

# Estimation of Lipid Profile among Preeclampsia Woman by Comparing with Normal Pregnancy

R. Anuradha<sup>1</sup>, T. Durga<sup>2</sup>

## ABSTRACT

**Introduction:** Preeclampsia is one of the main cause for increase in perinatal morbidity and mortality of both mother and fetus. The aim of the present study is to investigate and compare the levels of serum lipids among preeclampsia and normal pregnant women.

**Material and Methods:** A Prospective study was done among Preeclampsia women regarding Fluctuations in Serum lipids by comparing with normal pregnancy. Serum Lipid profile was estimated by Semiautomatic analyzers.

**Results:** Mean total cholesterol in Preeclampsia was 160.9±27.9 mg/dl and normal pregnancy was 136.85±10.44 mg/dl. Mean HDL in preeclampsia was 38.57±2.03 mg/dl and normal pregnancy was 39±1.49 mg/dl. Mean LDL in preeclampsia was 84.5±28.7 mg/dl and normal pregnancy was 72.75±9.62 mg/dl. Mean VLDL in preeclampsia was 41.95±8.63 mg/dl and in normal pregnancy was 24.7±3.05 mg/dl, Mean Triglycerides in preeclampsia was 126.85±16.68 mg/dl and normal pregnancy was 210.32±42.65 mg/dl. Total cholesterol, Low density lipoprotein, very low density lipoprotein, triglycerides were increased in preeclampsia when compared to normal pregnancy, which is statistically significant. Very low density Lipoprotein and Triglycerides were significantly increased in normal pregnancy when compared with mild and severe preeclampsia.

**Conclusion:** Estimating serum lipid profile is a simple screening test, helps to recognize dyslipidemia in early second trimester of patients who are at risk of preeclampsia. Due to early detection of altered lipid profile in preeclamptics, incidence of complications can be decreased, which in turn reduce the materno-fetal morbidity and mortality.

**Keywords:** Serum Lipids, Preeclampsia, Normal Pregnancy

## INTRODUCTION

Pregnancy induced hypertension (PIH) is hypertension occurring during pregnancy, usually appears after 20<sup>th</sup> week of gestation. PIH includes Preeclampsia and Eclampsia. The cardinal symptoms of preeclampsia are hypertension, oedema and proteinuria. All the symptoms or any of these can present during PIH, but Hypertension is the pathognomic feature.

Preeclampsia is one of the main cause for increase in perinatal morbidity and mortality of both mother and fetus, by resulting in various complications like Intrauterine Growth Retardation, preterm delivery etc.<sup>1-3</sup> The incidence of preeclampsia globally is about 2 - 10% of all pregnancies.<sup>4,5</sup>

Mild preeclampsia is defined as a diastolic blood pressure from 90 to 109 mm Hg combined with proteinuria 0.3-4.9 g/day or 1+ or 2+ on a urine dipstick, occurring during pregnancy. Severe preeclampsia is defined as preeclampsia with either a diastolic blood pressure of at least 110 mm Hg, or proteinuria of at least 5 grams/24 hours, or both.

In pregnancy there will be coagulation abnormalities and lipid alterations, which will show much more effect in preeclampsia women. Various circulatory diseases are associated with

pregnancy status which is due to thromboembolism. Thromboembolism disorders related to pregnancies are venous thrombosis, pulmonary embolism<sup>6</sup>, stroke<sup>7</sup>, myocardial infarction.<sup>8,9</sup>

Elevation of lipids occur during pregnancy, as there is significant relation.<sup>10-13</sup> Alteration in hormones during pregnancy results in changes of serum lipids, usually levels of lipids revert to normal shortly after delivery.<sup>14</sup> Compared to normal pregnancies, in preeclampsia endocrinological alterations are more, in turn there will be change in serum lipids among preeclampsia.<sup>15</sup>

Abnormal lipid profile is associated with various disorders like cardiovascular diseases, endothelial dysfunction, decrease in PGI:TxA2. Decrease in PGI:TxA2 is supposed to be one of cause for pathogenesis of pregnancy induced hypertension.<sup>16</sup> Few evidences suggest that risk of preeclampsia is associated with abnormal lipid metabolism in early pregnancy.<sup>17</sup>

Various methods were available to detect preeclampsia in early stage. A simple screening test is needed to detect preeclampsia and to avoid complications, as we selected estimation of serum lipid profile.

