Section: Biochemistry

Original Research Article

EVALUATION OF ASSOCIATION OF HIGH-SENSITIVE C-REACTIVE PROTEIN AND LIPID PROFILE IN EARLY PHASE ACUTE CORONARY SYNDROME PATIENTS: A TEACHING HOSPITAL BASED STUDY

Bilal Ahmad Yatoo[1], Jaya Jain[2], Sushil Kumar[3], Sonali Shukla Mishra[2]

[1]Ph.D. Scholar, Department of Biochemistry, INDEX Medical College and Hospital, Indore, MP
[2]Associate Professor, Department of Biochemistry, Index Medical College Hospital and Research Centre, Indore, Madhya Pradesh, India
[3]Assistant Professor, Department of Biochemistry, Rama Medical College Hospital and Research Centre, Kanpur, Uttar Pradesh, India

Received : 15/07/2024
Received in revised form : 12/08/2024
Accepted : 21/08/2024

Keywords:
Acute coronary syndrome, Coronary heart disease, hs- CRP & lipid profile.

Corresponding Author:
Dr. Sonali Shukla Mishra,
Email: sonalimishra100@gmail.com

DOI: 10.47009/jamp.2024.6.4.172

Source of Support: Nil,
Conflict of Interest: None declared

Int J Acad Med Pharm
2024; 6 (4); 882-884

Abstract

Background: One of the main causes of mortality and morbidity worldwide, including in India, is coronary heart disease (CHD). The goal of the current study was to evaluate the lipid profile and highly sensitive CRP in the early stages of acute coronary syndrome (ACS). **Materials and Methods:** In total, 100 ACS patients and 100 healthy controls were included in the current investigation. A comprehensive clinical profile, demographic information, and medical history of every patient were documented in a Performa. Every ACS patient was split into two study groups, which were as follows: Groups with early onset (symptoms appear within 6 hours) and late onset (symptoms appear within 6 to 24 hours) of ACS. **Result:** It was found that the mean hs-CRP levels in ACS patients and controls were 1.65 mg/L and 7.44 mg/L, respectively. Compared to healthy controls, the mean serum lipid profile of ACS patients was considerably abnormal. Significant results were also found when comparing the hs-CRP levels between patients in the early onset ACS group and the late onset ACS group. Important findings were found while assessing and contrasting the lipid profiles of patients with early-onset ACS with those with late-onset ACS. **Conclusion:** The ACS patients' altered lipid profiles and notably higher levels of the inflammatory marker hs-CRP in comparison to controls may be the reason of the greater mortality and morbidity.

INTRODUCTION

ST-elevation myocardial infarction (STEMI), non-ST elevation myocardial infarction (NSTEMI), and unstable angina are among the conditions grouped together under the term acute coronary syndrome (ACS). Accurate diagnosis and early risk stratification are made possible by a rapid yet comprehensive evaluation of the patient's medical history, physical examination results, electrocardiogram, radiologic examinations, and cardiac biomarker tests. These assessments are crucial for directing treatment. Acute coronary syndrome is diagnosed based on the patient's clinical presentation, ECG results, and biochemical evidence of myocardial damage.[1] Naturally, the initial branchpoint that should be checked for a patient suspected of having acute coronary syndrome is whether or not the 12-lead ECG shows diagnostic ST-segment elevations.[2] High sensitivity C-reactive protein (hsCRP), a biomarker of inflammation, has been shown in numerous studies published since the 1990s to be an independent predictor of coronary artery disease (CAD). After controlling for known risk variables, a meta-analysis of these observational studies revealed that, after accounting for established risk factors, persons in the highest quartile for hsCRP levels had an odds ratio (OR) of 1.5 compared with those in the lowest quartile for major cardiovascular events.[3] An excessive level of lipids (such as cholesterol, triglycerides, and/or fat phospholipids) in the blood is known as dyslipidemia. With a significant risk of cardiovascular diseases (CVDs), it has emerged as a global concern.[4] Thus, the with the objective to investigate the relationship between lipid profile and high-sensitive C-reactive protein (hs-CRP) in patients with acute coronary syndrome (ACS) in the early stages, the current study was carried out.

ISSN (O): 2687-5365; ISSN (P): 2753-6556

MATERIALS AND METHODS

The present study was conducted in the Department of Biochemistry, INDEX Medical College and Hospital, Indore, MP with the collaboration with Department of cardiology 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 100 patients with ACS (Group-I) and 100 healthy controls (Group-II) 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.

Biochemical analysis:

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-20 software. Chi-square test and Mann Whiteny U test were used for evaluation of level of significance.

