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Research article

Biochemical Study of Leptin and Associated with Hypertension Patients in Iraq

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ABSTRACT
This study was conducted to find out the effect of high blood pressure on some biochemical variables in the blood, and compared them with normal values (control groups) of (45) (23 females and 22 males) whose ages ranged between (49-70 years) and (Patients group) Includes (45) persons(16 females and 29 males) with high blood pressure, ages (45-75),the study included the following variables Leptin hormone, Cho, TG, HDL, LDL, VLDL.
The results of the study showed a significant increase ($p \geq 05.0$) in the concentration of cholesterol, triglycerides, low lipoprotein, and very low density lipoprotein compared with the control group, but the high density lipoprotein showed a significant decrease ($p \geq 05.0$) compared to the control group.
As for the results of the hormone leptin, the study showed that there was a significant increase in the concentration of the hormone in hypertensive patients compared with healthy subjects.
When calculating the linear correlation coefficient to clarify the relationship between the chemical variables, it was found that there is a significant direct correlation (between cholesterol and triglycerides and the hormone leptin) and there was a significant direct correlation between the hormone leptin and both (triglycerides and low density lipoprotein with high density lipoprotein).

Keywords: Leptin; hormone ; Hypertension ;Cho;TG; HDL; LDL; VLDL.

INTRODUCTION
High blood pressure (hypertension)
Scientists have known the case of high blood pressure when the value becomes greater or equal to (90/140) mm of mercury on a continuous basis. High blood pressure is often called a silent killer because most of those affected do not have any symptoms (Chobanian A et al; 2003). It is a major risk factor. With regard to cardiovascular disease, which contributes to the development of a number of diseases such as coronary heart disease and cerebral hemorrhage (CHD), hemorrhage cerebral, nephropathy and hypertensive retinopathy (Ward R et al; 1990). There are two types of elevation first, hypertension essential and this type Hypertension Disease Cardiovascular Disease, which accounts for 90% of cases of hypertension. Its causes are hereditary, and the reason for the increase in the death rate for patients with this type of pressure is due to insufficient blood supply to the coronary arteries, which leads to heart failure deficit and heart expansion Environmental factors, such as consumption of table salt, are the cause of an increase in blood pressure(Fred F. 2003). As well as smoking, alcohol use, the renin-angiotensin regimen and vasomegaly increase the likelihood of High blood pressure, secondary hypertension, and secondary hypertension, which constitutes 10% of cases of hypertension, and its causes are hereditary or congenital, such as stenosis aorta, Kidney polycystic Disease, and Renal Congenital Artery Diseases Hypertension And other diseases (Robert E. and Richard, M. 1996).

Hormone Leptin
The name Leptin came from Lepto, which means (thin) in Greek, as it is a hormone that regulates body weight, and has a molecular weight of (KDa 16), it consists of (167) amino acids (Karl H. 2005) , secreted from fatty tissues, and a quantity of it is excreted from the hypothalamus, stomach, placenta, skeletal muscles and mammary epithelial cells. Figure (1) shows the structure of leptin.

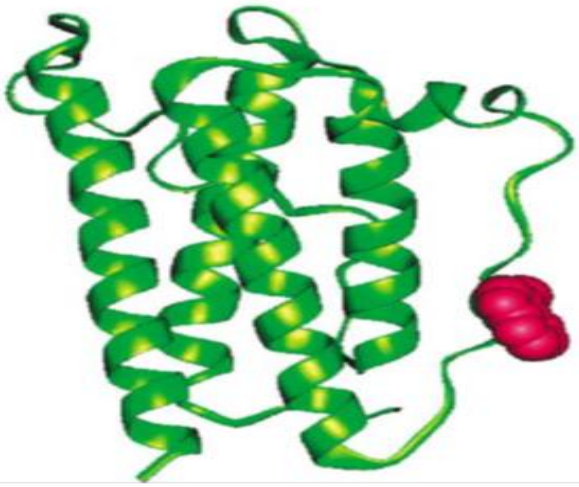

Fig.1: The chemical structure of leptin (Encarta.2007)

As for the leptin receptor, the researchers encoded a receptor gene and there are two types of leptin receptors, the first with a long structure leptin and consisting of 303 amino acids, the second with a short structure and consisting of 34 amino acids (Zahny Y et al. 1994).

