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RESEARCH ARTICLE

STUDY AND CORRELATION OF ANTI THYROID PEROXIDASE ANTIBODY AND ULTRASONOGRAPHY FINDINGS OF THYROID IN PATIENTS OF THYROID DISEASES

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Abstract

Aim: To determine Anti thyroid peroxidase antibody and ultrasonography features of thyroid gland in thyroid disorder patients and study their correlation.

Design: This is an observational, cross sectional study and techniques used are clinical and non-invasive.

Method: Thyroid function tests, Anti-thyroid peroxidase (Anti-TPO)antibody and ultrasonography neck were performed in 150 patients .Eligible participants were adults of age group 15-70 years with deranged thyroid function tests . Pregnant patients and patients already on thyroid medications were excluded from the study The participants were classified as overt , subclinical hypothyroid or overt, subclinical hyperthyroid. Anti thyroid peroxidase antibody and ultrasonography neck findings obtained were analyzed and correlated using statistical methods.

Statistical Analysis: Frequency and percentage were calculated and test of significance such as Chi square test, T test were used. Correlation was assessed using Spearman's correlation coefficient p=<0.05 is considered significant.

Result: From January 2020 to August 2021, 150 patients participated in the study in which 50%(n=75) patients were found to be subclinical hypothyroid, 21.3%(n=32) were overt hypothyroid, 21.3% (n=32) were overt hyperthyroid , 6% (n=09) were subclinical hyperthyroid and 1.3%(n=2) were euthyroid with thyroid swelling. 51.3%(n=77) patients had diffuse thyroid disease on ultrasonography neck, normal gland in 19.3%(n=29) patients, thyroiditis in 11.3%(n=17) patients ,Multinodular goiter in 10.6%(n=16) patients, nodule in 6%(n=09) and atrophic gland in 1.34%(n=02) patients. Anti thyroid peroxidase was positive in 62%(n=93) patients. Among patients with diffuse hypoechogenecity on ultrasonography 85%(n=80) patients had positive Anti-TPO antibody with p value 0.05.

Conclusion: Maximum number of patients with thyroid diseases had a positive Anti thyroid peroxidase antibody that suggests autoimmunity

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as a major etiology of thyroid disease.Among patients with diffuse hypogenecity on USG,85%(n=80)patients had positive Anti-TPO antibody with statistical significance(p 0.05). Ultrasonography neck is non invasive ,safe and cost effective method to ascertain the cause of thyroid disease and has a major role in predicting prognosis of the disease.

Abbreviations: Anti thyroid peroxidase antibody-Anti-TPO antibody; Ultrasonography-USG

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Introduction:-

Thyroid gland is an important gland involved in the metabolism, development and maintainence of internal environment of the body[1]. It plays critical role in cell differentiation and organogenesis during development and help maintain thermogenic and metabolic homeostasis in the body. Owing to its ability to control and modulate metabolism, thyroid is often called the master gland of metabolism in common parlance[2].

Thyroid diseases are among the commonest endocrine disorders worldwide.It has become clear that thyroid dysfunction is associated with significant morbidity and mortality. Patients present with symptoms attributable to physiological effects of increased or decreased plasma concentration of thyroid hormones. Thyroid dysfunction is an impairment in the function of thyroid gland and comprises a spectrum of disorders ranging from asymptomatic disease to symptomatic thyroid disease. Clinical findings can and must be integrated with thyroid diagnostic testing to yield accurate and efficient answers to questions pertinent to the diagnosis of thyroid diseases. Overt thyroid dysfunction is associated with significant mortality and morbidity. Both hypothyroidism and hyperthyroidism have been linked with increased risk of cardiovascular disease and, adverse effects of thyrotoxicosis in terms of osteoporosis risk is well established[3].

Hypothyroidism itself contributes to morbidity from osteoporosis, hyperlipidemia, hypercholesterolemia, cardiovascular and neuropsychiatry disease in the population[4]. The seriousness of thyroid diseases should not be underestimated as thyroid storm and myxedema coma can lead to death in a significant number of cases. For hypothyroidism, complaints of fatigue, weight gain, dry skin ,voice change help to suspect the disease[5].Whereas for hyperthyroidism , anxiety, sweating ,palpitations, weight loss, muscle weakness are specific[6]. They also present with symptoms related to localized or generalized enlargement of the gland.

