

## FREQUENCY OF COMMON MODIFIABLE RISK FACTORS IN PATIENTS WITH MYOCARDIAL DAMAGE UNDERGOING SINGLE VESSEL CORONARY ANGIOPLASTY

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### ABSTRACT

**Objective:** To determine the frequency of common modifiable risk factors in patients with myocardial damage undergoing single vessel coronary angioplasty.

**Study Design:** Descriptive study.

**Place and Duration of Study:** Armed forces Institute of Cardiology/National institute of Heart Disease Rawalpindi from June 2012 to Nov 2013.

**Patients and Methods:** Hundred patients undergoing elective single vessel percutaneous coronary angioplasty were evaluated with creatinine kinase and creatinine kinase MB levels before, after 8 hours and 24 hours following coronary angioplasty. The detailed performa was filled from each patient covering the necessary variables.

**Results:** Out of 100 patients 22% had raised creatinine kinase at 8 hours and 43% had raised creatinine kinase after 24 hours following coronary angioplasty. Whereas 19% patients and 38% patients had raised creatinine kinase MB levels at 8 hours and 24 hours following the procedure respectively. No patient had rise of creatinine kinase or creatinine kinase MB more than 3 times of normal limits in the study. Among patients with raised CK-MB highest frequency was of diabetes mellitus, raised LDL levels, smoking and hypertension.

**Conclusion:** Patients with raised CK-MB levels after 1<sup>st</sup> day of coronary angiography had diabetes mellitus (84%), raised LDL levels (79%), smoking (68%) and hypertension (58%).

**Keywords:** Creatinine kinase MB, Hypertension, Diabetes Mellitus.

### INTRODUCTION

Percutaneous coronary angioplasty has become the most commonly practiced invasive procedure for myocardial revascularization. In spite of these advances raised levels of cardiac enzymes have been reported in 5-30% of uncomplicated precautionary coronary interventions suggesting myocardial damage and cell necrosis<sup>1-3</sup>. A level of enzyme creatinine kinase (CK) and enzyme creatinine kinase MB (Myocardium Band -an isoenzyme of Creatinine Kinase ) of more than 5 times of normal following percutaneous coronary angioplasty is associated with worse prognosis<sup>4-7</sup>. The patients even if asymptomatic with no changes in cardiac functions have raised levels of cardiac markers

which are directly proportional to the extent of myocardial damage and are associated with increased long term mortality and morbidity<sup>8-9</sup>. The cardiac markers levels rise after the percutaneous coronary angioplasty reaching its peak after 24 hours. The rise of Troponin T or I levels, after percutaneous coronary angioplasty ranges from 13-44% depending on the number of stents used<sup>10-12</sup>. It has been established beyond doubt that any increase in enzyme creatinine kinase MB after percutaneous coronary angioplasty is associated with statistically and clinically significant, increase in the subsequent risk of death<sup>13</sup>. In addition to that it is more economical in our set up to follow creatinine kinase MB levels than the Troponin T or I levels. The current definition of myocardial infarction published by Joint ESC/ACCF/AHA/WHF Task Force for the Redefinition of Myocardial Infarction states elevation of cardiac biomarkers greater than 3 times of 99<sup>th</sup> percentile upper

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reference limit have been designated as defining percutaneous coronary angioplasty related

**Table-1: Demographic description of the study population (n = 100)**

Gender (Male)	64	64%
Previous MI	24	24%
CABG	4	4%
Treated hypertension	23	23%
Diabetes mellitus	36	36%
Smoking	39	39%
<u>Prior PTCA</u>	<u>24</u>	<u>24%</u>

PTCA: Primary coronary angioplasty

**Table-2: Description of modifiable risk factors in patients with raised CK-MB (n = 38).**

Risk Factors	Frequency	Percentage
Smoking	26	68
Hypertension	22	58
Diabetes mellitus	32	84
Raised LDL levels	30	79

myocardial infarction<sup>14</sup>. Though it is well known that smoking is injurious to health and has harmful effect not only on the smoker but his family too 15 there is a paucity of data regarding association of common modifiable cardiac risk factors and peri-procedural rise of cardiac enzymes. Therefore their significance is often undermined during coronary angioplasty.

The purpose of this study is to measure creatinine kinase and creatinine kinase MB fraction, after successful stent deployment and find out the association of common modifiable risk factors (hypertension, diabetes mellitus, low density lipoproteins levels, and smoking) with myocardial damage. This information will be the platform to carry out further studies to make the

process of stent deployment as myocardial friendly as possible.

## MATERIALS AND METHODS

This descriptive study was carried out at Armed Forces Institute of Cardiology / National Institute of Heart Disease Rawalpindi from June 2012 to November 2013. The study was approved from Armed Forces Institute of Cardiology/ National Institute of Heart Diseases Rawalpindi ethical committee. All the patients with typical stable effort angina, positive stress test (ECG, stress echocardiogram or nuclear scan) and undergoing elective percutaneous coronary angioplasty were included in the study. Patients with acute myocardial infarction (< 3 months), unstable angina, any rise of cardiac enzymes at presentation, and left ventricle ejection fraction of < 35% were excluded from the study. Patient having a significant side branch artery (>2.5 cm) at the target lesion were also excluded from the study. All patients with co-morbidity state like renal failure with creatinine of > 3 mg, refractory diabetes mellitus hypertension or chronic obstructive airway disease were also excluded. Patients who developed in-stent thrombosis during the procedure evident by clinical presentation and ECG changes were confirmed by re-angiography and excluded from the study. Total 100 patients were included in the study through non-probability consecutive sampling. Informed written consent was taken from each patient and the study details were explained to the patient. All patients were more than 30 years of age and target lesions had a stenosis of more than 70% by visual quantitative angiography. All percutaneous coronary angioplasty were elective and successful. Angiographic success was defined as final angiographic residual stenosis of < 20% by visual estimation. Standard drug regimen was given to all patients before the procedure. All patients underwent coronary angioplasty from right radial approach. Suitable views were taken to localize the target lesion. The patients with target lesion of more than 70% on quantitative angiography were selected and percutaneous coronary angioplasty with stenting

