Measuring levels of leptin, lipids and some electrolytes in obese subjects

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Abstract

In this study the human body. 90 people were distributed in groups, where 30 people were obese, 30 people were overweight, and 30 people were in a control group, i.e. their weights were normal. The people were men and women between the ages of (20-50).

As it was shown through this study that there is a significant increase in the concentration of the hormone leptin in obese subjects compared with the control group, where the value was ($p \leq 0.05$).

As it was found through this study that there was a significant increase in the concentration of cholesterol in obese people compared with the control group, where the value was ($p \leq 0.01$), and there was also a significant increase in the concentration of triglycerides in obese people compared with the control group. Where the value was ($p \leq 0.01$), and the results also showed that there was a rise in the concentration of low-density proteins in obese subjects compared with the control group, and the value of ($p \leq 0.01$) also there was a significant increase in the concentration of low-density proteins in subjects with obesity. of obesity compared with the control group where the value was ($p \leq 0.01$)While the results showed that there is a significant decrease in the concentration of beneficial high-density proteins in obese subjects compared with the control group, and the value was ($p \leq 0.05$).The results showed that there was a significant increase in sodium concentration in obese people compared with the control group, where the value was ($P \leq 0.01$). At the same time, the results showed a significant decrease in potassium concentration in obese people compared with the control group, where was the value of ($P \leq 0.05$).

Keywords: *Cholesterol, High-density lipoproteins (HDL), sodium Potassium, Obesity.*

Introduction

Leptin is a protein hormone consisting of 167 amino acids and has been shown to be one of the most important hormones synthesized and secreted by adipose tissue. [1]

Its production and release is increased in large adipocytes even after adipose cell volume has been formed so that its regulation shows similarities to that of inflammatory immune adipocytes [2] It acts through the

hypothalamus resulting in decreased appetite and increased energy expenditure thus regulating body weight as well as Leptin has a number of other activities including regulating endocrine function, reproduction and other functions in the human body [3]

Lipoproteins:

Fats are food ingredients because of their high nutritional value and are also important because of the vitamins that dissolve fats and the essential fatty acids found in the fats of natural foods because the natural fats found in water, and they are found in water, and are associated with fats and proteins that lipoproteins present in an important view of the information in the portal that occur [4].

Cholesterol

It is a fat component produced by the liver to perform many vital functions, such as protecting nerve cells, manufacturing some body tissues, and producing some hormones public health [5]

Triglycerides

It is one of the types of fats found in the blood. It consists of a chain of high-energy fatty acids. When you eat, the body converts any calories that it does not need to use immediately into triglycerides. Fats are stored as triglycerides in fat cells. Later, hormones release triglycerides to provide energy. Between meals, if the calories you ate are more than the calories you burn regularly, especially foods that contain a high percentage of carbohydrates, we may have a high level of triglycerides (hypertriglyceridemia). As for the diet that hypertriglyceride patients should follow a diet Regular healthy. [6]

High-density lipoproteins (HDL)

Beneficial cholesterol and transports cholesterol from all parts of the body, including the walls of the arteries, to the liver, where excess cholesterol is eliminated and turns into yellow matter that is excreted through the stool. To calculate our cholesterol level, we divide the total number of cholesterol by the number of high-density lipoprotein (HDL) cholesterol. So if your total cholesterol is 200 mg/dL and your HDL cholesterol is less than 50 mg/dL, your ratio is between 4 and 1. Higher levels indicate an increased risk of heart disease. [4] And people with naturally high levels of HDL cholesterol have a lower risk of heart attack and stroke [7]

Changes in routine that are known to increase HDL — such as exercising, quitting smoking, or improving your diet — have been shown to reduce the risk of heart attack. However, medications that specifically increase HDL levels Failed to reduce the incidence of heart attacks Strangely enough, people with extremely high levels of HDL (more than 100 mg/dL (2.5 mmol/dL) are at increased risk of heart disease, and this may be due to genetic factors.[8]

Low-density lipoproteins

These proteins transfer cholesterol to all parts of the body so that it can carry out all its functions, but the increase in cholesterol in this lipoprotein leads to formation on the walls of the arteries, the most important of which are the arteries of the heart. In the blood, they deposit cholesterol on the walls of blood vessels, which may cause blockage of these vessels and thus lead to heart attacks.

