International Journal of Research in Medical Sciences
Bali K et al. Int J Res Med Sci. 2016 Mar;4(3):809-812
www.msjonline.org
pISSN 2320-6071 | eISSN 2320-6012

DOI: http://dx.doi.org/10.18203/2320-6012.ijrms20160523

Research Article

Pattern of dyslipidemia in Type 2 Diabetes Mellitus in Punjab

Kusum Bali, Amarjit Singh Vij*

Department of Medicine, Punjab Institute of Medical Sciences, Jalandhar 144006, Punjab, India

Received: 12 January 2016
Accepted: 08 February 2016

***Correspondence:**
Dr. Amarjit Singh Vij,
E-mail: dr.asvij@gmail.com

ABSTRACT

Background: India leads the world with the largest number of diabetic patients. The risk of mortality is high with cardiovascular disease in patients of diabetes mellitus which in turn is well associated with dyslipidemia. Patients of type 2 diabetes mellitus are usually dyslipidemic, even when under relatively good glycaemic control. Diabetic dyslipidemia usually includes elevated plasma triglycerides (TG), elevated low density lipoprotein cholesterol (LDL-C) and decreased high density lipoprotein cholesterol (HDL-C) levels but its pattern is also influenced by patient ethnicity. The objective of the study was to investigate the pattern of dyslipidemia in patients of type 2 diabetes mellitus attending a tertiary care hospital of Punjab.
Methods: A cross sectional study was performed on the consecutive patients of type 2 diabetes mellitus attending the Medicine OPD of Punjab Institute of Medical Sciences, Jalandhar over 6 months period (March 2015 to August 2015). The study included 285 patients of type 2 diabetes mellitus and the variables recorded were demographic characteristics, weight, height and fasting lipid profile parameters i.e. total cholesterol (TC), TG, LDL-C and HDL-C. The collected data was analyzed statistically using SPSS version 20 software.
Results: There were 55.1% male and 44.9% female with mean age 52.7 ± 11.43; 42.8% patients were urban and 57.2% rural. The mean body mass index (BMI) was 26.8 ± 5.48 (male: 25.4 ± 4.62 and female: 28 ± 5.31). Dyslipidemia was found in 81.8% patients. The most commonly elevated lipid was LDL-C (59.3%) followed by TG (57.2%) and TC (36.5%). The HDL-C was decreased in 34.4% patients. The distribution of dyslipidemia among the different age groups was almost similar: 82.6% in < 45 years, 82.9% in 45-60 years and 83.7% in > 60 years, the difference was not statistically significant (p = 0.998).
Conclusions: Dyslipidemia is highly prevalent in type 2 diabetes mellitus patients in Punjab. The patients of all age groups are affected similarly. The patients of type 2 diabetes mellitus should be made aware of dyslipidemia and the consequent increased risk for cardiovascular diseases. The complete lipid profile should be evaluated and dyslipidemia should be treated. This would significantly reduce cardiovascular morbidity and mortality among the type 2 diabetes mellitus patients.

Keywords: Type 2 Diabetes mellitus, Dyslipidemia, India

INTRODUCTION

Diabetes has evolved into an epidemic in India. The estimated number of patients with diabetes in India was 62.4 million in 2011 which is projected to rise to a staggering 101.2 million by 2030.[1,2] Diabetes mellitus, a heterogeneous group of metabolic disorders is characterized by hyper-glycaemia resulting from defect in insulin secretion, insulin action or both. The lack of effective insulin action leads to alteration in carbohydrate, fat and protein metabolism.[3] Insulin resistance, relative insulin deficiency and obesity are found to be associated with hypertriglyceridemia, low serum HDL cholesterol and occasionally high serum LDL cholesterol in type 2 diabetes mellitus. Dyslipidemia in diabetes commonly manifests as raised low-density lipoprotein cholesterol (LDL-C), decreased high-density lipoprotein cholesterol (HDL-C) levels, or elevated

triglyceride (TG) levels.[4] Hypertriglyceridemia is an independent risk factor for coronary heart disease.[5] It is well-established that dyslipidemia is a major risk factor for macrovascular complications in patients of type-2 diabetes mellitus and affects 10%-73% of this population.[6] The Third Report of the Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel III or ATP III)[7] has reported Diabetes mellitus as the equivalent of coronary heart disease (CHD), elevating it to the highest risk category.

