

Serum Lipid Profile In Pregnancies Complicated By Pre-Eclampsia

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ABSTRACT:

Objectives: To compare the changes in lipid profile in women with pre-eclampsia to normotensive pregnant women.

Method: This prospective observational study conducted in 300 patients, 150 being normotensive pregnant women and 150 hypertensive pregnant women. Lipid profile was estimated and compared.

Results: There is a significant increase in triglycerides, total cholesterol, LDL & VLDL in the cases group but no significant difference in HDL between both groups.

Conclusion: Pregnancy is associated with physiological hyperlipidemia. But abnormal increase in triglycerides, total cholesterol, LDL & VLDL could contribute to promotion of oxidative stress and vascular injury leading to pre-eclampsia.

Keywords: Pre-eclampsia, CHL- Total cholesterol (mg/dl), TGL- Triglycerides (mg/dl), LDL- Low density lipoprotein (mg/dl), HDL- High density lipoprotein (mg/dl), VLDL- Very low density lipoprotein (mg/dl), BMI- Body mass Index (kg/m²).

INTRODUCTION

Preeclampsia is the most common complication of pregnancy and is a leading cause of maternal and perinatal morbidity and mortality. Preeclampsia is a pregnancy specific multisystem disorder characterized by hypertension and proteinuria that remits after delivery.

Hypertensive disorder of pregnancy complicates about 7 – 10% of pregnancies and 24% of all the maternal deaths in India is due to hypertensive disorders of pregnancy. Multiple theories have been postulated for the cause of pre-eclampsia but no particular theory regarding the cause of preeclampsia has been established yet. This limits the ability to prevent and treat this medical condition.

This study was under taken with the objective to ascertain the alterations of lipid metabolism in the development of pre-eclampsia and if preventive modalities can be laid on this basis.

MATERIAL AND METHODS

This is a cross sectional observational study conducted prospectively in the Department of Obstetrics & Gynaecology, Gandhi Medical College, Secunderabad between October 2011 and September 2014. The study included a target number of 300 subjects with 150 as cases and 150 as controls.

The cases comprised of 150 women with hypertension complicating pregnancy fulfilling the inclusion criteria, selected randomly. Controls comprised of 150 age and BMI matched normotensive pregnant women fulfilling the inclusion criteria. All the women gave informed verbal consent to participate in the study, which was approved by the institutional ethics committee.

Gestational age was calculated based on menstrual date and confirmed through ultrasound. Blood pressure was recorded with standard mercury sphygmomanometer. Pre-eclamptic women were then asked to collect urine for 24 hours for proteinuria quantification. This was done by means of photometric reading after addition of sulphosalicylic acid. Blood samples were collected from all participants after a 12 – hour fast using 5 ml tubes containing ethylenediaminetetraacetic acid (EDTA). Serum was obtained by centrifugation. Serum total cholesterol was measured by using CHOD (cholesterol oxidase) POD (peroxidase) methods. HDL cholesterol was measured by Enzyme selective protection method, serum triglycerides by enzymatic calorimetric method (GPO). LDL and VLDL were calculated according to Friedwald W.T equation.

Inclusion Criteria:

Cases:

- Subjects with age between 20 – 40 years
- Pregnancies beyond 20 weeks of gestation but not in labor with gestational hypertension (Blood pressure \geq 140/90 mm Hg) or Pre-eclampsia (blood – pressure \geq 140/90 mm Hg and proteinuria \geq 300 mg/dl over 24 hours)

Controls:

- Age, BMI, Socio economic status, gravidity matched in healthy pregnant women beyond 20 weeks of gestation and not in labour.

Exclusion Criteria:

- Chronic hypertension
- Pre-eclampsia superimposed on chronic hypertension
- Eclampsia

- Ruptured membranes
- Antepartum haemorrhage
- Any other medical illness
 - Diabetes mellitus
 - Thyroid disease
 - Renal disorders
 - Liver disorders
 - Cushing's syndrome
 - Obesity
- Drugs affecting lipid profile
 - Oestrogens
 - Lipid lowering drugs
 - Corticosteroids
 - Anti-epileptics
- Alcohol intake

STATISTICAL ANALYSIS

The values of the laboratory parameters are presented as mean \pm standard deviation. The statistical tool applied was by using the Open Epi, Version 3. Qualitative and quantitative data was analyzed by chi-square and ANOVA (Analysis of

Variance) respectively. The results were considered statistically significant when the probability of the null hypothesis was less than atleast 5% ($p < 0.05$).

RESULTS

The mean systolic BP in cases was 152.02 mm of Hg while that of controls was 118.26 mm of Hg. The difference is statistically significant ($P < 0.01$). Similarly, mean diastolic BP in cases was 94.72 mm of Hg while that in controls was 76.96 mm of Hg, the difference between the two being statistically significant ($P < 0.01$).

TGL, LDL, VLDL levels were 311.4 ± 79.5 , 253.3 ± 41.9 , 62.22 ± 15.91 respectively in case group. Where as 121.5 ± 25.0 , 122.6 ± 24.6 and 24.3 ± 5.0 in the control group. There was a significant increase in the TGL, LDL and VLDL levels in hypertensive group compared to normotensive group.

HDL level was 49.7 ± 5.5 in the case group and 49.4 ± 5.6 in the control group. There was no statistical difference between both groups.

Table 1: Comparison of Period of Gestation in Cases and Controls

Parameters	Cases = 150	Controls = 150	P – Value
Period of gestation (in weeks)	31.01 ± 2.32	31.59 ± 2.90	0.183

This table shows that the difference in period of gestation between the two groups is not statistically significant.