Very low density cholesterol

This very low-density lipoprotein (VLDL) cholesterol is formed inside the liver and

circulates in the bloodstream to provide all organs of the body with a type of fat called (triglycerides). Cholesterol, protein and triglycerides However, in varying quantities, about half of the VLDL particles consist of triglycerides. High levels of VLDL cholesterol have been linked to the deposition of fats on the walls of the arteries, which narrow them and impede the passage of blood through them. There is no easy, direct way to measure LDL cholesterol It is very dense, which is why it is not usually ordered with a routine cholesterol check.[9]

Sodium

is one of the body's electrolytes, which are minerals that the body needs in large amounts. Electrolytes convey an electrical charge when they dissolve in body fluids such as blood. Most of the body's sodium is found in the blood and in the fluid around cells. Sodium helps the body maintain normal fluid balance. Sodium plays a major role in function The body obtains sodium through food and drink and loses it mainly through sweat and urine [10]. potassium

It is one of the body's ions, which are minerals that carry an electric charge when ionized in body fluids such as blood. Most of the body's potassium is distributed within the cells. The availability of potassium is necessary for the normal functioning of cells, nerves, and muscles. The body must maintain the concentration of potassium in the blood within a moderate range, and it can be high A blood potassium concentration that is too high (hyperkalemia) or too low (hypokalemia) has serious consequences such as abnormal heart rhythms or even cardiac arrest [11]

Materials and Methods

This study began in December 2021 until October 2023, and 90 samples were collected from the city of Tikrit in Salah al-Din Governorate, from the Medical Rehabilitation Hospital, as well as from private laboratories, and these samples were Divided into three groups, as 30 samples were for people who suffer from obesity and in return 30 samples were for people who were overweight and also 30 people whose weights were normal (control group) and the ages of the participants in the research ranged between (20-50) The patients were men and women. These samples were collected after fasting for 12 hours. 5 ml of pink blood was drawn and placed in (Gel tub) tubes free of coagulant and left at room temperature until the blood froze. After that, it was separated by a centrifuge.

During 3000 cycles for 10 minutes, then it was placed in special tubes for keeping samples in the refrigerator at a temperature of 20 m. After that, the leptin concentration was measured using the enzyme-linked immunosorbent (ELESA) technique, as well as the concentration of triglycerides and liver enzymes using a spectrophotometer. The equipment used is a Bio-Labo type of French origin to measure the concentration of liver enzymes, and a German type Bio-System to measure the concentration of triglycerides to measure the concentration. In this study, the SPSS program was used in the statistical analysis, and the Word 2016 program was also used in writing this research, all for the

Windows operating system, and the data is expressed through arithmetic mean value.

Results and Discussion

Table (1-1) shows the concentration of cholesterol and triglycerides in the different studies.

Triglyceride(mg/dl) Mean ±SD	cholesterol(mg/dl) Mean ±SD		Weight groups	Gender
(20-30)Years				Male
114.64±15.66	152.1±15.67	10.25±2.41	normal weight	
190.70±20.66	187.8±12.76	25.74±5.07	overweight	
210.50±23.20	203.5±14.96	33.69±4.96	Obesity	
(31-40) Years				
114.89±12.33	153.1±14.54**	10.72±3.433	normal weight	
186.49±20.19**	186.23±10.12**	23.44±5.23	overweight	
189.22±17.00**	209.1±25.9**	32.66±4.68**	Obesity	
(41-50)Years				
186.44±20.61	187.33±9.11	20.22±1.88	overweight	
188.22±15.99ns	191.11±20.11ns	31.35±2.8*	Obesity	
(20 - 30) Years				Female
110.25±10.54	140.0±9.66	11.67±2.07	normal weight	
128.05±14.51**	168.4±8.99**	27.582±5.06	overweight	
148.60±17.88**	197.8±7.66**	33.79±6.71	Obesity	
(31-40) Years				
109.55±9.77	140.66±7.88	11.67±2.60	normal weight	
125.09±14.66**	168.99±7.66**	27.66±5.766	overweight	
151.00±10.668**	165.7±21.9**	37.79±6.33	Obesity	
(41 - 50) Years				
131.06±12.76 124. 0±14.9** 194.8±10.6**	193.0±26.9 190.8±24.6** 208.2±23.6	10.66±2.60 27.78±3.44 32.66±3.22	normal weight overweight Obesity	

Table (1-2) shows the concentration of lipid transporters in different studies.

