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A Study Showing Association between Hscrp and S. Cholesterol Level in Overweight and Obese Patients in Tertiary Care Centre In Gujarat, India

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ABSTRACT

Obesity is rapidly growing health problem in both developed and developing countries. In adults, obesity is associated with hyperinsulinemia, insulin resistance, dyslipidemia, and vascular dysfunction. C - reactive protein (CRP), formerly considered solely as a biomarker for inflammation, is now viewed as a prominent partaker in endothelial dysfunction and atherosclerosis. The present study aims to establish correlation between elevated hscrp levels and elevated serum cholesterol levels in overweight and obese patients. The present study was undertaken at a tertiary care center in Gujarat, India for a period of 2 years. Inclusion criteria includes healthy males and females more than 18 years with body mass index ≥ 25kg/m² whereas all the comorbidities like diabetes mellitus, hypertension, stroke, coronary artery disease is excluded. There was statistically significant positive correlation between elevated s. cholesterol level and HSCRP level (elevated s. cholesterol: normal s. cholesterol ratio of HSCRP is 2.96: 1.68, z value 5, p value < 0.0012). Data shows that there is more risk of future coronary events when there is combined elevation of s. cholesterol and HSCRP, but there may also be risk of future atherosclerosis and other coronary events when s. cholesterol is normal and HSCRP is elevated, as HSCRP is surrogate marker of inflammation and indirect predictive risk factor for atherosclerosis and other coronary events.

Key Words: HSCRP, Obesity, Body Mass Index (BMI)

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INTRODUCTION

Obesity is rapidly growing health problem in both developed and developing countries. In adults obesity is associated with hyperinsulinemia, insulin resistance, dyslipidemia, and vascular dysfunction. Recent evidence indicates that obesity may represent a low-grade chronic inflammatory state as reflected by the elevation in a number of inflammatory markers in serum, such as interleukin 6 (IL-6), tumor necrosis factor-α (TNF-α), soluble tumor necrosis factor receptor II (sTNF-RII), and C-reactive protein (CRP) [1]

C-Reactive Protein (CRP), formerly considered solely as a biomarker for inflammation, is now viewed as a prominent partaker in endothelial dysfunction and atherosclerosis [2,3] Serving clinically for several years as a nonspecific marker for inflammatory processes, CRP, with the advent of high-sensitivity assays, has emerged as one of the most powerful independent predictors of cardiovascular diseases [2,3]. In this study we studied correlation between elevated hscrp levels and elevated serum cholesterol levels in overweight and obese patients.

MATERIALS AND METHODS

A trial of 50 asymptomatic subjects having BMI ≥ 25 in the age group more than 18 years visiting to medicine department were included in the study. All these subjects were clinically evaluated and appropriate investigations were carried out in these subjects. Anthropometric measurements were done. Height and weight were measured by standard procedures. Body-Mass Index was

calculated by following formula

BMI= Weight in Kilograms / Height in Meter^2

Fasting blood samples were collected in all the subjects' s. cholesterol was measured. Concentrations of HSCRP were measured by a highly sensitive nephelometric assay using a monoclonal antibody to HSCRP coated on polystyrene beads. Blood samples for the assay were obtained using the standard venipuncture technique into standard collection tubes. This was followed by statistical analysis done by Epi Info version7.2 software.

Inclusion Criteria

Healthy males and females more than 18 years with body mass index ≥ 25kg/m^2 were included in the study.

Exclusion Criteria

1. Subjects with ischemic heart disease.
2. Subjects with Hypertension.
3. Subjects with diabetes mellitus.
4. Subjects with history of strokes.
5. Subjects with history of arthritis.
6. Subjects with ongoing fever.
7. Pregnant female patients.
8. Subjects with liver function test abnormalities.
9. Subjects receiving any form of therapies, including aspirin, cyclooxygenase-2 inhibitors and statins.
10. Subjects with HSCRP more than 10 mg/l.
11. Subjects with renal failure.
12. Subjects having history of carcinoma colon, carcinoma breasts, renal cell carcinoma, and adenocarcinoma of esophagus.

RESULTS

HSCRP levels (mg/L) were calculated in these subjects. According to HSCRP value patients were stratified in different risk groups.

1. 10 subjects had HSCRP < 1 mg/L – Low risk.
2. 12 subjects had HSCRP between 1 to 2 mg/L – Moderate risk.
3. 16 patients had HSCRP between 2 to 3 mg/L – High risk.
4. 12 patients had HSCRP > 3 mg/L – Very high risk. In study group 10 subjects (20% of total 50 subjects) had HSCRP < 1, 12 subjects (24% of total 50 subjects) had HSCRP 1-2, 16 subjects (32% of total 50 subjects) had HSCRP 2-3 and 12 subjects (24% of total 50 subjects) had HSCRP > 3. In subjects with HSCRP < 1, 50% were overweight (BMI 25-29.9) and 50% were moderately obese (BMI 30-39.9). In subjects with HSCRP 1-2, only 1 subject was overweight (BMI 25-29.9) rest all were moderately obese (BMI 30.-39.9). In subjects with HSCRP 2-3 all (100%) subjects had BMI ≥ 30 which was also true for subjects with HSCRP > 3. After statistical analysis body mass index was linearly related with HSCRP value 9 p value 0.000053). [Table-1]
5.

