

Study of Correlation between Value of Serum C - reactive protein And Abnormalities of Electrocardiogram in Patients Suspected of Coronary Artery Disease.

Serum CRP abnormalities and its relationship with LDL/HDL ratio in patients of coronary artery disease.

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KEYWORDS- C reactive protein , LDL/HDL ratio , Coronary artery disease , STEMI , NSTEMI.

Abstract

The C- Reactive protein has been reported as a predictor of coronary events indicating inflammatory process of atherosclerosis .The hyperlipidemia has long been known one of the major risk factors for coronary artery disease.The present study investigate the relationship between CRP and LDL/HDL ratio in the patients of myocardial infarction.**Objectives-** The study was carried out to determine serum levels of CRP and LDL/HDL ratio in patients of STEMI and NSTEMI. **Method** – The study was carried out on 50 patients of ECG proven myocardial infarction .The CRP and lipid profile estimation was carried out by standard lab procedure. **Results**– 37 patients were found to have raised CRP level with determined cut off of 11 ng/ml. 44 patients were observed to carry decreased value of HDL. There were 28 patients who had raised

LDL/HDL ratio .No relationship between raised level of CRP and abnormalities of LDL/HDL ratio. **Conclusion** – The study deduced that majority of coronary artery disease patients showed increased level of CRP .The CRP was raised in STEMI more than in NSTEMI.The raised level of CRP had no association with LDL/HDL ratio in patients of coronary artery disease.

INTRODUCTION

Coronary heart disease is known as the leading cause of death in developing countries.^[1] Despite advances in the diagnosis and treatment of coronary artery disease, it is still among the most common causes of death and disability in the world, which endangers global health^[2]

The term “acute coronary syndrome” (ACS) encompasses a range of thrombotic coronary artery diseases, including unstable angina (UA), and both ST-segment elevation (STEMI) and Non-ST segment elevation myocardial infarction (NSTEMI), mostly induced by local coronary thrombosis as an acute complication of atherosclerosis^[3]. Patients with an acute coronary syndrome have a high risk of suffering subsequent cardiac events^[3].

Coronary plaque disruption, with consequent platelet aggregation and thrombosis, is the most important mechanism by which atherosclerosis leads to the acute ischemic syndromes of unstable angina, acute myocardial infarction, and sudden death^[3].

With growing evidence that atherosclerosis is an inflammatory process, several plasma markers of inflammation have been evaluated as potential tools for the prediction of coronary events^[3]. These markers of inflammation include serum amyloid A, interleukin-6, homocysteine, fibrinogen levels, fibrinolytic capacity, apolipoprotein A, apolipoprotein B-100, lipoprotein(a) and C-reactive protein (CRP).³

CRP, a marker of systemic inflammation and one of acute phase proteins increases in cases of inflammation, infection and collagen vascular diseases. CRP increases faster than other acute phase reactants, and its decline occurs more quickly after removing the irritant and on recession of inflammation.⁽⁴⁾

Various studies have observed the prognostic and predictive role of CRP in mortality of patients with acute coronary syndrome and heart failure. There is a necessity to conduct simple tests such as the measurement of high-sensitivity CRP to achieve an acceptable prediction about the extent of coronary artery and ischemic heart involvement^(5,6). CRP has been shown to predict risk in a wide variety of clinical settings has incremental value in addition to standard lipid screening for primary prevention of coronary syndrome.^[5,6,7]

Studies conducted show that CRP predicts the risk of death or myocardial infarction within 30 days among patients undergoing percutaneous coronary intervention. CRP was found to be independently associated with the recurrence of cardiovascular events and with death in the mid to long term.^[9,10]

It has been suggested that CRP may not only be a marker of generalized inflammation but directly and actively participates in both atherogenesis^[11,12] and atheromatous plaque disruption. Measurement of CRP serum level in the patient can be used as a diagnostic tool to assess the risk of cardiovascular diseases.

Furthermore, Identifying and evaluating CRP levels with result of electrocardiogram of acute coronary events, provides a substantial contribution to prediction of ischemic heart disease severity even prior expensive actions and sometimes invasive imaging^(7,8).

Studies show that CRP has statistically stronger correlation than compared to LDL/HDL ratio¹⁴. Therefore the present study is carried out to find the correlation between levels of serum C.R.P and LDL /HDL ratio in patients with ECG proven coronary artery disease.

