

Levels of Myostatin, Adiponectin and Lipid Profile in Hyperlipidemia Patients

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Abstract

Background: Excess fat is one of the biggest risk factors for the development of heart disease and one of the top five leading causes of death. The researchers expect from their study that deaths due to cardiovascular diseases will increase from (17.3) million cases in 2017 to (23.6) million deaths by 2030.

Aim: Determination of the concentration of lipid profile variables (TC, TG, HDL-C, LDL-C, VLDL-C). Estimating the concentration of some hormones such as myostatin and adiponectin in the serum of study samples in males and females with hyperlipidemia at different ages.

Materials and methods: The study included collecting (90) samples and dividing them into two groups (20-60). Blood samples were collected from the vein (10ml) using medical syringes, and the blood was placed in plastic tubes, where the samples were left for (15-20) minutes at a temperature of 37 °C in a water bath until the blood coagulated, and then the samples were separated in a centrifuge.

Results: the results showed a significant increase in each of TC, TG, LDL and VLDL, and a significant decrease in Myostatin and HDL, while the results showed no significant difference in Adiponectin. In females compared to healthy subjects the results showed a significant increase in TC, TG, LDL, and VLDL, and the results showed a significant decrease in HDL, while the results showed that there was no significant difference in both Adiponectin and Myostatin.

Conclusions: We conclude from our current study that hyperlipidemia is associated with an imbalance in the level of muscular lipid movements and is therefore considered a risk factor for the occurrence of cardiovascular diseases and requires follow-up and a healthy diet with treatment.

Key words: TC, TG, HDL, Hyperlipidemia, Myostatin, Adiponectin

Introduction

Hyperlipidemia is defined as a disorder in the metabolism of fats in the body and results in an abnormal increase in the levels of blood fats, as it is characterized by an increase

in the level of triglycerides, an increase in the level of blood cholesterol and phospholipids, and it also occurs as a result of an increase or decrease in lipoproteins such as a decrease in HDL concentration and increased LDL concentration [1]. Low HDL concentration and low LDL is one of the factors in the development of cardiovascular disease and blood clot formation [2]. Cholesterol is present in abundance in all cell membranes, and it is also found in nerves, spinal cord, brain, ovaries, adrenal cortex and other membranes, as cholesterol is in the blood in two forms, either in free form or in the form of esterified cholesterol and has an important role in the biosynthesis of steroid hormones and vitamin D is also included in the composition of the bile juice that collects in the gallbladder, which has a role in the digestion process in the body [3]. Triglycerides are an essential source of energy storage in the body, as they are absorbed through the intestines and increase in obese people, as well as in heart patients and diabetics, with an increase in LDL lipoprotein and a decrease in HDL [4]. Excess fat affects some hormones such as myostatin, a protein secreted from skeletal muscles. Myostatin is also known as growth differentiation factor (GDF-8) [5], and adiponectin, a lipoprotein secreted from fat cells that plays an important role in regulating glucose levels, lipid metabolism, insulin resistance and has antioxidant and anti-inflammatory effects [6].

Materials and Methods

Samples:

Samples were collected from Samarra General Hospital and auditors of external clinics and laboratories diagnosed by doctors. The study included collecting (90) samples and dividing them into two groups. (20-60).

Blood collection:

Blood samples were collected from the vein (10ml) using medical syringes, and the blood was placed in plastic tubes, where the samples were left for (15-20) minutes at a temperature of 37 °C in a water bath until the blood coagulated, and then the samples were separated in a centrifuge at a speed of 3500 cycle per minute for a period of (5-15) minutes until blood serum is obtained. The serum is divided into sterile Eppendorf tubes. Samples are frozen, preserved and stored until chemical and hormonal tests are performed.

Hormonal analysis:

The concentrations of hormones (Myostatin and Adiponectin) were measured via enzyme linked immune sorbent assay (ELISA) by using the commercial kits (ELISA kit, Fine Test-China) and procedures was followed as given in the kits catalogs.

Biochemical analysis:

The concentrations (TC, TG and HDL) were measured by followed the procedure that given with kit (Biolabo-France) , Concentration(VLDL and LDL) is calculated using the following equation:

VLDLconcentration :

$$VLDLconcentration \left(\frac{mg}{dl} \right) = \frac{Triglycerides}{5}$$

$$LDLconcentration : LDLconcentration \left(\frac{mg}{dl} \right) = TotalCholesterol - HDL + VLDL$$

Results

The results in Table (1) show an increase in concentration (TC,TG and HDL) and a significant decrease in the concentration of the hormone myostatin in male patients compared

to the control group, with no significant difference in the concentration of Adiponectin. The results in Table (1) show an increase in concentration of (TC,TG and HDL) and with no significant difference in the concentration of Adiponectin and myostatin in female patients compared to the control group.