India has diverse lifestyle pattern and ethnic variations, thus epidemiological profile of diabetes mellitus may be different in different geographical areas. Ethnic Punjabi people are presumed to have high prevalence of coronary artery disease (CAD) risk factors: obesity, metabolic syndrome, diabetes, hypertension, dyslipidemia because of traditional Punjabi food and less physically active lifestyle. There are very few data available for prevalence of dyslipidemia in diabetes from Indian continent, which are mainly from South Indian population and few from North Indian population.[8] The present study aims to bridge the gap by studying the pattern of dyslipidemia in patients of type 2 diabetes mellitus of Punjab.

METHODS

This cross sectional study was carried on the patients attending the Medicine OPD of Punjab Institute of Medical Sciences, Jalandhar during 6 months period of March, 2015 to August, 2015. The patients of type 2 diabetes mellitus visiting consecutively in the Medicine OPD were considered for this study. The patients included in the study were already diagnosed with diabetes mellitus type 2 taking treatment and newly diagnosed diabetes mellitus type 2 patients. The patients of type 1 diabetes mellitus were not considered for this study. The patients who were also suffering from coronary artery disease (CAD) or had history of cerebrovascular accident (CVA) or were diagnosed as having CAD or CVA after enrolment and those patients already taking statins or other drugs for lipid lowering were excluded from this study. And those diabetic patients suffering from metabolic disorder or chronic systemic diseases were also excluded from the study. In those patients included in the study, detailed history was taken and clinical examination was done. The demographic parameters (age, sex, urban or rural) of the patients were recorded and their weight and height were recorded using standard methods. Fasting blood sample of the patients after at least 8 hours overnight fast was taken to measure serum lipid profile parameters of total cholesterol (TC), triglycerides (TG), low density lipid cholesterol (LDL-C) and high density lipid cholesterol (HDL-C). The cut-off normal values for individual lipid levels were taken as per guidelines of the National Cholesterol Education Program (NCEP) Expert Panel on Detection, Evaluation and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel III).[7] The term dyslipidemia refers to two or more abnormal lipid levels. The body mass index (BMI) was calculated by the Quetelet Index, BMI = Weight (Kg) / Height $(m)^2$ from weight and height measurements.[9] The data of the individual patients was entered in the Microsoft Excel sheet and was analysed statistically using SPSS version 20 software.

RESULTS

Table 1: Characteristics of the patients with prevalence of dyslipidemia (n = 285).

Charact-eristics	Number of patients (%)	Dyslipidemia (%)	p <0.05
Age (years)			
<45	46 (16.1)	38 (82.6)	0.998
45 – 60	147 (51.6)	122 (82.9)	
>60	92 (32.3)	77 (83.7)	
Sex			
Male	157 (55.1)	133 (84.7)	0.689
Female	128 (44.9)	101 (78.9)	
Locality			
Urban	122 (42.8)	99 (81.1)	0.817
Rural	163 (57.2)	138 (84.6)	
Duration of diabetes			
<2 years	76 (26.7)	64 (84.2)	0.974
2 – 5 years	105 (36.7)	82 (78.1)	
5 – 10 years	92 (32.4)	79 (85.9)	
>10 years	12 (4.2)	10 (83.3)	
Obesity			
Obese (BMI ≥25)	195 (68.4)	164 (84.1)	0.629
Non obese (BMI <25)	90 (31.6)	69 (76.6)	

