Iraqi Journal of Biotechnology, 2022, Vol. 21, No. 2, 172-177

Evolution of Thyroid Autoantibodies and Thyroid Parameters in Iraqi Hypothyroidism Patients

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Received: 1/6/2022 Accepted: 31/8/2022 Published: December 20, 2022

Abstract: The current study is a cross-sectional case/control study aimed to look for the Correlation between thyroid auto-Ab and thyroid parameters in a sample of Iraqi patients with hypothyroidism versus control. The study was conducted on 128 blood samples divided into 60 samples from the Hypothyroidism patients group and 68 samples from the apparently healthy control. Those patients attended the specialized Center for Endocrinology and Diabetes in Baghdad/ Rusafa –Iraq for the period between (December 6/2021, until February 13/2022), Thyroid-stimulating hormone (TSH), thyroxine T4, and immunological studies including anti-TPO antibody and anti-Tg antibody were measured using Cobas E411/Roche platform for two groups. According to the results, parameters (T4, TSH, anti-TPO ab, and anti-Tg ab) showed a highly significant difference between the hypothyroidism patient group and apparently healthy control (P-value were 0.0001 for all respectively),.Measurement of Anti-TPO Ab in patients with hypothyroidism in the blood can help to establish the diagnosis and sometimes to predict the clinical course and response to treatment. The final conclusion was the presence of anti-TPO Ab also predicts a higher risk of overt hypothyroidism development in adults.

Keywords: hypothyroidism, Anti TPO Ab, TSH, autoimmune.

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Introduction

Primary hypothyroidism is the second most common endocrine disease worldwide after diabetes mellitus and is characterized by thyroid hormone deficiency. Hypothyroidism can be classified based on its onset (congenital or acquired) and its severity, as an overt (clinical) or subclinical disease (1). Hypothyroidism affects up to 5% of the general population, with a further estimated 5% being undiagnosed (2). Hypothyroidism affects women ten times more frequently than men, and its rate increases with age (3). In individuals with a high TSH, TPO antibodies may be tested to assist determine the underlying reason. When TPO antibodies are high, hypothyroidism is most probably caused by an autoimmune disease (such as Hashimoto's thyroiditis) (4). more than 90% of patients with autoimmune hypothyroidism have positive TPO and/or Tg these antibodies are also present in about 10% of people without a thyroid disorder where they may be ‘markers’ of autoimmunity to cause autoimmune disease. This phenomenon may reflect that they may be more likely to develop autoimmune diseases in the future (5). It's unclear why the

immune system attacks thyroid cells. Disease onset might be linked to genetic factors, Infection, stress, or radiation exposure, environmental triggers, and Interactions between genetic and environmental variables(6). According to studies, thyroiditis has a substantial inherited susceptibility, and it appears to be a polygenic illness with a complicated mode of inheritance. (7). Aim of the study to investigate the predictive role of TPO and Tg in thyroid disease.

Materials and methods

This study is a cross-sectional case/control, conducted for the period between (December 6/2021, until February 13/2022), We measured the height and weight, and body mass index (BMI) of participants, in addition thyroid function tests, Thyroid-stimulating hormone (TSH), thyroxine T4, and immunological parameters including anti-TPO antibody and anti-Tg antibody were measured for two groups according to hypothyroidism patient group and apparently healthy control. A total of 128 candidates were selected for the present study. Divided into Two groups, the patients group included 60 patients who were chosen from the specialized Center for Endocrinology and Diabetes and identified by the specialist doctors with primary hypothyroidism according to the American thyroid association criteria of diagnosis (11). While the control group comprises 68 apparently healthy subjects who were randomly selected from the people who attend the clinics for checkups and relatives and colleagues. In the Patients group, 46 (76.7%) were females and 14 (23.3%) were males, their ages ranged from 25 to 60 years. While in the other sixty-eight subjects in the healthy control, 51 (75.0%) were females and 17 (25.0%) were males, Using Electrochemiluminescence (ECL) technology by Cobas E411 System manufactured by Roche /Germany.

Statistical analysis

All statistical analyses were performed using the SPSS 25 software (SPSS Inc., Chicago, IL, USA). All normally distributed qualitative data are expressed as mean ± standard deviation, and comparisons between two groups were carried out using the t-test. Odds ratios (OR). P-values of less than 0.05 were considered significant. Qualitative data are expressed as mean ± standard deviation, and comparisons between two groups were carried out using the t test. Odds ratios (OR) were calculated. P-values of less than 0.05 were considered significant.

