



Prevalence of Thyroid Peroxidase Antibodies in Subclinical Hypothyroidism in a Tertiary Care Hospital

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Abstract

Background & Objectives

Prevalence of Subclinical Hypothyroidism is around 3-15% based on population- based studies in India. Each year, approximately 2-5 percent of SCH patients are likely to develop overt hypothyroidism. Anti-TPO antibodies are seen in most of the cases of SCH and plays an important role that contributes to higher rate of progression from SCH to overt Hypothyroidism. The study was taken up to know the prevalence of thyroid peroxidase antibodies in SubclinicalHypothyroidism subjects.

Methodology

The study was an observational prospective

study done for 18 months which included all outpatients and inpatients with subclinical hypothyroidism who satisfied the inclusion criteria.

Results

Out of 64 individuals with high TSH values,32 individuals were TPO positive while 32 individuals were TPO negative. Out of 38 individuals with low TSH values,7 individuals were TPO positive while 31 individuals were TPO negative. There is significant association between TPO antibodies and TSH.

Out of 39 TPO positive cases, 33 members developed clinical hypothyroidism whereas none of the cases with negative TPO antibodies developed clinical hypothyroidism at 1 year follow up.

Interpretation & Conclusion

High prevalence of (38.2%) thyroid peroxidase antibody in subclinical hypothyroidism patients is suggestive of autoimmune etiology and is associated with high risk of progression to overt hypothyroidism. Hence it is recommended that early screening for thyroid peroxidase antibodies is important in subclinical hypothyroidism and will be helpful in predicting progression to overt hypothyroidism and its adverse outcomes.

Keywords

Subclinical Hypothyroidism, Thyroid Peroxidase antibodies, T3, T4, Thyroid stimulating hormone.

Introduction

Subclinical hypothyroidism (SCH) is a mild state of thyroid failure defined by an elevated serum thyroid stimulating hormone (TSH) concentration and a normal free thyroxine (FT4) concentration. Subclinical hypothyroidism is much more prevalent than overt hypothyroidism, and thus early detection and treatment may help prevent the onset of overt hypothyroidism and its associated symptoms.¹

Prevalence of Subclinical Hypothyroidism is around 3-15%² based on population- based studies in India. Most of the SCH patients have autoimmune thyroiditis while in the rest of the patients it may be due to iodine deficiency, radio iodine therapy, infiltrative diseases like amyloidosis, sarcoidosis, hemochromatosis, Riedel's thyroiditis, sub-acute

thyroiditis, partial thyroidectomy and external irradiation³

The subjects with SCH may have increased risk of coronary heart disease.⁴ Lipid alterations due to insulin resistance are common in SCH subjects⁵. Each year, approximately 2-5 percent of SCH patients are likely to develop overt hypothyroidism⁶. Anti-TPO antibodies are seen in most of the cases of SCH and plays an important role that contributes to higher rate of progression from SCH to overt Hypothyroidism⁷

Aim

- To study the prevalence of Thyroid peroxidase antibodies in subjects with SCH in a tertiary care hospital.

Objectives

- To evaluate the number of SCH cases that will develop clinical hypothyroidism at 1 year follow up.
- To compare the risk of developing clinical hypothyroidism among TPO antibodies positive and negative SCH individuals.

Methodology

This was a prospective observational study conducted for a period of 18 months in the department of General medicine, GSL Medical College & General Hospital. A total of 102 outpatients and inpatients with subclinical hypothyroidism who satisfied the inclusion criteria. A detailed history and clinical examination were carried out in every study subject according to a pre structured questionnaire. Investigations like T3, T4, TSH, free T4 and TPO antibodies were done in all subjects. Data Entry was done using Microsoft excel 2013 and analyses was carried out using SPSS V 16 version.

Inclusion Criteria

Subjects aged between 18 to 60 years with Subclinical Hypothyroidism i.e., TSH>5.5 μ IU/ml (5-10 μ IU/ml) (normal range of TSH:0.4-4.2 μ IU/ml, T4: 4.5-12.0 mcg/dL, FT4:10.6-19.4pmol/L).

Exclusion Criteria

Patients taking medications like levothyroxine, antithyroid drugs antipsychotic drugs, amiodarone, nitroprusside, sulfonylureas, thalidomide; having a previous history of hemithyroidectomy; radioactive iodine ablation.

