Research Article

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Trends of lipid abnormalities among newly detected type-2 diabetes mellitus in a tertiary care hospital in Karnataka, India

Chethan T. K.¹*, Venugopal K.²

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*Correspondence: Dr. Chethan T. K.,

E-mail: dr.chethan.tk@gmail.com

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ABSTRACT

Background: Diabetes mellitus is a common and a chronic disease with chronic complications and constitutes a substantial burden for both patient and health care system. Insulin resistance and type 2 diabetes are associated with a clustering of interrelated plasma lipid and lipoprotein abnormalities, which include reduced HDL cholesterol, a predominance of small dense LDL particles, and elevated triglyceride levels. Aims and objectives were to study the pattern of lipid abnormalities in newly detected type-2 diabetic patients.

Methods: A cross sectional study was conducted at Vijayanagara Institute of Medical Sciences Hospital and College, Bellary from May 2014 to November 2014. A total of 300 newly detected diabetic patients were included in the study. Blood Examination was done to estimate low density lipoprotein (LDL), high density lipoprotein (HDL) and triglycerides (TG).

Results: Out of 300 patients, lipid abnormality was seen in 200/300 (66.67%) of the patients. Increased LDL noted in 152 (50.67%), triglycerides in 112 (40.67%), decreased HDL in 130 (43.34%) of patients.

Conclusions: It is clearly evident that dyslipidaemia is very common association of type 2 diabetes mellitus, and culprit of majority diabetic related cardiovascular mortality.

Keywords: Triglycerides, High density lipoproteins, Low density lipoproteins, Atherosclerosis, Type-2 diabetes mellitus

INTRODUCTION

Diabetes mellitus is a common and a chronic disease with chronic complications and constitutes a substantial burden for both patient and health care system. According to the International Diabetes Federation (IDF) Diabetes Atlas 2011, the number of people living with diabetes is expected to rise from 366 million in 2011 to 552 million by 2030 if preventive programmes are not put in place. The prevalence of diabetes for all age-

groups worldwide was estimated to be 2.8% in 2000 and 4.4% in $2030.^2$

Type 2 diabetes mellitus (T2DM) is the predominant form of diabetes worldwide, accounting for 90% of cases globally. Sex, age, and ethnic background are important factors in determining the risk of developing T2DM. Age is also a critical factor. T2DM has been viewed in the past as a disorder of aging, and this remains true today. However, a disturbing trend has become apparent in which the prevalence of obesity and T2DM in children

¹Department of Community Medicine, Adichunchangiri Institute of Medical Sciences B G Nagar, Mandya, Karnataka, India

²Raghu Hospital, Sira, Tumkur Karnataka, India

is raising dramatically.⁵ Cardiovascular disease is the major cause of morbidity and mortality among diabetic patients, accounting for 75% of hospitalizations and 70–80% of deaths.^{6,7} In fact, coronary heart disease (CHD) is the leading cause of death among diabetic patients, who have a two- to fourfold higher risk of CHD mortality and incidence of nonfatal CHD events compared with patients without diabetes.⁸

Insulin resistance and type 2 diabetes are associated with a clustering of interrelated plasma lipid and lipoprotein abnormalities, which include reduced HDL cholesterol, a predominance of small dense LDL particles, and elevated triglyceride levels. At least 50% of deaths, are caused by coronary heart disease (CHD). The relative risk for CHD death is 1.5-2.5 in men and 1.7-4 in women. Although many factors play a part there is considerable evidence that abnormalities in serum lipids and lipid metabolism are important risk factors for this increased incidence of CHD in type 2 diabetes. On the control of the control

The incidence of diabetes and diabetic related cardiovascular death is very high in this part of Karnataka, India. This study was undertaken to study the pattern of dyslipidaemia in diabetes. Because reversal of these abnormalities carries the potential for preventing or ameliorating cardiovascular disease, early detection and prompt treatment of associated dyslipidaemia can delay or reduce the incidence of atherosclerosis and thus increases the mortality and morbidity associated with it.

METHODS

It was a cross sectional study in patients with type-2 diabetes mellitus patients, who visited medicine outpatient department Vijayanagara Institute of Medical Sciences and hospital, Bellary, Karnataka, India. During of the study was from May 2014 to November 2014.

Inclusion criteria

All newly diagnosed type-2 diabetic patient.

Exclusion criteria

Diagnosed case of diabetes on treatment, seriously ill patients, refused to be a part of the study and Pregnancy. The primary objective of this study was to examine LDL, HDL, and triglycerides. TG was tested by glycerol phosphate oxidase-peroxidase method; HDL and LDL were tested by direct enzymatic end point method. The patients were included in the study according to inclusion criteria. Universal sampling method was used. The entire newly diagnosed type2 DM patients during the study period were included. Data entry and management was done in excel, pre-determined data format have been introduced as datasets for quantitative data which was incorporated into a single master computer at the base. The data sets were transferred into SPSS after data cleaning and recoding with data definitions. Results of

quantitative data were summarized with frequencies and percentages.

RESULTS

A total of 300 patients were included in the study. Among which 176 (65.34%) were males, 124 (41.34%) were females. 178 (59.33%) patients were in the age group of 41-49 years. The youngest age was 26 years and eldest being 81 years.

Table 1: Distribution of patients according to age and sex.

Age (In years)	Male	Female	Total
<40	15	14	29
41-49	110	68	178
50-59	45	36	81
>=60	6	6	12
Toatl	176	124	300

Table 2: Distribution of patient according to BMI.

