

Diabetes & its Complications

Study of Blood Glucose State and Its Relationship with Lipid Profiles in Diabetic Patients in Kirkuk Province

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Received: 19 August 2019; **Accepted:** 18 September 2019

Citation: Aydin S.Ahmed, Pinar H. Tahir, Mohammed M. Al-Kattan. Study of Blood Glucose State and Its Relationship with Lipid Profiles in Diabetic Patients in Kirkuk Province. Diabetes Complications. 2019; 3(3): 1-4.

ABSTRACT

Background: Prevalence of Type 2 DM has been increasing steadily everywhere the globe and quick turning into an outbreak in some countries of the globe, particularly in poorly developed countries. Hyperlipidemia is a common comorbidity in diabetes and is associated with diabetes.

Aim: The purpose of the present study is to investigate the blood lipid levels and their relationship with HbA1c and blood glucose in diabetic patients.

Patients and Methods: One hundred –four, type 2 diabetic diagnosed patients (equal sex) attending Babagurgur diabetes center in K1 Hospital-Kirkuk from 10/11/2018 to 10/4/2019, were subjected to this study. Their ages ranged between 32-79 years with a mean age of 54.8 ± 8.3 years.

Biochemical tests for evaluation of diabetes; fasting blood glucose (FBG) and hemoglobin A1c (HbA1c %), and lipid profiles; cholesterol, triglyceride (TG), high-density lipoprotein (HDL) and low-density lipoprotein (LDL) levels were measured.

Results: The results showed that there was a significant ($p < 0.05$) increase in the tests of evaluation of blood sugar; FBG was 13.6 mmol/L and HbA1c of 9.6 % as mean values among the patients when compared with the same parameters in control group. Serum levels of cholesterol, triglycerides, and LDL showed significant ($p < 0.05$) increase, while HDL decreased. HbA1c and FBG levels were correlated with increasing levels of cholesterol, triglycerides, and HDL. Regarding the changes in parameters among age groups, the age group 50-59 years constituted most the diabetic cases (43; 41.3%).

Conclusion: It is concluded that the older age and poor glycemic control are important risk factors related to hyperlipidemia in the current T2DM population and associated with adverse lipid profiles.

Keywords

Diabetes Mellitus, Lipid profiles, Glycated hemoglobin.

Introduction

Diabetes mellitus (DM) is a clinical metabolic syndrome in which there's an increased blood sugar higher than the normal values [1]. Type II DM is a chronic metabolic disorder results from either inadequate insulin or insulin resistance. Its prevalence has been increasing steady everywhere the globe and quick turning into

an outbreak in some countries of the globe, particularly in poorly developed countries, with variety the amount the quantity of individuals affected expected to twice the current number every decade alongside raised ageing population, thereby adding to the already existing load for healthcare suppliers, Untreated DM can cause serious long-term complications include peripheral vascular disease, stroke, chronic renal disease, foot ulcers, and eye damages [2].

Although there was obvious decrease in the mortality rate from cardiovascular disease (CVD) in many countries worldwide over past years, the epidemic of cardiovascular disease will be a rising Asian public health challenge with growing urbanization [3].

Diabetes mellitus induces hypercholesterolemia and significantly increases the likelihood of atherosclerosis. It deals with the proliferation of smooth muscle cells in coronary artery blood vessels. From the available data on 20 Arab countries with more than twenty million were diabetic. Although data on diabetes in Iraq are scanty, it is considered as having a medium prevalence of 9.3% of diabetes in the Middle East. The pattern of lipid components in Iraqi patients and its relationship with plasma glucose levels below the cut-point for the diagnosis of diabetes is less clear.

Aim

The purpose of the present study is to investigate the blood lipid levels and their relationship with HbA1c and fasting blood glucose in diabetic patients.

Materials and Methods

Sample collection

One hundred-four, type 2 diabetic patients (equal sex) clinically proven under the supervision of specialists were selected from Babagurgur Diabetes Center in K1 Hospital-Kirkuk-Iraq during a period from 10/11/2018 to 10/5/2019. Their ages ranged between 30-79 years with a mean age of 54.8 ± 8.3 years. Complete information includes the age, gender, duration of diabetes, body weight and height of both male and female individuals were recorded according the form. Twenty-four healthy non-diabetic individual were subjected to the study as control.

Permission was taken from the hospital administration to allow the researchers to revise the patients' medical records archived in a specified diabetic center system (Medical plus).

