

Original Research Article

Assessment of hs –CRP in Patients with Hypothyroidism at University of Maiduguri Teaching Hospital, Maiduguri Borno State

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Abstract: Introduction: High sensitive c-reactive protein (hs-CRP) is an important sensitive inflammatory marker, but not a routine laboratory investigation for diagnosis of hypothyroidism. However, many thyroidal conditions involve inflammation in the present study, the level of hs-CRP and its link with hypothyroidism was assessed. **Materials & Methods:** A total of 60 males and 50 females aged 20-55 years were assessed for the study. Evaluation of hs-CRP was done on SD biosensor standard F200 fluorescent immunoassayauto analyser in serum was also assayed for FT3 FT4 and TSH by enzyme linked immunosorbent assay (ELISA) technique using Stat-fax-2100. **Result:** In our study, we have found the values of FT3 in cases as 1.21 ± 0.89 pg/ml lower than control values of 1.92 ± 0.66 pg/ml, values of FT4 in cases is 0.60 ± 0.53 ng/dl as compared to control group value of 1.40 ± 0.39 ng/dl, values of TSH as 2.07 ± 1.19 mIU/L higher than the control group of 0.48 ± 1.67 mIU/L. The mean values of hs-CRP for cases as 7.85 ± 0.72 higher than the control group with 3.50 ± 0.54 . **Conclusion:** Our study findings suggest that patients with hypothyroidism also have elevated hs-CRP which can have implication related to cardiovascular disease.

Keywords: FT3, FT4, TSH, hs-CRP and Hypothyroidism.

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1. INTRODUCTION

A substance present in the sera of acutely ill individuals that is able to bind the C-polysaccharide on the cell wall of streptococcus pneumoniae first was discovered in 1930, and by 1941 it was shown to be a protein and was named C - reactive protein [1]. It is one of the acute phase proteins to become elevated in inflammatory disease and also the one exhibiting the most dramatic increases in the plasma [1]. It is synthesized primarily by the liver, can recognize potentially toxic autogenous substances released from damaged tissue, bind them and then detoxify them or clear them from the blood and get catabolized after opsonization [1]. CRP long have been recognized as one of the most sensitive acute phase reactant thus, levels in plasma usually rise dramatically after myocardial infraction, stress, trauma, infection, inflammation surgery and neoplasm and the levels may reach 2,000 times normal [1, 2].

Thyroid hormones are well known regarding their activity on the cardiovascular system, therefore, small variations in levels of thyroid hormones could affect cardiovascular activity. This occurs in form of decreases or increases depending the prevailing thyroid hormone levels in the plasma.

Hypothyroidism defined as plasma level of free triiodothyronine (FT3) of <1.4 pg/ml, free tetraiodothyronine (FT4) of <0.8 ng/dl and thyroid stimulating hormone (TSH) of > 5.0 mIU/L is associated with decrease activity of the thyroid gland. The prominent features of hypothyroidism include; cold intolerance, weight gain, dry skin, hair loss, menstrual abnormalities, fatigue, constipation, hypertension, cardiomegaly and congestive cardiac failure. Leg swelling myxedema, pallor and brittle nails are other features associated with hypothyroidism [3].

CRP being a known risk stratification factor in cardiovascular disease due to arterial stiffening, elevated levels have been found in patients with hypothyroidism [4].

Hypothyroidism is often associated with hyperlipidaemia due to decrease catabolic activity of the thyroid hormones, predisposing the individual to coronary artery disease.

Hyperthyroidism on the other hand, causes increase heart rate, increase myocardial contractility, predisposes to cardiac arrhythmias as well as cardiac complications such as congestive cardiac failure, angina and atrial fibrillation [5, 6].

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 [7].

2. MATERIALS AND METHODS

2.1: Patients

A total of 140 individuals consisting of 60 male and 80 female patients aged 20-55 years comprising of 70 hypothyroids as cases and 70 euthyroids as controls were consecutively recruited at the endocrinology unit of the university of Maiduguri teaching hospital. Euthyroidism was defined as FT3 of 1.4 – 4.2 pg/ml, FT4 of 0.8-2.0ng/dl and TSH of 0.28 – 0.53 miu/ml [8]. Patients are hypothyroids if their serum levels of FT3 is <1.4 pg/ml, FT4 of <0.8ng/dl and TSH of > 0.53miu/ml.

Patients were excluded if they are hypertensive, diabetic or pregnant. Liver, kidney and heart diseases, previous history of thyroid disease as well as patients on medications that affect thyroid hormone levels are excluded.

Informed consent was obtained from all participants and the study was approved by the ethical committee of the University of Teaching Hospital.

2.2. Measurements

Measurements of weight, height, body mass index (BMI) and blood pressure were done. Weight was estimated using a weighing scale (OHAUS pioneer PA

413) with subjects putting on light clothes and no shoes. The height was measured by stadiometer and the BMI was estimated by calculation using weight (Kg) divided by height (m²). The blood pressure was measured twice in the sitting position on the left arm using an accuuson’s sphygmomanometer.

