

A study of clinico- laboratory profile of the patients with type II diabetes at rural tertiary health care center

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Abstract

Background: The relationship between alteration of serum lipids and vascular complications is more significant in diabetics than in non diabetics amongst the general population. Lipid abnormalities will lead to microvascular and macrovascular diseases in diabetic patients. **Aims and Objectives:** To Study Clinico- Laboratory profile of the patients with Type II diabetes at Rural tertiary health care center. **Methodology:** This was a cross-sectional study that was carried out in patients who were admitted to Sri Adichunchanagiri hospital and research center, B.G. Nagara, Mandya attached to Adichunchanagiri Institute of Medical Sciences, B.G. Nagara, Mandya. From the patients admitted, 50 cases with H/O Type 2 diabetes mellitus were taken as subjects for the study. Age and sex matched 50 Non-diabetic were taken as controls. Biochemical analysis was done for Fasting and post prandial blood sugar, Fasting sample for Serum Triglycerides, Total Cholesterol, HDLc, LDLc, VLDLc, The lipid and lipoprotein assay was done using Dr. Lange LP 700 equipment. Statistical Analysis was done by Analysis of variance (ANOVA) continuous scale between two groups (Inter group analysis) on metric parameters. Chi-square/ Fisher Exact test has been used to find the significance of study parameters on categorical scale between two or more groups. **Results:** Most of the diabetics were in the age group of 60-70. The mean \pm SD among the diabetics was 63.48 ± 9.79 and among the control population it was 52.06 ± 7.37 . There were 34 males and 16 females among the diabetic population and 33 males and 17 females among the control group. The mean FBS was significantly higher in cases than control i.e. 177.30 ± 41.14 and 94.04 ± 15.15 ($<0.001^{**}$). The PPBS mg/dl was 310.50 ± 55.78 , 139.78 ± 12.78 ($<0.001^{**}$). Triglycerides and VLDL were significantly raised to the tune of 98% among the diabetics compared to the non diabetics. Total cholesterol was also raised among diabetics compared to the non diabetics. HDL levels were reduced among the diabetics compared to the non diabetics. Triglycerides was 223.54 ± 46.98 among the diabetics compared to 152.26 ± 27.81 among the non-diabetics. VLDL was 45.18 ± 9.72 among the diabetics compared to 30.34 ± 5.59 among non-diabetics. HDL was reduced to 36.24 ± 4.96 among diabetics compared to 41.54 ± 3.46 among non-diabetics. **Conclusion:** This study laid emphasis on the fact that diabetes mellitus influences lipid metabolism in a significant way. This was evident by the fact that certain lipid fractions such as triglycerides and very low density lipoproteins were elevated and HDL was depressed in diabetics when compared to healthy controls. So hyperlipidemia is quite common in diabetes and hypertriglyceridemia is the most common abnormality.

Key Word: Type II diabetes, Lipid profile, Dyslipidemia, hyperlipidemia, Hyperglycemia.

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INTRODUCTION

The relationship between alteration of serum lipids and vascular complications is more significant in diabetics than in non diabetics amongst the general population. Lipid abnormalities will lead to microvascular and macrovascular diseases in diabetic patients.¹ Lipoprotein abnormalities correlated with large vessel disease are seen in diabetics and non diabetic populations, however atherogenesis is accelerated in diabetics.^{2,3} Coronary

artery disease is among the important vascular complications of diabetes. Diabetes is associated with a marked increase by a factor of two to four times increased risk of coronary artery disease.⁴ The plasma cholesterol level is a strong predictor of the risk of cardiovascular events both in patients with diabetes and in patients with coronary heart disease^{5,6} As these groups of patients are at a high risk of morbidity and mortality, the need for more aggressive lipid lowering therapy have been recognized by both the National Cholesterol Education Program⁷ and American Diabetes Associations⁸ The risk factors for cardiovascular disease in diabetes include central obesity, hypertension, dyslipidemia, microalbuminuria, coagulation abnormalities, loss of nocturnal dipping of blood pressure and pulse and left ventricular hypertrophy.⁹ Among the risk factors hypertension is twice as frequent in patients with diabetes as in those without diabetes and accounts for up to 85% of the cardiovascular disease risk. Patients with hypertension are more prone to diabetes than are normotensive persons. In a large population based epidemiologic study with 4400 cohort and using clinical criteria, there was evidence of neuropathy in 7.5% of patients at the time of diagnosis. The prevalence of neuropathy increased to 50% after 25 years of follow up.¹⁰ Prospective studies have demonstrated that mean blood pressure levels are significantly higher in those patients who progress to microalbuminuria than in those who do not, indicating that high blood pressure always plays an important role in the pathogenesis of diabetic kidney disease¹¹ but only about 30% develop clinically overt nephropathy. This study reveals some of the evidence relating dyslipidemia to type-2 diabetes mellitus and its vascular complications which were better understood in the last century.