The aim of the present study is to investigate and compare the levels of serum lipids among preeclampsia and normal pregnant women.

## MATERIAL AND METHODS

A Prospective study was done among Preeclampsia women regarding Fluctuations in Serum lipids by comparing with normal pregnancy. This study was done in the year 2015 at Government Medical College, Ananthapuramu after institutional ethical committee approval. Informed consent has taken from all the studied population.

A total of 80 cases were selected randomly for doing this study, 40 each of normal pregnancy and preeclampsia women. For better understanding they were divided into Group 1 and Group 2.

**Group 1 - Control Group:** Pregnant women with normal blood pressure at third trimester of pregnancy, without any evidence of preeclampsia signs, renal disorders, hematological abnormalities.

**Group2 - Study Group:** Pregnant women with preeclampsia symptoms and signs, increase in systolic blood pressure to 140

<sup>1</sup>Associate Professor, Government Medical College, Ananthapuramu, India

**Corresponding author:** Dr. R. Anuradha M.D, Associate Professor, Department of Biochemistry, Government Medical College, Ananthapuramu, India

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mmHg or diastolic blood pressure of at least 90 mmHg.

All details regarding from study and control group were noted including age, socio-economic status, parity, weight, height, past history of abortions, any significant family or personal history. General and systemic examination was done. Blood pressure was measured. Routine blood and urine examinations was done. 5 ml of venous blood sample was collected in to test tubes in the early morning (Fasting Sample) and stored at 4°C until the procedure of serum lipid profile estimation starts. Serum Lipid profile was estimated by Semiautomatic analyzers using following methods:

#### Serum Lipid Profile estimation has done by following methods

1. Estimation of serum total cholesterol (TC) by cholesterol oxidase / phenol aminoantipyrine method.
2. Estimation of serum triglycerides (TG) by glycerol phosphate oxidase – phenol aminoantipyrine method.
3. Estimation of serum High density lipoprotein (HDL) by cholesterol oxidase / phenol aminoantipyrine method.
4. Estimation of serum Low density lipoprotein (LDL) by Friedewald formula.

Serum lipids - Total Cholesterol (TC), Triglycerides (TG's), Low density Lipoprotein (LDL), High density Lipoprotein (HDL), Very Low density Lipoprotein (VLDL) were noted.

#### STATISTICAL ANALYSIS

Statistical Analysis was done using Graphpad soft ware and the P value <0.05 is considered as significant.

#### RESULTS

A total of 80 patients were included in the study. 40 women were selected for doing this study in each group (study group and control group). Serum Lipids after estimation, they were compared between preeclampsia and normal pregnant women. Demographic data related to studied population was noted and tabulated in Table-1. Among various characteristics BMI and Blood Pressure was significant variables among normal

pregnancy and preeclamptics.

After estimating serum lipid profile of total cholesterol (TC), high density lipoprotein (HDL), low density lipoprotein (LDL), very low density lipoprotein (VLDL), triglycerides (TG), levels were compared between preeclampsia and normal pregnancy (Table-2). Among various serum lipids, Total cholesterol, Low density lipoprotein, very low density lipoprotein, triglycerides were increased in preeclampsia when compared to normal pregnancy, which is statistically significant.

Increase in total cholesterol, low density lipoprotein, very low density lipoprotein, triglycerides among severe preeclampsia on comparison with mild preeclampsia women and normal pregnancy (Table-3). There is no much difference in High density Lipoprotein.