Out of 285 patients of type 2 diabetes mellitus eligible for this study, 157 (55.1%) were male and 128 (44.9%) were female. The mean age of the study population was 52.7 ± 11.43 (male: 56.8 ± 12.26; female: 50.6 ± 10.83) and 122 (42.8%) patients were from urban and 163 (57.2%) from rural areas. The mean duration of diabetes since diagnosis among the patients studied was 6.8 ± 3.48 years; 36.7% patients were diagnosed diabetic for last 2-5 years, 32.4% patients had diabetes for the last 5-10 years, 26.7% were diagnosed to be diabetic in last 2 years while only 4.2% patients were diabetic for >10 years. The mean BMI of the patients studied was 26.8 ± 5.48 (male: 25.4± 4.62 and female: 28 ± 5.31). The BMI was ≥25 in 68.4% patients and <25 in 31.6% patients. Dyslipidemia among patients aged < 5 years was 82.6%, 45-60 years aged 82.9% and >60 years aged 83.7%, difference not statistically significant (p = 0.998). The characteristics of the patients and the prevalence of dyslipidaemia are shown in Table 1. Overall, 81.8% patients were having dyslipidemia (Figure 1). The mean serum lipid values were: total cholesterol 189.8 ± 44.67, triglyceride 177.6 ± 71.32, LDL-C 107.8 ± 35.83 and HDL-C 47.3 ± 18.62.

Out of 285 diabetic patients studied, 104 (36.5%) patients were having high serum total cholesterol, 163 (57.2%) high serum triglyceride, and almost similar number of patients, 169 (59.3%) raised LDL-C and 98 (34.4%) patients had low serum HDL-C levels (Table 2).

Table 2: Serum lipid levels of the patients (n = 285).

Serum Lipid (Abnormal value)	Mean ± SD	Patients with deranged lipids (%)
TC (> 200 mg %)	189.8 ± 44.67	104 (36.5)
TG (>150 mg %)	177.6 ± 71.32	163 (57.2)
LDL-C (>100 mg %)	107.8 ± 35.83	169 (59.3)
HDL-C (< 40 mg %)	47.3 ± 18.62	98 (34.4)

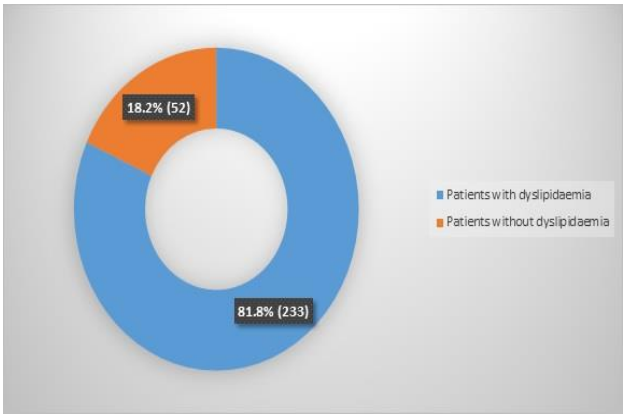

Figure 1: Percentage of patients with dyslipidemia.

DISCUSSION

Patients with diabetes mellitus have a 2 to 4 fold increased risk of cardiovascular, peripheral vascular and cerebrovascular disease, which are the leading causes of morbidity and mortality in this population. Diabetes is considered a coronary heart disease (CHD) - risk equivalent and it is frequently associated with various other cardiovascular (CV) risk factors. It is well-established that dyslipidemia is a major risk factor for macrovascular complications in patients with type-2 diabetes mellitus and affects 10%-73% of this population.[6,10] Approximately 80% of deaths in patients with diabetes are attributable to cardiovascular disease (CVD). Asian Indians have higher risk of CHD than whites.[11] Dyslipidemia in diabetes commonly manifests as raised low-density lipoprotein cholesterol (LDL-C), decreased high-density lipoprotein cholesterol (HDL-C) levels, or elevated triglyceride (TG) levels.[4] Furthermore, data from the United Kingdom Prospective Diabetes Study suggest that both decreased HDL-C and elevated LDL-C predict CHD in diabetes.[12] The present study shows very high prevalence of dyslipidaemia (81.8%) in the patients of type 2 diabetes mellitus.

