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Study of High Sensitivity C - reactive protein in Acute Myocardial Infarction

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ABSTRACT

Background: To estimate the levels of high sensitivity C-reactive protein (hs-CRP) in clinically diagnosed patients with myocardial infarction and its role in predicting in-hospital morbidity and mortality. **Methods:** It is an observational prospective study conducted on 50 Myocardial infarction patients who were admitted to ICCU/CCU of BLDE (DU) Shri B.M Patil Medical college Hospital and Research center, Vijayapura from November 2017 to June 2019.Information was collected through prepared proforma from each patient. **Results:** Among 50 Acute myocardial infarction (AMI) patients, 98% patients had an elevated hs-CRP at the time of admission. The values of hs-CRP showed a significant difference between times frames 6,24 and 48hrs and the difference increased as the time progressed. 8 patients developed complications and 2 patients died. The mean hs-CRP levels at the time of admission in patients with complications was 4 ± 0.2mg/dL, whereas among those without complication the hs-CRP levels were 2.28 ± 0.379 mg/dL. As the hs-CRP value increases left ventricular systolic function reduces. **Conclusion:** The measurement of hs-CRP can be useful as marker of Left ventricular systolic dysfunction(LVSD) in patients with AMI. Higher the serum hs-CRP levels on admission in patients of AMI the more the patient is prone for developing complications during their hospital stay.

Keywords: C - reactive protein, Myocardial Infarction.

INTRODUCTION

Acute myocardial infarction (AMI) is a major public Health problem in the developed and developing countries like India, despite progressive research in diagnosis and management over last three decades. During the last few years, major improvements have been achieved in diagnosis and treatment of patients with AMI but in spite of these developments, it remains an important event from clinical point of view.

It's becoming increasingly clear that inflammation is an important factor for AMI. Inherent to the inflammatory process is the occurrence of an acute phase response. This response is induced by pro-inflammatory cytokines, which are released from the inflamed tissue by inflammatory and parenchyma cells and stimulates the liver to synthesize a number of acute phase proteins.[1] High sensitivity C-reactive Protein (hs-CRP) is the classical acute phase reactant. Serum hs-CRP was measured in 936 initially in healthy men taken from a random population to know the association between hs-CRP levels and coronary heart disease in large populations who took part in the first MONICA Augsburg survey.[2] After 8-year follow up, study reported the significance of hs-CRP values in knowing about the prognosis and the occurrence of a first major coronary event.

Serum measurements of hs-CRP levels during clinical follow-up after acute coronary syndrome (ACS) may help to identify patients at higher risk of mortality and morbidity and predicts left ventricular remodeling and function.[3-5]

In clinical studies, circulation levels of hs-CRP were found to correlate with total infarct size and it is an indicator of underlying coronary inflammation as well as the extent of myocardial necrosis. In view of the above context, the present study was done to know the serum concentration of hs-CRP in patients of AMI.

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MATERIALS AND METHODS

A single centre prospective, randomized, observational study was conducted after getting approval from institutional ethical committee. The

information for the study was collected from 50 myocardial infarction patients who were admitted to BLDE (DU) Shri B.M Patil Medical college Hospital and Research center, Vijayapura from November 2017 to June 2019. Information was collected through prepared proforma from each patient. All patients were interviewed as per the prepared proforma and then complete clinical examination was done.

Estimation of hsCRP

5ml of venous blood is taken in a plain vacutainer at 6hrs, 24hrs and 48hrs and serum is separated , kept At 2-8degrees until analyses is carried by turbidimetric immunoassay method.

Inclusion Criteria

- Detection of a rise and/or fall of troponin values with at least 1 value above the 99th percentile URL and with at least 1 of the following.
- Patients with Symptoms of acute myocardial ischemia.
- New ischemic ECG changes.
- Development of pathological Q waves.
- Imaging evidence of new loss of viable myocardium or new regional wall motion abnormality in a pattern consistent with an ischemic etiology.

Exclusion Criteria

- Old ischemic heart disease, pericarditis, aortic dissection.
- Hematological malignancy, Hypothyroidism
- Chronic alcoholics
- Chronic kidney disease
- Chemotherapy
- Muscular dystrophy.

After completion of the study, all data were divided according to age groups and mean for each parameter is calculated and tabulated. Data was represented using Mean ±SD, and analyzed by Chi square test for association, comparison of means using t test, ANOVA and diagrammatic presentation.

Reference values of hs-CRP

<1mg/l - low risk
1-3mg/l – average risk
>3mg/l - high risk

RESULTS

Out of 50 patients, 39 were male and 11 were females. Most of the cases were between 40-60 years with mean age of 57.92.

Chest pain is predominant symptom in 64%patients followed by dyspnea in 18% and sweating in 10% and abdominal pain and vomiting in 8% of people this study. Most of the patients had inferior wall MI (36%) followed by anterior wall MI (24%) and lateral wall MI (20%).

