

Assessment of Serum Lipids in Type II Diabetes Male and Female Patients

Dinky Gajiwala¹, Malini Andrade²

Abstract: *Background and Objective:* Incidence of coronary heart disease is three to four folds higher in patients with type 2 diabetes mellitus compared to non-diabetic patients. It has been proposed that the composition of lipid particles in diabetic dyslipidemia is more atherogenic than other types of dyslipidemia. This study was conducted to assess serum lipid profile in type diabetes male and female patients. *Materials and Methods:* This study was conducted on 50 T2DM patients with history more than ten yrs diabetes. Diabetic patients with overt complications and patients on drugs like diuretics, steroids, oral contraceptives and beta blockers etc are excluded from study. *Results:* The serum total cholesterol, LDL cholesterol and triglycerides were significantly raised in both males and females. *Conclusion:* Hyperlipidaemia is a common finding among DM patients. DM patients should be screened and appropriate management should be instituted to reduce the risk of CHD and atherosclerosis.

Keywords: Lipid profile, Diabetes, Atherosclerosis, Coronary Heart Disease

1. Introduction

Diabetes mellitus arises when insufficient insulin is produced, or when the available insulin does not function correctly. Without insulin, the amount of glucose in the bloodstream is abnormally high, causing unquenchable thirst and frequent urination. The body's inability to store or use glucose causes hunger and weight loss.^[1] Non-insulin-dependent diabetes – type 2 diabetes occurs when the body does not produce enough insulin, and the insulin that is produced becomes less effective. This type of diabetes usually appears in people over the age of 40, and tends to have a more gradual onset. In most cases, glucose levels in the blood can be controlled by diet, or diet and tablets, although sometimes insulin injections may be needed. About 90 per cent of diabetics are non-insulin dependent.^[2] Patients with type-2 diabetes have increased risk cardiovascular disease associated with the risk for atherogenic dyslipidaemia. Coronary artery disease, especially myocardial infarction is the leading cause of morbidity and mortality worldwide^[3], Insulin deficiency causes excessive metabolism of free fatty acids, this may lead to a disorder in lipid metabolism. Insulin is a hypoglycemic hormone secreted from β cell of the islet of pancreas. Insulin also has an effect on lipid metabolism.^[4] Even more, it has been proposed that the composition of lipid particles in diabetic dyslipidemia is more atherogenic than other types of dyslipidemia.^[5,6] The cardiovascular disease is a cause of morbidity and mortality in patients with diabetes mellitus because of disturbance in lipoproteins i. e. serum triglycerides (TC) 69%, serum cholesterol 56. 6%, low-density lipoprotein (LDL) 77% and high density lipoprotein (HDL) 71%.^[7,8] The rationale of this present study was to detect the lipid abnormality in diabetic male and female patient.

2. Materials & Methods

This cross sectional study was conducted on 50 subjects with history of diabetes attending OPD at Holy Family

Hospital, 50 Patients with age group of 40-60yrs were included in study. Subjects had history of more than 10yrs of diabetes. 25 male and 25 female patients were included in the study. Diabetic patients with overt complications like neuropathy, nephropathy, retinopathy, and ischemic heart disease; patients with acute complications like diabetic keto-acidosis, non-ketosis hyperosmolar coma and hypoglycemia; patients with any concurrent illness like chronic liver disease, hypothyroidism and patients on drugs like diuretics, steroids, oral contraceptives and beta blockers etc are excluded from the study. After an overnight fasting of 10-12 hours, about 5 ml of whole blood was collected via vena puncture with the help of a disposable syringe in between 7.00am and 8.00am. Different Lipid fractions were estimated along with fasting plasma glucose. Glucose- detected by enzymatic reaction (glucose oxidase and peroxidase=GOD-POD).^[9] Serum total cholesterol was determined by an enzymatic (CHOD-PAP) colorimetric method.^[10] Triglycerides were determined by an enzymatic (GPO-PAP) method.^[11] HDL-Cholesterol was estimated by a precipitant method.^[12] LDL-Cholesterol was estimated by using Friedewald formula.^[13] $LDL\text{-Cholesterol} = \text{Total Cholesterol} - (\text{HDL cholesterol} + \text{Triglycerides}/5)$. Statistical analysis was carried out using standard deviation and chi-square test from which 'P' value is derived. The 'P' value less than 0.05 was considered significant.

