CORRELATION BETWEEN SERUM HSCRP AND CORONARY ARTERY DISEASE SEVERITY IN PATIENTS WITH ACUTE STEMI

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ABSTRACT

BACKGROUND

CRP levels increase after acute myocardial infarction (AMI) but their changes in the process of an acute ischemic attack has been studied mainly in patients with non-ST elevation MI. It seems that elevated levels of circulating inflammatory markers, especially Highly Sensitive C-reactive protein (CRP), bear prognostic information and may contribute to the long-term risk stratification of patients with acute coronary syndromes.

MATERIALS AND METHODS

The study was conducted in ICCU of KIMS, Hubli on 68 patients presenting with acute STEMI, diagnosed on the basis of ECG findings. Serum hsCRP was measured in all patients at admission and all patients underwent coronary angiogram. The study aimed at correlating the severity of coronary artery disease with the hsCRP levels.
Type of study- Cross sectional. Sample size- 68 patients with acute STEMI.

RESULTS

Incidence of STEMI was higher in males in our study with a percentage of 75%. 25% of these patients had triple vessel disease. Patients with TVD had higher BMI, Higher hsCRP and LDL cholesterol when compared to patients with SVD.

CONCLUSION

Patients with STEMI having high HsCRP levels tend to have triple vessel disease. Also, it was found in the study that higher the BMI and LDL cholesterol, more likely that patient can have a triple vessel disease.

KEYWORDS

STEMI, hsCRP, Coronary Artery, Severity.

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BACKGROUND

Highly sensitive C-reactive protein (CRP) has been well recognized as a strong independent predictor of short-term and long-term mortality after non–ST-segment elevation acute coronary syndromes. However, limited studies have been conducted correlating CRP levels with severity of coronary artery disease in patients with STEMI. The purpose of this study was to evaluate the predictive value of CRP measured by high-sensitivity CRP assay (hsCRP) the severity of Coronary artery disease in patients with ST-segment elevation MI.

It seems that elevated levels of circulating inflammatory markers, especially Highly Sensitive C-reactive protein (CRP), bear prognostic information and may contribute to the long-term risk stratification of patients with acute coronary syndromes (ACS).[1,2] However, there is now considerable evidence suggesting that it may not be possible to address ACS collectively. Because they constitute a heterogenous group, they also may demonstrate different CRP kinetics.[3-6] This observation appears reasonable, as CRP might represent two different inflammatory components that vary within the spectrum of acute ischemia: the preexisting low-grade vascular inflammation and the acute phase response to myocardial injury and/or necrosis. The former is measurable at the beginning and the latter builds up as ischemic injury evolves, while interventions such as reperfusion may also alter the course.[7,8] In this context, we attempted in the present study to investigate Highly sensitive CRP as a predictor of disease severity in patients with STEMI. A large body of evidence suggests that inflammation plays a key role in the pathogenesis of atherosclerosis. The chronic inflammatory process can develop into an acute clinical event by the induction of plaque rupture, leading to acute coronary syndromes.[9] More than 20 large prospective trials have shown that the

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inflammatory biomarker high-sensitivity C-reactive protein (hsCRP) is an independent predictor of future cardiovascular events, in addition to predicting the risk of incident hypertension and diabetes.[10]

In acute coronary syndromes, plaque rupture is induced by the inflammatory process in the atherosclerotic tissue. The pathogenesis of atherosclerosis is influenced by inflammatory mechanisms and different plasma markers of inflammation have been studied. CRP has been the most extensively studied. (Initial studies showed that hsCRP was a bystander marker of inflammation, but subsequent studies demonstrated that it was a risk marker in patients with ACS.[11] and could be used as a prognostic marker.) CRP levels increase after acute myocardial infarction (AMI) but their changes in the process of an acute ischemic attack has been studied mainly in patients with non-ST elevation MI.[12,13] Therefore, it is interesting to discuss the value of measurement of hs-CRP in patients with Acute STEMI and its role as a predictor of severity of coronary artery disease.

MATERIALS AND METHODS

Source of Data- Patients admitted in the Intensive Cardiac Care Unit of Karnataka Institute of Medical Sciences, Hubli between November 2015– January 2018 were included. A total number of 68 patients diagnosed with acute STEMI and who underwent Coronary angiogram and gave consent to participate were recruited for the study.

Sample Size- A total of 68 cases of ACS with STEMI were included in the study during the period extending between December 2015 to January 2018.

Exclusion Criteria- Patient with past CABG, PTCA, valvular heart disease, hepatic dysfunction, renal dysfunction with creatinine >1.5 mg/dl, Collagen vascular disease, recent or ongoing infection, fever or inflammatory disorder & Recent trauma.

Method of Collection of Data- Patients presenting with history suggestive of MI and whose ECG was showing an acute STEMI, were selected. Those who were willing to participate in the study were selected.