Leptin receptors (R-Ob) are present (mainly in the hypothalamus) to receive the hormone leptin produced from peripheral fat tissue after it has passed through the brain to perform its action in reducing appetite and increasing energy consumption (Imagwa K., et al 1998) , and the hormone leptin has an important role in regulating fats when nutrition over, the hormone leptin regulates fats in the body by binding to its R-Ob receptors on the surface of cells (Kershaw E.Flier J. 2004), it activates the enzymes of fatty acid oxidation in mitochondria, such as CPT_{-1} (Carnitine Palmitoyl Transferase) and Acyl-COA oxidase (ACO), While it inhibits the enzymes responsible for the formation of lipids in the cytoplasm Such as acetyl coA carboxylase (ACC) and fatty acyl synthetase complex (FAS), Whereas, Kinase-AMP phosphorylation in the cytoplasm acts by inhibiting the enzyme (ACC) that inhibits the formation of malonyl coenzyme A (Malonyl CoA), Which, in turn, inhibits the coenzyme A (acyl Fatty CoA) and then inhibits the formation of triglycerides.

In cases of chronic overnutriation, leptin deficiency occurs, which leads to an increase in the activity of the lipid-forming enzymes such as ACC and FAS, while the enzyme that inhibits fatty acid oxidation enzymes such as (CPT_{-1}) and (ACO).(Unger R. 2003)

METHODODLGY

Collection of Blood Sample

This study is conducted at AL-Hussein Teaching Hospital in Thi-Qar/ Iraq.

The present study was started with (90) cases (patients and healthy) .

The controls and patients are divided into two groups:

Control group: Includes (45) persons in good health ,ages (45-75).

Patient group: Includes (45) persons with high blood pressure, ages (45-75).

Blood samples of (5 mm) were collected from each patient and placed in a test tube containing a gel tube for the purpose of conducting the required tests.

Table 1:the biomedicals and its methods

Biomedical	*Methods*
Cholesterol	Oxidation of free cholesterol to form 4- Aminoantipyrine.
Triglycerides	The triglycerides are converted by the enzyme lipase to glycerol and fatty acids to form Quinoneimine.
LDL	The colorimetric method is by removing VLDL, chylomecron, and HDL, and deposition of LDL

HDL	Direct measurement using ((α-cyclodextrin)sulfate dextran) reagent to precipitate LDL, VLDL and chilomicron in the presence of the enzyme PEG.
VLDL	mathematically TG / 2.2 mmol / L
Leptin hormone	ELISA method using horseradish peroxidase (HRP) enzyme

RESULTS AND DISCUSSION

Clinical and Characteristic Features of the Studies Groups

There are 90 subject included in the present study, patients group 45 were compared with group of apparently healthy control 45 .Characteristic data for all studied groups shown in table (2).

Table 2: Characteristic data for studied groups

Groups	*Age (years) mean± SD*	*Sex (M/F)*	SBP (mmHg) Mean ±SD	DBP (mmHg) Mean ±SD	*BMI(Kg/m²) mean± SD*
Control	49.33±8.56	23/22	122.45 ±7.56	83.75 ±8.16	24.88±2.05
Patient	55.16±11.22	29/16	151.66±16.89	98.70±9.22	30.11±30.11

Table (3) and figure(2) show significant increase in the concentration of serum leptin in patient group in comparison with control group($p \leq 0.05$).

Table 3: The values of serum leptin in patient group with control group

Groups	No.	Liptin ng/ml Mean ±SD
Patients	45	83.91±3.76 a
Controls	45	71.16±3.34 b
p. value		0.002

