

Research Article

The prevalence of anti-thyroid peroxidase antibodies in subclinical and clinical hypothyroid patients

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ABSTRACT

Background: Subclinical hypothyroidism is a state of mild thyroid failure and is essentially a laboratory diagnosis with elevated serum thyroid stimulating hormone (TSH) and a normal free thyroxine (FT4) concentration. The main objective of study is to evaluate the prevalence of anti-thyroid peroxidase (anti-TPO) antibodies among patients with clinical and subclinical hypothyroidism.

Methods: A prospective study was conducted involving 50 patients with biochemical evidence of hypothyroidism. Subclinical hypothyroidism was defined as thyroid stimulating hormone (TSH) >5.0 µIU/ml with normal FT4 and clinical hypothyroidism as free thyroxine (FT4) and high TSH. A detailed history, clinical examination, and investigations comprising of complete haemogram, fasting plasma glucose, fasting FT4, TSH, anti-TPO antibodies and lipid profile were done for all the patients.

Results: Out of 50 cases, 28 subjects had clinical hypothyroidism (25 females and 3 males) and 22 had subclinical hypothyroidism (14 females and 8males). Among the 50 subjects with clinical and subclinical hypothyroidism, 33 were anti-TPO positive. The corresponding percentage of anti-TPO positivity noted in the clinical hypothyroidism and subclinical hypothyroidism groups were 80 % and 50% respectively.

Conclusions: Serum TSH and anti-TPO analyses are essential in determining the etiology of hypothyroidism and risk of progression to overt hypothyroidism in patients with subclinical.

Keywords: Clinical hypothyroidism, Subclinical hypothyroidism, Anti-TPO antibodies

INTRODUCTION

Subclinical hypothyroidism is a state of mild thyroid failure and is essentially a laboratory diagnosis with elevated serum thyroid stimulating hormone (TSH) and a normal free thyroxine (FT4) concentration.¹ Subclinical hypothyroidism is much more common than overt hypothyroidism and hence the early diagnosis and treatment of the condition may prevent the onset of overt

hypothyroidism and its associated effects.² Patients with subclinical hypothyroidism with high titre of anti-thyroperoxidase (anti-TPO) antibodies are more likely to progress to overt hypothyroidism. Most of the hypothyroid patients have an elevated anti-TPO titre, suggesting an autoimmune etiology for hypothyroidism. Literature evidence substantiates the positive association between serum anti-TPO levels and the activity of chronic autoimmune thyroiditis.

A study by Jeena et al (2013) has concluded on the usefulness of anti-TPO antibody estimation in establishing the etiological diagnosis of autoimmune thyroid diseases. The study has found that out of 47 hypothyroid subjects evaluated, 28 (60%) had an elevated TPO antibody titre.³ Another Indian study by Mohanty et al, has reported that among the 38 frank hypothyroid patients, 76% had raised anti-TPO levels.⁴ In a cross-sectional study conducted in Rajasthan, the prevalence of hypothyroidism noted in the overall study population (n=300) was 9.33%. A significantly higher number of females (83.33%) than males (16.67%) were diagnosed with subclinical hypothyroidism and a total of 56 (18.66%) subjects tested positive for anti-TPO antibody.⁵

Epidemiological studies have indicated a high anti-TPO titre in the subclinical hypothyroid patients, and such patients have an increased tendency to convert to overt hypothyroidism. The current prospective study was conducted in South India to evaluate the prevalence of anti-TPO antibodies in patients with clinical and subclinical hypothyroidism.

METHODS

Study subjects were selected from patients presented to the out-patient department of Vydehi institute of medical science and research centre, Bangalore, India between January 2013 and April 2014. Patients with clinical and biochemical evidence of hypothyroidism were included. Subclinical hypothyroidism was defined as thyroid stimulating hormone (TSH) >5.0 µIU/ml with normal FT4 (0.60-1.12 ng/dL) and clinical hypothyroidism as low FT4 and high TSH. The exclusion criteria considered were: females in gestational or postpartum period, patients with thyroid destruction (from radioactive iodine or surgery), and the patients receiving medications, which may cause thyroid dysfunction (e.g. amiodarone, lithium, and antithyroid drugs).

Free T4 (Beckman Coulter Access, Free T4 reagent, reference no.-33880) and TSH (Beckman Coulter Access, TSH reagent, reference no.-33820) were assessed using standardized assay systems, and anti-TPO antibody was assessed by two-step immunoenzymatic (sandwich) assay (Beckman Coulter Access, TPO-Ab). TPO antibody was considered positive if the value was more than 9 IU/mL.