Table 2: Comparison of Blood Pressure in Cases and Control

Parameter	Cases N=150	Control N=150	P Value
Systolic BP (mm/Hg)	152.02 ± 9.91	118.26 ± 5.77	< 0.001
Diastolic BP(mm/Hg)	94.72 ± 4.74	76.96 ± 5.61	< 0.001

This table shows that the difference in both systolic blood pressure and diastolic blood pressure in cases and controls is statistically significant. ($p < 0.001$)

Table 3: Comparison of the Lipid Level Distribution

Parameter	Cases N=150	Control N=150	P Value
TGL (mg/dl)	311.4 ± 79.5	121.5 ± 25.0	< 0.001
HDL (mg/dl)	49.7 ± 5.5	49.4 ± 5.6	0.694
LDL (mg/dl)	255.3 ± 41.9	122.6 ± 24.6	< 0.001
CHL (mg/dl)	259.4 ± 40.6	181.7 ± 27.8	< 0.001
VLDL (mg/dl)	62.22 ± 15.91	24.3 ± 5.0	< 0.001

There is a significant increase in triglycerides, LDL, VLDL and total cholesterol in the cases group where as there is no significant difference in HDL between both groups.

DISCUSSION

Hypertension is still the most common medical disorder associated with pregnancy, adversely affecting both mother and fetus. The pathogenesis of this condition is multifactorial and the key aspect is endothelial injury. In the present study, a total of 300 subjects were studied, out of which 150 were normotensive pregnant women and 150 were hypertensive pregnant women. The difference in blood pressure is statistically significant ($p < 0.001$). Comparing the lipid profiles between cases and controls (Table 2), it is observed that the level of triglyceride is significantly high ($p < 0.001$) in pregnancies complicated by hypertension. This finding is consistent with findings of Aziz R et al (2007) ($p < 0.001$) and other workers.

The level of HDL showed no statistically significant difference between the two groups ($p = 0.694$), which is similar to the observations of Cuneyt Evruke et al (2004) and others, while few workers have shown decrease in the level of HDL.

Comparison of lipid profile of cases (pre – eclampsia group) in the present study with other studies

Parameter	Present Study N = 150	C.Evrake et al (2004) N = 32	J. De et al (2006) N = 50	R. Aziz et al (2007) N = 16	S.Sahu et al (2008) N = 30
Triglyceride	311.4 ± 79.5 (p < 0.001)	251.9 ± 108.7 (p=0.0001)	275.6 ± 38.93 (p<0.05)	232.18 ± 106.41 (p<0.01)	233.57 ± 15.7 (p<0.001)
HDL	49.7 ±(p=0.694)	50.2 ± 15.3 (p=0.5)	45.9 ± 8.0 (p<0.01)	39.75 ± 11.99 (p<0.01)	50 ± 2.7 (p < 0.001)
LDL	255.3 ± 41.9 (p<0.001)	137.1 ± 42.0 (p=0.0001)	135.4 ± 23.36 (p>0.05)	117.93 ± 12.56 (p>0.05)	196.7 ± 15.3 (p<0.001)
Cholesterol	259.4 ± 40.6 (p<0.001)	237.7 ± 58.4 (p=0.001)	236.3 ± 35.63 (p>0.05)	177.5 ± 57.19 (p>0.05)	293.3 ± 15.7 (p<0.001)
VLDL	62.22 ± 15.91 (p<0.001)	55.14 ± 7.67 (p<0.001)	55.0 ± 7.83 (p<0.001)	61.2 ± 4.6 (p<0.001)	67.45 ± 15.46 (p<0.001)

A significant rise in the level of LDL (p < 0.001) and VLDL (p < 0.001) was seen in the present study, which is similar to the findings of Sahu S. et al (2009) and other workers (p < 0.001). In the present study, the pregnant women who subsequently developed hypertensive disorder in pregnancy showed high level of total cholesterol (p < 0.001), which is similar to the observation noted by Cekman B et al (2003) (p < 0.001) and others.

The association between dyslipidemia and risk of pre-eclampsia is biologically plausible and is compatible with what is known about the pathophysiology of pre-eclampsia. The association between dyslipidemia and pre-eclampsia can be explained by 3 hypothesis. First, elevated plasma lipids and lipoproteins induce endothelial dysfunction secondary to oxidative stress. Dyslipidemia also impairs trophoblastic invasion of maternal blood vessels, thus contributing to a cascade of pathophysiological events that lead to development of pre-eclampsia. The second mechanism is the pathologic process of pre-eclampsia via dysregulation of lipoprotein lipase resulting in a dyslipidemic lipid profile. Sera from pre eclamptic women had both a higher ratio of free fatty acids to albumin and increased uptake of free fatty acids, which are further esterified to triglycerides. A third possible mechanism may be via the metabolic syndrome. Metabolic characteristics of “insulin resistance syndrome” namely, hyperinsuline-mia and hyperuricemia are also present in pre eclampsia.

CONCLUSIONS

- Pregnancy is associated with physiological hyperlipidemia. But abnormal increase in triglycerides, LDL, VLDL and total cholesterol contribute to promotion of oxidative stress and vascular dysfunction leading to pregnancy – induced hypertension.
- Evaluation of blood lipid profile in pregnant women during early antenatal visits could be helpful in prediction and early detection of pre-

eclampsia and thus preventing obstetric complications like eclampsia, antepartum haemorrhage, preterm labour associated with pre-eclampsia.

- Novel interventions to correct dyslipidemia in pregnancy may decrease incidence and severity of pre-eclampsia, though this needs further studies.
- The present study would however give better results when applied on a larger number of subjects and long term follow – up to see changes in blood lipid profile.

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