Though the burden of diabetes and dyslipidemia in India is mainly contributed by urban population, the increasing trend of diabetes and even dyslipidemia is observed in rural population too, because of urbanization and changing lifestyle and food habits. In this study, dyslipidemia is found more in rural patients (84.6%) compared to urban patients (81.1%). Diabetic dyslipidaemia is assumed to be due to lavish lifestyle of fat and sugar rich food and lesser physical exercise. The high prevalence of dyslipidaemia in Punjabi diabetic patients might be contributing towards the rising prevalence of CAD in Punjab. More so, both male and female patients had dyslipidaemia in almost similar rates (male: 84.7% and female: 78.9%).

Considering the age of the patients studied, one frightening finding is that the young patients (<45 years age group) had similar prevalence of dyslipidaemia (82.6%) as patients of older groups (82.9% in 45 – 60 years and 83.7% in >60 years age groups). Considering BMI of the patients, dyslipidaemia is observed in 84.1% obese subjects and the non-obese patients also had the high prevalence (76.6%) of deranged lipids.

The recent focus on the pattern of dyslipidaemia in diabetes mellitus type 2 shows elevated triglycerides, elevated LDL and low HDL cholesterol.[13] Our study reveals that all lipids had abnormal mean levels as shown in Table 2; hypertriglyceridemia and high levels of LDL in 57.2% and 59.3% patients and low levels of serum HDL in 34.4% patients. Rakesh et al have also reported high LDL and low HDL in their study.[14]

In this study, most of the patients had mixed dyslipidaemia with more than one lipid abnormality. The mixed dyslipidaemia observed most commonly in our study was high LDL levels and hypertriglyceridemia (38.2%) which is different from the western studies. The serum LDL levels are not found very high in these studies.[15,16] These two abnormalities i.e. hypertriglyceridemia and raised levels of LDL cholesterol are strong risk factors for CAD in patients of type 2 diabetes mellitus. In our study, two other types of mixed dyslipidaemia were observed: hypercholesterolemia with high LDL levels and hypercholesterolemia with hypertriglyceridemia. Smith S et al also found hypercholesterolemia (mean±SD of total cholesterol 299.36±13.46) in their study done in Allahabad, India.[17] All the lipids were deranged in the 11.6% of the diabetic patients studied. Rani HS et al evaluated the risk factors for coronary heart disease in diabetes mellitus patients and found that, TC, VLDL, LDLs, TGs were high and the levels of HDLs were low compared to controls.[18] Dyslipidemia is a well-recognized and modifiable risk factor that should be identified early to institute aggressive cardiovascular preventive management.[19] So, the complete lipid profile of diabetic patients should be analysed instead of going for individual lipid fraction levels and the lipid lowering treatment should be started as early as possible.

