

Correlation of Serum Lipids with HbA1c in Individuals with Type 2 Diabetes Mellitus

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ABSTRACT

Background: Defects in insulin action and hyperglycemia could lead to changes in plasma lipoproteins in patients with diabetes. These Patients with type 2 Diabetes often exhibit an atherogenic lipid profile, which greatly increases their risk of cardiovascular deaths compared with people without diabetes. This dyslipidemia may be a treatable risk factor for subsequent cardiovascular disease.

Methods: The study was done at Hindu Rao Hospital Delhi. A retrospective analysis of 52 patients with Diabetes was done. Patients who were diagnosed as per WHO guidelines for diabetes mellitus and on statin therapy for at least 3 months were chosen for analysis.

Results: Results of this study show that the levels of LDL, HDL, TC and TG were significantly higher in type 2 diabetics.

Conclusion: Good glycaemic control is required for preventing other associated co-morbid conditions. Therefore, early diagnosis of dyslipidemia can be used as a preventive

measure for the development of cardiovascular disease (CVD) in type 2 diabetics.

Keywords: Lipid Profile, HbA1c, Diabetes Mellitus, Insulin.


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INTRODUCTION

Diabetic patients with accompanied (but often unnoticed) dyslipidaemia are soft targets of cardiovascular deaths. Patients with type 2 Diabetes often exhibit an atherogenic lipid profile, which greatly increases their risk of CVD compared with people without diabetes. Keeping in view the alarming increase in the incidence and prevalence of diabetics in India, WHO has declared India as the - Diabetic Capital of the World¹. With the prevalence of diabetes itself rising, particularly among ethnic minorities, CVD risk reduction in this population is of great public health importance.² Although lifestyle modifications and statins are the first-line interventions for CVD risk reduction in individuals with diabetes³, they remain at considerable risk for adverse cardiovascular events.⁴ Fatal cardiovascular disease before 40 years old shows an almost 20-fold increase in patients with type 1 diabetes compared with non-diabetic individuals.⁵ Dyslipidemia is a key cardiovascular risk factor (CVRf) in type 1 diabetes, with tighter treatment goals than the non-diabetic population.⁶ An early intervention to normalize circulating lipids has been shown to reduce cardiovascular complications and mortality.

Correlation of serum lipids with HbA1c is heterogeneous across the spectrum of glycemic control in type 1 diabetes individuals. Insulin resistance is the primary mechanism leading to lipid derangements in individuals with diabetes.⁷ This condition is due to nonutilization of glucose by body cells due to insulin resistance shown by the cells or due to insulin deficiency.⁸⁻¹⁰ This results in abnormalities in carbohydrate, protein and fat metabolism.¹¹ Chronic hyperglycemia is associated with significant long-term complications, particularly damage to the nerves, heart, blood vessels, eyes and kidneys¹² (Yki-Yarvinen, 1998). LDL-cholesterol and triglycerides worsened alongside HbA1c with distinct thresholds. Association of lower HDL-cholesterol with higher daily insulin dose is consistent and it points out to a role of exogenous hyperinsulinemia in the pathophysiology.

Study of 1275 individuals from the Brazilian multi-centre type 1 diabetes study and 171 normal controls.¹³

Khan et al observed a linear relationship between HbA(1c) and dyslipidaemia in a study on 1011 type 2 diabetes mellitus patients.¹⁴

The levels of serum cholesterol and TG were significantly higher and of HDL significantly lower in patients with worse glycaemic control as compared to patients with good glycaemic control. The findings of this study clearly indicate that HbA1C is not only a useful biomarker of long-term glycaemic control but also a good predictor of lipid profile.

In a study by Hadeel Najim et al on 50 newly diagnosed DM type 2 patients, (HDL-c) was increased markedly only in metformin treated group as monotherapy and as combination with glimepiride, while no significant changes were observed in triglyceride (TG) level in any group.

Metformin improve lipid profile when used in type 2 diabetic patients and reduce the risk of cardiovascular complications.¹⁵

In a study by Samir Maruti Adsule et al, they concluded that rosuvastatin 10 mg, atorvastatin 10 mg, and simvastatin 10 mg were very effective in reducing the levels of serum cholesterol, serum triglyceride, LDL, and VLDL after treatment for 12 weeks in patients with type 2 diabetes mellitus with dyslipidemia.¹⁶

The reductions in these lipid parameters were highly significant. All the three statins also increased the levels of HDL significantly ($P < 0.001$) after treatment for 12 weeks.

