Association of Highly Sensitive C – Reactive Protein Levels with Severity of Coronary Artery Disease

MARIAM MUSTAFA FAROOQI, SHAHIDA AMJAD, RIAZ SHAH

ABSTRACT

Coronary artery disease is a major component of cardiovascular disease and the main cause of death in developing countries1. The disease is characterized by a long   asymptomatic period of atherogenesis, resulting in plaque growth, and a symptomatic period of anginal complaints or a clinical coronary event[2]. In the present study, highly sensitive C - reactive protein (Hs-CRP) levels were determined in the patients of coronary artery disease having single, double and triple vessel disease and the values were compared with the disease severity. A moderate association was found with the p value of less than 0.001.It is suggested that and Hs-CRP should be done in all patients with significant atherothrombotic disease. These tests are relatively cheap and detect the predispositions to future incidents like acute MI (myocardial infarction) in patients of coronary artery disease.

Key words: Coronary artery disease (CAD), highly sensitive C-reactive protein levels (Hs-CRP)

INTRODUCTION

Coronary artery disease is a major component of cardiovascular diseases and it is the main cause of death in developing countries[1]. The disease is characterized by a long   asymptomatic period of atherogenesis, resulting in a plaque growth, and a symptomatic period of anginal complaints or a clinical coronary event[2] which usually ends up into serious complication if not treated.

Hs-CRP, a marker of vascular inflammation, is associated with the formation, progression and rupture of coronary plaques[3,4]. Similarly increased levels of Hs-CRP has been associated with worse clinical outcome.5 Coronary calcifications are the calcified coronary plaques, which represent about one fifth of the total coronary plaque volume[6].

CRP is a biochemical by-product that rises in level rapidly following an inflammatory stimulus (Eg, acute MI). Hepatocytes produce CRP in response to elevated IL-6 levels C-reactive protein (CRP), named for its capacity to precipitate the somatic C polysaccharide of Streptococcus pneumoniae, was the first acute phase protein to be described[7]. CRP is an exquisitely sensitive systemic marker of inflammation and tissue damage.8 It is a member of the pentraxin family of plasma proteins, which are part of the lectin fold super family of calcium-dependent ligand-binding and lectin (carbohydrate-binding) proteins[9].

Department of Haematology, Sh. Zayed Medical Complex, Lahore
Correspondence to Dr. Mariam Mustafa Farooqi, Assistant Professor Email: drmariamn@hotmail.com

MATERIALS AND METHODS

This study was done at Department of Haematology, Coronary Care Unit; Sheikh Zayed Hospital Lahore There was a random selection of cases. The sample size was calculated by using a pretest data of 12 patients with single, double and triple vessel disease in comparison with normal healthy controls. All subjects underwent standardized interviews.

Participants were asked about their medical history, including specific questions related to physician-diagnosed hypertension, diabetes, and gastroduodenal disease. 3 ml of blood was collected for the estimation of Hs-CRP Test principle[10, 11]

Anti-CRP antibodies coupled to latex microparticles react with antigen in the sample to form an antigen/antibody complex. Following agglutination, this is measured turbidimetrically on Roche automated clinical chemistry analyzers

Statistical Analysis: The collected data was entered and analyzed by using SPSS version 15.0. The Quantitative variable C - reactive protein was described by using mean ± Standard deviations and percentages.

RESULTS

A total of 60 cases of coronary artery disease and 20 cases of healthy controls were included in this study. Table 1 shows CRP in all four groups, the average CRP in healthy controls was found to be 1.03 with standard deviation of 0.60. In cases of single vessel disease it was 5.99+/- 0.30, double vessel disease 14.74+/- 6.42, and triple vessel disease 20.56 +/- 10

Table 1: Highly sensitive C - reactive protein (Hs-CRP) of patients with reference to the disease status group

	CRP mg/l			
	Mean	Standard Deviation	Min.	Max.
Healthy controls	1.03	0.60	0.50	2.50
Single vessel disease	5.99	3.31	0.30	14.00
Double vessel Disease	14.74	6.42	3.00	24.00
Triple vessel disease	20.56	10.50	3.00	43.00

Graph 1: Graphical presentation of mean C reactive protein among all the groups
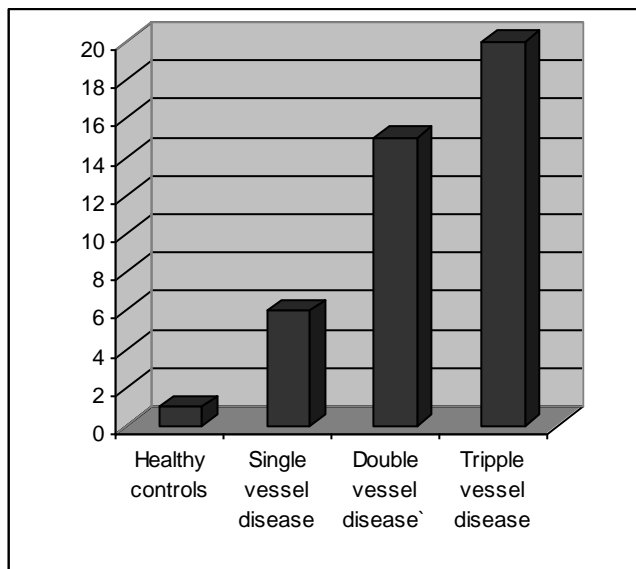
DISCUSSION

Coronary artery disease is one of the leading causes of death throughout the world. It's been decades that the risk factors have been defined for the coronary artery disease and associations have been shown with the severity of the disease, like hypertension, smoking, diabetes, etc[5, 8].

