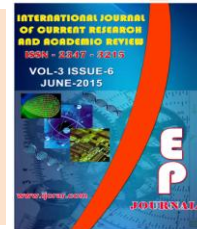




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Ischemia modified Albumin and C-Reactive protein is a novel markers for Myocardial Infarction

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KEYWORDS

Myocardial Infarction, C-Reactive Protein and Ischemia Modified Albumin

A B S T R A C T

The purpose of this study is to investigate the diagnostic and prognostic value of certain acute phase proteins in serum and plasma of cases of acute myocardial infarction. Myocardial infarction is the catastrophic frequently fatal form of ischemic heart disease that results from precipitous reduction or arrest of a significant portion of the coronary flow. Acute myocardial infarction was studied in three groups depends on with or without associated complications. in all three groups, mean serum levels of Ischemia Modified albumin and C-reactive protein on first day is higher than the mean serum control group. The serum levels of IMA show a definite increase in within 6 to 7 hours and CRP levels were significantly increased in seventh day compared with other previous days. IMA and CRP is an useful index, not only in the diagnosis and prognosis, but also in some critical situations of taking some important decision.

Introduction

Ischemia heart disease is the most widespread health problem over the age 35. The death rate due to coronary artery disease is increasing in developing countries¹. The diagnosis and inability to predict prognosis, poses difficult problem, because of a non-availability of specific and sensitive laboratory tools. The magnitude of this problem dictates that many medical personnel are involved in some aspects of recognition and treatment of ischemic heart

disease, of which myocardial infarction is the most important one².

Once the myocardial infarction has set in, it may take up any of the several pathways. The first and foremost is sudden cardiac death. The incidence of which is 20-25%. If the patient reaches the hospital in a stable condition and has no extension of infarction, 75 – 80% chances of surviving the attack³. However the first one week may be smooth

recovery or may be marked by a number of complications^{4,5}.

CRP is an extracellular protein synthesized mainly in the hepatocytes. A sub population of lymphocytes are said to have endogenous CRP on their surface membranes⁶. The secretion rate is low in healthy subjects and no hepatic store exists. CRP is considered to constitute a link in one mechanism for eliminating necrotic cells and foreign particles in the body. CRP is the fastest reacting and most sensitive indicator of an acute inflammatory reaction, increase observed within 6 hours⁷. CRP increase is several fold in slight tissue lesion and hundred fold in severe tissue lesion. Myocardial necrosis is a potent stimulus for increased CRP production. CRP is the most responsive and therefore most sensitive indicator of tissue damage caused by myocardial infarction⁸.

Materials and Methods

CRP kits were purchased from Immune Diagnostic kits, USA. Ischemia Modified Albumin and All the other chemicals used were of analytical grade.

Experimental Design

Forty two patients in the age group of 45-70 admitted in the intensive care unit of Meenakshi Medical College Hospital And Research Institute, Kancheepuram, India for the study.

This includes 30 male patients with acute myocardial infarction in whom a provisional diagnosis was made with specific change in electrocardiogram, indicating acute myocardial infarction. The remaining twelve patients, including two females were cases of angina, without specific electrocardiographic changes.

The patients were divided into three groups are included

Group-I-Patients were ultimately discharged in good condition

Group-II-Patients were admitted with myocardial infarction.

Group-III-Patients with myocardial infarction, associated with one or more complications and ultimately resulted in death.

Ethical concern

Ethical clearance was obtained from the Ethical committee meeting conducted at Meenakshi Medical College and Hospital, Kancheepuram, India.

Biochemical analysis

Ischemia Modified Albumin was estimated according to the method of Bar-Or *et al.*, (2001) and C-Reactive Protein were estimated according to the method of Levinger *et al.*, (1958).

Results and Discussion

C-Reactive proteins in myocardial infarction patients

Table.1 Shows the variation in mean serum level of CRP during the study in the three different groups.

In all three groups, mean serum level on first day is higher than the mean serum level of control group. Peak levels are seen on the third day, in all three groups when group –I and Group-II shows a decline in the mean serum level after 3 days, persistent elevation is seen in Group-III.