AIM

The purpose of this study is to study the correlation between serum levels of C.R.P and LDL/HDL ratio with abnormalities in electrocardiogram in patients with coronary artery disease.

OBJECTIVES

- 1)To determine the serum levels of CRP in patients with STEMI and NSTEMI.
- 2)To determine the LDL/HDL ratio in patients with STEMI and NSTEMI.

MATERIALS AND METHOD

The study was carried out with the following material and methods .

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Type Of Study-Prospective .

Duration of study-2 years .

Sample Size-50 patients of coronary artery disease.

All patients attending medicine OPD with clinical features suggestive of coronary artery disease were assessed by a detailed history and physical examination.

Relevant laboratory investigations were carried out to document presence of coronary artery disease.

Serum CRP levels were checked in all patients by dry chemistry method with clinical features suggestive of coronary artery disease.

7 ml of patient's venous blood was drawn under aseptic conditions in plain bulb. The CRP estimations were carried out in central clinical laboratory by dry chemistry on Vitros 5600, Ortho Clinical Diagnosis.

Inclusion Criteria:

1. Patients who presented with history of typical chest pain showing ECG of ST and NST myocardial infarction.

Exclusion criteria :

1. Patients with inflammatory or neoplastic conditions likely to be associated with an elevated CRP , 2. Patients with valvular heart disease, hepatic failure and renal failure , 3. Patients on NSAIDs and steroids.

RESULTS

There were 37 male and 13 female who suffered myocardial infarction and the maximum number of cases were

observed in the age range of 61-70 years as shown in Table 1 .

Table 1 : Age and Gender distribution.

AGE (years)	GENDER		STEMI	NSTEMI
	MALE N=36	FEMALE N=14		
21-30	01	00	00	01
31-40	00	00	00	00
41-50	09	00	06	03
51-60	10	06	10	06
61-70	11	02	10	03
71-80	06	05	06	05
TOTAL (N=50)	37	13	32	18

Out of 50 patients 32 had STEMI while 18 had NSTEMI.

There were no patient below age of 40 suffering from myocardial infarction except for 1 who suffered NSTEMI.

The LDL level were normal (below 150) in all cases except 2.(Table 2)

Table 2 : LDL level in study subjects.

LDL RANGE mg/dl	TOTAL NO. OF CASES-50	TOTAL NO OF CASES -50	
		STEMI	NSTEMI
1-50	05	03	02
51-100	23	14	09
101-150	20	11	09
151-200	02	01	01

There were 2 cases who had LDL level in range of 151-200 who suffered with single case of each category STEMI and NSTEMI . However low levels of HDL were observed in 44 cases of myocardial infarction.(Table 3)

TABLE 3 : HDL level in study subjects.

HDL RANGE mg/dl	TOTAL CASES=50	TOTAL NO OF CASES -50	
		STEMI	NSTEMI
1-20	05	03	02
21-40	39	23	16
41-60	10	07	03

There were 10 cases who had normal HDL but suffered myocardial infarction. Out of these 10 cases 7 were STEMI and 3 were NSTEMI.

The LDL/HDL ratio within normal range was observed in 2 cases. But 28 cases show more than normal LDL/HDL ratio.(Table 4)

Table 4 : LDL/HDL ratio in study subjects.

LDL/HDL	Total NO .	TOTAL NO OF
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RATIO	OF CASES	CASES -50	
		STEMI	NSTEMI
NORMAL =2.5	02	00	02
>NORMAL	28	18	10
<NORMAL	20	12	08

There were 20 cases who had less than normal LDL/HDL ratio which was unusual phenomenon.

The cut-off for CRP for current study was 11.

Out of 50 patients 37 had raised CRP level.(Table 5)

Table 5 : CRP levels in study subjects.

CRP RANGE(ng/ml)	Total no. of cases	TOTAL NO. OF CASES-50	
		STEMI	NSTEMI
5-10	13	00	13
11-20	23	18	05
21-30	14	14	00

There were 13 patients who had CRP level less than the CRP cut-off and still suffered Myocardial infarction. However these cases mostly belonged to NSTEMI.

