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A retrospective study of determination of lipid profile level and CRP level in offspring of DM patients

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Abstract
Background: Type 2 diabetes mellitus is associated with a number of other metabolic disorders including elevated triglycerides (TGs), low high-density lipoprotein cholesterol (HDL-C) and central obesity. The present study determined lipid profile and CRP level in offspring of diabetes mellitus patients.
Materials and Methods: 50 offspring of T2DM patients (Group I) and 50 healthy controls (Group II) were recruited. Assessment of plasma glucose level, serum hs-CRP, serum cholesterol serum TGs, and high-density lipoprotein (HDL) levels was done.
Results: The mean random blood glucose level in group I was 94.2 mg/dl and in group II was 93.4 mg/dl, hs- CRP was 2.6 mg/dl in group I and 1.4 mg/dl in group II, TG (mg%) was 169.2 and 126.3 in group I and group II, TC (mg%) was 176.4 and 146.2 in group I and group II, HDL (mg%) was 38.2 and 54.3 in group I and group II, LDL (mg%) was 106.2 and 74.4 in group I and group II and VLDL was 34.5 mg% in group I and 26.1 mg% in group II. The difference was significant (P<0.05). There was positive correlation of TG (r-0.26, P<0.05), TC (r-0.41, P<0.05), LDL (r-0.42, P<0.05) and VLDL (r- 0.29, P<0.05) and negative correlation of HDL (r- -0.26, P<0.05) with hs-CRP.
Conclusion: There was alteration of lipid profile and increased level of high-sensitivity C-reactive protein in offsprings of type II diabetes parents.

Keywords: Diabetes, Lipid profile, CRP

Introduction
Type 2 diabetes mellitus is associated with a number of other metabolic disorders including elevated triglycerides (TGs), low high-density lipoprotein cholesterol (HDL-C) and central obesity. It is also associated with disorders related with protein, carbohydrate, and fat metabolism [1]. Reduced glucose uptake by muscle and adipose tissue can be seen in people with diabetes, which is a consequence of chronic hyperglycemia and eventually tissue damage and chronic vascular problems. The absolute number of people with diabetes is increasing due to population growth, ageing of the population, urban settlement, and factors such as obesity and lack of physical activity [2].
The status of diabetes has changed from being considered as a mild disorder of the elderly to one of the major causes of morbidity and mortality affecting the youth and middle-aged people. The rise in C-reactive protein (CRP) as a response to the increase in the secretion of cytokines of adipose origin detected in obese individuals has been used as a marker of cardiovascular risk and diabetes in adults. When measured with new high-sensitivity assays, the levels of CRP have proven to predict future cardiovascular risk. Among apparently healthy men and women, the levels of high-sensitivity-CRP (hs-CRP) <1, 1-3 of and >3 mg/l distinguish between those at low, moderate and high risk of future cardiovascular disease [3].
Diabetic dyslipidemia is a complex cluster of potentially atherogenic lipid and lipoprotein changes [4]. Increased plasma triglycerides (TGs), especially very high-density lipoprotein (VLDL), TG, and low concentration of high-density lipoprotein cholesterol (HDL-C), preponderance of small, dense low-density lipoprotein (LDL) and excessive postprandial lipemia are the main components of diabetic dyslipidemia [5]. The present study determined lipid profile and CRP level in offspring of diabetes mellitus patients.

Materials and Methods

This study was conducted among 50 offspring of T2DM patients (Group I) and 50 healthy controls (Group II). Parents of offspings were informed and their written consent was obtained.

Data such as age, sex, and marital status, history of any medications, addictions, dietary habits, and lifestyle was recorded. Body weight (kg), height (m), waist circumference (cm), and hip circumference (cm), were recorded. Body mass index and waist:hip ratios were calculated. Venous blood was taken for estimation of plasma glucose level, serum hs-CRP, serum cholesterol serum TGs, and high-density lipoprotein (HDL) levels. Results were tabulated and subjected to statistical analysis. P value less than 0.05 was considered significant.

