Original Article

To Assess the Beneficial Effects of Rosuvastatin Before Percutaneous Coronary Intervention in Patients with Acute Coronary Syndrome

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ABSTRACT

Objective: To assess the frequency of major adverse cardiovascular events in patients who receive high dose Rosuvastatin before PCI.

Study Design: Case series study.

Place and Duration of Study: This study was conducted at the department of cardiology, Liaquat National Hospital & Medical College, Karachi from March 2018 to April 2019.

Materials and Methods: During the period of study total number of ACS patients for percutaneous coronary intervention at Liaquat national hospital in the department of cardiology in which 271 patients were admitted and samples of 153 patients were taken by Non probability consecutive sampling.

Results: The frequency of periprocedural myocardial injury/non fatal MI in patients who receive high dose Rosuvastatin before percutaneus coronary intervention is 6.5%, ECG changes after procedure that is development of pathological Q-wave found in 1.3% and sudden death in 0.7%.

Conclusion: The use of single high loading dose of rosuvastatin is not only helpful to reduce periprocedural myocardial injury but also decreases other major adverse cardiac events such as development of pathological Q-wave, non fatal myocardial infarction but no effect on prevention of sudden death.

Key Words: Statin, angioplasty, percutaneous transluminal

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INTRODUCTION

The main cause of acute coronary syndrome[1-4] is reduced flow of blood in coronary arteries in such a way that a part of cardiac muscle is incapable of functioning properly or it dies. Chest pain is the main symptom of ACS which can be radiated to jaw or left arm, that is associated with sweating and nausea. ACS consists of unstable Angina (USA), & non ST elevation myocardial infarction (NSTEMI) & ST elevation myocardial infarction (STEMI)[5]

As the living standards of people have changed in recent times with the change in diet the probability of ACS has augmented which can be really dangerous for health of human,[6,7] relying on imperfect statistics the price for hospitalization in United states of America for coronary artery atherosclerosis has touched 10 billion to 40 billion dollars, and more than one million patients with ACS are admitted in hospital annually[8].

Investigators assessed efficacy of statins in diminishing PMI and major adverse cardiovascular events (MACE) in patients with ACS who are planned to undergo PCI previously.[9] Although some trials supported statin pretreatment[10], others demonstrated that it does not provide clinical benefits in terms of PMI[9]. Therefore our study aimed to assess the effect of single high dose of rosuvastatin in patients with ACS before (PCI) in our population..

MATERIALS AND METHODS

This single center, non probability consecutive, case series study was conducted from May 2018 to April 2019. Study population in the inclusion criteria was either gender with 30 to 70 years of age, who were diagnosed cases of acute coronary syndrome attending department of Cardiology at Liaquat National Hospital Karachi. The patients who are eligible and are fulfilling the criteria of inclusion were advised and given permission from the ethical committee of Liaquat

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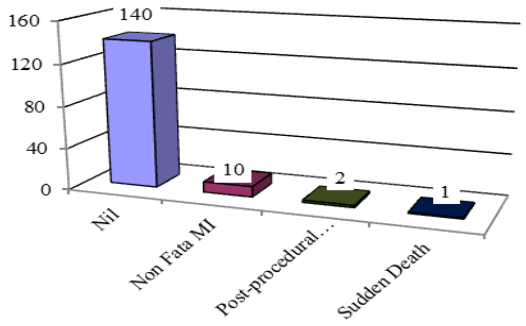
National Hospital and a written informed consent was taken from all the patients by principal investigator. Baseline Electrocardiogram was performed by trained electrocardiogram technician and blood sample for Trop I, CKMB level were taken from peripheral venipuncture done by expert nurses in the presence of investigator. Tablet rosuvastatin 40mg was given orally. All patients were taken to catheterization lab, Percutaneous coronary intervention was performed by expert interventional cardiologist having experience more than 5 years, after procedure patients were shifted to monitoring set up (coronary care unit). After 6 hours of procedure Trop I, CKMB & CRP were reassessed to compare with baseline level, 3 fold increase in Trop-I and CKMB level from baseline was considered as Periprocedural myocardial injury and Patients were monitored for major adverse cardiac events i.e. cardiac death and non fatal myocardial infarction during hospital stay. After 24 hrs electrocardiogram was performed to assess the changes with baseline electrocardiogram. Development of pathological Q-wave was considered as non fatal myocardial infarction. All the data was recorded on a pre designed Performa. Confounding variables were controlled by strictly following the inclusion and exclusion criteria.