MATERIAL AND METHODS

After approval from institutional ethical committee a cross-sectional study was carried out in patients who were admitted to Sri Adichunchanagiri hospital and research center, B.G. Nagara, Mandya attached to Adichunchanagiri Institute of Medical Sciences, B.G. Nagara, Mandya. From the patients admitted, 50 cases with H/O Type 2 diabetes mellitus were taken as subjects for the study. Age and sex matched 50 Non-diabetic were taken as controls. The diagnosis of Diabetes is based on revised criteria according to consensus panel of experts from National Diabetes Data Group and WHO. Patients with Type 2 diabetes mellitus of more than 40 years of age, Duration of Diabetes more than 4 years were included into study while The control group consists of non diabetics more than 40 years, who are normotensive, who do not have concomitant diseases or other

conditions or use drugs that affect lipid levels. Type -2 diabetes patients with concomitant diseases or condition affecting the lipid levels like hypothyroidism, on lipostatic drugs, thiazides etc, Age below 40 years were excluded from the study. A detailed history was taken and careful physical examination done alongside Routine Blood and Urine examination. Biochemical analysis for Fasting and post prandial blood sugar was done, Fasting sample for Serum Triglycerides Total Cholesterol, HDLc, LDLc, VLDLc, The lipid and lipoprotein assay was done using Dr. Lange LP 700 equipment, Total cholesterol-CHOD - DAP method, Total Triglycerides-GPO - DAP method, HDL cholesterol (HDL - C)-Enzymatic estimation, LDL Cholesterol estimation-LDL = Total cholesterol – HDL – Serum Triglyceride/5, VLDL Cholesterol-its concentration can be approximated by dividing the amount of plasma triglycerides by 5 described by Friedewald in 1972. Statistical Analysis done by Descriptive and inferential statistical analysis has been carried out in the present study. Results on continuous measurements are presented on Mean ± SD (Min-Max) and results on categorical measurements are presented in Number (%). Significance is assessed at 5 % level of significance. The following assumptions on data is made, **Assumptions:** 1. Dependent variables should be normally distributed, 2. Samples drawn from the population should be random, Cases of the samples should be independent. Analysis of variance (ANOVA) has been used to find the significance of study parameters between three or more groups of patients, Student t test (two tailed, independent) has been used to find the significance of study parameters on a continuous scale between two groups (Inter group analysis) on metric parameters.. Chi-square/ Fisher Exact test has been used to find the significance of study parameters on a categorical scale between two or more groups.

RESULTS

Table 1: Age distribution of patients studied

Age in years	Cases		Controls	
	No	%	No	%
40-50	7	14.0	24	48.0
50-60	13	26.0	21	42.0
60-70	25	50.0	5	10.0
70-80	4	8.0	0	0.0
>80	1	2.0	0	0.0
Total	50	100.0	50	100.0
Mean ± SD	63.48±9.79		52.06±7.37	

P = <0.001**

Most of the diabetics were in the age group of 60-07 more became it was a random study. The mean ± SD among the diabetics was 63.48 ± 9.79 and among the control population it was 52.06 ± 7.37.

Table 2: Gender distribution of patients studied

Gender	Cases		Controls	
	No	%	No	%
Male	34	68.0	33	66.0
Female	16	32.0	17	34.0
Total	50	100.0	50	100.0

Samples are age matched with P = 1.000

There were 34 males and 16 females among the diabetic population and 33 males and 17 females among the control group.

Table 3: Comparison of sugar parameters in two groups of patients studied

Sugar parameters	Cases	Controls	P value
FBS mg/dl	177.30±41.14	94.04±15.15	<0.001**
PPBS mg/dl	310.50±55.78	139.78±12.78	<0.001**

The mean FBS was significantly higher in cases than control i.e. 177.30±41.14 and 94.04±15.15 (<0.001**), The PPBS mg/dl was 310.50±55.78, 139.78±12.78 (<0.001**).