Results and discussion

The demographic characteristics of participants are shown in Table 1. There was no significant difference in BMI between the two groups (P= 0.82). On the other hand, the mean age of the patient's group was significantly higher than that of the apparently healthy control group (P<0.05). the age of the patient group was older than that of the apparently healthy control group because in the period in which patients were selected for research in the Specialized Center for Endocrinology and Diabetes, the patients who were attending were apparently older than that of the already selected healthy control group, Therefore, we needed to adjust our final results to the age to get rid of its possible confounding effect. The comparison of biochemical variables among study groups is also

shown in Table (1). Serum TSH and T4 concentrations were highly significantly different between groups (P<0.01) for both). Serum anti-TPO and anti-Tg antibodies were also significantly higher in the patient's group than healthy controls (P<0.01). In the patients' group, 9 out of 60 (15%) had normal anti-TPO Antibody titers, while 51 (85%) of people with hypothyroidism had high anti-TPO Ab. on the other hand; in the healthy control group; 9 out of 68 (13.2%) had high Anti- TPO Ab, while the other 59 (86.8%) had normal anti-TPO ab. shown in Table (1). The distribution gender in the present study among individuals targeted, in the Hypothyroidism patients group was female 46 (76.7%) and male 14 (23.3%) but in the apparently healthy control group females 51 (75.0%) and male 17 (25.0%). When working on research, found that women with hypothyroidism are higher than men, as previous studies mentioned by Wilson and Stem, (12). The prevalence of hypothyroidism in women is higher than in men. Maybe this result refers to little interest in men in their health and few visits to the specialized center for Endocrinology and Diabetes and private clinics.

Table (1): General characteristics of study subjects

Parameters	Group	Total number	Mean ± SD	Student t-test	
				t- test	P-value
BMI	Control	68	28.654± 4.5445	0.218	0.82
	patients	60	28.493± 3.7129		
Age	Control	68	35.74± 9.813	2.37	0.019
	patients	60	40.02± 10.539		
TSH	Control	68	0.718± 0.397	10.28	0.0001**
	patients	60	32.104± 23.630		
T4	Control	68	107.923±18.592	16.5	0.0001**
	patients	60	50.338±21.988		
Anti -TPO	Control	68	14.976± 32.505	9.27	0.0001**
	patients	60	245.820± 190.321		
Anti- Tg	Control	68	28.787± 73.684	5.01	0.0001**
	patients	60	488.668± 707.604		
Means having with the different letters in same column differed significantly. ** (P≤0.01).					

When tested the correlation between hypothyroidism and the studied parameters in all participants altogether, showed a significant correlation between hypothyroidism and TSH ,T4 , higher titers of Anti-TPO ab. and Anti-Tg ab. (t-test=5.925, 3.049 respectively) and (P-value= 0.000, 0.003 respectively) and this correlation was independent on other parameters age, BMI and gender as shown after multivariate analysis (t-test=5.774, 2.572 respectively) and (P-value= 0.000, 0.011 respectively), as shown in table (2). There was a positive significant correlation between TSH with anti-TPO antibodies, and anti-Tg antibodies in both patients and healthy control as demonstrated in Figures (1) and (2). The Correlation coefficient was (r= 0.420, 0.283 P= 0.001, 0.016 N=128 respectively). The odds ratio of anti-TPO ab is (37.1) and the odds ratio of anti-Tg ab is (14.9) table (3).

Table (2): Two steps multivariate regression analysis for the correlation of auto-Ab with hypothyroidism, and their independence on other studied parameters

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig. (P-value)
		B	Std. Error	Beta		
1	(Constant)	.297	.042		7.001	.000
	Anti Tg	.000	.000	.235	3.049	.003
	Anti TPO	.001	.000	.457	5.925	.000
2	(Constant)	.218	.280		.778	.438
	Anti Tg	.000	.000	.208	2.572	.011
	Anti TPO	.001	.000	.450	5.774	.000
	Age	.006	.004	.115	1.393	.166
	BMI	-.004-	.008	-.037-	-.470-	.639
	Gender	-.008-	.088	-.007-	-.095-	.925

