

Original Research Article

ASSESSMENT OF LIPID PROFILE LEVEL AND C-REACTIVE PROTEIN LEVEL IN OFFSPRING OF DM PATIENTS

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ABSTRACT

Background: Aim: To assess lipid profile and CRP level in the offspring of diabetes mellitus patients.

Material and Methods: 60 offspring of T2DM patients (Group I) and 60 healthy controls (Group II) were selected. Assessment of plasma glucose level, serum hs-CRP, serum cholesterol serum TGs, and high-density lipoprotein (HDL) levels was performed.

Results: There were 32 males and 28 females in group I and 30 males and 30 females in group II. The mean age in group I subjects was 36.2 years and in group II was 36.5 years. The mean weight was 60.8 kg in group I and 60.2 kg in group II, height was 1.71 meters in group I and 1.69 meters in group II, BMI was 22.7 Kg/m² in group I and 22.3 Kg/m² in group II. The mean waist circumference was 79.2 cm in group I and 74.5 cm in group II, hip circumference was 98.3 in group I and 97.5 in group II, W/H ratio was 0.81 in group I and 0.74 in group II. A significant difference was observed between both groups (P< 0.05). The mean fasting blood sugar level was 165.2 mg/dl in group I and 94.2 mg/dl in group II. The random blood glucose level in group I was 108.2 mg/dl and in group II was 93.6 mg/dl, hs- CRP was 2.9 mg/dl in group I and 1.4 mg/dl in group II, TG was 170.2 and 128.3 in group I and group II, TC was 178.4 mg/dl and 142.6 mg/dl in group I and group II, HDL was 37.2 mg/dl and 55.3 mg/dl in group I and group II, LDL was 108.2 mg/dl in group I and 76.4 mg/dl in group II and VLDL was 36.5 mg/dl in group I and 24.1 mg/dl in group II. A significant difference was observed between both groups (P< 0.05). There was positive correlation of TG (r- 0.24, p< 0.02), TC (r-0.42, p< 0.02), LDL (r-0.41, p< 0.04) and VLDL (r- 0.31, p< 0.04) and negative correlation of HDL (r- -0.23, p< 0.05) with hs-CRP.

Conclusion: Children of parents with type II diabetes have elevated levels of high-sensitivity C-reactive protein and a changed lipid profile. Clinicians may be able to intervene early in the course of the disease and stop future complications and outcomes with the support of timely screening and early detection of the increased hs-CRP in the first-degree relatives of T2DM participants.

Keywords: CRP, Diabetes, Offspring, HDL.

INTRODUCTION

Diabetes mellitus (DM) has emerged as the most significant and difficult health issue of the modern era. By 2025, there will be 380 million adults with diabetes worldwide, up from the predicted 246 million who had the disease in 2007. By 2025, there

will be 70 million diabetics in India, up from the current 41 million. Numerous additional metabolic diseases, such as excessive triglycerides (TGs), poor HDL-C, and central obesity, are linked to type 2 diabetes mellitus.^[1] Disorders about the metabolism of fat, protein, and carbohydrates are also linked to

it. People with diabetes have reduced glucose uptake by muscle and adipose tissue, which is a result of long-term hyperglycemia, tissue damage, and chronic vascular issues. Due to variables including obesity and inactivity, as well as population increase, aging of the population, and urbanization, there are a rising number of persons with diabetes overall.^[2]

Diabetes is now seen as one of the main causes of morbidity and mortality affecting young and middle-aged adults, rather than only a moderate illness affecting the elderly. Adult diabetes and cardiovascular risk have been linked to increases in C-reactive protein (CRP), which is a reaction to the increased release of cytokines with an adipose origin seen in obese people.^[3] New high-sensitivity assays have demonstrated that CRP levels accurately predict future cardiovascular risk. High-sensitivity-CRP (hs-CRP) levels of <1, 1-3, and >3 mg/l differentiate between individuals at low, moderate, and high risk of developing cardiovascular disease in the future among men and women who appear healthy.^[4] Diabetic dyslipidemia is a complicated cluster of potentially atherogenic lipid and lipoprotein alterations. The main elements of diabetic dyslipidemia are elevated plasma triglycerides (TGs), particularly very high-density lipoprotein (VLDL), TG, low concentration of HDL-C (high-density lipoprotein cholesterol), preponderance of small, dense LDL, and excessive postprandial lipemia.^[5] Considering this, we performed this study to assess lipid profile and CRP level in the offspring of diabetes mellitus patients.

MATERIAL AND METHODS

The present retrospective study was conducted among sixty offspring of T2DM patients of either gender. The study protocol was approved by the institutional ethical clearance committee. Parents of offspring were informed regarding the utility of the study and their written consent was obtained in vernacular language.

