



Role of Circulating C Reactive Protein in Thyroid Disorders

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Abstract

Introduction: High sensitive C-reactive protein (hs-CRP) is an important sensitive inflammatory marker. Serum level of hs-CRP is not a routine investigation parameter to diagnose thyroid disorders, although many thyroid conditions involve inflammation. In the present study, the level of the hs-CRP and its association with thyroid disorders were assessed.

Material & Methods: A total of 92 males and 112 females, from the age group of 20 to 55 year were selected for the study. Estimation of hs-CRP was done on semi auto analyzer (Robonikread well touch) by Enzyme immunoassay technique, the serum was also assayed for T3, T4 & TSH by enzyme linked fluorescence assay (ELFA) technique using Vidas auto-analyzer.

Result: In our study we have found the Value of T3 in cases is 1.13 ± 0.88 nmol/L is high as compared to control group value 1.04 ± 0.28 nmol/L, Value of T4 in cases is 90.64 ± 59.87 nmol/L as compared to control group value 92.47 ± 12.91 nmol/L, Values of TSH in cases is 7.15 ± 6.58 mIU/L is very high as compared to control group value 2.27 ± 1.06 mIU/L. During our study we have also found values of hs CRP in cases 2.86 ± 0.97 mg/L as compared to control 1.89 ± 0.62 mg/L

Conclusion: Our study findings suggest that abnormal thyroid hormones level interfere with the serum levels of hs-CRP which can have the implications related to Cardiovascular diseases.

Keywords: T3, T4, TSH, hsCRP & Thyroid Disorders.

Introduction

High-sensitive C-reactive protein (hs-CRP), a classic acute-phase reactant, an important sensitive inflammatory marker; increased

concentrations of it have been documented by researchers in their studies to be associated with cardiovascular diseases^[1].

The cardiovascular system is sensitive to the action of thyroid hormones and variable changes in cardiac performance are detected with small variations in the reference range of thyroid hormones. The effect of hyperthyroidism on cardiovascular system includes increase in resting heart rate, myocardial contractility, left ventricular muscle mass and a predisposition to atrial arrhythmias and heart complications such as congestive heart failure, angina pectoris and atrial fibrillation may occur^[2].

In hypothyroidism researchers reported reversible diastolic abnormalities. As hypothyroidism is often associated with hypercholesterolemia, coronary artery disease are very common in these patients^[3]. India, having a population of 1.2 billion, of which estimated about 108 million people suffer from multiple endocrine and metabolic disorders, out of these, 42 million people suffer from thyroid disorder^[4-5].

The hs-CRP role in thyroid disorders as risk factor for coronary artery disease has given conflicting results with some researchers shows positive correlation^[6-8].

So, this study was planned to assess the levels of hs-CRP in patients with thyroid disorders.

Material and Methods

A total of 300 subjects who were willing to take part were chosen for the study, out of which 204 patients were randomly selected. Data of 92 males and 112 females, from the age group of 20 to 55 years were selected from January 2015 to August 2016 in a cross sectional manner. Information about subject's age, sex, family history of endocrine disease and other chronic diseases/disorders were recorded in a predesigned format. 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 sample (5ml) after overnight fasting collected from each subject. Serum separated by centrifuging blood at 3000 rpm for 10 min, estimation of hsCRP were done on semi auto analyzer (Robonikreadwell touch) at central clinical biochemistry laboratory and routine investigations by auto analyzer using readymade kits.

An Enzyme immunoassay for hsCRP in which the principle of agglutination reaction is used. 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-Low risk: <1.0 mg/L, Average risk: 1.0 to 3.0 mg/L & High risk:> 3.0 mg/L respectively.

The serum also assayed for T3, T4 and TSH by enzyme linked fluorescence assay (ELFA) technique using Vidas auto-analyzer. The reference range for T3, T4, and TSH for our laboratory as: T3: 1.23–3.23 nmol/L, T4: 59–135 nmol/L & TSH: 0.4–4.2 mIU/L respectively. The patients were categorized into three groups. Those having T3, T4, and TSH levels within the reference range were categorized into the euthyroid group; patients having low T3, T4 and high TSH were in the hypothyroid group; and those having high level of T3 and T4 and lower TSH levels with respect to the reference range were regarded as hyperthyroid group.

Statistical Analysis

Statistical analysis was carried out with SPSS 16. ANOVA software package used in evaluation of significance between the mean of the two groups. Data were presented as mean \pm SD (standard deviation). Intergroup differences were tested by independent sample test (two groups). P-value lower than 0.05 was taken as significant.

Result

Levels of thyroid hormone profile mean \pm SD in control and cases group shown in the table 1.