VLDL(mg/dl) Mean ±SD	LDL(mg/dl) Mean ±SD	HDL(mg/dl) Mean ±SD	Weight groups	Gender
(20 - 30) Years				Male
24.09±4.30	84.6±22.5	55.66±2.00	normal weight	
26.22±2.18**	90.4±21.5*	43.66±3.11**	overweight	
31.20±6.59**	110.05±23.4*	39.74±3.22**	Obesity	

(40 - 31)Years				
22.83±4.01 30.08±5.06ns 31.00±8.19ns	90.7±27.4 112.8±21.9* 129.1±27.1*	50.66±2.66 *43.66±4.10*** *38.66±2.88***	normal weight overweight Obesity	
(41 - 50) Years				
27.67±5.12 31.00±7.00ns 31.50±7.40ns	112.0±28.0 115..5±20.3* 120.7±27.8*	47.55±2.09 44.99±3.44** 41.66±5.88**	normal weight overweight Obesity	
(20 - 30) Years				Female
23.09±4.00 24.77±3.44 29.65±3.55**	80.55±10.00** 85.63±15.58** 89.95±14.00**	65.66±3.44** 45.70±4.02** 43.77±5.6.9**	normal weight overweight Obesity	
(31 - 40) Years				
24.97±4.98* 30.81±3.89*	82.09±11.89* 92.57±14.67	42.50.05±4.05** 35.53±4.67**	overweight Obesity	
(41 - 50) Years				
30.051±3.089 32.099±2.138ns 33.069±2.09ns	85.02±15.90 87.66±13.07* 90.923±15.09*	46.61±3.440 45.09±3.44 43.67±4.99ns	normal weight overweight Obesity	

Table (1-3) shows the concentration of sodium and potassium in the different studies.

Potassium(mole\ml)	Sodium (mole\ml)	Weight groups	Gender
(20 - 30)Years			
3.814±0.514 3.233±0.373ns 3.580±0.442ns	142.14±7.14 144.00±5.03ns 146.00±9.29ns	normal weight overweight Obesity	male
(40 - 31)Years			
4.033±0.350 3.650±0.469 3.233±0.373**	148.67±5.92 146.42±5.99 153.38±7.37	normal weight overweight Obesity	
(41 - 50) Years			
4.150±0.636 3.683±0.373 3.650±0.518**	140.00±4.24 142.14±7.14 144.17±4.96*	normal weight overweight Obesity	
(20 - 30) Years			
3.514±0.544 3.333±0.383ns 3.280±0.442ns	139.14±6.14 142.00±5.09ns 145.00±8.29ns	normal weight overweight Obesity	Female
(31 - 40)Years			
3.933±0.350 3.650±0.469** 3.033±0.373	146.69±4.82 146.92±5.99 ns 150.38±6.37ns	normal weight overweight Obesity	
(41 - 50) Years			

4.340±0.636 3.583±0.363 3.550±0.518	139.09±4.24 140.14±7.14 145.17±4.96ns	normal weight overweight Obesity	

∗∗ ($p \leq 0.01$)

∗ ($P \leq 0.05$)

n.s (non-significant difference)

Results for the age group (20-30)

The percentage increase in the concentration of cholesterol in overweight persons, respectively (203.5 ± 14.96) (187.8 ± 12.76) (152.1 ± 15.67) in the concentration of triglycerides for overweight subjects compared to (210.50 ± 23.20) (190.70 ± 20.66) (114.64) ± 15.66), for cholesterol and Triglycerides were no significant differences in these age groups between males and females. The results showed that for high-density lipoproteins (HDL) there was a significant decrease in the concentration of obese and overweight people compared with the control group, where the Mean ±SD was respectively (39.74 ± 3.22) (43.66 ± 3.11) (55.66 ± 2.00) There were no clear differences between men and women in the concentration of high-density proteins. As for low-density proteins (LDL), there was a rise in the concentration of obese and overweight people compared to a group straight control (110.05 ± 23.4) (90.4 ± 21.5) (84.6 ± 22.5) As for the very low density proteins (VLDL), there was a rise in its concentration in obese and overweight people compared to the control group, where the Mean ±SD was respectively (321.20). ±6.59) (26.22 ± 2.18) (24.09 ± 4.30) As for the sodium concentration, the results showed a significant increase in its concentration in obese and overweight people compared with the control group, where the Mean ±SD was respectively (146.00 ± 9.29) (144.00 ± 5.03)(142.14 ± 7.14) As for potassium, there was a noticeable decrease in potassium concentration in obese and overweight people compared with normal weight, where the Mean ±SD values were respectively (3.58 ± 0.44) (3.23 ± 0.37) (3.81 ± (0.51) There were no significant differences between females and men in all variables for this age group.