MATERIALS AND METHODS

The study was done at Hindu Rao Hospital Delhi. A retrospective analysis of 52 patients was done. Patients who were diagnosed as per WHO guidelines for diabetes mellitus and on statin therapy for at least 3 months were chosen for analysis.

The following variables were studied:-Gender, age, Total Cholesterol, LDL cholesterol, Triglycerides, HDL, Liver function test and HbA1C.

Analysis was done using SPSS 15. P value less than .05 was taken statistically significant.

Table 1: Age distribution of patients in years

Age (yrs.)	40-50	51-60	61-70	>70
Male	3	9	6	2
Female	6	14	8	4

Table 2: HbA1C distribution of patients

HbA1C co-relation	HbA1C < 7	HbA1C > 7
Male	8	12
Female	20	12

Table 3: Dyslipidaemia and HbA1C

	Male	Female
Hypertriglyceridemia	2	5
Increased LDL	1	2
low HDL	1	2
Hypertriglyceridemia and Increased LDL	4	7

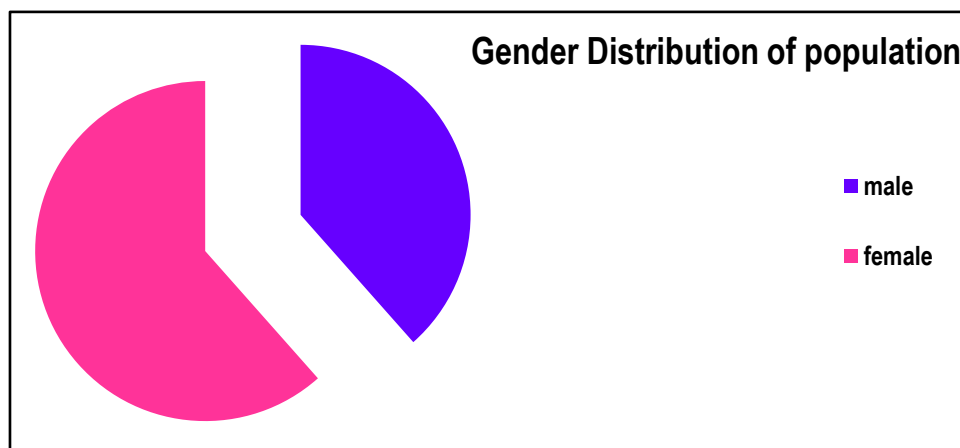


Fig 1: Gender distribution.

