A Study of Lipid Profile Changes in Diabetes Mellitus.

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ABSTRACT

Background: In the recent years, increase in the incidence of Diabetes Mellitus in developing countries has been associated with complications resulting in mortality and morbidity. This research determined the Lipid profile abnormalities in diabetes mellitus which is one of the leading cause of complications of diabetes mellitus. The incidence of type 2 diabetes mellitus (Type 2 DM) with altered lipid profile in one of the main causes of cardiovascular disease. **Methods**: 100 diabetic and 100 non diabetic patients enrolled in our hospital were included in the study. Biochemical tests for blood sugar levels, glycated hemoglobin, Total cholesterol, triglycerides, LDL, VLDL and HDL were performed. **Results:** The high levels of Total cholesterol, TGL and LDL were seen more among females than in males. Elevated levels of lipids were seen more among the diabetics than normal controls. **Conclusion**: Since high lipids with diabetes is a very dangerous combination, people should be educated properly towards the risk of this so that proper action can be taken maintain normal lipid levels.

Keywords: Diabetes Mellitus, Lipid, Cholesterol, Triglycerides

INTRODUCTION

The prevalence of diabetes in adult population worldwide was 4% in 1995 and is estimated to rise to 5.4% by the year 2025, with 42% increase from 51 to 72 million in developed nations and 170% increase from 84 to 228 million in the developing countries. The countries with largest number of people with diabetes will be India China and USA by the year 2025, with women to be more affected than men.[1,2]

Diabetes mellitus is almost always associated with changes in plasma lipoproteins. To understand the mechanism of the changes in lipoproteins that occur in diabetes mellitus and how they may influence the development of the cardiovascular disease that accompanies this disorder, we must examine lipoprotein metabolism.[3]

The most common alteration of lipoprotein in type-2 diabetes mellitus is hyper triglyceridemia caused by an elevation in VLDL concentration and LDL levels. These levels can be either increased or decreased depending upon hyperglycemia. HDL in type-2 diabetes mellitus is usually decreased due to increased rate of HDL clearance as measured by apo-A1 and apo-A2 kinetics.[3]

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Dyslipidemia which is usually present in diabetic in the form of increased triglycerides and decreased HDL cholesterol level is 2 to 3 fold common in diabetics than in the non diabetics and confers much of accelerated and increased early risk of coronary artery disease (CAD), cerebrovascular disease, peripheral vascular disease and sudden cardiac death. These lipid abnormalities will lead to microvascular and macrovascular diseases in diabetic patients. Lipoprotein abnormalities correlated with large vessel disease are seen in both diabetic and non-diabetic populations, however atherogenesis is accelerated in diabetics.[4,5]

The most important vascular complication among diabetics is coronary artery disease associated with a marked increase of two to four fold. 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.[6]

The microalbuminuria high blood pressure always plays an important role in the pathogenesis of diabetic kidney disease but only about 30% develop clinically overt nephropathy.

Despite the significant role that dyslipidemia is believed to play in the development of cardiovascular disease in diabetes, there are very few studies in our area on this prevalence.

This study was conducted primarily to determine if there is any association between lipid profile and Diabetes mellitus with respect to age or sex in our geographical area.

MATERIALS AND METHODS

This study has been carried out at Mallareddy institute of Medical sciences from May-2013 to April-2015 on 200 subjects, 100 diabetic patients and 100 normal healthy controls, in biochemistry lab by using semi auto-analyser (ERBA chem5 plus v2) to detect the plasma glucose and serum lipid profile

levels. The estimation of glucose was performed by enzymatic method (GOD POD). This method is linear up to 500 mg%. For all samples exceeding 500 mg% they were diluted and reassayed. The result was multiplied by the dilution factor. Cholesterol, for HDL, LDL and Total Cholesterol, was estimated by oxidase peroxidase method. Triglycerides were estimated by enzymatic colorimetric method.

RESULTS

Out of the 200 patients in our study, 100 were diabetic and 200 were non diabetic and were considered as controls. The lipid levels were all in the normal range in controls while they were considerably high in the diabetics [Table 1]. In the controls, the Total cholesterol and LDL were high in the 51-60 age group followed by the 30-40 age group. Incidentally, the age group of 41-50, though total cholesterol and LDL were the least, VLDL and TGL were higher [Table 2]. Among the diabetics, Total cholesterol, TGL and VLDL levels were highest in the 61-70 age group. Total cholesterol was lowest in 30-40 age group [Table 3]. In males, all the lipid levels were higher in the diabetics, though HDL and VLDL were only marginally elevated [Figure 1]. Although similar results were seen among the females, it as observed that there was no change in the HDL levels in both the cases [Figure 2]. However, it is observed in our study that Total cholesterol and triglyceride levels in females is more than that of males in diabetic patients while the rest of the lipid profile levels are very similar [Figure 3].