Results for the age group (31-40)

There was a significant increase in the concentration of cholesterol in obesity and overweight compared with the control group, where the Mean ±SD was respectively (209.1 ± 25.9) (186.26 ± 10.12) (153.1 ± 14.54). The results showed that triglycerides were also in this age group. There was a significant increase In the concentration of triglycerides for people who suffer from obesity and overweight compared to the control group, where the Mean ±SD was (189.22 ± 17.00) (186.49 ± 20.19) (114.89 ± 12.33), as for cholesterol and triglycerides, there were no significant differences in these age groups between Males and females, the results were shown for high-density lipoproteins (HDL) There is a significant decrease in the concentration in people who suffer from obesity and overweight, compared with the control group, where the arithmetic mean was respectively (38.66 ± 2.88) (43.66 ± 4.10) (50.66 ± 2.66). There were no clear differences between men and women in the concentration of elevated proteins. Density As for low-density proteins (LDL), there was a rise in its concentration in people who suffer from obesity and overweight compared to the

control group, respectively (129.1 ± 27.1) (112.8 ± 21.9) (90.7 ± 27.4), as for very low-density proteins (VLDL) There was a rise in its concentration in people who suffer from obesity and overweight compared to the control group, where the arithmetic mean was respectively (31.08 ± 8.19) (30.08 ± 5.06) (22.83 ± 4.01). As for the concentration of sodium, the results showed a significant increase in its concentration in people who suffer from obesity and overweight, compared with the control group, where the arithmetic mean was respectively (153.38 ± 9.29) (144.00 ± 5.03) (142.14 ± 7.14) As for potassium, there was A significant decrease in potassium concentration in obese and overweight people compared with normal weight, where the Mean ±SD values were respectively (3.65 ± 0.469) (3.22 ± 0.37) (0.35 ± 4.03) and the concentrations in this age group had a significantly higher increase. from the previous age group

Results for the age group (41-50)

There was a slight increase in the concentration of cholesterol in obesity and overweight compared with the control group, where the Mean ±SD was respectively (187.33 ± 9.11) (191.11 ± 20.11) and the results showed that triglycerides were in this age group as well. For people who suffer from obesity and overweight, compared with the control group, where the arithmetic mean was (188.22 ± 15.99) (110.25 ± 10.54) for cholesterol and triglycerides. There were no significant differences in these age groups between male and Female. The results showed that for high-density lipoproteins (HDL)

There is a slight decrease in its concentration in people who suffer from obesity and overweight compared to the control group, where the Mean ±SD was respectively (47.55 ± 2.09) (44.99 ± 3.44) (41.66 ± 5.88) There were no clear differences between men and women in the concentration of high proteins. As for low-density proteins (LDL), there was a slight increase in its concentration in obese and overweight people compared to the control group, respectively (120.7 ± 27.8) ((115.5 ± 20.3 (112.0 ± 28.0)) as for low-density proteins There was a very high concentration of (VLDL) in people who suffer from obesity and overweight compared to the control group, where the Mean ±SD was respectively (31.50 ± 7.40) (31.00 ± 7.00) (27.67 ± 5.12) As for the concentration of sodium, the results showed a slight increase in its concentration in obese and overweight people compared with the control group, where the Mean ±SD was respectively (145.17 ± 4.96) (140.14 ± 7.14) (139.09 ± 4.24) As for potassium, there was A slight decrease in potassium concentration in obese and overweight people compared with normal weight, where the Mean ±SD values were respectively (3.55 ± 0.518) (3.58 ± 0.36) (4.34 ± 0.63) and there were no significant differences between the groups in this age group.

It should be noted that in the whole study there were no significant differences between males and female of normal weight, and all the fats in this research were consistent with the study of their source [9] and differed with the results of the study of their source [12] and the results showed a significant increase in the concentration of Sodium in overweight and obese people compared to those with normal weight, and there were no significant differences in the concentration of sodium between male and Female. This study agreed with the study of its source [13]. In people who suffer from obesity and overweight compared with normal weights, this message was in agreement with a study of its source

[14] and differed with another study of its source [15]

