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A COMPARATIVE STUDY OF LIPID PROFILE IN TYPE 1 & TYPE 2 DIABETES MELLITUS

Research paper in ENGLISH

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Abstract

A comparative study on the estimation of both type 1 and type 2 diabetes mellitus patients was carried out by collecting 200 samples. The plasma and serum was separated and used for the diagnosis Plasma Glucose, Total cholesterol, TGL, HDL, LDL, VLDL, including the supportive parameters like serum urea and creatinine. The results obtained were subjected to statistical analysis and SD, percent SD and correlation coefficients were calculated. Deviation was found between the values of type 1 and type 2. The lipid profiles of both type 1 and type 2 diabetes showed positive correlation, but the significance of correlation was very less.

Keywords: *Lipid profile, Type 1 and 2 diabetes mellitus, plasma glucose.*

1. Introduction:

Diabetes mellitus is a common and chronic disorder of carbohydrate metabolism, due to deficiency or diminished effectiveness of insulin, resulting in glycemia and glycosuria [6].Secondary changes may occur in the metabolism of proteins, fats, water and electrolytes in

tissues or organs sometimes with grave consequences [18]. Prevalence of both type 1 and type 2 diabetes mellitus is increasing rapidly worldwide and is projected to reach about 300 million worldwide by the year 2025 [19]. The toll of diabetes in health and the economy is enormous and will continue to rise because there is no currently available cure for this disease [13]. Primary prevention through diet and life style modifications is of paramount importance. Dietary cholesterol is absorbed and excess may be deposited in the blood vessels leading to cardiovascular disease. The increased risk of coronary heart disease in diabetic patients may be partially explained through lipid abnormalities [16]. Abnormalities in type 1 diabetes can normally be reversed with glycemic control. But in type 2, although lipid values improve, abnormalities commonly persist even after optimal glycemic control [15, 12]. The present study is aimed to compare the lipid profiles of both type 1 and type 2 diabetes mellitus patients and to correlate its significance.

2. Material and Method:

A total of 200 samples were collected from type 1 and type 2 diabetes patients in Rajiv Gandhi Government General Hospital, Chennai with an ethical committee approval. Blood samples were collected from anticubital vein. The samples collected were transferred in to two sterile containers in which one contains EDTA for the separation of plasma and an empty tube for serum. Samples were centrifuged (2500 rpm.,10 mins) so that the serum and plasma were separated[13].Blood plasma was used to estimate glucose level by Glucose Oxidase Peroxidase method [2] and blood serum was used to analyse biochemical parameters such as cholesterol by Enzymatic method [11], Triglycerides by Serum Enzymatic method(Stein . Mayer .G.L., 1995) Creatinine by Picrate method [5], Urea by UV method[7], and High Density Lipoprotein by Polyethylene Glycol CHOD PAP method [11]. VLDL was calculated using the formula $VLDL = TGL/5$ [16] and LDL was calculated using the formula $LDL = (VLDL+HDL)-Total\ Cholesterol$, [25]. The values obtained were analyzed for SD, percentage of SD and correlations using statistical tools [23]

3. Results:

Prevalence of Type 1 diabetes was in the age group 0-25 years, with a predominance in the age group 10-20 years where as type 2 was in the age group 30-100 years with a

predominance in the age group 50-70 years. Out of 100 type 1 diabetes , 29 were in the age group 0-10, 50 from 10 – 20 and 21 from 20 -25. Out of 100 type 2 diabetes , 3 were in the age group 30-40, 17 from 40 -50, 21 from 50 – 60, 40 from 60 -70, 14 from 70 – 80, 3 from 80 – 90 and 2 from 90 -100. Males were found to be more prone to type 1 (52%) as well as type 2 (68%) diabetes.

3.1. Biochemical Parameters.

3.1.1. Plasma glucose:

Among type 1 diabetes, 3 were between 200 -250 mg/dl and 4 were between 150 – 200 mg / dl. In the case of type 2 diabetes, 7 were above 250 mg/dl, 15 were between 200 – 250 mg/dl and 19 were between 150 – 200 mg/dl. The values were calculated for standard deviation having normal value as standard and the deviation was 49.331 for type 1 and 60.141 for type 2 diabetes. The percentage of Standard deviation was about 55.14% and 66.82%. The values of both type 1 and type 2 were negatively correlated -0.07812(-7.812%).

3.1.2. Serum Urea:

In the case of type 1 diabetes, 19 were above 40 mg/dl and 15 were between 30 – 40 mg / dl. In the case of type 2 diabetes, 23 were above 40 mg/dl and 33 were between 30 – 40 mg/dl. The values were calculated for standard deviation having normal value as standard and the deviation was 8.864 for type 1 and 9.25 for type 2 diabetes. The percentage of Standard deviation was about 33.25% and 33.63%. The values of both type 1 and type 2 were positively correlated 0.03418(3.418%) but the significance of correlation was very less.

