ORIGINAL RESEARCH PAPER

GENERAL MEDICINE

A STUDY OF CLINICAL PROFILE WITH HIGH SENSITIVITY C-REACTIVE PROTEIN AND LIPID PROFILE IN CORONARY ARTERY DISEASE

KEY WORDS:

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ABSTRACT

BACKGROUND: Coronary artery disease (CAD) is the leading cause of death in India and worldwide. CAD is most commonly due to atherosclerosis of the coronary arteries. Empirical evidence suggests that inflammation plays a critical role in all the stages of atherosclerosis. Of the potential risk factors, high sensitivity C - reactive protein (Hs -CRP), a marker of low grade vascular inflammation, is among the most promising and considered to be the most robust tool with test characteristics desirable and conducive for clinical use.

AIMS AND OBJECTIVES: To evaluate the significance of Hs -CRP as one of the most reliable marker in CAD. To study the role of lipid abnormalities as a risk factor in CAD. To evaluate the lipid profile in comparison with the Hs -CRP value in CAD.

MATERIALS AND METHODS: The study was conducted on 100 subjects attending medicine OPD divided into two groups, 50 subjects having CAD manifested as acute coronary syndrome and the other 50 subjects are healthy control.

RESULTS AND CONCLUSION: In the present study the mean values of BMI, Serum Total Cholesterol, Serum Triglycerides and Serum Hs-CRP were significantly higher among the cases and there exists a significant positive correlation between them.

INTRODUCTION

Coronary artery disease (CAD) is the leading cause of death in India and the leading cause of death worldwide. CAD accounts for 20% of all deaths in the South Asian region (SAR).

CAD is most commonly due to atherosclerotic occlusion of the coronary arteries. Earlier, atherosclerosis was considered to be a bland condition associated lipid storage that reduces the arterial lumen. However, it is now believed to be a chronic inflammatory condition that starts at a very young age.

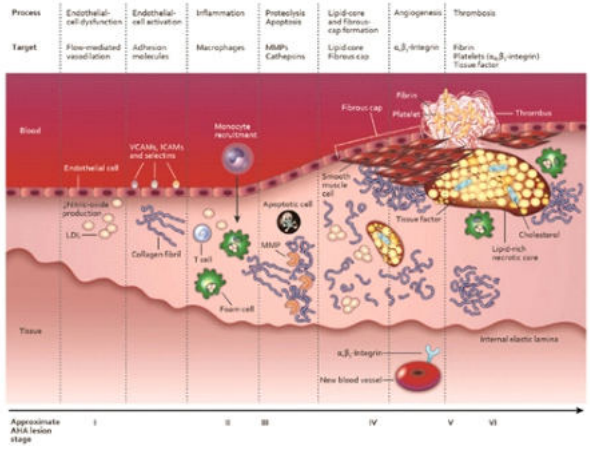
Empirical evidence suggests that inflammation plays a critical role in all the stages of atherosclerosis. Inflammation is an important feature of atheroma and is associated with activation and proliferation of macrophages, endothelial cells and smooth muscle cells.

Multiple studies additionally confirm that most vascular events occur among individuals without evidence of very high cholesterol levels, and that the intermediate risk group is large, heterogeneous and in need of better methods for risk stratification. Of the potential risk factors presently available, high sensitivity C - reactive protein (Hs -CRP), a marker of low grade vascular inflammation, is among the most promising. Thus, Hs-CRP is considered to be the most robust tool with test characteristics desirable and conducive for clinical use.

Serum levels of lipids have proven among the most potent and best substantiated risk factors for atherosclerosis in general and CAD in particular. The uptake of oxidized LDL –derived cholesterol by subintimal macrophages characterizes the formation of the atherosclerotic plaque, initiating a local inflammatory reaction. Dyslipoproteinemias constitute a major risk factor for atherosclerosis and CAD, and their proper recognition and management can reduce cardiovascular and total mortality rates.