Figure (1) The correlation between leptin and cholesterol

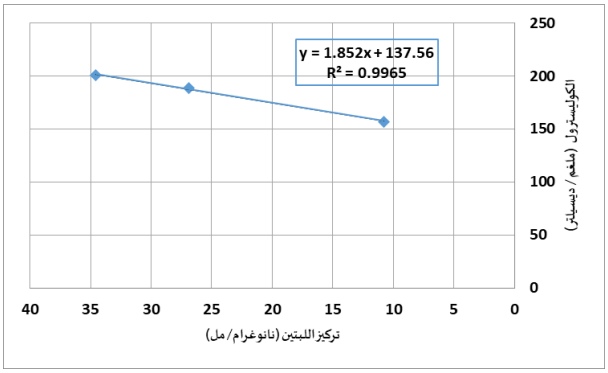


Figure (2) The correlation between leptin and triglycerides

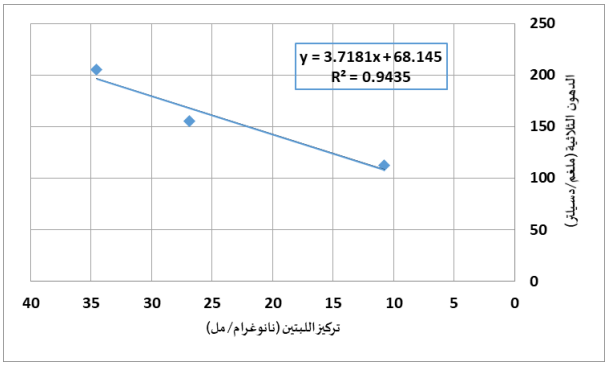


Figure (3) The correlation between blood leptin and HDL in the total study population

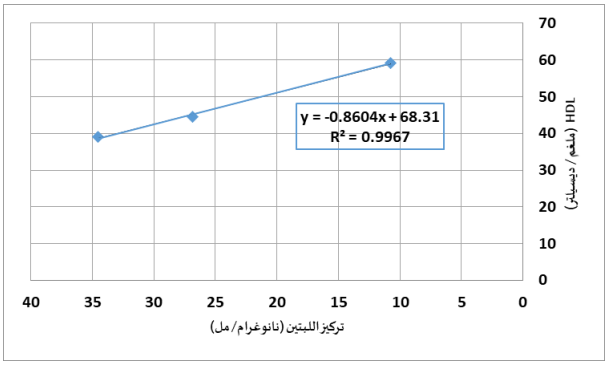


Figure (4) The correlation between blood leptin and LDL in the total study group

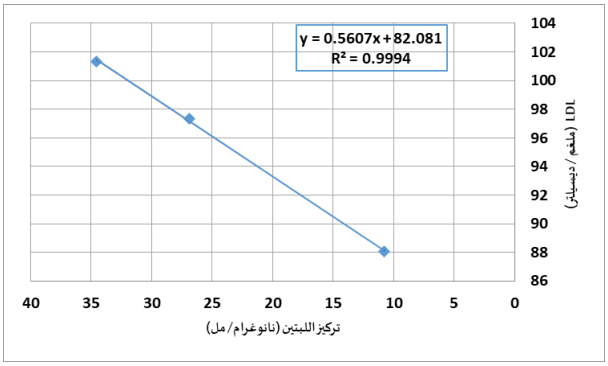


Figure (5) The correlation between blood leptin and VLDL in the total study population

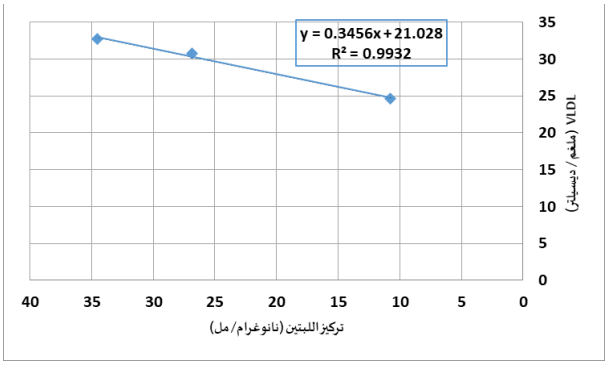


Figure (6) The correlation between blood leptin and sodium in the total study population

