Lipid profile of a group of Nigerian diabetic patients

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ABSTRACT

Diabetes Mellitus increases the risk for all manifestations of heart disease and the treatment of hyperlipidemia has been successful in reducing cardiovascular mortality in diabetic patients. The study was carried out to compare the lipid profile of a group of diabetics who belong to a diabetic association with controls so as to assess the risk of cardiovascular disease in this group. Serum fasting lipid profile was determined in 45 diabetic patients and 30 controls using standard methods. Fasting glucose levels were also assayed in both groups using glucose oxidase method. Mean serum total cholesterol (TC), lower density lipoprotein cholesterol (LDLC) and high density lipoprotein cholesterol (HDLC) levels were not significantly different in the two groups (P>0.05), even though occurrence of high cholesterol level was higher in the diabetic group. Mean triacylglyceride levels were significantly higher in the control group (P< 0.01). However, there was no association between hyperlipidemia and hyperglycemia. The diabetic patients studied had similar lipid profile to the control. This perhaps is a reflection of proper management of their condition as a result of having adequate access to information and networking. The observed high triacylglyceride in the control groups suggests a necessity in educating the general populace on the need for regular lipid profile check up.

Key words: Diabetes mellitus, atherosclerosis, hyperlipidemia, hyperglycemia, cardiovascular diseases, Association.

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INTRODUCTION

Type 2 diabetes increases substantially the risk for all manifestations of atherosclerotic vascular diseases, coronary heart disease, cerebrovascular disease and peripheral vascular diseases [1]. Though the relationship is not well known, it is well documented that the risk of these diseases is increased 3-4 times fold in patients with poor glucose control [2]. Lipid abnormalities play an

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important role in the causation of diabetic atherosclerosis [3,4], but the patho-physiology is complex and multifactorial .

Several studies have been carried out to assess the lipid profile of different categories of diabetics in our environment [5,6]. Attempts have also been made to compare the lipid profiles of diabetic and hypertensive patients [7]. Hyperlipidemia is an important risk factor for cardiovascular diseases, however, treatment and management of hyperlipidemia has also proved very successful in reducing cardiovascular mortality in diabetic patients [1]. This study was therefore conducted to compare the lipid profile of Nigerian diabetics who belong to an association and have regular access to necessary information and networking on management of diabetes with healthy population. We also assessed the risk of coronary heart disease in these subjects compared to controls using their lipid profile as markers.

MATERIALS AND METHODS

The study population was divided into two groups. Group one were 45 known diabetics who belonged to a diabetic club in Osogbo, Osun state. This group meets once in a month for lectures, seminars and other enlightenment programs to enhance life while managing diabetes. They diabetics were all on one or more anti-diabetic drug but none of them were on cholesterol-lowering drugs. Group two consisted of 30 healthy volunteers who were age matched with group one and they served as controls. Questionnaires were administered to obtain information on age, sex, duration of diabetes and drug history of subjects.

Fasting blood samples were collected from subjects in all the groups into fluoride oxalate bottles for glucose assay and lithium heparinized anticoagulant bottles for lipid analysis respectively. The blood samples were centrifuged at 10,000 rpm using a refrigerated centrifuge GL-18B, product of Surgifield Medical, England.

Determination of TC was by OCA-CHOD-PAP method[8] while that of LDLC was determined as the difference between TC and the cholesterol content of supernatant after precipitation of the LDL fraction by polyvinyl sulphate [9]. HDLC was calculated using Fredrickson-Friedwald's formular [10]. The TG concentration was measured by the method of Tietz[11] and blood glucose determination was carried out using the glucose oxidase method of Barham and Trinder [12].

Statistical analysis was carried out using SPSS version 11.0. Differences between means were tested with independent sample T-test and $P \le 0.05$ was accepted as significant.

RESULTS

Table 1: Mean ± Standard error of mean of plasma lipids and glucose levels in Diabetics and controls

Parameters(Mg/dl)	Diabetics (n=45)	Control(n=30)	P-Value
Total Cholesterol	166.22± 7.58	155.10± 7.11	>0.05
LDL-Cholesterol	104.45± 8.08	96.88± 8.60	>0.05
HDL-Cholesterol	96.92±5.96	112.47±11.18	>0.05
Triglycerides	175.75±15.58	271.25±29.76	<0.05
Glucose	159.34±12.31	88.99±26.75	<0.05

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Table II: Lipid profile distribution in Diabetics and control groups

Lipids (mg/dl)	Diabetics (%) (n=45)	Control(%) (n=30)
Total Cholesterol Normal (< 200) Borderline(200-239) High($\geq$ 240)	36(80) 1(2.2) 8 (17.8)	26(86.7) 3(10) 1(3.3)
LDL-Cholesterol Normal (<100) Borderline (100-159) High (160-189) Very High ($\geq$189)	28(62.2) 10(22.2) 4(8.9) 3(6.7)	23(76.7) 5(16.7) 1(3.3) 1(3.3)
HDL-Cholesterol Normal (($\geq$60) Borderline (40-59) Low <40)	38(84.4) 5(11.1) 2(4.5)	22(73.3) 6(20.0) 2(6.7)
Triglycerides Normal (<150) Borderline(150-199) High(200-499) Very High(($\geq$ 500)	24(53.3) 14(31.1) 5(11.1) 2(4.5)	7(23.3) 4(13.3) 17(56.7) 2(6.7)
Glucose Normal (<110) High(($\geq$110)	17(37.8) 28(62.2)	25(83.3) 5(16.7)