Present study is based on collection of eighty cases, out of which sixty cases were the diagnosed cases of coronary artery disease. The diagnosis and the severities of the disease were established by the angiographic evaluation. Sixty were grouped into single, double and triple vessel disease, to establish the results for the severity of the disease. Twenty cases of healthy blood donors were also selected and were labeled as control for the comparison of the results

Several authors have described the association between C reactive proteins with the severity of coronary artery disease. Their results support the concept of the contribution of intravascular atherothrombogenesis; Hs-CRP level correlates significantly with angiographic features of thrombi and eccentric lesions. Patients with totally occluded lesions with no visible thrombus had low CRP, suggesting its role as acute inflammatory marker.

A study was done in Karachi by Ghazalaet al[12] who studied the role of Hs-CRP concentration and angiographic characteristics of coronary lesion and assessed the relationship between preprocedural Hs-CRP concentration and coronary angiographic lesions. The results confirmed the increased levels of Hs-CRP with specific high risk coronary artery lesions. This was also seen in our study and hence supported the role of Hs-CRP in coronary artery disease.

In another study done in Chandigarh, India by Malhotra AS et al[13] who tried to study the Determination and Correlation of Anticardiolipin Antibody with High Sensitivity C- reactive Proteins and its Role in Predicting Short Term Outcome in Patients with Acute Coronary Syndrome

In conclusion, they concluded that anticardiolipin (aCL) antibodies could be implicated in the pathogenesis of acute coronary syndrome but are not significantly associated with recurrence of short-term events in patients with ACS. In addition aCL does not seem to have significant correlation with Hs-CRP in determining short term outcome in patients with acute coronary syndrome.

CONCLUSION

We finally conclude that the patients of CAD have higher Hs-CRP levels. These tests are relatively cheap and detect predispositions to future incidents like acute MI (myocardial infarction). Presently Hs-CRP costs Rs. 500/- per test, If the patient has associated hyperlipidaemia, administration of some of the statins also leads to reduction CRP levels by anti-inflammatory action through blocking the mevalonate pathway and isoprenoid synthesis. Therefore Hs-CRP should be done in all patients with significant atherothrombotic disease

REFERENCE

1. Siddiqui F J, Sami S A, Sarwar G, Shahabuddin S and Ahmed B. Coronary Artery Bypass Surgery in the Elderly: Experience of Tertiary Care Hospital Asian CardiovascThorac Ann 2006;14:479-84
2. Embersona J, Whincupb P, Morrisa R, Walkera M, Ebrahimc S. Evaluating the impact of population and high-risk strategies for the primary prevention of cardiovascular disease European Heart Journal 2004; 25: 484–91

3. Jialal I, Devaraj S, Singh U. C-reactive protein and the vascular endothelium: implications for plaque instability J Am CollCardiol. 2006; 47:1379-81

4. Lagrand WK, Visser CA, Hermens WT, Niessen HW, Verheugt FW, Wolbink GJ, Hack CE. C-reactive protein as a cardiovascular risk factor: more than an epiphenomenon? Circulation 1999; 100:96-102.

5. Danesh J, Wheeler JG, Hirschfield GM, Eda S, Eiriksdottir G, Rumley A, Lowe GD, Pepys MB, Gudnason V. C-reactive protein and other circulating markers of inflammation in the prediction of coronary heart disease. N Engl J Med. 2004; 350:1387-97.

6. Burke AP, Taylor A, Farb A, Malcom GT, Virmani R. Coronary calcification: insights from sudden coronary death victims Z Cardiol. 2000; 89(2):49-53.

7. Sagastagoitia JD, Sáez Y, Vacas M, Narváez I, Sáez de Lafuente JP, Molinero E, Magro A, Lafita M, Santos M, Escobar A, Iriarte JA. Association between inflammation, lipid and hemostatic factors in patients with stable angina, Thromb Res. 120; 2007:53–9.

8. Tataru MC, Heinrich, JR. Junker R, Schulte H, von Eckardstein A , Assmann G, Koehler E. D-dimers in relation to the severity of arteriosclerosis in patients with stable angina pectoris after myocardial infarction. Eur Heart J. 20; 1999:1493–1502.

9. Moresco RN, Halla-Júnior R, Vargas LCR and Silla LMR, Association between plasma levels of D-dimer and fibrinogen/fibrin degradation products (FDP) for exclusion of thromboembolic disorders. J Thromb Thrombolysis. 21; 2006:199–202.

10. Eda S. Development of a new microparticle-enhanced turbidimetric assay for C-reactive protein with superior features in sensitivity and dynamic range. J Clin Lab Anal. 1998; 12:137–44.

11. Use of Anticoagulants in Diagnostic Laboratory Investigations. WHO Publication WHO/DIL/LAB 99.1/Rev. 2 Jan. 2002

12. Irfan G, Ahmad M. Highly sensitive C- reactive protein concentration and angiographic characteristics of coronary lesion. J Ayub Med Coll Abbottabad 2008; 20 (3).

13. Malhotra AS, Sharma R, Mehta J, Kashyap JR, Gupta V, Kapoor N, Sachdev A. Determination and Correlation of Anticardiolipin Antibody with High Sensitivity C- reactive Proteins and its Role in Predicting Short Term Outcome in Patients with Acute Coronary Syndrome. Online J Health Allied Scs. 2011; 10(1):12.