

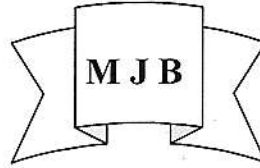
Evaluation of Thyroid Hormone Profile in Patients with Suspected Thyroid Dysfunction in Basrah

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Abstract

One thousand and seven patients (277 males and 730 females) with suspected thyroid dysfunction were studied for changes in serum levels of thyroxine (T₄), tri-iodothyronine (T₃) and thyroid-stimulating hormone (TSH). Among males, Thyroid hormone tests revealed that 89 (32.1%) patients were hyperthyroid, 42 (15.2%) were hypothyroid and 146 (52.7%) were euthyroid. The comparative figures for females were 197 (27.0%), 108 (14.8%) and 425 (58.2%) respectively. Thyroid hormone tests confirmed the initial clinical diagnosis in 436 (43.3%) patients, where in only 47.3% of male and 41.8% of female patients, the initial diagnosis was confirmed by hormonal tests. Among hyperthyroid male patients, 58 (62.5%) showed conventional thyrotoxicosis (increased both serum T₄ and T₃ levels), 17 (19.1%) presented with T₄ toxicosis, and 14 (15.7%) with T₃ toxicosis. Comparatively, the figures in females were 144 (73.1%), 41 (20.8%) and 12 (6.1%) respectively.

The study focused a light on the importance of the correlation of thyroid hormone changes with the clinical picture, and also, on the essential role of TSH assay in the diagnosis of thyroid diseases.

الخلاصة

تمت دراسة التغيرات في مستويات الثايروكسين (T₄)، ثلاثي ايبودو ثايرونين (T₃) والهرمون المحث للدرقية (TSH) في امصال دم الف وسبعة مرضى (277 ذكر و 730 انثى) يشتبه باصابتهم باضطراب الغدة الدرقية. اظهرت اختبارات هرمونات الدرقية عند الذكور بان 89 (32.1%) منهم مصابون بفرط افراز الدرقية و 42 (15.2%) منهم مصابون بنقص افراز الدرقية و 146 (52.7%) مصابون بالدرق نظامي الوظيفة. بينما كان في الاناث على وجه المقارنة 197 (27.0%) و 108 (14.8%) و 425 (58.2%) على التوالي. اثبتت اختبارات هرمونات الدرقية بانها مطابقه للفحوصات السريرية في 436 (43.3%) مريضاً بينما اثبت التشخيص الابتدائي في 47.3% للرجال و 41.8% للاناث مطابقتها للاختبارات الهرمونية فقط. لوحظ ان 58 (62.5%) من الرجال المصابون بفرط افراز الدرقية لديهم تسمم الدرقية العادي (زيادة كلا من مستويات T₄ و T₃)، 17 (19.1%) مصابون بسمية T₄ و 14 (15.7%) مصابون بسمية T₃. بينما كان في الاناث على وجه المقارنة 144 (73.1%)، 41 (20.8%) و 12 (6.1%) على التوالي.

ركزت هذه الدراسة الضوء على اهمية العلاقة لتغير هرمونات الدرقية مع الصورة السريرية وكذلك على الدور الاساسي لاختبار TSH في تشخيص امراض الدرقية.

Introduction

Thyroid hormones (thyroxine (T4) and triiodothyronine (T3)) are essential for normal growth and development, and influences a diversity of metabolic processes (1,2). Thyroid dysfunction is manifested by alteration in thyroid hormone secretion, enlargement of the thyroid gland (goitre) or both.

The measurement of TSH level and FT4E (free T4 estimate) or FT4I (free T4 index) will provide effective diagnosis and management of most patients with thyroid disease¹. Laboratory tests of thyroid function are required to assist the diagnosis and monitoring of thyroid disease. Additional tests are performed only if the hormone results are equivocal or the clinical presentation justify their use⁽²⁾, and includes ultrasound of the thyroid (1,3-5), radioactive iodine uptake^(1,2,5), thyroid scintiscanning (1,2,5,6), fine needle aspiration biopsy (FNAB)^(5,7) and immunological tests^(1,5,7).

This study was carried out to evaluate the hormonal pattern in patients with suspected thyroid disease in Basrah.

Patients and Methods

Patients

One thousand and seven (277 males and 730 females), 8 months -78 years of age, referred by different specialists in Basrah were included in this study extended from the 1st of June, 1997 to the 31th of December, 2000. All patients were referred for the suspicion of thyroid dysfunction and seen in the same diagnostic laboratory. They were categorized, with regard to thyroid function, into euthyroid, hyperthyroid or hypothyroid depending on the results of thyroid function test.

Methods

Serum concentrations of T₄, T₃ and TSH were determined using diagnostic kits (Ref. CA-1535M, CA-1541 and CA-1722 respectively) from

Diasorin. All procedures were followed in accordance with the instructions of the manufacturer. Quality control sera from Diasorin were included in each assay batch for all analytes.