PATHOPHYSIOLOGY

CAD is a chronic process that begins during adolescence and slowly progresses throughout life. Independent risk factors include a family history of premature CAD, cigarette smoking, diabetes mellitus, hypertension, hyper lipidemia, sedentary lifestyle and obesity. These risk factors accelerate or modify a complex and chronic inflammatory vascular process that ultimately manifests as fibrous atherosclerotic plaque.



The most widely accepted theory of atherosclerosis states that the process represents the body's attempt to heal in response to an endothelial injury. Vascular inflammation has emerged as a critical and established component of atherosclerosis genesis, activity, and potential plaque instability. Biochemical markers such as elevated levels of high sensitivity C-reactive protein in the absence of systemic inflammation are thought to signal an increased likelihood of vascular inflammation and to portend a higher risk of vascular events. This marker may also signal more rapidly advancing CAD and the need for aggressive preventive measures.

DIAGNOSIS

The initial diagnostic approach for CAD encompasses a detailed patient history including a comprehensive list of CAD risk factors, a thorough physical examination to include an assessment of all peripheral pulses which, when abnormal, may signal the presence of underlying peripheral arterial disease, and an electrocardiogram. Once this initial evaluation is performed, laboratory blood tests, stress testing, and a cardiac catheterization may be necessary to obtain further diagnostic insight.

DIAGNOSTIC CRITERIA

ELECTROCARDIOGRAPHIC MANIFESTATIONS OF ACUTE MYOCARDIAL ISCHEMIA

ST Elevation:

- New ST elevation at the J point in two contiguous leads with the following cut points: >0.1 mV in all leads (except V2 -V3).
- In leads V2-V3 the following cut points apply: >0.2 mV in men >40 years, >0.25 mV in men <40 years, >0.15 mV in women.

ST Depression and T Wave Changes

New horizontal or down sloping ST depression 0.05 mV in two contiguous leads

T-wave inversion >0.1 mV in two contiguous leads with a prominent R wave or R/S ratio >1

CORONARY ARTERIOGRAPHY:

Cardiac catheterization remains the gold standard for determining the presence of obstructive CAD. A cardiac catheterization yields a 2-dimensional rendering of the coronary artery circulation. To assist in circumventing the limitations of a 2 -dimensional depiction of 3-dimensional anatomy, multiple views from varying angles are obtained with the extent of CAD severity typically ascribed to the angulation with the greatest stenosis severity within the particular coronary arterial segment.

MATERIALS AND METHODS

The study was conducted on 100 subjects attending medicine OPD and divided into two groups, 50 subjects having coronary artery disease manifested as acute coronary syndrome and the other 50 subjects are age and sex matched healthy control.

Study design: Observational Case control study.

Inclusion Criteria:

Patients presenting with chest pain in whom the diagnosis of coronary artery disease was confirmed by clinical presentation and investigations like Characteristic electrocardiogram (ECG) changes
Positive treadmill test
Positive Echocardiographic findings
Positive Trop T

Exclusion criteria:

Confounding factors which could interfere in the biochemical analyses of study subjects and alter the results like
Smoking
Diabetes mellitus
Active inflammatory diseases
Nutritional deficiencies

Statistical Methods:

For each parameter mean and standard deviation was calculated. The value of $p<0.05$ was taken as significant. The qualitative variables were compared using x^2 test. The statistical software system SPSS version 22 for windows was used for analysis. Univariate and bivariate correlation was made using Kendall's tau method to confirm the significance of variables with Hs-CRP and lipid profile.

RESULTS AND ANALYSIS

Table 1: Age distribution of cases and controls

Age in years	No of cases	No of controls
30-40	5	4
41-50	19	19
> 50	26	27

In the present study mean age of cases was 51.24 ± 7.89, mean age of control was 52.18 ± 7.36. The minimum age was 33 for cases and 37 for control. The maximum age of cases and controls were 69 and 68 respectively. Majority of cases were > 40 years of age.

Table 2: Gender distribution of cases and controls

SEX	CASES	CONTROLS
MALE	16	16
FEMALE	34	34

The number of males included in the study was 16 (32%) and the number of females was 34 (68%). The female preponderance was due to application of the exclusion criteria (cigarette smoking)

Table 3: Distribution of Cases Based on Diagnosis At Admission

Clinical diagnosis	No of cases
STEMI	42
NSTEMI	7
UNSTABLE ANGINA	1

In this study 50 patients were enrolled in the case group of which 42 patients presented with STEMI, 7 with NSTEMI and 1 with unstable angina.