3. Results

50 patients with type 2 diabetes mellitus were evaluated for lipid profile. Out of 50 patients, 25 were males and 25 were females. In our study Serum total cholesterol, LDL cholesterol and triglycerides were significantly raised in both male and female patients & when compared with the females, males had significantly increased Serum total cholesterol, LDL and HDL cholesterol and triglycerides ($p < 0.0001$).

Table 1

	Male (n=25)	Female (n=25)	Mean difference	95% of difference	t-value	p-value
Serum total cholesterol	243.56±5.59	218.38±5.46	25.18	22.04–28.32	16.11	P<0.0001
LDL	143.42±3.77	133.89±5.89	9.53	6.72–12.34	6.814	P<0.0001
Triglycerides	173.88±8.23	149.81±6.01	24.62	21.19–28.05	14.43	P<0.0001
HDL	45.29±0.97	43.85±0.86	1.44	0.92–1.96	5.55	P<0.0001

4. Discussion

ADA (American diabetic association) and AHA(American heart association) have declared that diabetes is considered a coronary artery disease (CAD) equivalent and patients should be started on treatment for secondary prevention of CAD.^[14] According to guidelines of the ADA and the AHA, the target lipid values in diabetic individuals (age >40 years) without cardiovascular disease should be as follows: LDL < 2.6 mmol/L (100 mg/dL); HDL >1 mmol/L (40 mg/dL) in men and >1.3 mmol/L (50 mg/dL) in women; and triglycerides <1.7 mmol/L (150 mg/dL). In patients >40 years, the ADA recommends addition of a statin, regardless of the LDL level in patients with CHD (coronary heart disease) and those without CHD, but who had CHD risk factors. The recommended lipid goals for Indians with heart disease was <60mg/dl for LDL-C and <90mg/dl for non HDL-C. A reasonable HDL-C goal was 45mg/dl for men and 55mg/dl for women, whereas 60mg/dl for Indian men and women.^[15] Diabcare Asia-India study conducted nationwide survey of patients attending tertiary diabetes care centres and reported a mean age of onset of diabetes as 43.6 years with a mean duration of diabetes of 10.0years and 90.6% having T2DM (Raheja B S, Kapur A-2001). This study showed had significantly increased Serum total cholesterol, LDL and HDL cholesterol and triglycerides. A strong clustering risk factor for coronary artery disease has been observed in diabetic subjects. These observed increases and decreases in serum lipid profile associated with Diabetes mellitus are in agreement with finding of Ononogbu,^[16] Uddin and Miah,^[17] Scocpla et al.,^[18] Adedeji and Onitiril^[19] In diabetes many factors may affect blood lipid levels, this is because carbohydrates and lipid metabolism are interrelated to each other if there is any disorder in carbohydrate metabolism it also leads disorder in lipid metabolism so there is high concentration of cholesterol and triglycerides. In diabetic subjects sex plays a significant effect on risk of coronary artery disease. The males have marginally high serum lipid levels as compared to diabetic females. Similar results have been observed in other studies of Salonen et al.,^[20] Kaare.^[21] Significant difference in lipid profile of male and female diabetics is because sex hormones play unique role for lipid metabolism. Lipid abnormalities are common in diabetics and frequently seen in type-2 diabetics. Dyslipidaemias make diabetics prone to develop CHD and other complications of atherosclerosis.

5. Conclusion

As diabetes is a disease of self-management, appropriate nutrition (low calories, low carbohydrates, and low fat with high fiber diet) regular physical activity and proper

medication to achieve good glycaemic control have to be followed. HMG CoA Reductase inhibitors (statins) should be used to achieve LDL goals. Life style modifications like regular exercise, quitting smoking and alcohol along with yoga will help the diabetic patients to live a better life.

