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Detection of Autoimmune Thyroiditis among Newly Diagnosed Cases of Various Thyroid Disorders Attending Tertiary Care Hospital in Garhwal Region of Uttarakhand

Pallvi Rawat*[1], Dr. Javin Bishnu Gogoi[2], Dr. Kailash Gairola[3]

Ph.D Scholer (Medical Biochemistry) Hnbumu Dehradun Uttarakhand*[1]

Prof.& Head Dept. Of Biochemistry Ssjgims&R Almora Uttarakhand [2]

Prof.& Head Dept. Of Biochemistry Vcsggims&R Srinagar (Garhwal) Uttarakhand [3]

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KEYWORDS
Thyroid peroxidase; thyroid autoimmunity; anti-TPO antibodies.

ABSTRACT:

Background: Thyroid dysfunction is one of the most prevalent diseases around the world, especially in developing countries like India. India has the highest ratio of thyroid disorders due to iodine deficiency. Enzyme thyroid peroxidase (TPO), is necessary for the production of thyroid profile, anyone modification in TPO can lead to a disrupted thyroid hormones. TPO-specific antibodies are helpful indicators for identifying autoimmune thyroid conditions. Therefore, the goal of present study was conducted to determine the association of anti-thyroid antibody levels with various thyroid disorders patients.

Material and Method: This cross-sectional was carried out at a Tertiary Care Teaching Hospital in Garhwal Region of Uttarakhand after receiving approval from the Institutional Ethics Committee for 3 years wef 2021. This study included all adult patients (≥18 years old) who visited various clinical departments. These patients exhibited signs & symptoms related to thyroid disorders & were referred to the analysis of FT3, FT4, TSH & Anti-TPO. All thyroid estimations were done by the chemiluminescence technique (CLIA) using LIASION Analyzer, make DiaSorin, Italy. SPSS(version 20.0) was used to do the statistical analysis. The data and p-value were compared using the Chi-square test.

Results: The Study was conducted on 380 patients, with the largest group of 99 patients falling in the 41-50 year age. The average age for women was found to be 41.83 ± 11.68 years. The ratio of Men to Women was 1:2.17. Hypothyroidism was the most common condition, diagnosed in 187 patients, of which 136 were women & 51 were men. Out of 205 patients who tested positive for anti-TPO antibodies, 143 were women. Among these women, 77 were diagnosed with hypothyroidism. The age group with the highest number of hypothyroid and anti-TPO antibody, positive women was 41-50 years, with 36 out of the 77 belonging to this category.

Conclusion: The association between Age and Thyroid disorder is significant in females (p-value <0.05) as compared to Male. Anti-TPO antibodies, which are associated with hypothyroidism, were found more frequently in women.

Introduction

Thyroid disease is the second most common endocrine disorder affecting the women of reproductive age group. [1] According to Unnikrishnan et al, thyroid disorders affect around 42 million people in India.[2] According to a population study, anti-TPO prevalence was 9.5%.[3] Thyroperoxidase (TPO) is a glycoprotein enzyme that is bound the membrane and is essential for the synthesis of thyroid hormones. TPO catalyzes the iodination and coupling of tyrosine residues, which leads to the production of FT3 and FT4.[4] The production of thyroid hormones requires the presence of the enzyme thyroid peroxidase (TPO). It controls both the number of thyrotropin receptors and the amount of hormone released. Any changes could lead to an abnormal

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thyroid profile. [5]Autoimmune thyroid disorders, also known as AITDs, are a variety of autoimmune diseases that specifically target the thyroid. The most frequently occuring ones are Hashimoto's thyroiditis and Graves'.[6]

However thyroid gland's functional state, laboratory analysis reveals that auto-antibodies are present in 40-70% of Grave's disease cases and >90% of Hashimoto's thyroiditis cases.[7]

