

Correlation of serum levels of hsCRP and coronary artery diseases



Biochemistry

KEYWORDS: CAD, hsCRP, BMI

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ABSTRACT

The present study was conducted to determine the association of hsCRP and CAD patients attending Subharti Medical College & its associated hospital. This hospital based study involved 204 patients and the male to female ratio in our study was 0.82:1. These patients were evaluated for hsCRP, routine investigations and anthropometric measurement. Our study revealed that abdominal obesity in relation with hsCRP has a strong association with coronary artery diseases in the study population later in life through early low grade inflammation.

INTRODUCTION

Metabolic Syndrome (MetSyn) has recently been recognized as a risk factor for various diseases such as cardiovascular diseases and diabetes mellitus⁽¹⁻⁴⁾. It is a constellation and complex web of metabolic components, is very common among population of both developing and developed countries^(5,6). The prevalence of MetSyn has been alarmingly risen in recent years due to curb physical activity and unusual dietary patterns⁽⁷⁾. Patients with MetSyn have a 30-40% probability of developing cardiovascular diseases within next 20 years depending upon various numbers of components present⁽⁸⁾.

C-reactive protein is the most sensitive inflammatory marker. Various studies have found that benchmark levels of C-reactive protein are associated with risk of future cardiovascular diseases such as myocardial infarction, peripheral vascular disease, stroke and cardiovascular death amongst apparently healthy subjects⁽⁹⁾.

Patients with MetSyn usually present increased levels of high-sensitivity C-reactive protein (hsCRP), which is a marker of systemic inflammation⁽¹⁰⁾. Several studies have shown that there is a clear relationship between metabolic disorders and higher levels of hsCRP^(11,12).

There are several studies on hsCRP and CAD association but the data on the population residing in our region is very limited. So the present study was planned out to find the association of hsCRP and CAD in the population of our region.

MATERIAL AND METHODS

A total of 297 subjects who were willing to take part in the study and who had given informed written consent were chosen out of which 204 patients were randomly selected. Data of 92 males and 112 females, from the age group of 25 to 55 years were selected from December 2014 to July 2016 in a cross sectional manner. Information about subject's age, sex, monthly income, life style, family history of diabetes and other chronic diseases/disorders were recorded. Height, weight and waist circumferences were measured with the subject barefooted and lightly dressed. The abdominal circumference (waist) was measured at the end of expiration, by wrapping the tape at the level of the umbilicus.

Body mass index (BMI) was calculated as weight in kilograms divided by the square of height in meters. Blood pressure was measured with special precaution, individuals were requested to take rest for 10 min

at sitting position before measuring the BP.

Blood sample (3ml) was collected from each subject. Serum was separated by centrifuging blood at 3000 rpm for 10 min, estimation of hsCRP were done on semi auto analyzer (Robonikreadwell touch) in our central clinical biochemistry laboratory and routine investigations by Vitros 250 auto analyzer using readymade dry chemistry kits from Ortho-Clinical Diagnostics, Johnson & Johnson, USA.

An Enzyme immunoassay for the high sensitive determination of C-reactive protein (hsCRP) in human serum was used which was based on the principle of agglutination reaction. Measuring Range is 0.15mg/L to 5mg/L.

The American Heart Association and US Centers for Disease Control and Prevention have defined risk groups as follows:

Low risk: <1.0 mg/L
Average risk: 1.0 to 3.0 mg/L
High risk: >3.0 mg/L
Statistical Analysis

All the analysis was done by using the Windows based SPSS statistical package (Version 17.0) and P-values <0.01 were taken as the level of significance.

RESULT

The anthropometric measurement in relation to hsCRP of the study group were shown on the table 1.

Table 1. Comparison of characteristics between CHD and control groups

Parameters	Study group (N=132)	Control (N=72)	P
Age (Yrs.)	45.80±0.71	43.63±1.20	<0.01
Height (cm)	158.60±0.87	161.01±0.83	<0.01
Weight (kg)	74.98±1.17	65.81±1.65	<0.01
Body Mass Index (kg/m ²)	29.78±0.38	25.51±0.66	<0.01
Systolic BP (mmHg)	138.8±1.36	129.93±0.12	<0.01
Diastolic BP (mmHg)	87.76±0.84	75.25±1.71	<0.01
HsCRP (mg/L)	3.05±0.07	0.87±0.075	<0.01

In comparison with control subjects, the CHD subjects were older

($P < 0.01$) and had higher Body Mass Index (BMI) ($P < 0.01$). They also had higher systolic blood pressure ($P < 0.01$) and diastolic blood pressure ($P < 0.01$). The mean hsCRP value in the CHD population was 3.05 mg/L and in control subjects were 0.87 mg/L. hsCRP levels were significantly higher among the CHD subjects ($P < 0.01$).

Table 2 represents the result of the Pearson's correlation analysis of hsCRP with variables which are high risk for CHD subjects. hsCRP shows a significance positive correlation with age ($r = 0.05, P < 0.01$), BMI ($r = 0.19, P < 0.01$), systolic blood pressure ($r = 0.181, P < 0.01$), diastolic blood pressure ($r = 0.06, P < 0.01$).

Table 2. Pearson's correlation analysis of hsCRP and other risk variables in total subjects

Parameters	R	P value
Age (Yrs.)	0.05	<0.01
Body Mass Index (kg/m ²)	0.19	<0.01
Systolic BP (mmHg)	0.181	<0.01
Diastolic BP (mmHg)	0.06	<0.01

Discussion

While there have been many previous studies relating CRP and cardiovascular risk factors, the association of CRP with subclinical cardiovascular complication has been examined primarily in adults, with few studies in obese children⁽¹³⁾.

Traditional risk factors for cardiovascular disease include aging, hypertension, dyslipidemia, smoking and diabetes. Laboratory and experimental evidence indicates that chronic inflammatory processes play an important role in the development of CAD⁽¹⁴⁾. In view of this, we investigated the relationship of inflammatory marker with other risk factors. In our study, we have found that height, weight and BMI were significantly higher in the CHD subjects than in the control group. Also, obese group had significantly higher hsCRP as compared to the control group. These findings was in accordance with the study conducted by Quijada et al., who in their study shows that, systolic, diastolic and mean blood pressure (MBP) and hsCRP were significantly higher in the obese group⁽¹⁵⁾.

Our study showed elevated serum hsCRP levels were positively associated with elevated BMI, confirming previous studies^(16,17).

We have found that levels of hsCRP were positively associated with BMI. Our results are in agreement of Martos et al. who in their study stated that the levels of C-reactive protein (CRP) were significantly higher in CHD subjects than in controls⁽¹⁸⁾.

CONCLUSION

Our study demonstrate that abdominal obesity in relation with hsCRP has a strong association with coronary artery diseases in the study population later in life through early low grade inflammation. hsCRP is the inflammatory marker that can be easily be estimated in the susceptible patients, so our result suggest that cardiovascular disease should be considered during the routine evaluation of susceptible population & should be followed by detection & early treatment which helps to avoid severe complications in the diagnosis & management of coronary artery diseases.

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