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Changes in the level of lipid profile in diabetes mellitus in samples patients

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Abstract

Diabetes mellitus is a metabolic illness. Clinical manifestations include blood lipid and protein abnormalities, persistent hyperglycemia, and other conditions that have been widely shown to be associated with many consequences that severely lower the quality of life. The primary cause of lower extremity amputations and the development of chronic wounds is impaired wound healing. Diabetic foot ulcers are thought to be the secondary cause of 85% of foot amputations. The purpose of this study was to compare the levels of HDL, VLDL, triglycerides, cholesterol, and some biochemical markers, such as FBG and HbA1c, between healthy people and those with diabetes mellitus. Additionally, it seeks to identify a connection between a patient's elevated lipid profile and diabetes mellitus. **Methodology:** Look into a case-control study that was conducted for a period starting from March/2023 to May/2023 in Baghdad teaching hospital / medical city / Baghdad / Iraq. It was based on a clinical examination, the total number of participants were 50 subjects; they were divided into two groups: 30 subjects were patients with diabetes mellitus and 20 subjects we healthy control subject, all were subjected to laboratory tests: HBA1C, FBG, Cholesterol, Triglyceride, HDL, LDL and VLDL. From 50 included subjects, 20 were male and 40 female. **Findings** demonstrated that there were significant differences among the studied groups regarding age and gender. There were significant differences in HBA1c, FBG, Cholesterol, Triglyceride, HDL, and VLDL among the two studied groups. Whereas no significant differences were found in LDL among the two studied groups.

Key words: Diabetes mellitus, HDL, LDL, Triglyceride.

Introduction

A collection of metabolic abnormalities brought on by hyperglycemia as a result of decreased insulin production and/or action is known as diabetes mellitus (DM) **(1,2)**. It causes a lot of direct and indirect costs and is a significant cause of disease and death **(3-6).** Polyuria (frequent urination), polydipsia (increased thirst), and polyphagia (intense hunger) are signs of high features. Hyperglycemia, or high blood glucose, can cause irreversible damage to various tissues, particularly the retina of the eye, which can result in defects and diabetic retinopathy. It can also affect the renal glomeruli, causing diabetic nephropathy and

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diabetic neuropathy, which is caused by damage to the blood vessels and neural tissue **(7-10).** Ketoacidosis or a nonketotic hyperosmolar condition may appear in serious situations of DM, and it goes to coma and death in the obscurity of treatment **(11-13).** Type I diabetes risk may be increased by exposure to certain viral infections and environmental factors (CDC, 2019). All animal cells (except invertebrates) produce cholesterol for membrane construction and other purposes; the relative rates of production vary depending on the type of cell and the function of the organ. The liver and intestines produce around 80% of the daily total amount of cholesterol; the brain, adrenal glands, and reproductive systems all produce cholesterol at greater rates **(14-16).** The prevalence of diabetes mellitus was increasing; research indicates that between 2000 and 2030, the number of people with the disease will more than double **(17-20).**

About 30% of all animal cell membranes are made of cholesterol. It regulates membrane fluidity over the spectrum of physiological temperatures and is necessary for membrane construction and maintenance. Additionally, the enzymes employ substrate presentation as a mode of activation and the biological process of substrate presentation **(21-23).**

Lipoproteins, including Lipids including cholesterol, are transported through the bloodstream by low-density lipoprotein (LDL), very-low-density lipoprotein (VLDL), and high-density lipoprotein (HDL). Patients with diabetes mellitus have certain lipid abnormalities that are connected to the accumulation of cholesterol and fatty acids in the pancreatic β-cells and might contribute to the breakdown of the pancreatic islets **(24).**

Aim of study:

Studying the relationship between increasing cholesterol and its effect on diabetic patients and also studying the potential risks in diabetics patients with high cholesterol.

Methodology:

Subjects: In this study, 50 subjects participated as 30 patients suffering from Diabetes mellitus (DM) with an age >20 years. The Blood samples collection of this research study extended from March to May 2023 at Medical City, Baghdad Teaching Hospital, Baghdad, Iraq. A clinical evaluation served as its foundation.

For comparison, 20 healthy individuals were also used in the study, and their ages ranged >18 years. They also show negative results for related autoimmune diseases. Blood is drawn using disposable syringes and needles. Five milliliters of blood were drawn from both the control group and the patients. After letting the blood coagulate, the samples were centrifuged for ten minutes at 4500xg. In Epperdrof tubes, sera are separated and fractionated before being frozen until needed.

Methods:

Fasting plasma glucose:

The fasting serum glucose was measured using the Glucose kit and the colorimetric technique for the measurement of quantitative in vitro diagnostics.

Glycated Hemoglobin %:

HbA1c was measured according to the procedure mentioned by Architect Abbott C4000 (Germany).

Lipid profile test:

Serum Total Cholesterol:

Using a kit, the use of colorimetry in quantitative in vitro diagnostics assessment yielded the total serum cholesterol.

Low-density lipoprotein cholesterol (LDL-C) and High-density lipoprotein cholesterol (HDL-C):

Low-density lipoprotein- cholesterol (LDL-C) is calculated by the indirect method.

Very low –density lipoprotein cholesterol (VLDL-C)

Triglyceride concentration is divided by five to determine extremely low cholesterol and lipoprotein density, which is measured in milligrams per deciliter.