A demographic profile such as age, name, sex, and marital status, all prescription drugs, addictions, food preferences, was entered in the case history sheet. We kept all subjects in group I and for comparison equal number of healthy subjects were put in group II. The following measurements were made: height (m), hip circumference (cm), waist circumference (cm), and body weight (kg). Waist: hip ratios and the body mass index were computed. To estimate the levels of plasma glucose, serum hs-CRP, serum cholesterol, serum TGs, and high-density lipoprotein (HDL), venous blood was

drawn. Results were tabulated and entered in MS excel sheet. All findings were subjected to statistical analysis. P value less than 0.05 was considered significant.

RESULTS

There were 32 males and 28 females in group I and 30 males and 30 females in group II. The mean age in group I subjects was 36.2 years and in group II was 36.5 years. The mean weight was 60.8 kg in group I and 60.2 kg in group II, height was 1.71 meters in group I and 1.69 meters in group II, BMI was 22.7 Kg/m² in group I and 22.3 Kg/m² in group II. The mean waist circumference was 79.2 cm in group I and 74.5 cm in group II, hip circumference was 98.3 in group I and 97.5 in group II, W/H ratio was 0.81 in group I and 0.74 in group II. A significant difference was observed between both groups (P< 0.05). [Table 1]

The mean fasting blood sugar level was 165.2 mg/dl in group I and 94.2 mg/dl in group II. The random blood glucose level in group I was 108.2 mg/dl and in group II was 93.6 mg/dl, hs- CRP was 2.9 mg/dl in group I and 1.5 mg/dl in group II, TG was 170.2 and 128.3 in group I and group II, TC was 178.4 mg/dl and 142.6 mg/dl in group I and group II, HDL was 37.2 mg/dl and 55.3 mg/dl in group I and group II, LDL was 108.2 mg/dl in group I and 76.4 mg/dl in group II and VLDL was 36.5 mg/dl in group I and 24.1 mg/dl in group II. A significant difference was observed between both groups (P< 0.05). [Table 2, Figure 1).

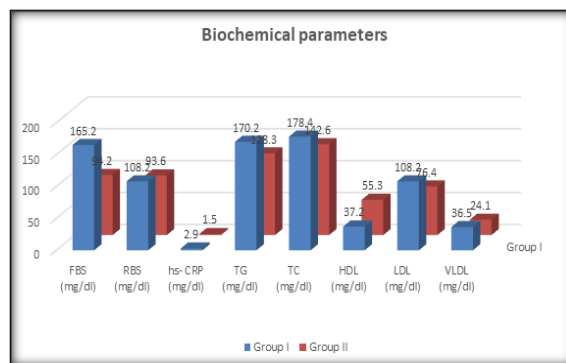


Figure 1: Measurement of biochemical parameters

There was positive correlation of TG (r- 0.24, p< 0.02), TC (r-0.42, p< 0.02), LDL (r-0.41, p< 0.04) and VLDL (r- 0.31, p< 0.04) and negative correlation of HDL (r- -0.23, p< 0.05) with hs-CRP. [Table 3]

Table 1: Demographic characteristics

Parameters	Group I	Group II	P value
Gender (M: F)	32:28	30:30	1
Age (Years)	36.2	36.5	0.94
Weight (Kgs)	60.8	60.2	0.87
Height (m)	1.71	1.69	0.90
BMI (Kg/m ²)	22.7	22.3	0.98

WC (cm)	79.2	74.5	0.16
HC (cm)	98.3	97.5	0.05
W/H ratio	0.81	0.74	0.05

Table 2: Measurement of biochemical parameters

Parameters	Group I	Group II	P value
FBS (mg/dl)	165.2	94.2	0.01
RBS (mg/dl)	108.2	93.6	0.72
hs- CRP (mg/dl)	2.9	1.5	0.04
TG (mg/dl)	170.2	128.3	0.01
TC (mg/dl)	178.4	142.6	0.04
HDL (mg/dl)	37.2	55.3	0.01
LDL (mg/dl)	108.2	76.4	0.04
VLDL (mg/dl)	36.5	24.1	0.03

Table 3: Correlation between hs-CRP and lipid profile

Lipid profile	R value	P value
TG	0.24	0.02
TC	0.42	0.02
HDL	-0.23	0.05
LDL	0.41	0.04
VLDL	0.31	0.05

DISCUSSION

Diabetes mellitus, commonly referred to as diabetes, is a chronic metabolic disorder characterized by elevated blood sugar levels (hyperglycemia).^[6,7] This condition results from either insufficient insulin production by the pancreas or the body's inability to effectively use the insulin it produces.⁸ Insulin is a hormone that helps regulate blood sugar (glucose) by facilitating its uptake into cells for energy. CRP is a non-immunoglobulin, pentameric protein with five identical subunits that has been identified as the primary indicator of inflammation.^[9,10] Highly sensitive tests can assess serum levels of high-sensitivity CRP (hs-CRP) at very low levels, which may signal increased inflammatory activity in the vessel wall. Consequently, it has been determined that persistent systemic inflammation is linked to both metabolic syndrome and diabetes mellitus.^[11,12] We performed this study to assess lipid profile and CRP level in the offspring of diabetes mellitus patients.

