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Prevalence Of Subclinical Thyroid Dysfunction In General Population: Focus On Tsh Co-Relation With Bmi

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ABSTRACT

OBJECTIVE

Subclinical thyroid dysfunction is common and has significant potential risk of progression to overt disease. A study was undertaken to detect the prevalence of subclinical thyroid dysfunction in the general population, and its co-relation was also checked with Body Mass Index (BMI) of the study population.

METHOD

It was an observational cohort study. Subjects were categorized as normal, obese and underweight based on BMI classification by WHO. Thyroid Stimulating Hormone (TSH) was estimated from the venous samples of the subjects and analyzed by serum chemiluminescence method.

CONCLUSION

Subclinical hypothyroidism (5.17%) is more prevalent than subclinical hyperthyroidism (1.72%) as noted in this study is consistent with the results of earlier studies. There was no significant difference in the level of TSH amongst the three BMI groups as P value is greater than the I.o.s 0.05. Thus, estimation of TSH levels should be advocated as a screening test for routine detection of thyroid dysfunction irrespective of the BMI.

Keywords : subclinical hypothyroidism, subclinical hyperthyroidism, Body mass index (BMI)

INTRODUCTION

Thyroid dysfunction is common¹, about 200 million people in the world have some form of thyroid disease. Thyroid gland, the largest endocrine gland is involved in metabolism, thermogenesis and lipolysis. This is accomplished through the secretion of two hormones Thyroxine (T4) and Tri-iodothyronine (T3) and is regulated by TSH secreted by the pituitary gland. 2 Hypothyroidism is the undersecretion of thyroid hormones, while hyperthyroidism is the oversecretion of these hormones. 3

Clinical manifestations of thyroid dysfunction vary considerably (according to dietary iodine intake or other factors) among patients in their character and severity. The serum TSH assay is an accurate, widely acceptable, safe and relatively inexpensive diagnostic test for all common forms of thyroid dysfunction. The signs and symptoms of hypothyroidism and hyperthyroidism are similar to other common medical problems, so the condition is often undiagnosed and overlooked.

Abnormal biochemical levels of thyroid hormones without any specific signs or symptoms of thyroid disease and no history of thyroid dysfunction or therapy seen, is said to be subclinical thyroid dysfunction. Subclinical hypothyroidism is defined by the finding of an elevated serum TSH concentration with serum free T4 concentration being within the reference range, whereas subclinical hyperthyroidism is defined by a low serum TSH with serum free T4 and free T3 concentrations being within the reference range.^{4,5}

Subclinical thyroid dysfunction is much more common than overt disease. ^{6,7} This study was undertaken to detect the prevalence of subclinical thyroid dysfunction in the general population. As subclinical hypothyroidism is common among

the obese ⁸, the TSH of the study population was co related with BMI.

METHOD

It was an observational cross-sectional study. A thyroid disease detection camp was organized in Minerva Hospital and Research Centre, Chinchwad, Pune in the month of June 2011. Fifty eight participants aged 18 years and above were examined. Subjects with known presence of thyroid disease were excluded. Informed consent was obtained from every subject. The study was ethically approved by the Hospital Ethics Committee.

A performa was used to screen the study population. The performa contained questions pertaining to demographic profile, consumption habits and clinical examination. Clinical examination included assessment of BMI using standard height charts and weight machines. Based on BMI classification by WHO ⁹ the participants were categorized as obese, normal and under weight. Patients with BMI of 18 to 24.9Kg/m² were labeled as normal, with BMI of 25 -29.9 Kg/m² as overweight, while obesity was defined as BMI of 30-39.9 Kg/m² and above.

Serum TSH, free T3 and free T4 test were measured by chemiluminescence immunoassay method. Analyses were undertaken using SAS (version 9.1)

RESULTS AND ANALYSIS

In the present study, of the 75 individuals screened, 77.33% were eligible leaving a final study population of 58 subjects. Their mean age was 33.649 years (18-62).