Aseptic venous blood collection from the subjected individuals were done via venipuncture. The collected 5 ml of blood divided into 2 parts, 4ml was drawn in anticoagulant free tube and centrifuged (3000xg) for ten minutes for serum separation. The separated serum was pipetted into clean Eppendorf's tube and used for estimation of fasting blood glucose (FBG) and lipid profiles; cholesterol, triglyceride, high-density lipoprotein and low-density lipoprotein. The remainder 1 ml of blood kept in anticoagulated (K3 EDTA) container and used for the estimation of glycated hemoglobin.

Methods

Type -2 DM diagnosed on the basis of the American diabetes association (ADA) 2015 guidelines [4]. According to the definition for the metabolic syndrome proposed by the International Diabetes Federation [5], elevated TG was defined as $TG \geq 1.7$ mmol/L and reduced HDL-C was defined as $HDL-C < 1.03$ mmol/L for men and < 1.29 mmol/L for women.

HbA1c was estimated by using AFIAS HbA1c (Boditech Med

Incorporated –Republic of Korea) a fluorescence immunoassay for the quantitative determination of HbA1c while TC, TG, HDL and LDL estimated by using kit {ASSEL S.r.L via Barsanti 13/A -00012 Guidonia (Rm)}.

Statistical analysis

All data were expressed as Mean \pm SD and analyzed using the Excel program version 10 package. The significance of invariant differences was assessed by student's t- tests. A $p < 0.05$ was considered statistically significant.

Results

The age and body mass index (BMI) of 104 diabetic patients were 54.8 ± 8.5 years, 31.9 ± 4.6 Kg/m², respectively. The results showed that there was significant ($p < 0.001$) increase in the tests of evaluation of diabetic blood sugar; FBG was 13.6 mmol/L vs 5.3 and HbA1c of 9.6 vs. 5.4 in control group (Table 1). There were obvious increase in the levels of Cholesterol, triglycerides, and LDL while HDL decreased, which were 6.5 vs. 4, 3.7 vs. 1.3, 0.8 vs. 1.2 and 2.5 vs. 1.9 mmol/L, respectively. Mean values of cholesterol and triglyceride showed significant increase ($p = 0.000$) when compared with values of control group, while HDL showed significant decrease. The level of LDL was significantly ($p < 0.05$) elevated when compared with control group (Table 2). Regarding the changes in values of investigated parameters among age groups, the age group 50-59 years constituted most of the diabetic cases (43; 41.3%); 22 male patients and 21 female patients.

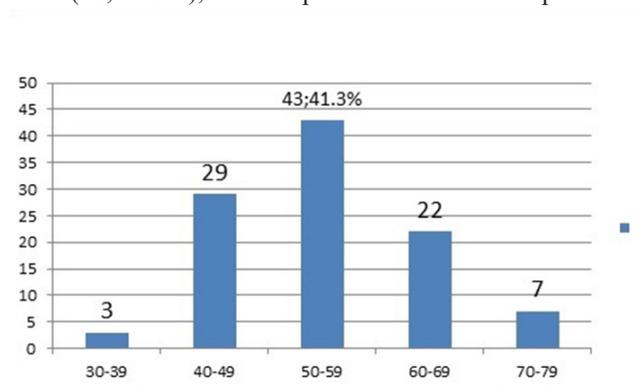


Figure 1: Distribution of diabetic patients according to the age groups.

| Parameters | Control Group | Patients |
|---------------------|----------------|---------------------|
| Number | 24 | 104 |
| Age (year) | 53.2 ± 9.9 | 54.8 ± 8.5 |
| FBG mmol/L | 5.3 ± 0.5 | $13.6 \pm 4.5^{**}$ |
| HbA1c (%) | 5.4 ± 0.42 | $9.6 \pm 1.6^{**}$ |
| Cholesterol mmol/L | 4.0 ± 0.63 | $6.5 \pm 0.8^{**}$ |
| Triglyceride mmol/L | 1.3 ± 0.38 | $3.7 \pm 1.2^{**}$ |
| HDL mmol/L | 1.2 ± 0.18 | $0.8 \pm 0.2^{**}$ |
| LDL mmol/L | 1.9 ± 0.35 | $2.5 \pm 0.5^*$ |

Table 1: Mean values of estimated parameters obtained from diabetic patients and control group.

* = statistically significant ($P < 0.05$) when compared with same parameter of control group.

