



# SIGNIFICANCE OF SCREENING FOR THYROID ANTIBODIES IN HEALTH CHECK- UPS

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## Abstract

Thyroid dysfunction is a common health problem affecting millions of people all around the world. One of the prominent types of thyroid disorder is Autoimmune Thyroiditis, known by testing the levels of thyroid antibodies. Major Thyroid antibodies are anti-thyroid peroxidase (TPOAb), anti-thyroglobulin antibody (TgAb) and TSH receptor antibodies (TrAb). Presence of thyroid antibodies leads to Thyroid autoimmunity (TAI). However, TAI is often undiagnosed since they are asymptomatic for a long period. In the present study, we assessed the link between TAI and significance of screening for TAI.

It is a cross-sectional study conducted in subjects over 18 years of age. Subjects included were known hypothyroid patients and individuals randomly selected from the public. The blood samples for thyroid profile analysis were collected from overnight fasting individuals. Thyroid parameters tested using Electro Chemiluminescence were, Total Thyroxine (T4), Total Triiodothyronine (T3) along with TgAb and TPO Ab. and using Ultra sensitive chemiluminescence was Thyroid Stimulating Hormone (TSH). The results were subject to ANOVA and Chi square test to compare the data and p-value.

Among the 21 hypothyroid individuals, 15 were diagnosed with TAI (71.4 %). All 15 who had TAI were on treatment for thyroid dysfunction (reported with altered thyroid profiles initially, now corrected with medication), thus proving, Anti TPO and Anti TG were found to be associated with thyroid dysfunction.

Among 23 ATP individuals, 17 were diagnosed with TAI (73.9 %), posing the risk of hypothyroidism in the later stages of life. Individuals who were already on treatment with hypothyroidism and ones with TAI had highly significantly increased antibody levels when compared to controls, and they were highly statistically significant. Significant relations between presence of thyroid antibodies and thyroid profile alterations were established in the study, proving that Anti TPO and Anti TG were found to be associated with thyroid dysfunction.

The results suggest that screening of Thyroid antibodies should be done during the health checkups for healthy individuals to conclude for the diagnoses of TAI.

Key words: Auto immune thyroiditis, Thyroid dysfunction, TPO AB. TG Ab, Hypothyroidism

## I. INTRODUCTION

Thyroid hormones act nearly all over the body by coordinating Basal metabolic rate and activating metabolic pathways such as gluconeogenesis, lipolysis, and lipogenesis<sup>(1)</sup>. It also assists in overall growth and development, cell differentiation and reproductive process<sup>(2)</sup>. It was estimated in 2011 that 42 million people in India were suffering from thyroid diseases<sup>(3)</sup>. Basically, Thyroid peroxidase (TPO) enzyme is required for the synthesis of thyroid hormones and estimating the circulating levels of Anti-TPO Ab and TgAb helps in the detection of auto-immune thyroid diseases. Past studies in general population<sup>(4)</sup> have reported prevalence of 9.5% anti TPO and 8.5% of anti-TG antibodies. It was also estimated that 15% of euthyroid subjects have circulating antibodies<sup>(5)</sup>. Altered levels of anti-thyroid antibodies and TSH in euthyroid subjects have been associated with development of hypothyroidism in later stages of life.<sup>(6)</sup> Anti-TPO and anti-TG antibodies are linked to thyroid stimulating hormone (TSH) levels and have been used to predict the development of hypothyroidism and hyperthyroidism alone and in combination<sup>(7)</sup>. It has been reported that thyroid autoantibodies are highly predictive of later thyroid autoimmunity and thyroid dysfunction<sup>(8)</sup>. Anti-TPO levels may be raised even before any changes are seen in the routine thyroid panel (T3, T4 and TSH)<sup>(9)</sup>. TPO-Ab titer is the strong

prognostic predictor of hypothyroidism<sup>(10)</sup>. Therefore, the present study was conducted to establish the link between anti-thyroid antibodies and significance of screening for Thyroid auto immunity.