3.1.3. Creatinine:

In the case of type 1 diabetes, 14 were above 1.3 mg/dl where as in the case of type 2 diabetes, 23 were above 1.3 mg/dl. The values were calculated for standard deviation having normal value as standard and the deviation was 0.224 for type 1 and 0.247 for type 2 diabetes. The percentage of Standard deviation was about 28.05% and 36.98%. The values of both type 1 and type 2 were negatively correlated -0.01721(-1.172%).

3.1.4. Total Cholesterol:

In the case of type 1 diabetes, 3 were above 300 mg/dl and 9 were between 250 – 300 mg / dl. In the case of type 2 diabetes, 11 were above 300 mg/dl and 19 were between 250 – 300 mg/dl. The values were calculated for standard deviation having normal value as standard and the deviation was 41.444 for type 1 and 61.577 for type 2 diabetes. The percentage of Standard deviation was about 23.22% and 30.788%. The values of both type 1 and type 2 were negatively correlated -0.08946(-8.946%).

3.1.5. Triglycerides:

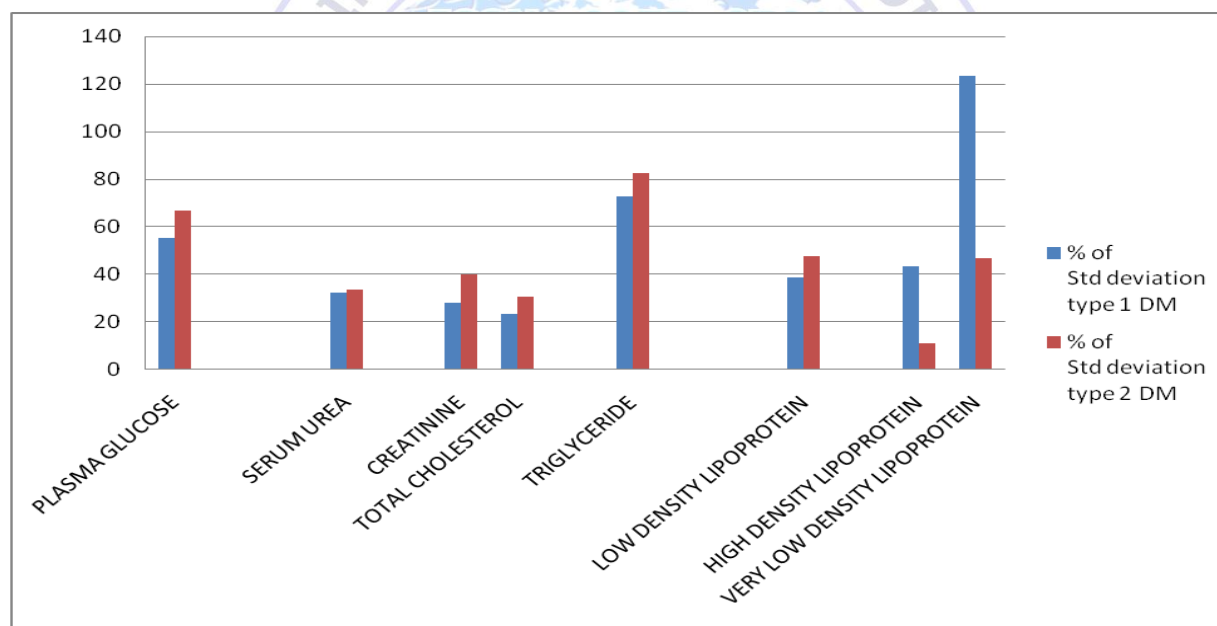
In the case of type 1 diabetes, 12 were above 250 mg/dl 23 were between 200 – 250 mg/dl and 19 were between 150 – 200 mg / dl. In the case of type 2 diabetes, 23 were above 250 mg/dl 25 were between 200-250mg/dl and 22 were between 150 – 200 mg/dl. The values were calculated for standard deviation having normal value as standard and the deviation was 71.636 for type 1 and 82.164 for type 2 diabetes. The percentage of Standard deviation was about 72.286% and 82.348%. The values of both type 1 and type 2 were positively correlated 0.02081 (2.081%), but the significance of correlation was very less.

Table 1: Comparison of biochemical parameters in type 1 & type 2 diabetes mellitus

BIOCHEMICAL PARAMETERS	TYPE 1 DIABETES MELLITUS			TYPE 2 DIABETES MELLITUS			Correlation b/w TYPE 1 & TYPE 2 DIABETES MELLITUS
	Abnormal values mg/dl	No of Patients	% of Std deviation	Abnormal values	No of Patients	% of Std deviation	
PLASMA GLUCOSE	Above 251	2	55.142	Above 250	7	66.825	-0.07812
	250 - 200	12		250 - 200	15		
	199 - 150	16		200 - 150	19		
SERUM UREA	Above 40	19	32.235	Above 40	23	33.637	0.03418
	40 - 30	15		40 - 30	33		
CREATININE	Above 1.3	14	28.053	Above 1.3	23	39.986	-0.01721

