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# Lipid profile in patients of preeclampsia: A comparative study

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## Abstract

Preeclampsia occurs in 7 to 10% of pregnancies worldwide. At present most popular theory is an oxidative stress. Abnormal lipid profiles and species may have a role in promotion of oxidative stress and vascular dysfunction seen in pre-eclampsia. The study was carried out to evaluate lipid profile in subjects with preeclampsia and to compare lipid profile in subjects of preeclampsia as compared to normal pregnant women from 26 weeks of gestation till term. Pregnant women with and without preeclampsia between 26weeks-till term were compared for serum total cholesterol, triglycerides(TG), low density lipoprotein(LDL), high density lipoprotein (HDL) and very low density lipoproteins(VLDL). The study was conducted in tertiary care hospital over a period of one year. The total serum cholesterol, triglycerides, LDL and VLDL was significantly raised in subjects with preeclampsia as compare to pregnant women without preeclampsia. Considering the results in this study correlating with the various other studies, it can be concluded that dyslipidemia is significantly evident in preeclampsia and plays an important role in its pathogenesis. The preventive measures taken to avoid dyslipidemia like dietary control, weight reduction and physical activity and its positive effect on pregnancy needs to be further studied.

**Keywords**: Preeclampsia, Lipid profile, Triglycerides, Total Cholesterol.

## Introduction

Preeclampsia is a pregnancy specific condition characterized by hypertension and proteinuria. It is characterized by multisystem disorder of pregnancy. It is the most common obstetric complication and associated with high maternal and perinatal mortality. Preeclampsia occurs in 7 to 10% of pregnancies worldwide. In India, the national incidence is reported to be 8 – 10% of pregnancies.[(1)]The etiology of preeclampsia is still unknown. The hypothesis which are accepted are myometrial vessels invasion hypothesis, genetic hypothesis, the immune maladaptation and hypothesis of the imbalance between free oxygen radicals and scavengers in favor of oxidants. At present most popular theory is an oxidative stress. Abnormal lipid profiles and species may have a role in promotion of oxidative stress and vascular dysfunction seen in preeclampsia. Predominantly the atherogenic small low density lipoproteins (LDL) and vascular cell adhesion molecules (VCAM) are increased in association with hyperlipidemia in preeclampsia.[(2-4)] Although there are growing evidence indicating that the risk of preeclampsia is increased in women with elevated levels of oxidized low density lipoproteins and triglycerides, the causal relationship of lipid peroxidation in the pathogenesis of preeclampsia is not clear. This study is designed to evaluate the changes in lipid profile that develops during normal pregnancy and preeclampsia and its role in pathogenesis in preeclampsia.

## Aims of Objectives

1. To evaluate lipid profile in patients with preeclampsia.
2. To compare lipid profile in patients of preeclampsia as compared to normal pregnant women from 26 weeks of gestation till term.

## Material and Method

**Study Design**: Comparative longitudinal study.
**Sample Size**: 30 patients in each group.
Group A: Pregnant women with preeclampsia between (PIH with proteinuria) 26wks-tillterm
Group B: Pregnant women with pregnancy between 26wks –till term without pregnancy induced hypertension.
**Site of study**: Outdoor; Indoor patients attending and admitted in OBGY ward at NKP Salve institute of medical sciences and Lata Mangeshkar Hospital, Nagpur India.
**Duration of Study**: 1 Year
**Inclusion criteria:**

1. Pregnant women with preeclampsia(pregnancy induced hypertension with proteinuria) from 26 wks –till term.
2. Pregnant women with normal blood pressure between 26wks – till term

The study was started after ethic committee approval. Informed consent of the patients included in study was taken. 5 ml venous blood sample was withdrawn from all subjects under all aseptic precautions. The sample was allowed to clot and serum was separated in biochemistry lab. Each serum sample from different groups was evaluated for fallowing parameters, using diagnostic kit. The outcome measures analyzed by using t test and chi-square test. Those who had Diabetes mellitus, Chronic hypertension, Hepatitis, Medical disorders like renal disease, thyroid disease, collagen vascular disease, Hemoglobin<8 g%, BMI>30,

patients treated for PCOS in past and eclampsia were excluded from the study. After collection of blood sample, the blood was allowed to clot (for 10 min) and serum was separated by centrifugation at 2500 rpm for 20 min. Each serum sample from different group was evaluated for serum cholesterol, tryglycerides, LDL, HDL and VLDL. The results were obtained by applying T test and chi- square test.

## Results

All the women in this study were in reproductive age between 19 and 35 years. Maximum subjects in each group were between 26 and 30 years as this is peak childbearing age group (Table 1).

**Table 1: Age wise distribution of subjects in various groups**

| Age in years | Without preeclampsia n = 30 | With preeclampsia n = 30 |
|---|---|---|
| 19 – 25 | 8 | |
| 26 – 30 | 18 | 16 |
| 31 – 35 | 4 | 6 |

**Table 2: Weeks of gestation at the time of test**

| Weeks of gestation | Without preeclampsia n- 30 | With preeclampsia n- 30 |
|---|---|---|
| 26-30 | 4 | 5 |
| 31-35 | 18 | 16 |
| 36-40 | 8 | 9 |

Maximum patients in both the groups were between 31 to 35 weeks of gestation (Table 2).