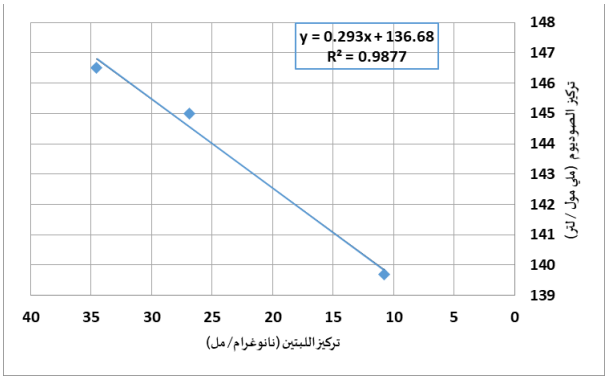
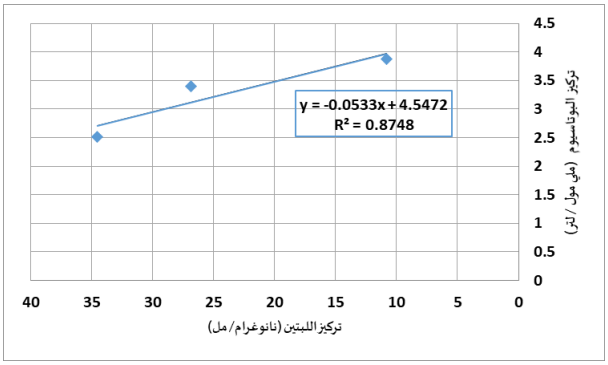


Figure (7) The correlation between blood leptin and potassium in the total study group



Conclusions

Turns out to focus on weight gain due to leptin resistance.

Fats in general, such as cholesterol, low proteins, and high-density proteins increase significantly in obese and overweight people.

Weight gain for people who are obese and overweight.

Overweight and obesity means that sodium plays a major role in weight gain.

It has been shown that potassium is proportional to sodium.

Weight gain causes a significant increase in the concentration of body fat, which leads to hyperlipidemia, and also works to raise sodium in the body, and obesity causes a decrease in potassium concentration in the blood.

Reference

1- 2009; 6: 1-3. 41. Ganji V, Kafai MR, and McCarthy E: Serum Leptin concentration are not related to dietary patterns but are related to sex, age, body mass index, serum triacylglycerol, serum insulin, and plasma glucose in the US population. Nutr and Me,.

2- 2007; 92:1023–1033. 43. Skurk T, Alberti-Huber C, Herder C, and Hauner H: Relationship between adipocyte size and adipokine expression and secretion. J. Clin. Endocrinol Metab.,.

3- from fat to 4- 2005; 579:295–301 45. Otero M, Lago R, Lago F, Casanueva FF, Dieguez C, Gomez-Reino JJ, and Gualillo O: Leptin,

4- and and G. R. T. effect of metformin and intensive lifestyle intervention on the [52] 2005; 142; 8:611-619. 70. Orchard TJ, Temprosa M,.

5- I. http://www. nhlbi. nih. gov/health/health-topics/topics/hbc. A. O. 5 2018. 61-What is cholesterol? National Heart, Lung, and Blood 2010. 69. Murray RK, Bender DA, Botham KM, Kennelly PJ, Rodwell VW, and Weil PA: “ Harper’s illustrated biochemistry”. 28 th ed. New York: McGraw-Hill,.

6- H. S. (Ed.). (2001). A. and therapy: S. articles from the encyclopedia of mental health. A. P. . 68-Friedman,.

7- 3016-3034.69 -Barness, L. A., Opitz, J. M., & Gilbert - Barness, E. (2007ديسمبر). Obesity: genetic, molecular, and environmental aspects. American journal of medical genetics part A, 143(24),.

8- H. S. (Ed.). (2001). A. and therapy: S. articles from the encyclopedia of mental health. A. P . 68-Friedman”.

9- 2018. 61-What is cholesterol? National Heart, Lung, and Blood Institute. http://www.nhlbi.nih.gov/health/health-topics/topics/hbc. Accessed Oct. 5.

10- VLDL cholesterol. Lab Tests Online. http://labtestsonline.org/understanding/analytes/vldl/tab/glance.1111 Accessed April 23,.

11- James L. Lewis III and B. 98. , MD, Brookwood Baptist Health and Saint Vincent's Ascension Health,.

12- Ahmed, Shaimaa Essa. "STUDY THE EFFECT OF THYROID HORMONES AND SOME BIOCHEMICAL PARAMETERS ON OBESE PERSONS." Thesis, University of Tikrit, 2016.

13- N. . Lawal, A. H., Halliru, H. A., Ahmad, M. B., & Adamu, A. I. (2021). Evaluation of serum cortisol, lipid profile and electrolyte among hypertensive subject in Kano.

14- O. (2008). C. in serum electrolytes and lipid profile in diabetes subjects in freetown S. L. . O".

15-FInas Mujil Nayef Al-janabi, Wahby Abd Al kadr Salman Al-hmdany, The effect of different concentrations of metformin in the liver and kidney functions for diabatic induced male rats. , Tikrit Journal of Pure Science: Vol. 26 No. 4 (2021)