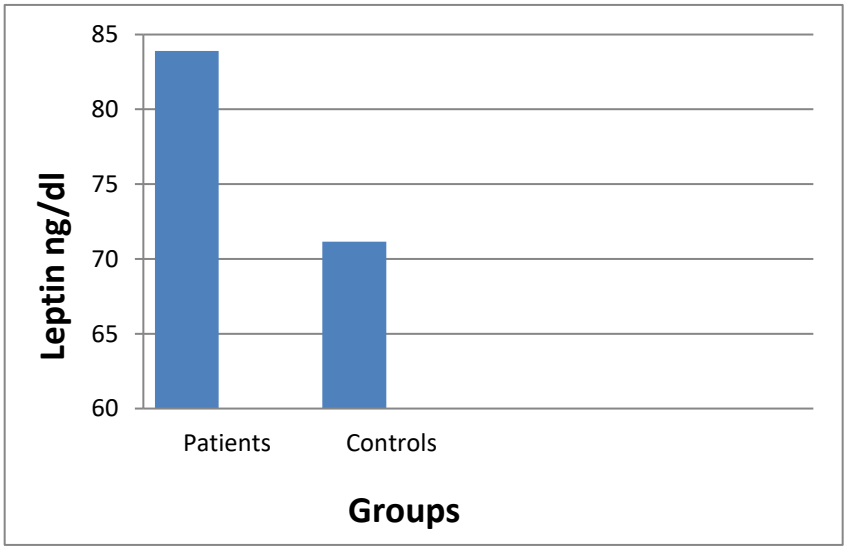

Fig.2: show significant increase in the concentration of serum leptin in patient group in comparison with control group($p \leq 0.05$).

Serum Lipid Profile Concentrations:

Serum Total Cholesterol (TC) Concentration:

Table(4) and figure(2) show significant increase in the concentration of serum TC in patient group in comparison with control group($p \leq 0.05$).

Table 4: The values of serum (TC) in patient group with control group

Groups	No.	TC mg/dl Mean ±SD
Patients	45	194.36±9.74 a
Controls	45	171.44±11.90 b
p.valu		0.029

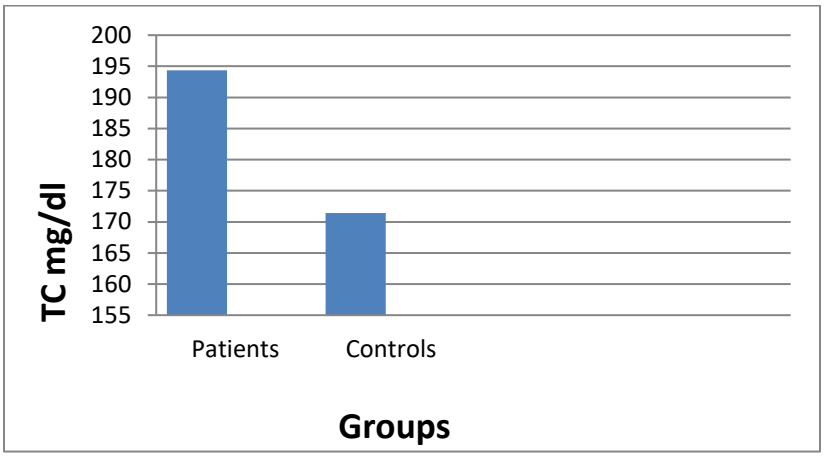

Fig.3: Serum Total Cholesterol (TC) value in controls and hypertension patients

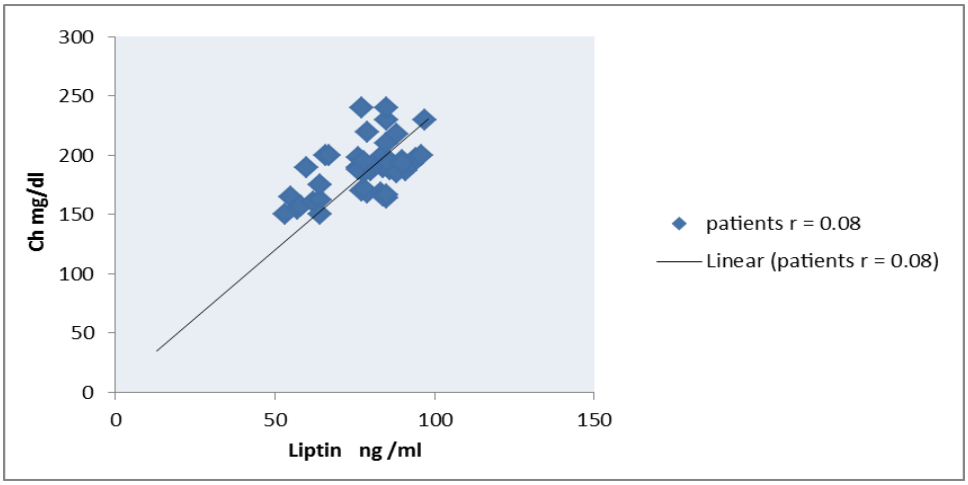

Fig.4: shows the positive correlation between leptin and TC with correlation coefficient (r= 0.08)

