Original Article

Study of serum apolipoproteins in diabetes mellitus

Landge R T[1*], Kalekar M G[2]

[1]Professor and HOD, Department of Biochemistry, Government Medical College, Latur, Maharashtra, INDIA.
[2]Ph D Student, Grant Government Medical College and Sir JJ Group of Hospitals, Mumbai, Maharashtra, INDIA.
Email: mohit7292@gmail.com

Abstract

Diabetes Mellitus is defined as a group of metabolic diseases characterized by hyperglycemia with disturbances of carbohydrate, fat and protein metabolism that are associated with absolute or relative deficiencies in insulin action and or insulin secretion. 60 maturity onset diabetic patients who were clinically diagnosed from July 2014 to May 2015 were selected. Estimation of Glucose (GOD-POD, Lab Diagnostic Kit) Estimation of HDL-cholesterol-Wybenga and PILEGGI'S Method/Bio-Lab Diagnostic kit used. It is verified that fall in cholesterol level reduces the chances of stroke and atherosclerosis in Diabetics Mellitus. Hyperlipidemia was very close related to cause mortality and morbidity. Insulin lack or resistance to insulin brings interference with lipoproteins metabolism and resultant is "Diabetic Lipemia" Early Management Regular, physical exercise, avoid consuming animal, saturated fat diet to control it.

Key Word: Diabetes Mellitus, Exercise, Metabolic, Insulin, complications.

[*]**Address for Correspondence:**
Dr. Landge R T, Ph D Student Grant Government Medical College and Sir JJ Group of Hospitals, Mumbai, Maharashtra, INDIA.
Email: mohit7292@gmail.com

Received Date: 22/04/2017 Revised Date: 17/05/2017 Accepted Date: 10/06/2017

Access this article online

Quick Response Code:

Website: www.medpulse.in

DOI: 14 June 2017

INTRODUCTION

Diabetes Mellitus is defined as a group of metabolic diseases characterized by hyperglycemia with disturbances of carbohydrate, fat and protein metabolism that are associated with absolute or relative deficiencies in insulin action and or insulin secretion. In Diabetes Mellitus, there is an important facet of the disease process in a close metabolic aberration involving lipid metabolism. Other factors which exert an adverse effect on plasma lipids like obesity and inadequate exercise may coexist in a diabetic patient. Di*et al*so has a profound effect over serum lipids in diabetes. Assessment of various lipid fractions may be of some help to patients and the treating physician, directly or indirectly in preventing or foreseeing the probabilities of complications. The present study aims to study the agewise and sexwise changes in serum lipids and lipoproteins in diabetes mellitus compared with nondiabetics and their association with complications of diabetes mellitus.

MATERIALS

60 maturity onset diabetic patients who were clinically diagnosed from July 2014 to May 2015 were selected which included Patients admitted in medicine wards and ICU with abnormal (high) blood or urine glucose levels with chronic complications of diabetes mellitus. For control group, normal healthy persons who were not obese, not predisposed and physically active were selected. 12-24 hr fasting venous blood was withdrawn for fasting blood sugar and serum lipids and lipoprotein estimations. 2 hours after meal, blood was again drawn for postprandial blood sugar estimation.

Detailed history taking and physical examination was done.

METHODS

Estimation of Glucose (GOD-POD,Lab Diagnostic Kit) Estimation of HDL-cholesterol-Wybenga and PILEGGI'S Method/Bio-Lab Diagnostic kit used. Triglycerides Enzymatic kit method of Bio-Lab Diagnostics. Estimation of erum Phospolipids. By Adlersberg's equation. Phospholipids =68+ (0.89x Cholesterol). Estimation of LDL-cholesterol by Fridwald .W.T. *et al*. 1972.

How to site this article: Landge R T, Kalekar M G. Study of serum apolipoproteins in diabetes mellitus. *MedPulse – International Medical Journal.* June 2017; 4(6): 806-808. http://www.medpulse.in (accessed 17 June 2017).