Clinically, autoimmune thyroid diseases manifest as either hyperthyroidism or hypothyroidism as a result of excessive hormone production or glandular follicle destruction, respectively.[8] The thyroid gland complexes are targeted by TPO antibodies. Consequently, auto-antibodies are helpful indicators for autoimmune thyroid diseases. In the compensatory phase, the thyroid hormone levels remain normal due to an increase Thyroid Stimulating Hormone (TSH), which counteracts the gradual reduction in thyroid function caused by the auto-immune process. Subsequently, TSH levels increase even more, and symptoms manifest as clinical hypothyroidism. Through complement-dependent cytotoxicity, anti-thyroid antibodies play a role in the pathophysiology of autoimmune thyroiditis.[9] Some studies suggest that the existence of anti-TPO in the blood is associated with higher likelihood of thyroid failure in the future.[10]

Thyroid antibodies are more common in women than in men. According to the Whickham survey, women who tested positive for anti-TPO antibodies and had normal thyrotropin levels had a 2.1% yearly chance of developing hypothyroidism. [5,11]

Few research have been done in India to investigate the association between anti-TPO antibodies and thyroid disorders. Thus the purpose of the current study is to investigate the connection between thyroid dysfunction and anti-TPO antibodies.

Material and Methods

This cross-sectional study was carried out at a Tertiary Care Teaching Hospital in Srinagar, Garhwal, Uttarakhand, for three years starting in 2021, after receiving approval from the Institutional Ethics Committee. The study included all adult patients (≥18 years old) referred for FT3, FT4, TSH, and anti-TPO antibody analysis who visited different clinical departments of OPD and had symptoms associated with thyroid dysfunction. Patients who declined to take part in the research were not included. Following written informed consent from study participants, data on patient age, gender, symptoms, FT3, FT4, TSH levels, anti-TPO were gathered on pre-designed proforma.

Using the patient's serum sample, FT3, FT4, TSH and anti-TPO tests were conducted after blood samples obtain from an overnight fasting were labeled and collected. It was conducted using the automated quantitative test for immune enzymatic determination known as Chemiluminescence Immunoassay (CLIA) technique (LIASION Analyzer, made in DiaSorin, Italy).[12]

The method for the quantitative determination of anti-TPO is a sandwich chemiluminescence immunoassay. [13] Normal values of FT3, FT4, and TSH were 2.2-4.2ng/ml, 0.8-1.7µg/dl and 0.3-3.6µIU/ml respectively. Positive and negative anti-TPO test results were assessed using the kit literature. SPSS (version 20) was utilized to perform the statistical analysis following data entry in Microsoft Excel Office. Using the Chi-square test, the data and p-value were compared.

Results

A total of 380 patients were examined and analyzed. The average age of the study population was 42.68 ± 12.05 years instead, the average age of Men and Women participants were 44.53 ± 12.66 and 41.83 ± 11.68 years respectively. The age group of 41-50 years comprised 99 patients, while the age group of 31-40 years comprised 69 patients. Male: female ratio was 1: 2.17 with 120 (32%) males and 260 (68%) females. (Fig 1)

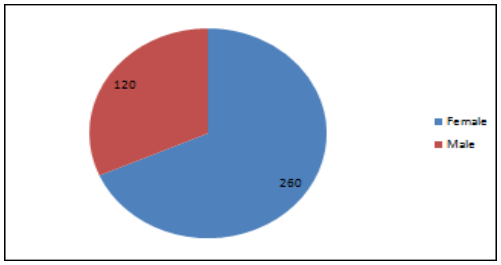

Fig: 1 Gender-wise distribution of thyroid dysfunction (n: 380)

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Out of 380 patients; 50 (13%), 187(49%), 24(6%), and 119 (31%) patients were Hyperthyroid, Hypothyroid, Subclinical Hyperthyroid, and Subclinical Hypothyroid respectively. Among the 187 Hypothyroid patients, 51(27%) were male and 136(73%) were female. (Table 1)

Table 1: Patients with thyroid dysfunction according to gender

Gender	**Thyroid dysfunction**				
	Hyperthyroid (n=50)	**Hypothyroid (n=187)**	**Subclinical Hyperthyroid (n=24)**	**Subclinical Hypothyroid (n=119)**	**Total no. of patient (N = 380)**
Males	22	51	06	41	120
Females	28	136	18	78	260

