ISSN : 2350-0743

www.ijramr.com

International Journal of Recent Advances in Multidisciplinary Research
Vol. 02, Issue 09, pp.0737-0739, September, 2015

RESEARCH ARTICLE

STUDY OF ROLE OF SERUM CARDIAC MARKERS IN MYOCARDIAL INFARCTION

[1,*]Dr. Chelmakuri Gayathri and [2]Dr. M. Venkateshwarlu

Department of Biochemistry, Rajiv Gandhi Institute of Medical Sciences, Kadapa

ARTICLE INFO

Article History:
Received 19th June 2015
Received in revised form
22nd July, 2015
Accepted 28th August, 2015
Published online 30th September, 2015

Keywords:
Acute myocardial infarction,
Cardiac markers,
Reperfusion.

ABSTRACT

Background: Acute Myocardial Infarction (AMI) has become one of the major causes of mortality in the world at present, and it is for this reason various researches are being done for its diagnosis and prognostic assessment. Serum enzyme estimation is an important tool for it.
Aim: To study changes in serum cardiac markers, after acute attack of MI Before & 2 hours after reperfusion and to establish usefulness of enzymes in early diagnosis of AMI.
Methodology: A study of changes in serum cardiac markers CK-MB, LDH and AST, after acute attack of MI-before and 2 hours after reperfusion was conducted at govt. hospital. Total 100 patients were studied. All the patients were confirmed cases of AMI, admitted in the intensive care unit of Government General Hospital, Rajiv Gandhi Institute of Medical Sciences, Kadapa. Blood samples were collected in plain bulb, at the time of admission and at 90 minutes (i.e. after reperfusion) and enzyme estimation was done for all 3 enzymes.
Result: It was found that the serum CK-MB is the first and earliest enzyme released in compare to AST and LDH, and after reperfusion it increases 6-7 folds. The mean levels of all enzymes were higher after reperfusion, suggestive of good prognosis in case of early reperfusion after an attack of AMI.

INTRODUCTION

Acute myocardial infarction (AMI) is one of the most common diagnoses in hospitalized patients in industrialized countries. The early (30 days) mortality rate from AMI is approximately 30%, with more than half of these deaths occurring before the individual reaches the hospital. (Fauci) So it has become one of the major causes of mortality in the world at present, and it is for this reason various researches are being done for its diagnosis and prognostic assessment. Serum enzyme estimation is an important tool for it. Acute Myocardial Infarction signifies sudden necrosis or death of a portion of cardiac muscle due to Inadeqate blood supply (Shanthilal Shaw *et al*., 1988). Myocardial infarction results from prolonged myocardial coronary thrombus at the site of a preexisting atherosclerotic stenosis (Forestar J. S *et al.*, 1984). In recent years, the incidence of myocardial infarction (MI) has increased in the population because of change in life style, urbanization, and increase in mental stress, inadequate physical exercises and diet rich in lipids. It has also been observed that there is sudden increase in AMI in young subjects mostly in second & third decades of life, who show increased morbidity & mortality. Hence, this will become a dreadful condition for the coming years. (Ramzi *et al.*, 1994; Shashtri, 1992) It becomes very much necessary for us to diagnose AMI as quickly as possible. In past years, there was a little interest in the early diagnosis of MI because it was thought that duration of symptoms had negligible impact on the hospital management strategy.

Corresponding author: Dr. Chelmakuri Gayathri,
Department of Biochemistry, Rajiv Gandhi Institute of Medical Sciences, Kadapa.