Results

The mean age of the study population was 39.29 ± 11.21 years.

11.8% of the participants were males and 88.2% of the participants were females. Mean BMI was 26.58 ± 3.83 Kg/m². 31.4% belonged to the category of 18.5-24.9 Kg/m², 48% were in the category of 25-29 Kg/m². and 20.6% were in the BMI category >30 Kg/m².

49% of the subjects presented with weight gain, 51% had headache, 44.1% had generalized weakness, 50% had loss of appetite, and 34.3% had constipation at presentation.

Family history of auto immune disorders is seen in 4 members, and 17(16.6%) participants had a positive

family history of thyroid disorders.

The T3 values were in the range of 70.5-187ng/dL and the mean T3 value was 115.82 ± 25.96 ng/dL, Total T4 values were between 4.50- 11.70mcg/dL and the mean T4 value was 7.49 ± 1.92 mcg/dL, Free T4 values were between 10.6-19.4pmol/L and the mean value was 13.50 ± 2.14 pmol/L.

TSH values were in the range of 5 -10 μ IU/ml and the mean TSH value was 7.65 ± 1.04 μ IU/ml. TPO antibodies were present in 39 members (38.2%) and 63(61.8%) had no TPO antibodies.

Out of 17 cases with positive family history of thyroid disease 12(70.5%) members were TPO positive while only 5(29.5%) members were TPO negative. There is statistically significant association between family history of thyroid disease and Anti-TPO antibodies.

Out of 64 individuals with high TSH values,32 individuals were TPO positive while 32 individuals were TPO negative. Out of 38 individuals with low TSH values,7 individuals were TPO positive while 31 individuals were TPO negative. There is significant association between TPO antibodies and TSH.

Out of 39 TPO positive cases, 33 members developed clinical hypothyroidism whereas none of the cases with negative TPO antibodies developed clinical hypothyroidism at 1 year follow up.

Thyroid profile	Mean \pm SD
T3	115.82 ± 25.96
Total T4	7.49 ± 1.92
Free T4	13.50 ± 2.14
TSH	7.65 ± 1.04

Table 1: Thyroid hormone profile of the study population

Thyroid disease	Anti-TPO Positive	Anti-TPO Negative
Yes	12	5
No	27	58
Total	39	63
Chi square test = 9.04, p=0.002*, Statistically significant		

Table 2: Family history of Thyroid disease and Anti-TPO

TSH level	Anti-TPO Positive	Anti TPO Negative
≥8	32	32
<8	7	31
Total	39	63
Chi square test = 10.07, p= 0.0015*, Statistically significant		

Table 3: Anti-TPO positivity in relation to TSH

Development of Clinical Hypothyroidism	Anti-TPO Positive	Anti TPO Negative
Yes	33	0
No	6	63
Total	39	63
Chi square test = 78.8, p<0.0001*, Statistically significant		

Table 4: Association between TPO levels and Development of clinical hypothyroidism at 1 year follow up

Parameters	Anti-TPO Positive	Anti TPO Negative	P value
Age	35.97±10.84	41.34±11.03	0.01*
Gender (F:M)	34:5	56:7	0.79
BMI (kg/m ²)	26.17±3.87	26.84±3.82	0.39
TSH	8.17±0.92	7.33±0.99	<0.0001*
T3	122.65±26.29	111.59±25.04	0.03*
Total T4	7.7±2.08	7.31±1.82	0.32
Free T4	13.36±2.03	13.58±2.23	0.62

