# Study Effect of Type 2 Diabetes (NIDDM) on Lipid Profile

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*Abstract:* Diabetes mellitus is a group of metabolic disorders characterized by hyperglycemia resulting from a defect in insulin secretion, insulin action or both. Lipid disorders are one of the most important risk factors for the development of CVD, which may be .mainly related to diabetes, high blood pressure, and obesity This study was conducted to determine the biochemical changes of lipid and protein levels in diabetic patients and to compare them with normal subjects. (60) samples for type 2 diabetes patients and (20) a samples of healthy people (the control group) during the period from December to January 2023 in the city of Baquba. The following analyzes were performed: glucose levels, total cholesterol, triglycerides, low-density lipids, and high-density lipids were measured. The results of this study showed a significant increase in blood glucose levels in diabetic patients, with significant differences compared to normal people. Also, the results showed a significant statistical increase in the values of both cholesterol and triglycerides, in diabetic patients compared to normal people. On the other hand, the results showed that there were no significant differences in the values of both low-density lipids and high-density lipids in diabetic patients compared to normal subjects. According to the results of this study, it indicates that lipid disorders are mainly associated with diabetes, which is characterized by an increase in the levels of both triglycerides and cholesterol.

## Introduction

It is considered one of the most important diseases in the modern era, and it is considered one of the most important of the most important economic diseases in the world. At the global level, the World Health Organization (WHO) decided that Damage to the work process as a result of the number of casualties and injuries occurring due to the rapid increase in the number of damages. Causes of abnormalities or damage to electrolytes, carbohydrates, fats, proteins, and secretions as a result of excess secretion.The hormone insulin, the action of insulin, or both. [1]

According to the report issued by the World Health Organisation, WHO, there are 171 million people (2.8%) He tells me that the number is expected to increase to 360 million RON (4%) at the current level.The world in the year 2030. [2]

The World Diabetic World Foundation (Foundation Diabetic World) has more than 6 million million pounds. Their rates are expected to rise annually and are estimated to be $3.5 billion annually, and the rate is expected to rise annually.

Deaths due to diabetes will rise to 25% over the next decade.[2]Chronic hyperglycemia is linked to chronic diabetes mellitus complications.On a daily basis, I can see my employees repeatedly during my job and during the various bridge functions, including this Damages, complications, and symptoms of retinopathy.Nephropathy is the most dangerous thing in the world. I am very worried about the dangers of the ocean.Suffering from ulcers in the feet and vascular disorders, leading to heart disease.[3]

The most important role in the future Arterial blood flow, including the types of fatty acids, including the types of fatty acids, proteins, and fatty acids.The most common causes that lead to arterial blockage.[3]

## Lipid Profile

Fasting lipid profile screening is a blood test that assesses the risk of developing cardiovascular complications by Measurement of total cholesterol, high-density lipoprotein (HDL-c) and low-density lipoprotein-c (low-density lipoprotein-c) levels (LDL) and triglycerides are also used to diagnose blood lipids, a condition characterized by an unhealthy lipid profile. In the blood, this includes high triglycerides and low levels of HDL cholesterol that are common in type 2 diabetes.and increasing the risk of heart disease in general.[4]

## Triglyceride

Triglycerides are a common type of fat that consists of three molecules of fatty acids and one molecule of alcohol Glycerin. Triglycerides come from the food we eat as well as from the body's production of other energy sources such as...

Cardiohydrate, high triglyceride levels can be limited by a number of factors; it may be hereditary or it may be hereditaryBe linked to obesity or untreated diabetes. [5]

## Cholesterol

Cholesterol is a lipolytic molecule essential for human life. It has many roles that contribute to the functioning of cells

Normally. For example, cholesterol is in the cell membrane. Contributes to the structural integrity of the membrane

Whatever

## Component

It also adjusts liquidity. Cholesterol functions as a natural molecule in the synthesis of vitamin D and steroid hormones (such as cortisol). Aldosterone, adrenal androgens) and sex hormones (such as testosterone, estrogen, and progesterone). Cholesterol is also a component of bile, which is used in digestion to facilitate the absorption of soluble vitamins.Because cholesterol is mostly lipophilic, it travels through the blood, along with fats A, D, E, and K.