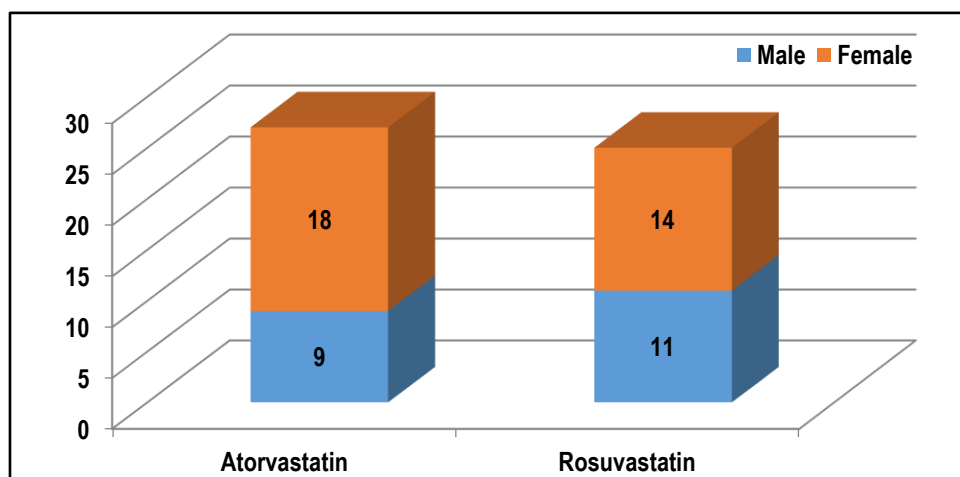


Fig 2: Patients on statin therapy

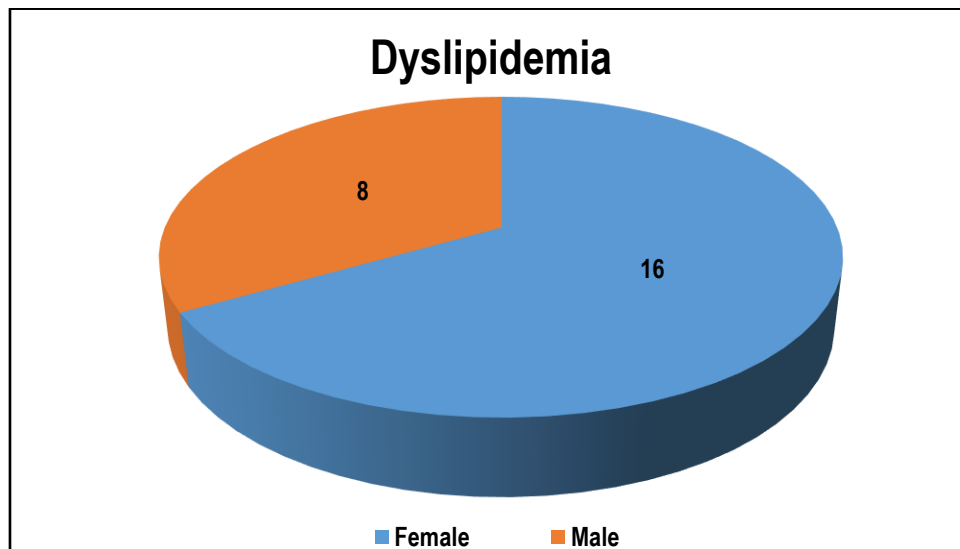


Fig 3: Gender distribution of dyslipidemic and non dyslipidemic patients

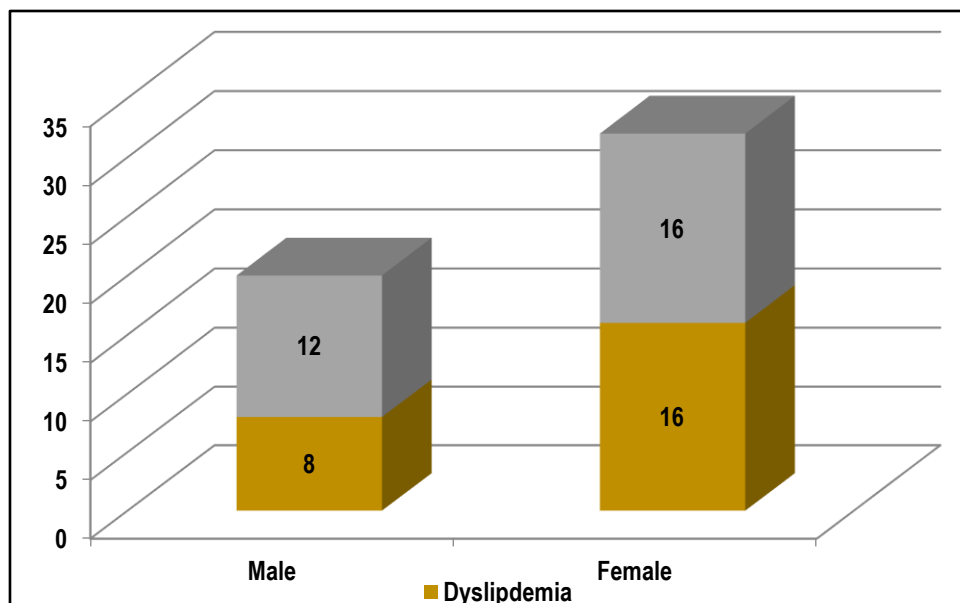


Fig 4: Gender distribution of dyslipidemic and non dyslipidemic patients

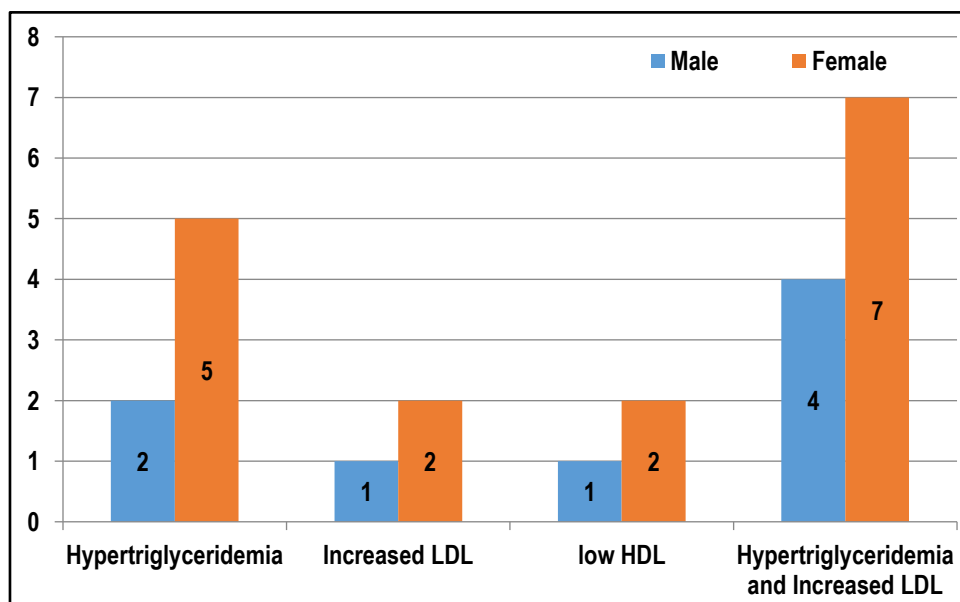


Fig 5: Gender distribution and type of dyslipidemia

RESULTS

Results of this study show that the levels of LDL, HDL, TC and TG were significantly higher in type 2 diabetics. These findings were in agreement with the previous studies.¹⁷

Total of 52 patient's data was analysed. There were 20 male patients and 32 female. Maximum patients (23 in number i.e 44.2%) were in the age group of 51-60 years.

DISCUSSION

Total number of patients included in the study was 52, out of which 20 were male and 32 were female. Average BMI was 22.4 ± 3.2 and Dyslipidaemia was seen in 46.15 % patients. It was more common in the age group of 51-60 years. Proportionally more common in female's than amongst male's. Average LDL was 128.11 mg/dl, HDL – 56.09 mg/dl, Chol –144.69 and TG was recorded 184.73 mg/dl. Average HbA1C was 8.76. Statistically significant co-relation with HbA1C was seen (p value < .01). Increased HbA1C was associated with dyslipidaemia.

The diabetic patients with higher HbA1c value (value > 7.0%) can exhibit a significant increase in TC, LDL, TAG and HDL in comparison to patients with HbA1c value $\leq 7.0\%$.