Table III: Comparison of lipid profile of male and female subjects in the diabetic and control groups

| Parameters (Mg/dl) | Diabetics | | | Control | | |
	Male (n=20)	Female (n=25)	P	Male (n=9)	Female (n=21)	P-value
Total Cholesterol	156.77±10.83	173.79±10.49	>0.05	136.32±11.52	163.15±8.44	>0.05
LDL-Cholesterol	96.53±9.86	110.79±12.26	>0.05	87.11±13.44	101.07±10.93	>0.05
HDL-Cholesterol	90.27±8.52	102.25±8.28	>0.05	94.39±17.19	120.21±14.08	>0.05
Triacylglycerides	150.17±15.85	196.21±24.55	>0.05	225.92±43.14	290.68±38.11	>0.05
Glucose	156.24±17.78	161.83±17.30	>0.05	87.78±13.89	89.51±4.03	>0.05

Table IV: Lipid composition by Glucose levels in the Diabetic group

| Parameters(Mg/dl) | Glucose Status | | P-value |
	<110mg/dl (n=17)	$\geq$110Mg/dl (n=28)	
Total Cholesterol	158.86±12.54	170.70±9.59	>0.05
LDL-Cholesterol	104.10± 15.68	104.66± 18.22	>0.05
HDL Cholesterol	92.58±9.32	99.55±7.82	>0.05
Triacylglycerides	189.16±35.03	167.60±13.71	>0.05

The results presented in Table 1 revealed that the diabetic group had a significantly higher mean fasting glucose level (P=0.000), confirming their hyperglycemic state. The plasma concentrations for TC, HDLC and LDLC were not significantly different in both the diabetic and control groups while the control group had a much higher triacylglyceride level than the diabetic group (Table I). The lipid profile distribution of the two groups are similar, as shown on Table II.

Plasma TC, HDLC and LDLC were not significantly different in men and women though women had higher levels of these parameters in both groups (Table III).

Table IV shows the mean lipid parameters by glucose levels. There are no significant differences in the lipid profile of diabetics with high glucose levels and those with normal glucose levels.

DISCUSSION

The risk of Ischemic heart disease is 2-4 times greater in diabetes, occurring at a younger age, and is much higher in women with diabetes [1]. Hyperlipidemia, as reflected in hypercholesterolemia/hypertriglyceridemia is an important risk factor for cardiovascular disease, and treatment of these conditions has proved very successful in reducing cardiovascular mortality in diabetic patients [2].In this study, even though diabetic patients are seen to have higher levels of total cholesterol, LDL-cholesterol and lower levels of HDL-cholesterol compared to controls, the differences are not significant. However, control subjects have significantly higher levels of Triacylglycerides compared to diabetics (Table 1). Prevalence of high Total cholesterol is higher in the diabetic group than the control group (17.8% and 3.3% respectively) while that of LDL-cholesterol are comparable (8.9% and 3.3% respectively). Prevalence of low HDL-cholesterol is also similar in the two groups(84.4% and 73.3%) while control subjects have a much higher prevalence of high Triglyceride levels than the diabetic group (11.1% and 57.6% respectively).

There have been conflicting reports on the lipid profile of diabetics. While some workers found high levels of lipids in these patients [7,13], others reported normal [5] or even lower levels compared to controls [6]. However, the results obtained from the present study reveals a non significant increase in plasma TC and LDLC in diabetic patients when compared with normal non-diabetic controls. These conflicting results seen in diabetics may have to do with the management of diabetes in the particular group being studied. Adequate monitoring leading to necessary lifestyle adjustments have been found to be very effective in maintaining normal lipid levels and thus lowering the risk of coronary heart diseases in diabetic patients [6].

The diabetics in this study were well monitored under a Diabetic Association. They are regularly exposed to seminars, interact with each other and engaged in some other activities where they are encouraged to make necessary adjustments. It is therefore not surprising that they have close to normal lipid profiles. Our government should encourage such associations by way of funding and involvement of health professionals as is being done all over the world.

In this study, even though women in both diabetic and control groups have higher levels of all the parameters than men, the differences are not significant. Generally, women are said to have about 20% higher HDL-levels than men, a circumstance that may explain the reduced incidence of CHD in women and their longer life expectancy [14].

The high prevalence of hypertryglyceridemia in the control group points to the fact that efforts should be made to educate the general populace on the need to update their lipid profile tests from time to time and take necessary steps as appropriate.

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Table IV shows that there are no significant differences in the lipid profile of the diabetics when they were grouped according to their Glucose status. This suggests that there is no clear cut relationship between hyperglycemia and hyperlipidemia. Similar observation has been reported [1]. This may be due to the many potential mechanisms of increased cardiovascular damage in diabetes mellitus. It may also result from hypertension, abnormal clotting function and abnormal vascular reactivity [15,16].

CONCLUSION

Proper management of Diabetes mellitus in terms of adequate access to information and making necessary lifestyle changes will help in maintaining a normal lipid profile and reduce the risk of cardiovascular diseases. Networking among people suffering from this ailment should be encouraged and the general populace should also be well educated on the need to check their lipid profile regularly.

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