However, the attitude changed in last few decades, after the publication of major mortality studies of thrombolytic therapy which showed that not only the treatment improves the prognosis but also that if it was given earlier after the onset of symptoms then much better benefit was obtained. Accuracy of ECG diagnosis of AMI is not more than 80% and it is often found that in cases of early AMI the ECG could be normal. So the enzyme estimation has become of immense utility in early diagnosis. For specific diagnosis, combination of several enzymes is used. Aspartate amino transferase was discovered in 1937 by Braunstern, who named it amino transferase and a practical method for its determination was made in 1951. Diagnostic value of AST for AMI was introduced into clinical practice by La Due et al (1952). (Vurton *et al.*, 1972; Banerjea, 1968; La Due *et al*., 1954) Because of greater specificity for heart, measurement of lactate dehydrogenase and lactate dehydrogenase isoenzymes replaced AST estimation. (La Due *et al*., 1954; Vasudevan *et al.*, 1978) However, the rapid appearance of creatinine kinase (CK) in the serum after AMI and improved specificity for myocardial injury provided by measurement of the MB isoenzyme quickly established CK-MB as the marker of choice (Hess, 1963). The current WHO criteria for the diagnosis of AMI include the presence of two of the following criteria.

- Clinical symptoms compatible with acute ischemia.
- ECG abnormalities.
- A pattern of enzyme release typically of myocardial injury (Bernard Henry, 1997).

Aim & Objectives

The aims and objectives of this study is to assess the

effectiveness of therapy in patients of Acute Myocardial Infarction**.**

- To study changes in serum cardiac markers after acute attack of MI before & 2 hours after reperfusion.
- To determine the earliest release of each enzyme after an attack of AMI.
- To establish usefulness of enzymes in early diagnosis of AMI.
- To evaluate the role of reperfusion on enzyme release after an attack of AMI.

MATERIALS AND METHODS

A study of changes in serum cardiac markers CK-MB, LDH and AST, after acute attack of MI-before and 2 hours after reperfusion was conducted at Department of Biochemistry, Rajiv Gandhi Institute of Medical Sciences, Kadapa. Total 100 patients were studied. All the patients were confirmed cases of AMI, admitted in the intensive care unit of Government General. Hospital, Kadapa. Detailed history, clinical findings, ECG findings, whether or not thrombolytic therapy received, and enzyme studies of all patients were collected. The diagnosis was based upon the ECG findings, complains and other relevant clinical findings. Serum estimation of creatine-kinase MB (CK-MB), aspartate amino transferase (AST) and lactate dehydrogenase (LDH) was done. Blood samples were collected in plain bulb, at the time of admission and at 90 minutes (i.e. after reperfusion). Patients were divided into 3 groups, according to the time of admission for the first sample only.

Group A: Those admitted within 6 hours of onset of chest pain.
Group B: Those admitted between 6-12 hours, after the onset of chest pain.
Group C: Those admitted after 12 hours of chest pain.

All patients were thrombolysed in ICCU, mostly with inj. Streptokinase. The serum level of CK-MB was determined by the commercially available kit manufactured by Reckon Diagnostic. The reference range for CK-MB with this kit is 0-25 IU/L. The serum level of AST was determined by the commercially available kit manufactured by Aggappe Diagnostics. The reference range for AST with this kit is 0-37 U/L. The serum level of LDH was determined by the commercially available kit manufactured by Reckon Diagnostics Ltd. The reference range for LDH with this kit is 230-460 U/L.

RESULTS AND DISCUSSION

It is evident from the above table that majority of patient were admitted within first six hours of onset of chest pain. However three patients had delayed admission beyond 12 hours, even up to 36 hours. Table 2 shows mean value of CK-MB of 100 patients at the time of admission is 117.219, which is increased after reperfusion significantly to 522.605. The mean value of difference value of CK-MB at time of admission and after reperfusion is 427.086. Table 3 shows that mean value of LDH of 100 patients at the time of admission is 452.02, which is increased after reperfusion significantly to 1284.047.

