Original Research Article

Demographic characteristics and thyroid related antibodies status in thyroid disorders

Sangeeta Kapoor[1*], Biswajit Das[2], Shikha Saxena[3], Umme Afifa[4]

[1]PhD Scholar, [3]Professor and HOD, Department of Medical Biochemistry, Rohilkhand Medical College and Hospital (RMCH) Bareilly International University (BIU) Bareilly, Uttar Pradesh, INDIA.
[2]Professor & HOD, Department of Biochemistry, Maa Vindhyavasini Autonomous State Medical College, Mirzapur, Uttar Pradesh, INDIA.
[4]Assistant Professor & Statistician, Teerthanker Mahaveer Medical College & Research Centre, Teerthanker Mahaveer University, Moradabad, Uttar Pradesh, INDIA.
Email: drsangeeta2000@gmail.com

Abstract

Background: Endocrine disease of the thyroid may result in either under- or over-activity of the gland. This may be due to congenital factors, inadequate levels of dietary iodine intake, pregnancy, radiotherapy, viral infections, surgery, underlying diseases such as infiltrative disorders or autoimmunity. Present study was aimed to study demographic characteristics and thyroid related antibodies status in thyroid disorders. **Material and Methods:** Present study was single-center, cross sectional, observational study, conducted in ppatients with thyroid disorders, 18-70 years age, visiting Medicine OPD for their regular thyroid check-up. **Results:** In present study 300 patients, majority were from 36-45 years (47.67 %), female (71 %) and had co-morbidities as diabetes mellitus (18 %), hypertension (29.67 %). Common thyroid diseases were Hypothyroidism (66 %), Hyperthyroidism (13 %), history of thyroid surgery (7 %), Goitre (6.33 %), Subacute viral thyroiditis (6 %) and Thyroid malignancy (1.67 %). Current or past thyroid medications were levothyroxine (87 %), Carbimazole (11.67 %) and Methimazole (1.33 %). In present study, majority were hypothyroid patients (38 %). Antithyroglobulin antibodies were noted in more in cases of NAITD (non-autoimmune thyroiditis) (150 cases, 50 %) as compared to cases of AITD (autoimmune thyroiditis) (36 cases, 12 %). Anti-thyroid peroxidase antibodies were noted i more in cases of NAITD (non-autoimmune thyroiditis) (162 cases, 54 %) as compared to cases of AITD (autoimmune thyroiditis) (24 cases, 8 %). Both Antithyroglobulin antibodies and anti-thyroid peroxidase antibodies were noted in more in cases of NAITD (non-autoimmune thyroiditis) (150 cases, 50 %) as compared to cases of AITD (autoimmune thyroiditis) (3 cases, 1 %). **Conclusion:** In patients of thyroid diseases such as hyperthyroidism, hypothyroidism, goiter, thyroid cancer and Hashimoto's thyroiditis, estimation of Antithyroglobulin antibodies and anti-thyroid peroxidase antibodies may serve as useful means to decide treatment protocol and the duration of treatment.

Keywords: thyroid diseases, hypothyroidism, antithyroglobulin antibodies, anti-thyroid peroxidase antibodies

[*]**Address for Correspondence:**
Dr Sangeeta Kapoor, PhD Scholar, Department of Medical Biochemistry, Rohilkhand Medical College and Hospital (RMCH), Bareilly International University (BIU), Bareilly, Uttar Pradesh, INDIA.
Email: drsangeeta2000@gmail.com

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INTRODUCTION

With the widespread availability of thyroid function testing in recent years increasing numbers of patients with symptoms, which might be attributable to hypothyroidism and hyperthyroidism are being tested. Data from eight different cities in India reveal a prevalence of hypothyroidism as 10.9% with higher prevalence of hypothyroidism among cities located inland than the coastal ones, which is attributable to consumption of sea food rich in iodine (11.7 vs. 9.5%) in the latter ones.[1] endocrine disease of the thyroid may result in either under- or over-activity of the gland. This may be due to congenital factors, inadequate levels of dietary iodine intake, pregnancy, radiotherapy, viral infection, surgery, underlying disease such as infiltrative disorders or autoimmunity.[2] Autoimmune thyroid disease is the result of a complex interaction between genetic and environmental factors. However, the most recent studies

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have shown that the human autoimmune thyroid diseases (AITDs) affect up to 5% of the general population and are seen mostly in women between 30 and 50 years.[3] The autoimmune thyroid disorders comprise Graves' disease, Hashimoto's thyroiditis and post-partum thyroiditis, in which the presence of circulating thyroid-specific autoreactive antibodies is characteristic[4] and are characterized by reactivity to self-thyroid antigens which are expressed as distinctive inflammatory or antireceptor autoimmune diseases.[5] Present study was aimed to study demographic characteristics and thyroid related antibodies status in thyroid disorders

MATERIAL AND METHODS

Present study was single-center, cross sectional, observational study, conducted in department of Biochemistry, at Rohilkhand Medical College and Hospital, Bareilly, U.P. India. Study approval was obtained from institutional ethical committee.

Inclusion criteria: Patients with thyroid disorders, 18-70 years age, visiting Medicine OPD for their regular thyroid check-up, willing to participate in present study.