Out of 380 patients, 205(54%) patients had anti-TPO antibody high and 175(46%) had anti-TPO antibody normal. Anti-TPO antibody results were found to be high in 62 males and normal in 58 males out of 120 total. Out of 260 females, 143(55%) females had Anti-TPO antibody high and 117 (45%) were normal. Among the 205 patients who tested positive for anti-TPO antibodies, 104 (51%) had hypothyroidism, and 77 (37%) were female. (Table 2)

Table 2: Status of anti-TPO antibodies and thyroid dysfunction based on gender

Anti-TPO- high (n= 205)						**Anti-TPO- Normal (n= 175)**					
	Hyperthyroidism (n=27)	**Hypothyroidism (n=104)**	**Subclinical Hyperthyroidism (n=09)**	**Subclinical Hypothyroidism (n=65)**	**Total**		**Hyperthyroidism (n=23)**	**Hypothyroidism (n=83)**	**Subclinical Hyperthyroidism (n=15)**	**Subclinical Hypothyroidism (n=54)**	**Total**
F	18	77	5	43	143	**F**	10	59	13	35	117
M	09	27	04	22	62	**M**	13	24	02	19	58
p-value<0.05											

M= Male, **F**= Female

Out of the 104 hypothyroid patients with high anti-TPO antibody status, included 45 patients followed by 16 patients in the age group of 41-50 and 21-30 years, respectively. A maximum of 36 out of the 77 females were hypothyroid and anti-TPO antibody positive, and they ranged in the age from 41-50 years.

Discussion

To diagnose thyroid dysfunction, clinical correlation should be used to support laboratory test results. Among the many available laboratory tests, the measurement of anti-TPO antibodies is one important one. This is due to the fact that the thyroid gland's lymphocyte infiltration is the primary cause of anti-TPO antibodies. Measuring anti-TPO antibodies is more important than anti-TG antibodies, according to Shinto et al. when diagnosing autoimmune thyroiditis, anti-TPO antibody is more sensitive than anti-TG antibody (98.1% vs. 61.8%; p value <0.05).[14]

In the current study, autoimmune thyroiditis were more common in women than in men, with a mean age of 41.83 years for female patients. Thyroid autoimmune diseases were more common in middle-aged women. according to the Unnikrishnan et al study In females,

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anti-TPO antibody prevalence was higher ($p < 0.05$) [2]. Tipu et al. discovered that females had higher rates of raised anti-TPO antibodies than males[6] did. 54% of patients in the current study had positive anti-TPO antibody tests. Ashwini et al. concluded that 44% of patients had elevated anti-TPO antibody levels.[5] According to the findings of Daneshpazhooh et al., 18% of patients had elevated anti-TPO antibody levels. [15]

In the current study, about 55% of the female participants had anti-TPO antibody positive results. There was statistical significance in this outcome. Several other studies have reported a higher distribution that is comparable among females.[16-19] The higher percentage of female patients in the study and the higher prevalence of thyroid dysfunction in women could be the causes of this female dominance.[2]

The majority of research participants had hypothyroid dysfunction in terms of thyroid dysfunction. Compared to male patients, a greater proportion of female patients more than 50% were hypothyroid. There was statistical significance in these findings. Consequently, a greater proportion of patients with anti-TPO antibody positivity had hypothyroidism, a thyroid dysfunction. It was also more prevalent in females between the ages of 41 and 50. Similar results were noted by Ghoraishian et al. when they examined the correlation between anti-TPO and FT3, FT4, and TSH in 2425 individuals and discovered that the antibody-positive group exhibited a significant derangement in these parameters.[20] According to Guillermo et al. patients with positive anti-TPO antibodies and females (41%) had a higher prevalence of hypothyroidism than males (19%).[21] In the current investigation, middle-aged females had higher levels of anti-TPO antibodies. Various studies reported similar results.[22,23]

While thyroid disease is widely recognized in the population, many individuals have undiagnosed thyroid dysfunction despite having positive anti-TPO antibody results and elevated TSH levels.[24,25] NHANES III was used to measure serum TSH, total serum T4, anti-TPO antibodies, and anti-TG antibodies in 17,353 individuals who were 12 years of age or older and who represented the geographic and ethnic diversity of the United States population. There is laboratory evidence of thyroid disease in a significant portion of the U.S. population, which supports the value of screening for early detection.[26] Therefore, the measurement of anti-TPO antibodies could serve as the basis for the diagnosis of thyroid autoimmunity in most cases, with the additional measurement of anti-TG antibodies in certain instances.

