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

Aydin S. Ahmed¹, Pinar H. Tahir² and Mohammed M. Al-Kattan²

¹Northern Technical University, Kirkuk Technical College, Medical Lab. Techniques Dept., Iraq.
²Babagurgur Center of Diabetes, K1 Hospital, Kirkuk, Iraq.

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 LDL 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 ≥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 ± 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 LDL 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.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Control Group</th>
<th>Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>24</td>
<td>104</td>
</tr>
<tr>
<td>Age (year)</td>
<td>53.2 ± 9.9</td>
<td>54.8 ± 8.5</td>
</tr>
<tr>
<td>FBG mmol/L</td>
<td>5.3 ± 0.5</td>
<td>13.6 ± 4.5**</td>
</tr>
<tr>
<td>HbA1c (%)</td>
<td>5.4 ± 0.42</td>
<td>9.6 ± 1.6**</td>
</tr>
<tr>
<td>Cholesterol mmol/L</td>
<td>4.0 ± 0.63</td>
<td>6.5 ± 0.8**</td>
</tr>
<tr>
<td>Triglyceride mmol/L</td>
<td>1.3 ± 0.38</td>
<td>3.7 ± 1.2**</td>
</tr>
<tr>
<td>HDL mmol/L</td>
<td>1.2 ± 0.18</td>
<td>0.8 ± 0.2**</td>
</tr>
<tr>
<td>LDL mmol/L</td>
<td>1.9 ± 0.35</td>
<td>2.5 ± 0.5*</td>
</tr>
</tbody>
</table>

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.
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 glycemic control are important factors to be considered when assessing the risk of CVD in the current T2DM in Kirkuk population in Iraq.

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### References

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