The correlation between LDL/HDL ratio and CRP in 50 cases of Myocardial infarction is shown in table 6

Table 6 : Correlation between CRP and LDL/HDL ratio

LDL/HDL RATIO	C reactive protein n=50						Total
	STEMI			NSTEMI			
	5 – 10	11 –	21 – 30	5 –	11 –	21–	

	ng/ml	20 ng/ml	ng/ml	10 ng/ml	20 ng/ml	30 ng/ml	
Normal (2.5)	00	00	00	01	01	00	02
>Normal (2.5)	00	14	05	07	02	00	28
<Normal (2.5)	00	04	09	05	02	00	20
Total	00	18	14	13	05	00	50

There was 1 case with normal LDL/HDL ratio and normal CRP but still suffered NSTEMI. When correlation was performed of the patients with more than normal LDL/HDL ratio for raised CRP, there were 21 cases of which 19 belonged to STEMI and 2 belonged to NSTEMI.

Thus, sizeable number of patients have both the abnormality for raised HDL/LDL ratio and raised C-reactive protein. The rest of the patients had less than normal LDL/HDL ratio but still had raised CRP; 11 cases of STEMI and 2 cases of NSTEMI.

DISCUSSION

The incidence of myocardial infarction beyond the age of 40 years have been reported in most of the studies reviewed for the present study.^{1,4,7,10}

The present observed that age is a risk factor for myocardial infarction where all 50 cases baring 1 were beyond age 40 similar to the observations of foresaid studies.^{1,4,7,10}

The male to female ratio tilted to the former for myocardial infarction as has been quoted by the previous studies. Similar distribution of gender has been made in the foresaid studies.^{1,2,10,14}

Okin et al¹⁵ reported LDL level 121 +/- 34 in a large study population who were showing echocardiomyography of ST segment depression.

Srivastava et al¹⁴ and Agarwal et al¹⁴ reported total cholesterol level of 165.5 +/- 31.3 in 43 cases who suffered of myocardial infarction.

The present study has only 2 patients who had more than normal value of LDL. This observation of the present study to the observation of Srivastava et al¹⁴ for LDL was either in normal range or mildly elevated in patients of myocardial infarction.

The present study has observed 35 patients who had HDL level less than that of normal that is below 40. Of the total cases 23 were STEMI and 12 were NSTEMI. In another 5 cases the HDL level were less than 20.

The study of Srivastava et al¹⁴ and Agarwal et al¹⁴ observed LDL/HDL ratio 2.5 ± 0.93 in their 43 cases of acute myocardial infarction with STEMI. Razvi et al⁴ observed the low level of HDL of P value 0.05 in the individuals with myocardial infarction. The present study too had observed that a significant population of 20 cases had an abnormal LDL/HDL ratio as observed in the studies of Srivastava et al¹⁴ and Agarwal et al¹⁴.

The following is the table that shows the value of abnormally elevated CRP for STEMI and NSTEMI in various studies reviewed for the present work.

AUTHOR	TOTAL NO OF CASES	CRP VALUES		
		STEMI	NSTEMI	Myocardial Infarction
Sheikh Aet al ³	963	29.4 $\pm$ 1.7	27.1 $\pm$ 1.7	-
Mubark et al ¹⁷	60	-	-	>40
Magadale et al ¹⁶	326	-	-	25-40
PRESENT STUDY	50	11-30	11-20	-

The CRP was found to be raised in condition of myocardial infarction in above quoted studies to which the observation of present study agrees^{5,6,9,12}.

The study of Sheikh et al³ have observed the abnormally raised CRP values more in STEMI than NSTEMI myocardial infarction. The present study has made a parallel observation that the CRP values of higher in STEMI as compared to NSTEMI.

The study of Srivastava et al¹⁴ and Agarwal et al¹⁴ that LDL/HDL ratio was elevated in 29.9 % cases and CRP level was elevated in 60.5 % cases. The comparison of LDL/HDL ratio with the CRP values showed that the rise of CRP level was independent of alteration of LDL/HDL ratio.

The present study is in agreement to the observations of Srivastava et al¹⁴ and Agarwal et al¹⁴ that the rise of CRP level is more sensitive biochemical alteration in myocardial infarction as compared to alteration of LDL/HDL ratio.

There were 22 cases in the present study without high LDL/HDL ratio but still showed elevated CRP levels.

The study concludes that the majority of patients do show raised CRP levels over a cut off of 11 ng/ml. However there is a proportion of population who suffers of coronary artery disease without significantly disturbed CRP levels. There exists no relationship between the rising values of CRP with abnormal LDL/hdl ratio.

A significant population of the present study showed low levels of HDL entailing the importance of role of HDL in prevention of coronary artery disease. CRP levels appear to be raised more in STEMI than in NSTEMI as is evident by the results of the present study.

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