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Study the Relationship between the Level of Thyroid Hormones and Obesity

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Abstract
Hormones are one of the most important elements in metabolic pathways in human body as its role in the controlling on metabolism reactions. In this research we study the effect of very importance hormones which affected directly on biosynthesis of lipid, carbohydrates and proteins in the body meaning triiodothyrionine T3and tyroxine (tetraiodothyrionine) T4. Two hormones secreted by thyroid gland which is consider an endocrine gland localized at the neck. In addition to these hormones we also measure in this study the amount of thyroid stimulating hormone TSH that secreted by pituitary gland. These three hormones were measured in fifty obese persons to study the relationship between the activity of these hormones and the body mass. Finally we compare the obtained results of hormones with the weight, age, and other disease for all the taken specimens.
Keywords: thyroid gland, T3,T4,TSH, obesity.

1 - Introduction

Thyroid gland

The thyroid gland is an organ with butterfly-shaped gland belong to endocrine category that is located at the lowersite of the neck. The thyroid's work is to synthesis thyroid hormones, which are travelled into the blood stream and then carried to body tissues. Thyroid hormone can helps the body to use energy, stay warm and keep the heart, brain, muscles and other organs working in suitable form [1].

Thyroid function

The major hormone made by the thyroid gland is tetraiodothyronine or thyroxine, also called T4 dueto four iodine atoms. To use its effects, T4 transformed to by removal of an iodine atom to second thyroid hormone triiodothyronine also called T3 due to three iodine atoms fig1[2]. This process is occurs in the liver mainly, and in the other certain tissues where T3 work sucha brain. The amount of T4 secreted by the thyroid gland was controlled by specified hormone, which is synthesized in the pituitary gland localized at the lower side of the brain, is called thyroid stimulating hormone TSH[3].

The amount of TSH that is sent into the blood Relies on the of T4 that the pituitary gland sees. If the amount of T4 is very little, then pituitary gland secretes more TSH to stimulate the thyroid gland to mademore amount of T4. In caseof the T4 in the blood goes above a wanted level, the pituitary's secretion of TSH is off [4]

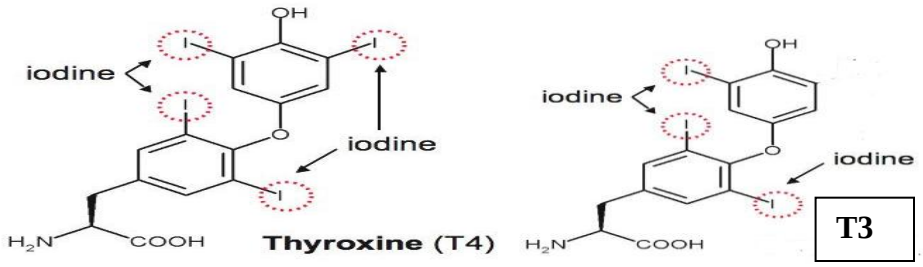

Fig.1 the structure of T3 and t4

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Anabolism reaction

Activity of Triiodothyronine T3 is about four times more than thyroxin T4 in its biological functions. A biochemical functions belongto thyroid hormones T3 and T4involve stimulate the metabolic activities and increases the oxygen consumption in most of the tissue[5].

They effect on proteins, lipid, carbohydrate metabolism since the concentration and activity of these hormones relates with stimulating protein synthesis by act at the transcriptional level hormones which work as anabolic hormones. In carbohydrates metabolism T3 and T4 increase the glycogenolysisrate and caused hyperglycemia, while hypothyroidism relates with higher concentration of lipid in lipid metabolism[6,7,8].

Thyroid disorder

Thyroid disease generally can be classified based on physiologic abnormalities into two types. Sometimes the secreted amount of these hormones too high this case called hyperthyroidism or too little in case of hypothyroidism[9,10]. Thyroid hormones regulate metabolism as we said above and affect nearly every organ in the body. Hyperthyroidism can cause some of the body's functions quick while the hypothyroidism can cause some of the body's functions are slow [11,12].

aim of study

one of the physical evidences of metabolic process in the body is an Obesity since the increasing of weight due to increase the anabolic reactions rate which are affected by T3 and T4. So to ensure from this relationship between obesity and amount of T3, T4 progressed this research.