RESULTS

Between July 2018 and Jan 2019 the total number of patients gone through the procedure (PCI) in cardiology department were 271 out of these 153 patients were included in our study.

Of all 153 patients base line Trop-I & CKMB were documented on proforma. Out of which 13 patients (8.5%) found to have major adverse cardiovascular events, in which 12 patients showed increase in base line Trop-I, CKMB levels and two with ECG changes after the procedure from these two, one was with isolated ECG changes and other was associated with increase in trop-I and CKMB levels.

Results were calculated of 13 patients with positive findings; results showed frequency distribution of male gender was 98 (64.1%) (Table # 2) with mean age of 58.79 ±8.30 years shown in (Table # 1), with mean base line trop-I was 5.54 ±5.74ng/ml and CKMB levels 457.25 ±229.92 IU/L and 6 hours post procedure mean trop I level 7.66 ±6.75 ng/ml and CKMB 708.14 ±339.907 IU/L (Table # 1). Frequency distribution of diagnosis is given in (Table # 2). Frequency distribution of 3 fold increase in baseline trop-I and CKMB is shown in (Table # 2). Frequency Distribution of major Adverse Cardiac events is Post-procedural pathological Q wave (2/153 patients) 1.3%, non fatal MI 6.5% (10/153 patients) and sudden death 0.7% (1/153 patients) in (graph # 1). Frequency and association of major adverse cardiac events is discussed according to age, base line trop-I in (Table #3 & 4) respectively in trop I is present according to age in (Table # 5).



Graph No.1: Frequency of Major Adverse Cardiac events.

Table No. 1: Descriptive Statistics

	Mean	SD
Age (Years)	58.79	8.30
Base line Trop-I	5.54	5.74
Base line CKMB	457.25	229.92
6 Hours post-procedural TropI	7.66	6.75
6 Hours post-procedural CKMB	708.14	339.907

Table No. 2: Frequency Distribution of Diagnosis, 3 Fold increase in Baseline TropI, 3 Fold increase in Baseline CKMB

Gender	Frequency (n)	Percentage (%)
Male	98	64.1
Female	55	35.9
TOTAL	153	100
Diagnosis		
Un Satable Angina	17	11.1
NSTEMI	126	82.4
STEMI	10	6.5
TOTAL	153	100
3 Fold increase in Baseline TropI		
Yes	12	7.8
No	141	92.2
TOTAL	153	100
3 Fold increase in Baseline CKMB		
Yes	12	7.8
No	141	92.2
TOTAL	153	100

Table No.3: Frequency and Association of MACE According to Age

		≤45 Years	>45 Years	P-value
Postprocedural pathological Q wave	n	1	1	0.160
	%	8.3%	0.7%	
Non Fata MI	n	1	9	
	%	8.3%	6.4%	
Sudden Death	n	0	1	
	%	0.0%	0.7%	
Nil	n	10	130	
	%	83.3%	92.2%	
TOTAL		12	141	153

Results showed that there is no significant association between MACE and Age.

Table No. 4: Frequency and Association of MACE According to BaselineTropI Level

		≤5.5	>5.5	P-value
Postprocedural pathological Q wave	N	2	0	0.047*
	%	2.0%	0.0%	
Non Fata MI	N	10	0	
	%	10.2%	0.0%	
Sudden Death	N	1	0	
	%	1.0%	0.0%	
Nil	N	85	55	
	%	86.7%	100.0%	
TOTAL		98	55	153

Results showed that there is significant association between MACE and base line trop i level.

Table No. 5: Frequency and Association of 3 Fold increase in TROPI According to Age Group

		≤45 Years	>45 Years	P-value
Yes	N	4	8	0.097
	%	16.7%	6.2%	
No	N	20	121	
	%	83.3%	93.8%	
TOTAL		24	129	153

Results showed that there is no significant association between 3 Fold increase in TROPI and Age.

DISCUSSION

Statins expressively minimize cardiovascular events in different patients who are having cardiovascular illness and patients who have probability of having cardiovascular illness[11]

PCI is an important part of management of ischemic cardiac illness. Joined with proof based pharmacological strategies, the practice of PCI in suitable patients diminish illness and death across the world.[12]

Risk of adverse cardiac events is reduced by high dose statins in patients suffering from ACS, inflammatory markers were reduced with high dose statins within 24 hours directly after PCI which proposes that anti-inflammatory consequence of statins can be a way that reduces periprocedural events. Statin treatment improved clinical results in patients going through PCI.[13]

Recent meta-analyses indicated that high-dose pretreatment with statins reduces PMI in patients with ACS[14] In Ye et al[18] meta-analysis, it was found that compared with the conventional dose of rosuvastatin, the loading dose of rosuvastatin could significantly reduce the level of inflammatory marker (hs-CRP) after PCI, including at 24 hours, 48 hours and four weeks, suggesting that the loading dose of rosuvastatin could decrease the inflammatory index and reduce the incidence of postoperative infection, which is beneficial to the prognosis of patients after PCI. In addition, the levels of LDL-C and cTnT of the high-dose group were significantly lower than the conventional dose group.

