

Lipid Profile of Controlled and Uncontrolled Diabetics in Erbil, Iraq

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ABSTRACT:

Background: Diabetes mellitus is a clinical syndrome characterized by hyperglycemia due to absolute or relative deficiency of insulin. This study was carried out to; compare lipid profile between uncontrolled and controlled diabetics, and find out; the prevalence, age and gender distribution of uncontrolled diabetics in a group of diabetic patients in Erbil, Iraq.

Methods: A cross-sectional study was conducted between March 1st, 2012 and October 1st, 2012. A convenience sample of 351 diabetic patients attending Erbil Teaching Hospital was taken. The recommended goal for (controlled) HbA1C is $\leq 7\%$. Venous blood was collected after at least 8 hours fasting for HbA1c, total cholesterol, triglycerides, high-density and low-density lipoprotein cholesterol.

Results: The sample included 351 patients (168 males and 183 females); their mean \pm SD age was 61.71 ± 9.5 years (ranged from 40 to 79 years) with a male: female ratio of 0.92:1. The mean \pm SD ages of controlled and uncontrolled diabetics were 59.91 ± 9.95 and 62.90 ± 9.02 years, respectively. Results revealed that the prevalence of uncontrolled diabetes is 60.1% and it is increased with age ($P=0.015$), and the prevalence of uncontrolled diabetes in males (65.5%) is significantly higher than (55.2%) that in females ($P=0.049$). The means \pm SD of serum total cholesterol (198.49 ± 54.79 mg/dl), serum triglycerides, serum LDL-cholesterol of uncontrolled diabetes were significantly higher than that of controlled diabetes ($P<0.001$, $P=0.042$, and $P=0.004$, respectively).

Conclusions: More than half of diabetic were uncontrolled and the prevalence of uncontrolled diabetes was higher in males than that in females and it was increased with age. There was significant difference of means of total cholesterol, triglycerides and LDL-cholesterol levels between controlled and uncontrolled diabetic patients.

Key words: Uncontrolled Diabetes, HbA1c, Lipid.

Introduction:

Diabetes mellitus is a clinical syndrome characterized by hyperglycemia due to absolute or relative deficiency of insulin. Diabetes occurs world-wide and the incidences of both type 1 and type 2 diabetes are rising; it is estimated that, in the year 2000, 171 million people had diabetes, and this is expected to double by 2030.

This global pandemic principally involves type 2 diabetes to which several factors contribute, including greater longevity, obesity, unsatisfactory diet, sedentary lifestyle and increasing urbanization.^[1]

Diabetes mellitus is a common secondary cause of hyperlipidaemia, particularly, if glycaemic control is poor, which in-turn is an important risk factor for atherosclerosis and coronary heart disease.

Diabetes mellitus increases the risk of atherosclerotic vascular disease because of associated dyslipidaemia.

Many studies advocate aggressive management of lipid disorders in Diabetes to decrease these complications.^[2] Glycosylated haemoglobin (HbA1c) is commonly used as a marker of glycaemic status. HbA1c has been proposed as a dual marker for glycaemic control and coronary artery disease (CAD) risk factor.^[3]

The American diabetes association (ADA) estimates that the risk of diabetes-related mortality increases 25% for each 1% increase in HbA1c.

It has also been estimated that each percentage point increase in HbA1c correspond to a 35% increase in the risk of microvascular complications

and an 18% increase in the risk of myocardial infarction (fatal and non-fatal).

The reduction or control of blood glucose level may lower the lipid risk factor for cardiovascular diseases.^[4]

In recent years a great deal of emphasis has been placed on relationship between elevated serum cholesterol levels, especially LDL cholesterol.^[5]

There is evidence of close relationship between poor glycaemic control and progression of dyslipidemia.^[6] Most frequent complication of DM is atherosclerosis; it affects major vascular beds leading to various metabolic abnormalities. Intensive glycaemic control means the glycohaemoglobin (HbA1c) or blood glucose values are normal or near normal range, no matter how simple or complex the treatment regimen is?^[7]

Diabetes control and complications trial group conclusively demonstrated the importance of glucose control in preventing and delaying the progression of classic microvascular complication of diabetes (retinopathy, nephropathy and neuropathy).^[8,9]

To the researcher's knowledge this is the first cross-sectional study concerning comparison of lipid profile between controlled and uncontrolled diabetics in Erbil.

