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Association between Glycemic Control and HDL Cholesterol in Type 2 Diabetes Patients

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Abstract
Dyslipidemia is associated with type 2 diabetes, with most common patterns of reduced HDL cholesterol and elevated triglyceride levels in diabetic patients. But, it is still unclear that whether low HDL cholesterol levels play a role in type 2 diabetes.
Study on 500 patients with type 2 diabetes and serum triglycerides <400 mg/dl was conducted at PMCH DHANBAD, Jharkhand, INDIA and it was observed that There was significant interaction between the HbA1C level risk of low HDL cholesterol.

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I Introduction

Nearly half of type 2 diabetic patients have low levels of HDL cholesterol, a strong independent risk factor for Cardiovascular Disease. HDL cholesterol is inversely related with cardiovascular risk, even when LDL cholesterol has been reduced in case of statin therapy.

An inverse relationship between HDL cholesterol and HbA1C levels has been described in type 2 diabetic patients. This study was done to know the association between glycemic control and HDL cholesterol in patients with type 2 diabetes.

II Materials And Method

Study on 500 patients with type 2 diabetes and serum triglycerides <400 mg/dl was conducted at PMCH DHANBAD, Jharkhand, India from Jan 2016 to Nov 2016. Age, sex, height and weight, smoking habit and current medications (lipid-lowering agents) recorded. Venous blood samples were taken for serum levels of HbA1C (immunoturbidometry method), glucose (glucose-oxidase method), cholesterol (total and HDL), and triglycerides (standard enzymatic assays) after a fast of 8 hours. LDL cholesterol was calculated with the Friedewald formula: LDL cholesterol = total cholesterol - (HDL cholesterol + [triglycerides/5]). Low HDL cholesterol was defined as levels of <40 mg/dl (men) or <50 mg/dl (women).

III Result

Higher HbA1C levels were recorded and prevalence of low HDL cholesterol was 47.4%. HbA1C levels tended to be higher in patients with low HDL cholesterol than in those with HDL cholesterol levels ≥40/50 mg/dl. There was significant interaction between the variables HbA1C level risk of low HDL cholesterol.

Table

Age (years)	52.5 ± 11.5
Diabetes duration (years)	11.6 ± 9.2
Sex (M/F)	298/202
BMI (kg/m^2)	28.5 ± 5.4
Current smoking (%)	14.3
HbA1C (%)	8.1 ± 1.9
HbA1C ≥7% (% of patients)	67.5
Total cholesterol (mg/dl)	184.1 ± 45.7
HDL cholesterol (mg/dl)	45.6 ± 12.9
Triglycerides (mg/dl)	140.4 ± 68.4
LDL cholesterol (mg/dl)	113.2 ± 34.6

HDL cholesterol <40/50 mg/dl(% of patients)	47.4
LDL cholesterol ≥100 mg/dl (% of patients)	64.9
Triglycerides ≥150 mg/dl (% of patients)	35.5
Diabetes therapy (%)	
Insulin ± Oral Hypoglycemic drugs	46.5
Oral Hypoglycemic drugs	39.6
Diet	13.9
Lipid-lowering drugs (%)	
Statins (%)	16.7
Fibrate (%)	1.3
Other hypolipemic drugs (%)	2.8
No hypolipemic drugs (%)	79.2

Analysis of result data revealed that increase in HbAlC values significantly increased the risk for low HDL cholesterol. The strength of this association was also maintained when additional adjustments for obesity (BMI ≥30 kg/m^2) and hypertriglyceridemia (≥150 mg/dl) were included in the multivariate analysis.

IV Conclusion

LDL cholesterol lowering therapy with statins is recommended by current guidelines for first-line treatment of diabetic dyslipidemia to reduce CVD in patients with type 2 diabetes. However, patients who achieve LDL cholesterol targets with statins may have some risk of cardiovascular disease related to low HDL cholesterol, which is an independent risk factor for cardiovascular disease. An additional therapeutic goal in diabetes including lifestyle modifications with emphasis of exercise and food habit changes, to increase HDL cholesterol levels is now being proposed.

In this study diabetic population having low HDL cholesterol was have higher HbA1C levels. This observation is consistent with previous reports (5,7,8,13). Lopes-Virella et al. (10) demonstrated a negative correlation between HDL cholesterol and serum glucose levels in diabetic subjects.

More interesting, our study found the association between poor glycaemic control and low HDL cholesterol remained significant even after adjustments for obesity and hypertriglyceridemia. It has also been observed that poor glycaemic control promotes glycation of the protein component of HDL cholesterol (apolipoprotein A1), altering HDL cholesterol metabolism and its ability to activate lecithin-cholesterol acyltransferase and the reverse cholesterol transport pathway (11).

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