In our results, there were 32 males and 28 females in group I and 30 males and 30 females in group II. The mean age in group I subjects was 36.2 years and in group II was 36.5 years. The mean weight was 60.8 kg in group I and 60.2 kg in group II, height was 1.71 meters in group I and 1.69 meters in group II, BMI was 22.7 Kg/m² in group I and 22.3 Kg/m² in group II. The mean waist circumference was 79.2 cm in group I and 74.5 cm in group II, hip circumference was 98.3 in group I and 97.5 in group II, W/H ratio was 0.81 in group I and 0.74 in group II. A study by Mane et al,^[13] involved 100 siblings and kids of T2DM patients who were between the ages of 20 and 50 and were not diabetic. There was no statistically significant difference in the mean blood sugar level (92.02 ± 9.23 vs 91.77 ± 7.99 , $p > 0.05$) between the patients and controls. The mean values of total cholesterol (TC) (176.99 ± 12.45 vs 147.59 ± 9.72), hs-CRP (2.4 ± 1.98 vs 1.0 ± 0.38),

TG (167.35 ± 17.35 vs 124.63 ± 13.55), 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 higher in the cases than in the controls. On the other hand, the mean value of HDL (37.11 ± 3.99 vs 51.01 ± 3.93) was lower in the cases than in the controls. Positive correlations have been seen between high-sensitivity C-reactive protein and TG, TC, LDL, and very low-density.

Our results showed that the mean fasting blood sugar level was 165.2 mg/dl in group I and 94.2 mg/dl in group II. The random blood glucose level in group I was 108.2 mg/dl and in group II was 93.6 mg/dl, hs- CRP was 2.9 mg/dl in group I and 1.4 mg/dl in group II, TG was 170.2 and 128.3 in group I and group II, TC was 178.4 mg/dl and 142.6 mg/dl in group I and group II, HDL was 37.2 mg/dl and 55.3 mg/dl in group I and group II, LDL was 108.2 mg/dl in group I and 76.4 mg/dl in group II and VLDL was 36.5 mg/dl in group I and 24.1 mg/dl in group II. Gelaye et al,^[14] conducted study among 1,525 individuals (569 men and 956 women; mean age 39 years old). Elevated CRP were significantly associated with increased mean fasting insulin and mean HOMA-IR concentrations ($p < 0.001$). Women with CRP concentration >2.53 mg/l (upper tertile) had a 2.18-fold increased risk of IR (OR = 2.18 95% CI 1.51-3.16) as compared with those in the lowest tertile (<0.81 mg/l). Among men, those in the upper tertile had a 2.54-fold increased risk of IR (OR = 2.54 95% CI 1.54-4.20) as compared with those in the lowest tertile.

There was positive correlation of TG ($r= 0.24$, $p < 0.02$), TC ($r=0.42$, $p < 0.02$), LDL ($r=0.41$, $p < 0.04$) and VLDL ($r= 0.31$, $p < 0.04$) and negative correlation of HDL ($r= -0.23$, $p < 0.05$) with hs-CRP. Kriketos et al,^[15] discovered that the FDRs with type 2 diabetes had a 20% lower glucose infusion rate (GIR) than controls (51.8 ± 3.9 vs. 64.9 ± 4.6 $\mu\text{mol/minute/kg}$ fat-free mass, $p= 0.04$). In contrast,

controls without a family history of diabetes showed normal and equivalent levels of complement proteins, adiponectin, and CRP in the FDR of T2DM participants. C-reactive protein showed a positive correlation with obesity ($p=0.04$) and an inverse relationship with GIR ($r=0.33$, $p=0.04$) and adiponectin ($r=0.34$, $p=0.03$). Nevertheless, CRP did not correlate with GIR regardless of fat mass. The findings imply that even in cases where the FDRs are normoglycemic, T2DM may be linked to a state of persistent low-grade systemic inflammation, as seen by elevated hs-CRP levels, early in the course of the illness.

CONCLUSION

Children of parents with type II diabetes have elevated levels of high-sensitivity C-reactive protein and a changed lipid profile. Clinicians may be able to intervene early in the course of the disease and stop future complications and outcomes with the support of timely screening and early detection of the increased hs-CRP in the first-degree relatives of T2DM participants.

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