

# Fasting lipid profile in pregnancy associated hypertensive disorders

Surekha Gawade<sup>1\*</sup>, Sachin Gawade<sup>2</sup>

<sup>1</sup>Department of Obstetrics and Gynaecology, SKNMC and GH, Pune, Maharashtra, INDIA.

<sup>2</sup>Department of Community Medicine, SKNMC and GH, Pune, Maharashtra, INDIA.

Email: [surekha.gawade10@gmail.com](mailto:surekha.gawade10@gmail.com)

## Abstract

**Background:** Pre-eclampsia (PE) is characterized by development of hypertension with proteinuria in previously normotensive and nonproteinuric woman generally after 20th week of pregnancy. Plasma lipids are seen to increase in normal pregnancy, but this event is not atherogenic<sup>3</sup>. It is under hormonal control<sup>3,8</sup>. In complicated pregnancy there is defect in mechanism of physiologic control on hyperlipidemia<sup>12</sup>. The abnormal lipid profile is important in the pathogenesis of pregnancy induced hypertension<sup>12, 13</sup>. With these perspective this study of estimating lipid profile was undertaken. **Aims and Objectives:** Estimation of Serum lipid profile during pregnancy in primigravida to identify high risk pregnancies who are more prone to develop Pre-eclampsia. **Material and methods:** Total 100 primigravida females were included in study out of which 50 were having normal pregnancy (controls) and 50 were diagnosed pre eclampsia cases (subjects). mean systolic and diastolic blood pressure were recorded in both groups. serum total cholesterol level, serum triglyceride level, VLDL level, HDL level were recorded and compared in both groups. **Results:** The mean systolic BP (179.08±14.45) and DBP (93.78±3.59) in pre eclampsia were significantly higher than in normal pregnancy (137.6±6.47) and (82.92±2.29) (P<0.0001). The mean total cholesterol (233.66±1.86) in pre eclampsia were significantly higher than in normal pregnancy (217.34±1.39) (P<0.0001). The mean triglycerides (243.04±1.79) in pre eclampsia were significantly higher than in normal pregnancy (223.36±1.98) (P<0.0001). The mean VLDL (47.08±1.19) in pre eclampsia were significantly higher than in normal pregnancy (43.68±1.42) (P<0.0001). The mean HDL (44.36±1.56) in pre eclampsia were significantly lower than in normal pregnancy (46.88±1.22) (P<0.0001). **Conclusion:** Preeclampsia is characterized by an abnormal pattern of lipid profile beyond the physiological change of normal pregnancy. **Key Word:** Pre eclampsia, PIH, TC, TG, VLDL, HDL, Lipid profile

## \*Address for Correspondence:

Dr. Surekha Gawade, Department of Obstetrics and Gynaecology, Smt. Kashibai Navale Medical College, Pune, Maharashtra, INDIA.

Email: [surekha.gawade10@gmail.com](mailto:surekha.gawade10@gmail.com)

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## INTRODUCTION

Normal pregnancy is associated with numerous physiological, biochemical and anatomical alterations. Pregnancy-induced hypertension (PIH) or Gestational hypertension is the emergence of new hypertension condition in a pregnant woman after 20 weeks of

gestation. It is associated with previous absence of protein in the urine or other signs of pre-eclampsia. Pre-eclampsia (PE) is defined as onset of high blood pressure and presence of protein in the urine. Pre-eclampsia is a complex patho physiological state in which regulatory mechanism of inflammation and endothelial function are stimulated beyond the physiological limits of normal pregnancy<sup>1</sup>. Endothelial dysfunction may be a result of disorder of lipoprotein metabolism<sup>2</sup> hence the Lipid play a key role in pathophysiology<sup>3</sup>. As per previous studies pathophysiology of pre-eclampsia includes endothelial cell injury and altered endothelial cell function.<sup>4</sup> It is thought that poorly perfused placenta during pregnancy is the cause of origin of humoral factor that may affect maternal systemic function. There is activation of endothelial cell with resultant vascular injury<sup>5</sup> The characteristic pathologic lesion seen in utero-placental bed of patient of pre-eclampsia termed as “acute