Table 5: Association between Anti TPO and other factors

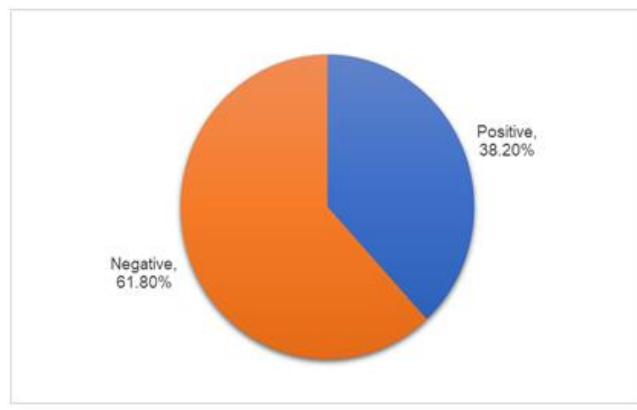


Fig 1: Pie diagram shows percentage of anti TPO positive and negative

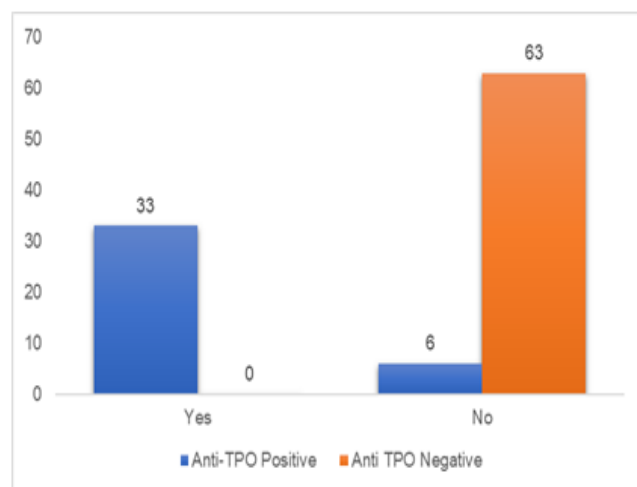


Fig 2: Bar diagram shows association between TPO levels and development of clinical hypothyroidism at 1 year follow up

Discussion

In India, between 10% and 11% of the population suffers from hypothyroidism. In the present study, mean TSH value was $7.65 \pm 1.04 \mu\text{IU/ml}$ with a reference range of 5 -10 $\mu\text{IU/ml}$ taken in our study. Shetty M et al⁸ study on clinical profile of SCH showed a mean TSH value was $8.4 \mu\text{IU/ml}$. (range of 4.5-18.9 $\mu\text{IU/ml}$). Deshmukh V et al⁹ study on clinical profile of subclinical hypothyroid and euthyroid subjects showed a mean TSH (range of 5-31 $\mu\text{IU/ml}$) value of $9.82 \pm 7.26 \mu\text{IU/ml}$.

In the present study, 38.2% cases are positive for Anti-TPO and the rest of the 61.8% had negative results for Anti-TPO antibodies, it could be attributed to on-going autoimmune destruction in some of the cases. The continuing on-going active autoimmune process may lead to high antibody titers later. Collet TH et al¹⁰ study on thyroid antibody status showed about 45.8% of TPO positivity among the SCH cases.

Jay Shankar CA et al¹¹ study on anti-thyroid peroxidase antibodies in subclinical and clinical hypothyroid subjects had 50% of SCH subjects with positive TPO antibodies. Dutta et al¹² study on TPO antibodies in clinical and subclinical hypothyroidism subjects had 51.5% of SCH subjects had positive TPO antibodies.

In the present study, 82% of Anti-TPO positive participants had high TSH levels and significant relation is present between TSH levels and Anti-TPO antibodies ($p=0.0015$).

Dutta et al¹² study on TPO antibodies in clinical and subclinical hypothyroidism subjects

showed significant association between high TSH levels and positive TPO antibodies ($p=0.003$).

In our study, all the 33 cases who developed clinical hypothyroidism at one year follow up are Anti-TPO positive, there is significant correlation between Anti-TPO antibodies and development of clinical hypothyroidism ($p=0.0001$).

NHANES III¹³ study on serum TSH, T4 and Thyroid Antibodies in the United States Population also showed a significant association between Anti-TPO antibodies and development of clinical hypothyroidism ($p<0.0001$).

Siriwardhane T¹⁴ study on Anti-TPO antibodies as an early predictive marker of thyroid disease also revealed that there is significant association between Anti-TPO positivity and subclinical/overt hypothyroidism ($p<0.0001$).

Conclusion

The present study results demonstrate that high prevalence of (38.2%) thyroid peroxidase antibody in subclinical hypothyroidism patients is suggestive of autoimmune etiology and is associated with high risk of progression to overt hypothyroidism. There was significant positive association between TPO antibodies and family history of thyroid disease, TSH levels and progression to clinical hypothyroidism. Therefore, it is recommended that early screening for thyroid peroxidase antibodies is important in subclinical hypothyroidism and will be helpful in predicting progression to overt hypothyroidism and its adverse outcomes, which can be prevented by early initiation of thyroid hormone replacement in such patients.

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