

## ORIGINAL RESEARCH

# Evaluation of Association of High-Sensitive C-Reactive Protein (hs-CRP) and Lipid Profile in Early Phase Acute Coronary Syndrome (ACS) Patients: An Institutional Based Study

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### ABSTRACT

**Background:** The present study was conducted for examining the association of high-sensitive C-reactive protein (hs-CRP) and lipid profile in early phase acute coronary syndrome (ACS) patients.

**Materials & Methods:** A total of 200 patients with ACS and 100 healthy controls were enrolled in the present study. A Performa was made and detailed clinical profile, demographic details and medical history of all the patients was recorded. All patients with ACS were divided into two study groups as follows: Early onset group: Onset of ACS symptoms in less than 6 hours, and Late onset group: Onset of ACS symptoms in between 6 hours to 24 hours. Blood samples were obtained within 24 hours from onset of symptoms and were sent to laboratory. Auto-analyzer was used for evaluation of serum lipid profile and hs-CRP levels.

**Results:** Mean hs-CRP levels among ACS patients and controls was found to be 8.32 mg/L and 1.13 mg/L respectively. Mean serum lipid profile was significantly deranged among ACS patients in comparison to healthy controls. Also, while comparing the hs-CRP levels among patients of early onset ACS and late onset ACS group, significant results were obtained. While evaluating and comparing the lipid profile among early onset ACS patients and late onset ACS patients, significant results were obtained.

**Conclusion:** The higher mortality and morbidity may be caused by the ACS patients' changed lipid profiles and noticeably higher levels of the inflammatory marker hs-CRP compared to controls.

**Key words:** C-Reactive proteins, Lipid, Acute coronary syndrome

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### INTRODUCTION

Acute coronary syndrome (ACS) refers to a group of conditions that include ST-elevation myocardial infarction (STEMI), non-ST elevation myocardial infarction (NSTEMI), and unstable angina. A quick but thorough assessment of the patient's history and findings on physical examination, electrocardiography, radiologic studies, and cardiac biomarker tests permit accurate diagnosis and aid in early risk stratification, which is essential for guiding treatment. Diagnosis of acute coronary syndrome relies on clinical presentation, ECG findings, and biochemical evidence of myocardial injury.<sup>1-3</sup> The immediate initial branchpoint for a patient with possible acute coronary syndrome is, of

course, the presence or absence of diagnostic ST-segment elevations on the 12-lead ECG.<sup>4</sup>

Various studies published since the 1990s have established high sensitivity C-reactive protein (hsCRP), a biomarker of inflammation, as an independent predictor for CAD. A meta-analysis of these observational studies showed that people in the top quartile for hsCRP levels had an odds ratio (OR) of 1.5 compared with those in the lowest quartile for major cardiovascular events, after adjusting for established risk factors.<sup>5-7</sup> Dyslipidemia is an abnormal amount of lipids (e.g. triglyceride, cholesterol, and/or fat phospholipids) in the blood. It has become a global issue with a high risk of cardiovascular diseases

(CVDs).<sup>8</sup> Hence; the present study was conducted for examining the association of high-sensitive C-reactive protein (hs-CRP) and lipid profile in early phase acute coronary syndrome (ACS) patients.

**MATERIALS & METHODS**

The present study was conducted for examining the association of high-sensitive C-reactive protein (hs-CRP) and lipid profile in early phase acute coronary syndrome (ACS) patients. A total of 200 patients with ACS and 100 healthy controls were enrolled in the present study. A Performa was made and detailed clinical profile, demographic details and medical history of all the patients was recorded. All patients with ACS with divided into two study groups as follows:

**Early onset group:** Onset of ACS symptoms in less than 6 hours, and

**Late onset group:** Onset of ACS symptoms in between 6 hours to 24 hours.

Blood samples were obtained within 24 hours from onset of symptoms and were sent to laboratory. Auto-

analyzer was used for evaluation of serum lipid profile and hs-CRP levels. All the results were recorded in Microsoft excel sheet and were subjected to statistical analysis using SPSS software. Chi-square test and Mann Whitney U test were used for evaluation of level of significance.

**RESULTS**

A total of 200 ACS patients and 100 healthy controls were analyzed. Mean hs-CRP levels among ACS patients and controls was found to be 8.32 mg/L and 1.13 mg/L respectively. On comparison statistically, significant results were obtained. Mean serum lipid profile was significantly deranged among ACS patients in comparison to healthy controls. Also, while comparing the hs-CRP levels among patients of early onset ACS and late onset ACS group, significant results were obtained. While evaluating and comparing the lipid profile among early onset ACS patients and late onset ACS patients, significant results were obtained.

