

**STUDY OF LIPID PROFILE IN PREECLAMPSIA - RISK FACTOR FOR FUTURE  
MATERNAL CARDIOVASCULAR DISEASES**Sudeshna Sil\*<sup>1</sup> and Dipanjan Rakshit<sup>2</sup><sup>1</sup>Biochemist Medical Officer, Department of Pathology ESI Hospital Sealdah Kolkata.<sup>2</sup>Consultant Biochemist, Department of Pathology, Metropolis Healthcare Ltd Kolkata.**\*Corresponding Author: Dr. Sudeshna Sil**

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**ABSTRACT**

**Introduction:** Preeclampsia is a multi-system disorder of unknown etiology characterised by the development of hypertension of 140/90mmHg or more with proteinuria after 20 weeks of gestation in previously normotensive and non-proteinuric patients. It is a common complication of pregnancy, causing maternal and fetal morbidity and mortality. Disorders of the lipoprotein metabolism are a major cause of endothelial dysfunction that may result in hypertension and proteinuria, the clinical hallmarks of preeclampsia. Epidemiological studies demonstrate a relation between preeclampsia and increased risk of maternal cardiovascular diseases. **Aim:** To study the alteration of lipid profile in preeclampsia and to compare the cardiovascular risk ratios of preeclamptic women with normal pregnant women. **Methodology:** Case control study comprising 30 preeclampsia patients as cases and 30 age matched normal primigravida women in third trimester as controls were taken from ESI Hospital Maniktala Kolkata. Blood pressure was measured and serum lipid profile was estimated and the cardiovascular risk ratios were calculated and statistically analysed. **Results and Conclusion:** The systolic and diastolic blood pressures of the cases are significantly elevated than controls. Total cholesterol, Triglycerides, LDL and VLDL are significantly increased and HDL significantly decreased in cases as compared to the control group. The risk ratios TC/HDL, TGL/HDL, LDL/HDL are significantly increased and HDL/VLDL significantly decreased as compare to the control group.

**KEYWORDS:** Preeclampsia, Proteinuria, Cardiovascular diseases, Lipid Profile.**INTRODUCTION**

Preeclampsia is a multi-system disorder of unknown etiology characterised by the development of hypertension of 140/90mmHg or more with proteinuria after 20 weeks of gestation in previously normotensive and non-proteinuric patients. It is a common complication of pregnancy, causing maternal and fetal morbidity and mortality. In India, the incidence is reported to be 8% - 10%.

Endothelial dysfunction plays a pivotal role in the genesis of the multisystem disorder developed in preeclampsia. The mechanisms involved in the induction of endothelial cell dysfunction are poorly understood.

Disorders of the lipoprotein metabolism are a major cause of endothelial dysfunction that may result in hypertension and proteinuria, the clinical hallmarks of preeclampsia.

Insulin resistance appears to be a potential mechanism linking preeclampsia and future cardiovascular diseases.

Epidemiological studies demonstrate a relation between preeclampsia and increased risk of maternal heart diseases.

The pattern of dyslipidemia seen in preeclampsia is similar to the pattern in coronary heart disease.

**MATERIALS AND METHODS****1. Source of Data**

The study comprises of Preeclamptic primigravida patients of age group 20-35years taken from the Department of Obstetrics and Gynaecology from ESI Hospital Maniktala Referral ESI Hospital Kolkata.

**2. Method of Data Collection****a. Study design** - Case control study

**b. Sample size** - 30 preeclampsia patients as cases and 30 age matched normal primigravida women in third trimester as controls.

**c. Inclusion criteria**

Patients of Preeclampsia diagnosed according to the criteria by American College of Obstetrics and Gynecology:

1. New onset hypertension with Blood pressure  $\geq$  140/90mmHg after 20 weeks of gestation.
2. Proteinuria  $\geq$  300mg/24 hour.

#### d. Exclusion criteria

1. Gestational diabetes.
2. Patients with Diabetes Mellitus.
3. Patients with pre-existing Hypertension
4. Patients with Cardiovascular diseases.
5. Patients of Chronic Renal Failure.
6. Patients with Hepatic dysfunction
7. Obese women (Body mass index  $\geq$  30kg/m<sup>2</sup>)

#### e. Methodology

After obtaining written informed consent from cases and controls, Blood Pressure was measured using Mercury Sphygmomanometer, and about 5ml of venous blood was obtained by venipuncture under aseptic conditions, centrifuged and the separated serum was used for estimation of lipid profile.

#### f. Parameters studied

Lipid Profile which includes:

Triglycerides (TGL)

Total Cholesterol (TC)

Very low density lipoprotein (VLDL)

Low density lipoprotein (LDL)

High Density lipoprotein(HDL)

#### g. Statistical Analysis

Student's t test.

