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Research Article

Lipid profile in children with insulin dependent diabetes mellitus

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ABSTRACT

Background: Dyslipidemia is a significant risk factor for coronary heart disease which may lead to an increased risk of atherosclerosis in Type I diabetes mellitus at a younger age.
Methods: Twenty five children with diabetes mellitus type 1 were assessed for the levels of glucose, total cholesterol, triglycerides, HDL, VLDL, LDL and cholesterol to HDL ratio and were compared with age; matched healthy controls.
Results: The result of the present study showed that all the above mentioned parameters were significantly (P<0.001) higher in type 1 diabetes mellitus as compared to the control group with glucose levels of 217.5 mg/dl, triglycerides levels of 156.5 mg/dl, cholesterol levels of 184.7 mg/dl, VLDL levels of 31.08 mg/dl, LDL levels of 120.1 mg/dl and cholesterol to HDL ratio of 5.87 whereas HDL levels were significantly lower i.e. 32.7 mg/dl in type 1 diabetes mellitus.
Conclusions: The patients are at a higher risk of developing atherosclerosis and dyslipidemia at an early age.

Keywords: Type I diabetes mellitus, Lipid profile, Glucose

INTRODUCTION

Type 1 diabetes also known as juvenile diabetes or insulin dependent diabetes mellitus, is widely thought to be an organ specific autoimmune disease. Type 1 diabetes is characterized by an inadequate secretion of insulin by the β-cells of pancreas and usually has a sudden and dramatic onset, ketoacidosis, and insulin dependency at a relatively early age.[1]

The incidence of type 1 diabetes has increased globally over the past decades. It has been estimated that on an annual basis some 65,000 children aged less than 15 years develop type 1 diabetes mellitus.[2]

Increased blood sugar levels also result in significant disturbance in lipid metabolism including both qualitative and quantitative change in the lipids.[3] Type 1 diabetes is associated with at least a 10-fold increase in cardiovascular disease as compared with an age-matched nondiabetic population.[4] Dyslipidemia has been shown to be a significant coronary heart disease risk factor in type 1 diabetes. [5-6]

Although, diabetes implies a relatively poor prognosis for the individual developing the disease, there is a distinct prospect of significant improvement in prognosis with the implementation of effective existing strategies including screening for risk factors, which should include determination of lipid profile.[7]

The American Heart Association categorizes children with type 1 diabetes are at risk of cardiovascular and recommends healthy lifestyle and pharmacological treatment for those with elevated LDL cholesterol levels.[8-9] Thus, it seems important to pay attention to lipid abnormalities, in patients with type 1 diabetes, in order to reduce cardiovascular disease in this population at an early age.[10]

METHODS

The study was conducted at the Lokmanya Tilak Municipal Medical Hospital, Sion. The study was approved by the local ethics committee. A total of 25 Diabetic patients from the Out Patients Department of the Department of endocrinology attached to Lokmanya Tilak Municipal General Hospital, Sion Mumbai were selected for the study. A group of healthy subjects with age and sex matched controls were selected.

Inclusion criteria

The study subjects, who underwent a detailed medical examination, was diagnosed type I diabetes mellitus for more than one year and no signs of acute or chronic illness.

Exclusion criteria

Children with chronic illnesses and cardiovascular disease were excluded. All patients with any renal dysfunction, (i.e. raised blood urea and serum Creatinine levels), with coexistent illness (i.e. infections), liver diseases, were excluded. None of the subjects were taking antihypertensive or lipid lowering medications at the time of the study.

The subjects were divided into the following 2 groups: Group I healthy Children without Type 1 DM (n=25). Group II Children with Type 1 DM (n=25).

Blood was collected from the arm veins of patients between 8 and 10am following overnight fast. Serum glucose levels were determined by the glucose oxidase method. Fasting lipid profile for each subject was obtained by measuring serum triglycerides (TAG) by acetyl acetone method; Total cholesterol was measured by Parekh and Jung method and HDL Cholesterol by Phosphotungstate method.[11]

Low density lipoprotein (LDL-C) and Very low density lipoprotein cholesterol (VLDL-C) were measured using the Friedewald equation: LDL-C = TC - (HDL-C + TG/5), while VLDL- C was calculated from the formula VLDL-C = TG / 5. Cholesterol to HDL Ratio was estimated by using formulae Total Cholesterol/ HDL Cholesterol

Statistics

Mean and standard deviations were determined for quantitative data. The significance of differences among the two groups was analyzed by student's t-test. P value < 0.001 was considered statistically significant.

