Study of Lipids Disorder in sera of Patients with Type II Diabetes Mellitus in Diyala

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Abstract:

Diabetes mellitus has been known to associate with lipid disorders and cardiovascular complication. This study was carried out to determine the changes in serum lipid profile in type 2 diabetic patients. Lipid profile was measured in sera of thirty males and females type-2 diabetic patients who attend Baqubah Educational Hospital in Diayla province and compared with thirty healthy of matched age and sex, as control group. The result indicate the presence of significant increase in serum TG ($p < 0.0001$), TC ($p < 0.0001$), LDL-C ($p < 0.0001$), and VLDL-C ($P < 0.0001$). Serum HDL-C levels were significantly decreased ($p < 0.0001$) in type 2 diabetic patients. In conclusion several lipid abnormalities were found in type 2 diabetes mellitus.

Key words: Diabetes Mellitus type 2, lipid profile, lipid abnormalities, hyperlipidaemia.

دراسة اضطراب الدهون في مصول دم المرضى المصابين بداء السكري(النوع الثاني) في محافظه ديالى

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الخلاصة:

من المعروف ان مرض السكري يقترن مع عدم انتظام الدهون ومشاكل امراض القلب. تم في الدراسة الحالية تعيين التغيرات في مستوى الدهون في مصول المرضى المصابين بمرض السكري الذين تتراوح اعمارهم من (45-65) سنة .

وقد تم قياس مستوى الدهون في مصل 30 مريض بداء السكري(النوع الثاني) من كلا الجنسين في مستشفى بعقوبة التعليمي في محافظة ديالى وتم مقارنتها مع 30 من عينات السيطرة الاصحاء من كلا الجنسين وباعمار مقاربة.

اشارت النتائج الى وجود زيادة معنوية في مستوى الكولسترول ، الدهون الثلاثية ، البروتين VLDL(P<0.0001) والبروتين الدهني منخفض الكثافة جداLDL الدهني منخفض الكثافة

HDL(P<0.0001) في حين ان هناك انخفاض معنوي في مستوى البروتين الدهني عالي الكثافة

في مصل الدم للمرضى المصابين بداء السكري(النوع الثاني).

Introduction

Diabetes Mellitus is a metabolic disorder characterized by chronic hyperglycemia and disturbances of carbohydrate, fat and protein metabolism associated with absolute or relative insulin deficiency. Diabetes Mellitus is two types: Type I and Type II [1].

Type II Diabetes Mellitus is a heterogeneous condition characterized by the presence of both impaired insulin secretion and insulin resistance [2]. It is one of the most common chronic diseases in the world, and the number of patients with Diabetes Mellitus has risen sharply in recent years [3].

Diabetes Mellitus may be associated with a number of complications including diabetic nephropathy, neuropathy, retinopathy, diabetic foot, macrovascular and microvascular diseases [4]. Type II Diabetes Mellitus considered as independent risk factor for coronary artery disease and risk of coronary disease is three to four fold increases in patients with Diabetes compared with non-diabetic population and

60-80% of Type II diabetics are obese [5]. The lipid abnormalities in patients with diabetes are probably playing important role in the development of atherogenesis. These lipid disorders include not only quantitative but also qualitative abnormality of lipoproteins which are potentially atherogenic [6]. Quantitative abnormalities include increased levels of total plasma cholesterol, triglyceride and low-density lipoprotein (LDL) cholesterol, and decreased level of high density lipoprotein (HDL) cholesterol. Qualitative abnormalities include change in the composition of LDL-cholesterol (small dense LDL-cholesterol, increase triglyceride content and increase electronegativity of LDL-cholesterol). These changes make LDL-cholesterol susceptible to oxidation and glycation with consequential foam cell formation, endothelial dysfunction and atherosclerosis [7]. Triglyceridemia has been associated with increased risk of coronary heart disease both in non-diabetic and Type II diabetic subjects. Remnants of triglyceride rich lipoproteins seem to be extremely atherogenic. LDL-cholesterol is related to life style factors such as diet and exercise. It has associated with metabolic syndrome [8]. The determination of the serum lipid levels in people with diabetes is now considered as a standered of the diabetes care and the measurement of the lipid profile of diabetic patients is needed to investigate how there lipid metabolism is affected by diabetes, as they have different genetic composition and life styles [9]. This study was carried out to compare between the lipid profile of patients with Type II Diabetes Mellitus and healthy peoples.

Materials and Methods

Patients with Type II Diabetes Mellitus were included in this study. Thirty diabetic patients (15 males and 15 females) treated with diabetic medication which does not have any side effects on lipid profile and thirty healthy controls (15 males and 15 females) were randomly selected and they examined for lipids abnormality. The patients who were enrolled in this study were selected from Type II diabetic patients who were attending Baqubah Educational Hospital in Diayla provinc. The age group selected was 45 to 65 years for both diabetic patients and healthy control.

