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Complications of Thrombolytic Therapy (Streptokinase) in Patients of Acute ST Elevation Myocardial Infarction (STEMI)

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Abstract **Original Research Article**

Introduction: Now a days there are many treatment are available for treating Acute ST-elevation myocardial infarction (STEMI) which is a major causative factor heart attack but even though still thrombolytic therapy or streptokinase use in many hospital. ***Objective:*** In this study our main goal is to evaluate the complications of thrombolytic therapy (streptokinase) in patients of acute ST elevation myocardial infarction (STEMI). ***Method:*** This cross-sectional study was done at BSMRAU medical college and hospital from April 2013 to April 2015 where 217 patients were studied. During the study patients who treated with the streptokinase were administered as soon as possible after the first symptoms of STEMI and all the data were checked also edited and analyzed after collection. ***Result:*** In the study majority of the patients were male (n = 179, 83%) and medical history of patients who received streptokinase where most of the patients had history of hypotension and & smoking. Also the most common ADRs for streptokinase were chest pain, hypotension, coughing, and ecchymosis. ***Conclusion:*** We can conclude that patients undergo adverse health complications by taking streptokinase. Further qualitative and quantitative analysis is needed for better outcome.

Keyword: Acute ST-elevation myocardial infarction (STEMI), thrombolytic therapy, streptokinase.

INTRODUCTION

Acute ST-elevation myocardial infarction (STEMI) is a major cause of morbidity, mortality, and disability. Myocardial infarction (MI), commonly known as a heart attack occurs when blood flow decreases or stops to a part of the heart, causing damage to the heart muscle. The most common symptom is chest pain or discomfort which may travel into the shoulder, arm, back, neck, or jaw [1]. Often it occurs in the center or left side of the chest and lasts for more than a few minutes [1]. The discomfort may occasionally feel like heartburn. Despite the progress in the treatment of STEMI, thrombolytic therapy or streptokinase is still being used in many countries. Streptokinase (SK) is a thrombolytic medication and enzyme. As a medication it is used to break down clots in some cases of myocardial infarction (heart attack), pulmonary embolism, and arterial thromboembolism [2].

Streptokinase is used in ST elevation myocardial infarction (STEMI). It is used by vein. It is metabolic product of beta-hemolytic streptococci, is an indirect fibrinolytic agent that interacts with plasminogen and forms an active complex with the protease activity that transforms plasminogen to plasmin. But this Streptokinase is a non-human protein, and its presentation into the circulatory system can lead to severe anaphylactic responses including death. The risk of this immune response is dependent to the level of the anti-streptokinase antibodies in circulation [4]. In this study our main goal is to evaluate the complications of thrombolytic therapy (streptokinase) in patients of acute ST elevation myocardial infarction (STEMI).

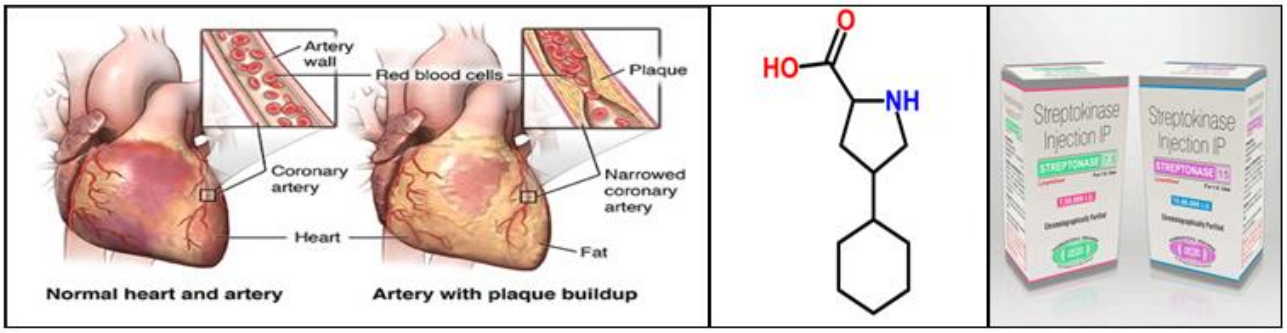

Fig-1a, 1b, 1c: Acute ST-elevation myocardial infarction (STEMI), streptokinase injection and its molecular structure [3]

Objective

General objective

- To observe the complications of thrombolytic therapy (streptokinase) in patients of acute ST elevation myocardial infarction (STEMI).