| **Table: 1**: Lipid profile in controls and diabetics (Mean ± SD).					
Variables	**TCh (mg/dl)**	**TGL (mg/ dl)**	**HDL (mg/dl)**	**LDL (mg/dl)**	**VLDL (mg/dl)**
Controls (n = 100)	168 ± 12.9	119 ± 10.9	40 ± 6.3	108 ± 10.4	23 ± 4.7
Diabetics (n = 100)	227 ± 14.3	185 ± 13.3	41 ± 6.3	150 ± 12.2	39 ± 6.15

Table 2: Age related lipid profile changes in controls (Mean ± SD).					
Age (Years)	**TCh (mg/dl)**	**TGL (mg/dl)**	**HDL (mg/dl)**	**LDL (mg/dl)**	**VLDL (mg/dl)**
30 – 40	176 ± 13.2	127 ± 11.2	39 ± 6.2	109 ± 10.4	25 ± 5
41 – 50	150 ± 12.2	126 ± 11.2	40 ± 6.3	104 ± 10.1	25 ± 5
51 – 60	182 ± 13.4	116 ± 10.7	44 ± 6.6	115 ± 10.7	23 ± 4.7
61 – 70	163 ± 12.7	108 ± 10.3	37 ± 6.0	105 ± 10.2	21 ± 4.5

Table: 3 Age related lipid profile changes in cases (Mean ± SD).					
Age (Years)	**TCh (mg/dl)**	**TGL (mg/dl)**	**HDL (mg/dl)**	**LDL (mg/dl)**	**VLDL (mg/dl)**
30 – 40	197 ± 11.0	176 ± 13.2	36 ± 6	126 ± 11.2	35 ± 5.9
41 – 50	237 ± 15.3	116 ± 10.7	41 ± 6.4	172 ± 13.1	31 ± 5.6
51 – 60	228 ± 15.1	151 ± 12.2	46 ± 6.8	151 ± 12.3	30 ± 5.5
61 – 70	247 ± 15.7	296 ± 17.2	38 ± 6.1	150 ± 12.2	59 ± 7.6
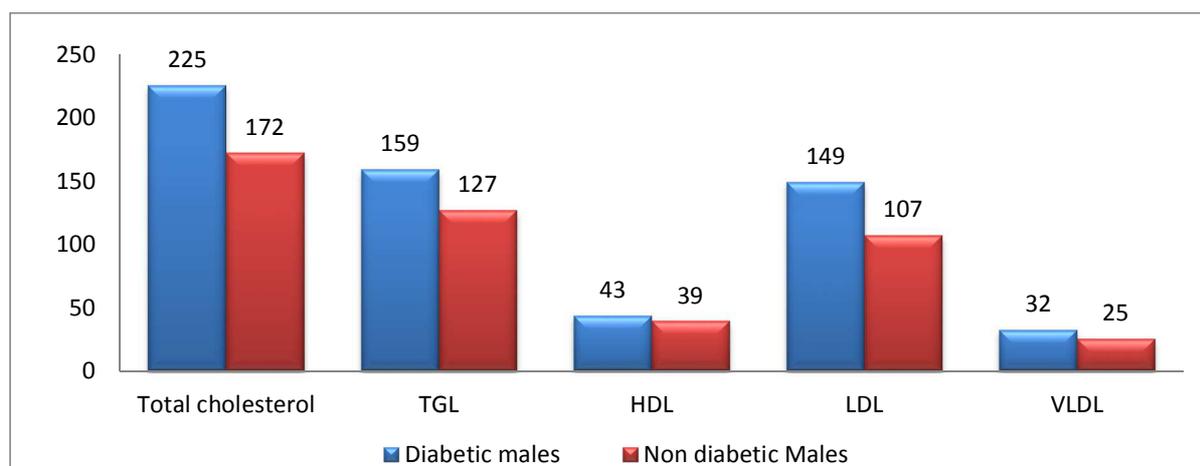
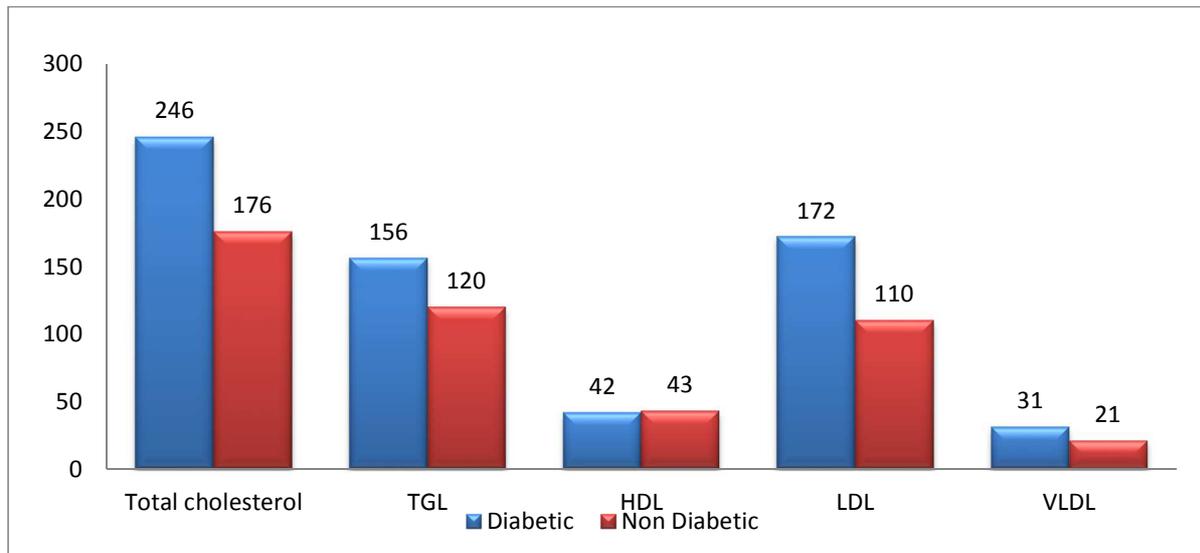**Figure 1:** Lipid levels of diabetic and non diabetic males.