Statistical analysis

Microsoft Excel 2007 was used for the statistical analysis of the data and the statistical significance was calculated using Chi-square test.

RESULTS

Fifty five patients with biochemical evidence of hypothyroidism were screened for the study among whom five were excluded since they were in the postpartum period. Fifty patients were included in the

study out of which 39 were females and 11 were males. Thirty two participants belonged to the 25-45 years age group, 10 in <25 years and 8 in >45 years group. The mean age of the subjects was 35.1±1.45 years. Gender distribution across all age groups was predominantly females with highest percentage of females in the age groups of 26-40 years. Out of 50 enrolled subjects, 28 cases had clinical hypothyroidism among which 25 (89%) were females and 3 (11%) were males. Out of the 22 cases detected with subclinical hypothyroidism, 14 (64%) were females and 8 (36%) were males (Table 1).

Out of the 50 subjects with either clinical or subclinical hypothyroidism, 33 were anti-TPO positive and 17 were negative. Among the 28 patients with clinical hypothyroidism, 80% were positive for anti-TPO; whereas among patients with subclinical hypothyroidism, 11 (50%) of the 22 subjects showed anti-TPO positivity (Table 1). In the subclinical hypothyroidism group, 16 (72.7%) cases had TSH values ranging from 5-10 µIU/ml and 6 (27.3%) cases had TSH levels >10.

Table 1: Prevalence of clinical and subclinical hypothyroidism.

Clinical entities	Prevalence		
	Female	Male	Anti-TPO positivity
Clinical hypothyroidism	25	03	22(80%)
Subclinical hypothyroidism	14	08	11(50%)

DISCUSSION

The enzyme thyroid peroxidase (TPO) plays a major role in thyroid hormone synthesis. Measuring the levels of anti-TPO autoantibodies is reported to be significant in diagnosing autoimmune thyroid diseases and predicting their clinical course. The prevalence of anti-TPO antibody noted in the current study in patients with clinical and subclinical hypothyroidism was 80% and 50% respectively. This study finding validates that the elevated anti-TPO levels could be correlated with autoimmune thyroid dysfunction. Similarly, Mohanty et al have showed that 45 of the 61 subclinical hypothyroid patients had elevated anti-TPO (73.78%), thereby suggesting an autoimmune aetiology for subclinical thyroid dysfunction and a higher risk of developing overt hypothyroidism in such patients.⁴ Bjoro et al in a 20-year follow-up study, conducted among Norwegian inhabitants (94,009), have found that the positive anti-TPO levels correlated significantly with thyroid dysfunction and the prevalence of elevated TSH was nearly 10-fold higher in both females and males with positive anti-TPO when compared to anti-TPO-negative subjects.⁶

The study by Silva et al, conducted in 89 Brazilian women, has noted elevated anti-TPO levels in around

90% of the patients with autoimmune thyroiditis.⁷ Lock et al has highlighted the importance of considering anti-TPO antibody testing as an integral part of the clinical investigation for subclinical hypothyroidism.⁸ Literature studies suggest a constant increase in the prevalence of anti-TPO positive patients in India. In a study conducted during the period of 2007-2010 in Delhi, the percentage of TPO antibody-positive adults was found to be 13.3%.⁹ Similarly, an apparent rise in prevalence was noted in the southern part of India. The corresponding prevalence of anti-TPO positivity noted in two different studies conducted in Kerala and Chennai were 16.7% and 25.81%.^{10,11}

In the current study, an increased preponderance of autoimmune thyroid disease was seen in women, especially in the age group of 26 to 40 years. The study by Ghoraiashian et al reported similar findings. The study has demonstrated that the prevalence of anti-TPO antibody in females was about 7 times higher than males. The researchers also demonstrated positive association between thyroid function test and anti-TPO antibody levels.¹² Swain et al has also reported that most (95%) of the patients with autoimmune thyroid disease were women, mainly belonging to the age group of 30-50 years.¹³

Though the results of the current study are significant it cannot be generalized due to the small sample size. Further long term studies involving large population are mandatory to confirm the clinical significance of anti-TPO in autoimmune thyroid diseases.

CONCLUSIONS

A major conclusion drawn from the present study is that both serum TSH and anti-TPO analyses are vital for the diagnosis of both autoimmune hypothyroidism and subclinical hypothyroidism. Since the subclinical hypothyroid patients with elevated anti-TPO titre are likely to develop overt hypothyroidism, regular follow-up or initiation of replacement with levothyroxine is highly recommended.

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