

SERUM MYOGLOBIN AS AN EARLY DIAGNOSTIC TEST IN ACUTE MYOCARDIAL INFARCTION

Cardiology

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ABSTRACT

Acute Myocardial Infarction is one of the leading causes of death worldwide with the prevalence of approximately three million people. In this study we have investigated Biomarkers like Serum Myoglobin, Creatine kinase MB, Lactate Dehydrogenase in Acute Myocardial Infarction within four hours and after four hours of chest pain. The possible role of Serum Myoglobin as an early indicator of Acute Myocardial Infarction. To determine if there is significant elevation of Serum Myoglobin less than four hours of Acute Myocardial Infarction and to compare it with other biomarkers of Acute Myocardial Infarction. It is a case control study done among a study population of 80 patients presenting to Emergency department of Government Theni Medical College Hospital with complains of chest pain. The study population was divided into two groups, Cases are 40 patients with chest pain less than 4 hours of duration and Controls are 40 patients with chest pain more than 4 hours of duration. Median Age group of patients in this study was between 51 to 60 years. Sig (2-tailed) test showed statistically significant difference in all groups namely Serum Myoglobin, Creatine kinase, Lactate Dehydrogenase distribution in cases and controls with p value < 0.05. According to the present findings in our study, the earliest Serum marker to be elevated in the case of Acute Myocardial Infarction is Serum Myoglobin. As it is not a specific marker, it can be combined with Biomarkers like Creatine Kinase and Lactate Dehydrogenase to identify AMI at the earliest.

KEYWORDS

Acute Myocardial Infarction, Myoglobin, Creatine Kinase, Chest pain, Lactate Dehydrogenase.

INTRODUCTION

The leading cause of morbidity and mortality in the world is Acute Myocardial Infarction.^[1] About 20% of patients visiting Emergency department are found to be suffering from Acute MI. Acute myocardial infarction diagnosis is based on clinical history and typical electrocardiographic evidence namely significant ST segment elevation with T wave changes, development pathological q waves^[3]. As ECG changes may vary over time and due to non cardiac reasons, biochemical cardiac markers are gaining importance as valuable diagnostic tool^[2].

OBJECTIVES:

- To detect serum myoglobin and other biomarkers in acute myocardial infarction.
- To determine if there is significant and specific elevation of Myoglobin less than four hours of onset of Acute Myocardial Infarction.

MATERIALS AND METHODOLOGY:

The case control study was carried out among those attending Emergency department during the period January to May in Government Theni Medical college hospital. 40 early presentation of Acute myocardial infarction patients (< 4 hours) and 40 early presentation of Acute myocardial infarction patients (> 4 hours) of same age group were included in the study.

The exclusion criteria were people suffering from muscle injury, recent strenuous exercise, electric shock and taking certain drugs like statin and sulfonylureas. After getting informed consent, using a semi structured questionnaire, detailed medical history was taken. 3 ml of venous blood sample was collected for biochemical analysis of serum Myoglobin, Creatine kinase MB and Lactate Dehydrogenase.

Statistical Analysis:

Data entry was made in the Microsoft Excel software in codes and analysis was done with SPSS-24 computer package. Categorical variables are expressed as percentages whereas continuous variables are expressed as mean $\pm$ standard deviation. Association between categorical variable was found by **chi-square test** and relationship between continuous variable was assessed by **Student's t-test**. P value < 0.05 was considered as statistically significant.

RESULTS:

Age group distribution of cases and controls

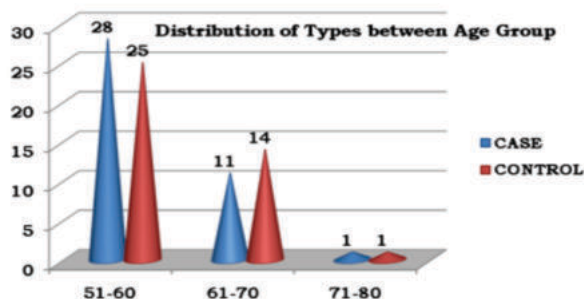


Figure 1: Age group distribution of cases and controls

Table – 1 Age group distribution of cases and controls

Types	Myoglobin		Total
	0-60 ng/ml	Above 61 ng/ml	
CASE	0	40	40
CONTROL	40	0	40
Total	40	40	80

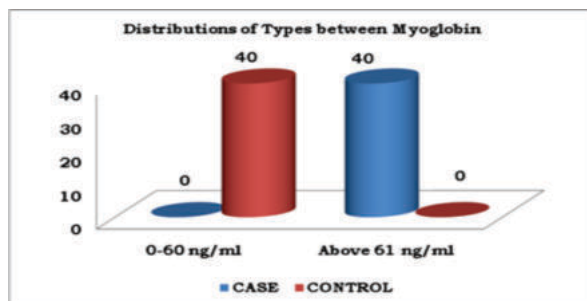


Figure 2: Serum Myoglobin distribution of cases and controls

Table – 2 Serum Myoglobin distribution of cases and controls

Types	Level of CK MB (U/L)		Total
	< 25 U/L	≥ 25 U/L	
CASE	39	1	40
CONTROL	1	39	40
Total	40	40	80