2- Procedure

The specimens were collected from patients whom suffers from Obesity at Al- Hussein Medical City and Zain Al-abiden hospital, Karbala, Iraq. For period from October 2016 to January 2017. An5 mL of blood was collected from fiftypersons.

The concentrations of T3 , T4 , TSH hormones were measured by - Cobas e411 system in laboratory unit at above hospitals. The questioner information has been taken from all studied cases which include Age , sex , Weight , and another chronic disease.

All the results were tabled into healthy and patients' cases.The comparison was done according to :a- Weight of persons.b- Age of persons.c- Other disease which patients suffer from it.Finally all the statistically treatment of results have been done by Microsoft Excel.

3 - Results and Discussion

To find out the relationship between the high and low thyroid hormones activity and between overweight in adults been carried this researchwhere the measuring the level of hormones T3 and T4 as evidence of the activity of the mentioned gland where this gland secretion and since these hormones are responsible are building processes within the body so we expect are to have a direct relationship or a direct impact on the weight of the human body as well as the measurement readings were taken for hormone stimulates thesehormones TSH[13].

All the obtained results were divided according to sex into two main groups, also each group divided into sub-groups according to weight , age and the presence of other diseases. all the data was tabledandhas been compared with readings of healthy individuals, as well as with theofficial normal values for these hormones TSH =0.6-5 IU/L, T4 =63-144 IU/L, T3 = 1.9-2.9 IU/L[14].

3.1 Effect of weight

We noticed through the taken samples that there is a decreased level of hormones T3 and T4 hypothyroidism from the normal level in the serum of people whom have obese with varying of values for male and female and the results were expected as the hormones are affect directly on

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anabolism operations and is considered the stimulates action of anabolic enzymes. Slow elevation in TSH amount is proves this results because the pituitary secretes more amount of TSH when the amount of T4 was decreased as we said in section one.

Low activity of thyroid glands leads to reduced secreted hormones and thus the action of enzymes uncontrollably reduced so that we expect an increase in the amount of bio-metabolism leads to increase building and storage the such as carbohydrates, fats and proteins.And this is reasonto causes obesity in these people. Tables 3.1 and 3.2 below show the obtained results are divided by weight for males and females respectively and deviation from normal values.

the level of obesity was measured by body mass index equation [15] as shown in the fig.2 below