The above table (4) shows an increase in cholesterol in hypertensive patients, as the body resorts to other sources of energy by consuming stored fats, and thus increasing it in the blood plasma, and this increase leads to cholesterol deposition in the capillary blood vessels, thus preparing one of the main causes of disease. The arteries and the relationship between cholesterol and high blood pressure are due to several mechanisms, including: (Halperin O., et al 2006) inhibiting the production of nitric oxide (NO) by increasing the production of free radicals, Stimulating the activity of plasma and tissue resonance, which leads to an increase in the production of angiostin-2, and these effects lead to vasoconstriction, which results in an increase in blood pressure (Sposito A. 2004), It is also possible to increase the oxidative formation of LDL, as an

increase in its concentration in the lining of the arteries leads to hardening of the arteries and thus high blood pressure, and shall The increased concentration of cholesterol leads to the transfer of rapid cholesterol surface between lipoproteins and cell membrane that reduces membrane fluidity and reduce the effectiveness of transfer channels Ions so the increase of cholesterol in the cell membrane of renal reduces sodium flow along sequentially reduces the filtering rate of sodium and thus stayed away with high blood pressure (Edwards C., Boucheir I. and Chilver E. 1996).

Serum Triglyceride (TG) Concentration:

Table 5: The values of serum (TG) in patient group with control group

Groups	No.	TG mg/dl Mean ±SD
Patients	45	171.50±8.02 a
Controls	45	144.36±8.16 b
p. value		0.042

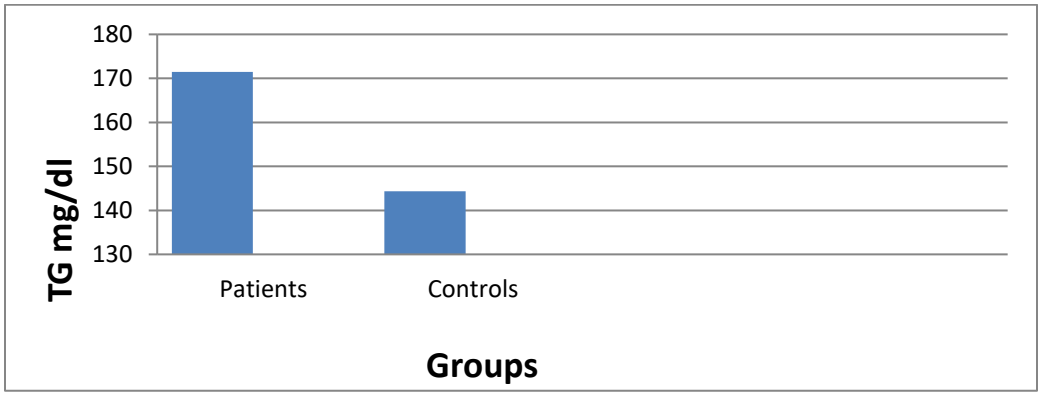

Fig.5: Serum Triglyceride (TG) value in controls and hypertension patients

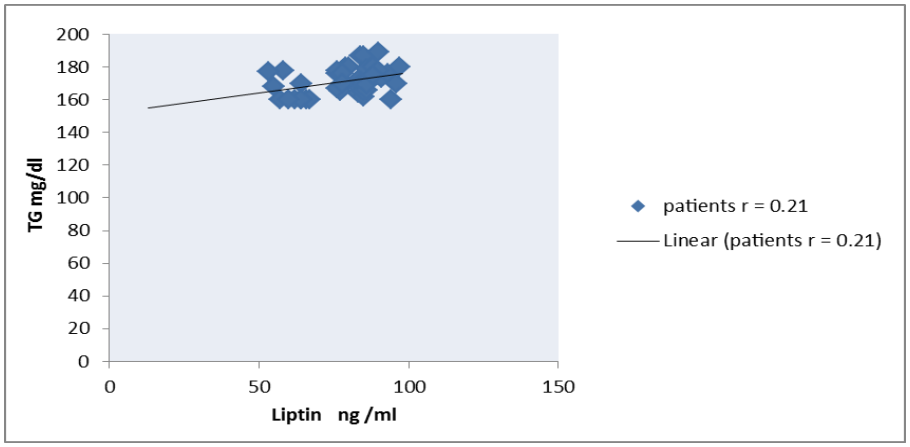

Fig.6: shows the positive correlation between leptin and TG with correlation coefficient (r= 0.21)

