Journal of Reports in Pharmaceutical Sciences **2014, 3(1), 85-89**

Effect of Streptokinase on Short-term Outcomes in the Acute Myocardial Infarction with ST-Segment Elevation

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ARTICLE INFO

Article Type:
Research Article

Article History:
Received: 2014-04-25
Revised: 2014-06-05
Accepted: 2014-06-10
ePublished: 2014-06-14

***Keywords*:**
Streptokinase
Myocardial Infarction
Outcome

A B S T R A C T

Acute coronary syndrome is one of the most prevalent cardiovascular diseases. The acute myocardial infarction is one of its kinds which embodies the indication of fibrinolysis. One of the fibrinolytic types mostly used in Iran is Streptokinase (SK). This study aims to study the short-term clinical outcomes after receiving SK.A prospective cohort study was conducted on 54 patients at hospitals affiliated to Isfahan Medical School. After discharging, within 30 days, patients were followed regarding the morality and major adverse cardiac events (MACE) including Re-MI, unstable Angina, Cerebrovascular Accidents (CVA) and doing revascularization. Results were analyzed in both independent samples and Chi-square by statistical t-tests using SPSS software. Out of 54 patients, 25 individuals received SK versus 29 cases who did not receive that. In 30-day follow-up, no CVA or Re-MI was observed. In patients who did not receive SK, despite more deaths (14.2 % vs. 8 %) and MACE (62% vs. 56 %), it was not statistically significant (P>0.05).In the present study, receiving SK did not cause to reduce the rate of mortality and MACE in the time period of 30 days. However, it is suggested that a similar study with a larger size and also follow-up with long-term outcome be conducted.

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Introduction

Through the past decade, the most common cause of death in the world has been cardiovascular diseases. For 30% of deaths and 14% of losing DALYs (Disability-adjusted life years), the cause is coronary disease [1]. In a study in Iran, 11.3% of individuals suffered from coronary symptoms and 1.4% of cases with myocardial infarction (MI) and the age-adjusted prevalence was about 12.7% [2].
In patients with MI, fibrinolysis will cause to reduce the infarct size and improve the myocardial function and survival in short- and long-terms [3]. Despite the spread of using fibrinolysis, only 50% of patients with MI receive drug along with ST-segment elevation (STEMI) and among them, the full reperfusion is occurred in 50-60% of the cases and also among from this number, re-occlusion will occur again in 10-20% of the cases. Various fibrinolytic drugs have been used for the treatment, that among these drugs, Streptokinase (SK) was their first generation and given that it is the cheapest type, it is still the drug which is most widely used in Iran. According to our information from studying papers published so far, the effect of SK on prognosis has not been examined in Iran. Therefore, this study aims to evaluate the short-term clinical outcomes of major cardiovascular events in patients receiving SK.

Materials and Methods

The framework of the study and patients

This is a prospective cohort study conducted at hospitals affiliated to Isfahan Medical School in which 54 patients were studied and a part of patients underwent a comprehensive study in the form of study on patients with MI.

Inclusion criteria

1) More than 18 years, 2) Referring to the emergency room due to the chest pain and diagnosis of myocardial infarction (MI) by emergency physician and 3) The patient agreement on participating in the study.

Exclusion criteria

1) Being negative Troponin I(TnI) after 6 hours referring and 2) Impossibility of patient follow-up

Ethical certification of the study

Patients and their attendances were given the written consent based on guidelines of University Research Ethics Committee matched on Ethics Center regulations for medical research in Ministry of Health and Medical Education.

Methods

During admission, a sample was taken from patients in order to test levels of serum TnI and Myeloperoxidase (MPO), after centrifuging and separating the serum, maintained at a temperature of -20ºC for sending to the laboratory later. After discharging, within 30 days, patients were followed in terms of the clinical outcomes of major adverse cardiac events (MACE) including death, unstable Angina, Re-MI, Cerebrovascular Accidents (CVA) and doing revascularization. Out of 54 STEMI patients, 25 cases received Sk (Streptase made in Germany Behring Company) and 29 cases received no SK. The dose of SK was 1500000 units within 20 minutes as infusion. The serum samples of MPO and TnI have been taken at the initiation of admission and before the injection of the drug.

Statistical analyses

The numerical variables were reported as mean and standard deviation and the qualitative variables were reported as frequency and percentage. In both independent samples and Chi-square, the statistical t-tests were applied to compare the groups in terms of numeric and qualitative variables, respectively. All analyzes were performed using SPSS software.

Results

For both groups who received and did not receive Sk, the basic and clinical characteristics have been listed in Table 1. The mean age of patients without SK was higher ($P<0.05$). In these patients, the percentage of males and diabetes mellitus (DM) were higher and BMI and smoking were lower while there was no statistically significant dif8ference with the group who received SK. In patients without SK, the level of DBP was higher ($P<0.05$). The mean delay was 6.17 hours (the range from 1 to 18 hours) in individuals without SK.

