INTRODUCTION

Cardiovascular disease (CVD) is one of the leading causes of death among people of both sexes in industrialized countries of the world. The incidence of CVD is showing increasing trend even in developing countries like India due to industrialization and changing lifestyle. Epidemiologists in India and international agencies such as World Health Organization (WHO) have been sounding an alarm on the rapidly rising burden of cardiovascular disease (CVD) for past 15 years. The reported prevalence of Coronary Heart Disease (CHD) in adult survey has raised four fold in 40 years and even in rural areas, the prevalence has doubled over the past 30 years. It is expected to be single most important cause of death in India by the year 2015

Myocardial infarction (MI) is one of the important manifestations of coronary heart disease. Coronary atherosclerosis is a complex inflammatory process characterized by accumulation of lipids, macrophages and smooth muscle cells in intimal plaques in the large and medium size epicardial coronary arteries. The etiopathogenesis leading to atherosclerosis is still unknown. But number of risk factors has been identified like modifiable and non-modifiable.

Current evidence supports that inflammation is a major driving force underlying the initiation of coronary plaques, their unstable progression, and eventual disruption; patients with a more pronounced vascular inflammatory response have a poorer outcome. Pathological and clinical data suggest a prominent role of inflammation at every stage of atherogenesis. The vascular endothelium is a complex synthetic substance which is subjected to injury from potential insults like modified lipoproteins like oxidized LDL (ox-LDL), hemodynamic stress, oxidative stress etc. Endothelial cell injury causes upregulation of cellular adhesion molecules such as vascular adhesion molecule-1 (VCAM-1) and intercellular adhesion molecule-1 (ICAM-1) that in turn causes chemokines mediated increased adhesion of leukocytes. On adherent to endothelium, leukocytes migrate into the intima of arterial wall. Recent research has shown that chemo attractant molecules like monocyte chemo attractant protein I (MCP-1) and T-cell chemo attractant family are responsible for direct transmigration of monocytes and lymphocytes respectively. Once resident in the arterial wall, these cells participate and perpetuate a local inflammatory response. Inflammatory mediators like macrophage colony stimulating factors (M-CSF) augment the expression of macrophage scavenger receptors leading to uptake of modified lipoprotein particles and formation of lipid laden macrophages (foam cells), that constitute a key element of atherosclerotic plaque. Mononuclear cells within the inflammatory infiltrate release cytokines, including interleukins (IL-1 and IL-6), which reinforce cellular recruit and promote the oxidation and uptake of LDL as shown in figure 1. Inflammatory response stimulates migration and proliferation of smooth muscle cells and contributes to maturation of atherosclerotic lesion.

Thus, cycles of accumulation of mononuclear cells, migration and proliferation of smooth muscle

Keywords: Myocardial infarction, hs-CRP, inflammation, atherogenesis.
cells and formation of fibrous tissue lead to further enlargement and restructing of the lesions so that it becomes covered by a fibrous cap. Activated macrophages stimulate production of matrix metalloproteinase's (MMPs) such as collagenases, elastases and stromelysins which degrades collagen in fibrous cap, rendering it thin and susceptible to rupture. Plaque rupture results in release of highly procoagulant contents of atheroma core, which promote thrombus formation. In some cases, the overlying thrombus is non-occlusive and incorporates into maturing plaque when the forming thrombus leads to rapid compromise of arterial flow resulting in acute myocardial ischemia or infarction.

C-reactive protein is one of the predominant inflammatory biomarker. It is ubiquitous protein and acute phase reactant. Because the range of CRP reported in clinical studies of vascular risk was often far below thresholds detectable by standard CRP assays that have lower detection limits of 5-10 mg/L, several scientists worked to develop and validate high sensitivity methods for CRP measurement that over time became known as “hs-CRP”.

According to the center for disease control and prevention and American heart Association (CDI/AA/A) guidelines 2002, CRP (as measured by high sensitivity assay (hs-CRP)) is the inflammatory marker of choice, as it has more stability, assay precision, accuracy and availability.

The link between cardiovascular disease and hs-CRP come from following observations.

