Research Article

Evaluation of the Adiponectin Hormone and Lipid profile in patients with Hypothyroidism in Thi-Qar Province-Iraq

HADEEL RASHID FARAJ
Department of Chemistry, college of science, University of Thi-Qar, Iraq.
Email id : Hadeal.r_chem@sci.utd.edu.iq
Received: 06.04.19, Revised: 06.05.19, Accepted: 06.06.19

ABSTRACT
There are 2 types of Hypothyroidism, primary hypothyroidism and secondary hypothyroidism. Primary hypothyroidism arises when thyroid gland itself doesn't work properly, whereas secondary hypothyroidism is initiated when the thyroid gland doesn't get adequate stimulation from thyroid stimulating hormones. Primary hypothyroidism is triggered by iodine deficiency, autoimmune disease, radiation therapy, drugs or thyroid surgery The study was designed to determine and compare the levels of **TSH**, **T4**, **T3**,adiponectin hormone **(ADP)** , and lipid profile (**TCH**), (**TG**), (**HDL**), (**LDL**) , and (**VLDL**)in patients with Hypothyroidismand apparently healthy individuals.Blood levels**TSH**, **T4**, **T3**, adiponectin hormone **(ADP)**, and lipid profile (**TCH**), (**TG**), (**HDL**), (**LDL**), and (**VLDL**) were determined in 45patients with Hypothyroidismand 40 apparently healthy subjects.The levels of serum **TSH**and biochemical markers of body lipid profile (serum **TCH,TG,LDL,VLDL**) were showing an enormous rise in patients having Hypothyroidismwhen matched withthe control group. On the contrary, the levels of **T4, T3,ADP, and HDL**indicated a considerable decrease in patients having Hypothyroidism when matched with control subjects($P \leq 0.05$).In patients with Hypothyroidism, we foundan increase in TSH. There is a momentous elevation in the cholesterol and triglyceride levels during patients with Hypothyroidism.Hypothyroidism can affect on lipoproteins levels (high LDL, low HDL, and high VLDL., the decrease in T4,T3,and ADP can clearly occur.

Keywords: Hypothyroidism, primaryHypothyroidism, Adiponectin hormone, and lipid profile.

INTRODUCTION

Thyroid hormone runs the process of metabolism in the human body. Hypothyroidism is a dysfunction which is triggered when the thyroid gland does not make adequate thyroid hormones, so the body does not continue to function normally and the organic activity decreases or slows down. It is considered as a great challenge for the health of people in both developed and underdeveloped countries [(1)].There are 2 types of Hypothyroidism, primary hypothyroidism and secondary hypothyroidism. Primary hypothyroidism arises when thyroid gland itself doesn't work properly, whereas secondary hypothyroidism is initiated when the thyroid gland doesn't get adequate stimulation from thyroid stimulating hormones. Primary hypothyroidism is triggered by iodine deficiency, autoimmune disease, radiation therapy, drugs or thyroid surgery[(2)].The decrease in the metabolic process is due to decreased flow of thyroid hormones.This triggers the catalyzation of anterior pituitary gland which releases TSH to favor the creation of more thyroid hormones[(3,4)]. The treatment of hyperthyroidism is based on several factors such as clinical appearances,patient's history, TSH and serum thyroid hormone levels.In the case of overt primary hypothyroidism, Serum TSH is increased whereas the levels of T4 and T3 are reduced.In the case of subclinical primary hypothyroidism,the T3 and T4 levels are normal whereas serum TSH levels are high[(5)].Adiponectin is a type of adipocyte hormones, it is named as adipokines and it plays a significant part in metabolic disorders by promoting inflammation of adipocytes, the metabolic disorders could be type 2 diabetes, obesity,cardiovascular diseases, and hypertension [(6)]. These thyroid hormones and adipokines have numerous physiological effects including the metabolism of lipids and glucose and regulating energy expenditure [(7, 8)].Lipids are a class of nonpolar molecules, they are found in the cell membranes, in the endoplasmic reticulum, and in specialized fat storage cells[(9)].Cholesterol is derived from dietary intake, most is synthesized by the liver and other tissues from simpler molecules. Almost 90% of synthesis occurs in the liver and gut; therefore, peripheral cells and other organs depend largely on cholesterol delivery from the circulation[(10)].Triglycerides are known as fatty acid esters of glycerol. Each one of them contains dissimilar fatty acid[(11)]. Lipoproteins are composed of a protein and a lipid. (HDL,LDL,VLDL,chylomicrons) [(12)].

Materials And Methods

This experiment was performed at the Center of Diabetes andthe Endocrine Glands in Thi Qar governorate, and specialist clinics. It included (85) subjects, control(40) and patients(45)diagnosed with Hypothyroidism including: (23female, 22male). The

blood sample of approximately (5milliliters)was taken from the patients of Hypothyroidism. The blood waspermitted to clot at normal temperature in blank disposable tubes centrifuge for separating it in the centrifuge for 10 minutesat 3000 xg. The samples of serum were allowed to separate and were stored at the temperature of -20ºCuntil analyzed for T3, T4, Adiponectin hormone, TSH and Lipid Profile.It is a type of automated quantitative test that uses VIDAS instruments. The experiment was conducted for the determination of enzyme immunoassay of human TSH, T3, and T4 in the plasma or serum of human using the method of **enzyme-linked fluorescent assay** (ELFA).The experiment used the kit provided by Elabscience, USA to determine Serum Adiponectin with the help of enzyme-linked immunoassay technique by ELISA Reader, USA.Serum cholesterol(TCH) was analyzed by the enzymatic colorimetric method byUV/VIS spectrophotometer, Japanusing kits supplied bySpinreact, Spain.Serum triglyceride (TG) was analyzed by the enzymatic colorimetric method byUV/VIS spectrophotometer, Japanusing kits supplied byBiolabs, France. Serum high-density lipoprotein (HDL) was analyzed by enzymatic colorimetric process byUV/VIS spectrophotometer, Japanusing kits supplied byBiomerieux, France.Serum low-density lipoprotein (LDL) is estimated through the below equation:- LDL = Total Cholesterol – (HDL + VLDL)