was carried out. Post percutaneous coronary angioplasty stenosis of < 20% in the target vessel was accepted. Creatinine kinase and creatinine kinase MB were measured before, after 8 hours and 24 hours of percutaneous coronary angioplasty. Blood samples were allowed to clot for 30 minutes at room temperature centrifuged and test was performed immediately on serum. Creatinine kinase and creatinine kinase MB were measured by immuno-inhibitory assay for quantitative in vitro determination using HITACHI 911 Clinical chemistry analyzer. Fasting Lipid profile was carried out before the coronary angioplasty to evaluate low density lipoprotein (LDL) levels by calculated parameter method using HITACHI 911/ SELECTRA 2 equipment. The ECG was recorded before, just after and 24 hours after the percutaneous coronary angioplasty and evaluated by an experienced cardiologist who was unaware of the test results (clinical diagnosis, creatinine kinase MB data).

A detailed performa was filled from each patient covering the necessary variables. Details of percutaneous coronary angioplasty and its result were recorded for every case.

Data had been analyzed using SPSS version 17. Descriptive statistics were used to describe the results. The association of certain risk factors (hypertension, diabetes mellitus, LDL levels and smoking) and raised creatinine kinase levels was studied by applying Chi-square test.

## RESULTS

Total 100 patients were included in the study. Average age of the patients was 55.5 years with min age of 36 years and maximum age of 75 years. Demographic description of the patients was given in table-1. All patients had normal renal functions as evaluated by serum creatinine measurement the day before percutaneous coronary angioplasty and had normal values of serum creatinine / creatinine kinase MB after percutaneous coronary angioplasty.

There were no in hospital major complication (death or need for urgent re-

vascularization) in our study. Out of 100 patients 22% had raised creatinine kinase at 8 hours and 43% had raised creatinine kinase at 1<sup>st</sup> day following coronary angioplasty. Whereas 19% patients and 38% patients had raised creatinine kinase MB levels at 8 hours and 1<sup>st</sup> day following coronary angioplasty respectively. No patient had raise of creatinine kinase or creatinine kinase MB more than 3 times above the normal limits in our study. Frequency of different modifiable risk factors among patients with raised CK-MB is given in table-2. In the study Intra-aortic balloon was placed in 2% patient and 13 patients (13%) were administered Gp IIb IIIa inhibitors during coronary angioplasty. Out of 100 patients 11% patents had transient T inversions in anterior leads which reverted to normal within 24 hours following coronary angioplasty but no rise of creatinine kinase or creatinine kinase MB was seen in these patients.

## DISCUSSION

Creatinine kinase MB is a purely cytosol enzyme mainly present in myocardium. Creatinine kinase MB may start to rise in few hours after ischemic event but minor myocardial injury like unstable angina can be associated with release of creatinine kinase MB. Creatinine kinase MB has half life of 10-20 hours and after myocardial infarction returns to normal in 24-72 hours<sup>16</sup>. In our study 22 % and 43 % patients had raised creatinine kinase levels after 8 hours and at 1<sup>st</sup> day following single vessel coronary angioplasty respectively. Similarly 19% and 38% patients had raised creatinine kinase MB after 8 hours and 1<sup>st</sup> day following single vessel coronary angioplasty respectively. None of the patient had rise of creatinine kinase MB more than 3 times of normal. This may have been observed because we excluded complicated coronary interventions (intra-coronary dissections, stent stenosis and perforations) from our study. According to Canadian statistical data full benefits of cessation of smoking may materialize after 20 years of quitting but even reduction of number of cigarettes may be beneficial<sup>17</sup>. In a study Karim<sup>13</sup> et al selected 25

patients undergoing single vessel percutaneous transluminal coronary angioplasty involving one vessel dilatation and reported elevated creatinine kinase MB levels in 16% and 28% just after and at 1<sup>st</sup> day following transluminal coronary angioplasty respectively. In a similar study Ravkilde<sup>12</sup> et al reported raised creatinine kinase MB in 6 of 23 patients (26%) following coronary angioplasty while evaluating every 6 hrs for 48 hours and then after on 4<sup>th</sup> and 8<sup>th</sup> day. As is expected peri-procedural myonecrosis is reduced by strategies which reduced the peri-procedural myocardial damage by anti-thrombotic, anti-inflammatory measures and prevention of embolization<sup>18</sup>. ECG is comparatively insensitive in detecting minor irreversible myocardial injury. Likewise only 11 of our patients had transient nonspecific ST changes. The transient ECG changes can not be fully explained but myocardial stunning can be a possibility. We can safely comment that in majority of cases only a small release of myocardial enzymes can be detected without ECG changes or cardiac function impairment.

This study is a single-center non-randomized selective patient study having a limited statistical value to detect a significant association between common modifiable risk factors and creatinine kinase MB levels in patients undergoing coronary angioplasty. Further more only single vessel coronary angioplasty has been studied that also in absence of a major off shoot branch at the lesion. Still this study can provide a platform for a larger prospective study. Larger patient population with multi-vessel stenting can highlight the true significance of this association and its prognostic implications.

## CONCLUSION

Patients with raised CK-MB levels after 1<sup>st</sup> day of coronary angiography had diabetes mellitus (84%), raised LDL levels (79%), smoking (68%) and hypertension (58%).

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