+ Suggestive significance (P value: 0.05<P<0.10)

\* Moderately significant (P value: 0.01<P ≤ 0.05)

\*\* Strongly significant (P value: P ≤ 0.01)

### RESULT

**Table 1: Age distribution of patients studied.**

Age in years	Cases		Control	
	No	%	No	%
21-25	14	46.7	18	60.0
26-30	14	46.7	10	33.3
31-35	2	6.7	2	6.7
Total	30	100.0	30	100.0
Mean ± SD	26.17±2.23		25.17±2.80	

**Table 2: Comparison of BP (mmHg).**

BP (mm Hg)	Cases	Control	P value
SBP	154.33±9.54	116.87±6.07	<0.001**
DBP	96.93±4.23	76.77±5.63	<0.001**

**Table 3: Comparison of Lipid parameters.**

Lipid parameters	Cases	Control	P value
TGL	272.70±77.15	200.33±75.14	0.001**
Total cholesterol	253.77±35.31	205.47±41.69	<0.001**
VLDL	54.43±15.48	39.77±14.91	<0.001**
LDL	159.10±27.29	116.00±32.26	<0.001**
HDL	39.30±5.93	49.47±10.32	<0.001**

Samples are age matched with P=0.132

**Table 4: Comparison of Ratio of lipid parameters.**

	Cases	Control	P value
TGL/HDL	7.05±2.01	4.31±2.11	<0.001**
TC/HDL	6.56±1.14	4.24±0.82	<0.001**
LDL/HDL	4.14±0.94	2.38±0.58	<0.001**
HDL/VLDL	0.78±0.26	1.43±0.62	<0.001**

\* The systolic and diastolic blood pressures of the cases are significantly elevated than controls.

\* Total cholesterol, Triglycerides, LDL and VLDL are significantly increased and HDL significantly decreased in cases as compared to the control group.

\* The risk ratios TC/HDL, TGL/HDL, LDL/HDL are significantly increased and HDL/VLDL significantly decreased as compared to the control group.

### DISCUSSION

\* Normal pregnancy is hyperlipidemic, but the hyperlipidemic pattern is not atherogenic.

\* In Preeclampsia, there is dramatic alteration of lipid profile with marked increase in triglycerides well above that in normal pregnancy and there is also a decrease in HDL cholesterol, a pattern resembling the changes seen in Coronary artery disease that is atherogenic dyslipidemia.

\* Preeclampsia is associated with insulin resistance, which is a major cause of increased Triglyceride and VLDL, due to decreased Lipoprotein lipase activity and decreased HDL due to elevated hepatic lipase activity.

\* VLDL particles are precursors of atherogenic LDL or small dense LDL, which are more commonly taken up by scavenger receptors on macrophages leading to generation of foam cells and atherosclerotic lesions, contributing further towards endothelial dysfunction.

\* Due to reduced HDL cholesterol there is decreased reverse transport of cholesterol to the liver leading to reduced excretion, and thus the total cholesterol increases.

\* Preeclampsia is a state of hypoestrogenemia, causing reduced transport of VLDL to the fetal compartment, leading to maternal hypertriglyceridemia.

\* LDL taken up by fetus decreases due to reduced fetoplacental perfusion leading to increased maternal LDL.

\* Some studies show that mutation in LPL gene in preeclampsia may lead to lowered activity of LPL resulting in decreased hydrolysis of triglycerides which predisposes to dyslipidemia and cardiovascular disease.

\* The Copenhagen Male study showed that TGL/HDL ratio > 6 had a much higher risk of developing heart disease.

This is observed in this study also that the TGL/HDL ratio is 7.05 ± 2.01 in cases as compared to 4.31 ± 2.11 in controls.

\* Bellamy et al reported that women with a history of preeclampsia presented with increased risk of Cardiovascular disease (Relative risk, RR = 3.7), Hypertension (RR = 2.16), Ishaemic heart disease(RR = 1.81), venous thromboembolism (RR = 1.79) and death (RR = 1.49)

\* These findings confirm the possible association between preeclampsia and future cardiovascular disease.

### CONCLUSION

Atherogenic dyslipidemia appears to be an important independent risk factor for cardiovascular disease. Elevation in the ratio of TGL/HDL ratio is the most powerful predictor of coronary heart disease. Therefore simple measurement of lipid profile at 20 weeks of gestation can go a long way in prevention of future cardiovascular risk by close monitoring and follow up. Further we see that obstetric history is an additive tool in cardiovascular risk evaluation in women with hypertension or chest pain.

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