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Lipid profiles and HBA1c level Among in Type, 2 Diabetes patients in Hilla city, Iraq

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ABSTRACT

Background: The defining feature of diabetes mellitus (DM), which includes different metabolic disorders, is insulin-induced hyperglycemia. Obesity, hypertension, and cholesterol are more prevalent in diabetics with type 2 diabetes (T2DM).

Objective: Assessment of lipid profiles and HbA1c in type 2 diabetic Hilla patients

Patients and Methods: A total of 300 people were enrolled, among whom 150 people with type 2 diabetes mellitus were chosen as case participants and 150 healthy participants of the same gender and age were treated as controls. The participants' ages ranged from 30 to 79 years. The data collection period spanned five months, from November1, 2022, to March 30, 2023. Serum samples from the patients were tested for fasting blood sugar (FBS), Hba1c, cholesterol, triglycerides, high-density lipoprotein (HDL), low-density lipoprotein (LDL), and very low-density lipoprotein (VLDL). Chi-square tests were used to determine whether lipid profiles and Hba1c levels were associated with T2DM and control.

Results: The Mean±SD of the age was 55.4±10.1 for T2DM and 55.3±10.0 for control, respectively. The age group 50-59 years had the greatest percentage of T2DM and control (33.3%) and the lowest percentage of T2DM and control (6.7%). The percentage of T2DM and control subjects who were female was 56.7%, while the percentage of T2DM and control subjects who were male was (43.3%). Of those who were married, T2DM subjects made up the highest percentage (93.3%), while controls made up the lowest percentage (6.7%).

Urban regions had the highest percentage of T2DM residents (55.3%), while rural areas had the lowest percentage of T2DM residents (44.7%). Regarding education, the highest percentage of them (24.7%) were Read & Write, while the lowest percentage of them (13.3%) graduated from college or higher in T2DM. In terms of education, the highest percentage (38.0%) were in college or higher, while the lowest percentage (7.3%) were illiterate in control. Mean of Hba1c levels in T2DM were 8.49±1.74, while in controls they were 5.08±0.85. The average levels of cholesterol, LDL, total cholesterol, HDL, and VLDL in people with type 2 diabetes were 4.27±1.22, 4.08±1.43, 1.95±1.00, 1.08±0.33, and 0.89±0.45, respectively. In contrast, the average levels in people without type 2 diabetes were 4.46 ± 0.97, 3.99 ± 1.05, 1.28 ± 0.54, 1.04 ±0.27, and 0.58 ± 0.25respectively in control.

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Conclusions: Diabetes mellitus causes an increased lipid profile, particularly in non-insulin-dependent type 2 diabetes mellitus, and some lipid profiles showed non-significant difference.

Keywords: *HBA1C, Diabetes, Lipid Profile, Hilla City, Iraq*

INTRODUCTION

High glucose levels brought on by the persistent metabolic disease diabetes can harm the kidneys, eyes, heart, blood vessels, eyes, and nerves. Type 2 diabetes (T2D), which is the most prevalent form of the disease, happens when the body develops an immunity to insulin. The majority of the 422 million diabetics worldwide, who account for the majority of fatalities each year (1.6 million), reside in low- and middle-income nations, according to the WHO(1). Iraq now has a 20% incidence of diabetes, a sharp increase over the previous 40 years. In addition, diabetes is seen as a significant cause of death in the bulk of developing nations, particularly in Iraq. Possible causes include unregulated glucose levels(2).

The development and progression of type 2 diabetes depend heavily on pancreatic beta cell failure, which is brought on by the interaction of genetic and acquired variables. (T2D). Beta cells are specialized endocrine cells that respond to a variety of integrated signals by producing, storing, and secreting insulin, closely regulating blood glucose levels. They are typically 10 mm in diameter and have an insulin content of 20 pg. In developed pancreatic islets, between 50 and 80 percent of the islet cells are beta cells(3).

Diabetics are more likely to acquire hyperlipidemia, obesity, and hypertension. T2DM, the most prevalent disease, is typically asymptomatic in its early stages and can go undetected for years. Diabetes is a long-term metabolic disease caused by a complex interplay of genetic, environmental, and behavioral factors. Diabetes-related deaths are on the rise for a variety of causes, including poor nutrition, obesity, smoking, and physical inactivity(4).

Diabetes screening may be beneficial in some instances because early detection and treatment can reduce the burden and consequences of diabetes. HbA1c, a long-term glycemic control marker, is frequently used to represent the average blood glucose level in diabetics, indicating the possibility of diabetic complications. Among other well-established risk factors such as hyperlipidemia and hypertension, HbA1c is now regarded an independent risk factor for cardiovascular disease (CVD) in diabetics and non-diabetics. The HbA1c diabetes biomarker is useful because it gives information on average blood glucose levels over the previous few months(5).