Ajmani et al. state that women are more likely than men to have hypothyroidism, which can lead to abnormal sexual development, irregular menstrual cycles, infertility, and premature menopause. [27]

A drawback of the current investigation was the absence of histopathological correlation of thyroid gland tissue to validate hypothyroidism. It's possible to correlate anti-TPO antibody-positive patients with other parameters, such as serum cholesterol levels. This might supplement current literature with new information. Thus, it was found that among patients whose anti-TPO antibody status was positive, hypothyroidism was the most common thyroid dysfunction. Additionally, it can be said that thyroid dysfunctions may or may not be linked to negative anti-TPO antibody results.

Conclusion

The current investigation concludes that hypothyroid dysfunction was frequently linked to anti-TPO antibodies. It was observed more frequently in middle-aged and reproductive-age females. As a result, these individuals ought to undergo screening to identify thyroid disorders early on.

Reference

1. Meena M, Chopra S, Jain V, Aggarwal N. The Effect of Anti-Thyroid Peroxidase Antibodies on Pregnancy Outcomes in Euthyroid Women. J Clin Diagn Res. 2016 Sep;10(9):QC04-QC07.
2. Unnikrishnan A, Menon U. Thyroid disorders in India: An epidemiological perspective. Indian J Endocrinol Metab. 2011;15(6):78–81
3. Menon UV, Sundaram KR, Unnikrishnan AG, Jayakumar RV, Nair V, Kumar H. High prevalence of undetected thyroid disorders in an iodine sufficient adult south Indian population. J Indian Med Assoc. 2009;107:72–7

