ORIGINAL RESEARCH PAPER

Volume-7 | Issue-1 | January-2018 | PRINT ISSN No 2277 - 8179

INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

STUDY OF RELATIONSHIP BETWEEN hs-CRP LEVEL AND RISK OF ACUTE CORONARY SYNDROME.

Cardiology

Anil Kumar M.D. Medicine, Senior Resident, Department of Medicine, Rajendra Institute of Medical Sciences, Ranchi, Jharkhand.

Amit Kumar* Junior Resident-3 Department of Medicine; Rajendra Institute of Medical Sciences, Ranchi, Jharkhand.*Corresponding Author.

ABSTRACT

Background : The CRP protein is well known as an acute phase protein whose concentration increases as a result of inflammatory process. However, in an attempt to improve global cardiovascular risk prediction, considerable interest has focused on detection of low levels of CRP. The CRP seems indeed to be a strong predictor of vascular events. Hence aim of this study is to study hs-CRP level in acute coronary syndrome and to determine the mortality risk associated with serum level of hsCRP

Material and method : A cross-sectional observational study on 55 patients was done in indoor patients of Department of Medicine, R.I.M.S, Ranchi. The Inclusion criteria was cases of acute coronary syndrome diagnosed clinically and supported by ECG, echocardiography and cardiac enzyme. Patients suffering from chronic kidney disease and pulmonary disease were excluded from this study. Immunoturbidimetric method was used for hs-CRP detection.

Results: In our study 19 case (57.54%) is male and 14 case (42.43%) is females were at the age group (30-60), and 81.82% males and 18.18% females were more than 60 years. Out of 55 cases of acute coronary syndrome, 10.92% patient died. All patients who died had more than 3mg/l hs-CRP level.

Conclusion: Higher mean level of hs-CRP was observed when acute coronary syndrome was present.

KEYWORDS

hs-CRP(high sensitivity C-reactive protein), Acute Coronary syndrome(ACS)

INTRODUCTION :

Acute coronary syndrome is the most important cardiac event in the golden years of life and therefore needs to be understood and managed well. High sensitivity C-Reactive Protein (hs-CRP) is important investigations which has found its value in predicting the outcome of cardiovascular events in recent western literatures. Studies have shown an association of pro-inflammatory biomarkers with incident hypertension, metabolic syndrome, coronary artery disease (CAD), acute coronary syndrome (ACS), peripheral artery disease, stroke and recurrent coronary and cerebrovascular events .[1,2,3,4]

An imbalance between pro- and anti-inflammatory factors contributes to the atherosclerotic process. Inflammatory processes have an effect on the integrity of the fibrous cap in atherosclerotic plaque. Pro-inflammatory processes involving innate , adaptive immune mech anisms weaken the fibrous cap causing a predisposition towards its rupture and thrombus formation in coronary artery responsible for severity of syndrome.

If plaque rupture and thrombosis is extensive, complete occlusion of coronary artery can occur, which manifests clinically as persistent chest pain and ST segment elevation. hs-CRP are associated with cardiovascular outcome. Studies like Pravastatin Inflammation/CRP Evaluation (PRINCE) and Justification for the Use of Statins in Primary Prevention: an Intervention Trial Evaluating Rosuvastatin (JUPITER) indicate that cardiovascular benefits are more apparent when systemic inflammation reduced in terms of hsCRP reduction.[5,6] The A to Z(Aggrastat- to- Zocor) trial demonstrated that the best clinical outcomes occurred when the hsCRP levels were lowered below 2 mg/l.[7]

The CRP protein is well known as an acute phase protein whose concentration increases as a result of inflammatory process. However, in an attempt to improve global cardiovascular risk prediction, considerable interest has focused on detection of low levels of CRP. The CRP seems indeed to be a strong predictor of vascular events. Hs-CRP is generally increased in obese patient due to increase TNF alpha and IL-6 in adipose tissue. It is also elevated in hypertensive and diabetic patients. If hs-CRP is 1.0 mg/l person has low risk of any cardiovascular disease. hs-CRP level in1.0-2.0mg/l has moderate risk and patient with hs-CRP level is >3mg/l at high risk of developing cardiovascular disease[13].High-sensitivity assay techniques such as immunoturbidimetry, can detect CRP with a sensitivity range of 0.01 to 10 mg/l.[13]

Hence aim of this study is to study hs-CRP level in acute coronary syndrome and to determine the mortality risk associated with serum level of hs –CRP.

MATERIALS AND METHODS

A cross-sectional observational study was done in indoor patients of Department of Medicine, Rajendra Institute of Medical Sciences, Ranchi during the period October 2016 to September 2017 after taking informed consent.

