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Clinical Relationship between Lipid Profile and Glycohemoglobin Among Iraqi Patients with Type 2 Diabetes Mellitus

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ABSTRACT

HbA1c (A1c%) is the index of Glycohemoglobin state for a long duration. In addition, D.M., the ticking bombshell, has many effects on subjects' lifestyles, especially if they are obese. Where Lipid abnormalities (dyslipidemia) are very prevalent in type2 D.M. Dyslipidemia consequent to insulin impedance, the prime why of coronary atherosclerosis and ischemic heart disease, is considerably related to type2 D.M. Diabetes of type2 is a worldwide spreads epidemic where the number of patients increasing continuously and rapidly in both underdeveloped and progressing countries about the scientist. Atherosclerosis brings about the ischemic core disease and remains the primary reason for death and early disability in progressing nations, and its spread is constantly increasing in outgrowth countries. This study aimed to look into the relation between HbA1c and F.B.S. with lipid profile parameters (HDL, T.G., LDL, VLDL& T.C.) and determine their levels in type 2 D.M. patients. The present study appears that a direct proportional relation exists between dyslipidemia and high values of Glycohemoglobin (A1c%), which means the riskiness of high HbA1c% values with dyslipidemia rising may lead to atherosclerosis. Conclusion: the well glycemic dominance by antidiabetic treatment with a lifetime mode rearranging can minimize the danger of atherosclerosis and side effects.

Keywords: Type2 DM, Glycohemoglobin, lipid abnormalities, lipids profile, atherosclerosis.

1. Introduction

According to World Health Organization, Diabetic is a set of metabolic unrest owned properties of high blood sugar and anomalies in sugars, lipid, and protein metabolism. It results in flaws in insulin excretion, insulin allergy, or both. Chronic microvascular, macrovascular, and neuropathic multiples may happen[(1)]. D.M. is the third most significant reason of dying around the world and is accountable for lot multiple effects on different members of the body[(2,3)]; it is like cancer[(4)] and the severe effect of alcohol abuse and cigarette smoking that are well-known worldwide on body functions, especially liver and kidney[(5)].

Away from carnal limitations and stress, D.M. increases economic encumbrance for the patients. Diagnosis of Diabetes mostly does not occur at a suitable time, and many subjects live with it until it is scouted by the lab tests carried out when the patient goes for therapy for some other illness. D.M. is considered a worldwide and nationally scourge, primarily because of the raised ratio of fatness. Fatness has widely become common in advanced nations, raising the spread of Diabetes[(6)].

Obesity is turning out widely epidemic. Fatness is a freelance hazard operator for different heart diseases in both sexes[(7)]. Disturbances of fat metabolism are rumours& conspicuous in Diabetes, cirrhosis and cancer, which are significant dangerous operators for the extensive repetition of atheromatous multiples in the disease[(8-10)]. In diabetic patients, coronary heart disease is related to many pathological traits involving hypertension, hyperglycemia and flaw glycation of proteins, dyslipidemia and others from autonomic nervous diseases, endothelial and cardiovascular diseases[(11-13)].Through the past contract, cardiovascular diseases have become the singular most significant cause of doom worldwide. High T.C. values are

responsible for about 56% of ischemic heart disease and 18% of strokes, reach to 4.4 million dying yearly[14-16].

In patients with type2 D.M., hyperlipidemia raises the danger of micro-vascular multiples, whereas hyperlipidemia is the leading danger agent to macro-vascular multiples[17-20]. Various long-term studies conducted in various populations of various ethnicities, various eating nature, work and various life manners appear that most patients appear various diffusion and fashion of abnormalities of lipid in type 2 diabetes mellitus. However, they always appear well in the relation between HbA1c and personal lipid markers. Also, other studies conducted in various places of the world clarified the existence of different average results for different fat types, but all inferred that too elevated scale of dyslipidemia spread between type2 D.M. with different styles. These studies clarified that with exacerbation of HbA1c, the patient's lipid profile worsens[21].

2. Results and discussion

2.1 Procedure

Our research was done on 105 volunteers who registered during attendance at our laboratories in Al-Ramadi Teaching Hospital/ Al-Anbar / Ramadi city. A105 subjects aged 35-65 years were split into three groups:

1-Group1 consists of 35 control subjects (healthy).

2-Group2 consists of 35 subjects who have HbA1c < 7% prediabetes and

3-Group3 consists of 35 subjects who have HbA1c > 7%.