## II. MATERIALS AND METHODS

The study is conducted across subjects over 18years of age. Subjects included were known hypothyroid patients and randomly selected from public. After overnight fasting of the individuals, the blood samples were collected for thyroid profile analysis. It was done using an automated quantitative test used for immune enzymatic determination, using Enzyme Linked Immunosorbent Assay (ELISA) technique.

## III. RESULTS

A total of 105 subjects were selected, among which 61 patients had normal thyroid profile, 21 were under treatment for hypothyroid and 23 were newly diagnosed individuals with abnormal TSH or increased antibodies. The comparison of thyroid profile and thyroid antibodies among various groups has been presented (Table 1). The level of TSH in hypothyroidism and in Altered Thyroid Parameters (ATP) group were found to be significantly higher ( $p=0.000$ ) when compared to controls.

Thyroid antibodies such as Anti-TPO and anti-TG antibodies were found to be significantly higher in hypothyroid and Altered Thyroid Parameters (ATP) group and it was found to be highly statistically significant ( $p=0.000$ ).

**Table 4.1: Comparison of thyroid profile and thyroid antibodies among Normal, hypothyroid and newly diagnosed groups**

Thyroid parameter	Normal Mean $\pm$ SD (N – 61)	Hypothyroid Mean $\pm$ SD (N- 21)	Altered Thyroid Parameters Mean $\pm$ SD (N-23)	F value	P – value	Group comparison
TSH	2.84 $\pm$ 1.58	8.65 $\pm$ 8.46	4.93 $\pm$ 2.41	15.84	.000***	1-2*,1-3 (ns), 2-3*
T <sub>3</sub>	120.67 $\pm$ 26.1	116.89 $\pm$ 26.85	140.55 $\pm$ 23.16	6.115	.003**	1-2 (ns),1-3*,2-3*
T <sub>4</sub>	7.574 $\pm$ 1.39	8.04 $\pm$ 2.10	6.43 $\pm$ 1.64	6.154	.003***	1-2 (ns),1-3*,2-3 *
TgAb	15.76 $\pm$ 8.26	208.26 $\pm$ 300.6	172.67 $\pm$ 175.4	16.11	.000***	1-2*,1-3*,2-3(ns)
Anti-TPO Ab	13.24 $\pm$ 11.0	204.60 $\pm$ 246.1	145.45 $\pm$ 192.3	17.47	.000***	1-2*,1-3*,2-3(ns)

Values are expressed in Mean  $\pm$  SD; SD- Standard Deviation; ‘ANOVA’ test, \* $p<0.05$ - \*\*\* $p<0.01$ - statistically significant, ns- not significant. TSH- Thyroid Stimulating Hormone, T<sub>3</sub>. Tri iodothyronine, T<sub>4</sub> – Tetra iodothyronine, TgAb - Anti thyroglobulin Antibody, Anti- TPO Ab - Anti Thyroid Peroxidase Antibody. Group comparison was done by Tukey - post hoc test. Group 1= Normal, Group 2 = Hypothyroidism, Group 3= Altered Thyroid Parameters group

**Table 4.2: Association between TSH and Thyroid antibodies in hypothyroid groups by using Chi-square test:**

Thyroid Parameter		Hypothyroid TSH N =21		Total N (%) N= 21	X <sup>2</sup>	P- value
		TSH Normal N =11	TSH Abnormal N= 10			
Tg Ab	Normal	07 (63.6)	05 (50)	12 (57.1)	.398	.528 (ns)
	Abnormal	04 (36.4)	05 (50)	09 (42.9)		
TPO Ab	Normal	06 (54.5)	05 (50)	11 (52.4)	.043	.835 (ns)
	Abnormal	05(45.5)	05 (50)	10 (47.6)		
Tg Ab / TPO Ab	Normal	08 (72.7)	07(70)	15 (71.4)	.019	.890 (ns)
	Abnormal	03 (27.3)	03(30)	06 (28.6)		

Table 2 depicts the association between TSH and thyroid antibodies in hypothyroid groups by using chi-square test. In hypothyroid category, 42.9 % of subjects had increased TgAb and 47.6 % had TPO Ab. Among 21 subjects of hypothyroid individuals with treatment, 11 patients had normal thyroid profile. In those 11 subjects, 36.4 % had increased auto antibodies even though they had normal thyroid profile. Though the results were not statistically significant it has got significant clinical value in predicting future hypothyroidism.