The Inclusion criteria was cases of acute coronary syndrome diagnosed clinically and supported by ECG, echocardiography and cardiac enzyme. Patients suffering from chronic kidney disease and pulmonary disease were excluded from this study. This study consisted of 55 cases with age >30years and 60 healthy individuals as control in the age group of 30-70 years. Immunoturbidimetric method was used to determine the hs-CRP level. Measuring range was 0.15-20.0 mg/l and normal value of CRP was <1 mg/l.

RESULTS :

Out of 55 cases of acute coronary syndrome 12(21.8%)had unstable angina,19(34.5%) had NSTEMI and 24(43.6%) had STEMI. In unstable angina group, all the patients had Trop-T value <0.01ng/ml and CPK-MB level was less than 20 IU/L. In NSTEMI group and STEMI group all the patient had Trop-T value >0.01ng/ml and CPK-MB level was more than 20 IU/L.

In total of 55 patients 3(5.45%) had anterior wall,13(23.63%) had inferior wall,11(20.0%) had lateral wall and 28(50.9%) had combined pattern i.e anterior, inferior or lateral wall motion abnormality. The area of ischaemia correlated with ECG finding.

The results and observation of this study has been presented in the following tables.

TABLE –1:LEVELS OF HS-CRP IN TYPES OF ACUTE CORONARY SYNDROME

hs-CRP	Unstable angina		NSTEMI		STEMI	
1-2mg/dl	6	50.1%	7	36.82%	3	12.5%
2-3mg/dl	4	33.33%	5	26.31%	9	37.4%
>3 mg/dl	2	16.66%	7	36.87%	12	50.1%

The mean hs-CRP level in unstable angina (1.899±0.84mg/l), NSTEMI (3.13±0.93), STEMI (2.77±0.956). p value is 0.01, which is statistically significant. Most of the patients with STEMI and NSTEMI had hs-CRP values 1-2mg/l, 2-3mg/l, >3 mg/dl, putting them in as low,

moderate and high vascular risk, respectively.

In unstable angina, 50.1 % cases were in low risk, 33.33 % in moderate risk, 16.66% in high vascular risk group. In patients of NSTEMI, 36.82% were in low risk, 26.31% in moderate risk, 36.87% in high vascular risk group. In STEMI patients, 12.5% were in low risk, 37.4% in moderate risk, 50.1% in high vascular risk group.

TABLE–2:RELATION OF LEVEL OF hs-CRP WITH CLINICAL OUTCOME OF ACUTE CORONARY SYNDROME

Clinical outcome	Hs-CRP		
	1-2 mg/l	2-3 mg/l	>3 mg/l
Death	0	0	6
Survival after ACS	11	18	20

Above table shows out of 55 cases of acute coronary syndrome 10.92% died, survived during their hospital stay. All patients who died had more than 3mg/l hs-CRP level. Those who survived had hs-CRP level 1-2 mg/l in 22.44%, 2-3 mg/l in 36.73% and more 3 mg/l in 40.81%.

DISCUSSION :

According to American Heart Association and the centres for Disease Control and Prevention, hs-CRP levels of 1-2, 2 to 3, and greater than 3mg/dl are interpreted as low, moderate, and high vascular risk respectively.[8,13]

This study shows that higher mean level of hs-CRP [cases 2.69±1.023 mg/l vs control 0.509±0.187 mg/l, p≤0.0001] were observed when acute coronary syndrome was present, and this was statistically significant .The result was found to be similar to study conducted by Gazala et al 2008.[14]

Moukarbel et al carried out similar study correlating hs-CRP and complex angiographic lesions in acute coronary syndrome and noted direct association between degree of complexity in angiography with measuring hs- CRP level.[15]

David A. Morrow, et al (2006) attempted to stratify clinical outcome and complications leading to longer hospital stay and noted its association with hs-CRP.[16]

de Winter et al carried out the study correlating even higher level of hs-CRP with death and recurrent myocardial infarction and suggesting intense endothelial inflammation.[9]

Shlipak, et al. and Menon, et al concluded that increased inflammatory markers such as hs-CRP is a risk factor of cardiovascular events.[10,11]

hsCRP should be one to which both advocates and critics of the inflammatory hypothesis of atherosclerosis can adhere because it is one that can immediately improve patient care.[17]

Study by Deepak Y. Kamath et al. concluded that he normal or basal values of hsCRP are likely higher in the Indian population.[18]

A limitation of our study was that we had only one baseline CRP value and no follow-up values. However, there are studies showing that CRP concentrations are relatively constant in an individual over time and that there is no marked diurnal variation (19,20)

In our study we recorded association of higher level of hs-CRP in death cases. All patients who died had level of > 3mg/l of hs-CRP level and those who survived had hs-CRP level of 1 to 2 mg/l. Thus we conclude that higher mean level of hs-CRP was associated with more severe acute coronary syndrome and high mortality.

