Original Research Article

Thyroid disorders – A random analysis of dysfunction and associations

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Abstract

The problem of thyroid dysfunction is known since 19th century. Long back the only assessment tool for thyroid function was clinical diagnosis, Basal Metabolic Rate, protein bound iodine assay and now the dramatic advantage in detection of thyroid dysfunction, even the subclinical abnormality with sensitive and specific third generation (functional sensitivity of 0.01 – 0.02 MIu/L) and the newer fourth generation (functional sensitivity of 0.001 – 0.002 MIu/L) have come up. The present study includes 100 female patients who attended the General Medicine Department at Shri Sathya Sai Medical College, Kanchipuram District for a 1 year period. This study is undertaken to analyse the spectrum of thyroid disorders prevalent in this area, to establish a casual association of lipid abnormality in cases of thyroid dysfunction especially in hypo thyroids to assess the risk of obesity in thyroid dysfunction and to assess the extent of cardiovascular risk factors in hypothyroid patients. In the present study, the association of thyroid status with obesity and lipid profile has been studied. Body Mass Index, serum TSH, T3, T4 and serum lipid profile were performed for 100 patients and data analysed and tabulated. We infer that overtly hypothyroid cases have an atherogenic lipid profile and are at definite cardio vascular risk.

Key Words: Thyroid disorders.

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INTRODUCTION

The Thyroid gland is located below and anterior to the larynx and it secretes thyroid hormones T3 and T4 which is controlled by trophic factors secreted by both the hypothalamus and the anterior pituitary. Decreased levels of T3 and T4 stimulate the release of thyrotropin releasing hormone (TRH) from the hypothalamus and thyroid stimulating hormone (TSH) from the anterior pituitary, causing T3 and T4 levels to rise[8]. Elevated T3 and T4 levels in turn feed back to suppress the secretion of TRH and TSH. The problem of thyroid dysfunction is known since 19th century. Thyrotoxicosis was described by Robert Graves in 1835 and Myxoedemic syndrome by Sir William Gull in 1873. Thyroid dysfunction especially adult primary hypothyroidism affects 5-10 % of general population. Hypothyroidism is the second most prevalent disorder in India[1] and more prevalent in females[2,7] and most cases require lifelong treatment. Based on the recent data subclinical hypothyroidism seen approximately 14 times more commonly than overt hypothyroidism. Laboratory investigation plays a vital role in the diagnosis of suspected hypothyroidism because of the non-specific nature of symptoms. Patients with unexplained increase in body weight or hypercholesterolemia should be assessed for potential hypothyroidism[3,5].

MATERIALS AND METHODS

A random 1 year study of 100 female patients who presented with specific and nonspecific symptoms to the General Medicine Outpatient department were subjected

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to biochemical analysis of thyroid function tests and other parameters like serum lipid profile, fasting blood sugar, blood urea and serum creatinine and total protein and the results summarised in the tabular columns. Clinical presentation of the cases – out of 100 cases, the following number of cases showed Nodular goitre: 22, Abnormal uterine bleeding: 18, Infertility: 15, Obesity: 22, Fibroid: 8, Gall stone: 4, Anxiety Neurosis: 6, Ovarian cyst: 5.

RESULTS

Table 1: Mean of Thyroid Function Test in the study groups

CASES	TSH in IU/L Min – Max Mean	T4 in IU/L Min – Max Mean	T3 in IU/L Min – Max Mean
Euthyroid (55)	0.496 – 4.864 2.469	4.412 – 11.85 7.863	0.214 – 4.76 1.47
Hypothyroid (35)	5.137 – 56.0 23.614	1.2 – 4.864 3.746	0.14 – 2.14 0.875
Hyperthyroid (10)	0.012 – 0.38 0.215	5.344 – 24.85 15.332	0.352 – 2.829 1.634

Table 2: Biochemical parameters of all cases in groups

TSH mIU/L	Urea Mg/dl	Creatinine Mg/dl	Total protein g/L	FBS Mg/dl
< 0.4 (10) Group I	29.86	0.673	6.58	88.84
0.4 – 5.0 (55) Group II	30.17	0.706	6.94	93.69
5.1 – 20.0 (35) Group III	28.65	0.723	6.76	93.69

None of the cases showed impaired glycaemic / renal / hepatic function as evidenced by their fasting sugar, blood urea, serum creatinine and total protein levels.

