



Original Research Article

Association of Anti - TPO Antibodies with Thyroid Dysfunction

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Abstract

Introduction: *Thyroid peroxidase (TPO) autoantibodies are a secondary response to thyroid injury and do not cause disease themselves. Though the presence of Anti TPO antibody may be a hallmark for autoimmune thyroid disease, there are reports that suggest the presence of Anti TPO antibodies can be a marker of thyroid dysfunction in future.*

Objective: *To assess the presence of Anti – TPO antibodies in patients with thyroid dysfunction.*

Materials and Methods: *This is a cross sectional study done on 60 Patients above the age of 18yrs attending General Medicine OPD with history of thyroid dysfunction and were subjected to thyroid function test and measurement of anti – TPO antibodies.*

Results: *Of the 60 patients 26 were found to be hypothyroidic, 15 were hyperthyroidic, FNAC of 7 patients suggested the presence of malignancy and 12 patients had Hashimoto's thyroiditis. A significant association was found between Anti TPO levels and trends of anaemia with a p value of 0.02. On assessing the association between thyroid function test and Anti TPO antibody level, a significant relation with a p value of 0.01 was found with trends of free T3 levels. Of the 7 patients under malignancy group, 5 patients (71.4%) who had papillary carcinoma thyroid had elevated Anti TPO antibody levels.*

Conclusion: *In presence of Anti TPO antibodies along with a thyroid swelling a direct diagnosis of autoimmune thyroiditis should not be made and an FNAC biopsy should always be performed to rule out the likely possibility of carcinoma thyroid.*

Introduction

Thyroid diseases are arguably, among the commonest endocrine disorders worldwide. India too, is no exception. According to a projection from various studies on thyroid disease, it has been estimated that about 42 million people in India suffer from thyroid diseases.¹

Iodine deficiency, biosynthesis defect, autoimmune disease, neoplastic and nodular diseases can each lead to thyroid swelling or thyroid dysfunction although by different mechanism.²

Biosynthetic defects and iodine deficiency are associated with reduced efficiency of thyroid synthesis, leading to increased TSH, which stimulates thyroid growth as a compensatory mechanism to

overcome the block in hormone synthesis.³ Grave's disease and Hashimoto's thyroiditis are also associated with thyroid dysfunction. In Grave's disease, the goiter results mainly from the TSH-R mediated effects of TSI. The goitrous form of Hashimoto's thyroiditis occurs because of acquired defects in hormone synthesis. Lymphocytic infiltrations and immune mediated growth factors also contribute to thyroid enlargement in Hashimoto's thyroiditis. Nodular disease is characterized by the disordered growth of thyroid cells, often combined with gradual development of fibrosis.⁴

In spite of many national programs to avoid thyroid dysfunction due to iodine deficiency, still it is prevalent in many regions of the country. There is a possible immunogenic background that may lead to thyroid dysfunction in people with no iodine deficiency.⁵

Anti TPO antibody being a major immune complex are polyclonal and although they are of IgG class, they are not restricted to one particular IgG subclass. TPO autoantibodies are a secondary response to thyroid injury and do not cause disease themselves. Though the presence of Anti TPO antibody may be a hallmark for autoimmune thyroid disease, there are reports that suggest the presence of Anti TPO antibodies can be a marker of thyroid dysfunction in future. Their presence can not only lead to hypothyroidic features and dysfunction but there are few studies that proved the prevalence of Anti TPO antibodies in patients with Grave's disease, hyperthyroidism and also neoplasm.⁶

Materials and Methods

Study Setting and Design

Our study was conducted in Sri Manakula Vinayagar Medical College and Hospital, a tertiary care centre in Puducherry from September 2018 to February 2019 for duration of 6 months after obtaining from the ethical committee.

Study Participants

Patients with thyroid dysfunction, attending General medicine OPD and admitted in Department of

General Medicine were taken up for the study. Our participants included patients above age of 18 years with any form of thyroid dysfunction or features suggestive of thyroid dysfunction. A total of 60 consecutive patients with thyroid dysfunction were taken up for the study.

Methodology

After obtaining the informed and written consent, basic history regarding the complaints, examination of the vital signs, pathological and biochemical investigation to assess the complete blood count, thyroid function like thyroid function test and Anti TPO antibodies were done and entered in the proforma. Terminally ill patients were excluded from the study. Obtained results were interpreted using computer software SPSS version 24.0. Patients were categorised into four groups namely hypothyroid, hyperthyroid, hashimoto's thyroiditis and carcinoma. Patients in each group were categorised into low, normal, high depending on the values of FT3, FT4 and TSH. These groups were individually assessed to estimate any association with Anti TPO antibody levels.