6. Future Scope

Assessment of serum lipid in T2DM patient requires further studies with large sample size. Long term follow up study with clinical outcome of deranged lipid profile in patient od T2DM would be beneficial for patient management purpose.

References

- [1] Chatrejee C C (1992) Human physiology (vol. I). Role of endocrine in lipid metabolism. (Editor- Medical allied agency) s.546-550, Culcutta-INDIA.
- [2] Chatterjee M N and Shinde R (2005) Text book of medical laboratory technology. Metabolism of carbohydrates. (Jaypee Brothers Medical publisher) Sixth edition s. 266-330, Delhi-India.
- [3] Roberto, T., A.R. Dodesini, Lepore G. Lipid and Renal disease, 2006. J. Am. Soc. Nephrol., 17: S145-7.
- [4] Godkar P and Godkar D (2003) Text book of medical laborarty technology.Ed.2 chemistry of carbohydrates (Bhalani publishing house) s.176-233, New Delhi-India.
- [5] Taskinen MR., Diabetic dyslipidemia, Atherosclerosis. Supplements, 2002; 3 (1); 47-51.
- [6] Sowers JR, Lester MA, Diabetes and cardiovascular disease, Diabetes Care 1992;22(suppl 3): C14-C20.
- [7] Khan, S.R., N. Ayub, S. Nawab and T.S. Shamsi, 2008. Triglyceride profile in dyslipidemia of type 2 diabetes mellitus. J. Coll. Physicians Surg. Pak., 18(5): 270-3.
- [8] Gadi, R. And F.F. Samaha, 2007. Dyslipidemia in type 2 diabetesmellitus. Curr. Diab. Rep. Jun., 7(3): 228-34.
- [9] Jietz. N.W. Fundamentals of clinical chemistry 2nd edition. W. B. Saunders Co., Toronto (1982)
- [10] Allain CC, Poon IS, Chan CHG, Richmond W. Enzymatic determination of serum total cholesterol. Clin. Chem.1974; 20: 470-71.
- [11] Jacobs NJ, Van Denmark PJ. Enzymatic Determination of Serum Triglycerides. Biochem. Biophys 1960; 88: 250-55.
- [12] Gordon T, et al. An Enzymatic Method for the Determination of the Serum HDL-Cholesterol. Am. J. Med 1977; 6: 707-08.
- [13] Friedewald WT, Levy RI, Fredrickson DS. Estimation of the Concentration of LDLCholesterol. Clin. Chem 1972; 18(6): 499-515.

- [14] Y.P. Munjal, API Text book of medicine- 2012; 9th edi; section 12, 17:666-672; section 9, 5: 336-338; section 18, 3: 1232-1239.
- [15] Enas A Enas, MD, FACC –How to beat the Heart disease epidemic among south Asians Chapter - 3.2:85-91,6.3:228-230,6.4: 231,6.7: 243-249.
- [16] Ononogbu, I.C. (1988) Lipid and Lipoproteins. New Africa Publishing Co.Ltd. Owerri, Nigeria.
- [17] Uddin and Miah (1995) Resistance diabetes and risk of cardiovascular disease. Bangladesh Med Res Counc Bull. Aug 21 vol. (2) 64-72.
- [18] Scopola A, Stein A and Mayer GL (1995) Effect of insuline on cholesterol synthesis in type II diabetes mellitus pateins. Diabetes care: 1995 Oct; 18 (10)1362
- [19] Adedeji O O and Onitiri A C (1990) Lipids in Nigerian hypertensives. Afr. J. Med. Sci. 19: 281-284.
- [20] Salonen J T, Puska P and Kotke T E (1981) Coronary risk factor clustering patterns in Eastern Finland. Int. J. Epidemiol., 10: 203-210.
- [21] Karee H and Banaa S (1991) the association between blood pressure and serum lipid in population. The tromso study. Circulation, 83; 1305-1314

Author Profile

Dinky Gajiwala is Resident Doctor, Department of Medicine, Holy Family Hospital, Mumbai.

Malini Andrade is Head of Department of Medicine, Holy Family Hospital, Mumbai.