Exclusion criteria: Subjects suffering from diseases like cirrhosis, congestive cardiac failure, tuberculosis, and renal diseases. History of drug intake like steroids, anti-epileptics, antipsychotics, oral contraceptive pills. Pregnant or lactating women.

The patients visiting Medicine OPD for their regular thyroid check-up were considered for study. Study was explained to patients and a written informed consent was taken for participation. Demographic details, clinical history was collected.

Three ml of venous blood samples were drawn from every participant in plain blood collection tubes, using sterile syringes and centrifuged (3000 r.p.m) for five minutes to obtain serum for analysis of thyroid hormones profile (TSH, T4 and T3) analysis. TSH, T4 and T3, were measured by, employing standard reagents and procedures using ELISA technique.

Normal ranges considered were as follows –

T3: 0.8 - 2.0 ng/ml; T4: 4.8 – 11.8 ug/ dl; TSH: 0.35 – 4.0 MIU/ml.

TSH more than 4.0 MIU/ml with decreased values of T3 and T4 was taken as hypothyroidism. TSH levels of less than 0.30 MIU/ml with raised T3 and T4 level were taken as hyperthyroidism. Individual variation of TSH i.e., increase TSH with normal T3, T4 levels were taken as subclinical hypothyroidism and decrease TSH with normal T3 and T4 values was taken as subclinical hyperthyroidism.

Other aliquots of two (2) ml were collected in plain container and were allowed to clot and then centrifuged (1500 rpm) for five minutes, the supernatant sera were transferred into a plastic tube (eppendorf tube) and stored at (-80 C) for the analysis of thyroid antibodies (antithyroid peroxidase, antithyroglobulin antibodies). Thyroid antibodies (Anti-thyroid peroxidase) and antithyroglobulin were measured by sequential ELISA method employing (Anti-TPO) ELISA, and (Anti-Tag) ELISA respectively. A cut off point of ≥ 35 IU/ml were considered as being positive for anti TPO antibodies. A cut off point of ≥ 125 IU/ml were considered as being positive for thyroglobulin Antibodies. Data was collected and compiled using Microsoft Excel, analysed using SPSS 23.0 version. Frequency, percentage, mean and standard deviation (SD) was calculated for the continuous variables, while ratios and proportions were calculated for the categorical variables. P value less than 0.05 was considered as statistically significant.

RESULTS

In present study 300 patients, majority were from 36-45 years (47.67 %), female (71 %) and had co-morbidities as diabetes mellitus (18 %), hypertension (29.67 %).

Table 1: Demographic characteristics and thyroid related history of the study population

Characteristics	Frequency (n=300)	Percentage
Age-group (years)		
18-35	24	8.00%
36-45	143	47.67%
46-54	94	31.33%
55-70	39	13.00%
Mean ± SD	45.85 ± 14.68	
Gender		
Female	213	71.00%
Male	87	29.00%
Comorbidities		
Diabetes mellitus	54	18.00%
Hypertension	89	29.67%

In present study, common thyroid diseases were Hypothyroidism (66 %), Hyperthyroid (13 %), History of thyroid surgery (7 %), Goitre (6.33 %), Subacute viral thyroiditis (6 %) and Thyroid malignancy (1.67 %). Current or past thyroid medications were levothyroxine (87 %), Carbimazole (11.67 %) and Methimazole (1.33 %).

Table 2: Thyroid related characteristics

Characteristics	Frequency (n=300)	Percentage
History of thyroid disease		
Hypothyroidism	198	66.00%
Hyperthyroidism	39	13.00%
History of thyroid surgery	21	7.00%
Goitre	19	6.33%
Subacute viral thyroiditis	18	6.00%
Thyroid malignancy	5	1.67%
Current or past thyroid medications, n (%)		
Levothyroxine	261	87.00%
Carbimazole	35	11.67%
Methimazole	4	1.33%

In present study, majority were hypothyroid (38 %).

Table 3: Thyroid status

Thyroid status	Frequency (n=300)	Percentage
Euthyroid	114	38.00%
Hypothyroid	84	28.00%
Subclinical hypothyroid	60	20.00%
Hyperthyroid	42	14.00%

Antithyroglobulin antibodies were noted in more in cases of NAITD (non-autoimmune thyroiditis) (150 cases, 50 %) as compared to cases of AITD (autoimmune thyroiditis) (36 cases, 12 %). Anti-thyroid peroxidase antibodies were noted in more in cases of NAITD (non-autoimmune thyroiditis) (162 cases, 54 %) as compared to cases of AITD (autoimmune thyroiditis) (24 cases, 8 %). Both Antithyroglobulin antibodies and anti-thyroid peroxidase antibodies were noted more in cases of NAITD (non-autoimmune thyroiditis) (150 cases, 50 %) as compared to cases of AITD (autoimmune thyroiditis) (3 cases, 1 %).