Results

Table 1: Demographic parameters

Parameters	Group I	Group II	*P* value
Age (Years)	34.2	35.5	0.94
Gender (M:F)	25:25	30:20	-
Weight (Kgs)	60.2	60.4	0.19
Height (m)	1.72	1.68	0.17
BMI (Kg/m^2)	22.87	22.41	0.02
WC (cm)	78.2	73.5	0.01
HC (cm)	97.3	96.5	0.04
W/H ratio	0.82	0.76	0.05

Table I shows that mean age in group I was 34.2 years and in group II was 35.5 years, there were 25 males and 25 females inn group I and 30 males and 20 females in group II, mean weight was 60.2 kg in group I and 60.4 kg in group II, height was 1.72 meters in group I and 1.68 meters in group II, BMI was 22.87 Kg/m^2 in group I and 22.41 Kg/m^2 in group II. Waist circumference was 78.2 cm in group I and 73.5 cm in group II, hip circumference was 97.3 in group I and 96.5 in group II, W/H ratio was 0.82 in group I and 0.76 in group II. The difference was significant (P<0.05).

Table 2: Assessment of biochemical parameters

Parameters	Group I	Group II	*P* value
RBS (mg/dl)	94.2	93.4	0.80
hs-CRP (mg/dl)	2.6	1.4	0.04
TG mg%	169.2	126.3	0.02
TC mg%	176.4	146.2	0.05
HDL mg%	38.2	54.3	0.01
LDL mg%	106.2	74.4	0.03
VLDL mg%	34.5	26.1	0.02

Table II, graph I shows that mean random blood glucose level in group I was 94.2 mg/dl and in group II was 93.4 mg/dl, hs- CRP was 2.6 mg/dl in group I and 1.4 mg/dl in group II, TG (mg%) was 169.2 and 126.3 in group I and group II, TC (mg%) was 176.4 and 146.2 in group I and group II, HDL (mg%) was 38.2 and 54.3 in group I and group II, LDL (mg%) was 106.2 and 74.4 in group I and group II and VLDL was 34.5 mg% in group I and 26.1 mg% in group II. The difference was significant (P<0.05).

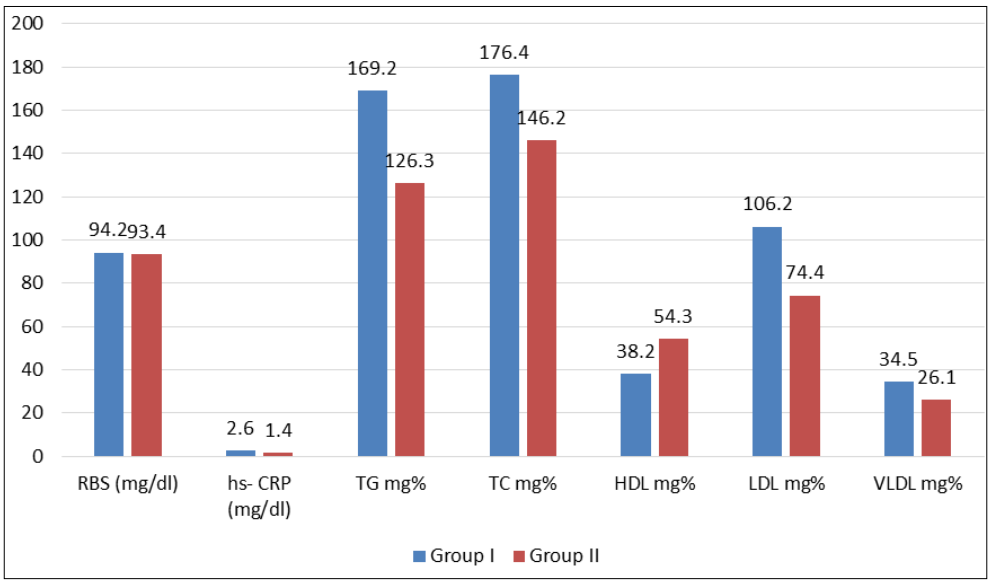

Fig 1: Assessment of biochemical parameters

Table 3: Correlation between hs-CRP and lipid profile

Lipid profile	R value	*P* value
TG	0.27	0.03
TC	0.41	0.01
HDL	-0.26	0.03
LDL	0.42	0.03
VLDL	0.29	0.05

Table III shows that there was positive correlation of TG (r-0.26, P<0.05), TC (r-0.41, P<0.05), LDL (r-0.42, P<0.05) and VLDL (r-0.29, P<0.05) and negative correlation of HDL (r--0.26, P<0.05) with hs-CRP.