With triglycerides, within the lipoprotein particles VLDL, LDL, IDL, HDL, and chylomicrons (.[6]

## High Lipoproteins Density (HDL)

High-grade lipoprotein is produced in the liver, where it transports sterols and fats from the origin and organs to the liver for decomposition and at the same time high-quality lipoprotein is transformed into tissue for production. And in fact High-quality lipoprotein helps protect against the risk of heart attacks due to its high protein content Compared to the rest of the dragon.[7]

## LDL cholesterol

Low-density lipoprotein (LDL) is produced in the liver and transports cholesterol and other fats from the liver to the liver.Various parts of the body, such as muscles, tissues, and organs (say). [8]

## VLDL Cholesterol

Very low-density lipoproteins are created in the liver by hepatic cortical cells and act on the liver Triglycerides, cholesterol, and phospholipids are transported to the rest of the tissues.[9]

**Material and methods**

**Table (1) Chemicals used and origin:**

| المواد الكيميائية<br>Chemicals Kit | الشركة<br>Company |
|---|---|
| Glucose Kit | SPINREACT |
| Triglyceride Kit | HUMAN |
| Cholesterol kit | HUMAN |
| HDL kit | SPINREACT |

**Table (2) includes the devices and origin that were used in the study**

| Instruments | Suppliers |
|---|---|
| Spectrophotometer(Apel) | JAPAN |
| Water Bath | UK |
| Centrifuge | Germany |

**The following table (3) includes the materials, tools, and facilities that are used in the study:**

| Materials | Suppliers |
|---|---|
| Automatic pipette and micro-automatic pipette | Germany |
| Cotton | Iraq |
| Alcohol (70%) | Iraq |
| Disposable syringe | China |
| Disposable gloves | China |
| Gel tube | China |
| Tourniquet | China |
| Can tube | China |

**Sample Collection**

(60) Samples were collected, including (40) samples from patients with type 2 diabetes, aged between (25-65). years, and (20) samples of healthy people (control group) whose ages ranged between (20-58) were collected in Contracted city through cooperation with private laboratories during the period from December to January 2023, and registering some Data about patients is represented in a questionnaire that contains a set of information about patients with diabetes and medical history.

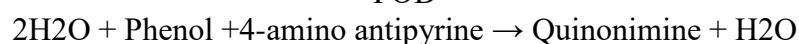**Measuring the level of glucose in the blood**

**Principle:**

Glucose is oxidized by glucose oxidase to gluconate and reacts with hydrogen peroxide under catalysis. red Quinonimine to form 4-amino antipyrinet and phenol with catalysis of peroxidase (POD)As an indicator. [10]

GOD

D-Glucose+ O2 → H2O + Glucose

POD
2H2O + Phenol +4-amino antipyrine → Quinonimine + H2O
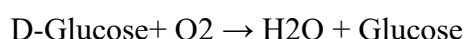
A test is performed to measure the level of glucose in the blood, by taking one ml (1 ml) of Kit Glucose solution.Add (10 microns of oestrogen serum) to the tube, then mix, then Place it in the incubator with Bath Water at 37 degrees for 10 minutes. Then it is read using a spectrophotometer at a wavelength of 500 nm.

**Measuring the level of triglycerides in the blood**

**Principle:**

According to the following reactions.[11] Triglycerides are hydrolyzed enzymatically by LIPS

LPL

Triglycerides → Glycerol + Fatty acids

POD

$H_2O_2$ + 4-AP + p-chlorophenol → Quinone + $H_2O$

The intensity of the color formed is proportional to the concentration of triglycerides in the sample. [10] A test is performed to measure the level of triglycerides in the blood, taking one ml (1 ml) of the Triglyceride Kit solution.

Add (10) microns of esophagus serum (serum) to the tube, then we work

To mix, then put it in the incubator with Bath Water at 37 degrees for 10 minutes. Then read using a device Spectrophotometer measures optical absorption at wavelength (500 nm).

**Measuring blood cholesterol level**

Cholesterol esters are hydrolyzed by CHE (cholesterase esterase) into cholesterol and fatty acids Free. Sense the following equation

CHE

Cholesterol esters + $H_2O$ → Cholesterol + fatty acid

The intensity of the color formed is proportional to the concentration of cholesterol in the sample.[11]A test is performed to measure the total cholesterol level in the blood. One ml (1 ml) is taken.Of the Kit Cholesterol solution is added to the tube. Then add (10) microns of serum.Then mix it with serum, then put it in the incubator with bath water at 37 degrees for 10 minutes.

Then it is read using a spectrophotometer at a wavelength of 500 nm.

