

## Lipid profile in pre-eclampsia and normal pregnancy

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### Abstract:

**Background:** Pre-eclampsia is globally a cause of maternal and fetal morbidity and mortality. Hence, it is important to study the lipid profile and risk factors for prevention, management and prognosis of the disease. **Objectives:** Present study was conducted to observe differences between normal and preeclampsia lipid profiles. **Method and materials:** A case control study was conducted in the Obstetrics and Gynaecology department, Tezpur Medical college, Tezpur, Assam from March 2022 to February 2023. In this study 100 cases were selected, out of which 50 normotensive pregnant women as a control and 50 pre-eclampsia women as study group. All routine baseline investigations, serum lipid profile estimation was done by collecting blood samples from antecubital veins from every case and control following a fast of 12 - 14 hours in plain vials and then analysed in the department of Biochemistry, Tezpur Medical college, Tezpur. **Results:** It was found that mean  $\pm$  SD of triglyceride ( $224.30 \pm 38.41$  mg/dl), total cholesterol ( $206.82 \pm 29.89$  mg/dl) and LDL cholesterol ( $119.94 \pm 20.24$  mg/dl) among the women in the study group was higher than the mean  $\pm$  SD of triglycerides ( $178.06 \pm 21.0$  mg/dl), total cholesterol ( $166.64 \pm 18.80$  mg/dl) and LDL cholesterol ( $90.22 \pm 15.41$  mg/dl) among women in the control group. Again, mean  $\pm$  SD of HDL cholesterol among the study group was lower than the mean  $\pm$  SD of HDL cholesterol among the control group. Statistically, there is a significant difference in case of triglycerides, total cholesterol, HDL - cholesterol and LDL-cholesterol. **Conclusion:** Abnormal lipid profile during pregnancy plays an important role in the development of Pre-eclampsia.

**Keywords:** Pre-eclampsia, lipid profile, triglycerides, high density lipoproteins.

Elevated blood pressure and proteinuria after 20 weeks gestation in a previously normotensive patient confirm its diagnosis. Incidence is 3-5% worldwide <sup>4</sup>. Normal adaptive metabolic responses are exaggerated in pregnancy by preeclampsia. It manifests itself during second and third trimester <sup>5</sup>. In India, incidence varies 5-15%; primigravida 10% and multigravida 5% <sup>6</sup>.

Mild preeclampsia: Blood pressure  $\geq 140/90$  mm of Hg on two measures at least 6 hours apart but not more than 7 days apart, and proteinuria  $\geq 300$  mg on a 24 hour urine or two dipstick results of at least 30mg/dl ("1+"). Severe preeclampsia: Blood pressure during bed rest  $\geq 160/110$  mm of Hg, and proteinuria  $\geq 5$  gm/dl on a 24 hour urine collection even if BP is in the mild range. In PE, hypertension is caused by vasospasm in the kidneys, uterus, placenta and brain. In pregnancy endothelial prostacyclin levels 8-10 times higher. Only 1-2 times greater in PE patient than normal pregnant women. Thromboxane levels also higher in PE than normal pregnant women <sup>7</sup>. Endothelial cell injury and its dysfunction results in pathogenesis of PE. Significant difference in lipid parameters and increased susceptibility to lipoprotein peroxidation – the most common factor associated with PE is placental

vasculopathy compared to normal pregnancy. In PE, triglyceride related vasculopathy could be one etiological factor<sup>8</sup>. Endothelial cell destruction ensures vasospasm because prostacyclin is a vasodilator and thromboxane is a vasoconstrictor<sup>9</sup>. Increased lipid synthesis raises the thromboxane prostacyclin rate, which contributes to the pathogenesis of pregnancy induced hypertension<sup>10</sup>. In preeclampsia increased triglycerides are likely to be deposited in uterine spiral arteries and cause endothelial dysfunction directly and indirectly through generation of small dense LDL, cholesterol, resulting in endothelial dysfunction causing feto-placental insufficiency and proteinuria. Present study was conducted to observe differences between normal and preeclampsia lipid profiles.

## Materials and methods

This is a case control study and was conducted on 100 selected cases in the Department of Obstetrics & Gynaecology, Tezpur Medical College, Tezpur who were regularly attended outdoor. 50 cases were with preeclampsia and 50 cases were normotensive as case control.

Inclusion criteria: singleton between 20-42 weeks gestation, 18-37 years of age and were known cases of preeclampsia.

Exclusion criteria: women with eclampsia, multiple pregnancies, severe anaemia and history of smoking or any other chronic medical illness were excluded.

Booked patients were admitted at term in the antenatal clinic on regular basis and also admitted as emergency, but those who never attended antenatal clinic are also admitted as emergency over a period of 1 year from March 2022 to February 2023. The cases were thoroughly examined and clinically assessed recording all information considered important and doing all investigations done viz. CBC, KFT, LFT, HIV, HBSAg, VDRL, Blood pressure, 24 hour urine sample was taken.

Estimation of serum lipid profile: Peripheral blood sample (5ml) was collected from antecubital vein from all cases including control group following a fast of 12-14 hours, collecting in vacutainer and sent for analysis. Sample were analysed for serum triglyceride, total cholesterol, and HDL (high density lipoprotein) - cholesterol (C) by enzymatic methods with the help of ROCHE diagnostic kit in auto-analyzer Hitachi 912. Serum LDL (low density lipoprotein) - C was calculated by using Friedewald equation:  $LDL-C = TC - (TG/5 + HDL-C)$ .