Discussion

Diabetes mellitus (DM) with its complication has become the most important and challenging contemporary health problem [6]. Globally, the estimated number of adults with diabetes in 2007 was 246 million and 380 million adults worldwide will have diabetes by 2025. India has 41 million diabetics and this number is expected to increase to 70 million by 2025 [7]. CRP is a pentameric and non-immunoglobulin protein having five identical subunits that have been introduced as the most important marker of inflammation [8]. Serum levels of high-sensitivity CRP (hs-CRP) can be measured at very low levels using highly

sensitive assays and may indicate increased inflammatory activity in the vessel wall [9]. Thus, chronic systemic inflammation has been identified as an associated factor in the metabolic syndrome and diabetes mellitus [10]. The present study assessed lipid profile and CRP level in offspring of diabetes mellitus patients.

In present study, mean age in group I was 34.2 years and in group II was 35.5 years, there were 25 males and 25 females inn group I and 30 males and 20 females in group II, mean weight was 60.2 kg in group I and 60.4 kg in group II, height was 1.72 meters in group I and 1.68 meters in group II, BMI was 22.87 Kg/m^2 in group I and 22.41 Kg/m^2 in group II. Waist circumference was 78.2 cm in group I and 73.5 cm in group II, hip circumference was 97.3 in group I and 96.5 in group II, W/H ratio was 0.82 in group I and 0.76 in group II. Kriketos *et al.* [11] found 20% lower glucose infusion rate (GIR) (51.8 ± 3.9 vs 64.9 ± 4.6 µmol/minute/kg fat-free mass, p= 0.04) which was measure of insulin sensitivity in the FDRs of T2DM than controls. However, FDR of T2DM subjects had normal and comparable levels of CRP, adiponectin, and complement proteins with controls without family history of diabetes. C-reactive protein was inversely related to GIR (r=0.33, *p*= 0.04) and adiponectin (r=0.34, *p*=0.03) and positively related to adiposity (*p*=0.04). However, CRP was not related to GIR independent of fat mass. Results suggest that T2DM associated with a state of chronic low-grade systemic inflammation indicated by raised hs-CRP levels could occur early in the disease course, even if the FDRs are normoglycemic.

We observed that mean random blood glucose level in group I was 94.2 mg/dl and in group II was 93.4 mg/dl, hs-CRP was 2.6 mg/dl in group I and 1.4 mg/dl in group II, TG (mg%) was 169.2 and 126.3 in group I and group II, TC (mg%) was 176.4 and 146.2 in group I and group II, HDL (mg%) was 38.2 and 54.3 in group I and group II, LDL (mg%) was 106.2 and 74.4 in group I and group II and VLDL was 34.5 mg% in group I and 26.1 mg% in group II. We observed there was positive correlation of TG, TC, LDL, VLDL and negative correlation of HDL with hs-CRP. Mane *et al.* [12] conducted study on 100 nondiabetic siblings and offspring of T2DM patients between the age group 20 and 50 years. The mean value of blood sugar level did not show significant difference between the cases and controls (92.02 ± 9.23 vs 91.77 ± 7.99, $p \geq 0.05$). The mean values of hs-CRP (2.4 ± 1.98 vs 1.0 ± 0.38), TG (167.35 ± 17.35 vs 124.63 ± 13.55), total cholesterol (TC) (176.99 ± 12.45 vs 147.59 ± 9.72), low-density lipoprotein (LDL) (106.41 ± 12.99 vs 71.65 ± 11.24), and very high-density lipoprotein (VHDL) (33.47 ± 3.47 vs 24.93 ± 2.71) (all $p<0.001$) were increased, however mean value of HDL (37.11 ± 3.99 vs 51.01 ± 3.93) was decreased in the cases as compared to controls. High-sensitivity C-reactive protein shows positive correlation with TG, TC, LDL, and very low-density lipoprotein and has negative correlation with HDL.

Conclusion

Authors found alteration of lipid profile and increased level of high-sensitivity C-reactive protein in offsprings of type II diabetes parents.

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