About 5ml of whole blood specimens were collected after an overnight fast from the antecubital vein observing aseptic procedures for measurement of FT3, FT4 and TSH. Serum was separated from the cells using Pasteur pipette and spun at 3,000 rpm for 10 minutes using swinging bucket centrifuge and stored-frozen at -20°C until time of analysis.

FT3, FT4 and TSH levels were estimated using enzyme linked immunosorbent assay (ELISA) kit, Perkins Elmer. The serum high sensitive c-reactive protein (hs-CRP) was evaluated using colorimetric enzyme linked immunosorbent assay (ELISA), mono bind inc kit (Acubind hs-CRP) product code; 3125 – 300 USA (measurement range is 0.15 – 5.0mg/L). Patients were considered by American heart foundation as low risk (< 1mg/L), average risk (1-3mg/L) and high risk (>3 mg/L) and have high serum CRP when Levels exceed 10mg/L [9].

3. STATISTICAL ANALYSIS

Data analysis was carried out with spss version 16. Analysis of variance software package used in evaluation of significance between the mean of the two groups. Results were presented as mean + standard deviation (SD). In between group differences were measured by independent sample test for the different groups. P-values of < 0.05 were considered as statistically significant.

4. RESULT

The mean age distribution for both cases and control was found to be 50.40 + 4.2, 52.10 + 5.2 (p-0.15) that are not statistically significant. On the other hand, body mass index of the cases was 22.3+3.1 higher than their control counterpart of 19.5 + 1.8 although not statistically significant (p-0.06). The waist to hip circumference ratio showed similarity with the BMI with mean values of 0.84 + 0.07 for cases and 0.81+ 0.09 in the control group are not statistically significant (P-0.08) (Table 1).

Table 1: This table shows mean values of age, Body Mass Index (BMI) and waist to hip circumference ratio (WHCR)

PARAMETER	CASES	CONTROL	P-VALUE
Age (Yrs)	50.4+ 4.2	52.1+ 5.2	0.15
BMI (Kg/m ²)	22.3+ 3.1	19.5 + 1.8	0.06
WHCR	0.84+ 0.07	0.81+ 0.09	0.08

P<0.05 = Significant

The mean values of free T₃ (FT3) in both cases and control was found to be 1.21 + 0.89 and 1.92 + 0.66(P<0.001) were statistically significant. The mean values of FT4 for the cases and control was 0.60 + 0.53, 1.40+ 0.30 respectively were statistically significant (P<0.001). The mean values of thyroid stimulating hormone (TSH) for cases and control was 2.07 + 1.19

and 0.48+ 1.67 were also statistically significant (P<0.003).

The mean values of hs-CRP for cases and control respectively were 7.85+ 0.72 and 3.50+ 0.54 (P<0.002) are statistically significant (Table II).

Table II: Thyroid Hormones and hs-CRP between cases and Controls

S/N	PARAMETERS	CASE	CONTROL	P-VALUE
1.	FT3 (Triiodothyromine)(pg/ml)	1.21+ 0.89	1.92+ 0.66	0.001
2.	FT4 (Tetraiodothyronine) (ng/dl)	0.6+ 0.53	1.40+ 0.30	0.001
3.	TSH (Thyroid Stimulating Hormone) (miu/L)	2.07+ 1.19	0.48 + 1.67	0.003
4.	hs-CRP (high sensitive C-reactive protein) (mg/L)	7.85+ 0.72	3.50+ 0.54	0.002

P<0.05 is considered significant

5. DISCUSSION

Thyroid disorders today have been known to be associated with various risk factors such as atherosclerosis, endothelial dysfunction and inflammatory process [10].

hs – CRP as a risk stratification factor has been widely used in predicting coronary artery disease [11].

A study showed that low FT4 is associated with elevated hs-CRP levels [12]. In the present study, the mean hs-CRP was 7.85+ 0.72 mg/L in the patients with hypothyroidism as compared to 3.50+ 0.54 mg/L in the euthyroid control group. We discovered that the levels are higher in patients with hypothyroidism, which tallies with the findings of Savas E [13] who concluded that there are significant changes in the level of inflammatory markers in patients with thyroid disorder.

Tuz cu *et al.*, [14], their study found the mean value of hs-CRP in thyroid patients is 4.2 + 0.8mg/L versus 1.05+ 0.3 mg/L in the control group. This is also in accordance with our study in which we found higher values of hs-CRP in patients with hypothyroidism. In a study conducted by Sharina *et al.*, [15], subjects with thyroid disorders had significantly higher levels of serum hs-CRP, when compared to controls.

6. CONCLUSION/RECOMMENDATION

In view of this study, hypothyroidism has become an important condition due to its possible link with cardiovascular risk factors that lead to acute myocardial infarction, a lethal condition famous with increase morbidity and mortality worldwide. Since our study findings suggest that abnormal thyroid hormone level regulates the level of hs-CRP which could lead to various complications such as cardiovascular disease.

More studies are needed regarding the screening of all thyroid patients for hs-CRP because of its links with cardiovascular disease.

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