Very low density Lipoprotein and Triglycerides were significantly increased in normal pregnancy when compared with mild and severe preeclampsia (Table-4)

#### DISCUSSION

Pregnancy induced hypertension including preeclampsia, are important factors of severe morbidity, disability and death among mothers, fetus and infants. Management of preeclampsia aims to minimalist any pregnancy related complications, avoiding unnecessary prematurity and maximize maternal and perinatal/neonatal survival. Preeclampsia and eclampsia are the major causes of maternal and perinatal morbidity and mortality.

In this study a simple screening was investigated to decrease the complications related to preeclampsia, detection of serum lipid profile in early pregnancy decreases the risk of preeclampsia. After estimation of Serum lipids, they were compared between preeclampsia and normal pregnant women. A total of 80 cases were investigated, all were in third trimester.

Among normal pregnancy and Preeclampsia mean BMI was 24.32±8.03 and 28.13±5.62 respectively. Preeclampsia women mean systolic pressure was 122.5±8.5 mmHg and mean diastolic pressure was 102.21±6.42 mmHg. BMI and Blood Pressure were significant variables among normal pregnancy and preeclampsia as per this study.

In the present study Mean total cholesterol in Preeclampsia was 160.9±27.9 mg/dl and normal pregnancy was 136.85±10.44 mg/dl. Mean HDL in preeclampsia was 38.57±2.03 mg/dl and normal pregnancy was 39±1.49 mg/dl. Mean LDL in preeclampsia was 84.5±28.7 mg/dl and normal pregnancy was 72.75±9.62 mg/dl. Mean VLDL in preeclampsia was 41.95±8.63 mg/dl and in normal pregnancy was 24.7±3.05 mg/dl, Mean Triglycerides in preeclampsia was 126.85±16.68 mg/dl and normal pregnancy was 210.32±42.65 mg/dl. Serum lipids including Total cholesterol, Low density lipoprotein, very low density lipoprotein, triglycerides were increased in preeclampsia when compared to normal pregnancy, which is statistically significant.

Characteristics	Normal Pregnancy (n=40)	Preeclampsia (n=40)	p value
Age in years	25.7±3.54	26.85±2.32	0.0897
BMI	24.32±8.03	28.13±5.62	0.0162
Parity			
≤ 2 pregnancies	32 (80%)	21 (52.5%)	0.009
> 2 pregnancies	8 (20%)	19 (47.5%)	
Blood Pressure			
Systolic blood Pressure	108.25±3.62	122.5±8.5	0.0001
Diastolic blood pressure	81.13±1.46	102.21±6.42	0.0001

**Table-1:** Showing demographic features of normal pregnancy and preeclampsia women

Serum Lipids	Normal Pregnancy	Preeclampsia	p value	Significance
Total Cholesterol	136.85±10.44	160.9±27.9	0.0452	SS
High density Lipoprotein	39±1.49	38.57±2.03	0.2835	NSS
Low density Lipoprotein	72.75±9.62	84.5±28.7	0.0163	SS
Very Low density Lipoprotein	24.7±3.05	41.95±8.63	0.0001	ESS
Triglycerides	126.85±16.68	210.32±42.65	0.0001	ESS

**Table-2** Serum Lipid profile among Normal pregnancy and Preeclampsia

Serum Lipids	Normal Pregnancy	Mild Preeclampsia	Severe Preeclampsia
Total Cholesterol	136.85±10.44	137.3±2.43	162.8±3.4
High density Lipoprotein	39±1.49	38.43±7.2	39.12±5.6
Low density Lipoprotein	72.75±9.62	74.7±4.5	106.3±8.6
Very Low density Lipoprotein	24.7±3.05	37.82±2.3	43.32±7.5
Triglycerides	126.85±16.68	193.4±6.8	223.6±9.42