Five to ten milliliters of blood were collected in tubes without anticoagulants. The blood samples allowed to clot at room temperature for one hour and were obtained by centrifugation at (3000xg) for 10 minutes and the collected serum was transferred into plain tube for lipid profile measurement.

Parameters that were measured include: Cholesterol, Triglyceride (TG), High density lipoprotein (HDL), Low density lipoprotein (LDL) and Very low density lipoprotein (VLDL).

Total cholesterol and triglyceride (TG) were determined by an enzymatic colorimetric method (Linear Chemicals. S. L.) [10,11]. HDL-cholesterol was measured enzymatically in the supernatant after the selective precipitation of apoliprotein B-containing lipoproteins (VLDL , LDL and (a) Lpa) by phosphotungstic acid /magnesium chloride solution and centrifugation (Linear Chemicals. S.L.) [12].

Low density lipoprotein (LDL) cholesterol was calculated by using Friedewald formula [13]:

LDL-cholesterol (mmol/L) = total cholesterol-HDL-cholesterol-TG/2.2 (mmol/L)

VLDL concentration is calculated by Fiancis formula:

VLDL (mmol/L) = TG/2.2

The values of all the parameters were given in mmol/L and they were described in terms of mean ± SD .The statistical significance of the deference between the control and study groups were evaluated by the t-test; a level of $p<0.0001$ was considered as statistically significant.

Results and Discussion

The mean ± SD of total cholesterol, TG, HDL-C, LDL-C, and VLDL-C of diabetic patients and control subject are shown in table 1.

Type 2 diabetic males and females showed statistically significant increase in the levels of serum TC, serum TG, serum LDL-C, VLDL-C ($P < 0.0001$) when compared to control subject, while serum HDL-C levels showed statistically significant reduced ($p < 0.0001$).

Table 1. Level of cholesterol, triglyceride, HDL, LDL and VLDL in sera of type 2 diabetes mellitus patients and control.

Parameters	Control subject	Type 2 diabetes mellitus patients treated with diabetic medication	P value
No.	30 (15male+15 female)	30 (15male+15 female)	
Age(years)	45-65	45-65	
Total cholesterol mmol/L mean±SD	5.30±0.43	7.68±0.15	P<0.0001
Triglyceride mmol/L mean±SD	1.08±0.24	2.64±0.20	P<0.0001
HDL-C mmol/L mean±SD	1.22±0.18	0.70±0.18	P<0.0001
LDL-C mmol/L mean±SD	3.59±0.49	5.78±0.122	P<0.0001
VLDL-C mmol/L mean±SD	0.49±0.11	1.20±0.09	P<0.0001

In the present study, the results showed that the lipid and the lipoprotein profiles were significant different ($p < 0.0001$) in type 2 diabetes mellitus patients. Total serum cholesterol, serum triglyceride, LDL-C and VLDL-C were significantly increased in the patients group and HDL-C was significantly decreased as compared to the control group. This variation in prevalence may be due to differences in BMI and possibly genetic variation and the results were in agreement with the findings of many similar study [4,18].

However, khan et al [16] reported no significant differences were observed in the levels of serum TC, LDL, HDL, and the LDL/HDL ratio. The most common abnormality found in diabetes is high triglycerides with Low high density lipoprotein (HDL), and although if low density lipoprotein (LDL) might not be higher, its metabolism is abnormal [14]. There is also an inverse relationship between serum levels of HDL-C and triglycerides in diabetic patients; with low serum HDL-C levels possible representing an independent risk factor for cardiovascular disease. Insulin resistance, which is central to the metabolic syndrome and type 2 diabetes mellitus, leads to high levels of very low-density lipoprotein (VLDL),which contain a high concentration of triglycerides, resulting in high serum triglyceride level and low serum HDL-C levels [15]. Although, in another study low triglyceride concentration was found in type 2 diabetic patients in African Americans [4]. Lipid abnormalities in diabetic patients with type 2 are described as increased serum triglycerides, very low density lipoproteins, low density lipoproteins and lowering of high of high density lipoproteins [17]. Early detection and treatment of hyperlipidemia in diabetes mellitus can prevent the progression of lipid abnormalities and minimize the risk for atherogenic cardiovascular disorder and cerebrovascular accident [18]. Out of this work, we conclude that there is several lipid abnormalities occur in our type 2 diabetic patients. Common lipid abnormalities in diabetes are increased triglyceride, LDL-C, serum cholesterol, VLDL-C and low HDL-C.

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