Imaging has long been established as an essential element in the workup of clinically suspect lesions of the thyroid gland. Ultrasonography is the modality of choice in initial characterization of thyroid disease[7].Thyroid USG is a valuable tool in diagnosis of thyroid diseases. It is possible to detect abnormalities in size ,echostructure like hypoechogenecity and hyperechogenecity, margins and other malignant features.

The various causes of thyroid dysfunction include autoimmunity, iatrogenicity, congenital, iodine deficiency, thyroiditis, carcinoma .After successful salt iodinisation adopted by the Indian government, World Health Organisation assessment status classified India as having optimal iodine nutrition in 2004. Autoimmune thyroid diseases broadly include Grave's disease and Hashimoto's disease which are most common causes of thyroid gland dysfunctions along with iatrogenic causes.

Antibodies to Thyroid Peroxidase and Thyroglobulin are important clinical markers of autoimmunity. Anti TPO antibody are related to levels of TSH and has been used to predict the development of hypo-/hyperthyroidism. It has been determined in various studies that altered levels of anti thyroid antibodies in euthyroid patients have been associated with development of overt hypothyroidism in future. Their appearance may precede development of overt thyroid disease or deranged thyroid function tests by several years[8].

Epidemiology of thyroid disorders among Indian population is poorly understood and this study provides valuable insight into the laboratory and radiological investigations of patients with thyroid disorders. Few studies have attempted to do the same.

Materials And Methods:-

This is an observational, cross sectional study and techniques used are clinical and non-invasive, thus as no such ethical issues is being created.

A Cross-sectional study at a tertiary care was conducted. Patients having deranged thyroid function tests: free iodothyronine (FT3), thyroxine (FT4), thyroid stimulating hormone(TSH) belonging to age group 15-70 years were included in the study. Pregnant patients and patients already on thyroid medications were excluded from the study.

The study was carried out from January 2020 to August 2021in 150 patients that presented in the out patient door and inpatient door of General Medicine wards. Frequency and percentage were calculated and test of significance such as Chi square test, T test were.Correlation was assessed using Spearman's correlation coefficient p=<0.05 is considered significant.

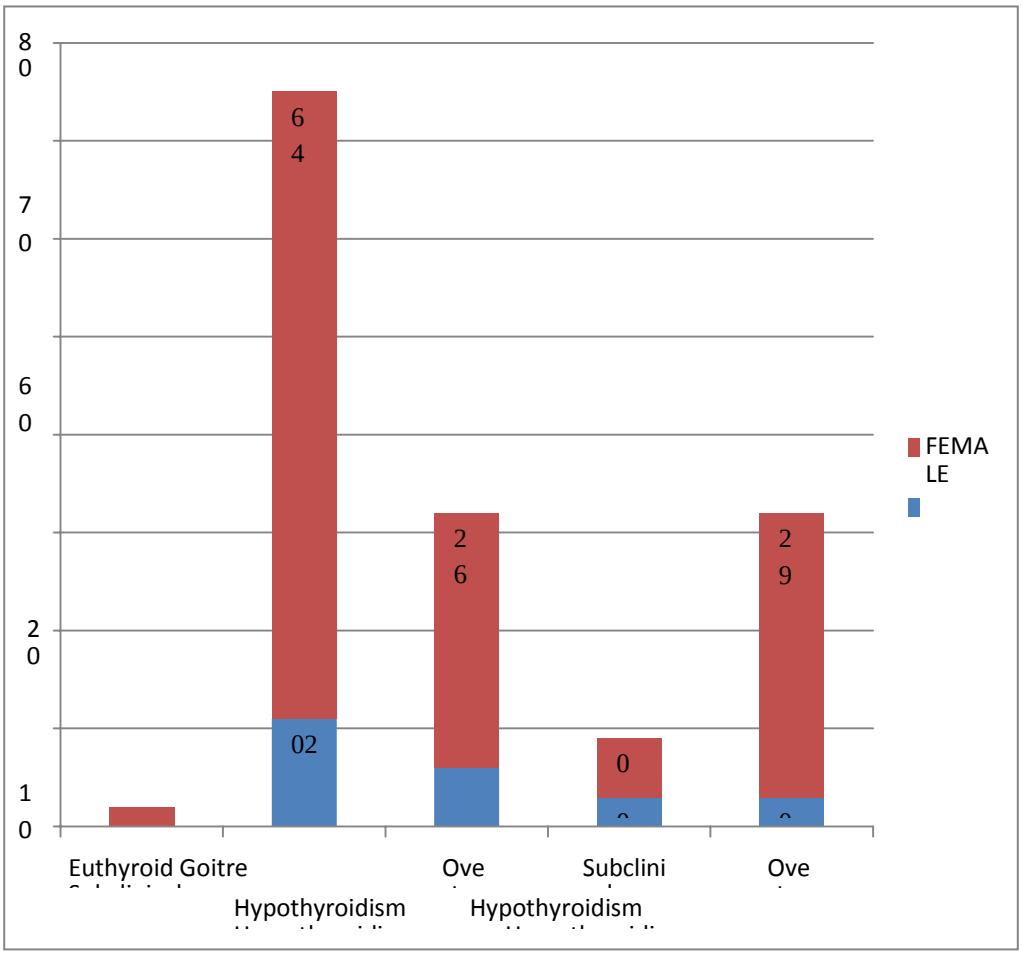
We have classified patients on the basis of FT_3,FT_4 and TSH as subclinical hypothyroid (TSH>5.5 Micro IU/ml and FT3 2.3-4.2 pg/ml FT4 0.89-1.76 ng/ml), Overt hypothyroid (TSH >5.5 micro IU/ml ,FT3 <2.3 pg/ml , FT4 <0.89 ng/ml), subclinical hyperthyroid (TSH <0.35 micro IU/ml, FT3 2.3-4.2 pg/ml ,FT4 0.89-1.76 ng/ml), overt hyperthyroid (TSH<0.35 microIU/ml, FT3 >4.2 pg/ml, FT4>1.76 ng/ml)