BMI	Number of patient	Percentage
Normal	104	34.66%
Overweight	88	29.33%
Obese	108	36%

104 (34.66%) were of normal BMI, 88 (29.33%) were overweight and 108 (36%) are obese.

Out of 300 patients, Lipid abnormality was seen in 200/300 (66.67%) of the patients. Increased LDL noted in 152 (50.67%), triglycerides in 112 (37.33%), decreased HDL in 130 (43.34%) of patients.

Table 3: Distribution of patients according to LIPID profile.

Parameter	Frequency
LDL	
<100	148 (49.3%)
100-129	72 (24%)
130-159	36 (12%)
160-189	28 (9.33%)
>190	16 (5.3%)
Triglycerides	
<150	188 (62.66%)
150-199	60 (20%)
200-499	40 (13.33%)
>500	12 (4%)
HDL	
<50	130 (43.34%)
>50	150 (56.66%)

Out of 300 patients 216 had complications, i.e. 72% of them had complications.

77% of patient with increased LDL, 32.14% with increased TG, 48.46% of patients with decreased HDL had complications.

Table 4: Frequency of complications.

Complications (n=216/300) (72%)		
Macro vascular	Micro vascular	
(n=144) (66.66%)	(n=72) (33.34%)	

DISCUSSION

Lipid abnormalities are due to resistance to insulin and hyperglycaemia which are decreased high density lipoprotein2b, and increased 3b and 3c, more small dense low density lipoprotein and elevated triglycerides.11 Altered metabolism of triglyceride-rich lipoproteins is crucial in the pathophysiology of the atherogenic dyslipidaemia of diabetes. Alterations include both increased hepatic secretion of VLDL and impaired clearance of **VLDL** and intestinally chylomicrons. An important consequence of retarded clearance is prolonged plasma retention of both VLDL and postprandial chylomicrons as partially lipolyzed remnant particles. 11 These remnants, which include cholesterol-enriched intermediate-density lipoproteins (IDLs), are particularly atherogenic in humans and in a number of animal models.¹²

Plasma VLDL levels correlate with increased density and decreased size of LDL 13 In addition, LDL size and density are inversely related to plasma levels of HDL, especially the HDL2 subclass. ¹⁴ Small dense LDL particles appear to arise from the intravascular processing of specific larger VLDL precursors through a series of lipolysis.¹⁵ Further including steps, triglyceride enrichment of the lipolytic products through the action of cholesteryl ester transfer protein, together with hydrolysis of triglyceride and phospholipids by hepatic lipase, leads to increased production of small dense LDL particles.¹⁴ Plasma residence time of these LDL particles may be prolonged because of their relatively reduced affinity for LDL receptors. 15

HDL particles are heterogeneous, and multiple subclasses differing in diameter and density have been identified, ranging from the small dense HDL3c, HDL3b, and HDL3a to the larger HDL2a and HDL2b. 16 The reductions in HDL associated with type 2 diabetes and insulin resistance are multifactorial, but a major factor appears to be increased transfer of cholesterol from HDL to triglyceride rich lipoproteins, with reciprocal transfer of triglyceride to HDL.

Insulin resistance may play a pivotal role in the development of diabetic dyslipidaemia by influencing several factors. In insulin resistance and type 2 diabetes, increased efflux of free fatty acids from adipose tissue and impaired insulin mediated skeletal muscle uptake of free fatty acids increase fatty acid flux to the liver. The

fact that free fatty acid levels are elevated in individuals with impaired glucose tolerance suggests that insulin resistance associated with elevated free fatty acid levels occurs before the onset of hyperglycaemia. ¹⁸ One study conducted in patients without diabetes showed that decreased glucose utilization in muscle was associated with acute elevation of free fatty acids. ¹⁹ Epidemiologic studies have also demonstrated a relationship between plasma free fatty acid levels and insulin resistance. ²⁰ In the presence of insulin resistance, free fatty acids in the form of triglycerides are deposited in muscle, liver, heart, and pancreas.

In the present study, the incidence of dyslipidaemia was seen in 200/300 (66.67%) of the patients. Increased LDL noted in 152 (50.67%), triglycerides in 112 (37.33%), decreased HDL in 130 (43.34%) of patients.

77% of patient with increased LDL, 32.14% with increased TG, 48.46% of patients with decreased HDL had macro vascular complications.

In a study conducted in Nigeria, the incidence of dyslipidaemia was seen in 89% of the patients. Increased LDL noted in 74%, triglycerides in 13%, total cholesterol in 42%, decreased HDL in 53% of patients.²¹

In Indian study, Udawat, et al the incidence of dyslipidaemia was seen in 89% of the patients. Increased LDL noted in 73%, decreased HDL in 58% of patients.²²

It is well documented that reduced HDL cholesterol levels are associated with an increased risk of coronary heart disease (CHD). A number of functions of HDL particles may contribute to direct cardio protective effects, including promotion of cellular cholesterol efflux and direct antioxidative and anti-inflammatory properties. Moreover, low HDL cholesterol levels are often accompanied by elevated triglyceride levels, [23] and the combination has been strongly associated with an increased risk of CHD.

CONCLUSION

From the above study it is clearly evident that dyslipidaemia is very common association of type 2 diabetes mellitus, and culprit of majority diabetic related cardiovascular mortality. Since it is reversible, early detection and treatment at the earliest will definitely reduce mortality and morbidity and improves the quality of life. This article stresses upon the evaluation of lipid parameters at the time of detection of diabetes and periodic evaluation of lipid parameters and prompt treatment in order to reach the target to improve the quality of life.

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Ethical approval: The study was approved by the

Institutional Ethics Committee

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