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Estimation of Free T3, free T4 and TSH Levels in a Sample of Iraqi Autoimmune Urticarial Patients

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Abstract: Chronic spontaneous urticaria (CSU) is a mast-cell driven skin disease, characterized by the recurrence of transient wheals, angioedema, or both for more than 6 weeks. CSU is associated with autoimmunity in 30–45% of the cases, sharing some immunological mechanisms with other autoimmune diseases, and is associated with Autoimmune Thyroid Disease (ATD) in about 4.3%–57.4% patients. This study involved eighty CSU patients were Clinically diagnosed by dermatologists in Specialized Center of Allergy in Baghdad/Al-Rusafa with age ranged between (11-60), as well as a control group 40 with age ranged between (11-60) from November 2021 to April 2022, the results show that free T3 (2.97±0.12 pg/ml) and free T4 (23.42±0.94 pg/ml) were highly significant differences (p-value=0.001 for both free hormones) in compared between patients and control group (1.46±0.12 pg/ml, 9.88±0.64 pg/ml) respectively, while TSH serum level was lower in CSU patients (0.95±.071 pg/ml) with highly significant differences (p-value=0.001) in compared with control group (1.96±0.26 pg/ml). in the other hand, the highest FT3 serum level of CSU patients was recorded in ages between 11-20 year while the highest FT4 serum level of CSU patients was recorded in ages between 41-50 year finally, the highest TSH serum level of CSU patients was recorded in ages between 21-30 year in compared with control group with same ages. Therefore, CSU patients may have symptoms of thyroid dysfunction.

Keywords: CSU, Free T3, Free T4 and TSH.

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Introduction

Chronic urticaria (CU) is a skin disease characterized by the spontaneous recurrence of transient wheals with or without angioedema lasting for more than 6 weeks (1). Although the disease is usually not life-threatening, it may impair the quality of life as patients with CU might have unexpected attack of wheals with extreme itching that can last for many years. Several investigators have suggested that CU could be divided into two subgroups, chronic spontaneous urticaria (CSU) and inducible urticaria (2). Chronic spontaneous urticaria (CSU) is a common skin disorder, characterized by recurrent episodes of mast cell-driven transient itchy hives, which are often associated with attacks of angioedema (3). patients with autoimmune CSU are widely held to often have other autoimmune disorders, including autoimmune thyroid disease (AITD) (4,5). Autoimmune thyroid disease encompasses a spectrum of disorders that affect 0.4%-9.1% of the population (6, 7, 8, 9, 10). Thyroid dysfunction included hypothyroidism and hyperthyroidism might be found in CSU patients (11).

Thyroid Hormone have role in metabolic and growth controlling as well as other functions of body. Triiodothyronine (T3) and Thyroxine or Tetraiodothyronine (T4) are the major hormones released by the thyroid gland, while the Thyroid-Stimulating Hormone (TSH) released by the anterior pituitary gland as well as the Thyrotropin-Releasing Hormone (TRH) secreted by the hypothalamus (12, 13). TSH released by the anterior pituitary gland (14, 15). Thyroid Stimulating Hormone is the first stimulator for production of the T3 or T4 hormone via stimulating the thyroid follicular cells (15). The relationship between T3, T4 and TSH represented by the negative feedback when low levels of T3/T4 lead to increasing the TSH secretion and vice versa. The predominant inhibitor of TSH releasing, while the TSH is so sensitive to small alternations in free T4 (16). In fact, elevated levels of thyroid hormones noted in patients with autoimmune thyroid diseases (AITD), these patients have a greater risk to undergo to CSU. It has been hypothesized that the inflammatory processes associated with these autoimmune conditions may lead directly to urticaria or increase the individual's susceptibility to ease and Hashimoto's thyroiditis account for the majority of cases, are common autoimmune ones characterized by various degrees of lymphocytic infiltration of the thyroid gland and thyroid autoantibodies (17).

Materials and methods

The total CSU patients were [80 (35 male), (45 female)] and Apparently Healthy control [40 (24 male), (16 female)]. Their age group (11-60) years collected from Specialized Center of Allergy in Baghdad/ Al-Resafa and during the period from November 2021 to April 2022. Identify the free T3, free T4 and TSH serum level by used ELISA technique and free T3 kit (Human, Germany), free T4 kit (Mybiosource, USA) and TSH kit (Mybiosource, USA).

