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LIPID ABNORMALITIES IN TYPE 2 DIABETES MELLITUS PATIENTS – PROSPECTIVE CROSS-SECTIONAL STUDY

M.V. Jali[*], Sanjay Kambar[1*], Suata M. Jali[2], Rajendra Deginal[*], M.B. Hiremath[*]

[*]KLES Diabetes Centre, KLES Dr. Prabhakar Kore Hospital & Medical Res. Centre, Belgaum- 590010, Karnataka, India
[1]Dept. of Community Medicine, KLE University's J N Medical College, Belgaum, India
[2] Dept. of Paediatrics, KLE University's J N Medical College, Belgaum, India

Abstract

Introduction: Diabetic dyslipidemia is the major cause for higher cardiovascular morbidity and mortality. Insulin resistance has been shown to be important in regulating the concentrations of lipoproteins and results in predominant lipid abnormalities.

Methodology: Prospective, cross sectional study was undertaken to know the prevalence of dyslipidemia among ambulatory patients with type 2 diabetes mellitus at Diabetes Centre, KLES Prabhakar Kore Hospital & MRC, Belgaum,Karnataka. The details history regarding demographic profile, anthropometric measurements, and life style related factors (tobacco and alcohol consumption) were documented in pretested proforma. Fasting venous sample was collected for measurement of serum lipids and glucose. We referred to National Cholesterol Education Programme (NCEP) -Adult Treatment Panel (ATP) III guidelines for lipid profile analysis.

Results: A total of 1112 patients with type 2 diabetics without obvious CVD, renal, hepatic or PVD problems were studied. We found that nearly 80% of the subjects had at least one abnormal lipid parameter. 58.6% males and 41.4% females found to be dyslipidemic (p=0.000). Further, the prevalence of isolated hypercholesterolaemia; males (63.4%), females (36.6%), isolated hypertriglycerdaemia; males (58.9%), females (41.1%), isolated high LDL; males (56.7%), females (43.3%) and isolated low HDL; males (52.7%), females (47.3%) was found. Thus prevalence of fasting isolated abnormal lipid parameters was significantly higher among males with diabetes.

Conclusion: Many patients with diabetes remain uncontrolled for dyslipidemia. Efforts at screening, treatment and Life style modification according to current guidelines would help in reducing CVD morbidity and mortality in diabetes dyslipidemic patients.

Keywords: Type 2 diabetes, Dyslipidemia, Cardiovascular morbidity, NCEP-ATP

Introduction

A substantial proportion of patients with type-2 diabetes have abnormal serum lipid. Insulin resistance is not only associated with hyperglycaemia but also with disorders of concentration of lipoproteins. Diabetic dyslipidemia is a hall mark of metabolic syndrome and is believed to play an important role in the pathogenesis of atherosclerosis.[1-2] Thus it has become major cause for higher cardiovascular morbidity and mortality. Cardiovascular diseases (CVD) are the most prevalent cause of death and disability in both developed as well as developing countries.[3] South Asians around the globe have the highest rates of Coronary Artery Disease (CAD).[4] According to National Commission on Macroeconomics and Health (NCMH), a government of India undertaking, there would be around 62 million patients with CAD by 2015 in India and of these, 23 million would be patients younger than 40 years of age[5]. CAD is usually due to atherosclerosis of large and medium sized arteries and Diabetic dyslipidemia has been found to be one of the most important contributing factor[6].

Methodology

A total of 1112 patients with type 2 diabetes attending Diabetes Centre, KLES Dr. Prabhakar Hospital and Medical Research Centre, Belgaum were recruited in this study. Patients with nephropathy, hepatic disease, hypothyroidism, Cushing's disease, inherited disorders of lipid metabolism, clinical or ECG evidence of CAD, alcoholism, smoking or use of medication affecting lipids were excluded. Prospective, hospital based cross-sectional study was carried to determine the prevalence of lipid disorders among ambulatory patients with type 2 diabetes mellitus**.** The study period was from March 2009 to February 2010.

A venous blood samples were collected after an over night fast for 12-14 hrs. The analysis was carried on an automated clinical chemistry analyzer. According to National Cholesterol Education Programme (NCEP) and Adult Treatment Panel (ATP) III guidelines[6-7] the lipid profile analysis was done as follows, Hypercholesterolaemia– TC > 200 mg/dl, Hypertriglycerdaemia – TG > 150 mg/dl, LDL-C > 100 mg/dl and HDL-C < 40 mg/dl. The statistical analysis

was carried out using the SPSS (version 17.0) and statistical tool used was Chi-square test.

Results

Our study population comprised of total 1112 subjects (Males: 62.1%, Females: 37.9%) ambulatory patients with type 2 diabetes mellitus. By referring to standard guidelines of NCEP-ATP III, we found that nearly 80% of the subjects had at least one abnormal lipid parameter.

Table No.1 Prevalence of Dyslipidaemia according to gender of subjects

Group	Males	Females	Total
Dyslipidemia	521(58.6%)	368 (41.4%)	889 (79.94%)
Normolipidemia	170 (76.2 %)	53 (23.8%)	223(20.05%)
Total	691 (62.1%)	421(37.9%)	1112

X^2=23.548 DF=1 P=0.000

The prevalence of dyslipidemia was higher among males (58.6%) compared to females (41.4%). The results were statistically significant (p=0.000).