**Table 4.3: Association between TSH and Thyroid antibodies in Altered Thyroid Parameters groups by using Chi-square test:**

Thyroid Parameter		TSH in Altered Thyroid Parameters Group (N=23)		Total N (%) N= 23	X2	P- value
		TSH Normal N =12	TSH Abnormal N= 11			
Tg Ab	Normal	02 (16.7)	06 (54.5)	08 (34.8)	3.630	<b>.057*</b>
	Abnormal	10 (83.3)	05 (45.5)	15 (65.2)		
TPO Ab	Normal	04 (33.3)	06 (54.5)	10 (43.5)	1.051	.305
	Abnormal	08 (61.5)	05 (45.5)	13 (56.5)		
Tg Ab / TPO Ab	Normal	06 (50)	07 (63.6)	13 (56.5)	.434	.510
	Abnormal	06(50)	04 (26.4)	11 (43.5)		

Table 3 describes the association between TSH and thyroid antibodies in Altered Thyroid Parameters groups by using chi-square test. There were 23 subjects in the Altered Thyroid Parameters category and among them 12 had Normal TSH and 11 had abnormal TSH. Among the normal (12) 10 have increased TgAb and 8 had TPO Ab. The results were statistically significant for TgAb antibodies ( $p = .057$ ). Total 6 patients out of 23 were having abnormal TgAb/ TPO Ab in the newly diagnosed category.

#### IV. DISCUSSION

Anti-thyroid antibodies have long been known to affect thyroid function and influence thyroid profile testing. Lee MW, Shin DY, Kim KJ, Hwang S, Lee EJ et.al, reported that TPO antibodies were found to be positive in 63.33% of hypothyroid patients<sup>(10)</sup>. The present study results were also similar to the above study, wherein 52% of the hypothyroid patients and among ATP individuals had increased TPO antibodies. Among these 52%, only 38% had abnormal TSH remaining others had normal TSH. This indirectly implicates that Anti-TPO levels may be raised even before any changes occur in the routine thyroid panel<sup>(9)</sup>. In the Wickham Survey, positive thyroid antibody status in women who were euthyroid at baseline (defined as serum TSH 6 mU/liter) was a strong predictor of hypothyroidism at follow-up, with an associated risk of 2.1% per year<sup>(11)</sup>. Thus, detection of anti-TPO antibodies is one important measurement to diagnose thyroid dysfunction. Shinto et al (2010) concluded that anti-TPO antibody is more sensitive than anti-TG antibody in diagnosing autoimmune thyroiditis<sup>(12)</sup>.

In spite of a high prevalence of recognized thyroid disease, a considerable number of subjects had undiagnosed thyroid dysfunction with positive anti-TPO antibody results and high TSH levels<sup>(13, 14)</sup>. In the present study 20% of the ATP individuals had increased anti- TPO antibodies as well as higher TSH levels. Past study in the Saudi population<sup>(15)</sup> revealed that TSH is more often deranged if anti-TPO or anti-TG antibodies are positive. In the present study 42% of hypothyroid and 64% of ATP individuals had increased anti- TG level. Anti-thyroid autoantibodies primarily exert their pathogenic effect through complement-dependent cytotoxicity and even though the relationship between presence of autoantibodies and development of future thyroid disease is complex<sup>(16)</sup>. Our findings suggest that TSH and thyroid autoantibodies are useful tools to identify the subjects at risk for developing overt hypothyroidism in the later stages of life.

#### V. Conclusion

The present study concludes that anti-TPO antibodies and TgAb are commonly associated with hypothyroid dysfunction. Health screening tests such as general health checkup and master health checkup should include thyroid antibody tests. Thyroid profile combined with thyroid antibodies serves as a prognostic tool to estimate the long-term risk of hypothyroidism.

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