



DOES HYPERTENSION AGGREGATE DYSLIPIDEMIA IN TYPE 2 DIABETICS ???

General Medicine

Dr. M. Aruna MBBS, post graduate in general medicine¹

Dr. M. Sri haribabu* MD, head of the department -general medicine *Corresponding Author

Dr. P. Ashrita Ramya MBBS, post graduate in general medicine

ABSTRACT

OBJECTIVES : To study the lipid profile in type 2 diabetics, To compare the lipid profile patterns in type 2 diabetics with and without hypertension.

METHODS : A Cross sectional observational study conducted in total 99 subjects, Divided into 2 groups. Group 1 consists 47 subjects with type 2 diabetes without hypertension and group 2 consists 52 subjects with type 2 diabetes and hypertension. Venous blood samples were collected after an overnight fast for fasting blood glucose and 2-hour postprandial blood glucose and for lipid profile.

RESULTS: Mean total cholesterol (TC) of diabetes without hypertension was 196.98±48.76 and diabetes with hypertension was 181.94±48.82. Total cholesterol (TC) abnormality was 42.5% in subjects with diabetes without hypertension and 57.5% in subjects with diabetes with hypertension. LDL cholesterol abnormality among diabetics without hypertension was 47.36% and diabetics with hypertension was 52.63%. Mean High Density Lipoprotein (HDL) cholesterol in diabetics without hypertension was 39.98±13.816 mg/dl and in diabetics with hypertension was 41.17±13.36 mg/dl. HDL cholesterol abnormality among diabetics without hypertension was seen in 52.72% and in diabetics with hypertension was 47.27%. Mean TG of diabetics without hypertension was 149.87±53.00 mg/dl and diabetics with hypertension was 168.15±63.92 mg/dl. TG abnormality among diabetics without hypertension was 45% and diabetics with hypertension was 55%.

CONCLUSION : Diabetes mellitus and essential hypertension were independently associated with hyperlipidemia.

KEYWORDS

Dyslipidemia, diabetes, hypertension.

INTRODUCTION

Both diabetes and hypertension are known to be associated with lipid abnormalities. Almost 50% diabetics have dyslipidaemia¹. This is characterised by elevated plasma triglycerides (TG) levels, low high density lipoproteins (HDL) cholesterol levels and increased concentration of small dense low-density lipoproteins (LDL) cholesterol. Similarly, dyslipidaemia has been reported in 50% to 80% of hypertensive patients². Relationship between dyslipidaemia and hypertension is complex. It is believed that dyslipidaemia may lead to the development of hypertension by causing endothelial dysfunction³. Moreover, the co-existence of these two risk factors exerts more than an additive impact on the vascular endothelium, resulting in heightened atherosclerosis and thus CHD⁴.

Given the effects of both these disorders on lipid parameters individually, it may be presumed that the impact of co-existent diseases would be far greater.

This study was conducted to determine the effect of hypertension on lipid parameters in type 2 diabetics.

PATIENTS AND METHODS

This cross sectional, observational study was carried out at GSL medical college and hospital, Rajahmundry, Andhra Pradesh from November 2016 to February 2018. Approval of the research protocol was obtained from the institutional ethics review committee. Patients with T2DM, aged 30 years and above were included in the study. Known smokers, alcoholics, who are obese, already on lipid-lowering agents, who had hypothyroidism, renal impairment were excluded. All those fulfilling the selection criteria were enrolled after obtaining informed written consent from them. Demographic data was noted down. History of hypertension noted. Height and weight were recorded to calculate body mass index (BMI).

Diagnosis of diabetes was made according to WHO criteria or if the subjects were already taking insulin or oral anti-diabetic drugs. Criteria for diagnosis of Diabetes mellitus is -Fasting plasma glucose 7.0 mmol/l (126mg/dl) or 2hr plasma glucose 11.1 mmol/l (200mg/dl). Subjects with systolic pressure more than 140mm Hg and diastolic pressure more than 90 mmHg or those already on antihypertensive drugs were considered as hypertensives.

TC > 200mg/dl, Triglycerides >170mg/dl, HDL <35mg/dl and LDL > 100mg/dl was taken as dyslipidemia.

