Study the changing that happen in the concentration of thyroid hormones values in healthy persons of Wasit Province

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دراسة التغيرات الحاصلة في تركيز هورمونات الدرقية في الناس الاصحاء لمحافظة واسط

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المستخلص

الهرمونات الرئيسية للغده الدرقية هي هرمونات الثيروكسين T4,وكذلك ثلاثي يودو ثايرونين T3.الدراسة الحالية أجريت لتوضيح العلاقة أو تأثير العمر والجنس على هرموني ألغده الدرقية وكذلك TSH الهرمون المنشط للغده الدرقية في 534 من الأشخاص الأصحاء الذين يعودون لمختلف المناطق من محافظه واسط,الزهراء والكرامة وفي قضاء الكوت وكذلك قضاء النعمانيه و العزيزيه والحي ألتابعه لمحافظه واسط قيست هذه الهرمونات في المصل بطريقه ELIZAفحص الإنزيم المرتبط المناعي وكانت القيم ألطبيعيه لهذه الهرمونات T4(60-150)nmol\L (3.1-T3(0.6,أما قيم TSH µIU/L (0.3-4.8)وكانت معدلات التغيربالقيم بالنسبة T4تغير معنوي في القيم عن القيم المرجعية ,كذلك بالنسبة TSH,T3هنالك تغيرات بسيطة وغير معنوية عن القيم المرجعية في قيم مختبرات منظمة الصحة العالمية وتستخلص من الدراسة أن العمر والجنس لهما تأثير محسوس على مستويات هرمونات T4, T3, TSH

Abstract

The principal hormones of thyroid gland are thyroxine (T4) and triiodothyronine (T3). The current study was carried out to investigate the effect of age, gender of Thyroxine (T4), Triiodothyronine (T3) and Thyroid Stimulating Hormone (TSH) in normal healthy individuals were measure in healthy subject. Methods: Serum levels of T4, T3 and TSH in 534 normal healthy individuals belonging to different districts to Wasit Province, of deferent parts to the city center alkarama and al Zahra AL-Hai AL-Aziziya AL-Nomania Wasit, Iraq, were examined. Serum T4 , T3 and TSH were analyzed by enzyme linked immunosorbent assay (ELIZA) method). Results: Levels of T4, T3 and TSH ranged from60 to 150 ηmol/L, 0.6 to 3.1 ηmol/L and 0.3–4.8 µIU/L respectively. The levels of T4 hormones show significant change from the reference values were the other hormones T3 and TSH show slightly changes but not significant that are used in clinical laboratories depend by WHO Conclusion:, It is concluded that the age, gender, all have an appreciable effect on the levels T4, T3 and TSH hormones.

Introduction

The pituitary gland is located in the brain. This gland reaches its maximum size in middle age and then gradually becomes smaller. It has two parts: The front (anterior) portion produces hormones that affect the thyroid gland (TSH)The thyroid gland is located in the neck. It produces hormones that help control metabolism. With aging, the thyroid may become lumpy (nodular). Metabolism slows over time, beginning at around age 20. Because thyroid hormones are produced and broken down (metabolized) at the same rate, thyroid function test T3 and T4 hormones play an important role in regulating major functions in the body, most of cognitive abilities such as concentration , memory, and attention span as well as mood and emotions depend on normal thyroid hormone levels, also thyroid hormones regulates the levels and action of serotonin , noradrenaline , and GABA (gamma-aminobutyric acid) now accepted as the main chemical transmitters implicated in both depression and some anxiety disorders(1) .thyroid gland synthesizes and release T3 and T4.thyroxine Biological active hormones T3 (1)and T4 Play a significant role in the growth, development and function of all major tissues. Thyroid hormones regulate the basal metabolic rate of all cells, which also include hepatocytes. Liver in turn metabolizes the thyroid hormones and in turn regulates their endocrine effects (2). Complete lack of these hormones, cause the BMR to fall 40- 50% below normal (3). The thyroid stimulating hormone (TSH) also known as thyrotropin is an anterior pituitary hormone. The thyroid function is controlled by TSH, whose secretion is controlled by hypothalamus (4).TSH concentration is higher in women than in men (5). The secretion of this tropic hormone is in turn regulated in part by thyrotropin releasing hormone (TRH) form hypothalamus and is subjected to 'negative feedback' control by high circulating levels of thyroid hormones acting on the anterior pituitary and hypothalamus. In normal individuals the range of thyroid hormones and TSH in the blood is as follows: Thyroxine (6-8). (T4) 60–150 nmol/L Triiodothyronine (T3) 0.6–3.1 nmol/L Thyroid Stimulating Hormone (TSH) 0.3–4.8 µIU/L Some of the important factors affecting the thyroid hormones level include neonates, in which the T4 concentration gradually decreases, reaching towards the normal at the end of first year. Serum T3 remains higher through early adolescences (9). There appears to be a systemic decrease in the increments of serum TSH in response to TRH in men over 40 years of age. Alteration in nutritional status, whether short term or long term and whether as the result of over feeding or under feeding or merely a change in substrate mix, affects different aspects of thyroid hormones economy, especially peripheral hormones metabolism(10).