Table 4: Distribution of lipid parameters in two groups of patients studied

Lipid parameters	Cases (n=50)		Controls (n=50)		P value
	No	%	No	%	
Total cholesterol mg/dl					
<200	18	36.0	39	78.0	<0.001**
>200	32	64.0	11	22.0	
LDL mg/dl					
<130	27	54.0	40	80.0	<0.001**
>130	23	46.0	10	20.0	
Triglyceride mg/dl					
<150	1	2.0	27	54.0	<0.001**
>150	49	98.0	23	46.0	
HDL mg/dl					
<40	34	64.0	13	26.0	<0.001**
>40	16	32.0	37	74.0	
VLDL mg/dl					
<30	1	2.0	26	52.0	<0.001**
>30	49	98.0	24	48.0	

Triglycerides and VLDL were significantly raised to the tune of 98% among the diabetics compared to the non diabetics. Total cholesterol was also raised among diabetics compared to the non diabetics. HDL levels were reduced among the diabetics compared to the non diabetics.

Table 5: Comparison of lipid parameters in two groups of patients studied

Lipid parameters	Cases	Controls	P value
Total cholesterol mg/dl	209.02±27.15	180.78±24.21	<0.001**
LDL mg/dl	126.82±25.63	106.80±27.41	<0.001**
Triglyceride mg/dl	223.54±46.98	152.26±27.81	<0.001**
HDL mg/dl	36.24±4.96	41.54±3.46	<0.001**
VLDL mg/dl	45.18±9.72	30.34±5.59	<0.001**

Triglycerides was 223.54 ± 46.98 among the diabetics compared to 152.26 ± 27.81 among the non-diabetics. VLDL was 45.18 ± 9.72 among the diabetics compared to 30.34 ± 5.59 among non-diabetics. HDL was reduced to 36.24 ± 4.96 among diabetics compared to 41.54 ± 3.46 among non-diabetics.

DISCUSSION

Diabetes is characterized by chronic hyperglycemia and disturbances of carbohydrate, lipid and protein metabolism¹². Dyslipidemia is one of the major risk factor for cardiovascular disease in Type 2 Diabetes mellitus, characterized by elevated Total cholesterol (TC), Triglycerides (TG), Low density lipoprotein (LDL) and decreased High density lipoprotein (HDL)¹³. Because detection and treatment of dyslipidemia is one means of reducing Cardiovascular Disease (CVD) risk, determination of serum lipid levels in people with diabetes is now considered a standard of care¹⁴. Most of the diabetics under the study group were males (68%) compared to (32%) females which was comparable to Ajagnakar and Sathi *et al* 1989 and Vaishnava *et al* 1989 who's s studies implied that the incidence of diabetes was greater among the male population compared to the females. In the study group most of the diabetics were in the age group of 60-70 years, moreso because it was a random study. Dyslipidemia was an obvious feature in the present study among the study group. TG's and VLDL's were significantly raised to the tune of 98% in the study population compared to the control population. HDL levels were reduced among the diabetics when compared to the non diabetics. These findings corroborated with the Study conducted by Mazzone *et al* (2000) where he documented an increase in TG's. In this study it was observed that apart from an increase in TG's and VLDL and decrease in HDL, TC also was found to be slightly raised in the study. A study conducted by H.O Otamere *et al* also documented an increase in triglycerides, total cholesterol, LDL and decrease in HDL which was similar to the findings in this study Studies such as Fredrick *et al* (1994), Michel *et al* (1987) also documented increased levels of TG's, VLDL and decreased levels of HDL which was pretty much the picture in this study. Chase and Glasgow *et al* (1976) conducted a study and documented elevated levels of TG's, TC, LDL and depressed levels of HDL, similar to that observed in this study P.K. Bijaani *et al* (1983) and Barr *et al* (1951) found that HDL levels were depressed in diabetics which was one of the finding in this study as well with mean HDL level of (36.24±4.96) among the diabetic population compared to HDL level of (41.54±3.46) among non diabetics These findings were similar to that of which showed that Elevated LDL-C,

elevated TCHOL, elevated TRG, and reduced HDL-C levels were noted in 28.37%, 36.37%, 39.01%, and 30.12% of the patients, respectively¹⁵. Low density lipoprotein and TG were highest among 50-59 years age group while TC was highest among 70-79 years in both male and female participants. HDL was lowest among 60-69 years male and 40-49 years female. A similar study showed that Median and upper range of total cholesterol, HDL-C and LDL-C were found to be higher in women than in men in all the age groups. However triacylglycerol and VLDL-C concentrations were observed to be higher in the men than women except in age group of 61-70 years¹⁶.

CONCLUSION

This study laid emphasis on the fact that diabetes mellitus influences lipid metabolism in a significant way. This was evident by the fact that certain lipid fractions such as triglycerides and very low density lipoproteins were elevated and HDL was depressed in diabetics when compared to healthy controls. So hyperlipidemia/dyslipidemia is quite common in diabetes and hypertriglyceridemia is the most common abnormality.

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