RESULTS

The mean±SD values and p-values of biochemical parameters were performed in the control and diabetic groups (Table 1). Mean Blood Glucose, Total cholesterol, VLDL-cholesterol were significantly higher in diabetic children than control group. Serum LDL-cholesterol and HDL-Cholesterol levels were also statistically significant.

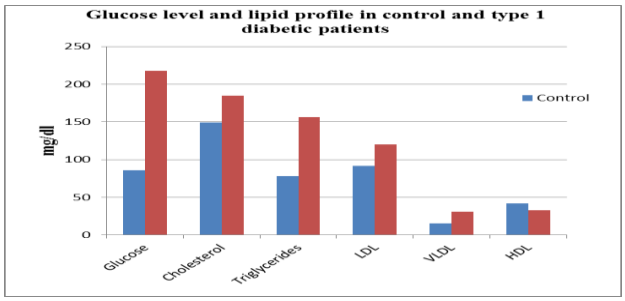

Figure 1: Comparison of biochemical parameters between groups.

Table1: Biochemical parameters.

Parameters	Group I Control	Group II Type 1 diabetes	't' Value	'P' Value
Blood glucose (mg/dl)	85.8±11.05	217.5±32.9	18.94	P<0.001
Cholesterol (mg/dl)	149±16	184.7±10.83	9.22	P<0.001
Triglycerides (mg/dl)	78.2±23.4	156.56±30.42	10.19	P<0.001
HDL (mg/dl)	42.08±4.06	32.7±7.60	5.42	P<0.001
LDL (mg/dl)	91.96±15.68	120.12±14.23	6.64	P<0.001
VLDL (mg/dl)	15.36±4.73	31.08±6.1	10.08	P<0.001
Cholesterol/HDL ratio	3.595±0.53	5.87±1.49	7.19	P<0.001

DISCUSSION

Type 1 diabetic children have elevated levels of lipids despite short duration of disease and normal BMI as compared to healthy age and sex matched control children.[12] The present study showed increased Glucose levels (p<0.001) in Type 1 Diabetic patients as compared to the control group.

Al-Naama LM, et al showed that mean total cholesterol, HDL-C, LDL-C, VLDL-C, LDL-C / HDL-C ratio were significantly higher in diabetic children compared to the control group (P<0.02 to <0.0001), whereas TG level was higher in diabetic children compared to the control, but the difference was statistically marginally significant (p 0.06).[7]

This is in agreement with our present study in which Type I diabetic patients exhibited a significant increase in total cholesterol, Triglycerides, LDL and VLDL cholesterol as compared to the control group(P<0.001). In healthy persons, cholesterol level varies from 150 to 200mg/dl. Values around 22mg/dl will have moderate risk and values above 240 mg/dl will need active treatment.

Blood levels under 130mg/dl are desirable. Levels above 160mg/dl carry definite risk. Hence LDL is "bad" cholesterol.HDL level above 60 mg/dl protects against heart disease. Hence HDL is "good" cholesterol. A level below 40 mg/dl increases the risk of CAD. For every 1 mg/dl drop in HDL, the risk of heart disease rises 3%. If the ratio of total cholesterol/HDL is more than 3.5, it is dangerous.[13]

This study shows that there is a decrease in HDL cholesterol and increase in Cholesterol to HDL ratio in Type 1 Diabetic patients as compared to the control group. This is similar to the trend shown by Faghih S, et al in which the mean apolipoprotein A and triglyceride levels in cases were higher than in controls, while mean apolipoprotein B and lipoprotein-a, as well as LDL, HDL and total cholesterol were higher in controls.[14]

Coronary heart disease is the leading cause of mortality in patients with type 1 diabetes. As in persons with type 2 diabetes and the general population, dyslipidemia is a considerable dangerous factor for Coronary heart disease (CHD) in type 1 diabetic patients.[15]

CONCLUSION

The study indicated that there is a significant increase in the level of Lipid profile, Cholesterol HDL ratio, Glucose and a decrease in HDL Cholesterol in Type 1 Diabetic patients.

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