Materials and methods

Collection of blood sample: Blood samples were obtained from anti-cubital vein of of 534 healthy subjects who attended hospital Serum was separated and stored in a freezer at -20 ºC. the persons had no family of thyroid disease and were not on any drug, to prevent any interference with thyroid hormone assay. They were selected from different parts of Wasit Province Al Karama Teaching Hospital, Al ZahraTeaching Hospital, ALHai , ALAziziya and ALNomania Wasit, Iraq, . Serum was separated by centrifugating at 2000 rpm for 5 mins. Blood samples were analyzed for TSH ,T3 and T4 level by Enzyme Linked Immunosorbent Assay, ELISA using Biomerx kit supplied by Biomerx Company Leon France.

Ages of persons divided for 6th decades to 10year, 20year, to 30 year, to40 year, to50 year, and above or equal 6o year the mean and standard deviation were obtained by using

SPSS package for these groups of data as show in table 1, 2 ,3 ,4.

Results

The samples of study comprised of 534 persons within the age limits of 1year- to more than 60 year old. Among 534 subjects 322(60.29%) were females, and 212 (37.82%) were males. The results are presented in following tables The result of the study showed that the present study was designed to focus on thyroid function during physiological aging, taking advantage of 6th groups of selected aged individuals: study the serum concentrations of T4, T3 and TSH were measured in the area of Wasit Province. The Mean±SD for T4 was 87.75±13.10 ηmol/L with range 53–167 ηmol/L and for T3 it was found to be 1.41±0.65 ηmol/L with a range of 0.6–3.1 ηmol/L. The normal range for TSH was found to be 0.3–4.8 µIU/L and the Mean±SD for TSH observed was 1.55±0.90 µIU/L.The impact of age, gender on the T4, T3 and TSH levels. The observed values for T4, T3 and TSH reveal that these values deviate from the fixed standard values as the ranges for both T4 and T3 have slightly, expanded while in case of the TSH it has decreased current observations. The normal hormonal levels are different for different genders. The gender impact observed in the current study, it is shown in mean values obtained in case of T4 and TSH showed very slight difference with elevated level of T3 in males and TSH in females, while the mean values for T4 were almost the same in both the genders. The Age-effect studies subjects for the determination of thyroid hormoneT3 and TSH levels,it is shown in Table-2. The study subjects were divided into six different age groups. It is almost clear from the data that the serum value for T4 for the 1st decade 2nd decade 3rd are elevated more than all other ages .The serum T4 value decreases progressively in the fourth decades of life and the value of T4 still less than other ages more than 40 years. The T3 Observed values are low in the first decade of life. The second, third and fourth decades showed an increase in values of T3 with decreased value in the fifth and seventh decade of life. The serum TSH value is higher in the second decade of life which decreases up to third decade progressively with an increased value at fourth decade of life.SerumT4was markedly decreased in old of both genders, and can show the deference clearly in female adult (more than 60 year) but serum TSH was unaffected.SerumT3decreasedon lying aged male.

Table (1): Gender distribution of hormone levels

Gender	T4 (ηmol/L)	T3 (ηmol/L)	TSH (µIU/L)
Males (n=212)	86.6±11.458	1.59±0.34	1.23±1.8
Females (n=322)	87.20±15.23	1.26±0.22	1.86±1.2

Values are expressed as Mean±SD

Table (2): The concentration of hormone groups divided on the different age groups.