29 patients had hypertension, 20 were smokers, 26 had LDL >100, 20 had TGL>150, HDL was <50 in 25 patients.

Patients with the mean left ventricle ejection fraction (LVEF) in patients with MI with hs-CRP >0.4mg/dl is 34.7 and in patients with hs-CRP < 0.4mg/dl is 43.4.

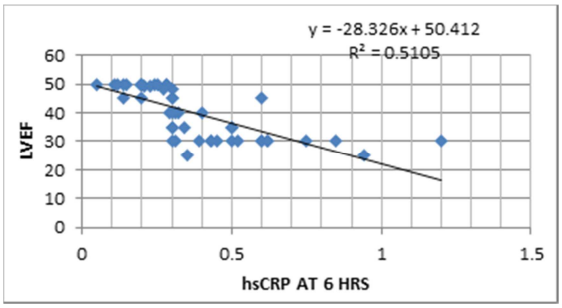

Figure 1: Pearson Correlation between Lvef and hsCRP

Mean hs-CRP levels at the time of admission in patients with complications was 4 ±0.2 mg/dL, whereas among those without complication the hs-CRP levels were 2.28 ± 0.379 mg/dL.

Table 1: comparing hscrp complications associated with AMI

Compications	No. of patients	Mean hs-CRP
No complications	40	2.28mg/dl
Cardiogenic shock (CS)	3	4.6mg/dl
Left ventricular failure (LVF)	4	5.8mg/dl
DEATH	2	6.9mg/dl
Ventricular Tachycardia(VT)	1	4.5mg/dl

The above fig clearly states that with time after infarction the hs-CRP values shows an increasing trend.

Table 2: Mean hsCRP Level between Cases

hsCRP	Cases		p value
	Mean	SD	
6hrs	0.37	0.22	<0.001*
24hrs	0.47	0.19	<0.001*
48hrs	0.56	0.22	<0.001*

Note: * significant at 5% level of significance (p<0.05)

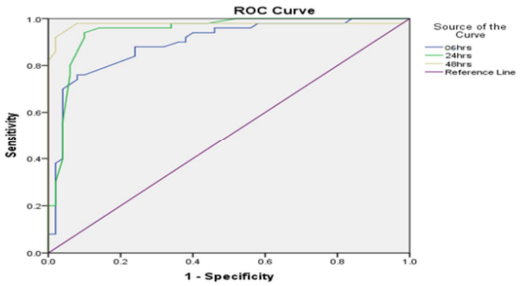

Figure 2: ROC Curve.

DISCUSSION

Out of 50 patients enrolled in this study 78% were males and 22% were females. Mean age of the population is 57.92 years.

As mentioned by Park et al. this is about a decade earlier compared to the Western developed countries. Sex distribution was similar to that described in Stamler et al.

The classical symptoms of AMI were found in 82% of patients in our study group. This was similarly described by Huggins et al.

With regard to lipid profile 40% had elevated triglycerides, 52% had elevated low density lipoprotein and 50% had lower HDL. These findings were comparable to the study carried by Goldstein et al.

hs-CRP was more than 0.6 mg/dL in 96% of population which was comparable to the study conducted by Pietila et al.

Patients with high hs-CRP showed reduced Left ventricular ejection fraction and there is a negative correlation between them. This is compared to Iwona Swiatkiewicz et al in their study on usefulness of C-reactive protein as a marker of early post-infarct left ventricular systolic dysfunction concluded that measurement of CRP plasma concentration levels may be useful as a marker of LVSD in patients after first STEMI.

When compared to other studies, our study also found similar results indicating that higher serum hsCRP levels on admission in patients with AMI are prone for developing complications during their hospital stay. Zairis et al. studied serum hs-CRP levels on admission in 319 patients of AMI and concluded that these levels predict reperfusion failure and short and long-term prognosis after ST elevation in AMI.

Tomoda et al. measured hs-CRP levels in 234 patients of AMI and suggested that these levels reflect vulnerability of culprit coronary lesion and predicted adverse coronary events after primary PTCA (percutaneous trans-coronary angioplasty) or stenting.

Pietila et al. measured hs-CRP in 23 patients with AMI. They found that in 14 patients who did not receive thrombolytic treatment there was a linear relation between infarct size and hs-CRP response. Therefore, they concluded that daily measurement of serum hs-CRP is useful in evaluating infarct size in patients with AMI, who do not receive thrombolytic therapy.

CONCLUSION

Serum hs-CRP levels are potent predictors of prognosis in patients with AMI and elevated levels of hs-CRP at the time of admission indicates a poor prognosis in patients with AMI. Hence, from our study we can conclude that, higher the serum hs-CRP levels on admission in patients of AMI the more the patient is prone for developing complications during their hospital stay.

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