a. Dependent Variable: group

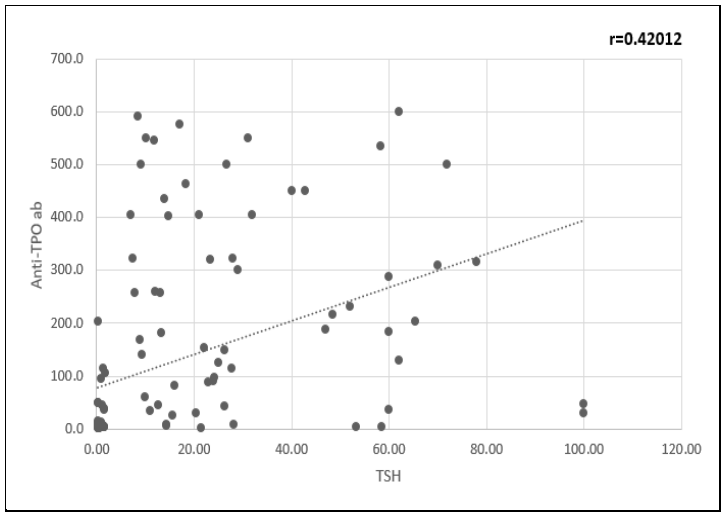

Figure (1): Correlation coefficient between TSH and Anti-TPO antibodies Values in both groups.

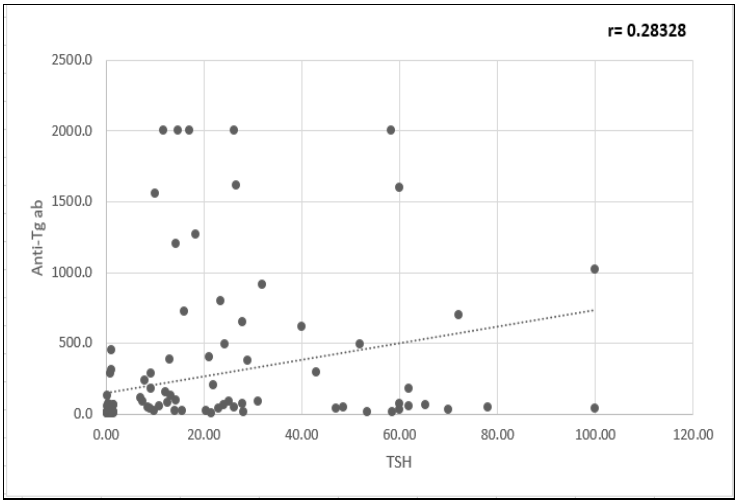

Figure (2): Correlation coefficient between TSH and Anti-TG antibodies Values in both groups.

Table (3): Anti-TPO Ab and Anti- Tg Ab level in hypothyroidism patients and control groups

Count		Group		Total
		Patients(60)	Control(68)	
Anti-Tpo Ab category	Positive	51 (85%)	9 (15%)	60
	Negative	9 (13.2%)	59 (86.8%)	68
Total		60	68	128
Odd ratio (95% CI)		37.148 (13.707-100.681)		

Count		Group		Total
		Patients(60)	Control(68)	
Anti-Tg Ab category	Positive	30 (88.2%)	4 (11.8%)	34
	Negative	30 (31.9%)	64 (68.1%)	94
Total		60	68	128
Odd ratio (95% CI)		16.00 (5.169-49.521)		

A found a positive correlation between anti-TPO Ab. and anti-TG Ab. with hypothyroidism, similarly, other previous studies have demonstrated similar findings, and they showed that serum anti-TPO levels are strongly positively correlated with presence of hypothyroidism. These antibodies are thought to be involved in the pathogenesis of auto-immune hypothyroidism. Amouzegar *et al*, (10) demonstrated prevalence of anti-TPOAb in general Iranian population as 14.9 % in the total population (10), which has been close to the results of the present our study (13.23%). In our study, nine (15%) of the hypothyroid patients had normal anti-TPO antibodies, whose thyroid dysfunction is probably not caused by an autoimmune disease, for of them the onset of diagnosis of hypothyroidism was early (earlier than age of 15 years). Primary hypothyroidism at birth is most commonly caused by a problem with thyroid gland development (dysgenesis) or a disorder of thyroid hormone biosynthesis (dyshormonogenesis). When Hypothyroidism is present at birth (congenital hypothyroidism), thyroid dysgenesis and dyshormonogenesis account for approximately 85% and 15% of permanent cases of congenital primary hypothyroidism, respectively (13,14).

Conclusion

Anti TPO Ab and anti-TG Ab. are useful parameters for prediction of hypothyroidism, and they can help to establish the diagnosis and sometimes to predict the etiology, clinical course and response to treatment.

Recommendation

Anti TPO Ab and anti-TG Ab. can be utilized to predict development of hypothyroidism in people who are at risk, like those with subclinical hypothyroidism or with strong family history of thyroid dysfunction.

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