

## Evaluation of High-Sensitivity C-Reactive Protein and Lipid Profile in Nondiabetic Siblings and Offspring of Type 2 Diabetes Mellitus Patients

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### ABSTRACT

**Background:** Diabetes mellitus (DM) with its complication has become the most important and challenging contemporary health problem. The present case-control study was carried out to evaluate High-sensitivity C - reactive protein and Lipid Profile in Nondiabetic Siblings and Offspring of Type 2 Diabetes Mellitus Patients.

**Materials and Methods:** A total 80 nondiabetic siblings and offspring of T2DM patients between the age group 20 and 50 years were selected and compared with 100 age- and sex matched healthy controls. Detailed history of participants was recorded. Anthropometric measurements were recorded. 12 hour fasting venous blood samples were collected from all participants in fluoride and plain bulbs. Serum was tested for plasma glucose level, serum hs-CRP, Serum cholesterol, serum TGs, and high-density lipoprotein (HDL) levels were also recorded. The results were analyzed by SPSS software, version 10. *p* value was obtained from unpaired *t* test and  $<0.05$  was considered statistically significant.

**Results:** Total of 160 participants were enrolled in the study, 80 as cases with family history of T2DM and 80 as controls without family history of T2DM. The mean value of blood sugar level did not show significant difference between the cases and controls ( $92.52 \pm 8.40$  mg/dL vs  $91.42 \pm 7.03$  mg/dL). The mean values of hs-CRP in cases were  $2.43 \pm 1.94$  mg/L and in controls it was  $1.02 \pm 0.29$  mg/L. The mean values of TG in cases were  $167.35 \pm 17.35$  mg% and in controls it was  $124.63 \pm 13.55$  mg%. The mean values of TC in cases were  $174.79 \pm 12.05$  mg% and in controls it was  $143.29 \pm 9.41$  mg%. The

mean values of HDL in cases were  $36.41 \pm 3.70$ mg% and in controls it was  $51.41 \pm 3.34$ mg%. The mean values of LDL in cases were  $104.31 \pm 12.54$ mg% and in controls it was  $71.35 \pm 11.04$  mg%. The mean values of VLDL in cases was  $33.27 \pm 3.71$  and in controls it was  $24.37 \pm 2.41$ . The hs-CRP shows positive correlation with TG, TC, LDL, and VLDL and has negative correlation with HDL.

**Conclusion:** The present study concluded that there was increased level of high-sensitivity C-reactive protein and alteration of lipid profile in offsprings of type II diabetes parents as compared to control.


**Keywords:** C - Reactive Protein, Lipid Profile, Type 2 Diabetes Mellitus Patients.

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### INTRODUCTION

Diabetes mellitus is a complex multifactorial metabolic disorder due to absolute or relative deficiency of insulin secretion or insulin resistance.<sup>1</sup> 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.<sup>2</sup> In India, nearly 75% of T2DM patients have the first-degree family history. The lifetime risk of developing the disease is about 40% in offspring of one parent with T2DM and the risk approaches to 70% if both parents have diabetes. In terms of sibling relative risk, a first-degree relative (FDR) of a patient with T2DM has a threefold

increased risk of developing the disease.<sup>3</sup> The most actively and commonly studied sensitive inflammatory marker is hs-CRP, a liver-derived pattern recognition molecule. It is an acute phase reactant protein from a member of the pentraxin family released in response to inflammation.<sup>4</sup> Lipid metabolism in T2DM is modulated by a series of factors among which, the degree of glycemic control and the presence of insulin resistance (IR) are the two most important factors. Diabetic dyslipidemia is a complex cluster of potentially atherogenic lipid and lipoprotein changes. 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.<sup>5</sup> The present case-control study was carried out to evaluate High-sensitivity C - reactive protein and Lipid Profile in Nondiabetic Siblings and Offspring of Type 2 Diabetes Mellitus Patients.

## MATERIALS AND METHODS

The present case-control study was carried out to evaluate High-sensitivity C - reactive protein and Lipid Profile in Nondiabetic Siblings and Offspring of Type 2 Diabetes Mellitus Patients. Before the commencement of the study ethical approval was taken from the ethical committee of the institute and informed consent was taken from the patient. A total 80 nondiabetic siblings and offspring of T2DM patients between the age group 20 and 50 years were selected and compared with 100 age- and sex matched healthy controls. Individuals not having any family history of T2DM among FDRs, T2DM patients, patients suffering from any acute or chronic cardiovascular diseases and any other major

illness, and subjects taking oral contraceptives pills were excluded from study. Participants were selected on the basis of detailed history, clinical examination, and laboratory investigations. Detailed history of participants including age, sex, and marital status, history of any medications, addictions, dietary habits, and lifestyle was recorded. Anthropometric measurements, such as body weight (kg), height (m), waist circumference (cm), and hip circumference (cm), were recorded. Body mass index and waist:hip ratios were calculated. 12 hour fasting venous blood samples were collected from all participants in fluoride and plain bulbs. Serum was separated after 1 hour by centrifugation at 3,000 rpm for 10 minutes and was tested for plasma glucose level (GOD- POD method), serum hs-CRP [chemiluminescence immunoassay (CLIA) using Acculite CLIA microwells. Serum cholesterol (cholesterol oxidase peroxidase), serum TGs, and high-density lipoprotein (HDL) levels were also recorded. The results were analyzed by SPSS software, version 10. *p* value was obtained from unpaired *t* test and <0.05 was considered statistically significant.