CONCLUSION

This study highlights the very high prevalence of dyslipidaemia in the diabetic patients and the young as well as the older patients having similar prevalence. The patents have a higher prevalence of high serum cholesterol, high triglycerides and high LDL cholesterol and lower HDL cholesterol. Dyslipidaemia is one of the highest ranked risk factors for CAD in Indians, especially Punjabi population. In most of the diabetic patients, one or another lipid level is found to be abnormal, suggesting that whole lipid profile must be done and evaluated at regular intervals in these patients. It is important to aim for the stricter goals in Punjabi diabetic patients to start early and prompt preventive measures to reverse the tide of the rising CAD epidemic in Northern Indians. This will significantly reduce morbidity and mortality among the diabetic Punjabis.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Mohan V, Sandeep S, Deepa R, Shah B, Varghese C. Epidemiology of type 2 diabetes: Indian scenario. Indian J Med Res. 2007;125:217-30.
2. Anjana RM, Pradeepa R, Deepa M, Datta M, Sudha V, Unnikrishnan R. ICMR–INDIAB Collaborative Study Group. Prevalence of diabetes and prediabetes (impaired fasting glucose and/or impaired glucose tolerance) in urban and rural India: Phase I results of the Indian Council of Medical Research India Diabetes (ICMR INDIAB) study. Diabetologia. 2011;54:3022-7.
3. Gavin JR. Report of the expert committee on the diagnosis and classification of diabetes mellitus. Diabetes Care. 1998;21(1):5-519.
4. O'Brien T, Nguyen TT, Zimmerman BR. Hyperlipidemia and diabetes mellitus. Mayo Clin Proc. 1998;73(10):969-76.
5. Ginsberg HN. Identification and treatment of hypertriglyceridemia as a risk factor for coronary heart disease. Curr Cardiol Rep. 1999;1(3):233-7.
6. Farmer JA. Diabetic dyslipidemia and atherosclerosis: Evidence from clinical trials. Curr Diab Rep. 2008;8:71-7.
7. National Cholesterol Education Program (NCEP) Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel III) Third Report of the National Cholesterol Education Program (NCEP) Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel III. Circulation. 2002;106(25):3143-21.
8. Misra A, Pandey RM, Devi JR, Sharma R, Vikram NK, Khanna N. High prevalence of diabetes, obesity and dyslipidaemia in urban slum population in northern India. Int J Obes Relat Metab Disord. 2001;25:1722-9.
9. Eknoyan G. Adolphe Quetelet. The average man and indices of obesity. Nephrol Dial Transplant. 2007;23(1):47-51.
10. Saydah SH, Fradkin J, Cowie CC. Poor control of risk factors for vascular disease among adults with previously diagnosed diabetes. JAMA. 2004;291:335-42.
11. O'Keefe JH, Miles JM, Harris WH, Moe RM, McCallister BD. Improving the adverse cardiovascular prognosis of Type 2 diabetes. Mayo Clin Proc. 1999;74:171-80.
12. Ethnicity and cardiovascular disease. The incidence of myocardial infarction in white, South Asian, and Afro Caribbean patients with type 2 diabetes (U.K. Prospective Diabetes Study 32). Diabetes Care. 1998;21(8):1271-7.
13. Masram SW, Bimanpalli MV, Ghangle, S. Study of lipid profile and glycated hemoglobin in Diabetes mellitus. Indian Medical Gazette. 2012;257-65.
14. Parikh RM, Joshi SR, Menon PS, Shash NS. Prevalence and Pattern of Diabetic Dyslipidemia in Indian type 2 Diabetic patients. Diabetes and Metabolic Syndrome. Clinical Research and Review. 2010;4(1):10-12.
15. U.K. Prospective Diabetes Study 27. Plasma lipids and lipoproteins at diagnosis of NIDDM by age and sex. Diabetes Care. 1997;20(11):1683-7.
16. Cowie CC, Howard BV, Harris MI. Serum lipoproteins in African Americans and whites with non-insulin dependent diabetes in the US population. Circulation. 1994;90(3):1185-93.
17. Smith S, Lall AM. A Study on Lipid Profile Levels of Diabetics and Non-Diabetics Among Naini Region of Allahabad, India. Turk J Biochem. 2008;33(4):138-41.
18. Rani HS, Madhavi G, Rao VR, Sahay BK, Jyothy A. Risk factors for coronary heart disease in type II diabetes mellitus. Indian J Clin Biochem. 2005;20(2):75-80.
19. Keech A, Colquhoun D, Best J, Kirby A, Simes RJ, Hunt D. LIPID Study Group. Secondary prevention of cardiovascular events with long-term pravastatin in patients with diabetes or impaired fasting glucose: results from the LIPID trial. Diabetes care. 2003;26(10):2713-21.

Cite this article as: Bali K, Vij AS. Pattern of dyslipidemia in type 2 diabetes mellitus in Punjab. Int J Res Med Sci 2016;4:809-12.