Diabetes's complications, which include microvascular and microvascular complications, pose a danger to increase morbidity and death. A common microvascular consequence of diabetes mellitus is diabetic dyslipidemia (DD). In both established and developing nations, diabetes is viewed as a serious health issue and one of the main risk factors for cardiovascular disease (CVD). More than 75% of people with type 2 diabetes (T2DM) who have solely mixed dyslipidemias have dyslipidemias. Due to insulin resistance, the amount and type of triglycerides that increase the risk of CVD are what characterize the components of DD(6).An increase in cholesterol, triglycerides, and LDL as well as a decline in HDL are all risk factors for atherosclerosis and are all connected to poor glycemic control in T2DM. High amounts of apolipoprotein B are the result of increased LDL particles along with increased VLDL. Conversely, greater postprandial serum triglyceride levels suggest a higher chance of cardiovascular disease. The metabolic syndrome, which is characterized by insulin resistance and obesity as a consequence of high blood lipid levels, is caused by lipid accumulation in body tissues. The most prominent criterion for T2DM patients is obesity, which indicates that blood glucose levels were elevated due to insulin resistance, which raised cholesterol and LDL levels and lowered HDL levels in accordance with the diabetic control status(7).

PATIENTS AND METHODS

The case-control research was carried out at the Diabetes and Endocrinology Center in Al-Hilla, Iraq. The data collection period spanned five months, beginning on November 1, 2022, and ending on March 30, 2023. Cases: All patients identified with Type 2 diabetes who attended the Diabetes and Endocrinology Center in Hilla City were included. Murjan Hospital and the Diabetes and Endocrinology Center in Babylon Governorate provided the controls, who were not Type 2 diabetics. The controls were age and sex paired in a one-to-one ratio. Type 2 diabetics living outside of Babylon City, Type 2 diabetics who refuse to join, Type 2 diabetics in out-of-place sample groups, Type 2 diabetics taking hypothyroidism, and women with gestational diabetes are all excluded.

Statistical data analysis

Using the accessible statistical package SPSS-28, data analysis was done. (Statistical Packages for Social Sciences, version 28). Simple frequency, percentage, mean, standard deviation, and range calculations were used to show the data. (minimum-maximum values).

Using the students' t-test for differences between two independent means or the ANOVA test for differences between more than two independent means, the significance of differences between various means (quantitative data) was examined. When appropriate, Yate's correction or the Fisher Exact test were applied to the Pearson Chi-square test (x2-test) to determine the significance of differences between various percentages (qualitative data). When the P value was 0.05 or less, statistical importance was taken into account.

RESULTS AND DISCUSSIONS

The 300 individuals included 150 T2D patients (85 girls and 65 boys) and 150 age- and sex-matched controls. The mean age of T2DM cases was 55.4±10.1 years, whereas the mean age of controls was 55.3±10.0 years. Figure 1 demonstrates that the majority of T2DM individuals (33.3%) were between the ages of 50 and 59. 56.7% (n = 85) of the T2DM cases were female, while 43.3% (n = 65) were male. (Table 1). There was statistically significant difference among age categories, educational attainment (P = 0.0001), and marital state (P = 0.008). Age and gender variables did not differ significantly (P = 0.05).

TABLE 1: Demographic characteristics of T2DM and control

		T2DM		**Control**		**P value**
		No	%	No	%	
Age (years)	30---39	10	6.7	10	6.7	-
	40---49	28	18.7	28	18.7	
	50---59	50	33.3	50	33.3	
	60---69	47	31.3	47	31.3	
	70---79	15	10.0	15	10.0	
	Mean±SD(Range)	55.4±10.1(30-77)		55.3±10.0(30-77)		0.986
Gender	Male	65	43.3	65	43.3	-
	Female	85	56.7	85	56.7	
Educational level	Illiterate	34	22.7	11	7.3	0.0001*
	Read & Write	37	24.7	19	12.7	
	Primary	30	20.0	21	14.0	
	Secondary	29	19.3	42	28.0	
	College & Higher	20	13.3	57	38.0	
Marital status	Married	140	93.3	148	98.7	0.008*
	Single/Widow	10	6.7	2	1.3	
*Significant difference between percentages using Pearson Chi-square test (χ^2-test) at 0.05 level.						
#Significant difference between two independent means using Students-t-test at 0.05 level.						