History including chest pain duration, risk factors and previous history of medical illness was collected.

Each patient underwent CAG and the findings were noted and were classified based on number of vessels involved in CAG.

Blood investigations which included Lipid profile, hsCRP, Serum urea, Serum creatinine, complete blood count and LFT were obtained. Patients with raised total count and abnormal LFT and features suggestive of inflammation were excluded from study.

RESULTS

68 patients presenting with ACS with STEMI who satisfied the inclusion criteria were enrolled in the study. The data both clinical as well as laboratory values were collected and then analysed accordingly.

Among 68 patients, total 51 were males and 17 were female patients among them 33 males and 9 females had Single vessel disease (SVD), 5 males and 4 females had double vessel disease (DVD), 13 males and 4 females had triple vessel disease (TVD).

Data was analyzed using SPSS 22 version software. Categorical data was represented in the form of Frequencies and proportions. Continuous data was represented as mean and standard deviation. Appropriate statistical test of significance was used, and result was obtained.

	Single Vessel Disease	**Double Vessel Disease**	**Triple Vessel Disease**
Sex Distribution	Male- 33	Male- 5	Male- 13
	Female- 9	Female- 4	Female- 4
History of Diabetes mellitus	Yes- 12	Yes- 1	Yes- 3
	No- 30	No- 8	No- 14
History of Systemic hypertension	Yes- 5	Yes- 2	Yes- 4
	No- 37	No- 7	No- 13
History of smoking	Yes- 23	Yes- 5	Yes- 10
	No- 19	No- 4	No- 7
History of alcohol use	Yes- 19	Yes- 2	Yes- 6
	No- 23	No- 7	No- 11
History of tobacco use	Yes- 37	Yes- 8	Yes- 15
	No- 5	No- 1	No- 2

Table 1. Sex Distribution and Risk Factor in our Patients

In this study mean hsCRP among those with SVD was 1.2 mg/L having P value <0.05 in comparison to triple vessel disease with mean of 6.6 mg/L, among those with DVD was 2.5 mg/L and having P value 0.15 in comparison with single vessel disease. There was significant difference in mean hsCRP with respect to number of Vessel blocked. Higher hsCRP was seen among those with TVD and lower hsCRP was seen among patients with SVD.

	Single Vessel Disease	**Triple Vessel Disease**	**P value**
Mean HsCRP mg/L	1.2	6.6	<0.05
Standard deviation	0.72	2.09	

Table 2. Comparing Mean hsCRP in Patients with SVD and TVD

	Single Vessel Disease	**Double Vessel Disease**	**P value**
Mean HsCRP mg/L	1.2	2.5	0.15
Standard deviation	0.72	1.47	

Table 3. Comparing Mean hsCRP in Patients with SVD and DVD

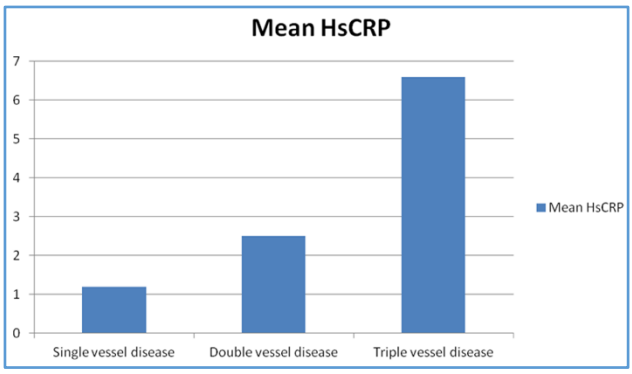

Chart 1. Comparing Mean hsCRP in mg/L in Patients with SVD, DVD and TVD.

Thus, in our study patients with high hsCRP had more severe coronary artery disease with respect to number of vessels involved and it was found to be statistically significant.

	Single Vessel Disease	Double Vessel Disease	P value
Total Cholesterol	217	262	0.057
LDL Cholesterol	100	132	0.059
HDL Cholesterol	46	44	0.95
Triglycerides	144	164	0.47

Table 4. Mean Values of Lipid Profile in mg/dl in Patients with SVD and DVD

	Single Vessel Disease	Triple Vessel Disease	P value
Mean Total Cholesterol	217	252	0.057
Mean LDL cholesterol	100	141	<0.05
Mean HDL Cholesterol	46	43	0.75
Mean Triglycerides	144	169	0.10

Table 5. Mean Values of Lipid Profile in mg/dl in Patients with SVD and TVD

With respect to lipid profile, in our study it was noted that patients with triple vessel disease had statistically significant high LDL cholesterol when compared with patients who had single vessel disease. Also, it was observed that HDL cholesterol was lower in patients with TVD when compared with patients with SVD but this was not statistically significant.

