

Original article:

Study of correlation of TFTs and thyroid antibodies with lipid abnormalities and ECG changes in Hypothyroidism

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Abstract

Introduction: Hypothyroidism is relatively common and is associated with an unfavorable effect on lipids. Therefore, our study focuses mainly on correlation of thyroid antibodies with lipid abnormalities and ECG changes in hypothyroid patients.

Materials and methods: 60 patients with hypothyroidism, admitted in medicine wards were included in this study over a period from July 2013 to September 2015. All the patients with hypothyroidism of age more than 18 years were included in the study. Patients who underwent thyroidectomy, pregnant patients and patients who underwent radioactive iodine therapy patients were excluded from the study. Detail history was recorded from patient. Investigations performed included T₃, T₄ and Ultra TSH, anti-thyroglobulin antibodies , anti – TPO antibodies, Fasting lipid profile and ECG.

Observations and results: Out of these hypothyroid patients, 21 patients had anti – TPO antibodies positive and 11 had anti – thyroglobulin antibodies positive. There was a significant correlation found between the TSH levels and Triglycerides in our study, however, no significant correlation was found between thyroid antibodies and serum cholesterol, HDL levels, LDL levels and Triglycerides.

Conclusion: From this study we concluded that TSH were positively associated with fasting lipid levels and ECG changes. Correlation of positive thyroid antibodies i.e anti – TPO antibodies and anti –thyroglobulin antibodies did not show any significant correlation with lipid profile and ECG changes.

Introduction:

It is well known that alterations in thyroid function result in changes in the composition and transport of lipoproteins¹⁻³. Hypothyroidism is a common metabolic disorder in the general population. This results in a decreased intracellular cholesterol concentration in hypothyroidism. Additionally, thyroid hormones activate the LDL receptors; the promoter of the LDL receptor gene contains a thyroid hormone responsive element (TRE) which allows the triiodothyronine (T₃) to upregulate the gene expression of the LDL receptor⁵. Moreover, thyroid hormones stimulate the cholesteryl ester transfer

protein (CETP), an enzyme which transports cholesteryl esters from HDL2 to the very low density lipoproteins (VLDL) and triglycerides in the opposite direction⁶. Finally, thyroid hormones stimulate the lipoprotein lipase (LPL), which catabolizes the triglyceride-rich lipoproteins, and the hepatic lipase (HL), which hydrolyzes HDL2 to HDL310. The increased serum lipid levels in subclinical hypothyroidism as well as in overt disease are potentially associated with increased cardiovascular risk.⁷ Treatment with thyroid hormone replacement to restore euthyroidism reverses the risk ratio.⁸ If untreated, the dyslipidemia together with the diastolic

hypertension associated with hypothyroidism may further predispose the patient to atherosclerosis.⁹

Taking into account the consideration mentioned above, with the present study, we investigated the potential association between thyroid hormones levels and thyroid antibodies with lipid profile and ECG changes.¹⁰

Materials and methods

Sixty patients admitted in medicine wards were included in this study over a period from July 2013 to September 2015. “Institute Ethics Committee Clearance was obtained before start of Study”.

Inclusion criteria: All patients of hypothyroidism with age more than 18 years.

Exclusion criteria: Post thyroidectomy cases
Pregnancy.

Patient who underwent radioactive iodine therapy.

Statistical analysis

The collected data was compiled and analyzed using SPSS (Statistical Programme for Social Sciences) software 15 version. OpenEpi Software Version 2.3. All data was expressed as means ± standard deviation (SD).

Results

Out of 60 hypothyroid patients, 49 were females and 11 were males. Age wise distribution showed 63% of study cases were in a group of 21 to 40 yrs, followed by 20% in age group of ≤20 yrs and remaining 10 cases were in age group of > 40 yrs (table 1).

Table 1

Age (Yrs)	No of cases	Percentage
≤20	12	20
21 – 30	20	33.33
31 – 40	18	30
>40	10	16.67
Total	60	100

Table 2- Association between sex and thyroid antibodies (anti - TPO) in study group

Sex	Thyroid antibodies (anti - TPO)		Total
	Positive	Negative	
Male	5	6	11
Female	16	33	49
Total	21	39	60

Table 3- Association between sex and thyroid antibodies (Thyroglobulin) in study group

Sex	Thyroid antibodies (anti -Thyroglobulin)		Total
	Positive	Negative	
Male	3	8	11
Female	7	42	49
Total	10	50	60

Table 2 and table 3, above, shows the association between sex and thyroid antibodies which showed out of total 49 female patients, 16 have anti – TPO antibodies positive and 7 had anti – thyroglobulin antibodies positive whereas out 11 males 5 had anti –

TPO antibodies positive and 3 had anti – thyroglobulin positive.

Association of TSH levels with Triglycerides was significant in our study as shown in table 4 below. Table 4 shows correlation of TSH with triglycerides having p value <0.05 which is of significance.