For table (5), it shows the high level of triglycerides in hypertensive patients, and this is due to the increase in oxidation in the body, which leads to a decrease in the effectiveness of the lipoprotein enzyme (LPL), and this decrease leads to its reduction in the body and an increase in the level of TG in the blood this is in agreement with what was indicated by the researcher (Wiliens., 1999) that the amount of fats in the blood is proportional to the amount of rise in blood pressure through the experiments conducted outside the body of the living being (In Vitro) and (Rahmouni et al., 2005) indicated that an increase in TG hypertriglyceridemia, when it is associated with an increase in hypercholesterlemia, is a cause of high blood pressure.

Serum High-density lipoprotein (HDL) Concentration:

Table(6) and figure (7) show significant decrease in the concentration of serum HDL in patient group in comparison with control group($p \leq 0.05$).

Table 6: The values of serum (HDL) in patient group with control group

Groups	No.	HDL mg/dl Mean ±SD
Patients	45	40.56±2.55 b
Controls	45	60.11±3.23 a
p. value		0.000

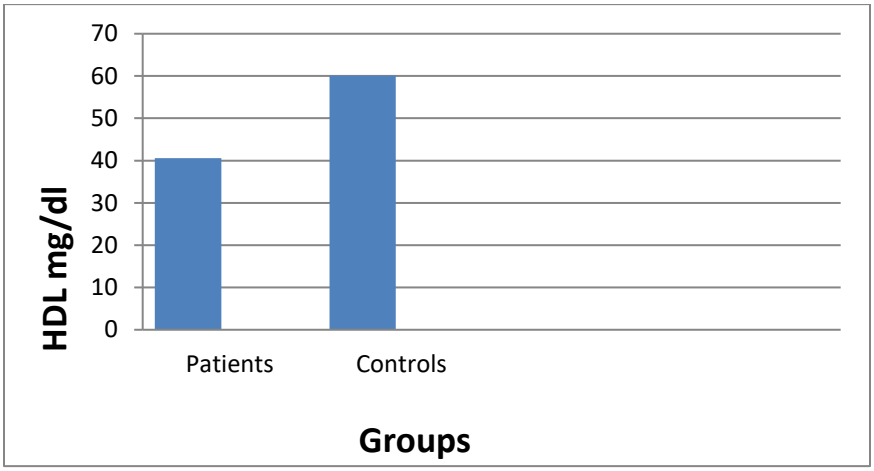

Fig.7: Serum High-density lipoprotein (HDL) value in controls and hypertension patients

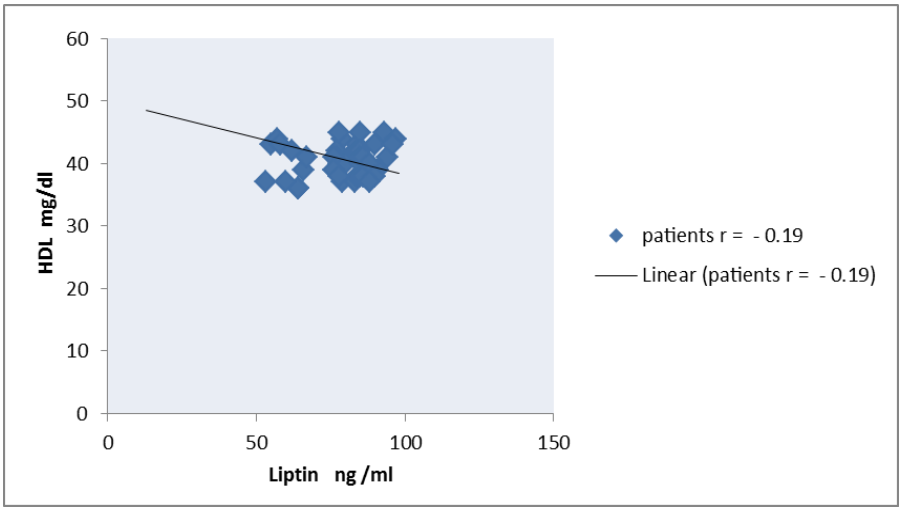

Fig.8: shows the negative correlation between leptin and HDL with correlation coefficient (r= - 0.19)