atherosis” Pre-eclampsia is the most frequently encountered medical complication during pregnancy<sup>3,7</sup> in developing countries it is the leading cause of maternal, fetal and neonatal mortality and morbidity<sup>2,8,9,10</sup> with estimates of >60,000 maternal deaths/year<sup>7</sup>. Overall world wide incidence of Pre-eclampsia is 3-5%<sup>7</sup> In India incidence is 5-15%<sup>11</sup>. incidence of pre-eclampsia in healthy nulliparous women may be as high as 7.5%<sup>3</sup> in worldwide and in India it is around 15%<sup>11</sup> Plasma lipids are seen to increase in normal pregnancy, but this event is not atherogenic<sup>3</sup>. It is under hormonal control<sup>13, 8</sup>. In complicated pregnancy there is defect in mechanism of physiologic control on hyperlipidemia<sup>12</sup>. The abnormal lipid profile is important in the pathogenesis of pregnancy induced hypertension<sup>12, 13</sup>. Altered lipid metabolism is not merely a manifestation of pre-eclampsia, but it is directly involved in its pathogenesis<sup>14</sup>. Serum lipid have a direct effect on the endothelial function and cause endothelial dysfunction<sup>4,15</sup>. Lipid profile shows dramatic changes during pregnancy may be to supply lipid nutrients to the growing fetus. Triglycerides and cholesterol both increase approximately upto 30% and 50% respectively<sup>16</sup>. Uptil now several studies have done previously related to lipid profile in pregnancy but the magnitude and significance of the lipid changes in pregnancy is associated with pregnancy induced hypertension (PIH) has not been well defined. So our study aims to study serum lipid profile with estimating serum triglycerides, serum cholesterol, serum LDL-C, serum HDL-C and serum VLDL-C in Pre-eclamptic Primigravida associated with risk of pregnancy induced hypertension (PIH). Estimation of Serum lipid profile during pregnancy in primigravida, may help in identifying high risk pregnancies who are more prone to develop Pre-eclampsia.

## MATERIAL AND METHOD

The study was conducted in Department of Obstetrics and gynaecology in tertiary care hospital. The study included 100 primigravida females out of which 50 were having normal pregnancy (controls) and 50 were diagnosed pre eclampsia cases (subjects). Approval of institutional ethics committee was taken prior to commencement of this study.

**Estimation of fasting serum lipid profile:** Blood sample was collected after an overnight fast of 12 hours. Serum was stored at 20C and tested for total cholesterol, triglyceride, very low density lipoprotein cholesterol and Serum high density lipoprotein cholesterol. All tests were performed on Biochemistry analyzer Erba XL 640. Serum total cholesterol estimation done by Cholesterol Oxidase Peroxidase method (CHOD-POD), Serum triglyceride by Lipase/ Glycerokinase/ Glycerophosphate oxidase (GPO) method using commercial kits from Erba diagnostics. Serum HDL by Selective inhibition method using commercial kits from Agappe diagnostics. Serum VLDL estimated by Friedewald’s formula. Estimation of Urine albumin (protein) done by Reagent strip. Different analytes in the urine react with specific reagent area on the test strip to produce a standardized range of visible color change within 1 to 2 minutes. The protein portion of the dipstick reagent strip measures the protein based on the “protein error of pH dye indicator”, principle (method) using bromphenol blue. Due to the negative charge of albumin, if protein (albumin) is present in urine, the pH increases, and a positive test result occurs.

### Exclusion Criteria:

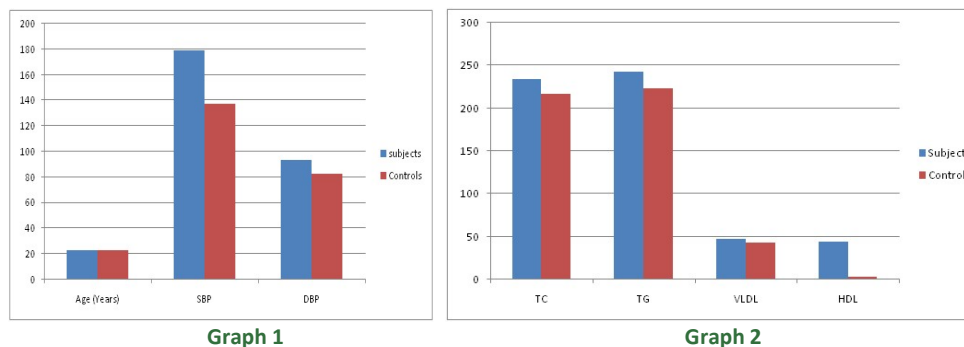
1. Multigravida with more than one Para.
2. Previous history of hypertension, Diabetes Mellitus, renal disease, thyroid disorder, dyslipidemia.
3. Family history of pre-eclampsia.
4. Other medication except for vitamins, Iron and Calcium.

## OBSERVATION AND RESULT

A total of 100 subjects (50 Normal pregnancy and 50 pre eclampsia) were included in the study. The mean age (in years) was 22.88± 1.78 in controls and 22.86 ±1.88 in subject. There was no significant difference in the age in the two groups (p =0.9565). The mean systolic BP (179.08±14.45) and DBP (93.78±3.59) in pre eclampsia were significantly higher than in normal pregnancy (137.6±6.47) and (82.92±2.29) (P<0.0001). All the subjects in study group had albumin (proteinuria) in the urine which ranges from 1+ to 4+ and it was absent in urine of control groups. (Table 1, Graph 1).