Table 4: Correlation between TSH and lipid profile in study group

Correlation between TSH and	r Value	P value
Sr. Cholesterol	0.007	>0.05
HDL	-0.12	>0.05
LDL	0.08	>0.05
Triglyceride	0.27	<0.05

Lipid profile results were not significantly associated with thyroid antibodies (both Anti TPO and thyroglobulin) among the study group. Sr cholesterol, HDL and Triglyceride was not significant with presence of thyroid antibodies in the study group. The table 5 below shows comparison of lipid profile with thyroid antibodies thyroglobulin in study group. Mean Sr Cholesterol in cases with abnormal thyroglobulin was 189.30 (S.D.±29.387) and in normal thyroglobulin 174.82 (S.D.±31.04). Mean Sr HDL in cases with abnormal Thyroglobulin was

53.80 (S.D.±14.99) and in normal thyroglobulin 56.06 (S.D.±13.39). Mean Sr triglyceride in cases with abnormal Thyroglobulin was 134.70 (S.D.±58.31) and in normal thyroglobulin 140.9 (S.D.±60.42). Lipid profile and thyroglobulin was analyzed quantitatively. Z value worked out to be 1.36, 0.48 and 0.20 for Sr cholesterol, HDL and Triglyceride respectively, which was statistically not significant. (P>0.05).

Table 5

Parameter	Thyroid antibodies (Thyroglobulin)				Z Value	P Value
	Abnormal (n=12)		Normal (n=48)			
	Mean	SD	Mean	SD		
T Cholesterol	189.30	29.387	174.82	31.046	1.36	>0.05
HDL	53.80	14.995	56.06	13.396	0.48	>0.05
Triglyceride	134.70	58.319	140.92	60.426	0.20	>0.05

The table 6 below shows comparison of lipid profile with thyroid antibodies TPO in study group. Mean Sr Cholesterol in cases with positive Anti TPO was 181.33 (S.D.±29.285) and in negative TPO 175.03 (S.D.±32.058). Mean Sr HDL in cases with positive Anti TPO was 52.05 (S.D.±11.74) and in negative TPO 57.64 (S.D.±14.21). Mean Sr triglyceride in

cases with positive Anti TPO was 137.62 (S.D.±67.39) and in negative TPO 141.1 (S.D.±55.92). Lipid profile and Anti TPO was analyzed quantitatively. Z value worked out to be 0.75, 1.54 and 0.21 for Sr cholesterol, HDL and Triglyceride respectively, which was statistically not significant. (P>0.05).

Table 6

Parameter	Thyroid antibodies (TPO)				Z Value	P Value
	Positive (n=21)		Negative (n=39)			
	Mean	SD	Mean	SD		
T Cholesterol	181.33	29.285	175.03	32.058	0.75	>0.05
HDL	52.05	11.741	57.64	14.212	1.54	>0.05
Triglyceride	137.62	67.392	141.10	55.925	0.21	>0.05

There was a significant correlation observed between the TSH levels and ECG changes in form of low voltage and bradycardia as shown in table 7, but no significant correlation was observed between Thyroid antibodies and ECG changes.

among cases with normal ECG was 62.16 (S.D.±48.87) TSH and ECG was analyzed quantitatively. Z value worked out to be 3.19 which is statistically significant (p<0.005).

Table 7 below shows mean TSH in cases with abnormal ECG was 114.36(S.D.±49.43). Mean TSH

Table 7

Parameter	ECG				Z Value	P Value
	Abnormal (n=11)		Normal (n=49)			
	Mean	SD	Mean	SD		
TSH	114.36	49.43	62.16	48.87	3.19	<0.005

Discussion

Thyroid dysfunction was a risk factor for cardiovascular disease mediated by the effects of thyroid hormones on lipids metabolism and blood pressure. In this study, hypothyroidism was found more in females than males which was also seen in the previous studies⁽¹¹⁾. High number of total thyroid dysfunction was observed in 21 to 40 years of age groups, followed by 41 to 60 years of age groups (Table 1). Lipid profile results were not significantly associated with thyroid antibodies (both Anti TPO and anti – Thyroglobulin antibodies) among the study group. Sr cholesterol, HDL and Triglyceride was not significant with presence of thyroid antibodies in the study group. (Table no 2 and 3). Similar findings were observed in a study conducted by Yun Zhang et al investigating the potential association between

thyroid parameters and lipids profile in a cohort of euthyroid suggesting lipid levels were lower in TPO-Ab positive patients; however, the differences were not significant⁽¹²⁾. However, there was a positive correlation of TSH levels with serum triglycerides levels, showing patients with hypothyroidism levels have higher concentrations of triglycerides. This finding was consistent with study conducted by Jan Kvetny, Poul Erik Helgaard, Else – Maire Bladbjerg and Jorgen Gram stating subclinical hypothyroidism is associated with an increased triglyceride levels.⁽¹³⁾ ECG changes were not found be significantly associated with thyroid antibodies (both anti – TPO and anti – thyroglobulin antibodies). Low voltage ECG and bradycardia were associated with a higher level of TSH.

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