**Table 1: Comparison of biochemical parameters**

Parameter	Mean $\pm$ SD	
	Cases (n = 80)	Controls (n = 80)
BSL 70-110 mg/dL	92.52 $\pm$ 8.40	91.42 $\pm$ 7.03
hs-CRP up to 1 mg/L	2.43 $\pm$ 1.94	1.02 $\pm$ 0.29
TG up to 150 mg%	164.25 $\pm$ 16.78	127.69 $\pm$ 12.80
TC up to 200 mg%	174.79 $\pm$ 12.05	143.29 $\pm$ 9.41
HDL 40-60 mg%	36.41 $\pm$ 3.70	51.41 $\pm$ 3.34
LDL up to 100 mg%	104.31 $\pm$ 12.54	71.35 $\pm$ 11.04
VLDL	33.27 $\pm$ 3.71	24.37 $\pm$ 2.41

**Table 2: Correlation between hs-CRP and lipid profile**

	TG	TC	HDL	LDL	VLDL
hs-CRP r value	0.31	0.40	-0.26	0.41	0.31
hs-CRP p value	<0.05	<0.001*	<0.05	<0.001*	<0.05

## RESULTS

A total of 160 participants were enrolled in the study, 80 as cases with family history of T2DM and 80 as controls without family history of T2DM. The mean value of blood sugar level did not show significant difference between the cases and controls (92.52  $\pm$  8.40 mg/dL vs 91.42  $\pm$  7.03 mg/dL). The mean values of hs-CRP in cases were 2.43  $\pm$  1.94 mg/L and in controls it was 1.02  $\pm$  0.29 mg/L. The mean values of TG in cases were 167.35  $\pm$  17.35 mg% and in controls it was 124.63  $\pm$  13.55 mg%. The mean values of TC in cases were 174.79  $\pm$  12.05 mg% and in controls it was 143.29  $\pm$  9.41mg%. The mean values of HDL in cases were 36.41  $\pm$  3.70mg% and in controls it was 51.41  $\pm$  3.34mg%. The mean values of LDL in cases were 104.31  $\pm$  12.54mg% and in controls it was 71.35  $\pm$  11.04 mg%. The mean values of VLDL in cases was 33.27  $\pm$  3.71 and in controls it was 24.37  $\pm$  2.41. The hs-CRP shows positive correlation with TG, TC, LDL, and VLDL and has negative correlation with HDL.

## DISCUSSION

CRP is a pentameric and nonimmunoglobulin protein having five identical subunits that have been introduced as the most important marker of inflammation.<sup>6</sup> 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. Thus, chronic systemic inflammation has been identified as an associated factor in the metabolic syndrome and diabetes mellitus.<sup>7</sup>

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values of TC in cases were  $174.79 \pm 12.05$  mg% and in controls it was  $143.29 \pm 9.41$ mg%. The mean values of HDL in cases were  $36.41 \pm 3.70$ mg% and in controls it was  $51.41 \pm 3.34$ mg%. The mean values of LDL in cases were  $104.31 \pm 12.54$ mg% and in controls it was  $71.35 \pm 11.04$  mg%. The mean values of VLDL in cases was  $33.27 \pm 3.71$  and in controls it was  $24.37 \pm 2.41$ . The hs-CRP shows positive correlation with TG, TC, LDL, and VLDL and has negative correlation with HDL.

Hojbjerre et al. found IR, elevated plasma C-reactive protein, leptin, and monocyte chemoattractant protein-1 (MCP-1), high IL-6 in the FDRs of T2DM subjects.<sup>8</sup>

Zehua et al. found increased hs-CRP ( $p < 0.05$ ), fasting plasma glucose ( $p < 0.01$ ) in normoglycemic FDRs of T2DM patients.<sup>9</sup>

Tian et al. found high TG, low HDL levels in the FDRs of T2DM subjects than subjects without family history of T2DM.<sup>10</sup>

## CONCLUSION

The present study concluded that there was increased level of high-sensitivity C-reactive protein and alteration of lipid profile in offsprings of type II diabetes parents as compared to control.

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