Percentage

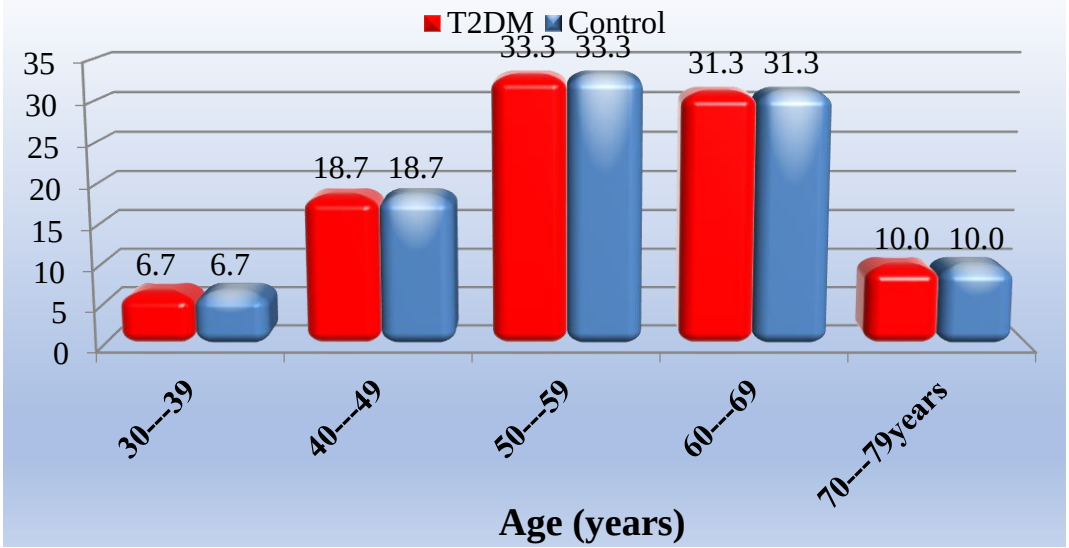

FIGURE 1: Demographic characteristics of T2DM and control according Age (years)

Table 2 shows the comparison between T2DM and control according to the biochemical test. the table shows a significant difference at a P-value less than 0.05 level. Except for B-urea, cholesterol, HDL, and LDL showed no significant difference.

The highest percentages were (94.0%) for high HbA1C and (72.7%) for high FBS of T2DM. While the control does not have a ratio of FBS to HbA1C at a P-value of 0.0001,

Regarding serum calcium in T2DM, the highest percentage (17.3%) was low calcium, while the control (8.0%) was low calcium at a P-value of 0.015.

Table (2) illustrates that the highest percentage (4.0%) of T2DM was associated with high serum creatinine (P = 0.015). The table also shows VLDL as having the highest percentage (80.0%) of T2DM. while the control (VLDL) had the lowest percentage, the high (57.3%) P-value (0.0001)

TABLE 2: Comparison between T2DM and Control according to Biochemical Tests

Biochemical Tests		T2DM		Control		P value
		No	%	No	%	
FBS (mmol/L)	High	109	72.7	-	-	0.0001*
	Normal (3.6-6.5)	41	27.3	150	100	
HbA1C (%)	High (>6.5)	141	94.0	-	-	0.0001*
	Normal (4.2-6.2)	9	6.0	150	100	
S Calcium (mmol/L)	Low	26	17.3	12	8.0	0.015*
	Normal (2.0-2.6)	124	82.7	138	92.0	
B urea (mmol/L)	High	2	1.3	-	-	0.156
	Normal (2.5-7.5)	148	98.7	150	100	
S creatinine (mmol/L)	High	6	4.0	-	-	0.013*
	Normal (80-115)	144	96.0	150	100	
Cholesterol (mmol/L)	High	9	6.0	6	4.0	0.427
	Normal (3.9-6.2)	141	94.0	144	96.0	
Triglycerides (mmol/L)	High	-	-	-	-	-
	Normal (0.4-1.8)	150	100	150	100	
HDL (mmol/L)	Low	67	44.7	79	52.7	0.166

	Normal (0.9-1.4M/1.1-1.6F)	83	55.3	71	47.3	
LDL (mmol/L)	High	55	36.7	52	34.7	0.718
	Normal (1.8-4.3)	95	63.3	98	65.3	
VLDL (mmol/L)	High (>0.53)	120	80.0	86	57.3	0.0001*
	Normal (=<0.53)	30	20.0	64	42.7	
*Significant difference between percentages using Pearson Chi-square test (χ^2-test) at 0.05 level.						

The HbA1c test is used to check blood glucose management. The HbA1c is a strong predictor of diabetes complications, as is the length of time a person has had diabetes. HDL, LDL, TG, and TC levels are well-known risk factors for diabetes complications such as coronary heart disease and CVD. In a study by Rani et al. (2005), Our results go along with a study by Patil et al.People with diabetes often have abnormalities in their lipids, and people with T2DM are no exception. Insulin resistance has previously been linked to the T2DM aberrant lipid profile because insulin resistance causes an increase in fatty acid release, reduces insulin-dependent muscle-free fatty acid uptake, and increases hepatic fatty acid production in the liver. Diabetic individuals often have high LDL and triacylglycerol values and low HDL. The current investigation results revealed that individuals with diabetes had a higher lipid profile(5).