Exception Criteria

•People with type 1diabetes

•Hypothyroidism

•CKD, Nephrotic syndrome

•People who drink alcohol

•People who take lipid-lowering drugs

• Persons with high blood pressure who are using beta blockers or thiazide diuretics

• B.M.I. more than 25

• Smokers

• Cirrhosis or other liver diseases

• Hyperthyroidism / Hypothyroidism

2.2 Specimens

Individual consent was obtained from blood sample donors for the study purposes. For all 105 subjects, venipuncture specimens were withdrawn after at least 10 hr. fasting. Venipuncture specimens of all subjects were compiled in two types of tubes. One of them contains EDTA to measure HbA1c, while the other tube contains a gel material (non-anti-coagulant tube) to measure F.B.S. and lipid profile (T.C., T.G., HDL, VLDL and LDL). All information was recorded in detail, including lifestyle and symptoms of Diabetes mellitus type2, its duration, treatment and complications. Personal clinical history and eating habits were recorded. Smoking, drinking alcohol, exercise and other habits of the research volunteer were also recorded in the questionnaire. Comprehensive and accurate examinations were conducted for healthy volunteers and patients, such as liver, kidney, lipid, insulin resistance and thyroid tests, and heart, nervous and respiratory tests were recorded in the personal questionnaire for each volunteer.

2.3 Spectrophotometer APEL PD-303 JAPAN

All patients were measured F.B.S., and lipid profile (T.C., T.G., HDL, VLDL and LDL), where F.B.S. in blood was measured by spectrophotometry (GOD-POD) method[22,23] and T.C. measure method in sera include using of three enzymes: (CE), (C.O.) and (P.O.D.)[23,24,25] by using LiNEAR Chemicals. At the same time, the T.G. test method depends on the enzyme reaction lipoprotein lipase (L.P.L.) with T.G. in plasma or serum like other methods[26]. HDL, VLDL and LDL were measured too.

2.4 Clover A1c System

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The Clover A1c system is a fully automated boronate affinity assay. The HbA1c % of all patients was measured by the Clover A1c system.

2.5 Statistical Analysis

We used the Statistical Analysis System- S.A.S. program to reveal the effect variation groups in our study criteria. Minimum significant variation - L.S.D. test (Analysis of Variation- ANOVA) was used to compare the mean and standard deviation of results significantly.

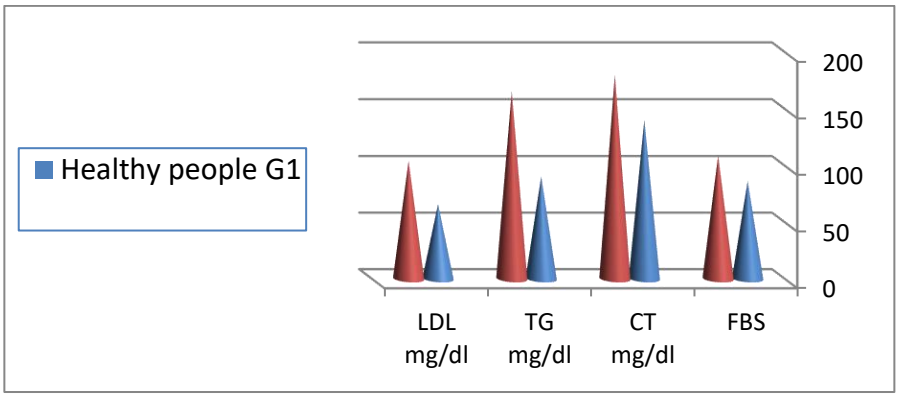

Fig.1. Group2: Each value represents the mean ± S.E.M of F.B.S., CT, T.G. and LDL of type 2 diabetic patients (HbA1c < 7%) compared to the healthy group (control).

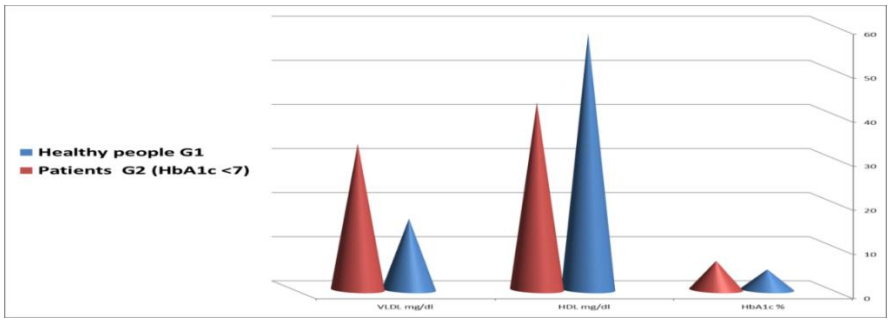

Fig.2. Group2: Each value represents the mean ± S.E.M of HbA1c%, HDL and VLDL of type 2 diabetic patients (HbA1c < 7%) compared to the healthy group (control).