This study was carried out to; compare lipid profile between uncontrolled and controlled diabetics, and find out; the prevalence, age and gender distribution of uncontrolled diabetics in a group of diabetic patients in Erbil, Iraq.

Methods:

Population and data collection: A cross-sectional study conducted between March 1st, 2012 and October 1st, 2012. A convenience sample included 351 diabetic patients attending Erbil Teaching Hospital during the study period. Verbal informed consent was obtained from all participants and they were assured that their participations are voluntary; there were no identifying questions (name) on the questionnaire.

The official permission for carrying out this study was obtained from the directorate of Erbil teaching hospital.

The scientific committee of the department of Community Medicine and the ethical committee of College of Medicine at Hawler Medical University approved the study protocol. Necessary corrections were made according to the comments of the committees.

Instrument:

Data collection done through direct interview using specially designed questionnaire (appendix) including age, sex, smoking (Current smoker was defined as a person who had smoked at least one cigarette per day, and non-smoker was defined as a person who never smoked.

Ex-smoker was defined as anyone who had smoked at least 100 cigarettes in his or her lifetime but had stopped smoking at the time of the study for at least six months)^[10], exercise (walking at least 30 minutes per day), family history of diabetes and hyperlipidemia. Weight and height were measured and BMI was calculated.^[11]

Individuals was considered diabetics if the condition had been previously diagnosed by a physician, or if they have been receiving insulin and/or treatment before admission or they were discovered to have fasting blood sugar of ≥ 126 mg/100ml.

The recommended goal for (controlled) HbA1C is $\leq 7\%$.^[1] Venous blood samples were collected from all the patients after at least 8 hours fasting.

The sera were analysed for HbA1c, total cholesterol, triglycerides (TG), high-density lipoprotein cholesterol (HDL) and low-density lipoprotein cholesterol (LDL).

Data analysis: Data entry and data analysis done by using Statistical package for social sciences (SPSS, version 18.0). P value ≤ 0.05 regarded as statistically significant. Statistical tests included Chi-square (χ^2) test to compare between the proportions of different "characteristics" among controlled diabetes with the same proportions among uncontrolled diabetes, and Student t-test to compare between means of numerical variables (lipid profile) among controlled and uncontrolled diabetes.

Results:

The sample included 351 patients (168 males and 183 females); their mean \pm SD age was 61.71 ± 9.5 years (ranged from 40 to 79 years) with a male:female ratio of 0.92:1. The mean \pm SD ages of controlled and uncontrolled diabetics were 59.91 ± 9.95 and 62.90 ± 9.02 years, respectively.

Table 1 shows that the prevalence of uncontrolled diabetes was 60.1% and there is significant association between uncontrolled diabetes and age (P=0.015).

Results revealed that the prevalence of uncontrolled diabetes in males (65.5%) was significantly higher than (55.2%) that in females (P=0.049), and there is significant association between smoking (P=0.013), practicing exercise (P=0.005), family history of diabetes (P=0.019) and uncontrolled diabetes as shown in Table 2.

Table 3 shows that the means \pm SD of serum total cholesterol (198.49 ± 54.79 mg/dl), serum triglycerides (149.44 ± 82.78 mg/dl), serum LDL-cholesterol (122.99 ± 51.28 mg/dl) of uncontrolled diabetes were significantly higher than (180.06 ± 41.21 mg/dl, 132.91 ± 68.00 mg/dl, and 108.91 ± 39.29 mg/dl, respectively) that of controlled diabetes (P<0.001, P=0.042, and P=0.004, respectively).

Discussion:

Diabetes mellitus increases the risk for atherosclerotic vascular disease. The risk is greatest in people who have other known risk factors, such as, dyslipidaemia, hypertension, smoking and obesity.^[2]

Patients with type 2 DM have two to fourfold increase in cardiovascular disease (CVD) and dramatically higher risk of accelerated cerebral and peripheral vascular disease.^[12] Indeed, 75–80% of adult diabetic patients die of coronary artery disease, cerebrovascular disease, peripheral vascular disease or a combination of these conditions.^[13]

Patients with type 2 diabetes can have many lipid abnormalities, including hyperchylomicronaemia, elevated levels of low-density lipoprotein cholesterol and triglycerides; and low levels of high-density lipoprotein cholesterol.^[14]