Triglycerides:

Using a kit and the colorimetric approach, serum triglycerides were measured quantitatively in vitro for diagnostic purposes.

Statistical Analysis:

The influence of the patient and control groups on the research parameters was found using the Statistical Analysis System SAS (2018) application. The t-test was used in this study to compare the means in a meaningful way.

3. Results & Discussion:

Distribution of sample study according to Gender and Age:

The relationship between diabetes mellitus and gender and age in this study was displayed in table (3-1). Diabetes mellitus is more common in females than males. Mean ± SE values of gender and age were higher in females than males with statistically highly significant differences ($p \leq 0.05$) and ($p \leq 0.01$) in the mean ± SE values between the gender and age of all diabetic groups. Additionally, the data showed that males had a lower mean ± SE of age and gender than females.

The findings of this investigation demonstrated that, with a slight variation in their mean, males and females vary significantly in all DM-related parameters. This outcome is comparable to the outcome of **(25),** who discovered that DM may be prevalent in both boys and girls and that the gender differences in DM spread are really important. Also, in agreement with the finding of **(23).** They discovered that there is no discernible difference in the prevalence of DM between males and females.

Table (3-1): Distribution of sample study according to Gender and Age

Factor		Patients (No=30)	Control (No=20)	P-value
Gender	Male	9 (30.00%)	11 (36.67%)	0.693 NS
	Female	21 (70.00%)	19 (63.33%)	0.693 NS
	P-value	0.0052 **	0.0267 *	---
Age (year)	Mean ± SE	52.57 ±2.37	25.43 ± 0.88	0.0001 **
* (P≤0.05), ** (P≤0.01).				

Comparison between patients and control groups in F.B.G. and HbA1C

As shown in table (3-2), the mean ± SE of FPG was significantly ($p \leq 0.01$) higher in the diabetic patients compared to that of a nondiabetic group. Also, results showed that mean ± SE of HbA1c was significantly ($p \leq 0.01$). higher in the diabetic patients compared to that of a nondiabetic group.

The current study demonstrated that diabetes patients had higher mean FPG and HbA1c values than the control group, with a significant difference between the two groups, as shown in the table (3.2). This result is comparable to the results of **(26).** They discovered that patients had higher mean fasting, random blood sugar, and HbA1c than the control group. Additionally, the current study's findings are consistent with earlier research **(27).** The study mean

FPG of DM patients was higher than that of the non-diabetic group. and non-diabetes individuals, this agreed with **(28).** who showed that the mean blood glucose value between DM patients and the control group differs significantly, according to the results of statistical analysis. The mean FPG of DM patients in the current research was greater than that of the group without diabetes.

Comparison between patients and control groups in Lipid profile

50 individuals were involved in this study (30 DM patients and 20 not diabetics individuals as a control group). The biochemical and clinical features of the selected groups were illustrated in the table (3-3). The results demonstrate significant differences between the groups studied in cholesterol, Triglyceride, HDL, and VLDL. In contrast, there is no significant difference in LDL.

The results of this study demonstrated that diabetes patients had significantly greater mean levels of HDL, VLDL, triglycerides, and cholesterol than the control group. Also showed that the mean of LDL was non-significant difference when compared to patients with the control group as in table (3.2). This result is consistent with the findings of **(29).** who found that the mean of Cholesterol, Triglyceride, HDL and VLDL was higher in patients than in the control group and a stronger risk factor than LDL. Also, the current results of the present study agree with previous studies **(30).**

Also, in agreement with the findings of **(31,32).** who discovered that cholesterol buildup appears to be a significant factor in ß-cell dysfunction caused by low-density lipoprotein (LDL).

Table (3-2) Comparison between patients and control groups in F.B.G. and HbA1C

Group	Mean ± SE	
	F.B.G. (mg/dl)	HbA1C (mg/dl)
Patients	173.20 ±9.27	7.62 ±0.36
Control	85.73 ±1.48	4.62 ±0.11
T-test	18.770 **	0.848 **
P-value	0.0001	0.0001
** (P≤0.01).		

Table (3.3): Comparison between patients and control groups in Lipid profile

Group	Mean ± SE				
	Cholesterol (mg/dl)	Triglyceride (mg/dl)	HDL (mg/dl)	LDL (mg/dl)	VLDL (mg/dl)
Patients	215.83 ±2.59	212.40 ±12.81	27.98 ±1.99	135.00 ±1.06	56.76 ±9.62
Control	194.20 ±7.24	128.56 ±1.72	44.76 ±0.74	123.47 ±6.29	18.17 ±1.28
T-test	15.406 **	25.871 **	4.240 **	12.771 NS	19.446 **
P-value	0.0067	0.0001	0.0001	0.0758	0.0002
** (P≤0.01).					

Conclusions:

The current study revealed the following:

1. The presence of significant correlation of HbA1c with FPG the importance of inflammatory response in patient with diabetic mellitus, old age patients and patients with hypertension at higher risk of developing to DM, the elevated of Cholesterol, Triglyceride, LDL and VLDL with lowering of HDL is one of risk factor of Hypertension in Diabetic patient.

Declaration of Conflicting Interests:

The authors declare that they have no possible conflicts of interest

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