Ischemia modified albumin in myocardial infarction patients

Table.2 shows the variation in mean serum level of Ischemia Modified Albumin during the study in the three different groups.

In all three groups, mean serum level on first day is higher than the mean serum level of control group. Peak levels are seen on the third day, in all three groups when group –I and Group-II shows a decline in the mean serum level after 3 days, persistent elevation is seen in Group-III.

C-Reactive Protein: from the table.1 has been observed that CRP is the most responsive and sensitive index, not only in diagnosis, but also to differentiate those cases of acute myocardial infarction without

complications and those associated with complications. Mean serum CRP levels in Group III shows a significant increase than the mean serum levels in Group-II thus indicating that CRP estimation, may serve as a specific criterion for prognosis. The persistent elevated mean serum level (256.9 ± 29.89) on the third day and the mean serum level (203.0 ± 55.35). because after uncomplicated myocardial infarction, CRP should decline after third day and failure in fall of CRP levels, indicates inter current complications, which require investigations.

Three interesting Cass in our present study provides the potential value of regular monitoring of CRP as an useful index for taking some important decisions/ 2 cases belong to Group-III both males. 65 years and 60 years old respectively

Table.1

Particulars	Group-I	Group-II	Group-III
First day	139.75 \pm 51.28	148.7 \pm 40.67a*	141.0 \pm 39.05b*
Third day	199.1 \pm 55.35	201.3 \pm 52.17a@	203.0 \pm 55.35b@
Seventh day	241.3 \pm 41.23	229.5 \pm 44.36a*	256.9 \pm 29.89a*

Each value is expressed as mean \pm SD for six rats in each group.

a: as compared with Group I

b: as compared with Group II

Statistical significance: * p<0.001; @ p<0.01; # p<0.05.

Table.2

Particulars	Group-I	Group-II	Group-III
First day	82.4 \pm 4.1	96.4 \pm 10.2a*	106.0 \pm 10.05b*
Third day	85.2 \pm 4.9	109.3 \pm 10.6a@	121.2 \pm 12.5b@
Seventh day	86.1 \pm 5.4	115.3 \pm 11.3a*	126.4 \pm 12.8a*

Each value is expressed as mean \pm SD for six rats in each group.

a: as compared with Group I

b: as compared with Group II

Statistical significance: * p<0.001; @ p<0.01; # p<0.05.

Ischemia modified albumin (IMA) is a new marker of transient myocardial ischemia. IMA is measured by the Albumin Cobalt Binding (ACB) test, which measures the binding capacity of exogenous cobalt to the N-terminus of human albumin⁹. In the presence of myocardial ischemia, structural changes take place in the N-terminus of albumin that rapidly reduce its binding capacity for transition metal ions. These changes in the N-terminus of human albumin are attributed, among other factors, to ischemia/reperfusion mediators, hypoxia, and acidosis¹⁰. Studies have shown that IMA is highly sensitive for the identification of ACS and, in combination with the ECG and troponin, has both high sensitivity and negative predictive value. IMA has also been shown to be elevated in patients after coronary angioplasty as a result of ischemia reperfusion injury¹¹.

IMA has been shown to rise within minutes after the onset of ischemia, stay elevated for 6 to 12 hours, and return to normal within 24 hours. Furthermore, IMA has been shown to predict with high sensitivity subsequent elevation in the Tns in the clinical setting^{12,13}. Blood levels of IMA rise in patients who develop ischemia during percutaneous coronary intervention¹. IMA levels during balloon angioplasty are related to number, pressure, and duration of inflations, suggesting that IMA reflects the magnitude and duration of ischemia induced during percutaneous coronary intervention and is not simply a marker of free radical damage^{14,15}.

Statistical analysis

For statistical analysis, one way analysis of analysis of Variance (ANOVA) was used, followed by the Newman-Keuls Multiple Comparison test.

Conclusion

From the present study, estimation of serum CRP and Ischemia Modified Albumin is an useful index, not only in the diagnosis and prognosis, but also in some critical situations of taking some important decisions like assessment of condition of the patients for transfer from coronary unit or for discharge. Ischemia Modified Albumin and C- Reactive Proteins is novel marker for myocardial infarction.

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