Lipid abnormalities may be the result of the unbalanced metabolic state of diabetes (i.e., hyperglycaemia and insulin resistance) and improved control of hyperglycaemia does moderate diabetes-associated dyslipidaemia.^[15]

In type 2 diabetes the major disturbances in lipoprotein metabolism are reflected by an increase in plasma triglyceride and a low HDL-cholesterol with normal or near normal LDL-cholesterol levels. However in diabetics this LDL fraction contains a greater proportion of small, dense LDL particles which are believed to be more atherogenic.^[16]

Previous studies reported that rise in total cholesterol, triglyceride, LDL-cholesterol, while reduction in plasma HDL-cholesterol level in

glycemic uncontrolled diabetes occurs due to metabolic disturbance of lipids.^[17,18]

They observed that increased hyperglycemia leads to decrease lipoprotein lipase for LDL pathway activity induces under insufficient insulin action.

In the current study similar findings were observed. Mangeasis^[19] reported that low level of HDL- cholesterol often results in type 2 because in diabetics increased level of free fatty acids (FFA) may occur as the result of insulin resistance.

It may be related to fundamental defect in adipose tissue in which there is an abnormality in stimulation of free fatty acids incorporation into

triglycerides in the adipocytes. This results in an increased flux of FFA back to the liver resulting enhanced secretion of very low-density lipoprotein (VLDL) from liver in to blood stream involving two key proteins in lipoprotein metabolism – the cholesteryl ester transferase and hepatic lipase.^[20]

The cholesteryl ester transfer protein for the triglycerides in VLDL producing a pylycerider enriched but cholesteryl ester depleted HDL. As well such triglycerides enriched HDL appears to be catabolised more rapidly by the kidney, decreasing HDL cholesterol level.^[21] The findings of current study agreed with their observations.

Table 1: Age distribution of controlled and uncontrolled diabetic patients

Age (years)	Controlled DM No. (%)	Uncontrolled DM No. (%)	Total No. (%)	χ^2	P-value
<50	26 (61.9)	16 (38.1)	42 (100)		
50-59	36 (40.0)	54 (60.0)	90 (100)		
60-69	46 (37.1)	78 (62.9)	124 (100)	0.419	0.015
≥ 70	32 (33.7)	63 (66.3)	95 (100)		
Total	140 (39.9)	211 (60.1)	351 (100)		

Table 2: Description of the sample

Characteristics	Controlled DM (n = 140) No. (%)	Uncontrolled DM (n = 211) No. (%)	χ^2	P-value
Sex				
Male	58 (34.5)	110 (65.5)	3.864	0.049
Female	82 (44.8)	101 (55.2)		
Smoking				
Non smoker	92 (46.5)	106 (53.5)	8.735	0.013
Ex-smoker	21 (28.4)	53 (71.6)		
Current smoker	27 (34.2)	52 (65.8)		
BMI				
Normal	63 (42.0)	87 (58.0)	0.860	0.651
Overweight	47 (36.7)	81 (63.3)		
Obesity	30 (41.1)	43 (58.9)		
Practicing exercise				
Yes	26 (59.1)	18 (40.9)	7.738	0.005
No	114 (37.1)	193 (62.9)		
Family history of DM				
Yes	32 (30.5)	73 (69.5)	5.533	0.019
No	108 (43.9)	138 (56.1)		
Family history of hyperlipemia				
Yes	25 (43.1)	33 (56.9)	0.300	0.584
No	115 (39.2)	178 (60.8)		

Table 3: Means of serum lipid profile of controlled and uncontrolled diabetics

Lipid profile (mg/dl)	Controlled DM mean ± SD	Uncontrolled DM mean ± SD	t-test	P-value
Serum total cholesterol	180.06 ± 41.21	198.49 ± 54.79	- 3.589	<0.001
Serum triglycerides	132.91 ± 68.00	149.44 ± 82.78	- 2.043	0.042
Serum HDL-cholesterol	46.15 ± 13.09	43.93 ± 14.98	1.429	0.154 (NS)
Serum LDL-cholesterol	108.91 ± 39.29	122.99 ± 51.28	- 2.904	0.004

Conclusions:

More than half of diabetics were uncontrolled and the prevalence of uncontrolled diabetes was higher in males than that in females and it was increased with age. There was significant difference of means of total cholesterol, triglycerides and LDL-cholesterol levels between controlled and uncontrolled diabetic patients.

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