%)
Aphasia	6(2%)
Body pain	38(11%)
Ataxia	13(4%)
Vertigo	31(9%)
Depression	17(5%)
Cold sweat	39(11%)
Double vision	25(7%)
Hypotension	19(5%)
Coughing	36(10%)
itching	7(2%)
None	6(2%)

According to the Naranjo scale, the most ADRs ranked as "probable" (Table 2). Based on Common Terminology Criteria for Adverse Events v4.0 (CTCAE) the most ADRs were categorized in mild to moderate and death ADR (Table 3).

Table 2: Probability of adverse drug reactions based on Naranjo scale.[19,20]

Characteristics	N (%)	Naranjo probability scale			
		Doubtful	Possible	Probable	Highly Probable
Abdominal Pain	**56(16%)**	✓			
Chest pain	**19(5%)**			✓	
Dyspnea	**24(7%)**		✓		
Full body Paralysis	**12(3%)**	✓			
Hemiplegia	**9(3%)**	✓			
Aphasia	**6(2%)**	✓			
Body pain	**38(11%)**			✓	
Ataxia	**13(4%)**	✓			
Vertigo	**31(9%)**		✓		
Depression	**17(5%)**	✓			
Cold sweat	**39(11%)**			✓	
Double vision	**25(7%)**		✓		
Hypotension	**19(5%)**		✓		
Coughing	**36(10%)**			✓	
itching	**7(2%)**		✓		
	6(2%)		✓		

Table 3: The severity of the reaction was classified according to the internationally recognized Common Terminology Criteria for Adverse Events (CTCAE) version 4.0.[15]

Characteristics	N (%)	Severity of ADR				
		Mild (grade1)	Moderate (grade2)	Severe (grade3)	Very Severe (grade4)	death (grade5)
Abdominal Pain	56(16%)		✓			
Chest pain	19(5%)			✓		
Dyspnea	24(7%)				✓	
Paralysis	12(3%)				✓	
Hemiplegia	9(3%)				✓	
Aphasia	6(2%)				✓	
Body pain	38(11%)	✓				
Ataxia	13(4%)			✓		
Vertigo	31(9%)	✓				

Depression	17(5%)			✓		
Cold sweat	39(11%)		✓			
Double vision	25(7%)		✓			
Hypotension	19(5%)		✓			
Coughing	36(10%)	✓				
None	7(2%)					

Using Pearson analysis and student's t-test, Correlation Coefficient(r) between age and different ADR of streptokinase and T-value was calculated in table 4.

The results of Pearson analysis showed that the number of ADRs by streptokinase was associated with the risk factors of MI (Age, BSL,Hb)(Table 4)

Table 4: The risk factors of MI.

Significant Parameters	Correlation Coefficient(r)	t -value
Age-Cold sweat	0.01987	2.8527
Age-vertigo	0.03124	5.2887
Age-Hypotension	0.021529	6.53161
Age-Itching	-0.0733	5.84139
Age-cough	0.023105	6.95921
Age-double vision	-0.13106	1.06025
Age-dyspnea	0.133982	7.89526
Age-paralysis	0.076521	4.18567
Age-body pain	0.030916	7.78022
Age-ataxia	0.186144	6.11623
Age-depression	0.13567	5.88107
Age-abdominal pain	0.068843	6.03902
Age-chest pain	0.042623	6.63363
Age-hemiplegia	0.038893	5.69859
Age-aphasia	0.12821	5.70393
Age-Number of ADRs	-0.03763	4.50982
No. Of ADR-Hb	0.032797108	0.004455
No.of ADR-BSL	-0.07421148	1.2047
ADRs: adverse drug reactions, Hb: haemoglobin, BSL: blood sugar level		

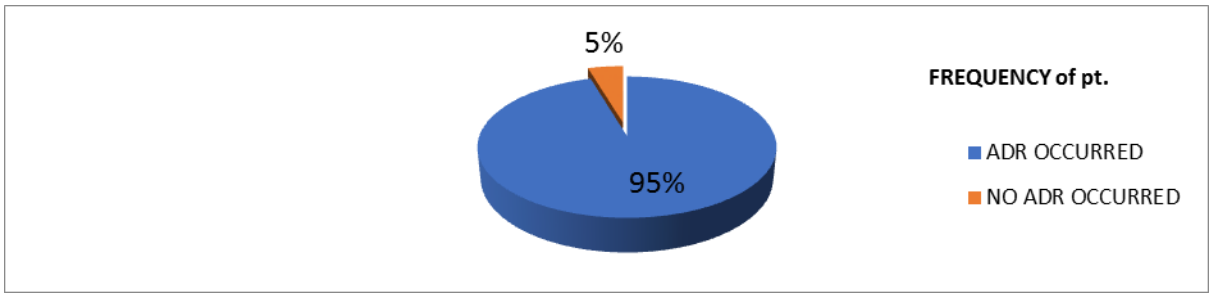
Table: 5

Mean and standard deviation of various risk factors

Significant Parameters	Mean	Standard deviation
Age	54.88235294	15.08992652
Male ADR	3.166667	2.429535
Female ADR	3.172414	2.429535

8. DISCUSSION

This study evaluated the patients with acute STEMI who received streptokinase. The main outcomes of these finding is that incidence of acute STEMI may be seen in the patients with the history of smoking. It was observed that **32 %** of total population showing smoking which leads the risk of a first MI. Furthermore, abdominal pain was one of the most occurred ADR. In the present investigation it was observed that **95 %** incidence of ADRs by streptokinase was seen and the results were similar to the previously reported literature.[1] The incidence of ADRs is shown in below graph. The various studies reported the allergy as one of the factor in occurring ADR.[20]



Further from the data it was observed that out of total population **16 %** (n=56) of population showed abdominal pain which may be due to the rapid injection of the drug. In reported literature the hypotension and arrhythmia were found as the most common ADRs induced by streptokinase, but in our study such abdominal pain was a common ADR found. Studies have explained the role of gender in the incidence of ADRs. Our study suggests more incidences of ADRs were seen in female compared to male. The similar results were reported.[20] Moreover, our study indicated that the side effects increased with increasing age that is consistent with the numerous previous reports ageing related decrease in kidney and liver function may be one of the responsible factors. Present of various diseases in older patients are the other factors that leads to more ADRs.[5,6]

9. CONCLUSION

Our study suggests that smoking is the main risk in occurring acute MI and streptokinase treatment was related with a high rate of abdominal pain in Indian population.

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