RESULTS

One hundred ACS patients and one hundred healthy controls were examined in total. It was discovered that the mean hs-CRP levels in ACS patients and controls were 1.65 mg/L and 7.44 mg/L, respectively. Significant statistical results were achieved on comparison. Compared to healthy controls, the mean serum lipid profile of ACS patients was considerably abnormal. Significant results were also found when comparing the hs-CRP levels between patients in the early onset ACS group and the late onset ACS group. Important findings were found while assessing and contrasting the lipid profiles of patients with early-onset ACS with those with late-onset ACS.

Table 1: Shows the distribution of Patients.

Group	Group-I (ACS)	Group-II (Control)
Male:Famale ratio	56:44	50:50

Table 2: Shows the comparison of hs-CRP levels among ACS patients and controls.

Group	Group-I (ACS)(Mean±S.D.)	Group-II (Control)(Mean±S.D.)	P-value
hs-CRP (mg/L)	7.44±1.24	1.65±0.52	0.001

Table 3: Shows the comparison of lipid profile among ACS patients and controls.

Group	Group-I (ACS)(Mean±S.D.)	Group-II (Control)(Mean±S.D.)	P-value
Total cholesterol (mg/dl)	222.9±35.7	138.52±11.7	0.01
Triglycerides (mg/dl)	184.6±31.7	112.9±14.5	0.01
HDL (mg/dl)	35.7±5.82	51.4±5.2	0.02
LDL (mg/dl)	150.5±39.0	64.38±3.12.2	0.001

Table 4: Shows the comparison of hs-CRP and lipid profile between early onset and late onset ACS.

Group	Early onset ACS patients(Mean±S.D.)	Late onset ACS patients(Mean±S.D.)	P-value
hs-CRP (mg/L)	4.18±0.21	12.54±2.4	0.01
Total cholesterol (mg/dl)	168.4±12.5	176.2±14.5	0.02
Triglycerides (mg/dl)	136.6±10.2	148.6±12.4	0.01
HDL (mg/dl)	48.5 ±4.26	37.2±5.28	0.01
LDL (mg/dl)	90.4 ±8.24	104.4 ±8.35	0.01

DISCUSSION

Acute coronary syndromes (ACS) and coronary artery disease (CAD) contribute significantly to global public health burdens by raising rates of morbidity and mortality. Epidemiological research has demonstrated the diseases' broad prevalence and significant effects on people's lives and healthcare systems. Stable angina and myocardial infarction are examples of acute coronary syndromes. Acute coronary syndrome continues to be a major cause of morbidity and mortality even if survival has increased.[5] Research from multiple research indicates that doctors frequently fail to include the most significant risk indicators in a clinical risk assessment. In one investigation, the treating physicians' judgment of risk, which associated poorly with risk as determined by a validated risk score, seemed to be unaffected by a number of known risk drivers.[6] In healthy people without a history of cardiovascular disease, high-sensitivity C-reactive protein (hsCRP) is a marker of inflammation that can be used to predict incident myocardial infarction, stroke, peripheral arterial disease, and sudden cardiac death. In patients with acute or stable coronary syndromes, it can also be used to predict recurrent events and death.[7] Epidemiological studies have demonstrated a direct correlation between the risk of IHD and atherosclerosis resulting from dyslipidemia. Hypercholesterolemia, in particular higher plasma levels of cholesterol in low-density lipoproteins

