A COMPARATIVE STUDY OF hsCRP AND LDL-C/HDL-C RATIO IN ACUTE CORONARY SYNDROME

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ABSTRACT

BACKGROUND

Cardiovascular diseases (CVD) have been the leading cause of morbidity and mortality in India. Recent trends indicate that the disease is being seen in younger age groups also. It has a significant presence in both males and females, both in urban and rural populations. Acute Coronary Syndromes (ACS) are the major causes of mortality in coronary care units. Inflammation plays an important role in ACS. C-reactive protein is a prototypical acute phase reactant, whose levels are increased proportional to the extent of inflammation. This study is aimed at comparing high sensitivity c-reactive protein levels (hsCRP) with LDL-C/HDL-C ratio in patients of acute coronary syndrome.

METHODS

100 patients with acute coronary syndrome (STEMI and NSTE-ACS) were included in the study. Serum high sensitivity c-reactive protein levels (hsCRP) and LDL/HDL ratio were measured at admission. Patients were followed up in hospital for mortality and complications.

RESULTS

There were 76 male and 24 female patients. Mean age for males was 58.73 years and for females was 55.70 years. STEMI was seen in 76 patients and 24 patients had NSTE-ACS. hsCRP were elevated in 68 patients, out of which only 6 patients had LDL/HDL ratio >3 (p <0.01) and among 32 patients in whom hsCRP were not elevated, only 4 patients had LDL/HDL ratio >3.

CONCLUSIONS

Raised hsCRP level is more significantly associated with the acute coronary syndrome as compared to LDL/HDL ratio. Hence hsCRP levels obtained at admission can be used as a marker for identification of patients who are likely to develop significant complications in the immediate in-hospital course and to predict the prognosis.

KEYWORDS

STEMI, NSTEMI, ACS, hsCRP, LDL/HDL Ratio, CVD.

BACKGROUND

Cardiovascular diseases (CVD) have been the leading cause of morbidity and mortality in India. Recent trends indicate that the disease has escalated to younger age groups also. It has a significant presence in males and females in both urban and rural population. In addition to the high rate of CVD mortality in the Indian subcontinent, CVD manifests almost 10 yrs. earlier on average in this region compared with the rest of the world.[1]

Cardiovascular diseases have been gaining importance in India recently because of increased incidence of the disease. It is the first among top 5 causes of deaths in Indian population (rural vs. urban, economically backward vs. developed states, men vs. women and at all stages vs. middle age).[2] In 2000, there were an estimated 29.8 million people with CHD in India out of a total estimated population of 1.03 billion, or a nearly 3% overall prevalence.[3,4] The prevalence of its associated risk factors has been found to exist increasingly in the population.

Previously thought to affect only high-income countries, CVD burden is now being transferred to the developing countries as evident by its presence in India. It is catching up in lower income groups also, in spite of the difference in the lifestyle, culture etc. indicating the urgency of addressing the associated risk factors.[5]

Coronary artery disease is one of the major health problems worldwide and in India in particular.[6] The Registrar General of India reported that Coronary heart diseases led to 23% of total and 32% of adult deaths in 2010-2013. The prevalence varies from 1%-2% in rural populations and 2%-4% in urban populations.[7]

Many risk factors for atherosclerosis development, progression and complications have been identified in clinical and population-based studies (such as hypertension, diabetes, hypercholesterolemia, cigarette smoking etc).

These are known as "traditional risk factors". During the last few years a growing body of evidence has demonstrated that inflammation plays a pivotal role in the pathogenesis of atherosclerosis.[8]

Highly sensitive C-reactive protein (and not conventional CRP) is believed to be in the absence of other contributing factors, one of the best predictors of cardiovascular disease. In addition to the lipid profile, an assessment of CRP dramatically improves the risk prediction of coronary artery disease. A few studies have indicated negative correlation between CRP and high-density lipoprotein cholesterol.[9]

Aims and Objectives

To compare the serum hsCRP levels and LDL-C/HDL-C ratio in patients with Acute Coronary Syndrome and determine its significance in prognosis.

METHODS

Patients diagnosed as acute coronary syndrome (ST Elevation Acute myocardial Infarction and Unstable angina/Non-ST Elevation Myocardial Infarction) and admitted to Navodaya Medical College & Hospital, Raichur are the subjects.

Exclusion Criteria

Age <40, Recent history of surgery or trauma within the preceding 2 months, Patients on dialysis, malignancy, Connective tissue disorders.

CBC, FBS /PPBS, Fasting lipid profile, hsCRP, Troponin T, 12 lead ECG & 2D ECHO was done in all patients. All patients were followed up in hospital for mortality and complications.