Age Groups Years	T4 (ηmol/L)	T3 (ηmol/L)	TSH (µIU/L)
1–10 (n=34)	91.90±25.31	1.55±.422	2.17±.281
11–20 (n=108)	90.50±13.81	1.64±.369	2.17±1.46
21–30 (n=52)	90.46±15.78	1.60±.33	1.42±.90
31–40 (n=106)	87.55±14.06	1.53±.33	2.01±1.16
41–50 (n=62)	84.05±9.73	1.65±.34	2.44±4.19
51–60 (n=78)	84.30±9.32	1.58±.38	2.08±1.35
60+ (n=94)	82.36±9.36	1.57±.310	1.68±1.00
P value	0.000	0.559	0.940

Table (3): Thyroid and TSH hormone level in males of different age groups (n=498)

Age Groups Years	T4 (ηmol/L)	T3 (ηmol/L)	TSH (µIU/L)
1–10 (n=14)	84.01±13.68	1.40±0.21	0.918±0.318
11–20 (n=50)	90.7 ±13.68	1.7 ±0.35	2.68 ±1.29
21–30 (n=20)	87.80±17.18	1.57±.0.4	1.13±0.75
31–40 (n=44)	84.48±8.oo	1.57±0.323	1.88±1.22
41–50 (n=26)	86.43±11.05	1.72±0.39	3.2±.6
51–60 (n=20)	86.26±9.81	1.47±0.36	2..68±1.31
60+ (n=42)	84.38±.16	1.53 ±0.27	1.64±1.11

Values are expressed as Mean±SD

Table (4): Thyroid and TSH hormone level in females of different age groups (n=498)

Age Groups Years	T4 (ηmol/L)	T3 (ηmol/L)	TSH (µIU/L)
1–10 (n=20)	95.84±8.52	1.58 ±0.21	2.177 ±0.318
11–20 (n=58)	90.50±13.68	1.58 ±0.38	1.57±0.2
21–30 (n=32)	88.12±15.12	1.6±0.96	1.6 ±0.96
31–40 (n=66)	89.16±16.22	1.51±0.35	2.o7±1.13
41–50 (n=36)	82.32±8.57	1.59±0.30	1.89±1.38
51–60 (n=58)	83.52±9.21	0.8±.38	1.84±1.31
60+ (n=52)	80.81±9.38	1.61±o.33	1.71±0.93

Values are expressed as Mean±SD

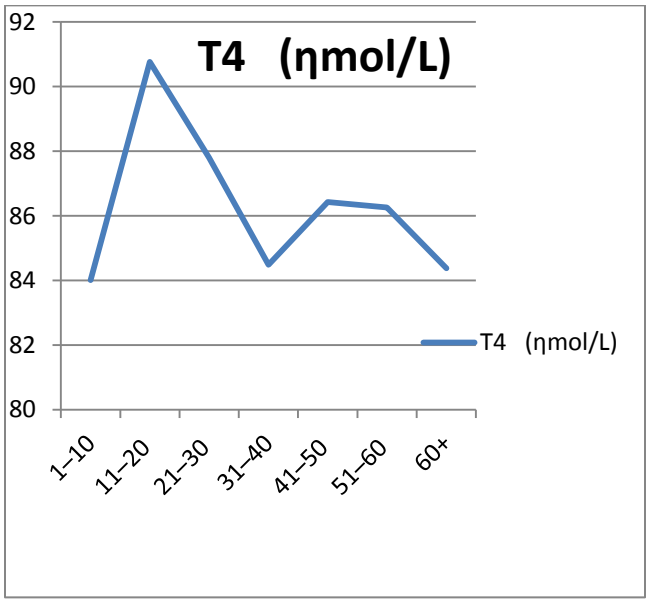

Figure (1): T4 concentrations were significantly lower in older females whose age 51 - 60 years old than the other age groups (P < 0.05), this is depicted in table (2).

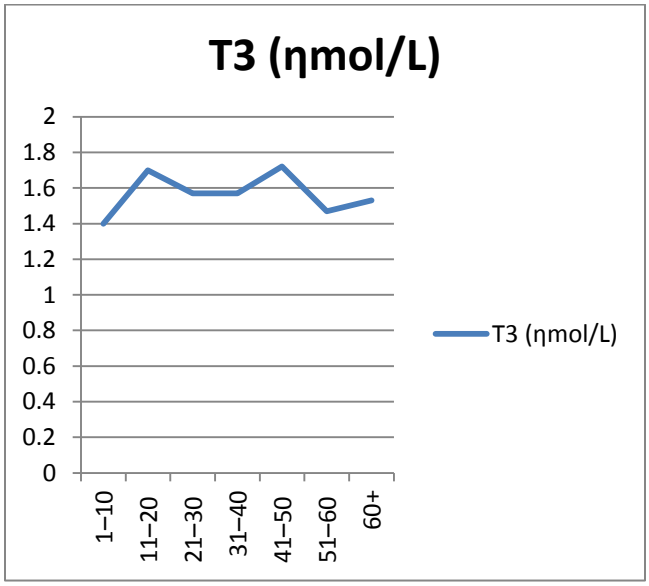

Figure (2): The diagram show T3 were found to decrease with age but without significant change (P > 0.05),table (2).