Anti TPO antibody and ultrasonography neck were studied in each patients and a correlation was drawn between Anti TPO antibody and USG thyroid.

Results:-

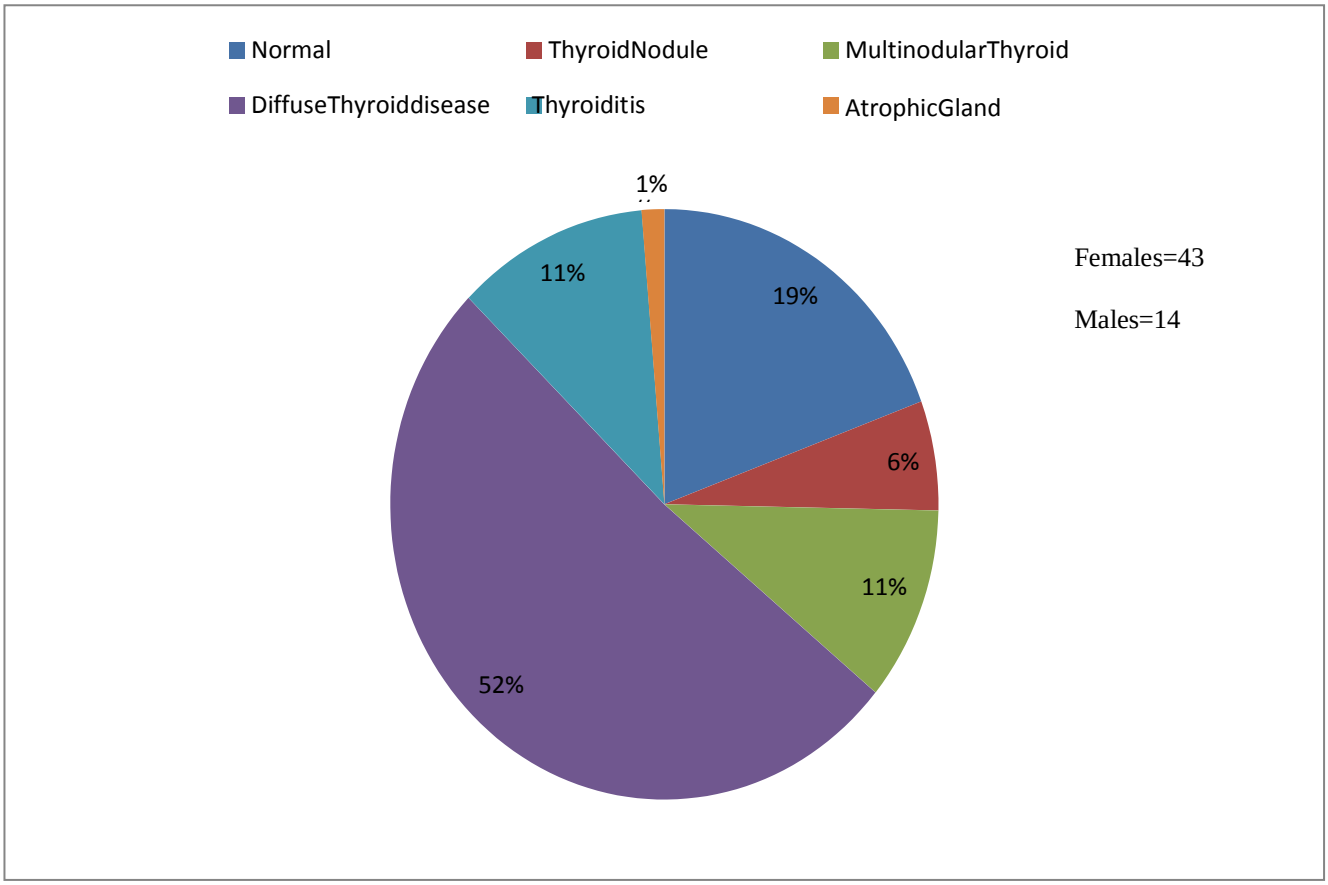
150 patients with deranged thyroid function tests were studied and the following observations were drawn.