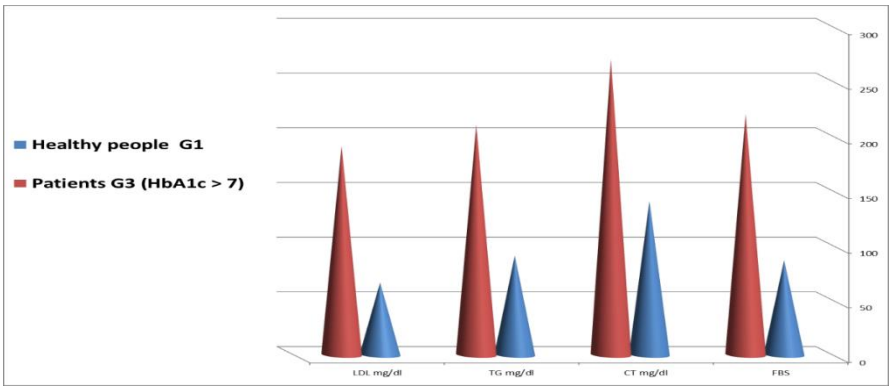

Fig.3. Group3: Each value represents the mean ± S.E.M of F.B.S., CT, T.G. and LDL of type 2 diabetic patients (HbA1c > 7%) compared to the healthy group (control).

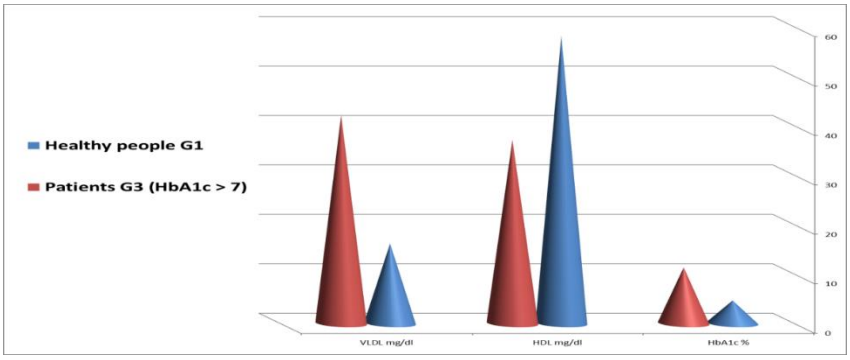

Fig.4. Group3: Each value represents the mean ± S.E.M of HbA1c %, HDL and VLDL of type 2 diabetic patients (HbA1c > 7%) compared to the healthy group (control).

3. Results

In our project, 105 people were chosen according to exception criteria which we determined before in the practical protocol part, where 105 people aged 35-65 years were split into three groups: group one (healthy), group two (HbA1c < 7%) and group three (HbA1c > 7%).

With regards to group two (HbA1c < 7%) of type 2 diabetic patients, their (mean ± S.E.M.) of F.B.S., CT, T.G. and LDL were (109.12 ± 6.21, 180.16 ± 18.75, 165.63 ± 20.63 and 104.51 ± 8.20) respectively as explained in figure1 and table (1).

Table 1: Represents the mean ± S.E.M of F.B.S., CT, T.G. and LDL of type 2 diabetic patients (HbA1c < 7%) compared to the healthy group (control).

Mean ± SD	S mg/d	mg/dl	mg/dl	L mg/dl
Healthy ple G1	51 ± 2	0.36 ± 51	65 ± 13	08 ± 8
Patients G2 (HbA1c <7)	9.12 ± 1	0.16 ± 75	5.63 ± 63	7.51 ± 0

Also, (mean ± S.E.M.) of HbA1c% <7% , HDL, and VLDL were (6.56 ± 0.32, 42.53± 2.98 and 33.13 ± 8.40) respectively, as explained in figure2 and table (2).

Table 2: Represents the (mean ± S.E.M) of HbA1c%, HDL, and VLDL of type 2 diabetic patients (HbA1c < 7%) compared to the healthy group (control).