REFERENCES

1. Hak AE, Stehouwer CD, Bots ML, Polderman KH, Schalkwijk CG, Westendorp IC, et al. Arterioscler Thromb Vasc Biol. 1999;19:1986–91. [PubMed] 32 32 29 38 27 28 39 1/4/2018 High sensitivity C-reactive protein (hsCRP) & cardiovascular disease: An Indian perspective https:// www.ncbi.nlm.nih.gov/ pmc/articles/ PMC4669860/ 6/9
2. Hansson GK. Inflammation, atherosclerosis, and coronary artery disease. N Engl J Med. 2005;352:1685–95. [PubMed]
3. Ridker PM, Rifai N, Pfeffer MA, Sacks FM, Moye LA, Goldman S, et al. Cholesterol and Recurrent Events (CARE) Investigators. Circulation. 1998;98:839–44. [PubMed]
4. Elkind MS, Tai W, Coates K, Paik MC, Sacco RL. High-sensitivity C-reactive protein, lipoproteinassociated phospholipase A2, and outcome after ischemic stroke. Arch Intern Med. 2006;166:2073–80. [PubMed]
5. Albert MA, Danielson E, Rifai N, Ridker PM. PRINCE Investigators. Effect of statin therapy on Creactive protein levels: the pravastatin inflammation/CRP evaluation (PRINCE): JAMA. 2001;286:64–70. [PubMed]
6. JUPITER Study Group. Ridker PM, Danielson E, Fonseca FA, Genest J, Gotto AM, Jr, Kastelein JJ, et al. N Engl J Med. 2008;359:2195–207. [PubMed]
7. Wiviott SD, de Lemos JA, Cannon CP, Blazing M, Murphy SA, McCabe CH, et al. A tale of two trials: a comparison of the post-acute coronary syndrome lipid-lowering trials A to Z and PROVE ITTIMI 22. Circulation. 2006;113:1406–14. [PubMed]
8. Pearson TA, Mensah G, Alexander RW. AHA/CDC scientific statement- markers of inflammation and cardiovascular disease. Circulation. 2003;107:499-511.
9. DeWinter RJ, Bholasingh R, Lijmer JG, Koster RW, Gorgel JP, Schouten Y, et al. Cardiovasc Res. 1999;147(1):54-7
10. Shlipak MG, Fried LF, Cushman M, Manolio TA, Peterson D, Stehman-Breen C, et al. Cardiovascular mortality risk in chronic kidney disease: comparison of traditional and novel risk factors. JAMA. 2005;293:1737–1745.
11. Menon V, Greene T, Wang X, Pereira AA, Marcovina SM, Beck GJ, Kusek JW, Collins AJ, Levey AS, Sarnak MJ: C-reactive protein and albumin as predictors of all-cause and cardiovascular mortality in chronic kidney disease. Kidney Int 68: 766–772, 2005.
12. Ridker PM, Cook NR. Clinical utility of very high and very low levels of C-reactive protein across the full range of Framingham risk scores. Circulation. 2004; 109: 1955–1959.
13. Roberts WL. CDC/AHA Workshop on Markers of Inflammation and Cardiovascular Disease: Application to Clinical and Public Health Practice: laboratory tests available to assess inflammationperformance and standardization: a background paper. Circulation. 2004;110:e572–6. [PubMed]
14. Ghazala Irfan, Mansoor Ahmad. Highly sensitive C-reactive protein concentration and angiographic characteristics of coronary lesion. J Ayub Med Coll Abbottabad 2008;20(3):100-103.
15. Moukarbel GU, Arnaout MA, Alan SE. C-Reactive protein in marker for a complex culprit lesion anatomy in unstable angina. Clin Cardiol 2001;24:506-10.
16. David A. Marrow, James A. de Lemos, Marc S. Sabatine, Stephen D. Wiviott, et al. Clinical relevance of C-reactive protein during follow-up of patients with acute coronary syndromes in the Aggrastat-to-Zocor Trial. Circulation. 2006;114:281-288.
17. Ridker PM. C-reactive protein and the prediction of cardiovascular events among those at intermediate risk: moving an inflammatory hypothesis towards consensus. J Am Cardiol. 2007;49(21):2129-38.
18. Deepak Y. Kamath, Denis Xavier, Alben Sigamani, and Prem Pais: Indian J Med Res. 2015 Sep; 142(3): 261–268. doi: 10.4103/0971-5916.166582 PMCID: PMC4669860.
19. Meier-Ewert HK, Ridker P, Rifai N, Price N, Dinges D, Mullington J: Absence of diurnal variation of C-reactive protein levels in healthy human subjects. Clin Chem 47:426–430, 2001.
20. Ockene IS, Matthews CE, Rifai N, Ridker P, Reed G, Stanek E: Variability and classication accuracy of serial high-sensitivity C-reactive protein measurements in healthy adults. Clin Chem 47:444–450, 2001.