ISSN (O): 2687-5365; ISSN (P): 2753-6556

(LDL-C), has been directly associated with coronary artery disease (CAD). Patients with low plasma levels of high-density lipoprotein (HDL-C) cholesterol have been found to have an increased risk of AMI.[8] Therefore, in order to investigate the relationship between lipid profile and high-sensitive C-reactive protein (hs-CRP) in patients with acute coronary syndrome (ACS) in the early stages, the current study was carried out. One hundred ACS patients and one hundred healthy controls were examined in total. It was discovered that the mean hs-CRP levels in ACS patients and controls were 1.65 mg/L and 7.44 mg/L, respectively. Significant statistical results were achieved on comparison. Compared to healthy controls, the mean serum lipid profile of ACS patients was considerably abnormal. Significant results were also found when comparing the hs-CRP levels between patients in the early onset ACS group and the late onset ACS group. Important findings were found while assessing and contrasting the lipid profiles of patients with early-onset ACS with those with late-onset ACS. Our findings were consistent with those of Jindal P et al., who also reported findings that were comparable. The lipid profile and highly sensitive CRP were evaluated by the authors in the early stages of acute coronary syndrome (ACS). There were 100 ACS patients overall, male and female. Patients with ACS made up Group I, while healthy individuals made up Group II. The mean hs-CRP for groups I and II were 7.44 and 1.65, respectively; TC and 138.52 and TG were 184.6 and 112.9; LDL-C and 64.38, HDL-C and 35.7 and 51.4, VLDL-C and 36.88 and 22.64; TC:HDL-C and LDL-C:HDL-C ratios were 4.2 and 3.36 and 2.52 and 1.24, respectively. There was a noticeable difference.[9] A recent study proposed that the prognosis of patients with acute myocardial infarction and those with non-obstructive coronary artery disease is influenced by the systematic inflammatory response in an interactive manner. Additionally, the emergence of hs-CRP-targeting medicines is anticipated to increase the clinical importance of hs-CRP. Canakinumab, a completely human monoclonal antibody that targets interleukin-1β, was found to dramatically lower the hs-CRP level and improve clinical outcomes in patients with a history of myocardial infarction. This effect was observed in the CANTOS investigation, and it was independent of LDL-C levels.[10] Consequently, a number of inflammatory response mediators, such as cytokines, cellular adhesion molecules, and acute-phase proteins, have been assessed as putative predictors of the likelihood of both recurring problems following initial presentation and of a first acute atherothrombotic event. A significant portion of clinical research has focused on hs-CRP since it is the archetypal acute-phase reactant. According to several epidemiological research (Blake GJ et al, Liuzzo G et al, Ridker PM et al), hs-CRP is a highly reliable indicator of upcoming cardiovascular events.[11] In a related study, Krintus M et al. examined whether evaluating apolipoproteins and C-reactive protein (CRP) in addition to the standard lipid profile improves the process of assessing the risk of acute coronary syndrome (ACS). Their research showed that CRP helps with risk stratification for the incidence of ACS more effectively than apolipoproteins and lipid profile.[12]

CONCLUSION

In summary, the hs-CRP contributes significantly to inflammatory processes in ACS. In the early stages of ACS, it is noticeably higher in the patient's group. The ACS patients' altered lipid profiles and notably higher levels of the inflammatory marker hs-CRP in comparison to controls may be the cause of the greater CHD mortality and morbidity.

REFERENCES

1. Voudris KV, Kavinsky CJ. Advances in Management of Stable Coronary Artery Disease: the Role of Revascularization? Curr Treat Options Cardiovasc Med. 2019 Mar 11;21(3):15.
2. Moreno PR, Falk E, Palacios IF, Newell JB, Fuster V, Fallon JT. Macrophage infiltration in acute coronary syndromes: implications for plaque rupture. Circulation 1994;90(2):775-778
3. Danesh J, Wheeler JG, Hirschfield GM, Eda S, Eiriksdottir G, Rumley A, et al. C-reactive protein and other circulating markers of inflammation in the prediction of coronary heart disease. N Engl J Med. 2004;350:1387–97.
4. AmanullahSafiullah, Jarari Abdulla, GovindanMuralikrishnan, Ismail Basha Mohamed, KhatheejaSaira. Association of hs-CRP with diabetic and non-diabetic individuals. Jordan J Biol Sci. January 2010;3:7–12.
5. Gimbrone M.A., Jr., Garcia-Cardena G. Endothelial Cell Dysfunction and the Pathobiology of Atherosclerosis. Circ. Res. 2016;118:620–636.
6. Mehta SR, Granger CB, Boden WE, et al. Early versus delayed invasive intervention in acute coronary syndromes. N Engl J Med. 2009;360:2165–75
7. Bassuk SS, Rifai N, Ridker PM. High-sensitivity C-reactive protein: clinical importance. CurrProblCardiol. 2004 Aug;29(8):439-93.
8. Rasheed SJ, Ahmed S, Samad A. Effect of statins on triglycerides in the management of hypercholesterolemia in patients with coronary heart disease. Pak J Cardiol. 2002;13:65–72.
9. Lagrand W., Visser C., Hermens W. C-reactive protein as a cardiovascular risk factor. More than an epiphenomenon? Circulation. 1999;100:96–102
10. J.D.S. Sara, M. Prasad, M. Zhang, R.J. Lennon, J. Herrmann, L.O. Lerman, et al. High-sensitivity C-reactive protein is an independent marker of abnormal coronary vasoreactivity in patients with nonobstructive coronary artery disease. Am Heart J, 190 (2017), pp. 1-11
11. Liuzzo G., Biasucci L.M., Gallimore J.R. The prognostic value of C-reactive protein and serum amyloid a protein in severe unstable angina. N Engl J Med. 1994;331:417–424.
12. Krintus M, Kozinski M et al. Value of C-Reactive Protein as a Risk Factor for Acute Coronary Syndrome: A Comparison with Apolipoprotein Concentrations and Lipid Profile. Mediators of inflammation. 2012; 419804.

ISSN (O): 2687-5365; ISSN (P): 2753-6556