



CREATINE KINASE-MB;

COMPARISON OF CREATINE KINASE-MB IN MALE AND FEMALE ACUTE MYOCARDIAL INFARCT PATIENTS BEFORE AND AFTER THE TREATMENT.

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ABSTRACT... Objective: To compare the levels of creatine kinase-MB in male and female patients of acute myocardial infarction before and after the treatment. **Study design:** Comparative study. **Setting:** Faisalabad Institute of Cardiology, Faisalabad, Pakistan. **Period:** 08 months, March 2014 to September 2014. **Material & Methods:** Total 60 patients of acute myocardial infarction were enrolled in the study; 30 males and 30 females. The creatine kinase-MB levels of all the patients were checked and compared before starting the treatment for acute myocardial infarction and then after 24 & 48 hours of treatment. **Results:** The results of the study shown that the mean of CK-MB levels before treatment was high in male as compared to female patients with p-value < 0.01. Similarly the comparison of mean CK-MB levels after 24 and 48 hours of treatment were also found to be significantly higher in male patients with p-value < 0.01 each. **Conclusion:** The levels of CK-MB in male acute myocardial infarct patients were high both before and after the treatment.

Key words: Myocardial infarction, Creatine kinase-MB, Cardiovascular diseases, Troponin, Electrocardiogram, Cardiac biomarkers

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INTRODUCTION

Myocardial infarction (MI) is the irreversible death (necrosis) of heart muscle secondary to prolonged lack of oxygen supply.¹ Cardiovascular disease (CVD) is now believed to be the leading cause of disability and death globally. The Western countries have successfully reduced the mortality rate from cardiovascular disease but still it is increasing in most of the Asian countries, including Pakistan. According to World Health Organization (WHO) there were 17.3 million deaths due to cardiovascular issues worldwide in 2008, in which acute myocardial infarction (AMI) was responsible for 7.3 million deaths.² AMI is one of the major complications of CVD. The Asian population is more vulnerable to AMI. It has been estimated that risk of AMI is 50% higher in South Asians than in white people in the United Kingdom. Pakistan being a part South Asia bears a huge burden of CVD.³ The risk of chronic heart diseases is remarkably lower among women than men before the age of 50 years after which it also increases in women. It is believed that it may be

due to protective effects of female sex hormones but other factors contributing to high risk in men may be smoking and differences in diet.⁴

AMI is based on presence of risk factors, clinical features, electrocardiographic changes and levels of cardiac biomarkers. Some patients with myocardial infarction may present atypical signs and symptoms rather than typical ones. Thirty percent patients have little or no chest discomfort, and the electrocardiographic changes may not specify the diagnosis. In both typical and atypical cases level of cardiac biomarkers is useful to diagnose AMI. It is more valuable if performed 4-6 hours after the onset of signs and symptoms. Measuring the levels of cardiac biomarkers also help to assess the extent of myocardial damage and patient's prognosis. Clinically, measurement of the level(s) of one or more specific cardiac biomarkers is used to determine the extent of myocardial damage and to assess a patient's prognosis. Historically, creatine kinase (CK), CK-MB, CK mass, and lactate dehydrogenase have

been used for routine clinical management.⁵

Creatine kinase-MB (CK-MB) is found mostly in heart muscles. Its level rises within 3-12 hours of AMI as the heart muscle cells get damaged, reach peak values within 24 hours and decline to baseline after 48-72 hours.⁶ CK-MB has long been considered a marker for the diagnosis of AMI.⁷ Sensitivity level of CK-MB in diagnosis of MI is about 90%.⁸ Although its specificity is less than some of the other cardiac markers but still it can be used for prognosis and diagnosis of myocardial infarction especially the reinfarction because of its speedy decline to base line as compare to other cardiac markers.⁹

Few studies have established gender and ethnic differences for the levels of CK-MB.¹⁰ The purpose of this study was to compare the levels of CK-MB in male and female acute myocardial infarct patients before and after the treatment. The results of this study will suggest the gender showing prolong rise in the CK-MB levels should undergo aggressive therapy as many studies have suggested it as prognostic marker of myocardial damage.