Table 1: HSCRP level of the case studied

HSCRP	No.	Percent
< 1mg/l	10	20
1-2 mg/l	12	24
2-3 mg/l	16	32
> 3 mg/l	12	24
Total	50	100

Table 2: S.cholesterol level among the subjects

S.cholesterol	No.	Percentage
220	20	40
220	30	60
Total	50	100

Table 3: Comparison of HSCRP with s.cholesterol

S.cholesterol (Mg%)	HSCRP (Mg/L)	
	Mean	SD
220	2.96	0.80
220	1.68	0.87
Total	2.19	1.05
Z test applied	Z value is 5	
	P value is < 0.0012	
	Difference is Significant	

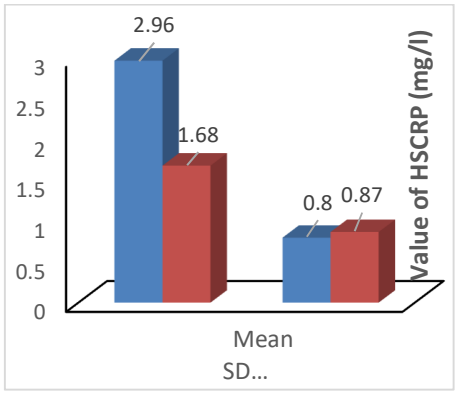

Figure 1: Comparison of HSCRP and S.cholesterol

Table 2-3 and graph-1 shows that 20 subjects had s.cholesterol ≥ 220 mg% and 30 subjects had s.cholesterol < 220 mg%. In subjects of s.cholesterol ≥ 220, mean HSCRP was 2.96 and in subjects of s.cholesterol < 220, mean HSCRP was

1.68 after application of Z test, there was statistically significant positive correlation between s.cholesterol and HSCRP (elevated s.cholesterol : normal s.cholesterol ratio of HSCRP was 2.96 : 1.68, z value 5, P value < 0.0012

Table 4: BMI, S.cholesterol and HSCRP relation

BMI (kg/m²)	Cholesterol (mg %)	HSCRP	
		Mean	SD
25-29.9	≥ 220	-	-
	< 220	1.02	0.55
	Total	1.02	0.55
30-39.9	≥ 220	2.78	0,82
	< 220	1.94	0.86
	Total	2.28	0.93
≥40	≥ 220	3.71	0.11
	< 220	-	-
	Total	3.71	0.11
Total	≥ 220	2.96	0.82
	< 220	1.70	0.87
	Total	2.19	1.05
ANOVA applied	F value is 14.092 P value is <0.05 **Difference is significant**		

Patients were selected in such a way that their blood pressure, serum creatinine was normal so their comparison in assessing risk of future complications was not taken into consideration.

DISCUSSION

In study subjects serum cholesterol showed statistically significant correlation with HSCRP (elevated S. Cholesterol: Normal S .Cholesterol ratio of HSCRP was 2.96:1.68, z value 5, P value <0.0012). Also s. cholesterol level showed positive linear correlation with both BMI [table-4] and HSCRP (r value for BMI and cholesterol was 0.618, r value for BMI and HSCRP was 0.750, r value for s. cholesterol and HSCRP was 0.625, ANOVA for various BMI and HSCRP shows F=14.095, p <0.05, ANOVA for various BMI and s. cholesterol shows F=13.28, p < 0.05). Dyslipidemia may indicate either associated metabolic syndrome or additional risk factor in obese individual.

Data demonstrate that the joint effects of HSCRP and lipid screening are greater than the product of the individual effects of each risk factor considered alone.[4] Furthermore, when study participants were stratified according to the quintile of HSCRP and the quintile of the ratio of total cholesterol to HDL-cholesterol (TC : HDL-C ratio), the relative risk of first coronary events in those in the highest quintiles of both HSCRP and TC : HDL-C ratio was approximately eighty to nine fold higher than that of those in the lowest quintiles of these analysts. In all of these analyses, risk prediction models that incorporated TC : HDL-C ratios were significantly better (P<0.001) than those based on HSCRP alone [5,6]

Increased BMI individually and combined with s. cholesterol having statistically significant positive linear correlation with HSCRP level (r value for BMI & cholesterol is 0.618, r value for BMI & HSCRP is 0.750, r value for s. cholesterol and HSCRP is 0.625, ANOVA for various BMI & HSCRP shows F 14.095, P<0.05, ANOVA for various BMI & s. cholesterol shows F 13.28, p < 0.05). This shows that in patients with BMI ≥ 25, when there is high s. cholesterol, HSCRP value is still higher which indirectly suggesting that there is increased possibilities of vascular events in future as HSCRP is a surrogate marker of chronic low grade inflammation and is a indirect predictive risk factor for atherosclerosis and coronary artery events. Data shows that there is more risk of future coronary events when there is combined elevation of s. cholesterol and HSCRP, but there may also be risk of future atherosclerosis and other coronary events when s. cholesterol is normal and HSCRP is elevated, as HSCRP is surrogate marker of inflammation and indirect predictive risk factor for atherosclerosis and other coronary events. However available evidence is indirect which will require further testing in both epidemiological and clinical investigative studies.

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