Table 1: Baseline Characteristics of Participants

Characteristics	Number of Subjects	Mean (\pm SD) of TSH Level (Reference range of 0.4–5.5 mIU/L)
Age(in years)		
15-24	15 (25.86%)	1.756 \pm 0.774
25-34	18(31.03%)	3.214 \pm 2.024
35-44	16 (27.58%)	2.296 \pm 1.9141
45-54	8 (13.79%)	2.4885 \pm 1.444
55-64	1 (1.72%)	1.6
Gender		
Male	7 (12.06%)	1.3914 \pm 0.471
Female	51 (87.93%)	2.5700 \pm 1.7688
BMI		
Normal	32 (55.17%)	2.5425 \pm 2.0508
Obese	5 (8.62%)	2.3900 \pm 1.4731
Over weight	21 (36.20%)	2.2619 \pm 1.1520

Three subjects (5.17%) had subclinical hypothyroidism (median serum TSH 7.17 mIU/L, median free T4 13.2 pmol/liter), and one individual (1.72%) had subclinical hyperthyroidism (serum TSH < 0.1 mIU/L; median free T4 17.5 pmol/liter; median free T3 5.9 pmol/liter) as seen in figure 1.

Figure:1 Prevalence of Subclinical Hyperthyroidism and Hypothyroidism

*Note: Figures rounded off two decimal point places.

In the present study, thyroid dysfunction was seen in 7.48% of female population. Moreover, the prevalence of high TSH levels increased with age and was predominant among females (figure: 2). Among the different age groups, women in 25-34 year age group had a higher incidence as compared to the other age groups.

Figure: 2 Prevalence of high TSH levels

This cohort study also showed no statistically significant difference in the TSH levels for the body types of the individuals as P value is greater than the level of significance 0.05

DISCUSSION

Disorders of the thyroid gland are among the most common endocrine conditions seen. Global prevalence of thyroid disorders is more than 2 billion with approximately 40 million in India. 10 Overall incidence of hypothyroidism is 5.4% and hyperthyroidism is 1.9% and the ratio¹¹ of hypothyroidism and hyperthyroidism is 1:5. Subclinical hypothyroidism is mild thyroid dysfunction, if left untreated leads to overt hypothyroidism in many cases. It has been reported that patients with subclinical hypothyroidism and hyperthyroidism develop overt thyroid disorders at the rate of 3-18% and 5% respectively

per year.^{12,13} Untreated hypothyroidism can lead to fatigue, weight gain, and heart failure whereas untreated hyperthyroidism can lead to atrial fibrillation, congestive heart failure and neuropsychiatric problems. Thus, early treatment can prevent the progression of overt hypothyroidism as well as hyperthyroidism.

Earlier conducted studies showed the prevalence of subclinical hypothyroidism varies from 5% to 13.2% depending upon the population studied. ¹⁴ Reported incidence of subclinical hyperthyroidism is 0.7% – 2.1%.¹⁵ In the present study, the total numbers of patients with (raised TSH levels) subclinical hypothyroidism were 3(5.17%) and subclinical hyperthyroidism was 1 (1.72%), all cases being females. The results of the present study are in agreement with the data across the world in terms of high prevalence among females.¹⁶

Our study also showed no significant association between the TSH level and BMI of the individuals, results being consistent with an Indian study held in Kashmir.^{17,18} Contradictory to our present findings, an international study conducted by The Endocrine Society of USA (2005) showed a positive co relation between the BMI and TSH levels of the individuals. ¹⁹ This positive association between TSH and BMI were also established in various other studies. ²⁰

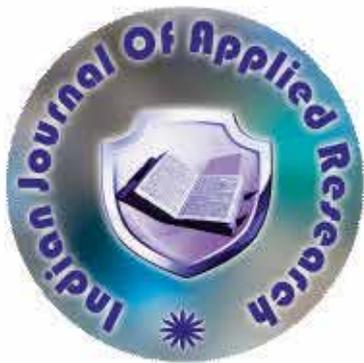
CONCLUSION

Thyroid dysfunction is common and presents with wide range of nonspecific symptoms, and needs to be considered in many differentials. Once diagnosed, Thyroid function test needs to be regularly monitored to optimize therapy. In general practice, the most common use of thyroid function test (TFT) is to screen for thyroid dysfunction based on symptoms or signs suggestive of thyroid dysfunction. British guidelines have been developed to promote the rational use of Thyroid function test. ²¹

In this study, asymptomatic subjects were found to be suffering from thyroid dysfunction. Earlier studies have shown positive co relation between BMI and TSH levels, however, this study shows that not only obese but normal subjects can also be at the risk of hypothyroidism. Thus, TSH should be advocated as a routine screening test for detection of thyroid dysfunction irrespective of the BMI.

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