MATERIAL AND METHODS

The study was conducted on sixty patients who were divided into two groups; each group included thirty men and thirty women (having age of forty years and above), diagnosed as cases of AMI. The study was performed at Faisalabad Institute of Cardiology, Faisalabad from March 2014 to September 2014 after approval of the ethical committee. The diagnosis of AMI was established on the basis of clinical criteria; acute chest pain, significant ECG changes and elevation of cardiac enzymes including CK-MB. From each patient three blood samples were collected, first sample was collected before the start of drug therapy. Second and third samples were collected after 24 and 48 hours of the treatment. Same treatment was given to both male and female patients. Those patients who had taken the treatment (single or multiple drugs) before presenting to the emergency department or even before taking the blood samples, who were decided to treat with different drugs and patients with renal diseases,

acute stroke and myopathy were excluded from the study.

Serum CK-MB was determined by using commercially available kit of Roche (Private) Ltd, US. The levels of CK-MB for both male and female patients before treatment were compared with the levels after 24 and 48 hours of treatment. The levels of CK-MB were considered high when they were found to be raised than the reference values of the kit.

STATISTICAL ANALYSIS

Data was entered and analyzed by using SPSS 18.0. Mean and standard deviation were used as descriptive measures. Independent sample t-test was used to compare means of CK-MB levels before and after the treatment. P-value ≤ 0.05 was considered statistically significant.

RESULTS

The results of the study showed that the mean of CK-MB levels was high in male patients before treatment as compared to female patients with p-value <0.01 . When the mean of CK-MB levels of male patients after 24 hours of therapy was compared with the mean value of female patients; a significant difference was found with p-value <0.01 . Similarly the comparison of mean CK-MB levels of both male and female patients after 48 hours of treatment were also found to be statistically significant with p-value <0.01 (Table 1).

Gender	Before	After 24 hours	After 48 hours
Male	76.25 \pm 1.72	128.44 \pm 2.74	98.34 \pm 4.57
Female	21.15 \pm 1.73	90.65 \pm 1.68	53.90 \pm 5.69
P-value	<0.01	<0.01	<0.01

Table-I. Mean serum CK-MB (ng/ml) \pm SD of male & female patients before and after the therapy

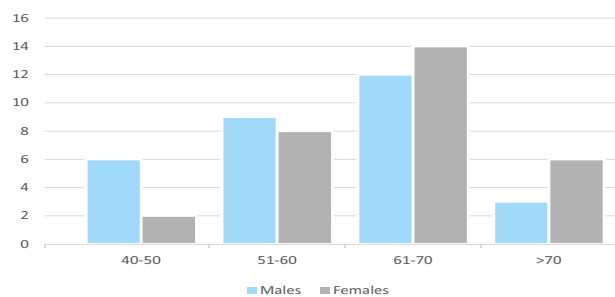


Figure-1. Age wise distribution of male & female patients

DISCUSSION

The current study to our knowledge represents the first study of comparing the levels of CK-MB in male and female acute myocardial infarct patients before and after the treatment. The levels of CK-MB before treatment was high in male as compared to female patients. Similarly comparison of CK-MB levels after 24 and 48 hours of treatment were also found to be significantly higher in male patients.

CK-MB levels also play a significant role in the differential diagnosis and monitoring of MI patients.¹¹ The guidelines of the National Academy of Clinical Biochemistry (NACB) recommend the use of cardiac troponin (cTn) as the preferred marker for diagnosis of myocardial infarction (MI) but it also appreciate the CK-MB concentration as an acceptable alternative in cases when cardiac troponin is not available.¹²

Cardiac muscles are the primary source of CK-MB comprising of 40% while less than 2% is present in skeletal muscles, therefore, CK-MB fraction is more specific for cardiac muscle.¹³ Myocardial damage results in elevated CK-MB levels. Although, now a days troponin assays are preferred in the workup of many patients with acute chest pain but CK-MB is still useful if the initial troponin determination is abnormal or if there is suspicion of reinfarction.¹⁴

The European Society of Cardiology/American College of Cardiology consensus document notes that in the clinical setting of a reinfarction, CK-MB may be more beneficial in monitoring of AMI because CK-MB remains elevated for only 2–4 days after an AMI where as other biomarkers remain high for prolong periods, so subsequent elevations are suggestive of another cardiac event.¹⁵

Some studies also reported the correlation of CK-MB levels and myocardial damage; high levels of CK-MB in an AMI patients indicates significant myocardial damage and vice versa. Study on 11,725 patients with a 6-month follow up have described that even slight elevations of CK-MB seem to have important and independent prognostic implications. Similarly another study

also suggested that CK-MB concentration in serum after an AMI is an independent predictor for both the short and long term cardiac outcomes. But still some researchers believe that combination of markers of myocardial necrosis, such as admission TnT (or troponin I) along with admission CK-MB would be expected to have more prognostic information compared to a single marker.¹⁶

