

Estimation of thyroid hormone for diabetes mellitus type 2 patients in Al-Nasserya city .

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Abstract:

Diabetes mellitus type 2 and thyroid disease are common endocrine disorders in the general population. Seventy of Diabetic patients' type 2 and forty two healthy control group , where were taken from Al-Nasserya hospital of Al-Nasserya city, during the period between November /2013 until March/2014. Blood samples were collected to estimate fasting blood sugar enzymatically and TSH,T3 andT4 hormone detected by VIDAS .

The aim of this study is to find the effect of hyperglycemia on thyroid hormones. The results showed higher percentage (30.4% and 28.6 %) at the age group (30-39 and 40-50 years) than other age group . It was also observed that female patients have a higher percentage (51.8%) than male patients (10.7%), while there was a highly significant increased ($P<0.01$) in the mean concentration of fasting blood sugar and TSH (241.57mg/dl and10.22 μ lu/ml) in the patients compared with control (97.6mg/dl and 1.70 μ lu/ml) respectively .It was non significant ($P>0.01$) in the mean concentration of T4 and T3 (84.25 and.41 nmol/l) in patients compared with control (86.28 and.28 nmol/l) .It is concluded that TSH is increases among Type 2 diabetic patients, especially in female gender.

Key words :Diabetes Type2, TSH (thyroid stimulating hormone), T3 (triiodothyronine), T4 (thyroxine).

تقدير هرمونات الغدة الدرقية في مرضى داء السكري النوع الثاني في مدينة الناصرية

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المستخلص:

إن داء السكري من النوع الثاني و أمراض الغدة الدرقية و اضطرابات الغدد الصماء هي الاكثر شيوعا في عموم السكان سبعون من مرضى السكري من النوع الثاني واثنين وأربعين مجموعة سيطرة ، حيث اخذت من مستشفى في الناصرية في مدينة الناصرية ، خلال المدة بين تشرين الثاني / 2013 حتى آذار / 2014 تم جمع عينات الدم لتقدير تركيز السكرالسيامي في الدم التي اعتمدت بقياسها على الانزيمات وهرمون المحفز للدرقية وهرمون الثايروكسين وهرمون الثالث يود الثايروين الكشف عنها بواسطة فيداس، الهدف من هذه الدراسة هو إيجاد تأثير ارتفاع السكر في الدم على هرمونات الغدة الدرقية. وأظهرت النتائج أن نسبة عالية (30.4 % و 28.6 %) في الفئة العمرية (30-39 و 40-50 عاما) من الفئة العمرية الأخرى . ولوحظ أيضا المرضى من النساء لديهم نسبة عالية (51.8 %) من المرضى الذكور (10.7 % . في حين أن زيادة كبيرة للغاية ($P < 0.01$) في متوسط تركيز السكر في الدم الصيام و وهرمون المحفز للدرقية (97.6mg/dl and 1.70 μ lu/ml) في المرضى مقارنة مع مجموعة السيطرة (97.6mg/dl and 1.70 μ lu/ml) على التوالي . بينما متوسط تركيز غير معنوي ($P > 0.01$) هرمون الثايروكسين وهرمون الثالث يود الثايروين (84.25 and 41 nmol/l) مقارنة مع السيطرة (86.28 and 28 nmol/l) وقد تم استنتاج ان الهرمون المحفز للدرقية يزيد في مرضى السكري النوع الثاني في الاناث .

Introduction:

The thyroid hormones, triiodothyronine (T3) and thyroxine (T4), are tyrosine-based hormones produced by the thyroid gland that are primarily responsible for regulation of metabolism. The major form of thyroid hormone in the blood is thyroxine (T4), which has a longer half-life than T3. The ratio of T4 to T3 released into the blood is roughly 20 to 1. T4 is converted to the active T3 (three to four times more potent than T4) within cells by deiodinases (5'-iodinase) [1,2]. The thyronines act on nearly every cell in the body. They act to increase the basal metabolic rate, affect protein synthesis, help regulate long bone growth (synergy with growth hormone) and neural maturation, and increase the body's sensitivity to

catecholamines (such as adrenaline) by permissiveness. The thyroid hormones are essential to proper development and differentiation of all cells of the human body. These hormones also regulate protein, fat, and carbohydrate metabolism, affecting how human cells use energetic compounds. They also stimulate vitamin metabolism. Numerous physiological and pathological stimuli influence thyroid hormone synthesis[3,4].

Diabetes mellitus type 2 (formerly noninsulin-dependent diabetes mellitus (NIDDM) or adult-onset diabetes) is a metabolic disorder that is characterized by hyperglycemia (high blood sugar) in the context of insulin resistance and relative lack of insulin.[2] .The classic symptoms are excess thirst, frequent urination, and constant hunger. Type 2 diabetes makes up about 90% of cases of diabetes. type 2 diabetes is initially managed by increasing exercise and dietary changes[5,6].