¹⁸ Khan et al., also reported that severity of dyslipidemia increases in patients with higher HbA1c value. As elevated HbA1c and dyslipidemia are independent risk factors of CVD, diabetic patients with elevated HbA1c and dyslipidemia can be considered as a very high risk group for CVD¹⁴. Improving glycemic control can substantially reduce the risk of cardiovascular events in diabetics.¹⁹ It has been reported that reducing the HbA1c level by 0.2% could lower the mortality by 10%.²⁰ This study suggest the importance of glycemic control in order to manage dyslipidemia and risk for cardiovascular diseases in type 2 diabetics. None of the patients had altered liver function test. There was no statistically significant association with gender, BMI was seen. Furthermore, there was no statistically significant association with the type of statin used.

CONCLUSION

It was concluded from the results of this study that good glycaemic control is required for preventing other associated co-morbid conditions. Therefore, early diagnosis of dyslipidemia can be used as a preventive measure for the development of cardiovascular disease (CVD) in type 2 diabetics. Further, dyslipidaemia management with 20 mg Atorvastatin or 10 mg Rosuvastatin is not beneficial unless associated with glycaemic control.

RECOMMENDATION

To consider dyslipidaemia along with other co-morbid conditions while managing diabetes mellitus type 2 patients.

Monitoring glycaemic control and appropriate statin therapy along with lifestyle modification for the patients is also very important.

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