	Single Vessel Disease	Double Vessel Disease	P value
Mean Ejection Fraction in %	44	45	0.96

Table 6. Comparing mean Ejection Fraction in Patients with SVD and DVD

	Single vessel disease	Triple vessel disease	P value
Mean Ejection Fraction in %	44	43	0.99

Table 7. Comparing Mean Ejection Fraction in Patients with SVD and TVD

In relation to ejection fraction mean value in SVD was 44%, 45% in DVD and in TVD it was 43% and there was no statistically significant difference.

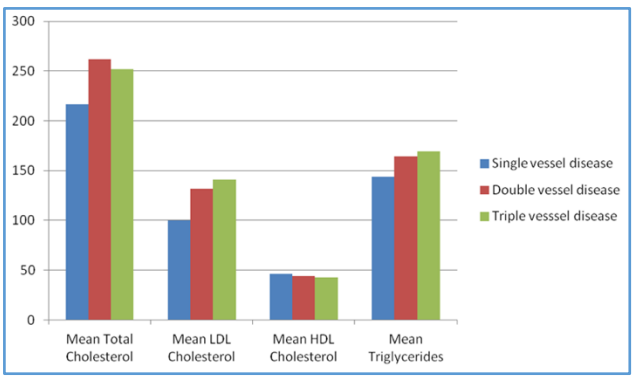

Chart 2. Comparison of Lipid Profile in Patients with SVD, DVD and TVD (Value in mg/dl)

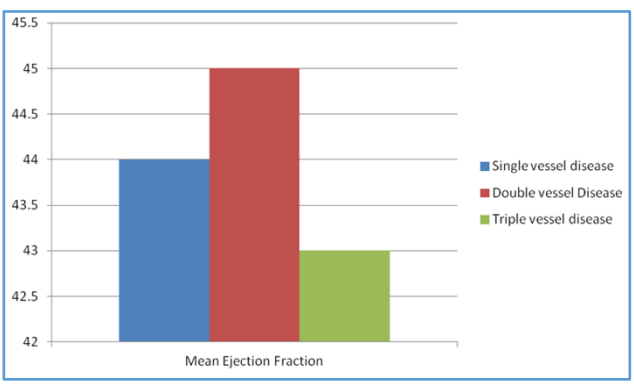

Chart 3. Comparing mean Ejection Fraction in Patients with SVD, DVD and TVD (value in %)

	Single Vessel Disease	Double Vessel Disease	Triple Vessel Disease	P value
Mean Age (Years)	52	58.7	58	0.09
Mean BMI (Kg/m^2)	26.6	27.8	29	0.001

Table 8. Comparison of Mean Age and BMI Patients with SVD, DVD and TVD

Mean age of patients in our study was found to be 52 years in SVD, 58.7 years in DVD and in TVD 58 Years. There was no statistically significant difference between the groups.

Mean BMI was 26.6 Kg/m^2 in SVD, 27.8 Kg/m^2 in DVD and in TVD 29 Kg/m^2 and was found to be statistically significant. That is patients with higher BMI had more severe coronary artery disease.

DISCUSSION

Recently, it is demonstrated that old age, unsuccessful or delayed reperfusion, multivessel disease, and cardiogenic shock are independently associated with poor clinical outcomes.[14,15,16] hsCRP continues increasing for the first 72 hours in patients with STEMIs. This observation corroborates and furthers the results of previous studies based on smaller numbers of patients.[17] HsCRP is able to reduce nitric oxide activity in endothelial cells eventually leading to disorders in the vasodilation of the arteries. However, its relationship with the severity of coronary atherosclerosis is still questionable. The current study provided us with the evidence that the severity of the disease could be predicted based on the hsCRP values. Therefore, this index is better to be taken into account. The Correlation between High-Sensitivity C-Reactive Protein (hsCRP) Serum Levels and Severity of Coronary Atherosclerosis.[18] The higher the maximum CRP recorded, the more severe the infarction suffered, the greater the likelihood of ventricular remodeling, the lower the ejection fraction, and the greater the risk of heart failure, heart rupture, and death.[19] The results of the present study expand upon previous reports that demonstrated non-significant differences in CRP levels at baseline in patients with acute coronary syndromes, which tended to be higher in successive samples.[20]

Following an Acute MI, fibrinogen, CRP, and IL-6 levels are reported to be significantly higher in patients with complications, both as in-hospital and follow-up prognostic indicators.[21,22]

The level of C-reactive protein (CRP) can be used to identify patients with the most complicated coronary lesions and the greatest degree of intracoronary thrombosis, but it can also help identify patients with apparently noncomplex lesions that are susceptible to rupture - a problem that would lead to patient instability.[23,24,25] Thus hsCRP acts as a risk predictor for CAD.

CONCLUSION

Patients with STEMI having high HsCRP levels tend to have triple vessel disease. Also, it was found in the study that higher the BMI and LDL cholesterol, more likely that patient can have a triple vessel disease.

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