Figure No 1:- Thyroid Status Of Patients.



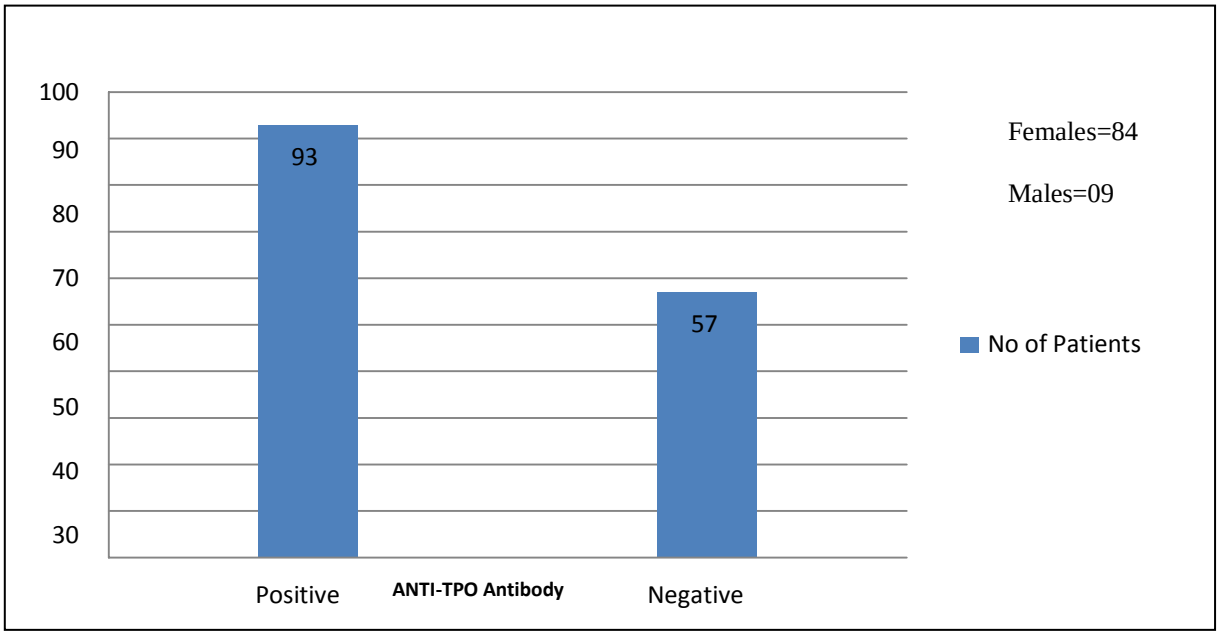
Patients were grouped into five groups according to the definitions based on TSH and FT4 levels and further statistical analysis was done based on these groups. According to our definition, 75(50%) patients found to be subclinical hypothyroid, 32(21.3%) patients are overt hypothyroid, 32(21.3%) patients are overt hyperthyroid, 9(6%) patients are subclinical hyperthyroid and only 2 patients are euthyroid.