Table 1: Thyroid hormone profile between euthyroid control (Group I) & thyroid disorder cases (Group II)

S.No	Parameters	Group I (control)	Group II (cases)	P-value	t-TEST
1	Total T3 (Triiodothyronine) (nmol/L)	1.04±0.28	1.13±0.88	P>0.05	0.84
2	Total T4 (Thyroxine) (nmol/L)	92.47±12.91	90.64±59.87	P>0.05	0.26
3	TSH (Thyroid stimulating hormone) (mIU/L)	2.27±1.06	7.15±6.58	P<0.001	6.23

P value <0.05 is considered significant

Values of T3 in cases is 1.13±0.88 nmol/L high as compared to control group value 1.04±0.28 nmol/L, Values of T4 in cases is 90.64±59.87 nmol/L as compared to control group value 92.47±12.91 nmol/L,

Values of TSH in cases is 7.15±6.58 mIU/L is very high as compared to control group value 2.27±1.06 mIU/L

Table 1 showed significant increment in the value of group II when compare to group I.

Table 2: Comparison of hs-CRP levels between euthyroid controls and thyroid disorder cases

S.No	Parameter	Group I (control)	Group II (cases)	t Test
1	hsCRP (mg/L)	1.89±0.62	2.86±0.97	7.51

During our study it was found that there was a significant difference in the hsCRP mean values levels of the two groups, with increase in the group II (2.86±0.97 mg/L) as compared to group I

(1.89±0.62 mg/L). The results showed significant increment in the hsCRP value of the patients of thyroid disorders (Table 2)

Table 3 Correlation factors of serum hs-CRP with the thyroid function test i.e. T3, T4 & TSH in patients suffering from thyroid disorders

hsCRP Verses Thyroid hormones	Parameters	r value	p. value
	T3	0.06	P >0.05
	T4	0.01	P >0.05
	TSH	0.11	P >0.05

Table 3 representing the correlative study among hsCRP and the Thyroid hormones i.e. T3, T4 and TSH. our results indicates a P value of >0.05. hsCRP had a insignificant correlation with the T3 (r= 0.06,p>0.05) as well as with T4 (r=0.01, p>0.05). Similar correlation was also found in between the hsCRP and the TSH (r=0.11,p>0.05).

Discussion

In India around 42 million people are suffering from thyroid dysfunctional diseases ^[9].

Thyroid disorders are associated with aggravated various risk factors like atherosclerotic cardiovascular disease, endothelial dysfunction and low grade inflammation ^[10].

As inflammatory biomarker, hs-CRP has been widely used for predicting atherosclerotic cardiovascular disease ^[11], hs-CRP

has a strong association with cardiovascular events have been shown in some studies^[12,13]. One study showed that low Ft4 is associated with elevated hs-CRP levels^[14].

In present study, the mean hs-CRP was 3.06±0.07 mg/L in thyroid patients as compared to 0.88±0.075 mg/L in controls. We find that the levels are higher in patients with thyroid disorder, which is in accordance with the findings of Savas E ^[15] they concluded that there are significant changes in the level of inflammatory markers in patients of thyroid disorder.

Tuzcu et al.^[8] in their study found the mean value of hs-CRP in thyroid patients is 4.2 ± 0.8 mg/L versus 1.05 ± -0.3 mg/L in control group. Which is also in accordance to our study in which we found higher values of hs-CRP in thyroid patients. In a study conducted by sharma et al ^[16] subjects with thyroid disorders had significantly higher levels of serum hs-CRP, when compared to

controls. Further, a significant positive correlation was observed between TSH and hs-CRP.

In our study we have also found that thyroid hormones and TSH were correlated with hs-CRP there was a positive correlation between them.

In a study conducted by Czarnywojtek A^[17] the mean values of hs-CRP in hyperthyroid 3.6 ± 2.8 mg/L, in euthyroid 2.5 ± 1.5 mg/L and in hypothyroid 5.9 ± 5.8 mg/L were respectively. Which is in accordance to our study in which we found the higher levels of hs-CRP in thyroid patients as compared to euthyroid controls.

Conclusion

In view of this study thyroid disorders becomes an important entity due to possible link between thyroid disorder and cardiovascular risk factors. Since our study findings suggests that abnormal thyroid hormone level regulate the level of hs-CRP which could lead to various complication like cardio vascular diseases. Also, highly significant association between thyroid hormones disorders, TSH and hs-CRP is an important finding in our study.

More scientific work is required to find out that the management of thyroid disorders will have any favorable effect on cardiovascular diseases and hyperlipidemia.

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