The above table shows a decrease in the level of HDL concentration among patients with high blood pressure compared with healthy subjects. The decrease in the level of HDL concentration increases the risk of developing atherosclerotic diseases because HDL has a major role in the process of transporting cholesterol from the cells of the body to the liver, thus reducing the cholesterol present in the blood vessels (Lorosa J. 1997), there are several reasons for the low concentration of HDL, including High TG concentration, high weight, lack of physical activity, type II diabetes mellitus and high blood pressure lead to a decrease in the HDL level, according to the report of the International Commission for the Discovery, Evaluation and Treatment of High Cholesterol in Adults IIIATP,(Iuliano L., Mauriello A., et al. 2000) HDL plays an important role in maintaining blood

pressure through the inhibition of secretion of aldosterone from the adrenergic gland so the low concentrations as a result of insulin resistance leads to increased secretion of aldosterone, which in turn increases the retention of sodium and contraction of the arteries and veins and this Pedroh leads to high blood pressure ,Increase the effectiveness of hepatic LPL that facilitates the elimination of HDL, As well as the occurrence of changes in the functions of the liver, which leads to inhibition of production of apo-A , which is the main protein in the HDL.

Serum Low-density lipoprotein (LDL) Concentration:

Table(7) and figure (9) show significant increase in the concentration of serum LDL in patient group in comparison with control group($p \leq 0.05$).

Table7: The values of serum (LDL) in patient group with control group

Groups	No.	LDL mg/dl Mean ±SD
Patients	45	119.51±3.94 a
Controls	45	82.27±3.94 b
p. value		0.007

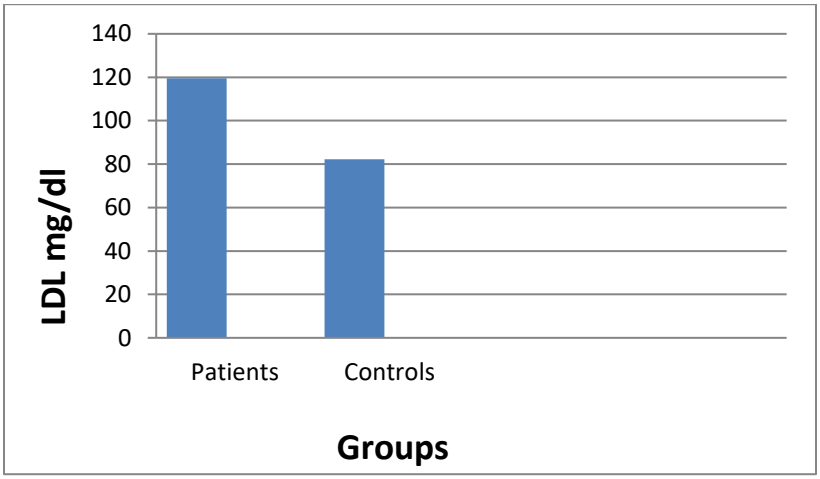

Fig.9: Serum Low-density lipoprotein (LDL) value in controls and hypertension patients

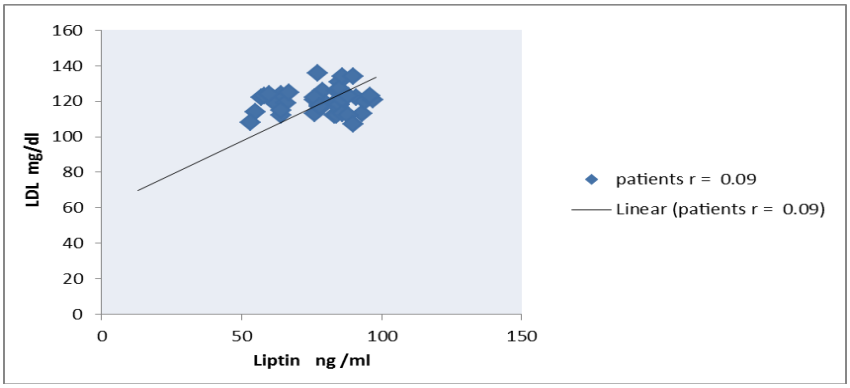

Fig.10: shows the positive correlation between leptin and LDL with correlation coefficient (r= 0.09)