**Table-3:** Serum lipid profiles in both mild and severe preeclampsia

Serum Lipids	Normal Pregnancy Vs Mild Preeclampsia		Mild Vs Severe Preeclampsia		Normal Pregnancy Vs Severe Preeclampsia	
	p value	Significance	p value	Significance	p value	Significance
Total Cholesterol	0.7913	NSS	0.0001	ESS	0.0001	ESS
High density Lipoprotein	0.6293	NSS	0.6337	NSS	0.896	NSS
Low density Lipoprotein	0.2491	NSS	0.0001	ESS	0.0001	ESS
Very Low density Lipoprotein	0.0001	ESS	0.0001	ESS	0.0001	ESS
Triglycerides	0.0001	ESS	0.0001	ESS	0.0001	ESS

**Table-4:** Showing Statistical significance of serum lipids among preeclampsia and normal pregnancy

This study correlates with Singh U<sup>18</sup>, which was shown there is an association of Mean cholesterol, LDL, VLDL and Triglyceride level among normal and PIH cases and were statistically significant ( $p < 0.05$ ). Amandeep Singh Kaloti et al<sup>19</sup>, Josephine Latha P et al<sup>20</sup> were documented that association of HDL, VLDL and Triglyceride level among normal and PIH cases are statistically significant ( $p < 0.05$ ).

Hemanth Deshpande et al<sup>21</sup> reported high lipid profile levels, Mean cholesterol level in PIH cases was 208.8±12.64 mg/dl and in normal cases was 163.8±8.83 mg/dl, mean HDL level in PIH cases was 38.06±3.01 mg/dl and in normal cases was 49.56±4.08 mg/dl, mean LDL level in PIH cases was 140.36±10.8 mg/dl and in normal cases was 120.2±7.98 mg/dl, mean VLDL level in PIH cases was 52.76±4.96 mg/dl and in normal cases was 35.4±3.62 mg/dl and mean Triglyceride level in PIH cases was 201.06±10.67 mg/dl and in normal cases was 158.8±9.96 mg/dl. They were observed cholesterol, HDL, LDL, VLDL, TG were statistically significant ( $p < 0.05$ ) on comparing preeclamptics with normal pregnancy.

In this study Very low density Lipoprotein and Triglycerides were significantly increased in normal pregnancy when compared with mild and severe preeclampsia. Low density lipoprotein and total cholesterol shown significant difference between Mild and severe preeclampsia.

Hemanth deshpande et al<sup>21</sup> were reported cholesterol, LDL, VLDL and triglyceride levels were gradually increasing from Mild PIH to Severe PIH to Eclampsia, while HDL levels were gradually decreasing from Mild PIH to Severe PIH to Eclampsia. Many studies observed that preeclampsia preceded by dyslipidemia, particularly hypertriglyceridemia and elevated lipoprotein, which indicates they may be etiologic and pathophysiologic mechanism responsible for preeclampsia.<sup>22-24</sup> Many mechanisms were investigated regarding association between dyslipidemia and preeclampsia. Altered lipid levels in serum results in oxidative stress stimulated by linoleic acid, which in turn cause endothelial dysfunction. This is one of the pathophysiologic event responsible for development of preeclampsia.<sup>25</sup> Preeclamptic women had both a higher ratio of free fatty acids to albumin and increased lipolytic activity, resulting in enhanced endothelial uptake of free fatty acids, which are further esterified to triglycerides.<sup>26,15</sup> Genetic and

environmental factors contribute to pathogenesis of metabolic syndromes including hyperinsulinemia nad hyperuricemia, observed in preeclamptics.<sup>11</sup> During pregnancy there will be hyperlipidemia, insulin resistance and up-regulation of inflammatory markers.<sup>27</sup>

## CONCLUSION

We concluded that there is elevation of serum lipids among preeclamptics when compared to normal pregnancy. There is also increase in Cholesterol, LDL, VLDL, TG from mild to severe preeclampsia significantly. Estimating serum lipid profile is a simple screening test, helps to recognize dyslipidemia in early second trimester of patients who are at risk of preeclampsia. Due to early detection of altered lipid profile in preeclamptics, incidence of complications can be decreased, which in turn reduce the materno-fetal morbidity and mortality.

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