Venous blood samples were taken after an overnight fast for fasting blood glucose and 2-hour postprandial blood glucose and lipid profile. Plasma glucose concentration was estimated using the glucose oxidase method. Serum lipids (total cholesterol, triglycerides, LDL cholesterol and HDL plasma cholesterol concentrations) were measured. Cholesterol and triglyceride levels were determined in the serum by commercially available kits on an Erba Mannheim -360 analyzer. High density lipoprotein was measured by using the direct high-density lipoprotein method. Low density lipoprotein and very low density lipoprotein cholesterol were calculated according to the formula of Friedewald et al.

STATISTICAL METHODS:

SPSS 21 was used for data analysis. Patients with diabetes were divided into two groups: those without hypertension, those with hypertension. Means of the different lipid fractions were compared between the two groups using student t test. Proportions of patients with abnormalities in lipid fractions were compared using chi-square test. A p-value < 0.05 was considered statistically significant.

OBSERVATIONS AND RESULTS

Out of 99 patients, 47 are women and 52 are men. Mean age of study participants was 52.76 ± 10.892 years. Mean BMI of study subjects is 23.9608. Mean FBS of total participants was 158.25mg/dl. Mean PPBS was 254.52mg/dl. Mean total cholesterol (TC) of diabetes without hypertension was 196.98±48.76 and diabetes with hypertension was 181.94±48.82. Total cholesterol (TC) abnormality was 42.5% in subjects with diabetes without hypertension and 57.5% in subjects with diabetes with hypertension. Mean Low Density Lipoprotein (LDL) cholesterol in diabetics without hypertension was 130.00±52.96 mg/dl and diabetics with hypertension was 109.04±54.46mg/dl. LDL cholesterol abnormality among diabetics without hypertension was 47.36% and diabetics with hypertension was 52.63%. Mean High Density Lipoprotein (HDL) cholesterol in diabetics without hypertension was 39.98±13.816 mg/dl and in diabetics with hypertension was 41.17±13.36 mg/dl. HDL cholesterol abnormality among diabetics without hypertension was seen in 52.72% and in diabetics with hypertension was 47.27%. Mean VLDL cholesterol in diabetics without hypertension was 26.83 and diabetics

with hypertension was 31.75. VLDL abnormality among diabetics without hypertension was 27.77% and diabetics with hypertension was 72.22%. Mean TG of diabetics without hypertension was 149.87±53.00 mg/dl and diabetics with hypertension was 168.15±63.92 mg/dl. TG abnormality among diabetics without hypertension was 45% and diabetics with hypertension was 55%.

Table No.1. Comparison Of Total Study Parameters In Type 2 Diabetics With And Without Hypertension:

Variables	Total study subjects N = 99	Group 1 N = 47 (mean value)	Group 2 N = 52 (mean value)	P value
Age	52.76	48.23	56.85	0.000
BMI	23.96	23.64	24.25	0.193
FBS	158.25	170.40	147.27	0.042
PPBS	254.52	270.28	240.27	0.048
TC	189.08	196.98	181.94	0.129
HDL	40.61	39.98	41.17	0.663
LDL	118.99	130.00	109.04	0.049
VLDL	29.41	26.83	31.75	0.138
TG	159.47	149.87	168.15	0.127

N= number of subjects

Group 1 – diabetes without hypertension

Group 2 – diabetes with hypertension

FBS – fasting blood sugar, PPBS – post prandial blood sugar.

TC – total cholesterol, HDL – high density lipoprotein,

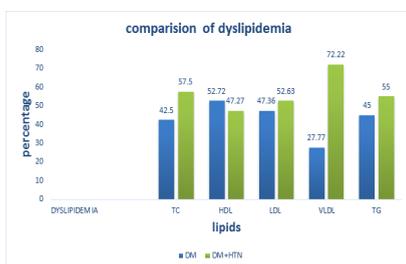
LDL – low density lipoprotein, VLDL – very low density lipoprotein

TG – triglycerides.

Table No.2. Comparison Of Dyslipidemia In Diabetics With And Without Hypertension.

DYSLIPIDEMIA	DM n=47 n(%)	DM+HTN n=52 n(%)	TOTAL n = 99 n(%)
TC (>200 mg/dl)	17 (42.5)	23 (57.5)	40(100)
HDL (<35 mg/dl)	29 (52.72)	26 (47.27)	55(100)
LDL (>100mg/dl)	27 (47.36)	30 (52.63)	57(100)
VLDL (>40mg/dl)	5 (27.77)	13 (72.22)	18(100)
TGL (>170mg/dl)	18 (45)	22 (55)	40(100)

n = number of subjects.