As for Table (7), it is evident that the high level of LDL concentration increased significantly in the case of patients with pressure compared to healthy subjects, but this increase remained within the normal range and despite the fact that this elevation was higher. The arteries are hardened and this is in agreement with Vakili et al., 2001 who mentioned that high levels of LDL can cause arteriosclerosis by oxidation of (LDL) particles it contains fatty proteins of the same type (ApoB-100) (Vakili B., Okin P., Devereux R. 2008).

Serum very-low-density lipoprotein (VLDL) Concentration:

Table(8) and figure (11) show significant increase in the concentration of serum VLDL in patient group in comparison with control group($p \leq 0.05$).

Table 8: The values of serum (VLDL) in patient group with control group

Groups	No.	VLDL mg/dl Mean ±SD
Patients	45	34.30±7.32 a
Controls	45	28.87±5.13 b
p. value		0.039

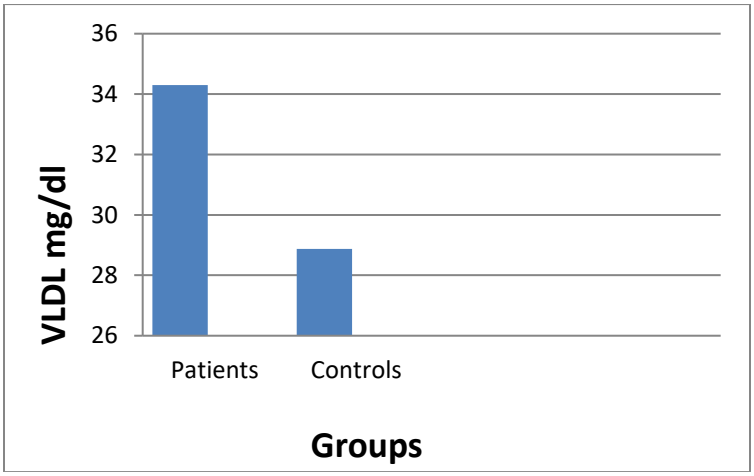

Fig.11: Serum very-low-density lipoprotein (VLDL) value in controls and hypertension patients

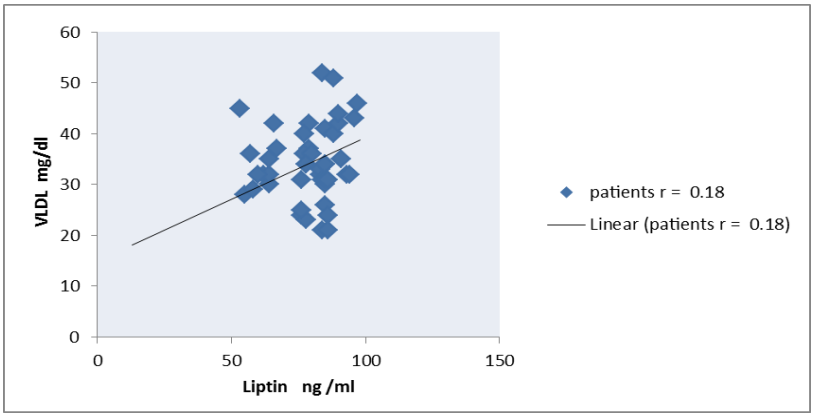

Fig.12: shows the positive correlation between liptin and VLDL with correlation coefficient (r= 0.18)

As for VLDL particles, they have increased from the normal level, and the percentage of TG in VLDL is high, so the increase in its concentration is due to the increase in oxidation in the body, and this reduces the activity of the enzyme (LPL) in the body, This causes an imbalance in fat levels and an increase in the level of TG and thus an increase in the level of VLDL in the blood (Zena L. 2010).

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