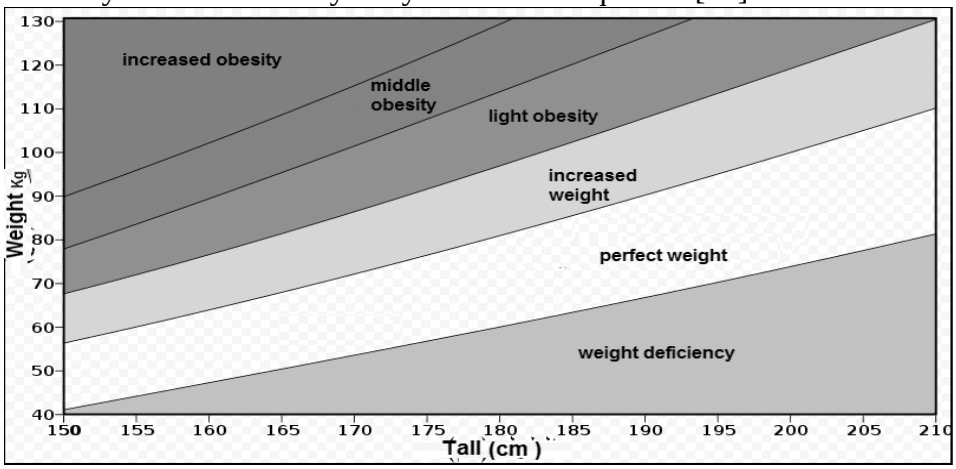

Fig.2 BMI index

Table 3.1: the obtained result classified according to BMI for men

BMI	T3 IU/L	T4 IU/L	TSH IU/L
<20	1.7	78.89	1.66
20-25	2.3	85.14	3.5
>30	1.51	40.14	23.38

Table 3.2: the obtained result classified according to BMI for men

BMI	T3	T4	TSH
<20	1.87	96.7	1.75
20-25	1.3	71.33	7.46
25-30	1.68	51.59	9.2
>30	1.66	45.16	14.76

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3.2 Effect of Age

The obtained results isolated and classified according to age into several periods to ease of comparison and then statistically treated, we have found the concentration of hormoneT3, T4 and TSH did not influenced by age for the patients and healthy people.The results showEach of hormones begin to decline after 45 years, and this is what we observe clearly that obesity begin to appearat older people,this result also has seen in both men and women. Table 3.3 and 3.4 show the distribution of the taken samples according to age of men and women respectively.

Table 3.3 : the distribution of the taken samples according to age of men .

Age (years)	**T3 IU/L**	**T4 IU/L**	**TSH IU/L**
<40	**1.07-1.5**	**1.55-146.53**	**1.04-1.1**
40-45	**0.97-2.51**	**0.9-71.37**	**1.11-1.38**
45-55	**0.19-1.77**	**1.23-85.14**	**1.64**
55-60	**0.73-0.94**	**70.95-108.36**	**2.19-2.61**
>60	**0.54-1.16**	**2.08-85-14**	**0.01-1.59**

Table 3.4 : the distribution of the taken samples according to age of women .

Age (years)	**T3 IU/L**	**T4 IU/L**	**TSH IU/L**
<40	**0.79-2.69**	**0.73-201.13**	**0.01-7.46**
40-45	**1.03-1.64**	**1.04-155.3**	**1.78-4.76**
45-55	**1.14-2.17**	**117.2-146.9**	**0.35-0.86**
55-60	**0.73-0.94**	**70.95-108.36**	**2.19-2.61**
>60	**0.54-1.16**	**0.65-116.1**	**1.48-3.48**

3.3 Effect of another disease

The high and the low level of these hormones values in the blood serum may be effect ofanother disorders. like Blood pressure which caused by rise in level of electrolytes or lipids , diabetes which caused from rising in blood sugar resulting from disorder in insulin work and myocardial infection[16].

Abnormal results were Observed in hormones level [decreasing level] at patients whom suffering from above diseases as follows :

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1. mild decreasing in the level of the three hormones T3, T4 and TSH for people with heart disease for both men and women.
2. Men whom suffer from high blood pressure were observed slightly lower than normal values. While for women theamount of these hormones T3 and T4 were observed low values, whereas TSHwas seen slightly higher than the normal values.
3. Finally, for people who suffer from diabetes mellitusthe results were a little closer to the normal value of all three hormones T3, T4 and TSH and for both men and women. As we show in tables 3.5 and 3.6

This results also expected because of the significance of these Hormones since play a major role in themyocardial action and lipid metabolism which causes a rise of blood pressure making a clear impact on the values of these hormones in blood

Table 3.5: concentrations of electrolytes in patients have other disease of men

Other Disease	T3	T4	TSH
Heart Disease	1.87	55.14	1.59
Blood Pressure	1.39	48.53	1.05
Diabetes Mellitus	1.39	62.08	5.64

Table 3.6: concentrations of electrolytes in patients have other disease of women

Other Disease	T3	T4	TSH
Heart Disease	1.77	49.77	0.86
Blood Pressure	1.08	55.94	5.29
Diabetes Mellitus	1.73	66	5.15

4. Conclusion

All the studied cases have been taken from the hospitals in holy Karbalacity , Iraq, where the number of samples wasfifteen. The aim of the research was to find outthe variableof hormones concentration T4, T3 and TSH with age factor , body weight and certain diseases. The results show that is not necessary the values of these hormones are sync in the rise and fall , it is possible to find one hormones High or low hormones, while the others are normal value.

We have also noted a clear impact of hormones concentration on the human body weight where the lowest concentration of these hormones lead to increasingin body weight and thisresults was expected ,also we have noted the impact of the high concentration of hormones on blood pressure and heart disease, while the impact slightly on diabetes. The decrease in the concentration of these hormone can be recompenseby drugs and medications such as thyroxin.

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