Table 1

Parameter	Mean Subject (50)	Mean Control (50)	P value
Age (Years)	22.86 ± 1.88	22.92 ± 2.29	P=0.9565
Systolic BP (mm of Hg)	179.08 ± 14.45	137.6 ± 6.47	P<0.0001
Diastolic BP (mm of Hg)	93.72 ± 3.59	82.88 ± 1.78	P<0.0001



Graph 1

Graph 2

The mean total cholesterol ( $233.66 \pm 1.86$ ) in pre eclampsia were significantly higher than in normal pregnancy ( $217.34 \pm 1.39$ ) ( $P < 0.0001$ ). The mean triglycerides ( $243.04 \pm 1.79$ ) in pre eclampsia were significantly higher than in normal pregnancy ( $223.36 \pm 1.98$ ) ( $P < 0.0001$ ). The mean VLDL ( $47.08 \pm 1.19$ ) in pre eclampsia were significantly higher than in normal pregnancy ( $43.68 \pm 1.42$ ) ( $P < 0.0001$ ). The mean HDL ( $44.36 \pm 1.56$ ) in pre eclampsia were significantly lower than in normal pregnancy ( $46.88 \pm 1.22$ ) ( $P < 0.0001$ ). (Table2, Graph2)

Table 2

Parameter	Mean Subject (50)		P<0.0001
Total cholesterol (mg/dl)	$233.66 \pm 1.86$	$217.34 \pm 1.39$	<b>P&lt;0.0001</b>
Triglycerides (mg/dl)	$243.04 \pm 1.79$	$223.36 \pm 1.98$	<b>P&lt;0.0001</b>
VLDL (mg/dl)	$47.08 \pm 1.19$	$43.68 \pm 1.42$	<b>P&lt;0.0001</b>
HDL (mg/dl)	$44.36 \pm 1.56$	$46.88 \pm 1.22$	<b>P&lt;0.0001</b>

## DISCUSSION

The changes in the lipid profile in normal pregnancy are physiological due to the hormonal variations during pregnancy<sup>8,17</sup>. These are due to changes in hepatic and adipose tissue metabolism which alter circulating concentrations of triglycerides, fatty acids, cholesterol and phospholipids. It is attributed to higher concentration of estrogen and state of insulin resistance<sup>62</sup>. It is also characterized by increased hepatic lipase activity and decreased lipoprotein lipase activity which leads to increase in circulating triglycerides<sup>17</sup>. Because of reduction in adipose tissue lipoprotein lipase activity, there is reduction in clearance of circulating triglyceride<sup>18</sup>. In the previous studies Lipid peroxides also have been found to be elevated in the serum of women with pre-eclampsia compared with normal pregnant women, and some correlation appears to be present between lipid peroxide levels and the severity of preeclampsia<sup>19</sup>. In particular, lipid peroxides and blood oxidative imbalance are part of the cytotoxic mechanism leading to endothelial injury. Lipid peroxides are formed when a lipid interacts with a radical, such as the oxygen radical. Lipid peroxides are unstable but highly reactive and causedamage<sup>20</sup>. Elevated lipid peroxides could lead to endothelial cell dysfunction by altering the important biochemical reactions in the cell by modulating prostacyclin synthesis Previous studies related to lipid in pre eclampsia Serum Cholesterol was raised in studies conducted by Faruh Khaliq *et al*, Usha Adiga *et al*, H, uzum *et al*, Kocyight A and Van den Elzen HJ *et al*<sup>8</sup>.

Serum LDL-C was raised in studies conducted by Faruh Khaliqetal, Mustafa Baki Cekman *et al*, Bayhan Get *al*, H, UZUM *et al*, Kocyight A, Belo L *et al*, Chiang AN *et al*, Loke DF, *et al*, Wakatsuki, A *et al* and Naveed Sattar *et al*. According to the study done by Kim YZ, atherogenic lipid profile and oxidized LDL enhanced in pre-eclampsia significantly contributes to endothelial dysfunction<sup>21</sup>. Serum VLDL-C, was raised in studies conducted by Faruh Khaliq *et al*, Winne Hirome Takahashi *et al*, Jayanta De *et al*, H, UZUM, *et al* and Sattar N *et al*. Serum HDL-C levels were decreased in studies conducted by Faruh Khaliq *et al*, Jayantha De *et al*, Usha Adiga *et al*, Rubina aziz *et al*, Kim YZ, KocyightAandBeloLetal<sup>22</sup>

## CONCLUSION

The present study concludes that

1. Normal pregnancy is characterized by physiological hyperlipidemia.
2. Gestation is associated with an "atherogenic" lipid profile that is further enhanced in preeclampsia
3. Preeclampsia is characterized by an elevation in triglyceride levels beyond the physiological increase of normal pregnancy
4. An abnormal lipid metabolism and high lipid peroxides contribute to promotion of oxidative stress and vascular dysfunction seen in pre-eclampsia.

This study may help in understanding the pathophysiological process of Pre-eclampsia and early diagnosis. for developing strategies for prevention and management

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