CONCLUSION

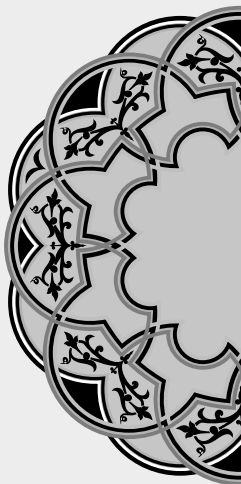
CK-MB levels were high in male acute myocardial infarct patients before and after the treatment as compared to the female patients. Sustained increase of CK-MB levels even after the treatment is suggestive of aggressive therapy for male patients. However more work is still needed to confirm the correlation between elevated or sustained elevated levels of CK-MB and myocardial damage.

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REFERENCES

1. **Myocardial Infarction.** <http://emedicine.medscape.com/article/155919-overview> (accessed 6 October 2016).
2. Aljefree N, Ahmed F. **Prevalence of cardiovascular disease and associated risk factors among adult population in the gulf region: A systematic review.** *Advances in Public Health.* 2015: 1-25
3. Iqbal R, Jahan N, Hanif A. **Epidemiology and Management Cost of Myocardial Infarction in North Punjab, Pakistan.** *Iran Red Crescent Med J.* 2015; 17(7): 1-7.
4. Sonia S. et al. **Risk factors for myocardial infarction in women and men: insights from the INTERHEART study.** *Eur Heart J.* 2008; 29: 932–40
5. Al-Hassan RB. **Significance of total creatine kinase and creatine kinase-MB levels in patients with acute myocardial infarction.** *Int J Biol Med Res.* 2011; 2(3): 762-65.
6. **Elevated creatine kinase.** <https://www.healthgrades.com/symptoms/elevated-creatin-kinase> (accessed 8 october 2016).
7. Santos ES, Baltar VT, Pereira MP, Minuzzo L, Timerman A, Avezum A. **Comparison between cardiac troponin I and CK-MB mass in acute coronary syndrome without ST elevation.** *Arq Bras Cardiol.* 2011; 96(3): 179-87.

8. Al-Hadi HA, Fox KA. **Cardiac markers in the early diagnosis and management of patients with acute coronary syndrome.** Sultan Qaboos Univ Med J. 2009; 9(3): 231–46.
9. **Markers of myocardial infarction.** <http://www.pathologystudent.com/?p=1372> (accessed 15 december 2016).
10. Strunz CM, Araki LM, Nogueira AR, Mansur AP. **Gender differences in serum CK-MB mass levels in healthy Brazilian subjects.** Braz J Med Biol Res. 2011; 44(3): 236-39.
11. AlGani FA. **Significance of total creatine kinase and creatine kinase-MB levels in patients with acute myocardial infarction.** Int J Biol Med Res. 2011; 2(3): 762-65.
12. Fleming JJ, Janardhan HP, Jose A, Selvakumar R. **Anomalous Activity Measurements of Creatine (Phospho) Kinase, CK-MB Isoenzyme in Indian Patients in the Diagnosis of Acute Coronary Syndrome.** Ind J Clin Biochem. 2011; 26(1): 32–40.
13. **Myocardial infarction.** <http://library.med.utah.edu/WebPath/TUTORIAL/MYOCARD/MYOCARD.html> (accessed 4 January 2017).
14. Mair J, Artner-Dworzak E, Dienstl A, et al. **Early detection of acute myocardial infarction by measurement of mass concentration of creatine kinase-MB.** Am J Cardiol 1991; 68:1545-50.
15. Apple FS, Murakami MM. **Cardiac Troponin and Creatine Kinase MB Monitoring during In-Hospital Myocardial Reinfarction.** Clin Chem. 2005; 51(2):460-63.
16. Kazmi, K., Iqbal, S., Bakr, A., Iqbal, M. **Admission creatine kinase as a prognostic marker in acute myocardial infarction.** J Pak Med Assoc. 2009; 59(12), 819-22.



“Nothing makes a women more beautiful than the belief that she is beautiful.”

Sophla Loren

AUTHORSHIP AND CONTRIBUTION DECLARATION

Sr. #	Author-s Full Name	Contribution to the paper	Author=s Signature
1	Dr. Attia Anwar	Conception and design, acquisition of data, important intellectual content and final approval of the version	
2	Dr. Rizwan Faisal	Conception and design, acquisition of data, important intellectual content and final approval of the version	
3	Asifa Sharif	Literature search, Analysis and interpretation of data, revising the data critically for important intellectual content	