Table 4: Thyroid antibody status in AITD and nonAITD patients

Thyroid antibody	Frequency (n=300)	Percentage
TG-AB		
AITD	36	12.00%
NAITD	150	50.00%
TPO-AB		
AITD	24	8.00%
NAITD	162	54.00%
Both		
AITD	3	1.00%
NAITD	150	50.00%

DISCUSSION

Autoimmune thyroiditis (AT), alternatively known as chronic lymphocytic thyroiditis or Hashimoto's thyroiditis, is an autoimmune disorder characterized by an inflammatory infiltration of lymphocytes that replaces the thyroid parenchyma.[6,7] These processes may lead to thyroid cell damage, cell destruction, and subsequently to impaired thyroid hormone production and clinical thyroid dysfunction.[7] This thyroid dysfunction may progress to a euthyroid, hyperthyroid (HT) and then hypothyroid state, which will be the end of AT, based on the cell destruction characteristics and immune-mediated loss of follicular cells.[7,8] The different actions of the anti-thyroid antibodies correspond to differences in cellular location of the antigens, titers of the circulating antibodies, duration of antibody exposure, and immunological mechanisms in GD and Hashimoto's thyroiditis.[9] Thyroid Peroxidase (TPO) is the key thyroid enzyme catalyzing both the iodination and coupling reaction for the synthesis of thyroid hormone.

Anti-TPO autoantibodies are found in over 90% of patients with autoimmune hypothyroidism and Graves' disease. Together with thyroglobulin (TG) antibodies, these are the predominant antibodies in autoimmune hypothyroidism (AH). Anti-TPO antibodies are mainly of the IgG class 1 and IgG4 subclasses in excess.[10,11] Anti

TPO antibodies is especially helpful in the case of subclinical hypothyroidism in deciding initiation of treatment and the duration of treatment. In patients with subclinical hypothyroidism, presence of anti TPO antibodies is associated with an increased risk of developing overt hypothyroidism.[12] Thyroglobulin (TG) Antibodies are found in less than 60% of patients with lymphocytic thyroiditis and 30% of Graves' disease patients. They are polyclonal and mainly of IgG class with all four subclasses represented. [13] Population studies have suggested that about 16.7% of adult subjects have anti-thyroid peroxidase (TPO) antibodies and about 12.1% have anti-thyroglobulin (TG) antibodies. In above mentioned study of 971 subjects, when subjects with abnormal thyroid function were excluded, the prevalence of anti-TPO and anti-TG antibodies was 9.5% and 8.5%.[14] Raman K *et al.*,[15] studied 4409 adults, from 18-90 years of age, 9.6 % of subjects had clinical goiter (13.3% women and 3.3% in men). Prevalence of nodules on palpation was found to be in 1.6% which was lower in men. The nodule prevalence increased to 4.6% in men and 5.6 % in women on ultrasonography. Thyroid hypoechogenicity was seen in 30.6% of subjects with severe hypoechogenicity higher in women (5.7% men and 15.5 % women). TPO antibody was positive in 13.3% adults and it showed a positive correlation with age, female sex and hypothyroidism. Subclinical hypothyroidism was the commonest abnormality encountered and affected 19.3 % subjects (15.9% men; 21.4% women). Ganie MA *et al.*,[16] studied 763 subjects (56.4% women and 43.6% men) with a mean age of 39.46 ± 17.51 years, goiter was detected in 6.8%, while 33.2% subjects had some form of thyroid dysfunction (including 24.1% subclinical and 6.8% overt hypothyroidism). Subclinical and overt hyperthyroidism were observed in 1.3 and 0.9% of cases, respectively. Anti-TPO Ab was elevated in 13.6%, while the median [156.13 (134) µg/L in men and 147.26 (136) µg/L in women]. A negative correlation was observed between urinary iodine concentration (UIC) and anti-TPO Ab ($r = -0.087$, $P = <0.05$). In study by Prajya SS *et al.*,[17] Out of 768 samples, 79.9% were of women and 20.1 % were of men. A total of 205 (26.7%) were positive for anti TPO antibodies of which 83.4% were women and 16.6% were men. Women had more patients with anti TPO antibodies positive as compared men (27.9 vs 21.1%). Mean Anti TPO titre were also more in women as compared to men (61.01 vs 48.20 IU/ml). Dhamija J *et al.*,[18] studied 175 cases of subclinical hypothyroidism Significantly high (p value< 0.001) levels of Anti-TPO, Cholesterol, LDL was found in patients having TSH levels >10 in comparison to TSH levels ≤ 10. while there was no statistical difference (p value >0.05) in values of TG, VLDL, HDL levels between both groups. Thyroid peroxidase antibody is more prevalent than thyroglobulin antibody in thyroid disorders and appears to be a better marker than thyroglobulin antibody in detecting autoimmune thyroid dysfunction.[2] Further studies are recommended in a larger cross-section of population, including environmental and etiological factors like role of goitrogens, autoimmunity, medications, iodine, and nonthyroidal illness for better diagnosis and management of thyroid illness.

CONCLUSION

In patients of thyroid diseases such as hyperthyroidism, hypothyroidism, goiter, thyroid cancer and Hashimoto's thyroiditis, estimation of antithyroglobulin antibodies and anti-thyroid peroxidase antibodies may serve as useful biochemical markers to decide treatment protocol and the duration of treatment.

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