**Measuring the amount of high-density lipoprotein cholesterol (HDL)**

100 microns are taken from the 1R kit HDL and placed in a tube can, then we add 1 ml of esophageal serum. (Serum) and mix it, then put it in a centrifuge at a speed of 4000 NM per minute. For 20 minutes, after class, we take 10 microns of the liquid and then add to another tube can containing 10 ml of liquid. Cholesterol Kit Cholesterol solution, then mix, then put it in the incubator with Bath Water at a temperature Heat C37 for 10 minutes.[12]Then it is read using a spectrophotometer at a wavelength of 500 nm.

**Measuring the amount of low-density lipoprotein (LDL) cholesterol:**

Using Fried Wald formula. [13]

LDL-C = Total cholesterol – HDL-C – (TG/5

**Measuring the amount of very low-density lipoprotein (VLDL) cholesterol**

VLDL Concentration can be estimated mathematically.[13]

VLDL = TG/5

**Statistical analysis**

The data were analyzed statistically using SPSS software, then the arithmetic means and standard deviations were calculated for the study groups, the ANOVA test was conducted to compare the different age groups of the study groups. While then using the test-t test to compare between both genders, males and females, and then adopting the total Value.P value. $P < 0.05$, then calculate the statistically significant differences if the P value is $< 0.05$.

**Result and discussion**

A number of (60) already established cases of type 2 diabetes were collected, and (20) samples of the group of healthy people (the control group). Their number was 40% of the total number studied, while their number was the number of females, 60% of the total number studied

**Serum glucose level (FBS)**

The results of this study, as expected, indicated a significant increase in serum glucose levels for patients with diabetes. Type 2 diabetes. It was noted that there were differences in glucose concentration levels in the diabetic group compared to Natural group.

Figure No. (1) Shows the blood glucose concentration levels for both the diabetic group and the normal group. The results are telling.The arithmetic mean values ± standard error
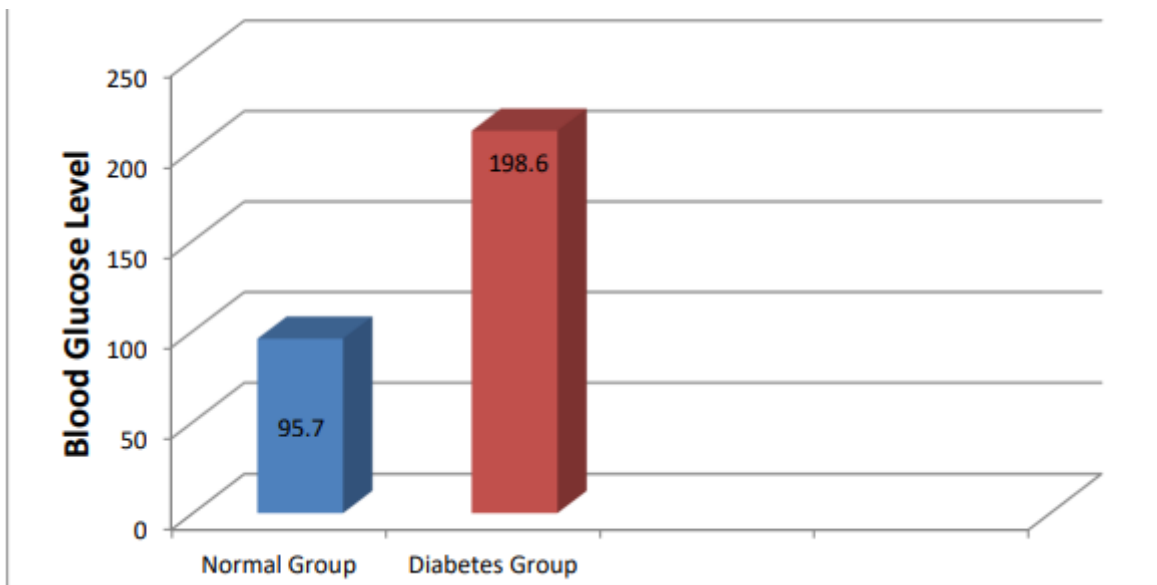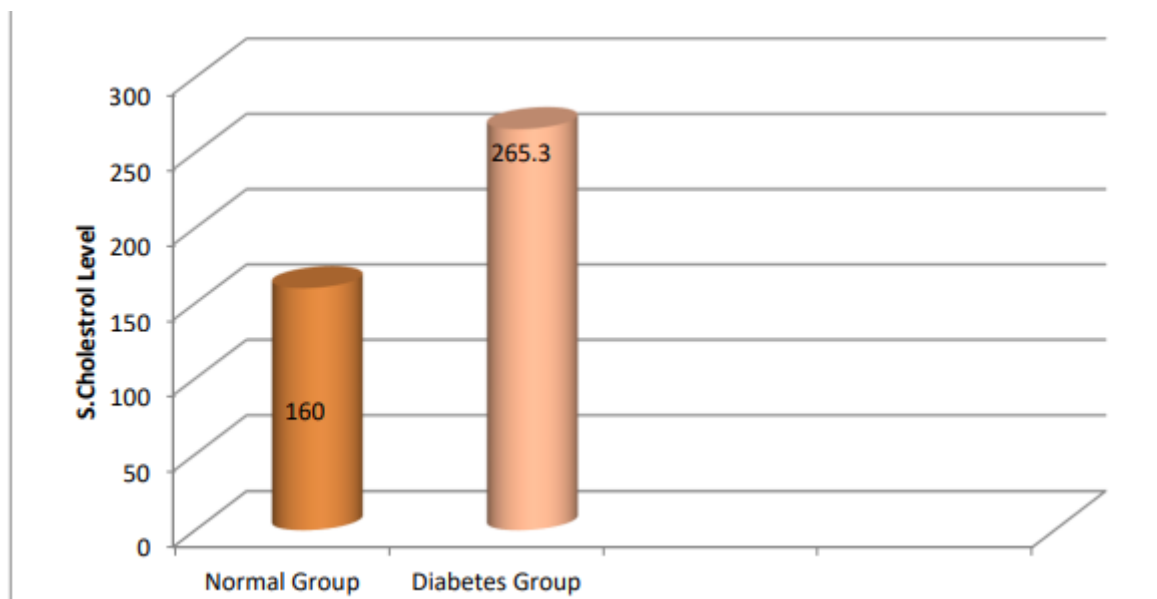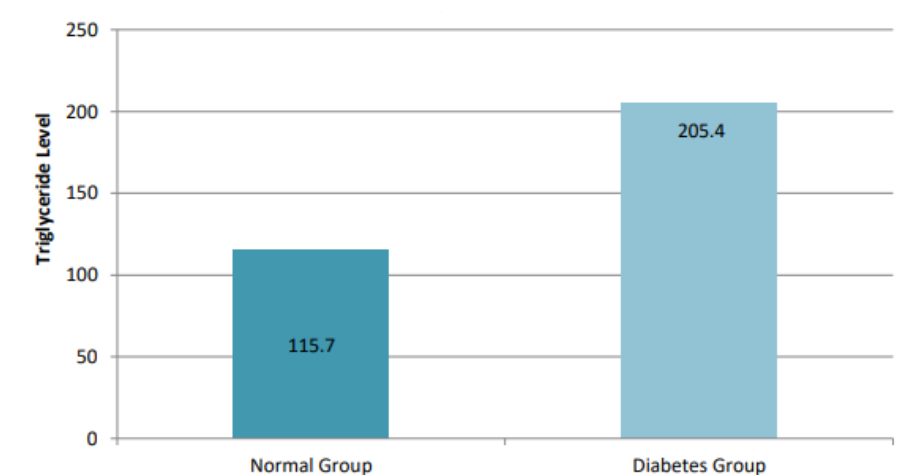