Statistical Analysis

Statistical analysis was done by SPSS version 9.0 (SPSS, Chicago, IL). Data were given as mean \pm standard deviation for continuous variables and frequency and percentage for categorical variables. Group comparisons were performed via independent t Test and ANOVA test. p-value less than 0.05 were considered as statistically significant.

Results

Of the 60 participants in the study 47 (78.3%) were female and 13 (21.7%) were males. Most of the patients were in the age group of 20-40 years. On interpreting the results of thyroid function test and other supportive investigations (FNAC of swelling) 26 were found to be hypothyroidic, 15 were hyperthyroidic, FNAC of 7 patients suggested the presence of malignancy and 12 patients had hashimoto's thyroiditis.

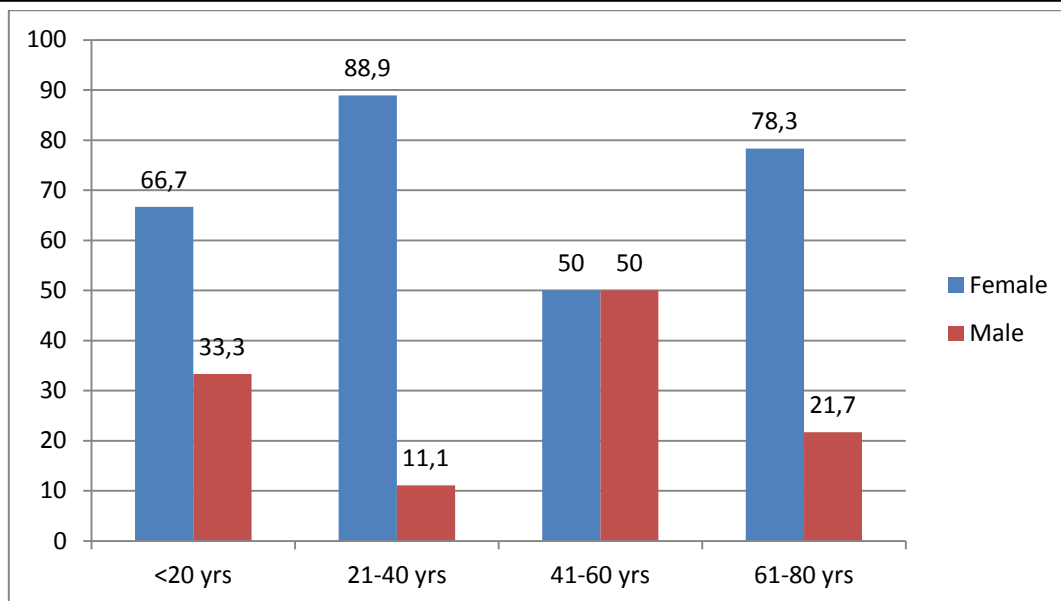


Fig.1: Age and sex distribution of study participants

Of all the four groups 20 , 14, 7 and 10 patients from hypothyroid, hyperthyroid, Malignancy and Hashimoto’s thyroiditis respectively had symptoms pertaining to the same, where as others were asymptomatic and thyroid dysfunction was found on routine health check up. While swelling was almost present in all the patients fatigue, puffiness

of face and constipation were symptoms majority of patients in hypothyroidism group presented with. In case of patients in hyperthyroid and malignancy group most of them suffered from fatigue, dyspnoea, palpitation, weight loss and loss of appetite.

Table 1: Symptoms of patients with thyroid dysfunction

Presence of	Hypothyroidism	Hyperthyroidism	Carcinoma of Thyroid	Hashimoto’s thyroiditis
Swelling	20 (76.9)	14 (93.3)	7 (100.0)	10 (83.3)
Palpitation	4 (15.4)	7 (46.7)	5 (71.4)	1 (8.3)
Diarrhea	3 (11.5)	2 (13.3)	2 (28.6)	0 (0.0)
Heat intolerance	3 (11.5)	4 (26.7)	3 (42.9)	1 (8.3)
Fatigue	20 (76.9)	7 (46.7)	5 (71.4)	10 (83.3)
Constipation	13 (50.0)	9 (60.0)	2 (28.6)	5 (41.7)
Neck pain	8 (30.8)	5 (33.3)	4 (57.1)	3 (25.0)
Puffiness	14 (53.8)	6(40.0)	3(42.9)	2(16.7)
Dyspnea	7(26.9)	10(66.7)	2(28.6)	6(50.0)
Weight loss	3(11.5)	3(20.0)	5(71.4)	3(25.0)
Appetite loss	1.(3.8)	6(40.0)	5(71.4)	1(8.3)
Diabetes	7(26.9)	2(13.3)	2(28.6)	4(33.3)
Hypertension	3(11.5)	0 (0.0)	3(42.9)	2(16.7)