Results

Table 1 presents the hormonal profile in patients with suspected thyroid dysfunction, where 89 (32.1%) male patients were hyperthyroid, 42 (15.2%) hypothyroid and 146 (52.7%) were euthyroid. Comparatively, the figures in females were 197 (27.0%), 108 (14.8%), and 425 (58.2%) respectively.

The age distribution of the studied patients is shown in Table 2, where 689 (68.4%) of patients were younger than 45 years of age, with male and female figures were 189 (68.2%) and 500 (68.5%) respectively. Among hyperthyroid male patients, 55 (61.8%) were younger than 45 years, 31 (34.8%) between 45-65 years and 3 (3.4%) were elderly. The comparative figures in females were 137 (69.5%), 48 (24.4%) and 12 (6.1%) respectively. Among hypothyroid men, 23 (54.8%) were younger than 45 years of age 15 (35.7%) between 45-65 years and 4 (9.5%) were older than 65 years. Comparatively, the figures in females were 62 (57.4%), 39 (36.1%) and 7 (6.5%) respectively.

As shown in Table 3, in 436 (43.3%) patients only, hormonal analysis confirmed of the clinical suspicion of thyroid dysfunction. In 131 (47.3%) of male patients and 305 (41.8%) of female patients, thyroid hormone tests confirmed the initial clinical diagnosis. Among males, 183 (66.1%) have clinical suspicion of hyperthyroidism, however hormonal tests confirmed the diagnosis in 89 (48.6%) patients only. In the remaining 94 (33.9%) patients, hypothyroidism was suspected, with the hormonal tests confirmed the diagnosis in 42 (44.7%)

patients only. In females, hyperthyroidism was clinically suspected in 475 (65.1%) patients, however the diagnosis was confirmed by hormonal tests in 197 (41.5%) patients. On other hand, hypothyroidism was suspected in 255 (34.9%) patients, with the hormonal tests confirmed the diagnosis in 108 (42.4%) have hormonal confirmation of their diagnosis.

Table 4 presents the frequencies of types of thyrotoxicosis. Among hyperthyroid male patients, 58 (65.2%) have conventional thyrotoxicosis (increased both T_4 and T_3 levels), 17 (19.1%) have T_4 toxicosis and 14 (15.7%) have T_3 toxicosis. The comparative figures in females were 144 (73.1%), 41 (20.8%) and 12 (6.1%) respectively.

Discussion

In spite of improvement in free T_4 assays, the highly sensitive TSH assay is the most sensitive test of thyroid function. In addition, TSH assay may provide a useful guideline in predicting the optimal daily maintenance dose of levothyroxine in patients with primary hypothyroidism(8), and, also, it may be of a role in predicting relapse of patients with Grave's disease(9). However, normal serum thyroid hormone levels do not exclude thyroid disease, and abnormal thyroid hormone tests do not always indicate thyroid disease¹⁰. Severe systemic illness, physical trauma, stress and psychiatric disturbances can induce changes in thyroid hormone levels without intrinsic thyroid disease(1,5,11-18). Such condition is termed as Sick Euthyroid Syndrome (SES)(1,5,18,19). In addition, several drugs have been found to affect thyroid hormone concentrations(20-23).

As presented in Table 3, the hormonal tests confirmed the initial clinical diagnosis in 43.3% of patients only (47.3% of males and 41.8% of females). In addition, 68.4% of patients

were younger than 45 years of age. These two observations raise the possibility that considerable number of patients with suspicion of thyroid disorder (thyrotoxicosis in particular) might have simple diffuse goitre, or having anxiety, or uncommonly, phaeochromocytoma. The latter two conditions mimicked thyrotoxicosis in their presentation(5) On the other hand, some of patients categorized as euthyroid especially those in whom TSH assay was not performed might be early cases of hypothyroidism, where in such circumstances thyroid hormone levels, particularly T_3 , may be still above the lower limit of the reference interval, but TSH is elevated^{5,10}. In addition, mild thyrotoxicosis is often associated with marginal abnormalities in serum T_4 and T_3 values. In such instances, the ultrasensitive TSH assay or the thyrotropin releasing hormone (TRH) stimulation test assume crucial importance¹.