**Figure No. (2) Shows the cholesterol concentration levels for both the diabetic group and the normal group. Results Expressed as mean values ± standard error**



**Triglyceride levels**

**Figure (3) shows the triglyceride levels for both the diabetic group and the normal group.We notice a significant increase in the level of fats in diabetic patients compared to the normal group. Results are expressed as mean values ± standard error**



There are noticeable differences at the significance level of p=0.0001

Results are expressed as means ± SEM

**High-density lipoprotein (HDL) cholesterol**

Figure No. (4) shows the levels of high-density lipoprotein (HDL) for both the diabetic group and the normal group.

Results are expressed as mean values ± standard error



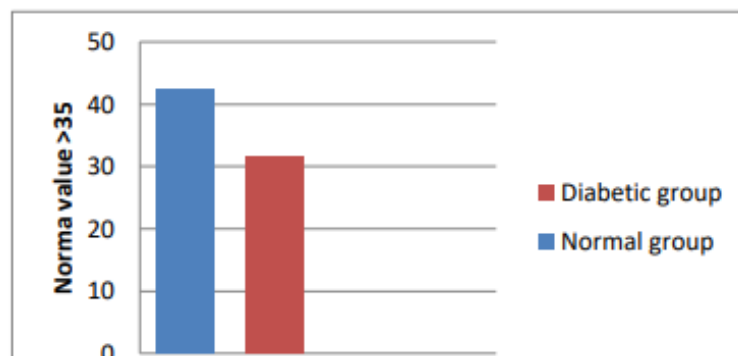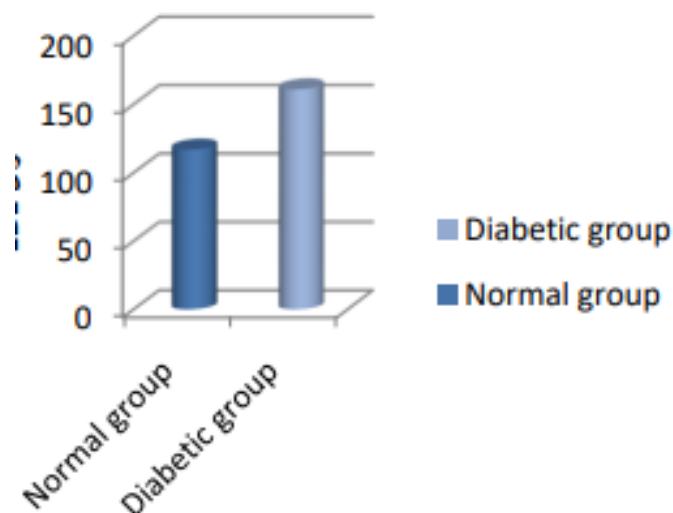**Figure (5) shows the levels of low-density lipoprotein (LDL) for both the diabetic group and the normal group.Results are expressed as mean values ± standard error**

It was also observed through the results shown in both Figures (4 and 5) Figure No. (6) That there are statistically significant differences in both low-density lipoprotein (HDL) levels and High-density lipoprotein (LDL) levels between the diabetic group and the normal group.

The samples were divided according to gender into males and females for both groups, the diabetic group and the male group Normal (control) was demonstrated by the results shown in Table (5) when comparing both male genders However, for the normal group, there were significant differences in the arithmetic mean values for the levels of glucose, cholesterol, Low-density fats, high-density fats, triglyceride levels, and very low-density fats, on the one hand Finally, the diabetic group showed a statistically significant increase in cholesterol values compared to the group Males and there were significant differences at the significance level p=0.03

## DISCUSSION

Previous studies have proven that a defect in the effectiveness of insulin and high blood sugar are among the most common causes that lead to diabetes

There are abnormal changes in the levels of lipids and proteins in people with diabetes, especially type 2 diabetes Diabetes.[14]

It has been shown that cardiovascular disease occurs most commonly in type 1 and type 2 diabetes Diabetes is one of the most common causes of death in the world, and it has been found that the most dangerous factors What leads to the development of heart disease is dyslipidemia. On the other hand, it has been found that the relationship

The relationship between diabetes and coronary artery disease is not completely clear. However, it has been found that diseases of both types and types it is linked to diabetes and is one of the causes that leads to a defect or illness in the production or reduction of fats. Proteinuria.[14]

Through the results of this study, it was found that there was an increase in glucose levels in diabetic patients compared to the control group It was also observed that there were statistically significant differences (p=0.0001) in glucose levels among the group of patients. Diabetes compared to the normal group over the past decades, many studies have shown that diabetics are

They have an increase in blood glucose levels (hyperglycemia) compared to healthy people.[15]

Hyperlipidemia is a medical condition that occurs due to an excessive increase in fat levels In particular, the increase in levels of cholesterol major and triglycerides.[16] The results of this study showed abnormal changes in lipid levels in diabetic patients It appears clearly through the high levels of cholesterol and triglycerides, with statistically significant differences. In lipid levels in diabetics compared to healthy people, the results of this study agreed with the results Previous studies conducted by.[17]

Which showed a significant increase in levels of total cholesterol and low protein fats LDL and very low-density lipoprotein (VLDL). Previous experimental and clinical studies reported that high concentrations or levels of total cholesterol are a factor Dangerous and strong for causing heart disease.[18]

This can be explained by previous studies that have proven that high levels of cholesterol and fats are low Density leads to an increase in the substrates of reactive oxygen derivatives (species oxygen reactive free radicals). Radicals interact with LDL molecules and thus lead to the formation of oxidized fat molecules Oxidized LDL particles, which play an important role in the onset and development of atherosclerotic plaques,[19]

**Conclusions:**

The study showed that there was an increase in blood serum levels of total cholesterol, triglycerides and cholesterol Harmful effects in diabetics compared to the control group. Low levels of HDL cholesterol in diabetics Compared to the control group, The age factor is of great importance, as it plays a major and influential role. The results of this study in influencing Turns out too Biochemical

variables are significant and influential. And in increasing the imbalance, and the development of diabetesIt's long

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