Patients and Methods

Patients

This study was conducted on (70) patients with DM type 2 and (42) as a control at Al-Nasserya hospital . Selection of the patients depending on history of patients (included of the patients have diabetes type 2 only but have no other disease)

Sample collection

From each patients' included in this study the blood was transferred into disposable plain tube and let stand for 30 minute to clot . Serum was separated by centrifugation at 3000 rpm for 5 minute and kept frozen unless analyzed immediately[7]. The serum was utilized for determination of fasting blood sugar, TSH, T3 and T4 .The age , sex of each individual were recorded during the period between November /2013 until March/2014.

Commercial Kits

For biochemical analysis , the following kits were used:

| Kits | supplier |
|--|---------------------------------|
| Kit for determination of serum glucose | Randox / united kindom |
| Kit for determination of serum TSH | VIDAS from bioMérieux SA/France |
| Kit for determination of serum T3 | VIDAS from bioMérieux SA/France |
| Kit for determination of serum T4 | VIDAS from bioMérieux SA/France |

Statistical analysis

Suitable statistical methods were used in order to analyze and assess the results, includes the following [8]:

1- Descriptive statistics:

- A) Statistical tables including observed frequencies with their percentages.
- B) Summary statistic of the readings distribution (mean, SD, SEM, minimum and maximum).

2 – Inferential statistics:

These were used to accept or reject the statistical hypotheses, they include Repeated student test (t-test) by using SPSS program version-10.

Result and discussion:

A. Distribution of patients and control according to percentage of age/year.

The distribution of diabetic patients according to percentage of age is listed in table (1) shows the highly percentage (30.4% and 28.6 %) at the age group (30-39 and 40-50 years) than other age group. This results agree with other study [9,10] which found that thyroid disease is found commonly in most forms of diabetes and is associated with advanced age, particularly in type 2 diabetes.

Table (1): Distribution of studied groups according to age / Year .

| | | | group | | Total |
|-------|-------|------------|----------|---------|--------|
| | | | patients | control | |
| AGE | 20-29 | Count | 4 | 7 | 11 |
| | | % of Total | 3.6% | 6.2% | 9.8% |
| | 30-39 | Count | 34 | 20 | 54 |
| | | % of Total | 30.4% | 17.9% | 48.2% |
| | 40-50 | Count | 32 | 15 | 47 |
| | | % of Total | 28.6% | 13.4% | 42.0% |
| Total | | Count | 70 | 42 | 112 |
| | | % of Total | 62.5% | 37.5% | 100.0% |

B. Distribution of patients and control according to gender.

Table (2) showed female patients have highly percentage (51.8%) than male patients (10.7%) compared with control .These observations agree with the other studi[11, 12, 13] which found female are more likely than male with the disease because to have poor blood glucose control and may be obese.

Table (2): Distribution of studied groups according to Gender.

| | | | group | | Total |
|--------|--------|------------|----------|---------|--------|
| | | | patients | control | |
| gender | female | Count | 58 | 33 | 91 |
| | | % of Total | 51.8% | 29.5% | 81.2% |
| | male | Count | 12 | 9 | 21 |
| | | % of Total | 10.7% | 8.0% | 18.8% |
| Total | | Count | 70 | 42 | 112 |
| | | % of Total | 62.5% | 37.5% | 100.0% |

C. Distribution of patients and control according to mean concentration of fasting blood sugar, TSH, T3 and T4.

Table (3) shows a highly significant increased ($P < 0.01$) in the mean concentration of fasting blood sugar and TSH (241.57mg/dl and 10.22 μ lu/ml) in the patients compared with control (97.6mg/dl and 1.70 μ lu/ml) respectively .while non significant ($P > 0.01$) in the mean concentration of T4 and T3 (84.25 and .41 nmol/l) in patients compared with control (86.28 and .28 nmol/l) . This results referred to some type 2 subjects were on insulin treatment that is capable of raising the levels of TSH and suppressing the levels of T3. On the other hand some of the oral hypoglycaemic agents such as the phenylthioureas are known to suppress the levels of T4, while causing raised levels of TSH hormone levels in diabetics .Also in this study this results may be due to modified TRH synthesis and release and may depend on the glycaemic status of the diabetics studied [12, 13,14,15,16].

Table (3): Distribution of patients and control according to mean concentration of fasting blood sugar, TSH, T3 and T4.

| group | N | Mean | Std. Deviation | Levene's Test for Equality of Variances | |
|----------------|----|----------|----------------|---|--------|
| | | | | F | sig |
| FBS(patients | 70 | 241.5714 | 83.77222 | 49.443 | .000* |
| mg/dl) control | 42 | 97.6190 | 13.75917 | | |
| TSH(μ patients | 70 | 10.2206 | 1.87189 | 4.832 | .010* |
| Iu/ml) control | 42 | 1.7005 | .69675 | | |
| T4(nm patients | 70 | 84.2564 | 16.22762 | .195 | .659** |
| ol/l) control | 42 | 86.2871 | 14.21488 | | |
| T3(nm patients | 70 | .4109 | .25312 | 1.942 | .166** |
| ol/l) control | 42 | .4252 | .28191 | | |

*highly significance $P < 0.01$

** Non significance $P > 0.01$

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