Hyperlipidemia, a common secondary cause of diabetes mellitus and a major risk factor for atherosclerosis and coronary heart disease, is frequently brought on by poor glycemic control in particular. The vast majority of earlier studies found a connection between the significance of attaining ideal glycemic control and reducing the risk of CVD. It is crucial for diabetic adult patients to maintain HbA1c goals of less than 7% because one current decrease in HbA1c lowers the possibility of myocardial infarction by roughly 14% and the risk of microvascular complications by roughly 37%. Indeed, elevated blood glucose levels are believed to increase the chance of elevated blood LDL and other pathologies that cause atherosclerosis(8).

Our results supported those of the Iranian research by Rahmanian et al., which found no connection between gender differences and type 2 diabetes(9)and disputes Aregbesola et al.'s claim in a Finnish research According to Nigerian research, living in a city makes it more likely for older individuals to develop new cases of diabetes,(10)Contradicting our findings, other studies have found that they were not significantly impacted by group-specific sociodemographic differences(11),(12).

CONCLUSION

The lipid profiles between people with T2DM and controls showed no significant difference except for VLDL, which showed a significant difference. HbA1c may be a useful marker for predicting dyslipidemia and CVD

RECOMMENDATIONS

Type 2 diabetes and lipid profiles all require specialized clinical research to be conducted in well-defined populations.

REFERENCES

1. World Health Organization. Diabetes [Internet]. 2021 [cited 2023 Mar 16]. Available from: https://www.who.int/health-topics/diabetes#tab=tab_1
2. Mikhael EM, Hassali MA, Hussain SA, Shawky N. Self-management knowledge and practice of type 2 diabetes mellitus patients in Baghdad, Iraq: A qualitative study. Diabetes, Metab Syndr Obes Targets Ther. 2019;12:1–17.
3. Mara Suleiman 1 LM 1, , Miriam Cnop 2, 3, Decio L. Eizirik 2 , Carmela De Luca 1, Francesca R. Femia 4, Marta Tesi 1, Silvia Del Guerra 1 and Piero Marchetti 1 4. The Role of Beta Cell Recovery in Type 2 Diabetes Remission. 2022; Available from: https://doi.org/10.3390/ijms23137435
4. Mahboobi S, Rahimi F, Jafarnejad S. Effects of prebiotic and synbiotic supplementation on glycaemia and lipid profile in type 2 diabetes: A meta-analysis of randomized controlled trials. Adv Pharm Bull. 2018;8(4):565–74.
5. Al-Shaheeb S, Hashim HK, Mohammed AK, Almashhadani HA, Al Fandi A. Assessment of

lipid profile with HbA1c in type 2 diabetic Iraqi patients. Bionatura. 2022;7(3):1–5.
6. Vesa CM, Popa L, Popa AR, Rus M, Zaha AA, Bungau S, et al. Current data regarding the relationship between type 2 diabetes mellitus and cardiovascular risk factors. Diagnostics. 2020;10(5).
7. Feingold KR. Role of Glucose and Lipids in the Atherosclerotic Cardiovascular Disease of Patients with Diabetes. Endotext [Internet]. 2020;
8. Mohamed RAA, Noor BYM, Ahmed SM, Dafalla AM, Mohammed Y abdelhameed, Modawe GO. Assessment of Lipid Profile among Sudanese patients with Type 2 Diabetes Mellitus. AL-Kindy Coll Med J. 2022;18(1):30–5.
9. Shojaei M, Rahmanian K, Jahromi AS. Relation of type 2 diabetes mellitus with gender, education, and marital status in an Iranian urban population. Reports Biochem Mol Biol [Internet]. 2013;1(2). Available from: www.RBMB.net
10. Balogun WO, Gureje O. Self-reported incident type 2 diabetes in the ibadan study of ageing: Relationship with urban residence and socioeconomic status. Gerontology. 2012;59(1):3–7.
11. Dudzińska M, Tarach JS, Zwolak A, Kurowska M, Malicka J, Smoleń A, et al. Type 2 diabetes mellitus in relation to place of residence: Evaluation of selected aspects of socio-demographic status, course of diabetes and quality of life - a cross-sectional study. Ann Agric Environ Med. 2013;20(4):869–74.
12. Sarray A al. Purslane and garlic extract and dyslipedemia among a sample of hypertensive patients attending Baghdad teaching hospital The 3rd International Scientific Conference of Medical and Health Specialties. 2019;