In 19.1% of hyperthyroid male and 20.8% of hyperthyroid female patients, T_4 toxicosis was reported, which is thyrotoxicosis associated with clear elevation of serum T_4 level and a seemingly normal T_3 level(1). The syndrome of T_4 toxicosis occurs most commonly in the setting of prior excess iodine exposure in patients who are elderly, ill or both. In another 15.7% of hyperthyroid male and 6.1% of hyperthyroid female patients, T_3 toxicosis was observed. It is thyrotoxicosis with increased T_3 level, whereas T_4 level remains normal⁵. The female figure is close to the reported one of T_3 toxicosis of 5%²⁴. However, the male figure is 3 fold higher. Although the rate of T_3 formation is increased disproportionately relative to that of T_4 in all forms of hyperthyroidism, however, in some patients with Grave's disease, multinodular goitre and hyperfunctioning adenoma, this discrepancy is exaggerated(1). This

condition is most frequently encountered during the initial phase, or relapse of Grave's disease(1,5).

As the thyroid hormone tests are influenced by a diversity of conditions without intrinsic thyroid disease, and also by several drugs. In addition, as thyroid diseases may be associated, in some cases, with normal thyroid hormone levels. Therefore, it is vital to deal with every case of suspected thyroid disorder on its merit. Also, the results of thyroid function test should be correlated in conjunction with complete history and thorough physical examination, together with TSH assay which has a crucial diagnostic role, as it enables the establishment of the diagnosis of the majority of thyroid diseases, and also, decreases the need for further and more sophisticated investigational tools.

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Table1 Thyroid hormone concentrations in women with suspected thyroid dysfunction.

patients	Group	T ₄ (μg/dl)	T ₃ (ng/ml)	TSH(μu/ml)
Males	Hyperthyroid	N=89	N=89	N=41
	N=89(32.1%)	17.12±5.96	3.94±2.76	3.18±8.56
	Hypothyroid	N=42	N=31	N=37
	N=42(15.2%)	3.12±2.35	0.82±0.32	30.34±24.28
	Euthyroid	N=146	N=127	N=104
	N=146(52.7%)	8.88±2.13	1.38±0.29	2.09±1.59
Females	Hyperthyroid	N=197	N=197	N=113
	N=197(27.0%)	17.27±4.67	3.29±1.51	1.89±4.16
	Hypothyroid	N=108	N=81	N=89
	N=108(14.8%)	2.36±2.20	0.69±0.36	39.06±19.48
	Euthyroid	N=425	N=379	N=287
	N=425(58.2%)	8.83±2.04	1.30±0.29	2.21±1.48

Values given as X±SD

N= No. of patients

Table 2 Age distribution of the studied patients .

Patients	Age (years)	Hyperthyroid		Hypothyroid		Euthyroid		Total	
		No.	%	No.	%	No.	%	No.	%
Males	<45	55	61.8	23	54.8	111	76.0	189	68.2
	45-65	31	34.8	15	35.7	30	20.5	76	27.4
	≥65	3	3.4	4	9.5	5	3.4	12	4.3
Total		89	100.0	42	100.0	146	100.0	277	100.0
Females	<45	137	69.5	62	57.4	301	70.8	500	68.5
	45-65	48	24.4	39	36.1	109	25.7	196	26.8
	≥65	12	6.1	7	6.5	15	3.5	34	4.7
Total		197	100.0	108	100.0	425	100.0	730	100.0

Table 3 Clinical suspicion and hormonal confirmation of thyroid dysfunction

patients	Hyperthyroid		Hypothyroid		Overall	
	Clinically suspected	Confirmed by hormonal test	Clinically suspected	Confirmed by hormonal test	Clinically suspected	Confirmed by hormonal test
Male	183	89 (48.6%)	94	94	277	131 (47.3%)
Female	475	197 (41.5%)	255	255	730	305 (41.8%)
Total	658	286 (43.5%)	349	349	1007	436 (43.3%)

Table 4 Types of thyrotoxicosis.

Patients	Type	No.	%	T ₄ (μg/dl)	T ₃ (ng/ml)	TSH(μU/ml)
	Convent-ional (increased	58	65.2	N=58	N=58	N=25

	T ₄ &T ₃)			19.69±4.35	4.03±1.56	1.67±4.08
Males	T ₄ toxicosis	17	19.1	N=17	N=17	N=9
				16.03±3.98	1.62±0.23	1.21±0.86
	T ₃ toxicosis	14	15.7	N=14	N=14	N=7
				7.81±3.65	6.38±5.24	11.13±18.21
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	Total	89	100.0	N=89	N=89	N=41
				17.12±5.96	3.94±2.76	3.18±8.56
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	Convent-ional	144	73.1	N=144	N=144	N=84
				18.61±4.08	3.68±1.13	1.86±4.40
Females	T ₄ toxicosis	41	20.8	N=41	N=41	N=23
				15.33±2.53	1.59±0.26	1.86±3.83
	T ₃ toxicosis	12	6.1	N=12	N=12	N=6
				7.79±3.55	4.33±3.20	2.42±1.32
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	Total	197	100.0	N=197	N=197	N=113
				17.25±4.66	3.29±1.51	1.89±4.16

Values given as X±SD

N: No. of patients.