- hs-CRP found localized in atherosclerotic plaque.
- Acute /chronic infections that cause rise in circulating hs-CRP yield a higher risk for cardiovascular disease.
- hs-CRP is an independent cardiovascular risk factor even after correction for other risk factors.
- Baseline hs-CRP levels in apparently healthy persons with stable angina pectoris constitute an independent risk factor for cardiovascular events.
- The predictive value of hs-CRP was significantly higher than that associated with traditional biochemical CHD risk factors (TC, TG, and LDL) or other novel markers.
- After inflammation it peaks on 2nd day and returns to normal after 5th day
- hs-CRP plays a direct pathogenic role in arterial disease by
- T cell mediated endothelial destruction
- Expression of adhesion molecules such as VCAM and E-Selectin
- Stimulates macrophages to produce tissue factor
- Activation of complement
- Attenuates nitric oxide production
- Increase in the expression and activity of Plasminogen activator inhibitor-I in human endothelial cells
- Inhibit angiogenesis

hs-CRP is an independent predictor of future cardiovascular events. It has a potential role for the prediction of risk for developing CAD and may correlate with severity of CAD.

**MATERIALS AND METHODS**

The present study comprised of 50 normal healthy subjects in the age group above 30 years as controls (males 31, females 19) and 50 clinically diagnosed cases of Myocardial Infarction of the same age group (males 35, females 15) admitted at the Basaveshwar Teaching and General Hospital, attached to Mahadevappa Rampure Medical College, Gulbarga. An informed consent was obtained from the controls and cases before collecting the blood samples. The study was approved by Ethical and Research Committee of the Institution.

**Collection of blood samples**

Blood sample was withdrawn on 3rd day of MI as hs-CRP reaches peak after 2nd day and returns to baseline by 5th day. Total of 5ml venous blood samples (fasting) is collected from antecubital vein under all aseptic precautions in plain bulb. It is then allowed to clot and then centrifuged for serum separation. Serum hs-CRP was estimated by QUANTA CRP-US Kit using chem-5 semi auto analyser. Total cholesterol by CHOD-PAP method, Triglycerides by GPO-TRINDER method, HDL by Phosphotungstic acid method and LDL, VLDL by friedwald formula.

The data analysis was done by unpaired student ‘t’ test & chi square test. All results were expressed in mean± standard deviation. The difference in mean values of various parameters were analyzed for significance and the values expressed in terms of p value.

**RESULTS**

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<th>Table 1: Comparison of hs-CRP in controls and cases of Myocardial Infarction</th>
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<td><strong>Controls (Mean±SD)</strong></td>
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<td>hs-CRP (mg/L)</td>
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Inflammation is inflammation in pathophysiology of atherosclerosis. Despite progress in its measures in prevention, detection and treatment, it continues to be the leading cause of death.

Research over last decade proved the role of inflammation in pathophysiology of atherosclerosis. Inflammation is an important contributor to atherosclerosis, both accelerating the process and precipitating acute plaque rupture. Various traditional and newer biomarkers were suggested for diagnosis and prognosis of MI. In view of this, present study has been undertaken to assess clinical utility of some of the promising biochemical markers like hs-CRP and lipid profile which are inexpensive, identified by easy methods and validated that can be of some diagnostic and prognostic significance.

In our study, the levels of hs-CRP was found to be significantly elevated (p<0.001) compared with controls. Our studies were in accordance with findings of Hon-Kan Yip18, Benjamin Scirica19 and Anderson20. The findings of our study are contradictory to the findings of Thompson21 who demonstrated non-significance of hs-CRP measurement in MI. However in his study, a rather insensitive assay for CRP was used that was unable to differentiate levels with the normal range. There was a significant increase in Total cholesterol, Triglycerides and Low Density Lipoprotein levels in patients compared with controls where as High Density Lipoprotein levels were reduced in cases than controls. Hypercholesterolemia and hypertriglyceridemia are the major risk factors for the development of atherosclerosis, in turn causing MI.

CONCLUSION

In conclusion, our present study suggests that together with other biomarkers hs-CRP can improve the ability to detect absolute coronary risk, a critical issue because one half of all MI occur among individuals without overt hyperlipidemia. It plays a significant role in the risk assessment, prophylaxis and management of Myocardial Infarction.

BIBLIOGRAPHY


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