Figure No 2:- Ultrasonography Findings In Thyroid Patients.



Out of 150 patients of thyroid disorder,94 patients(62.6%) had diffuse hypoechogenecityon ultrasonography ,of which 77 patients (51.3%) had diffuse thyroid disease followed by thyroiditis in 17 patients(11.3%).29 patients(19.3%)had normal thyroid USG while 16 patients (10.6%) had Multinodular goiter. 9 patients(6%) had thyroid nodule and only 2 patients had atrophic gland on USG. 2 patients with thyroid nodule on USG had TIRAD score 3,4 respectively and FNAC was done which revealed adenomatous goiter although these 2 patients were euthyroid.

Figure No 3:- Association Of Anti-Thyroid Peroxidase Antibody Levels With Sex Of The Patient.



Out of 150 patients tested for Anti-TPO Antibody,93 patients have raised levels of antibody, while 57 patients have normal value of the antibody.

Out of 93 patients that were positive for Anti TPO antibody, 84 were females (60%) and 9 (39.1%) were males.

Statistical analysis with Chi-Square reveal statistically significant result with p value 0.05.

Table 1:- Correlation Between Anti-Tpo Antibody, Thyroid Status, Thyroid Ultrasonography.

THYROID STATUS	NORMAL ANTI-TPO ANTIBODY											
	USG NECK											
	NORMAL		NODULE		MULTINODULAR GOITRE		DIFFUSE THYROID DISEASE		THYROIDITS		ATROPHIC	
	Count	Row N%	Count	Row N%	Count	Row N%	Count	Row N%	Count	Row N %	Count	Row N%
EUTHYROID	0	0.00%	2	100.00 %	0	0.00 %	0	0.00%	0	0.00%	0	0.0 %
HYPER THYROIDSM	0	0.00%	2	25.00%	4	50.00 %	2	25.00 %	0	0.00%	0	0.0 %
HYPO THYROIDSM	3	42.80 %	1	14.20%	0	0.00 %	2	28.50 %	0	0.00%	1	14. 0%
SUBCLINICAL HYPER THYROIDSM	0	0.00%	1	14.20%	6	85.70 %	0	0.00%	0	0.00%	0	0.0 %
SUBCLINICAL		60.60				0.00						0.0

HYPO THYROIDSM	20	%	2	6.06%	0	%	9	27.20 %	2	6.06%	0	%

THYROID STATUS			POSITIVE ANTI-TPO ANTIBODY									
			USG NECK									
	NORMAL		NODULE		Multinodular Goitre		DIFFUSE THYROID DISEASE		THYROIDITS		ATROPHIC	
	Count	RowN%	Count	RowN%	Count	RowN%	Count	RowN%	Count	RowN%	Count	RowN%
EUTHYROID	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
HYPER THYROIDSM	0	0.00%	1	4.10%	5	20.80%	14	58.30%	4	16.60%	0	0.00%
HYPO THYROIDSM	2	8.00%	0	0.00%	0	0.00%	18	72.00%	5	20.00%	0	0.00%
SUBCLINICALHYPER THYROIDSM	0	0.00%	0	0.00%	1	50.00%	1	50.00%	0	0.00%	0	0.00%
SUBCLINICALHYPO THYROIDSM	4	9.50%	0	0.00%	0	0.00%	32	76.10%	6	14.20%	0	0.00%

In 77 patients with diffuse thyroid disease on USG,65 patients (84%) and in 17 patients with thyroiditis on USG,15 patients (88%) had positive anti TPO antibody, maximum number of which are subclinical hypothyroid followed by overt hypothyroid. While in 16 patients with MNG on USG, 6 patients (37%) and only one patient with thyroid nodule on USG had positive anti-TPO antibody. Statistical analysis with Chi-square reveal significant relation with P value 0.05.