Mean ± SD	bA1c %	HDL mg/dl	DL mg/dl
althy people	62 ±0.41	8.15 ± 3.19	13 ± 1.89
Patients G2 (HbA1c <	56 ±0.32	9.53 ± 2.98	13± 8.40

Moreover, in Group three (HbA1c > 7%) of type 2 diabetic patients, their (mean ± S.E.M.) of F.B.S., CT, T.G., and LDL were (220.08 ± 43.06, 270.18 ± 19.80, 210.33 ± 19.41 and 191.0 ± 16. 31) respectively as explained in figure number 3, and table3.

Table 3: Represents the mean ± S.E.M of F.B.S., CT, T.G. and LDL of type 2 diabetic patients (HbA1c > 7%) compared to the healthy group (control).

Mean ± SD	S mg/d	mg/dl	mg/dl	L mg/dl
Healthy ople G1	.51 ± 5.32	0.36 ± 51	65 ± 13	08 ± 4.78
Patients G3 (HbA1c >7)	0.08 ±7.06	0.18 ± 80	0.33 ± 41	4.03 ± 7.

Again (mean ± S.E.M.) of HbA1c%, HDL and VLDL were (11.32 ± 0.21, 37.53 ± 3.27 and 42.06 ± 9.32) respectively as explained in figure number 4 and table 4.

Table 4: Represents the (mean ± S.E.M) of HbA1c%, HDL, and VLDL of type 2 diabetic patients (HbA1c > 7) compared to the healthy group (control).

Mean ± SD	A1c %	L /dl	DL /dl
Healthy people	2 ±0.41	15 ± 9	13 ± 1.89
Patients (HbA1c>	11.32± 0.	37.53 3.	42.06 ± 9.

However, group1 (the healthy group) their (mean ± S.E.M.) of F.B.S., CT, T.G. and LDL were (86.51 ± 9.32, 140.36 ± 10.51, 90.65 ± 14.13 and 66.08 ± 14.78) respectively as shown in figures number 1 & 3; also (mean ± S.E.M.) of HbA1c%, HDL and VLDL to the healthy group were (4.62 ± 0.41, 58.15 ± 3.19 and 16.13 ± 1.89) as shown in figures number 2 & 4.

The results showed a direct relationship between fasting blood sugar level and HbA1c% in blood, as shown in Figures 1&3, with a significant value ($p < 0.001$). Also, the results showed a direct relationship between the high levels of different lipids in patients with type2 Diabetes, as shown in figures 1-4.

Again the results showed a direct relationship between fasting blood sugar level (mean ± SEM) of FBS (109.12 ± 6.21) of group2 (HbA1c < 7%) & (220.08 ± 43.06) of group3 (HbA1c > 7%) respectively versus (86.51 ± 9.32) of control group (healthy group) and HbA1c % level in blood (mean ± SEM) of HbA1c% (6.56 ± 0.32) of group 2 (HbA1c < 7%) & (11.32 ± 0.21) of group3 (HbA1c > 7%) respectively versus (4.62 ± 0.41) of control group (healthy group), as shown in figures 1 & 3, with a significant value ($p < 0.001$).

Moreover, the values also explained that there is a direct relationship between the high blood levels of different lipids in patients with type 2 diabetic (mean ± SEM) of CT, TG and LDL (109.12 ± 6.21, 180.16 ± 18.75, 165.63 ± 20.63 and 104.51 ± 8.20) respectively of group2 (HbA1c < 7%) & CT, TG and LDL (220.08 ± 43.06, 270.18 ± 19.80, 210.33 ± 19.41 and 191.0 ± 16. 31) respectively of group3 (HbA1c > 7%) and HbA1c% level in blood (mean ± SEM) of HbA1c% (6.56 ± 0.32) of group 2 (HbA1c < 7%) & (11.32 ± 0.21) of group3 (HbA1c > 7%) respectively versus (4.62 ± 0.41) of control group (healthy group), as is clear in Figures 1-4 with a significant value ($p < 0.001$) as shown I table (5).

Table 5: Represents the mean ± S.E.M of F.B.S., CT, T.G. and LDL of type 2 diabetic patients (HbA1c < 7% and HbA1c >7) of G1compared to the healthy group (control).

