Comparison of Lipid Profiles in Normal Pregnancy and in Pre-Eclampsia: A Case Control Study

Dr. Swapan Das[1], Dr. Debasish Char[2], Dr. Sanjay Sarkar[3], Dr. Prakash Das[4], Dr. Tushar Kanti Saha[5], Dr. Sucheta Biswas[6]

[1,2](RMO, Dept. of Gynaecology and Obstetrics, Bankura Sammilani Medical College & Hospital, Bankura);
[3](RMO, Dept. of Medicine, Bankura Sammilani Medical College & Hospital, Bankura);
[4](PGT, Dept. of Gynaecology and Obstetrics, Bankura Sammilani Medical College & Hospital, Bankura, India)
[5](Asst. Prof., Dept.Of Community Medicine, NRS Medical College, Kolkata);
[6](PGT, Dept. of Physiology, Barddhaman Medical College & Hospital, Barddhaman)

Abstract
Objective: *The objective of the study was to compare the changes in lipid profile in normal pregnancy and in preeclampsia.* ***Study Design:*** *A case control study.* ***Method:*** *In this case control study total 180 study subjects were evaluated, 90 normotensive pregnant woman as control group and 90 pre-eclamptic subjects as study group. Fasting venous blood samples were collected and serum levels of triglycerides (TG), Total cholesterol (TC), low density lipoprotein- cholesterol (LDL-C), and Very low density lipoprotein – Cholesterol (VLDL-C), High density lipoprotein cholesterol (HDL-C) were measured.* ***Result:*** *Results showed that in pre-eclamptic group serum triglyceride (212.75 ± 50.29 mg/dl) was increased significantly (p < 0.02) as compared to normotensive pregnant woman (185.60± 40.67 mg/dl). Other parameters TC, LDL-C, VLDL-C and HDL-C were not changed significantly.* ***Conclusion:*** *The findings of the present study are consistent with previous studies, suggesting increased level of serum triglyceride as an important factor in the pathological process of pre-eclampsia.*
Keywords: *Pre-eclampsia, Lipid profile, Triglyceride.*

I.   Introduction:

Pre-eclampsia (PET) is a pregnancy specific disorder and is an important cause of foetal and maternal morbidity and mortality worldwide. Nearly 7 to 10% of pregnancies are complicated with PET in developing countries [1]. It is characterised by blood pressure of 140/90 mm of Hg or rise in systolic blood pressure of more than 30mm of Hg or diastolic blood pressure of more than 15mm of Hg after 20 weeks of gestation accompanied by proteinurea $\geq$ 300mg / 24 hrs or greater or equal to 1+ or 100mg /dl by dipstick response [2, 3]. The risk of developing pre-eclampsia appears to be greater in woman , who have family history of essential hypertension, and there may also be a relationship between rise of PET and the metabolic syndrome [4]. Several studies have shown that endothelial dysfunction is related to hyperlipidemia [5, 6]. Altered lipid synthesis leading to decreased in PGI_2 : TXA_2 ratio is also supposed to be an important way of pathogenesis in pregnancy induced hypertension [7]. Significantly elevated plasma concentration of Triglycerides (TG), phospholipids and total lipids and decreased high density lipoprotein – cholesterol (HDL-C) concentration were found in woman with pre-eclampsia in comparison to normal pregnancy [8,9]. The present study has been undertaken to compare the changes in lipid profile in normal pregnancy and in pre-eclampsia.

II.   Materials & Methods

It was a case control study done in the department of obstetrics and gynaecology of B.S. Medical College, Bankura in this study women of 18 to 30 yrs of age were selected and grouped as follows.

Group – I (Controls) : 90 normotensive pregnant women ; Group – II (Cases): 90 pre-eclamptic subjects. Inclusion criteria were primi, gestational age 29 weeks to term. The cases and controls having past history of diabetes mellitus, hypertension, renal disease, liver disorders, multiple pregnancies and history of treatment with drug influencing lipid profile were excluded. The pre-eclamptic patients were diagnosed by the presence of persistent hypertension (140/90 mm of Hg or more), gross proteinurea (tested by heat test of urine) with or without oedema. Blood samples were drawn from all the subjects following a fast of 12 hours and analysed for serum Triglycerides (TG), total cholesterol (TC) and HDL Cholesterol (HDL-C) by enzymatic methods with the help of Glaxo Kits on ERBA Chem – 5 semi-auto analyzer. Serum LDL Cholesterol (LDL-C) was calculated by Frederickson – Friedwald's Formula according to which LDL-C = Total cholesterol – (HDL-C+ VLDL-C). VLDL Cholesterol (VLDL-C) was calculated as $1/5^{th}$ of Triglycerides. Statistical analysis was done using the unpaired T-test and significance was expressed in term of 'P' Value.