Specific objective

- To detect medical history of patients who received streptokinase
- To identify frequency of Streptokinase induced adverse drug reactions

METHODOLOGY

Study type

- This study was a cross-sectional study

Study place and period

- This study was performed at BSMRAU medical college and hospital from April 2013 to April 2015.

Method

Based on data from hospital, 217 patients were studied. Patients who treated with the streptokinase were administered as soon as possible after the first symptoms of STEMI with the usual adult dose of AMI as 1,500,000 unit's intravenous (IV) infusion over 60 min. In case of allergic reactions and fever, it was recommended that patients concurrently should receive corticosteroids that can be repeated during treatment. Before treatment, the patient PT and PTT were being controlled. In case of anaphylactic shock symptoms and hypotension, malaise, chills, nausea and arrhythmia, the infusion was being stopped. All patients receiving streptokinase that had completed the informed consent form were monitored for ADRs induced by streptokinase. Detection and monitoring of ADRs were done through completing a questionnaire by reviewing the patients' medical file and documentation as well as interviewing with the patients. The questionnaire includes the demographic information, past medical history, drug history, familial, habitual and social history, laboratory and echocardiographic information.
Data analysis:

- During the study all the data were checked and edited after collection. Then the data were entered into computer and statistical analyses of the results were obtained by using window-based computer software devised with Statistical Packages for Social Sciences (SPSS-13) (SPSS Inc, Chicago, IL, USA). The results were presented in tables and figures; the statistical terms included in this study were mean, median, standard deviation, percentage.

RESULTS

In Table-1showsgender distribution of the patients where the majority of patients were male (n = 179, 83%). The following table is given below:

Tabel-1: Gender distribution of the patients

Gender distribution	Frequency	Percentage
Male	179	83%
Female	38	17%

In figure-2 shows medical history of patients who received streptokinasewhere most of the patients had history of hypotensionand smoking with the frequency of 92 and 97. The following figure is given below in detail:

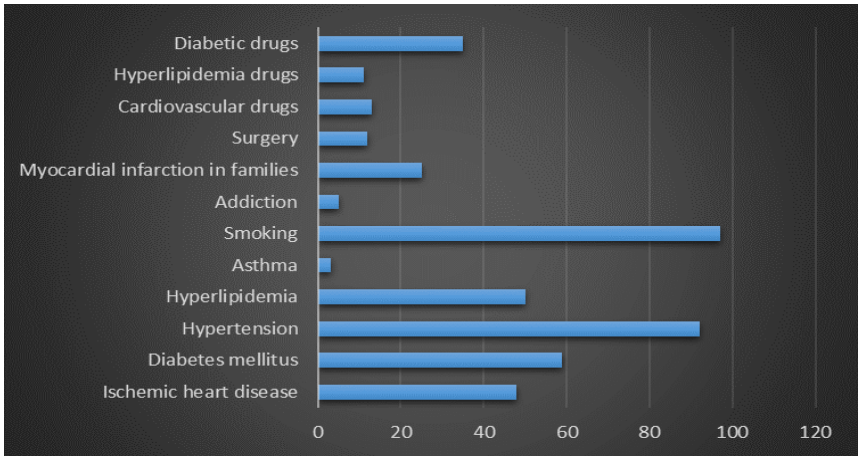

Fig-2: Medical history of patients who received streptokinase

Multiple responses was observed in patients

In figure-3 shows the frequency of Streptokinase induced adverse drug reactions where the most common ADRs were chest pain, hypotension, coughing, and ecchymosis with the frequency of more than fifty percent. The following figure is given below in detail:

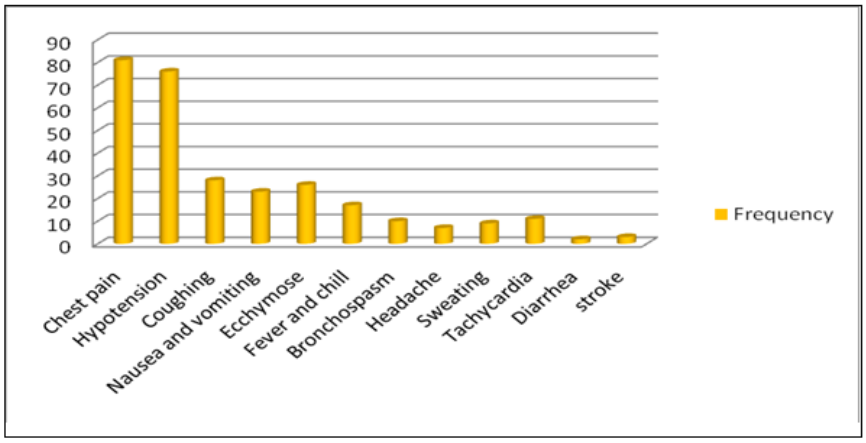

Fig-3: Frequency of Streptokinase induced adverse drug reactions

Multiple responses were observed in patients

In table-3 shows the linear regression model between the incidences of adverse drug reactions by streptokinase and independent factors where the linear regression analysis showed the three models of correlation between the incidence of ADRs and study risk factors including age, history of allergy, history of percutaneous coronary intervention and dyslipidemia. The following table is given below in detail:

Table-3: The linear regression model between the incidence of adverse drug reactions by streptokinase and independent factors

Model no.	Factor	Standardized Beta	*P* - value	R^2	Adjusted R^2	95% Confidence Interval for B
1	History of allergy	0.234	0.011	0.055	0.046	0.208-1.53
2	History of allergy: age:	0.248 0.219	0.006 0.014	0.102	0.087	0.272 – 1.57
3	Allergy: Age: History of PCI:	0.251 0.214 0.199	0.005 0.015 0.023	0.142	0.119	0.296 – 1.57
4	Allergy: Age: History of PCI: Dyslipidemia:	0.244 0.237 0.207 0.203	0.005 0.007 0.016 0.019	0.182	0.154	0.282 – 1.53

*Source By: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5958324/[10]Where, PCI: percutaneous coronary intervention

In table-4 shows the linear regression model between the number of adverse drug reactions and independent factor where in the linear regression model, a significant correlation between the number of ADRs and use of anti-coagulant agents, low hemoglobin level and age of patients was documented. The following table is given below in detail:

Table-4: The linear regression model between the number of adverse drug reactions and independent factor

Model no.	Factor	Standardized Beta	*P* - value	R^2	Adjusted R^2	95% Confidence Interval for B
1	Anticoagulant use	0.319	0.0001	0.102	0.094	0.763-2.58
2	Anticoagulant use: Hemoglobin:	0.280 -0.253	0.001 0.004	0.164	0.150	0.580 – 2.36
3	Anticoagulant use: Hemoglobin: Age:	0.276 -0.207 0.173	0.002 0.020 0.049	0.192	0.171	0.565 – 2.33 0.267 - -0.025 0.00 – 0.044

*Source by: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5958324/[10]

DISCUSSION

This study evaluated 217 patients with acute ST-elevation MI who received streptokinase. The main finding of this research may be that the history of drug allergy was the main predictor in the incidence of ADRs induced by streptokinase. Furthermore, hypotension was one of the most occurred ADR that may be associated with the rapid injection of the drug. Moreover, in this study hemorrhagic stroke and bleeding complications was higher than the other reports. Although, no case of anaphylactic shock was documented. Several studies have described the role of gender in the incidence of ADRs. In the analysis of 48 cohort studies with 513,606 patients in UK, females were more likely to experience ADRs (60% more than males) [5]. Also, according to other studies female patients are more likely than men to experience ADRs [6, 7]. Similarly, in our study the incidence of ADRs in females was more than males that is in agreement with the earlier reports. Moreover, our study indicated that the number of side effects increased along with the 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. Existence of various underlying diseases and poly pharmacy are the other participating factors that put the older patients to experience more ADRs [8, 9].The significant correlation between the incidence of ADRs and underlying diseases such as hyperlipidemia, VF, PTE was the other finding of present study that is in line with the other reports, which had indicated the background diseases as a main predictor in the incidence of ADRs.

Limitation

Present study included the relatively weak correlation coefficient

CONCLUSION

After much examination we can conclude that patients undergo adverse health complications by taking streptokinase. Further qualitative and quantitative analysis is needed for better outcome.

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