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www.jchr.org

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4. Bromińska B, Bromiński G, Owecki M, Michalak M, Czarnywojtek A, Waśko R, Ruchała M. Anti-thyroidal peroxidase antibodies are associated with thyrotropin levels in hypothyroid patients and in euthyroid individuals. Ann Agric Environ Med. 2017 Sep 21;24(3):431-434.
5. Jantikar AM. A study on relationship between thyroid peroxidase antibodies (Anti-TPO antibodies) and thyroid dysfunction patients. International Journal of Clinical Biochemistry and Research. 2020;7(2):238-42.
6. Tipu HN, Ahmed D, Bashir MM, Asif N. Significance of Testing Anti-Thyroid Autoantibodies in Patients with Deranged Thyroid Profile. J Thyroid Res. 2018 Apr 11;2018:9610497.
7. Franco JS, Amaya AJ, Anaya JM. Thyroid disease and autoimmune diseases. In: Anaya JM, Shoenfeld Y, Rojas-Villarraga A, et al, editors. Autoimmunity: From Bench to Bedside. Bogota (Colombia: El Rosario University Press; 2013. p. 30
8. N. Aruna and N. Pushpa, "Pregnancy outcome in euthyroid women with anti thyroid peroxidase antibodies," Te Journal of Obstetrics and Gynecology of India, 2015.
9. H. Miko´s, M. Miko´s, M. Obara-Moszynska, and M. Niedziela, ´ "The role of the immune system and cytokines involved in the pathogenesis of autoimmune thyroid disease (AITD)," Endokrynologia Polska, vol. 65, no. 2, pp. 150–155, 2014
10. Prummel MF, Wiersinga WM. Thyroid peroxidase autoantibodies in euthyroid subjects. Best Pract Res Clin Endocrinol Metab. 2005; 19(1): 1–15.
11. P rummel MF, Wiersinga WM. Thyroid peroxidase autoantibodies in euthyroid subjects. Best Pract Res Clin Endocrinol Metab. 2005;19(1):1–15.
12. FT3, FT4 & TSH determination kit (LIAISON® Anti-TPO DiaSorin Italia S.p.A.) Via Crescentinosnc - 13040 Saluggia (VC) – Italy.
13. Anti-TPO determination kit (LIAISON® Anti-TPO DiaSorin Italia S.p.A.) Via Crescentinosnc - 13040 Saluggia (VC) – Italy.
14. Shinto AS, Pachen L, Sreekanth TK, George D. Prevalence of Antithyroid Antibodies inHistologically Proven Autoimmune Thyroid Diseases and Correlation with Thyroid Dysfunction in South India. Thyroid Sci. 2010;5(9):1–5
15. Daneshpazhooh M, G MM, Behjati J, Akhyani M, Robati RM. Antithyroid peroxidase antibody and vitiligo: a controlled study. BMC Dermatol. 2006;6(1):3.)
16. Panesar NS, Chan KW, Li CY, Rogers MS. Status of AntiThyroid Peroxidase During Normal Pregnancy and in Patients with Hyperemesis Gravidarum. Thyroid. 2006;16:481–4.
17. Adlan MA, Premawardhana LD. Thyroid Peroxidase Antibody and Screening for Postpartum Thyroid Dysfunction. J Thyroid Res. 2011;2011. doi:10.4061/2011/745135.
18. Bussen S, Steck T, Dietl J. Increased prevalence of thyroid antibodies in euthyroid women with a history of recurrent in-vitro fertilization failure. Hum Reprod. 2000;15(3):545–8.
19. Lazarus JH. The Continuing Saga of Postpartum Thyroiditis. J Clin Endocrinol Metab. 2011;96(3):614–6.
20. Ghoraishian SM, Moghaddam SH, Afkhami-Ardekani M. Relationship between anti-thyroid peroxidase antibody and thyroid function test. Iran J Immunol. 2006;3(13):146–9.
21. Umpierrez GE, Latif KA, Murphy MB, Lambeth HC, Stentz F, Bush A, Kitabchi AE. Thyroid dysfunction in patients with type 1 diabetes: a longitudinal study. Diabetes Care. 2003 Apr;26(4):1181-5.
22. Sharma VK, Niraula A, Tuladhar ET, Bhattarai A, Raut M, Dubey RK, Baidya S, Parajuli N. Autoimmune thyroid status in subclinical thyroid disorders in patients attending a tertiary care center in Nepal: a hospital-based cross-sectional study. BMC EndocrDisord. 2023 Oct 11;23(1):221.

Journal of Chemical Health Risks

www.jchr.org

JCHR (2023) 13(6), 1369-1374 | ISSN:2251-6727

23. Manjula K, Reena R, Jaswanth S, Usha S. Thyroid Function and Anti-TPO Antibody Status among Tribal Perimenopausal Women Near Bengaluru, Karnataka, India. Journal of Clinical & Diagnostic Research. 2020 Oct 1;14(10).
24. Zelaya AS, Stotts A, Nader S, Moreno CA. Antithyroid peroxidase antibodies in patients with high normal range thyroid stimulating hormone. Fam Med. 2010;42(2):111–5.
25. Chaker L, Razvi S, Bensenor IM, Azizi F, Pearce EN, Peeters RP. Hypothyroidism (Primer). Nature Reviews: Disease Primers. 2022;8(1).
26. Hollowell JG, Staehling NW, Flanders WD, Hannon WH, Gunter EW, Spencer CA, et al. Serum TSH, T4, and Thyroid Antibodies in the United States Population (1988 to 1994): National Health and Nutrition Examination Survey (NHANES III). J Clin Endocrinol Metab. 2002;87(2):489–99.
27. Ajmani NS, Sarbhai V, Yadav N, Paul M, Ahmad A, Ajmani AK. Role of Thyroid Dysfunction in Patients with Menstrual Disorders in Tertiary Care Center of Walled City of Delhi. J ObstetGynaecol India. 2016 Apr;66(2):115-9.