Table 3: Distribution of obese cases

Serum TSH mIU/L	Group	BMI Kg / m^2	BMI >22.99 Kg / m^2	BMI <22.99 Kg / m^2
< 0.4 (10)	Group I	23.32	6	4
0.4 – 5.0 (55)	Group II	23.78	32	23
>5.1 (35)	Group III	25.24	29	6
Total (100)		**24.7**	**67**	**33**

In hypothyroid cases 29 out of 35 were obese.

Table 4: Lipid profile in Euthyroid, Hypothyroid and Hyperthyroid subjects

Serum TSH mIU/L	Group	TC Mg/dl	TG Mg/dl	HDL – C Mg/dl	LDL – C Mg/dl	VLDL – C Mg/dl
< 0.4 (10)	I	166.13	130.33	44.46	94.0	25.73
0.4 – 5.0 (55)	II	169.8	137.15	44.30	93.15	27.52
5.1 – 20.0 (35)	III	186.38	149.88	43.38	112.69	30.5

ANALYSIS AND DISCUSSION

In the present study, the association of thyroid status with obesity and lipid profile has been studied. Body Mass Index and the following biochemical parameters were performed in 100 patients,

- Serum TSH, T_3 and T_4 hormone assay
- Serum total cholesterol
- Serum triglycerides
- HDL cholesterol

The data obtained from the study were analysed and tabulated. 100 apparently healthy subjects ranging from 20 – 55 years were included in the study. None of these cases showed impaired glycaemic / hepatic function / renal function as evidenced by their fasting sugar, serum urea, creatinine and total protein levels (Table I). The cases were designated as euthyroid, hypothyroid and hyperthyroid on the basis of TSH levels. The prevalence of hypothyroidism was more common than hyperthyroidism in our study.[9] It is usually observed that thyroid disorders are frequently associated with either weight loss or weight gain, particularly patient with hypothyroidism tend to become obese. BMI is a precise variable to assess these changes in body weight and development of obesity. The normal BMI for Asian population including India is considered to be <22.99 kg/m^2. In our subjects, we observed the mean BMI of all cases being 24.7 +/- 4.7 kg/$m^2$and ranging between 17-40

kg/m^2. Thyroid dysfunction clearly influences BMI. The probable mechanism is thyrotropin induced adipogenesis and adipokine production. It acts on thyrotropin receptors in adipocytes and preadipocytes inducing differentiation and expansion (adipogenesis). It also directly induces the synthesis and release of adipokine and leptin. Positive correlation between serum levels of TSH and leptin has been reported. Hypothyroids bear a great risk of developing hypercholesterolemia; the probable mechanism is that thyroxine may affect an early stage in cholesterol metabolism causing reduced activity of HMG-COA reductase. The triglycerides kinetics in myxoedema showed a lowered fractional clearance of both exogenous and endogenous triglycerides from circulation. Reduced number of LDL receptors in the liver leads to decreased LDL receptors mediated catabolism resulting in increase in LDL concentration in hypothyroidism.[6] From the above discussion, we infer that overtly hypothyroid cases have a atherogenic lipid profile and are at definite cardiovascular risk. Dyslipidaemia is reversible with treatment if identified early in thyroid disorders. This study emphasises the importance of identification of this biochemical abnormality, to prevent the later occurrence of atherosclerosis and cardiovascular diseases in these cases.[4]

CONCLUSION

As dyslipidaemia is reversible with treatment if identified early, this study emphasises the importance of identifying this biochemical abnormality to prevent the later occurrence of atherosclerosis and associated cardiovascular complications especially in hypothyroids which is the most common thyroid dysfunction in our study.

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