Of the patients with elevated Anti TPO antibodies, 2(7.7%) were in hypothyroidic state, 5 were in hyperthyroidic state (33.3%) and malignant state (71.4%). A statistical analysis was conducted to study the relation between the various symptoms, blood investigations like complete blood count

and thyroid function test with Anti TPO antibodies level. A significant association was found between Anti TPO levels and trends of anaemia with a p value of 0.02. Anaemia was more prevalent among hypothyroid and malignancy patients.

Table 2: Association of anaemia with Anti TPO antibodies

	Anaemia		Total	P value
	Present	Absent		
Hypothyroidism	18	8	26	0.02
	69.2%	30.8%	100.0%	
Hyperthyroidism	3	12	15	
	20.0%	80.0%	100.0%	
Carcinoma of thyroid	5	2	7	
	71.4%	28.6%	100.0%	
Hashimoto's thyroiditis	7	5	12	
	58.3%	41.7%	100.0%	
Total	33	27	60	
	55.0%	45.0%	100.0%	

On assessing the association between thyroid function test and Anti TPO antibody level and a significant relation with a p value of 0.01 was found with trends of free T3 levels but not with free T4 and TSH levels. An important finding in our study was although all the patients in hashimoto's thyroiditis group had elevated Anti TPO levels which was consistent with previous studies conducted by Aminorroaya⁷ et al and Hanush raj⁸ et al, a significant rise in Anti TPO levels was observed in patients in malignancy group. Previous

studies conducted by Shen et al have also reported the same in their study of 1126 patients.⁹ Of the 7 patients under malignancy group 5 patients (71.4%) had elevated Anti TPO antibody levels. Another important finding was all these 5 patients were diagnosed to have papillary carcinoma of thyroid. In previous studies conducted by Eyun song et al similar findings were observed where there is a rise in Anti TPO antibody level in carcinoma patients.¹⁰

Table 3: Association of Thyroid function test with Anti TPO antibodies

Diagnosis	Thyropoxidase		Total	P value
	Normal	Elevated		
Hypothyroidism	24	2	26	0.01
	92.3%	7.7%	100.0%	
Hyperthyroidism	10	5	15	
	66.7%	33.3%	100.0%	
Carcinoma of thyroid	2	5	7	
	28.6%	71.4%	100.0%	
Hashimoto's thyroiditis	0	12	12	
	0.0%	100.0%	100.0%	
Total	34	26	60	
	56.7%	43.3%	100.0%	

Discussion

The first thyroid autoantibody discovered was anti-thyroglobulin antibody (ATG Ab) in 1956. Later, in 1976 antibodies to antigens present in the cytoplasm of thyroid follicular cells (AMA) similar to the enzyme thyroid peroxidase was discovered and hence these antibodies are also called thyroid peroxidase antibodies (TPOAbs). TPOAbs appeared to be much more prevalent than ATG Antibodies.¹¹ While hypothyroidism is the characteristic abnormality in autoimmune thyroid disease, the inflammatory state early in the course

may cause thyroid follicular destruction and thyroid hormonal release resulting in transient hyperthyroidism. With recent advances the role of Anti TPO antibodies in autoimmune thyroiditis is greatly studied. Along with Anti thyroglobulin antibodies, Anti TPO antibodies play a major role in pathology of autoimmune thyroiditis¹². Although the association of Anti TPO antibodies has been well studied, the significance of the same in other pathologies like carcinoma thyroid and their role in developing thyroid dysfunction in future are under study. In our study all the patients suffering

from hashimoto's thyroiditis had an elevated Anti TPO antibodies titre more than 1300 IU/L. However there was also a rise in Anti TPO levels in patients suffering from papillary carcinoma of thyroid, but had a mean rise of value 338 IU/L. The mechanism of rise of Anti TPO antibodies in carcinoma thyroid is not clearly understood. In studies conducted by Shen et al, the rate of metastasis to distant site was found to be inversely proportional to the existence of Anti TPO antibodies suggesting its protective role against distant metastasis. The limitation of our study was it was a small study with a relatively small sample of 60 patients.

Conclusion

Presence of Anti TPO antibodies although is a pathologic background for autoimmune thyroiditis, a significant number of cases with papillary carcinoma thyroid were also found to have elevated Anti TPO levels. Further larger scale studies are required to evaluate the significance and role of Anti TPO levels in carcinoma thyroid and their prognosis.

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