**Table 1: Comparison of hs-CRP levels among ACS patients and controls**

hs-CRP (mg/L)	ACS patients	Controls
Mean	8.32	1.13
SD	6.12	0.79
p-value	0.001 (Significant)	

**Table 2: Comparison of lipid profile among ACS patients and controls**

Lipid profile	ACS patients	Controls	p-value
Total cholesterol (mg/dL)	176.3	159.2	0.001 (Significant)
Triglycerides (mg/dL)	148.8	121.7	0.004 (Significant)
HDL (mg/dL)	38.6	51.1	0.000 (Significant)
LDL (mg/dL)	102.7	85.3	0.002 (Significant)

**Table 3: Comparison of hs-CRP and lipid profile between early onset and late onset ACS**

Variables	Early onset ACS patients	Late onset ACS patients	p-value
Hs-CRP (mg/L)	4.12	13.87	0.017 (Significant)
Total cholesterol (mg/dL)	166.2	175.5	0.039 (Significant)
Triglycerides (mg/dL)	135.9	149.1	0.001 (Significant)
HDL (mg/dL)	49.8	36.7	0.003 (Significant)
LDL (mg/dL)	91.7	105.3	0.001 (Significant)

**DISCUSSION**

Coronary artery disease (CAD) and acute coronary syndromes (ACS) represent a significant public health burden worldwide, contributing to substantial morbidity and mortality rates. Epidemiological studies have highlighted the widespread prevalence and considerable impact of these conditions on individuals and healthcare systems. Acute coronary syndromes encompass myocardial infarction and unstable angina. Although survival has improved, acute coronary syndrome remains a significant cause of morbidity and mortality.<sup>9</sup>

<sup>10</sup> Evidence from several studies suggests that physicians often do not integrate the most important markers of risk into a clinical assessment of risk. In one study, several established determinants of risk appeared not to influence the treating physicians' assessment of risk, which correlated poorly with risk assessed by a validated risk score.<sup>11</sup> High-sensitivity C-reactive protein (hsCRP) is a marker of inflammation that predicts incident myocardial infarction, stroke, peripheral arterial disease, and sudden cardiac death among healthy individuals with no history of

cardiovascular disease, and recurrent events and death in patients with acute or stable coronary syndromes.<sup>12</sup> Epidemiological surveys have shown that atherosclerosis due to dyslipidemia is directly correlated with a risk of IHD. Coronary artery disease (CAD) has been directly linked to hypercholesterolemia, particularly elevated plasma levels of cholesterol in low-density lipoproteins (LDL-C). Increased risk of AMI has been seen in patients with low plasma levels of high-density lipoprotein (HDL-C) cholesterol.<sup>13, 14</sup> Hence; the present study was conducted for examining the association of high-sensitive C-reactive protein (hs-CRP) and lipid profile in early phase acute coronary syndrome (ACS) patients.

A total of 200 ACS patients and 100 healthy controls were analyzed. Mean hs-CRP levels among ACS patients and controls was found to be 8.32 mg/L and 1.13 mg/L respectively. On comparison statistically, significant results were obtained. Mean serum lipid profile was significantly deranged among ACS patients in comparison to healthy controls. Also, while comparing the hs-CRP levels among patients of early onset ACS and late onset ACS group, significant results were obtained. While evaluating and comparing the lipid profile among early onset ACS patients and late onset ACS patients, significant results were obtained. Our results were in concordance with the results obtained by Jindal P et al who also reported similar findings. In their study, authors assessed high sensitive CRP and lipid profile in early phase of acute coronary syndrome (ACS). 72 ACS patients of both genders were included. Group I comprised of ACS patients and group I had healthy subjects. In group I and group II, the mean hs-CRP was 9.12 and 1.06, TC was 168.4 and 158.4, TG was 142.5 and 116.8, LDL-C was 104.2 and 88.5, HDL-C was 40.6 and 49.2, VLDL-C was 27.6 and 23.1, TC:HDL-C ratio was 4.1 and 3.41 and LDL-C:HDL-C ratio was 2.89 and 1.92 respectively. The difference was significant.<sup>3</sup>

One recent study suggested an interactive effect of the systematic inflammatory response on prognosis in not only patients with acute myocardial infarction but also patients with non-obstructive coronary artery disease. Further, the clinical significance of hs-CRP is expected to increase with the introduction of treatments targeting hs-CRP. Indeed, the CANTOS study showed that canakinumab, a fully human monoclonal antibody targeting interleukin-1 $\beta$ , significantly reduced the hs-CRP level and improved clinical outcomes in a manner that was independent from LDL-C levels in patients with a previous history of myocardial infarction.<sup>15, 16</sup>

Accordingly, several mediators of the inflammatory response, including acute-phase proteins, cytokines and cellular adhesion molecules have been evaluated as potential indicators of the risk of a first acute atherothrombotic event, as well as of recurrent

complications after initial presentation. As the prototypical acute-phase reactant, hs-CRP has been the focus of much of the clinical investigation. Various epidemiological studies have demonstrated that hs-CRP is a strong predictor of future cardiovascular events (Blake GJ et al, Liuzzo G et al, Ridker PM et al, Ridker PM et al).<sup>17- 20</sup> Krintus M et al, in another similar study, investigated whether assessment of C-reactive protein (CRP) and apolipoproteins, besides the traditional lipid profile, enhances the assessment process for the risk of acute coronary syndrome (ACS). Their study indicated that CRP superiorly to apolipoproteins and lipid profile facilitates the risk stratification for ACS occurrence.<sup>21</sup>

## CONCLUSION

The higher CHD mortality and morbidity may be caused by the ACS patients' changed lipid profiles and noticeably higher levels of the inflammatory marker hs-CRP compared to controls.

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