Discussion:-

Thyroid diseases are common in adults and prevalence is increasing in all parts of the world.Ethnicity and geographical position also affects the prevalence of thyroid disorders along with gender, age and iodine concentration in diet.Thyroid dysfunction are considered as the most common endocrine diseases. Thyroid hormones are recognized as catabolic hormones and they regulate various processes of metabolism including synthesis, mobilization and breakdown of lipids. Thyroid is also considered to have an effect on reproductive hormones and cardiovascular system.It also has an impact on psychological and psychiatric well-being of the individual.In order to diagnose thyroid disorders clinical findings should be accompanied with laboratory and radiological investigations. Among the laboratory investigations available, Anti-TPO antibodies appear to be one important measurement. This is because anti-TPO antibodies appear mostly with lymphocytic infilteration in the thyroid gland. **Shinto et al** concluded that anti-TPO antibody is more sensitive than anti-TG antibody in diagnosing autoimmune thyroiditis[9].

In our study we selected 150 patients with deranged thyroid function tests from OPD and IPD of the hospital.In the present study, thyroid disease is predominantly affecting women,80% patients are females and 20% are males.

According to study done by **Ghoraishai et al**, 2006 [10], 88% patients were female and 12% were male. In a study conducted by **Shinto et al**, 2010,91% were females and 9%were male patients[9].

In our study, subclinical hypothyroidism(50%) is most commonly seen than overt hypothyroidism(21.3%),overt hyperthyroidism(21.3%)and subclinical hyperthyroidism(6%), euthyroid goiter(1.3%).This result is similar to the study conducted by **S.Shrestha et al**, 2017 in which most common was subclinical hypothyroidism (56.3%) followed by overt hyperthyroidism (18%),overt hypothyroidism (16.9%)and subclinical hyperthyroidism(1.8%)[11].**Deokar et al**, 2016, found out the prevalence of subclinical hypothyroidism to be 9.44% followed by overt hypothyroidism 4,24% ,subclinical hyperthyroidism 5.97% and overthyperthyroidism2.5%[12].

In present study,diffuse hypoechogenecity was found in 62.6%(N=94)patients on USG, out of which 51.3%(n=77) had diffuse thyroid disease and 11.3%(n=17) had thyroiditis, 10.6% patients(N=16) had multinodular goitre on USG,19.3% (N=29)patients had normal USG and single nodule was present in 6% patients. Only 2 patients had atrophic gland on USG. According to **Hanshuraj et al**, 2016 most common finding on thyroid USG was diffuse thyromegaly in 56.67% followed bythyroiditisin20% and MNG in13%patients[13].

In present study, Anti-TPO antibody is raised in 62% patients (N=93) and normal in 38% patients (N=57).Out of 93 patients ,84patients (90%) were female and 9(10%) were male. 66%(n=84) females and 39%(n=9) males had anti TPO positive result. This is statistically significant, P value<0.05.Similar observations seen in study conducted by **S.Shrestha et al**, in which 63.7% patients were Anti-TPO positive. Autoimmune thyroid disease were found more in females as compared to male.Adult females of child bearing age are prone to develop autoimmune thyroid disease .This is in accordance to **Unnikrishnan et al**, 2013, where there was increased prevalence of Anti-TPO antibody in females more than males[14].

In present study, out of 94 patients with diffuse hypoechogenecity on USG,85% (N=80)patients are anti –TPO antibody positive.76.2% (N=61) of these patients are hypothyroid, overt and subclinical , 23.75% (N=19) are hyperthyroid.37.5%(N=6) patients with MNG on USG are antibody positive while 20.6% (N=6)patients with hypothyroidism and normal USG are antibody positive. The result is statistically significant with P<0.05.This observation is similar to that made by **Pedersen et al**, in their study for evaluating the value of USG in prediction of autoimmune thyroid disease. He found out elevated TSH, Low TSH and positive anti-TPO antibody in 66.4%,17.6% and 66.8% of patients with reduced USG echogenecity on USG respectively[15].

Conclusion:-

Although thyroid disease is so prevalent worldwide,Anti-TPO antibody and USG thyroid gland is usually neglected investigation in patients with thyroid disease.In our study, we have seen the importance of both these investigations in diagnosing etiology and predicting the prognosis of the patient.85% patients(N=80) with diffuse hypogenecity had a positive Anti-TPO antibody levels, which suggests autoimmunity as a major etiology in the patients. Thus,USG thyroid gland is a non- invasive , safe, easily available and cost effective method for ascertaining the etiology of the patients with thyroid diseases.

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