OBSERVATIONS

Parameter	Control	Mean + S.D)(n=60)	t-Value	P value
Serum Glucose (mg/dl) Fasting.	70-110 mg/dl.	130+2.3	16.3	<0.05
After 2 hrs. food /Glucose <140 mg/dl.	70-140 mg/dl.	300+3.5	12.7	<0.05
Triglyceride	40- 160 mg/dl	161 + 25.6	30.3	<0.05
Cholesterol(mg/dl).	150-200 mg/dl.	290 + 21.5	19.5	<0.05
HDL –cholesterol.	Men:30-60 mg/dl. Women:40-60 mg/dl.	26.9 + 3.1	43.9	<0.05
LDL-Cholesterol.	20-180 mg/dl.	185 + 12.4	24.4	<0.05
VLDL- cholesterol.	8-32 mg/dl.	32.4 + 4.7	30.5	<0.05
Sr. Phospholipids.	Birth 29-93 mg/dl. Males upto 65 years. 175-275 mg/dl. Female, Non pregnant 158-232 mg/dl. Female, early pregnancy. 205-291 mg/dl.	208.6 + 20.9	18.2	<0.05
ApoA1	>120	103+3.4	27.4	<0.05
Apo B	<120	140+2.4	21.2	<0.05

RESULTS AND DISCUSSION

There was significant elevation of serum lipid profiles and glucose profiles in maturity onset diabetics as compared to normal. The rising tendency of different lipid fractions was noted as the severity of hyperglycemia increases. Insulin deficiency and or resistance lead to over production and impaired clearance of VLDL triglyceride, resulting in increased triglyceride levels. Hypertriglyceridemia and increased VLDL levels were the predominant lipoprotein abnormalities are the common type of hyperlipoproteinnemia (type IV). Hypercholesterolemia (type IIb) and combined Hyperlipidemia(type V) were also observed. The Increased lipolysis, reduced LDL receptor number/function and reduced cholesterol and LDL levels. Serum phospholipids concentrations were significantly increased in diabetic patient as compared with non- diabetic. The serum phospholipid concentration were significantly increased in diabetic patient as compared to the non-diabetic patient the serum Phospholipid bears a close relationship to the serum cholesterol. There was no significant difference agewise in serum lipid and lipoproteins in different age groups, but increase as those increased. There was definite difference sexwise in hyperlipidemia, in females it was accentuated. Greater risk of coronary artery disease with increased atherogenicity due to increased cholesterol , triglyceride, phospholipids, LDL cholesterol, VLDL cholesterol, chol./HD ratio and decreased HDL cholesterol, decreased HDL cholesterol, HDL/LDL- ratio, A.A.I levels have been postulated. Obesity adversely affected lipid profile in both diabetics as well as non-diabetics. Abnormal lipid and lipoproteins favored the occurrences of C.A.D with preponderance in females. However, there was no significant correlation between hypertension and lipid profile. Dietary regulation, weight reduction, regular exercise, glycemic control and early management of hypertension would go long way in the preventing or postponing atherosclerosis related morbidity and mortality events. Apo A1<120 is CHD risk factor. In this study ApoA1 is 103 implies risk of CHD Apo B >120 is CHD risk factor. In this study Apo B is 140 implies risk of CHD. Total Cholesterol/HDL >3.5 is dangerous. In this study is found to be 290/26.9 = 11.153 which is a major risk of morbidity and mortality. Thus it can be concluded that rigid metabolic control of diabetics (Hyperglycemia) will prevent the alternation in lipid metabolism and also postpones the manifestations of vascular complication. Serum lipid and lipoprotein levels will guide the treating physicians to monitor the lipid metabolic state and hence advise the individual patient for control and prevent the patients from untimely catastrophy.

CONCLUSIONS

Increased cholesterol level was found in this study. It is verified that fall in cholesterol level reduces the chances of stroke and atherosclerosis in Diabetics Mellitus. 1 % fall in cholesterol reduces 2% risk of in CHD. Cholesterol and Serum Phospholipid parameters are directly proportion to each other. The rising levels of lipids and lipoproteins caused for the occurrences of CHD, CAD, Heart stroke. Increased level also found to cause atherosclerosis and is found decrease in immunity. Decrease immunity is found in such patients and there is large degree of disturbances between intestine liver and adipose tissue. Regular exercise and

being tension free life are the only remedy and the only solution to control it. HDL/LDL ratio is found to be decreased in hypertensive diabetes MI, Atherosclerosis, CHD, CAD are the diseased caused by D M. While CHD and HDL are inversely proportional to each other. Hypertriglyceridemia and hypercholestrerolmia are the main abnormal features of the diabetics and diabetes mellitus. Hyperlipidemia was very close related to cause mortality and morbidity. Insulin lack or resistance to insulin brings interference with lipoproteins metabolism and resultant is "Diabetic Lipemia" Early Management Regular, physical exercise; avoid consuming animal, saturated fat diet to control it.