Table 4: Distribution of cases & controls based on S.Total cholesterol

S.Total cholesterol (Mg/dl)	CASES	CONTROLS
< 180	14	28
180 – 199	7	13
200 – 239	19	7
> 240	10	2

Total cholesterol was estimated for all study subjects, 36 cases as compared to 22 controls had S.TC > 180Mg/dl, of which 10 cases were > 240Mg/dl.

Table 5: Distribution of cases and controls based on HDLc

S.HDLc (Mg/dl)	CASES	CONTROLS
40	30	33
> 40	22	17

In this study, 30 cases and 33 controls had HDLc < 40Mg/dl and 22 cases and 17 controls had HDL > 40Mg/dl.

Table 6: Distribution of cases & controls based on LDLc

LDLc (Mg/dl)	CASES	CONTROLS
< 130	26	38
130 – 159	13	9
160 - 189	8	3
> 190	3	NIL

In this study, 24 cases and 12 controls had LDLc > 130Mg/dl of which 3 cases were >190Mg/dl.

Table 7: Distribution of cases & controls based on TGL

TGL (Mg/dl)	CASES	CONTROLS
< 150	28	35
150 – 199	12	6
200 - 500	10	9
> 500	NIL	NIL

In this study, 22 cases as compared to 15 controls had TGL > 150Mg

Table 8: Distribution of cases & controls based on Hs-CRP

Hs-CRP (mg/L)	CASES	CONTROLS
< 1	7	36
1 – 3	37	14
> 3	6	NIL

In this study, 37 cases had Hs-CRP in the range of 1 – 3mg/L and 6 cases were > 3mg/L as compared to the control group which had 36 subjects with values < 1mg/L and 14 in the range of 1 – 3mg/L.

Table 9: Correlation between risk factors, lipid profile and Hs-CRP.

PARAMETER	Hs-CRP	SIGNIFICANCE
T. CHOLESTEROL	< 0.001	HS**
TGL	< 0.005	S*

HDLc	> 0.05	NS
LDLc	< 0.005	S*
VLDLc	> 0.05	NS
BMI	< 0.001	HS**

** Correlation is significant at the 0.01 level (2 tailed)
* Correlation is significant at the 0.05 level (2 tailed)

DISCUSSION

In this study 50 patients diagnosed as coronary artery disease by ECG, Echocardiogram, and cardiac enzymes who satisfied the inclusion and exclusion criteria were taken as cases and 50 age and sex matched controls satisfying the exclusion criteria were taken as controls, cardiac and clinical profile was assessed in both groups and a correlation was made between clinical profile, Lipid profile and Hs-CRP.

Lipid profile in CAD

The mean value of T.cholesterol was high in cases as compared to controls, and was statistically significant, p<0.001.Comparing HDLc, LDLc, VLDLc and TGL between cases and controls, there was no significant correlation except for LDLc which was statistically significant p<0.002.

Hs-CRP in CAD

In the present study 43 cases had Hs-CRP> 1mg/L as compared to 14 controls. Among the 43 cases, 6 had Hs-CRP values > 3mg/L. The mean Hs-CRP levels was higher among cases compared to control, and it was statistically significant (p<0.001). This data suggests a strong correlation between high Hs-CRP and CAD.

Lipid profile and Hs-CRP in CAD

In the present study, there was a statistically significant correlation between Hs-CRP and T.Cholesterol (p<0.001), TGL (p<0.005), LDLc (p<0.004) and VLDLc (p<0.007). There was no statistically significant correlation of Hs-CRP with HDLc.

CONCLUSION

1. In the present study the mean values of BMI, Serum Total Cholesterol, Serum Triglycerides and Serum Hs-CRP were significantly higher among the cases.
2. There exists a significant positive correlation between Serum Hs-CRP and parameters of lipid profile namely, Serum Total Cholesterol, LDLc, VLDLc, and Triglycerides.

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