Figure 2: Comparison of lipid profile in diabetic female and non-diabetic female.

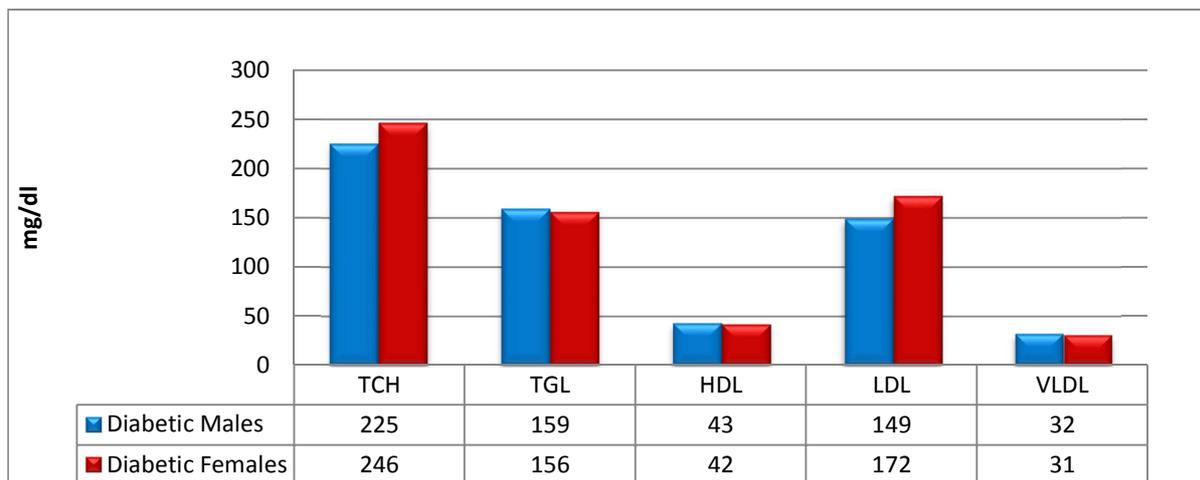|	TCH	TGL	HDL	LDL	VLDL
Diabetic Males	225	159	43	149	32
Diabetic Females	246	156	42	172	31

Figure 3: Chart shows the sex related changes of lipid profile in Diabetic Patients.

DISCUSSION

Lipid abnormalities are common in diabetics and frequently seen in type-2 diabetics. Dyslipidaemias make diabetics prone to develop CHD and other complications of atherosclerosis.[7] In our study, we have studied lipid profile in 100 diabetic and 100 non diabetic mellitus patients. We observed a high of TCh and TGL in the higher age groups and low HDL and high LDL cholesterol in adolesent age groups. The age of diabetic patients observed to be ≥40yrs confirmed earlier works that proves that age plays a significant role in the risk of developing Type 2 DM especially after 40yrs.[8,9] Samantha et al also found similar results were elevated cholesterol levels were found among the diabetics.[10]

Diabetes confers a markedly increased risk of susceptibility to diseases in both male and female patients.[11] However, women with diabetes are more susceptible to increased cardio vascular mortality.[12] Diabetic women may be subject to more adverse changes in coagulation, vascular function and cardiovascular risk factor than diabetic man.[13] We observed the lipid profiles, especially, T Ch, TGL and LDL of females to be considerably higher than that of males, which is in accordance with previous reports13. The higher incidence of females among the diabetics with high lipid profile was also observed by Walden et al.[14]

In a study by Zecollari et al.[9], the level of LDL, total cholesterol and TG were higher in the group of the patients with hepatosteatosis and the level of HDL cholesterol was lower in the group of the patients

with hepatosteatosis the differences were not statistically significant.

CONCLUSION

Type 2 DM patients usually suffer from elevated levels of TG, reduced levels of HDL with either normal or elevated levels of LDL. This indicates the influence of Type 2 DM on abnormal lipid profile of patients with its associated danger of elevated CVD risk. Reversibility of these changes cannot be complete at any stage of disease even by meticulous treatment. Thus Lipid profile analysis must be made an integral part of Type 2 DM patients' clinical reviews and treatment. All the patients suffering from diabetes, families of such patients and people prone to diabetes must be educated in the risks of this condition and take the necessary steps to manage it.

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