Statistical analysis: Data was expressed as mean and percentage. Statistical analysis was done by using Chi-square, Mann Whitney test, Student T test. Statistical package for social sciences (SPSS- 22) and Microsoft Excel software were used for analysis. P <0.05 was considered as significant at 95% CI.

## Results

In the present study table 1 shows that out of 50 patient of study, 26 (52%) cases are in the age group of 20-24 years, followed by 14 (28%) in the age group of 25-29 years, 6(12%) cases in <20 years and 4 (8%) cases are in the age group > 30 years. The youngest patient is 17 years and oldest is 33 years old in the study.

Table 2 shows that out of 50 cases selected, SBP (systolic blood pressure) between 141-160 mm of Hg in 25 (50%), 161-180 mm of Hg in 13 (26%), 181-200 mm of Hg in 10 (20%) and >200 mm of Hg in 2 (4%) cases.

Table 1: Table showing age distribution of patients		
Age (Years)	No. of patients	Percentage (%)
<20	6	12%
20—24	26	52%
25—29	14	28%
30-- >30	4	8%
Total	50	100%
Mean age	23.5	
SD	+4.24	

<b>Table 2: Table showing distribution of systolic blood pressure in the cases</b>		
<b>SBP on admission (mm Hg)</b>	<b>No. of cases</b>	<b>Percentage</b>
141-160	25	50%
161-180	13	26%
181-200	10	20%
>200	2	4%
Total	50	100%

Table 3 it was found that out of 50 cases selected, DBP (diastolic blood pressure) between 91-100mm of Hg in 9 (18%), 101-110 mm of Hg in 16 (32%), 111-120 mm of Hg in 20 (40%) and >120 mm of Hg in 5 (10%) cases.

<b>Table 3: Table showing distribution of diastolic blood pressure in the cases</b>		
<b>DBP on admission (mm Hg)</b>	<b>No. of cases</b>	<b>Percentage</b>
91-100	9	18%
101-110	16	32%
111-120	20	40%
>120 mm Hg	5	10%
Total	50	100%

<b>Table 4: Table with serum lipid profile of cases and controls</b>			
<b>Parameters</b>	<b>Study Group; (Mean±SD) mg/dl</b>	<b>Control Group; (Mean±SD) mg/dl</b>	<b>P-value</b>
Triglyceride	224.30±38.41	178.06±21.02	<0.001
Total cholesterol	206.82±29.89	166.64±18.80	<0.001
HDL-cholesterol	38.92±6.09	45.64±4.69	<0.001
LDL-cholesterol	119.94±20.24	90.22±15.41	<0.001

SD – Standard deviation, HDL – High density lipoprotein, LDL – Low density lipoprotein

In table 4 it was found that mean ± SD of triglyceride, total cholesterol and LDL cholesterol among the women in the study group was higher than the mean ± SD of triglycerides, total cholesterol and LDL cholesterol among women in the control group. Again, mean ± SD of HDL-cholesterol among the study group was lower than the mean ± SD of HDL-cholesterol among the control group. Statistically, there is a significant difference in case of triglycerides, total cholesterol, HDL-cholesterol and LDL-cholesterol.

## Discussion

It has been many discussions about the role of lipid metabolism in the development of preeclampsia (PE). The lipid changes are thought to play a role in the endothelial cell damage that is characteristic of PE. All cells and tissues have low level of lipid peroxidation. In good health, free radicals and antioxidant are balanced<sup>11</sup>. It has been seen in previous studies that plasma lipid levels in preeclampsia were higher than in healthy pregnant women<sup>12, 13</sup>.

This present study was conducted to compare serum lipid in preeclampsia and normal pregnancy. In the preeclampsia group, mean ± SD serum triglyceride level was 224.30 ± 38.41 mg/dl. But, in the control group, the mean ± SD of serum triglyceride level was 178.06 ± 21.02 mg/dl; this difference is statistically significant. Jayanta De et al<sup>14</sup>, and Torun Clausen et al<sup>15</sup>, also observed a significant increase in triglyceride levels in preeclampsia women than normotensive.

In our study, mean serum concentration of total cholesterol is 166.64 ± 18.80 mg/dl in controls and 206.82 ± 29.89 in preeclampsia; the difference is statistically significant. Shruthi Mohanty et al<sup>16</sup>, Md. Zakir H et al<sup>17</sup>, also observed a significant increase in total cholesterol levels in preeclampsia than normotensive women.

In this study, mean serum concentration of LDL cholesterol is 90.22 ± 15.41 mg/dl in control group and 119.94 ± 20.24 mg/dl in preeclampsia group; Torun Clausen et al<sup>15</sup>, Carlos A Negrato et al<sup>18</sup>, also observed a significant increase in LDL cholesterol levels in preeclampsia cases than normotensive cases.

In our study, mean serum concentration of HDL cholesterol is  $45.64 \pm 4.69$  mg/dl in control and  $38.92 \pm 6.09$  mg/dl in preeclampsia women; the difference is statistically significant. S Ware Jauregui et al<sup>19</sup> and Carlos A Negrato et al<sup>18</sup> also observed a significant decrease in HDL cholesterol levels in preeclampsia women compared to normal.

## Conclusion

Abnormal lipid profile during pregnancy plays an important role in the development of pre-eclampsia. Raised triglycerides, LDL-C and decreased HDL-C leads to the development of preeclampsia by causing oxidative stress and endothelial dysfunction. Chance of recurrence in the next pregnancy is high. By detecting the lipid profile changes in early pregnancy, it is helpful in early diagnosis and can prevent and slow down the progress of the disease by medication or lifestyle modification.

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**Conflict of interest:** None. **Disclaimer:** Nil.