When routinely measured, biomarker release after PCI is common, occurring in 5% to 30% of cases: most of these are minor releases. Large elevations in biomarker release (e.g., CK-MB release 5 to 8 ULN) are independently associated with mortality.[15] In our data two with ECG changes after the procedure from these two one was with isolated ECG changes and other was associated with increase in trop-I and CKMB levels that is (1/10 in 153 patients) 10%.

Cay et al[16] performed a trial, and 299 patients were randomized to a rosuvastatin-treatment (n = 153) group and 146 patients were placed in to a no-treatment group. A forty mg loading dose of rosuvastatin was administered 24 h before PCI, and the CK-MB and cTnI levels were measured before and at 12 h after PCI. The incidence of CK-MB and cTnI elevation in the rosuvastatin group was significantly lower compared with the control group and Cay indicated that high loading dose of rosuvastatin (40 mg/day) could effectively reduce the incidence of peri-procedural myocardial necrosis and infarction. In 2011, a 12-month follow-up trial was also performed by Yun et al[17]. In our study we analysed that the frequency of periprocedural myocardial injury in patients who receive high dose Rosuvastatin before PCI is 6.5% with mean age of patients underwent the procedure with adverse outcome was 58.79 $\pm$8.3 years, with male predominance 64% as compare to Ye et al[18] study, 445 patients with ACS who underwent PCI were randomly assigned to receive no statin treatment before PCI (control group, n = 220) or to receive 40mg rosuvastatin loading before PCI (rosuvastatin group, n = 225), and cardiac death, non-fatal MI, non-fatal stroke and any ischemia-driven revascularization were assessed after 12 months. During the follow-up, major adverse cardiac events occurred in 20.5% of patients in the control group and 9.8% of patients in the rosuvastatin group (p = 0.002), and the incidence of death and non-fatal MI was significantly higher in the control group compared with loading dose of atorvastatin (p = 0.021).

The fundamental mechanisms of initial defensive action are not taken due to effects of lowering cholesterol levels ,since all trials involved in examination used a temporary pre-ailment having high dose statin, that could not imposed sufficient impact on the level of cholesterol. Different studies showed that initial lipid-independent role of statin, that is Pleiotropic effect and comprising antithrombotics influence,[19]

Previously described plieotropic properties of statins might play role to diminish myocardial necrosis because of technical microembolization in locating of PCI, specifically patients suffering from ACS and high provocative status, in which there is multipart communication between thrombosis and disturbance in functioning /activation, irritation, may originate an

applicable advantage from initial high amount of statin treatment an aggressive strategy[20]

In our country cardiovascular interventional procedures are increasing day by day so the high incidence of major cardiac events is expected and can be prevented by use of preprocedural statin, as the frequency of MACE with cardiovascular intervention in at risk patients is around 12.6% which can be reduced to 7.4% with high dose statin pretreatment,[21] while our study shows the occurrence of major cardiovascular events with ECG changes after procedure that is development of pathological Q-wave found in 1.3% along with 6.5% Non fatal Myocardial Infarct and sudden death in 0.7%. In Pan et al study high-dose RSV preloading before PCI lead to a 58 % reduction in MACE and a 60 % reduction in PMI.[22]**.**

CONCLUSION

In conclusion, the use of high loading dose of rosuvastatin is not only helpful to reduce PMI but also decreases other major adverse cardiac events such as development of pathological Q-wave, non fatal myocardial infarction and no effect on prevention of sudden death. So it decreases mortality in patients going through coronary interventions with ACS. As it decreases the frequency of complications during PCI so it comes out with multiple benefits, with an ability to recover with speed after the procedure in short time spent in hospital to minimize the expenses**..**

Author's Contribution:

Concept & Design of Study:	Faisal Ahmed
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Revisiting Critically:	Faisal Ahmed, Imran Khan Sandeelo
Final Approval of version:	Faisal Ahmed

Conflict of Interest: The study has no conflict of interest to declare by any author.

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