RESULTS

Age Groups in Years	STEMI		NSTEACS		
	Males	Females	Males	Females	Total
41-50	20	6	9	1	36
51-60	16	9	7	1	33
61-70	13	6	5	1	25
71-80	6	0	0	0	6
Total	55	21	21	3	100

Table 1. Distribution of Acute Coronary Syndrome Among Different Age Groups and Sex

hsCRP	LDL-C/HDL-C		Total	p Value
	<3	>=3		
hsCRP<3	28	4	32	P=0.007 <0.01** $x^2 = 7.373$
hsCRP>=3	62	6	68	
Total	90	10	100	

Table 2. Distribution According to hsCRP and LDL/HDL Ratio

Risk Factor	No. of Patients	Percent
Hypertension	56	56
Smoking	55	55
Lipid abnormalities	53	53
Alcohol	41	41
Diabetes mellitus	31	31

Past history of ischemic heart disease	14	14

Table 3. Risk Factors for ACS

Complications	hsCRP		Total
	<3	>=3	
Left Ventricular Failure	2	34	36
Cardiogenic Shock	2	8	10
Atrioventricular BLOCK	0	5	5
Bundle Branch Block	1	3	4
VT/VF and Death	1	4	5
Total	6	54	60
p Value	0.001 <0.01**		

Table 4. Post MI Complications in Relation to hsCRP Levels

DISCUSSION

Age

In our study mean age of occurrence of ACS is 57.92 years. In Foussas et al [10] study and Mohmoud Suleiman et al [11] study mean age was seventh decade. And in Indian subcontinent coronary artery diseases occur a decade earlier than the western population.

Sex

76% of our patients are males and 24% are females. This is similar to Foussas et al (79% males) and Mohmoud Suleiman et al (80%) study.

Risk Factors
Hypertension

In our study 56 (56%) patients had hypertension as the risk factor, this correlates with other studies. In Foussas et al[5] study, hypertension was seen in 51% of patients and in Mohmoud Suleiman et al[6] study, hypertension was present in 53% of patients. In "INTER HEART" study by Prof. Salim Yusuf et al,[12] hypertension was seen in only 19.3% of patients, if only South Asian population is considered. In P S Singh et al[13] study, Hypertension was seen in 33%.

Smoking

In the present study smoking was the next most common risk factor, found in 55 (55%) patients. In Foussas et al study, smoking was observed in 57% of patients. In Mohmoud Suleiman et al study, smoking was observed in 40% of patients. Prof Salim Yusuf et al study, 65.19% of patients were smokers.

Lipid Abnormalities

In our study 53 (53%) patients had lipid abnormalities. Most common lipid abnormalities were high triglycerides and low HDL levels. In Foussas et al study 64.6% of patients had lipid abnormalities. And in Mohmoud Suleiman et al study 41% of patients had dyslipidaemias. LDL/HDL ratio was taken in all patients. Among 100 patients LDL/HDL ratio was greater than 3 in 10 patients and less than 3 in 90 patients. So the ratio is not significant (p<0.01) with the incidence of myocardial infarction.

Diabetes Mellitus

In the present study 31 (31%) patients had diabetes as the risk factor. In Foussaset al study Diabetes mellitus was seen in 31% of patients and Mohmoud Suleiman et al study diabetes was present in 30% of patients.

Type of Myocardial Infarction

In our study 76 (76%) patients had ST segment Elevation Myocardial infarction. Almost similar number of patients had ST segment Elevation Myocardial infarction in Mohmoud Suleiman et al study.

High Sensitivity C Reactive Protein Levels

We have studied 100 patients with acute coronary syndrome. In this study 68 (68%) patients had raised levels (>3 mg/dl). Out of 68 patients, 54 had complications and 14 patients had no complications and 32 (32%) patients had hsCRP levels (<3 mg/dl).

Foussas et al studied 1, 846 patients with acute myocardial infarction and showed that, elevated plasma CRP levels confer a significantly increased risk of future fatal or non-fatal ischemic complications.

Mohmoud Suleiman et al concluded that, plasma CRP levels obtained within 12-24 hours of symptom onset is an independent marker of 30-day mortality and the development of heart failure in patients with acute myocardial infarction.

BibiKulsoom et al[14] studied 50 cases of acute myocardial infarction and observed that high serum CRP levels rather than high LDL: HDL are associated with myocardial infarction in the patients presenting at NICVD with myocardial infarction. This study has observed that high serum C-reactive protein is significantly associated with myocardial infarction rather than high LDL: HDL, especially in age group 46-60 years.

CONCLUSIONS

Plasma hsCRP level at admission serves to identify high risk patients in the setting of acute coronary syndrome.

Significantly increased LDL/HDL ratio was in less number of patients. So, raised highly sensitive C reactive protein level is more significant with the acute coronary syndrome as compared to LDL/HDL ratio.

Raised hsCRP levels are independent markers of adverse outcomes.

Hence hsCRP levels obtained at admission in acute coronary syndromes can be used as a marker for identification of patients who are likely to develop significant complications in the immediate in-hospital course and to predict the prognosis.

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