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ASSOCIATION OF HIGH SENSITIVITY C-REACTIVE PROTEIN (HS-CRP) WITH CORONARY ARTERY DISEASE (CAD)

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ABSTRACT

Introduction: In the contemporary world, extensive research is going on novel markers for coronary artery disease. With the evolution of more markers, the predictability of upcoming disease in a subject will be soon possible. Inflammation plays a crucial role in the development and progression of coronary artery disease (CAD). Hs-CRP has been identified as one of the promising inflammatory marker associated with CAD. **Aims And Objectives:** To find the association between serum high sensitivity C-reactive protein (hs-CRP) levels and coronary artery disease risk. **Materials And Methods:** In this case control study, we compared hs-CRP in 50 subjects with angiographically proven coronary artery disease with those of 50 age and sex matched healthy controls. Serum hs-CRP levels were estimated by ELISA. Data was collected and analysed by suitable statistical methods. **RESULTS:**

Levels of hs-CRP were 5.07 ± 3.25 mg/L in cases as compared to 1.9 ± 1.45 mg/L in controls (p value <0.0001) **CONCLUSION:** There is a strong association between serum hs-CRP levels and coronary artery disease risk.

KEYWORDS: Inflammation, hs-CRP, coronary artery disease

INTRODUCTION

Coronary Artery Disease (CAD) is a major global health problem. CAD is common in the general population, affecting the majority of adults beyond 60 years.[1] Inflammation plays a crucial role in the development and progression of coronary artery disease (CAD). A variety of biomolecules has been studied to understand their role in setting and progression of the inflammatory cascade in co- morbidities like obesity, type 2 diabetes and cardiovascular diseases (CAD). Various research studies were carried out on CAD patients in Indian population for the assessment of inflammatory status. The most extensively studied biomarker of inflammation in cardiovascular disease is serum C-reactive protein (CRP), for which standardized high-sensitivity assays (hsCRP) are widely available.[2,3] CRP is an acute phase protein that is produced predominantly by hepatocytes under the influence of cytokines such as interleukin 6 and tumor necrosis factor-alpha.[4]

The mechanisms responsible for the association between CRP and cardiovascular disease are not clear. CRP may be only a marker of inflammation and thrombotic risk, without any specific role in the degree of atherosclerosis(5,6)or it may have a direct effect. The following observations suggest that there may be a direct effect: i) CRP has been found in atherosclerotic lesions, ii) CRP binds to low density lipoprotein (LDL), allowing LDL to be taken up by macrophages without the need for modification,7 and iii) Administration of CRP promotes inflammation in humans and atherosclerosis in an animal model.[7,8]

Various studies have found that CRP is a determining factor in plaque rupture,[9,10] prognosis after non-ST elevation MI,[11,12] recurrent in-hospital cardiac event, long term mortality after MI,[16,17] and recurrent ischemic event after coronary artery bypass grafting.[18] Also, among patients with known stable coronary disease, a strong positive correlation between CRP measured at baseline and future acute coronary events has been demonstrated in most studies,[19-24] but hs-CRP is only weakly associated with the extent of coronary disease on angiography,[19,25] and the degree of coronary artery calcification on electron beam CT.[26]

However, results from these studies cannot be directly compared as cut points for CRP levels differed from study to study.

CRP and hs-CRP are the two names given to the same protein. CRP is measured in a broader range as it is a non specific marker of inflammation and increases inmany inflammatory conditions (Normal Range- 1-1000 ml). However hs-CRP is measured in a very limited range i.e.high sensitivity (0.1 to >10 mg/L) and considered to be heart/cardiac specific.[26] C-reactive protein (CRP) is a strong predictor of cardiovascular risk. It is a marker of the underlying pro-inflammatory process of atherosclerosis.

The study aimed to evaluate the circulatory levels of hs-CRP in CAD patients.

MATERIALS AND METHODS

In this case control study, we compared hs-CRP in 50 subjects with angiographically proven coronary artery disease with those of 50 age and sex matched healthy controls.

The following inclusion and exclusion criteria were implemented (Table 1).

Table 1: Inclusion and exclusion criteria for patient selection in association of Hs-CRP and CAD.

Inclusion criteria	Exclusion criteria
Angiographically proven cases of coronary artery disease	systemic inflammatory conditions, such as infection, liver, or kidney disease patients on statins for more than 1 month collagen vascular disease recent trauma

Serum hs-CRP estimation was done by using a commercially available ELISA based kit by CALBIOTECH following manufacturer's instructions. The kit uses enzyme-linked immunosorbent assay (ELISA) to assay the level of hs-CRP in samples.

The data were analyzed with the SPSS for windows statistical package version 21, and were presented as Mean ± SD for continuous variables.

RESULTS

The levels of serum hs-CRP in patients of CAD were high as compared to that in healthy controls (Table 2). Levels of hs-CRP were 5.07 ± 3.25 mg/L in cases as compared to 1.9 ± 1.45 mg/L in controls (p value <0.0001).

Table 2: Serum hs-CRP mean levels among cases and controls.

	Mean ± SEM (mg/L)	p value
CAD patients (n=50)	5.07 ± 3.25	<0.0001*
Controls (n=50)	1.9 ± 1.45	

*statistically significant

DISCUSSION

Our study observed high levels of hs-CRP in CAD patients than controls. Our study supports the hypothesis that hsCRP levels are associated with extent of CAD. Hence hs-CRP can be considered as an important marker of inflammatory status in CAD patients.

The human CRP molecule is composed of five identical non-glycosylated polypeptide chains, containing 206 amino acid residues per chain. C-Reactive protein (CRP) is an alpha globulin with a molecular mass of approximately 110,000 to 140,000 daltons, and is composed of five identical subunits, which are noncovalently assembled as a cyclic pentamer.[28] CRP is synthesized in the liver and is normally present as a trace constituent of serum or plasma at levels less than 0.3 mg/dl. CRP is one of the acute-phase proteins, the serum or plasma levels of which rise during general, nonspecific response to a wide variety of diseases.[29-31] Although the detection of elevated levels of CRP in the serum is not specific for any particular disease, it is a useful indicator of inflammatory processes.[32] Additionally, measurement of CRP by high-sensitivity CRP assays may add to the predictive value of other cardiac markers (myoglobin, creatine-kinase-MB, troponin I and T), which are used to assess the risk of cardiovascular and peripheral vascular disease.[33-34]

Hs-CRP is a strong predictor of cardiovascular risk. It is a marker of the underlying pro-inflammatory process of atherosclerosis.[35.36]

CONCLUSION

The present study reported high hsCRP levels in CAD patients than the normal controls. There is a strong association between serum hs-CRP levels and coronary artery disease risk.

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