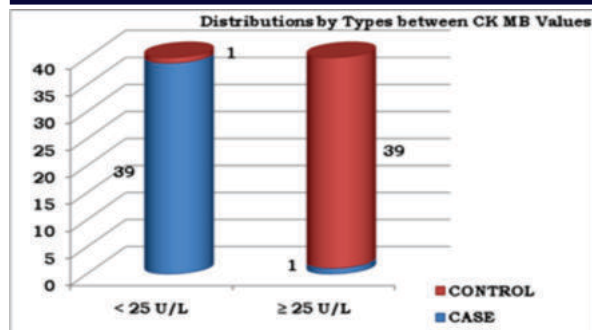


Figure 3: Serum CK-MB distribution of cases and controls

Table – 3 Serum CK-MB distribution of cases and controls

Types	Level of Serum LDH (U/L)			Total
	Below 224 U/L	225 – 450 U/L	Above 451U/L	
CASE	24	15	1	40
CONTROL	3	6	31	40
Total	27	21	32	80

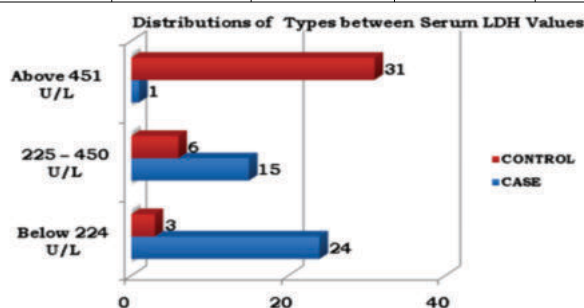


Figure 4: Serum LDH distribution of cases and controls

Table – 3 Serum LDH distribution of cases and controls

Myoglobin				
Types	Mean ± Std.Deviation	df	F - Value	Sig (2 Tailed)
Case	983.85 ± 787.66	78	297.14	0.001
Control	29.36 ± 11.35			

As per the above table, Case and Control between Myoglobin is Probability Value is P=0.001 and P value of < 0.05. This is statistically significant.

CK MB				
Types	Mean ± Std.Deviation	df	F - Value	Sig (2 Tailed)
Case	8.9 ± 22.10	78	98.707	0.001
Control	216.8 ± 165.07			

As per the above table, Case and Control between CK MB Values is Probability Value is P=0.001 and P value of < 0.05. This is statistically significant.

SERUM LDH				
Types	Mean ± Std.Deviation	df	F - Value	Sig (2 Tailed)
Case	240.25 ± 158.34	78	22.69	0.001
Control	1113.98 ± 1250.82			

As per the above table, Case and Control between SERUM LDH Values is Probability Value is P=0.001 and P value of < 0.05. This is statistically significant.

Case Study

In the present study, effect of crumb rubber as fine aggregate replacement on the compressive strength of concrete having mix proportions of 1:1.31:1.14 was investigated. The percentages of replacements were 0%, 10%, 20% and 30% by weight of fine aggregate. Tests were performed for compressive strength or all replacement levels of crumb rubber at different curing periods (7-days & 28-days).

DISCUSSION

Elevated myoglobin levels were detected earlier in the serum than levels of CPK-MB and LDH. This study clearly states that Serum Myoglobin is elevated in AMI much earlier than CK-MB and LDH, as

early as one hour after the onset of chest pain. In some patients, chest pain may be the only early indication of AMI heralding ultimate cell necrosis in the absence of significant ECG changes^[4,5]. As many as 40% of individuals with autopsy proven AMI have non diagnostic ECG initially^[8].

Therefore, this knowledge of the diagnostic performance of myoglobin measurement is very valuable in treating patients who have nondiagnostic electrocardiograms and normal cardiac levels of troponin I values at presentation.

The release of intracellular proteins that are used as cardiac markers from injured myocardial cells is dependent on Size of the protein, Regional myocardial blood flow and Lymphatic drainage^[6,7,9]. Hence Myoglobin (17000 Da) appears more rapidly in plasma than CPK (82000 Da) and LDH (135000 Da)

CONCLUSIONS

The data from this study shows that the earliest serum marker to be elevated in case of acute myocardial infarction is serum Myoglobin.

Though not a specific marker it is sensitive and when combined with other markers like Troponin I, CK-MB and LDH it definitely can identify AMI at the earliest.

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