III.   Results

Demographic and clinical characteristics of control and study groups are shown in Table – 1. There was no significant difference of maternal age and gestational age between control and study groups. The mean value of systolic blood pressure in mm of Hg (SBP) in study group was 143.62 ± 10.22 and in control 114.31 ± 6.78 there being a significant difference   ($p < 0.001$) between study and control goods. The mean diastolic blood pressure in mm of Hg (DBP) in study and control group were 96.68 ± 6.30 and 74.42 ± 5.60 respectively, there being a significant difference ($p < 0.001$) between study and controls. The mean BMI (Body Mass Index) in study group was 25.83 ± 3.28 & in controls was 24.52 ± 3.04, 'p' value was more than 0.05, which was statistically insignificant.

Lipid Profiles of control and study groups are shown in Table – 2. The mean value of serum Triglycerides (TG) in study and control groups were 212.75 ± 50.29 mg/dl and 185.60 ± 40.67 mg/dl respectively. There is significant rise in TG ($p < 0.002$) in study group in comparison with controls.
There was no significant difference in other lipid profile parameters of study and control groups.

IV.   Discussion

In our study we investigate the roll of lipid profile in the development of pre-eclampsia. Serum Triglyceride (TG) concentration increased more significantly in pre-eclampsia in our study which corroborated with the findings of many other studies [10, 11]. The hyperoestrogenemic state of pregnancy is mainly responsible for this rise in serum Triglyceride level in pregnancy. Oestrogen induces hepatic bio-synthesis of endogenous Triglyceride which is carried by VLDL [12]. This increased serum Triglyceride found in pre-eclampsia is likely to be deposited in pre-disposed vessels such as the uterine spiral arteries and contributes to the endothelial dysfunction, both directly and indirectly through generation of small dense LDL [13]. Moreover, this hypertriglyceridemia may be associated with hyper- coagulability [14]. In our study in contrast to normotensive pregnant women, the increase in serum TG was statistically significant ($p < 0.02$) in pre-eclamptic patients.

In our study there was an insignificant difference in other lipid profile parameters of study and control groups. However, other have found significant rise in serum total cholesterol (TC) in pre-eclamptic patients [15, 16].

In conclusion the findings of our present study suggest that the woman who developed pre-eclampsia had altered lipid profile due to abnormal lipid metabolism. Increased Triglyceride levels and its delayed clearance appeared to be of immense value in understanding the pathological process of pre-eclampsia and may help in making strategies for prevention and early diagnosis of preeclampsia.

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Table: I = Background information n

Parameter	Group – I Controls (n-90)	Group – II Cases (n-90)	'P' value
Maternal age (Yrs) Mean ± SD	24.80 ± 4.02	24.10 ± 4.70	
Gestational Age (Weeks) Mean ± SD	33.75 ± 5.16	34.20 ± 3.01	
Systolic BP (mm of Hg) Mean ± SD	114.31 ± 6.78	143.62 ± 10.22	p < 0.001
Diastolic BP (mm of Hg) Mean ± SD	74.42 ± 5.60	96.68 ± 6.30	p < 0.001
BMI (Body mass Index)	24.52 ± 3.04	25.83 ± 3.28	p > 0.05

Table: 2 = Lipid profiles of Control and study groups

Lipid profile	Group – I Controls (n-90) Mean ± SD	Group – II Cases (n-90) Mean ± SD	'P' value
TG (mg/dl)	185.60 ± 40.67	212.75 ± 50.29	p< 0.02
HDL (mg/dl)	42.32 ± 6.68	40.20 ± 7.72	p > 0.05
LDL (mg/dl)	111.63 ± 41.20	113.87 ± 26.21	p> 0.05
VLDL (mg/dl)	36.47± 7.98	39.42 ± 9.72	p > 0.05
TC (mg/dl)	192.35 ± 42.86	202.1 ± 37.37	p > 0.05

TG: Triglycerides, HDL: High Density Lipoprotein, LDL: Low Density Lipoprotein,   VLDL: Very Low Density Lipoprotein; TC: Total Cholesterol.