Statistical analysis

The data was analyzed using SPSS statistical approach (Statistical Package for the Social Sciences) version-26 For quantitative variables free T3, free T4 and TSH.

Results and discussion

The results were female patients number was higher than male (45 vs. 35) this result was agreed with Erol *et al.*, (18) study that show the female with CSU higher than male also Broder *et al*., (19) reported that CSU affects females more often than males.

The free hormones level (T3, T4) showed highly significant differences in patients (2.97±0.12 pg/ml, 23.42±0.94 pg/ml) respectively, than the control group (1.46±0.12 pg/ml, 9.88±0.64 pg/ml) respectively (p-value=0.001) for both FT3 and FT4, in the other hand TSH level in patients (0.95±0.071 pg/ml) was lower than the control group (1.96±0.26 pg/ml) with highly significant difference (p-value=0.001) as shown in table (1).

Table (1): Serum levels of FT3, FT4 and TSH in patients and control groups

Groups	FT3 (pg/ml) (Mean ± S.E)	FT4 (pg/ml) (Mean ± S.E)	TSH (pg/ml) (Mean ± S.E)
Patients	2.97±0.12	23.42±0.94	0.95±.071
Controls	1.46±0.12	9.88±0.64	1.96±0.26
p-value p>0.001	**0.001***	**0.001***	**0.001***

***High significant**

Similar observations were reported previously in (20) who found high free T3 and T4 but low TSH in patients also agreed with (21) who study the Association between CSU and thyroid autoimmunity, Thyroid stimulating hormone abnormalities were more prevalent in the chronic urticaria group in the current study which was consistent with earlier research (22). Thyroid autoimmunity may develop many years after the CU appearance. Hence, the periodic follow up and thyroid evaluation is observed in CU patients (21).

Moreover, the results of ages and thyroid hormones showed in table (2), the patient with age 11-20 year had highest FT3 level while those with age 41-50 year had highest FT4 level but patients with 21-30 year showed highest TSH level however, the patients with different ages recorded high hormones levels except TSH than the control with same ages.

Table (2): Distribution of FT3, FT4 and TSH hormone levels (pg/ml) according to age groups

Groups	Age Group	N	FT3 (Mean± S.E) Pg/ml	FT4 (Mean± S.E) Pg/ml	TSH (Mean± S.E) Pg/ml
Patients	**11-20**	13	3.33±0.139	20.42 ±2.82	0.94 ±0.06
	21-30	21	3.11±0.15	22.28 ±1.84	1.019±0.13
	31-40	22	3.02±0.26	22.57±1.96	0.91±0.18
	41-50	12	2.35±0.43	27.21±1.77	0.87±0.19
	51-60	12	2.89±0.37	26.47± 1.64	0.99±0.15
Control	**11-20**	5	1.05±0.25	8.01±2.24	1.41±0.13
	21-30	18	1.48±0.15	10.31±0.95	2.53±0.47
	31-40	5	1.6±0.37	8.6±0.72	0.89± 0.27
	41-50	5	1.9 ±0.39	7.2±1.32	1.2±0.15
	51-60	7	1.19±0.32	12.04±1.65	1.74±0.70
p-value	*p*>0.001		**0.001***	**0.001***	**0.003***

*High significant

A previous study by Horacek *et al.* (23) reported that people with hyperthyroidism the level of FT3 and FT4 was higher in ages 0-40 however in general, this study had somewhat different than in other studies. The best answer for explain these differences is the nature of population which involved in study, while other studies involve the patients with primary care (24). Other possible causes of this differences may be earlier revealing of disease in different countries different ages of patients at onset, different levels of iodine intake or differential disease classification.

However, both children and adults may develop urticaria, with the peak onset age in adults being between (20-40) years. Urticaria is termed 'acute' if it lasts for less than 6 weeks and 'chronic' if it lasts for more than 6 weeks (25, 26).

Conclusion

The obtained results showed the female was higher than male in risk of CSU which this was agreed with different previous studies, also this study showed the CSU patient had high FT3 and FT4 serum levels in compared with control group. However, TSH serum level in CSU patients was lower than control group. Finally, the highest levels for FT3, FT4 and TSH was various between age group in CSU patients in compared with control group.

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