REFERENCES

1. Hottman E. In the Biochemistry of clinical clinical medicine, 4th edn. Year book Medical Publisher. Inc. pp. 185, 1970.
2. Harper's Biochemistry, 24th edn, 1993.
3. Henry N.G et.al. Lipoproteins metabolism and its relationship to atherosclerosis, Medical clinis of North America, vol. 78. No.1. 1-20, Jan. 1994.
4. Bajpai H S et.al.Diabetic retinopathy (A Clinico-biochemical study. Ind. J Opthalm, 27,12:1975.
5. Abrams JJ et al; Metabolism of Cholesterol and plasma TG in non ketotic D.M, Diabetes 31: 903-910, 1982
6. Baynes C. et al, The effect of NIDDM on serum lipids and lipoproteins, Quaterly Journal of Med, New series 72 no. 267, 579-87, July 1989
7. Bagdade J. D. et al: Diabetic lipemia, A form of acquired fat- induced lipemia, N. Eng. J. Med. 276: 427-433, 1967.
8. American Diabetes Association: Management of dyslipidemia in adults with diabetes (Position Statement). Diabetes Care 26 (Suppl. 1):S83–S86, 2003
9. Reaven GM, Chen YD, Jeppesen J, Maheux P, Krauss RM: Insulin resistance and hyperinsulinemia in individuals with small, dense low density lipoprotein particles. J Clin Invest 92:141–146, 1993
10. Braunwald E The rise of cardiovascular medicine Eur Heart J 2012 vol. 33(pg. 838 -845)
11. Wexler DJ, Grant RW, Meigs JB, Nathan DM, Cagliero E: Sex disparities in treatment of cardiac risk factors in patients with type 2 diabetes. Diabetes Care. 2005, 28 (3): 514-520. 10.2337/diacare.28.3.514
12. Krauss RM: Lipids and lipoproteins in patients with type 2 diabetes. Diabetes Care. 2004, 27 (6): 1496-1504. 10.2337/diacare.27.6.1496
13. 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): 138-141.
14. Taskinen MR, Kahri J, Koivisto V, Shepherd J, Packard J: Metabolism of HDL apolipoprotein A-I and A-II in type 1 (insulin-dependent) diabetes mellitus. Diabetologia. 1992, 35 (4): 347-356. 10.1007/BF00401202
15. Giannini C, Santoro N, Caprio S, Kim G, Lartaud D, Shaw M, Pierpont B, Weiss R: The triglyceride-to-HDL cholesterol ratio: association with insulin resistance in obese youths of different ethnic backgrounds. Diabetes Care. 2011, 34 (8): 1869-1874. 10.2337/dc10-2234
16. Barrett, Conner E., S.M. Grundy and M.J. Holdbrook Plasma lipids and diabetes mellitus in an adult. Am. J. Epidemiol., 15(5): 657-663.
17. Cianflone K, Paglialunga S, Roy C. Intestinally derived lipids: metabolic regulation and consequences—an overview. Atheroscler Suppl. 2008;9:63–68
18. Vergès B. Abnormal hepatic apolipoprotein B metabolism in type 2 diabetes. Atherosclerosis. 2010;211:353–360
19. Chahil TJ, Ginsberg HN (2006) Diabetic dyslipidemia. Endocrinol Metab Clin North Am 35:491–510, vii–viii
20. Ooi EM, Ng TW, Chan DC, Watts GF. Plasma markers of cholesterol homeostasis in metabolic syndrome subjects with or without type-2 diabetes. Diabetes Res Clin Pract. 2009; 85: 310–316.
21. Hogue JC, Lamarche B, Tremblay AJ, Bergeron J, Gagne C, Couture P. Evidence of increased secretion of apolipoprotein B-48-containing lipoproteins in subjects with type 2 diabetes. J Lipid Res. 2007;48: 1336–1342.

Source of Support: None Declared
Conflict of Interest: None Declared