** = statistically significant (P<0.001) when compared with same parameter of control group.

| Age groups (years) | 30-39 | 40-49 | 50-59 | 60-69 | 70-79 |
|-----------------------|-------------|--------------|-------------|-------------|-------------|
| No. of patients / % | 3 (2.9%) | 29 (27.9%) | 43 (41.3%) | 22 (21.2%) | 7 (6.7%) |
| BMI Kg/m ² | 33.58 ± 5.8 | 32.36 ± 4.37 | 32.1 ± 4.7 | 30.49 ± 3.9 | 32.41 ± 7.1 |
| HbA1c (%) | 9.93 ± 3.6 | 9.76 ± 1.4 | 9.57 ± 1.58 | 9.4 ± 1.38 | 9.1 ± 0.7 |
| FBG mmol/L | 11.69 ± 2.5 | 13.8 ± 3.27 | 13.52 ± 4.6 | 13.96 ± 5.9 | 13.45 ± 5.0 |
| Cholesterol mmol/L | 5.11 ± 0.7 | 6.41 ± 0.6 | 6.68 ± 0.7 | 6.47 ± 0.79 | 6.14 ± 1.4 |
| Triglyceride mmol/L | 2.85 ± 0.2 | 3.64 ± 1.37 | 3.8 ± 1.2 | 3.9 ± 1.27 | 3.66 ± 1.2 |
| HDL mmol/L | 0.84 ± 0.3 | 0.81 ± 0.14 | 0.81 ± 0.2 | 0.81 ± 0.2 | 0.95 ± 0.1 |
| LDL mmol/L | 2.22 ± 0.6 | 2.52 ± 0.54 | 2.54 ± 0.5 | 2.41 ± 0.6 | 2.31 ± 0.5 |

Table 2: Mean values of Blood parameters obtained from subjected diabetic patients distributed according to the age groups.

* = statistically significant (P<0.05).

Regarding changes in lipids profiles in patients distributed according age group, our results showed that there was obvious increase in the levels of cholesterol in patients among age group 50-59 years and it reached 6.68 mmol/L. LDL levels also elevated in patients of group 50-59 and 60-69 year which reached 3.8 and 3.9 mmol/L, respectively While mean value of HDL level was the least (0.8 mmol/L) at group 40-49years (Table 2).

Discussion

According to official statistics issued by the Iraqi Ministry of Health in its annual report for 2013 that 2.9% of the deaths for the year was due to the diabetes disease, and we are expected to have, in that year specifically more than 1.5 million cases of the disease, on the other hand, That Iraq ranks 9th in the Arab world and 30 in the world with injuries up to 10.2% of the total. Iraq has a large population of diabetic patients with a vast geographical distribution and significant variations in the types of [6,7].

Nowadays, there is a tendency that DM is also suffered by patients under the age of 40 years old which occurs due to lifestyle changes, especially in modern urban adolescents The prevalence of DM in adults (type 2 DM) is predicted to become prominent continuous increase in the next two decades especially in developing countries where the majority of patients are aged between 45 and 64 years [8]. The mean age of this study participants was about with about 54.8 years and most of the diabetic patients were within fifth decade of age.

As resulted from present study, the prevalence of hyperlipidemia increased with age, this result was agrees with the findings of Guang-Y., et al. [9]. In a study included seven populations of Asian origin, Chen, et al. [10], found that with IFG and/or IGT had worse lipid profiles, with higher prevalence of elevated TG

and its combination with reduced HDL-C than normoglycaemic individuals. In a study carried out on urban and rural Indonesian population it was reported that the highest percent of the prevalence of hypercholesterolemia was at age group 55-64 years old [11].

Individuals with high levels of serum are at an increased risk of developing type 2 diabetes and abnormal glucose metabolism, as well as increased morbidity and mortality from type 2 DM and CVD [12,13]. It is well established that serum lipid profiles are worse in diabetic than in non-diabetic subjects [14,15]. Yang W., et al. [16] found that subjects with hyperlipidemia showed higher FPG and 2h-PG levels than individuals with normal serum lipid levels. These findings confirm our results that showed that hyperlipidemia observed in diabetic patients who have elevated FBG levels.

Conclusion

Our present study reported that there were significant increase in the glycated hemoglobin, FBG and lipid profiles alteration in diabetic patients than in normal individuals. These parameters along with increase in age and poor glycaemic control are important factors to be considered when assessing the risk of CVD in the current T2DM in kirkuk population in Iraq.

Acknowledgments

The authors would like to acknowledge the financial support provided by General Director of North Oil Company. and all staffs in the Baba+Gurgur Diabetes Center who helped us.

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