Table 1: Distribution of patients based on duration of chest pain at the time of admission

Time of admission	Male	Female	Total
Group A:			
0-6 hrs (including 6th hour)	59	14	73
Group B:			
6-12 hrs After 6 hrs	19	5	24
Group C:			
i) At 15 hrs	1	0	
ii) At 18 hrs	1	0	3
iii) At 36 hrs	1	0	
Total	81	19	100

Table 2. Levels of CK-MB among patients

Time of sampling	Sample Size	Mean Value	Mean of Diff Between CK-MB Value at Time of Admission & afterReperfusion	SD	T	P
At time of Admission	100		427.08	187.5	22.77	<0.001 Highly
After 90 min (after reperfusion)	100	522.60				Significant

Table 3. Levels of LDH among patients

Time of sampling	Sample Size	Mean Value	Mean of Diff Between AST Value at Time of Admission & after reperfusion	SD	T	P
At time of Admission	100	452.02	788.34	461.82	17.07	<0.001
After 90 min (after reperfusion)	100	1284.04				

Table 4. Levels of AST among patients

Time of sampling	Sample Size	Mean Value	Mean of Diff Between AST Value at Time of Admission & after reperfusion	SD	T	P
At time of Admission	100	55.253	120.345	82.48	14.59	<0.001
After 90 min (after reperfusion)	100	179.38				

Table 5. Mean values of all enzymes

Enzymes	Mean value	
	At time of Admission	At 90 min(after Reperfusion)
CK-MB	117.219	522.605
AST	55.253	179.386
LDH	452.02	1284.047

The mean difference value of LDH at time of admission and after reperfusion is 788.342 which were highly significant. (t value 47.0, $p<0.001$).

Table 4 shows that mean value of AST of 100 patients at the time of admission is 55.253, which is increased after reperfusion significantly to 179.386. The mean difference value of AST at time of admission and after reperfusion is 120.345, which was highly significant. (t value14.59 ,$p<0.001$)

Table 5 shows that after reperfusion the mean values of all enzymes rises 3 to 5 times, which signifies successful reperfusion.

Conclusion

The CK-MB level increases rapidly after reperfusion, which is 5-6 times more as compared to CK-MB level before reperfusion. The AST and LDH levels increase not so fast as CK-MB level after reperfusion. This is 2-3 times more as compared to AST and LDH levels before reperfusion, but it is also significant statistically.

Hence, at the end of study regarding the serum enzymes in AMI, some important conclusions were derived: Serum CK-MB is the first and earliest enzyme released in compare to AST and LDH, and after reperfusion it increases 6-7folds. The mean levels of all enzymes were higher after reperfusion, suggestive of good prognosis in case of early reperfusion after an attack of AMI. Thus, enzyme evaluation is a convenient and non-invasive method for diagnosis of MI.

REFERENCES

Banerjea, J. C. and De, T. K. 1968. Evaluation of serum enzymes studies w.s.r. to serum histaminases in early diagnosis of AMI. Indian Heart Journal1968; 31:369-375

Eugene, Braunwald. Heart disease. A text book of cardiovascular medicine. 5th ed. Prism Saunders; 1996. pp1185-1208

Fauci, Braunwald, Kasper, Hauser, Longo, Jameson, Loscalzo. Harrion's principles of Internal medicine. 16th ed. Mc Graw Hill; pp1448

Hess, J. W. MacDoral, R. R. 1963. Serum creatine phosphokinase, Mitch. Medicine, 62:1095.

John Bernard Henry, 1997. Clinical diagnosis and management by laboratory methods. Nineteenth Edition, W.B. Saunders Companym 268-290.

La Due, J. S., Roblewski, F. 1954. Karman A.: Serum glutamic oxaloacetic transaminase activity in human acute transmural myocardial infarction. Sience, 120: 499, Quoted by Ref No.6,7.

Ramzi, S.. Cotran, Vinay Kumar, Stanley Robbins, 1994. Pathologic basis of disease, 5th ed. prism publishers; pp524-534

Shashtri, K. H. 1992. Coronary heart disease; Practical book of preventive and Social Medicine, 1st ed. Prism publishers;pp3-28

Vasudevan, G. Mercer, D. W., Varat M. A. 1978. lactic dehydrogenase isoenzyme determination in diagnosis of acture myocardial infarction circulation, 57: 1055-1057.

Vurton, W., Sobel and William E. Shell. 1972. Serum enzyme determination in diagnosis and assessment of myocardial infarction, circulation; pp14, 471

****