DISCUSSION

This study examined lipid profile patterns in type 2 diabetics with and without hypertension. Available literature shows that both diabetes and hypertension are known to be associated with lipid abnormalities.

According to some studies almost 50 % diabetics develop dyslipidemia⁵. Diabetic patients have 2 to 3 fold increased risk of developing coronary heart disease compared to the non-diabetic patients and it is due to the frequent association of diabetes with dyslipidemia, hypertension, and obesity.

In the present study, the mean age of diabetics with and without hypertension was 56.85±9.88 and 48.23±10.22 respectively and prevalence of hypertension in diabetics increased with increasing age and age difference between the groups was statistically significant. (P=0.000) in this study. Fifty seven % of patients in the study were in the age group of 40-60 years, which is a more vulnerable group to develop cardiovascular morbidity and mortality in India. Therefore the results of the present study and other studies conducted by Abdul Rehman Arshad et al⁶ and S.A. Isezuo et al⁷ indicate that the mean age of diabetes occurrence is above 40 yrs. Usually Type 2 DM occurs in people who are obese and over 40 years⁸. Age plays an important role

in relation to occurrence of diabetes and further increase in age causes increase in the risk of developing HTN. Aging results in changes at molecular, cellular and organ levels and plays a causative role in vascular complications of DM. According to Palta et al⁹, largest population of cardiovascular deaths was frequently seen in individuals of age group 40 years and above.

In present study mean total cholesterol (TC) of diabetics without hypertension was 196.98±48.76 and diabetics with hypertension was 181.94±48.82 and the difference is statistically insignificant (P=0.129). Total cholesterol (TC) was above threshold level in 42.5% of study subjects in diabetes without hypertension whereas 57.5% of subjects had elevated TC among diabetics with hypertension. It was observed that TC was elevated in more number of subjects in diabetes with hypertension compared to diabetes without hypertension. Other similar studies conducted by Oladayo et al¹⁰ and Tedesco et al¹¹, revealed that both diabetics with and without hypertension had higher levels of total cholesterol levels though the magnitude of dyslipidemia varied with each study. This can be attributed to the dietary habits and levels of physical activity in the studied populations.

In the present study the mean High Density Lipoprotein (HDL) cholesterol in diabetics without hypertension was 39.98±13.816 mg/dl and in diabetics with hypertension was 41.17±13.36 mg/dl. Smoking modifies serum lipid levels, may lead to insulin resistance and can lower serum HDL-C levels¹². In the present study smoking was one of the exclusion criteria. It is an additional factor that can be attributed to relatively normal levels of HDL cholesterol.

In the present study the mean Low Density Lipoprotein (LDL) cholesterol in diabetics without hypertension was 130.00±52.96 mg/dl and diabetics with hypertension was 109.04±54.46 mg/dl which was statistically significant (p=0.049). The prevalence of LDL cholesterol abnormality among diabetics without hypertension was 47.36% and diabetics with hypertension was 52.63%. It was observed that prevalence of LDL abnormality was high in diabetics with hypertension compared to diabetics without hypertension. And LDL cholesterol abnormality was high in both groups compared to abnormality of other lipid parameters. LDL cholesterol was the strongest independent predictor of CHD followed by HDL cholesterol and these observations support the current national guidelines in which LDL lowering is the primary lipid target for reducing CHD¹³.

Regarding triglycerides (TG) in the present study it was found that the mean TG of diabetics without hypertension was 149.87±53.00 mg/dl and diabetics with hypertension was 168.15±63.92 mg/dl. TG abnormality among diabetics without hypertension was 45% and diabetics with hypertension was 55%. Prevalence of TG abnormality was high in diabetics with hypertension than diabetics without hypertension.

Therefore, in the present study the percentage of subjects having dyslipidemia was high in diabetes with hypertension group compared to diabetes without hypertension.

CONCLUSIONS.

our study demonstrated that dyslipidemia exists in the type 2 diabetic population with high TC and LDL cholesterol in diabetics without hypertension and high VLDL cholesterol and triglycerides in diabetics with hypertension.

It has shown that diabetes mellitus and essential hypertension were independently associated with hyperlipidemia.

The mean values of lipids were high in diabetics without hypertension but the prevalence of dyslipidemia was high in diabetics with hypertension.

While managing diabetes, it is recommended to screen these patients for dyslipidemia and hypertension as a routine.

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