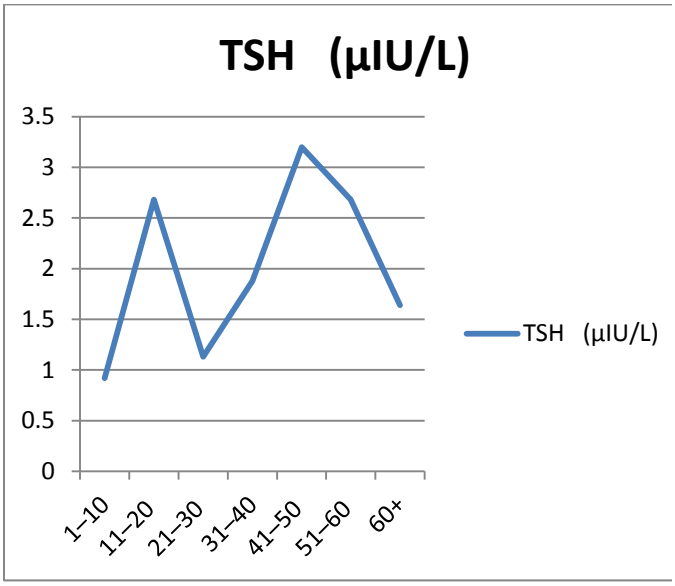

Figure (3)The diagram showed that the TSH concentrations were increased slightly with aging tile reach 60 and old decrease without a significant change (P > 0.05) table(2)

Discussion

The deferent in the mean values of the thyroid, TSH hormones level with gender (Table (1) suggests that a small change within a normal range can be seen in serum T4 level in both genders with a slightly higher level in females than males. That in males the value of sex hormones increases the circulating level of thyroxin binding globulin (TBG), which directly leads to an increase in circulating level of T4(8). However, somewhat contradictory results were reported by others who worked on the effect of age and gender on thyroid function and concluded that level of T4 was higher in females than males. They further concluded that T3 and TSH levels are not influenced by gender (8)

Table (2) in old age (or senescence), it is a physiological process which is characterized by a progressive generalized impairment of many functions of the human being body resulting in the loss of adaptive responses to stress and a growing risk of age associated disease T4 concentration table (2) (11,12). However, after the age of 60 years person is commonly known as old aged person, when it involves progressive loss of cells, reduced metabolic activities and decreased efficiency of many functions of different organs (13).It was found that during a normal human life span, serum T3 is low at the time of birth, only small increase in childhood stable to other time, decreases in old age. Some studies reported stable T4 levels for men throughout life, and T4 values lower in females older than 60 years .Different studies showed conflating results. Some of the studies showed increasing trend of TSH with age.(7, 8, 12, 13) also changes this process. For example, an endocrine tissue may produce less of its hormone than it did at a younger age, or it may produce the same amount at a slower rate increased degradation rate of thyroid hormones in old age T4 concentration table (2) without significant change figure (3) (14). Other researchers also assayed thyroid hormones and TSH and found no changes in TSH level with age (15). When estrogen levels are high, the liver produces high levels of thyroid-binding globulin (TBG), a protein that binds to thyroid hormones in the blood and prevents them from being taken up by the cells normally functioning thyroid gland that produces adequate amounts of thyroid hormone, and blood tests to measure levels of thyroid hormone and thyroid-stimulating hormone may be read as “normal.” However, because the hormone is bound to and inactivated by circulating proteins, little of it actually getting into the cells so the fact point to state of low level of thyroid(15,16).

The TSH level was found higher in the first decade and become in peak value in second decade (figar3) then decrease in third decade

with sharp peak in this decade of human life ,then increase tile age 50 year ,so after this time begin to decline , These results are similar to the previous work of, Pakistan , Egyptian Population (8), and in California USA (1). While in case of females it remained nearly constant in first few decades of life with a little decreased value in the last decades of life table (4).

Conclusion

It is concluded from this study that the age and gender of healthy person have significant effect on the levels of T4, while it has a slight and non-significant effect on the levels of TSH and T3.

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