Mean ± SD	S mg/d	mg/dl	mg/dl	L mg/dl
Healthy people G1	.51± 5.32	40.36 ± 10.51	.65± 22.13	.08± 4.78
Patients G (HbA1c <7	109.12 ± 6.21	180.16 18.75	165.63± 19.63	107.51 ± 8.20
Patients G (HbA1c >7	220.08 ±7.06	270.18 19.80	210.33 ± 15.41	184.03 ± 7.31

Again the results showed an opposite relationship between (mean ± SEM) of HDL level in blood (42.53± 2.98) of group 2 (HbA1c <7%) and (37.53 ± 3.27) of group3 (HbA1c >7%) respectively versus (58.15 ± 3.19) of control group (healthy group) and (mean ± SEM) of HbA1c% (6.56 ± 0.32) of group 2 (HbA1c < 7%) and (11.32 ± 0.21) of group 3 (HbA1c > 7%) versus (4.62 ± 0.41) of control group, as we can see in figures 2&4 with a significant value ($p < 0.001$) as shown I table (6).

Table 6: Represents the (mean ± S.E.M) of HbA1c%, HDL, and VLDL of type 2 diabetic patients (HbA1c < 7% and HbA1c > 7) compared to the healthy group (control).

Mean ± SD	A1c %	L /dl	DL mg/dl
Healthy people G1	2 ±0.41	15 ± 3.19	13 ± 1.89
Patients (HbA1c	6 ±0.32	53 ± 2.98	13± 8.40
Patients (HbA1c >	11.32 ± 0.	37.53 ± 3.	42.06 ± 9.

4. Discussion

Diabetic is the third most prominent reason to die worldwide and is accountable for many multiples affecting different body members[2]. Diabetes mellitus is considered a worldwide and nationally scourge, primarily because of raised rates of obesity. The results of our study explained that for subjects who are HbA1c < 7%, their (mean ± S.E.M.) of F.B.S., CT, T.G., VLDL and LDL for pre-diabetic (patient of group2) were higher than their non-diabetic, while HDL cholesterol values were found to be lower than the non-diabetics group1 (healthy group). Again group2 (HbA1c < 7%) of type 2 diabetic patients if we compared their (mean ± S.E.M.) of F.B.S., CT, T.G., VLDL and LDL with (mean ± S.E.M.) of F.B.S., CT, T.G., VLDL and LDL of group3 diabetic patients (HbA1c > 7%) were higher than their of group3, while HDL of subjects who are HbA1c < 7%, they are (mean ± S.E.M.) is higher than HDL of subjects who are HbA1c >7% versus to healthy group (reveres relation) and the reasons can result due to the obesity which the last is turn out a worldwide plague. Fitness is a freelance danger operator for heart diseases in both sexes[7].

Our study also explained the rise diffusion of hypercholesterolemia, hypertriglyceridemia and hence, bad fats rise in Patients with type 2 Diabetic (HbA1c > 7%, group 3 patients), immensely well-known dangerous agents that cause cardiovascular diseases. Insulin affects the liver apolipoprotein manufacture, where it regulates the enzymatic action of lipoprotein lipase (LpL) and cholesterol ester transfer protein. All these agents are likely to cause dyslipidemia in D.M.[24].

In addition, insulin deficiency minimizes the vigour of hepatic lipase and many proceedings in the production of biologically active LpL may be altered in D.M. So, indeed exists affirmative relation between plasma glucose and HbA1c to T.C. and T.G. levels, and all determined diabetic patients should be checked to ensure of cardiac regarding problems[27-30].As a result, HbA1c control of the patient has strongly affected lipid profile levels, heart diseases, and stroke. Patients should be learning uniform control of lipid profiles and if set to be abnormal, should control glucose levels in blood, cholesterol and triglyceride very effectively[31,32].

Therefore A1c would be used as a foreteller of dyslipidemia in type 2 diabetes mellitus and as a glycemic control marker. Also, the study said that early diagnosis of dyslipidemia would be used as preventative gauge for improved cardiovascular disease in type 2 diabetes[33].

5. Conclusion:

Results mention that the A1c level will be applied as a perfect operator for an estimate the fats of diabetic patients. So well glycemic dominance through anti-diabetes treatment and lifestyle change will minimize the danger of heart diseases and their multiples. Also, eating some healthy drinks such as green tea helps reduce fat levels, as green tea reduces HDL and LDL cholesterol[2].

This double biomarker- A1c management and fats monitoring- can be used to check height fat danger patients for early diagnosis of abnormal lipids. Subsequently, we avoid heart diseases and their multiples by the timely intervention of the disease.

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