Serum very low-density lipoprotein (VLDL) is estimated through the following equation:-

VLDL = Triglyceride/2.2

The results of the experiment were presented in the form of mean ± standard deviations (mean ± SD). In order to compare parameters in various studied groups, one-way ANOVA-test was employed. P-values ($P \leq 00.05$) were taken statistically important.

Results

In this work, we determined the effect of this diseaseon the**TSH**, **T4**, and **T3**. Adiponectin hormone **(ADP)**, we are concerning its effect onlipid profile (**TCH**),(**TG**), (**HDL**),(**LDL**), and (**VLDL**).The levels of serum TSH and biochemical markers of body lipid profile (serum TCH,TG,LDL VLDL) were showing a significant increase in hypothyroidism patients in comparison to control group.On the contrary, the levels of T4, T3, HDL,and ADPindicated a considerable reduction in hypothyroidism patients when compared to control subjects.

Table(1):-Serum TSH, T4, and T3 concentrations of(control) and(hypothyroidism patients) groups

Group	n	TSH (μIU/ml) mean ï SD	T4 (μg/dl) mean ï SD	T3 (ng/ml) mean ï SD
Control	40	2.65± 0.81^{b}	5.51± 0.99^{b}	1.22±0.35^{b}
hypothyroidism patients	45	4.92± 1.04^{a}	3.47±0.73^{a}	0.63 ± 0.10^{a}
LSD		0.82	1.03	0.08

Each value in this table indicate the values of the mean ± SD with non-identical superscript (a, b or c…etc.) and were taken as expressively different ($P \leq 0.05$).

Table(2):- Serum Adiponectin concentrations of (control) and (hypothyroidism patients) groups

Group	n	Adiponectin concentrations (ng/ mL) mean ± SD
Control	40	6.74±1.69^{a}
hypothyroidism patients	45	0.50±0.11^{b}
LSD		0.17

- Legend as in table (1).

Table(3):-Serum Lipid Profile concentrations of(control) and (hypothyroidism patients) groups

Groups	n	TC mmol/L	TG mmol/L	HDL mmol/L	LDL mmol/L	VLDL mmol/L
control	40	3.76±0.98^{b}	1.42±0.63^{b}	1.35±0.42^{a}	1.55±0.84^{b}	0.35±0.11^{b}
hypothyroidism patients	45	6.12±1.31^{a}	2.36±0.72^{a}	0.79±0.16^{b}	4.05±1.22^{a}	0.45±0.12^{a}
LSD		0.82	0.34	0.31	0.91	0.15

- Legend as in table (1)

Discussion

Hypothyroidism emerges as a result of deficient excretion of thyroid hormones.This happens due to a problem in the HPT axis. Hypothyroidismis usually triggered by autoimmune thyroid and its related diseases. It is the first indicatorof thyroid or pituitary disease [13].In overt hypothyroidism, the fT4 levels are found to be low whereas TSH levels are noted as high. The patients having a low serum fT4 and a high serum TSH concentration indicate the symptom of hypothyroidism[14,15].Thyroid hormones and Adiponectin have a few similar properties such as lipid oxidation and reduction in body fat by rising thermogenesis [16]. It is noted that adiponectin may affect the production of thyroid hormone by its interface with gC1q receptor located in thyroid mitochondria [17].Dimitriadis *et a.l* indicates decreasing levels of adiponectin in hypothyroidism [18].Nagasaki *et al,*indicated in his study the comparable levels of adiponectin hypothyroid and controls patients[19].In the experiment performed, a considerable rise in serum levels of TG, TC, and LDL was observed in patients having hypothyroidism.This matches the results of previous reports. The movement of lipoprotein lipase (LPL) is decreased by the decreased levels of thyroid hormones.LPL is an enzyme that has a great part in the clearance of TG-rich lipoproteins[20,21].This causes arise in the levels of TG in the serum. Thyroid hormones like T3 are directly bound to thyroid hormone responsive elements (TREs) to control LDL receptors [22].They also control sterol regulatory element-binding protein[23]. In hypothyroidism, the reduced thyroid hormones causea decrease in the expression of LDL receptors.This weakens cellular uptake of LDL from catabolism and circulation of LDL.This eventually causes a rise in the levels of circulating TC[24,25]. The higher ratio of LDL to HDL is found in patients with hypothyroidism because of a slight decrease in HDL levels and a major increase in LDL levels [26].

Conclusion

From the experiment and the discussion, it can be concluded that there is a rise in TSH in Hypothyroidism patients. The level of triglyceride and cholesterol are also significantly high in patients with Hypothyroidism. Hypothyroidism can effect on lipoproteins levels (high LDL, low HDL, and high VLDL, the decrease in T4,T3,and ADP can clearly occur.

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