Table 1. Basic and clinical characteristics of patients with STEMI who received or did not receive SK

Variable	Total of patients	Received SK	No received SK	P-value
Demographic:				
-Age (year)	60.44 (12.19)	56.36 (12.06)	63.67 (11.35)	0.02
-Sex (male)	43 (79.6)	19 (35.2)	24 (44.4)	0.54
-Location(Rural)	10 (18.5)	3 (5.6)	7 (13)	0.31
Risk of factors:				
-Hypertension	16 (29.6)	8 (14.8)	8 (14.8)	0.77
-Diabetes Mellitus	12 (22.2)	5 (9.3)	7 (13)	0.75
-Cardiovascular disease	11 (20.4)	5 (9.3)	6 (11.1)	0.61
-Smoking person (waiting)	15 (27.8)	9 (16.7)	6 (11.1)	0.24
Clinical and Para-clinical findings :				
-BMI	26.23 (5.31)	26.64 (5.11)	25.87 (5.55)	0.60
-SBP	131.37 (27.72)	135.80 (30.32)	127.55 (25.18)	0.28
-DBP	79.54 (17.33)	84.80 (18.28)	75.00 (15.35)	0.04
-LVEF in percentage	40.19 (11.07)	42 (9.35)	38 (12.31)	0.25

Quantitative variables of the mean (SD) and qualitative variables of the number (percentage of total number)

The statistical information on the mean serum levels of TnI and MPO has been provided in Table 2. Although the serum level of TnI in patients who received SK is higher, there is no statistically significant difference with the other group and their serum level of MPO was significantly higher than that in the group who did not receive it ($P<0.05$).

Table 2. Comparison of the mean serum levels of TnI and MPO in patients who received and patients who did not receive SK

Enzyme SK	Yes	No	T-test	P-value
MPO(ng/ml) [mean (SE)]	6.56 (0.85)	4.20 (0.55)	-2.39	0.02
TnI (ng/ml) [mean (SE)]	4.42 (1.33)	3.2 (0.61)	-0.83	0.41

Statistical information on morality and major adverse cardiac events (MACE) has been provided in Table 3. There was no case of CVA or Re-infarction at 30 days following. Despite more morality and MACE in patients without SK, it is not statistically significant.

Table 3. Comparing the incidence of morality and major cardiac adverse events (MACE) {number (percentage)} in patients who received and patients who did not receive SK.

Complication	SK	Yes	No	OR	CI 95%	P-value
Death	Yes	2 (8)	4 (14.2)	1.92	0.32-11.49	0.47
	No	23 (92)	25 (85.8)			
MACE	Yes	14 (56)	18 (62)	1.29	0.43-3.82	0.65
	No	11 (44)	11 (38)			

Discussion

In the study of Dehghani et al in Mashhad, for patients receiving SK, the mean age was 52.28 years, most of them were male (70.8%), the most common risky factor was tobacco (32.8%) and then hypertension (26.3%), diabetes (18.8%) and the record of IHD (19.3%), respectively [5] which is similar to our study.

In the study of Samadikhah et al in Tabriz, patients with STEMI were most male (78.7%) with the mean age of 60∓76.12 years which is similar to our study. Despite the fact that this disease has been more in rural patients receiving SK, it is statistically not significant [6]. On the other hand, in the study of Hosseinian et al in Ardebil, although 28% of patients were rural, male and living in the city and their disease was associated with a faster onset of treatment, the education level, age and the record of

MI had no relationship with the onset of treatment [7]. In our study, the mean onset of pain to admission in patients who received SK was 2.3 hours and they were statistically younger.

In the study of Fussas et al on 786 patients with STEMI who received IV thrombolysis at the first 6 hours, it showed that the higher the serum of TnI, the more the 30-day mortality [8]. In our study, the mean level of TnI was higher in those receiving SK; however, it was not statistically significant. The study by Goldmann et al indicated that in patients with MI, the level of MPO increased more by passing time [9] while in our study, patients receiving SK had higher level of MPO which was statistically significant, despite that the mean onset of pain to admission (2.3 vs. 4.49 hours) was lower. However, in a study, Mocatta et al found that there was no difference between the level of MPO in patients who received thrombolysis and those who did not receive that [10].

In studying the level of MPO in patients with MI receiving thrombolysis; Karaday et al showed that the level of MPO was related to in-hospital events including morality, re-infarction, recurrent ischemia, arrhythmias, clinical heart failure and cardiogenic shock [11]. The study conducted by Reikvan et al showed that during the admission, patients who received thrombolysis and aspirin had 35% mortality vs. 11% mortality in those who did not receive them [12]. In the study by Hsu et al on diabetic patients, 12.1%, 2%, 11.1% and 27.3% of patients died 30 days after fibrinolysis, re-infarction, unstable heart angina and revascularization, respectively that the total MACE was 52.5% of the cases [13] while in our study, during 30 days examining from the onset of admission, despite higher morality and MACE in patients receiving SK, it was not statistically significant.

Hsadai et al indicated that in patients with MI receiving fibrinolysis, in the case of the mild to moderate heart failure, death and re-MI occur 8% and 12% versus 2% and 4% in those who have no heart failure [14]. It may account for the reality that in our study, for those receiving and not receiving SK, LVEF has been reduced that had no significant difference with each other. As a result, the reduction of MACE in patients receiving SK was not statistically significant.

Conclusion

In this study, patients with MI who did not receive SK statistically had significant higher age and lower DBP. Although there was higher MPO in patients receiving SK, the level of TnI did not differ. Despite the fact that in various studies, receiving SK has caused to reduce mortality and MACE within 30 days, in our study, although there was a lower percentage of MACE, it was not statistically proved because our study size (potential) is limited, however it may be changed in long-term outcome. In order to investigate the effect of SK in Iran, it is suggested that larger studies and long-term follow-up be conducted.

Acknowledgements

This work was supported by Isfahan University Medical Sciences.

Conflict of interest

Authors certify that no actual or potential conflict of interest in relation to this article exists.

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