TOTAL CHOLESTEROL	Above 300	3	23.222	Above 300	11	30.788	-0.08946	
	300 - 250	9			300 - 250			19
TRIGLYCERIDE	Above 250	12	72.636	Above 250	23	82.348	0.020281	
	250 - 200	23			250 - 200			25
	200 - 150	19			200 - 150			22
LOW DENSITY LIPOPROTEIN	Above 200	0	38.681	Above 200	20	47.466	0.00503	
	200 - 150	0			200 - 150			14
HIGH DENSITY LIPOPROTEIN	Above 65	7	43.43	Above 65	0	10.951	0.043097	
VERY LOW DENSITY LIPOPROTEIN	Above 65	70	123.32	Above 65	7	46.855	-0.05176	

Fig 1: Percentage of Std. deviation of Type 1 & Type 2



3.1.6. Low Density Lipoprotein:

In the case of type 1 diabetes, none were above 200 mg/dl and between 150 – 200 mg/dl. In the case of type 2 diabetes, 20 were above 200 mg/dl, 14 were between 150-200mg/dl. The values were calculated for standard deviation having normal value as standard and the deviation was 50.285 for type 1 and 61.704 for type 2 diabetes. The percentage of Standard deviation was

about 38.681% and 47.46%. The values of both type 1 and type 2 were positively correlated 0.000503 (0.503%), but the significance of correlation was very less.

3.1.7. High density Lipoprotein:

In the case of type 1 diabetes, 7 were above 65 mg/dl. In the case of type 2 diabetes, none were above 65 mg/dl. The values were calculated for standard deviation having normal value as standard and the deviation was 23.886 for type 1 and 6.023 for type 2 diabetes. The percentage of Standard deviation was about 43.43% and 10.95%. The values of both type 1 and type 2 were positively correlated 0.043091(4.43%), but the significance of correlation was very less.

3.1.7. Very Low Density Lipoprotein:

In the case of type 1 diabetes, 70 were above 65 mg/dl. In the case of type 2 diabetes, 7 were above 65 mg/dl. The values were calculated for standard deviation having normal value as standard and the deviation was 49.331 for type 1 and 16.342 for type 2 diabetes. The percentage of Standard deviation was about 123.323% and 46.855%. The values of both type 1 and type 2 were negatively correlated -0.05176 (-5.07%).

4. Discussion:

Diabetes is a common endocrine disease and its complications are of major stimuli for the enhancement of efforts towards its management [4]. An increase in lipid and fat level may lead to less action of insulin as well as increase in toxicity levels in the body. Quantitative changes include increase in VLDL and decrease in lipoprotein-lipase activity leading to peripheral utilization of LDL [6]. Increase in LDL level and decrease in HDL level increase the hepatic lipase activity and decrease in VLDL clearance. Qualitative changes include increase in the amount of Triglycerides, LDL, HDL non enzymatic glycation of LDL and non enzymatic glycation of HDL thus increasing the risk of heart diseases [17]. Negative correlations of the values of plasma glucose for type 1 and type 2 diabetes signifies that the secretion of insulin facilitates the peripheral utilization of the prandial nutrient load, suppresses hepatic glucose production and limits the elevations in the glucose levels [14]. It was identified that the serum urea values were positively correlated and in the case of creatinine the values were negatively correlated. This study investigated a large cohort of type 2 diabetic patients with early and

moderate diabetic nephropathy strictu sensu. Notably, impaired renal function can be often diagnosed. These patients even in the presence of elevated creatinine levels, express a very high cardio renal risk [22, 3]

The metabolic syndrome of type 2 diabetes is commonly associated with lipid profile and is known for moderately elevated triglycerides, a preponderance of small, dense LDL particles and low levels of HDL particles. Lipid profile that includes Total cholesterol, TGL, LDL, HDL, and VLDL [24] were diagnosed and statistically analyzed. It was observed that mean of serum triglycerides were higher in type 2 diabetes when compared with type 1 diabetes patients [21,20]. It is probably due to the increased production and reduced clearance of rich lipoproteins especially VLDL [12]. The relation between percent body fat and HDL is increase in adiposity and increase in serum triacylglycerol concentration. The values of LDL and HDL were positively correlated but the significance of the correlation was very less [8] and it was studied by Haffner,[10] that type 2 patients have many lipid abnormalities including elevated levels of VLDL and LDL and HDL than type 1 patients, the inverse correlation of HDL cholesterol level is an independent risk factor in the cardio vascular diseases.[15,9]. The possible relationships between the circulating levels of modified derivatives of LDL correlate the extent of coronary artery disease in type 2 patients. [1].The values obtained from the lipid profile of type 1 and type 2 diabetes were correlated the significance of correlation was very less 5.23% which shows the values of the lipid profile was not similar for both type 1 and type 2 patients but in contrast a significant positive correlation existed between LDL and HDL among type1. Women had significantly higher concentration of lipids compared to men irrespective of the diabetic status.

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