Discussion

The reason for the increase in total cholesterol and triglycerides in males may be due to the male hormone Testosterone, which plays an important role in increasing the activity of the hepatic lipase enzyme and decreasing the activity of the enzyme lipase lipoprotein (LPL), thus increasing the breakdown of HDL and this protein is important In the transfer of cholesterol from the surrounding blood vessels to the liver, which in turn leads to an increase in the level of cholesterol and fats carried in the blood, which directly affects the incidence of cardiovascular disease [7]. Obesity is one of the causes that lead to a decrease in high-density lipoprotein (HDL-C) in patients with hyperlipidemia. Obesity is usually accompanied by a high concentration of lipoproteins rich in VLDL triglycerides, and thus can lead to the risk of cardiovascular disease [8]. An imbalance between oxidation and reduction leads to an increase in LDL-C, and this balance is important in signal transmission, and any imbalance in this balance triggers a chain of reactions that lead to the production of free radicals in patients with hyperlipidemia and those with cardiovascular diseases, and this imbalance leads to stress Oxidative stress in LDL-C receptors in the liver [9]. The reason for the high lipoprotein VLDL-C is due to the high concentration of triglycerides (TG) in the blood because this protein is a means of transporting these fats and facilitating their passage through the blood circulation [10]. The hormone myostatin decreases with an increase in triglycerides (TG) and a decrease in high-density lipoprotein (HDL-C), as well as patients, since a large percentage of patients in the current study had an increase in the concentration of triglycerides, a decrease in HDL-lipoprotein, a decrease in the hormone Myostatin [11].

Conclusion

The current study indicated that hyperlipidemia is associated with an imbalance in the level of muscular lipid movements and is therefore considered a risk factor for the occurrence of cardiovascular diseases and requires follow-up and a healthy diet with treatment.

Ethical Approval: The research protocol was approved by the College of Applied Sciences College Ethical Committee, Samarra University..

Conflict of Interest: The authors declare that they have no conflict of interest.

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References

1. Piché ME, Tardif I, Auclair A, Poirier P. Effects of bariatric surgery on lipid - lipoprotein profile. *Metabolism* , 2021;115:154441 .
2. Wolska A, Dunbar RL, Freeman LA, Ueda M, Amar MJ, Sviridov DO, et al. Apolipoprotein C-II: New findings related to genetics, biochemistry, and role in triglyceride metabolism. *Atherosclerosis*,2017;267:49-60.
3. Okosun RE, Adu ME. Effect of oral vitamin E on serum lipid profile of apparently healthy Nigerians in Benin City. *Tropical Journal of Pharmaceutical Research*,2015; 14(6):1071-1074.
4. Marshall WJ, Bangert SK. *Clinical chemistry* 6th ed, Edinburgh mosby,2008.
5. Lee SJ. Targeting the myostatin signaling pathway to treat muscle loss and metabolic dysfunction . *J Clin Invest*, 2021;131(9): e148372 .

6. Nguyen TMD. Adiponectin : role in physiology and pathophysiology. Int J Prevent Medicine , 2020;11:136.
7. Berrougui H, Momo CN, Khalil A. Health benefits of high density lipoproteins in preventing cardiovascular diseases. Journal of clinical lipidology,2012; 6(6):524-533.
8. Stadler JT, Marsche G. Obesity-related changes in high-density lipoprotein metabolism and function. International journal of molecular sciences, 2020; 21(23): 8985.
9. Khatana C, Saini NK, Chakrabarti S, Saini V, Sharma A, et al. Mechanistic insights into the oxidized low-density lipoprotein-induced atherosclerosis. Oxidative Medicine and Cellular Longevity, 2020.
10. Han DS, Chu-Su Y, Chiang CK, Tseng FY, Tseng PH, Chen CL, et al. Serum myostatin is reduced in individuals with metabolic syndrome. PLoS One,2014; 9(9), e108230.
11. Packard CJ, Boren J, Taskinen MR. Causes and consequences of hypertriglyceridemia. Frontiers in endocrinology, 2020;11:252.

Table .1. Hormones, TC, TG, HDL, LDL and VLDL levels according to gender in patients and controls groups

Variables	Male (patient)	Male (control)	Female (patient)	Female (control)
TC(mg/dl)	227.1*±46.9	179.5±33.1	254.4*±43.7	182.6±32.3
TG(mg/dl)	283.8*±72.2	131.0±36.8	246.2*±36.5	123.7±35.5
HDL(mg/dl)	39.3*±11.7	48.4±13.9	37.2*±10.7	45.2±14.7
LDL(mg/dl)	136.1*±54.0	104.9±31.6	169.9*±48.4	107.4±39.7
VLDL(mg/dl)	56.1*±16.0	26.01±7.28	49.21*±7.25	25.57±8.24
Myostatin	175.3*±47.8	213.7±57.0	196.3±57.8 n.s	179.9±55.2
Adiponectin	70870±16862 n.s	72071±21623	70700±8572 n.s	73505±11423

- Values represent the mean ± the standard deviation.
- (*) represents a significant difference
- n.s (non-significant) represents the absence of significant difference