Table No.2 Age Specific Prevalence of Dyslipidemia among Males

Age Group (yrs)	Total Males	Diabetic Dyslipidemia subjects	%
30-40	190	138	72%
40-50	271	199	73%
> 50	230	184	80%
Total	691	521	75.4%

X^2=3.975 DF=2 P=0.137

We found that prevalence of dyslipidemia increases as the age advances among males. The prevalence was 80% among > 50 yrs which was significantly higher compared to other age groups. The results were statistically not significant (p=0.137).

Table No.3 Age Specific Prevalence of Dyslipidemia among Females

Age Group (yrs)	Total Females	Diabetic Dyslipidemia subjects	%
30-40	138	121	87.6%
40-50	162	145	89.5%
> 50	121	102	84.3%
Total	421	368	87.4%

X^2= 1.721 DF= 2 P=0. 423

We found that no significant difference of prevalence of dyslipidemia among all age groups of females. The results were statistically not significant (p=0.423).

Table No.4 Prevalence of Isolated Dyslipidaemia

Dyslipidemia group	Males	Females	Total
Hypercholesterolemia	170 (63.4%)	98 (36.6%)	268 (30.15%)
Hypertriglycerdaemia	145 (58.9%)	101 (41.1%)	246 (27.67%)
High LDL	118 (56.7%)	90 (43.3%)	208 (23.39%)
Low LDL	88 (52.7 %)	79 (47.3%)	167 (18.78%)
Total	521(58.6%)	368(41.4%)	889 (79.94%)

X^2=5.292 DF=3 P= 0.152

The prevalence of isolated hypercholesterolaemia; males (63.4%), females (36.6%), isolated hypertriglycerdaemia; males (58.9%), females (41.1%), isolated high LDL; males (56.7%), females (43.3%) and isolated low HDL; males (52.7%), females (47.3%) was found. Thus prevalence of fasting isolated abnormal lipid parameters was significantly higher among males with diabetes. However, the results were statistically not significant (p=0.152).

Discussion

The study reveals the prevalence of hypercholesterolemia, hypertriglycerdaemia and abnormally high LDL-C and low HDL-C levels which in all age groups. Our results are consistent with the previous cross-sectional study conducted by Sawant AM et.al among young adult population wherein increased prevalence of dyslipidemia in young adults was found to be one of the major contributors of CVD.[8] In our study, the high prevalence of hypercholesterolemia, hypertriglycerdaemia and low HDL, in all age groups among females was a major cause of concern. It has been observed that in comparison with western population, a relatively lower level of cholesterol appears to predispose Indians to CAD. [9] Also in a Chennai based hospital study, it was shown that around 75% of patients with myocardial infarction (MI) had TC levels <200mg/dl indicating that the threshold for the TC levels above which it posses a risk for CAD is low in Indians.[10] We found that the crude prevalence of dyslipidemia was higher in men than in women. The contributing factor for dyslipidemia in our population could be our diet rich in carbohydrates.[11] High TG levels have been associated with increased levels of small dense LDL which are considered to be highly atherogenic.[12] Increased prevalence of low HDL has been reported earlier by Enas et.al., who found that only 4% of Asian Indian men and 5% Asian Indian women had optimal HDL levels.[13] Low HDL-C levels are stronger predictor of occurrence and reoccurrence of MI and stroke and are also associated with premature and severe CAD.[14] Oxidative modification of LDL-C is a key process of atherosclerosis and elevated LDL-C has been recognized as primary risk factor for CAD by NCEP – ATPIII. [15] In our study increased LDL-C has been found to be contributing majorly to dyslipidemia irrespective of age and gender. Comparing our data with a Turkish study conducted on similar lines, lead to the observation that in both the studies, prevalence of dyslipidemia was more in males but the percentage prevalence in our population was higher indicating Indians being at higher risk.[16] Diet with high fat and calorie intake and lack of physical activity would be the major culprits of dyslipidemia in our population. References have shown that our diets are rich in saturated fats. Besides it also involves overcooking of food which results in destruction of nutrients like folate, deep frying and refrying in the same oil leading to trans fatty acids formation which probably contributes to increase of Dyslipidemia in our population.[17] In addition many studies have reported that lipid metabolism could by altered by factors such as obesity,[18] insulin resistance,[19] age[20] and visceral obesity.[21]

Conclusion

The increasing modernization and adoption of a more sedentary lifestyle in rural and urban India has taken its toll on the health of the populace, with its chronic course, we can expect diabetes and dyslipidemia to have a serious adverse impact on the life expectancy as well as the quality of life in India. Many patients with diabetes remain uncontrolled for dyslipidemia. Efforts at screening, treatment and Life style modification according to current guidelines would help in reducing CVD morbidity and mortality in diabetes dyslipidemic patients. A better understanding about the cause of a predisposition of Indians to become diabetic dyslipidemia will go a long way in planning health policy to curb the burden of chronic diseases.

Correspondence

Any correspondence should be directed to Dr. M.V.Jali, Professor of Medicine, KLE University's JN Medical College, Chief Diabetologist, KLES Diabetes Centre; Medical Director & Chief Executive, KLES Dr. Prabhakar Kore Hospital & Medical Research Centre, Belgaum-590010, Karnataka, India (drmvjali@gmail.com).

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