**Table 3:Obstetric history in subjects**

| Obstetric history | Without preeclampsia n- 30 | | With preeclampsia n- 30 | |
|---|---|---|---|---|
| Primigravida | 24 | | 20 | |
| Multigravida | 6 | | 10 | |

At the time of study maximum patients were primigravida in both the groups (Table 3).

**Table 4: Mean total cholesterol in study groups-(mg/dl)**

| Total cholesterol | Without preeclampsia n- 30 | With preeclampsia n- 30 | t | P |
|---|---|---|---|---|
| Mean | 164.33 | 186.50 | 4.852 | 0.000 |
| SD | 12.11 | 21.89 | | |

P value for both groups is < than 0.05 which is significant. Total cholesterol (mg/dl) (Table 4) shows mean total cholesterol in both the groups. In our study there is significant total cholesterol increase in preeclampsia than in subjects without preeclampsia.

**Table 5: Mean triglyceride concentration in study groups(mg/dl)**

| Triglycerides | Without preeclampsia n- 30 | With preeclampsia n- 30 | t | P |
|---|---|---|---|---|
| Mean | 57.26 | 66.00 | 3.369 | 0.001 |
| SD | 9.72 | 10.34 | | |

P value for both the groups is <0.05 which is significant Triglyceride (mg/dl) (Table 5) shows that the triglyceride concentration was found more in preeclamptic subjects than subjects with pregnancy without preeclampsia.

**Table 6: High density lipoprotein HDL (mg/dl) in study group**

| HDL | Without preeclampsia n- 30 | With preeclampsia n- 30 | T | p |
|---|---|---|---|---|
| Mean | 50.63 | 51.53 | 0.422 | 0.675 |
| SD | 7.43 | 9.01 | | |

P value for both the groups is > 0.05, hence not significant. High density lipoprotein(mg/dl) (Table 6) shows that there is no significant change in high density lipoprotein in both the subjects.

**Table7: Low density lipoprotein LDL(mg/dl) in study group**

| LDL | Without preeclampsia n- 30 | With preeclampsia n- 30 | t | p |
|---|---|---|---|---|
| Mean | 53.5 | 68.97 | 3.770 | 0.000 |
| SD | 14.52 | 17.15 | | |

P value is < 0.05 which is significant. Low density lipoproteins (mg/dl)- Table 7 shows that there is significant increase in LDL concentration in pre-eclamptic subjects than subjects without preeclampsia.

**Table 8: Very Low density lipoprotein VLDL(mg/dl) in study group**

| VLDL | Without preeclampsia n- 30 | With preeclampsia n- 30 | t | p |
|---|---|---|---|---|
| Mean | 12.03 | 13.19 | 2.254 | 0.028 |
| SD | 1.901 | 2.06 | | |

P value is <0.05 which is significant. Very low density lipoproteins (mg/dl)- Table 8 shows that there is significant increase in very low density lipoproteins in subjects with preeclampsia than subjects without preeclampsia.

## Discussion

In this study conducted over a period of one year, both the groups were comparable in terms of age, religion and socio-economic status. The two pregnant groups were also carefully chosen at same gestational period. The Maximum subjects in each group were between 26 and 30 years as this is peak childbearing age group. Maximum patients in both the groups were between 31 to 35 weeks of gestation. At the time of study maximum patients were primigravida in both the groups.

Pre-eclampsia is a complex pathophysiological process where regulatory systems of inflammation and endothelial function are stimulated beyond the physiological limits of normal pregnancy.[3] Abnormal lipid metabolism is also involved in pathogenesis of disease.[4] Pregnancy is a physiological stress in which many changes occur in the milieu interior of the body, more and more stress being laidon the biochemical changes, which occur in the blood during normal pregnancy, become exaggerated in complications of pregnancy with preeclampsia. The most common factor associated with pre-eclampsia is placental vasculopathy. If pre-eclampsia is multi causal disease, then TG-related vasculopathy may be one possible etiological factor.[3] Women with pre-eclampsia have higher levels of circulating serum triglycerides which is an essential step in lipid mediated endothelialdys function. The mechanisms driving the abnormal elevation of triglycerides leading to pre-eclampsia are unclear. During pregnancy, there is an increase in the hepatic lipase activity and decrease in lipoprotein lipase activity. Hepatic lipase is responsible for the increased synthesis of the triglycerides at the hepatic level, and the decreased activity of lipoprotein lipase is responsible for the decreased catabolism at the adipose tissue level, whereas placental VLDL receptors are up regulated. This results in re-routing of TG rich lipoproteins to the feto-placental unit.[1]

Why hypertriglyceridemia predispose a woman to pre-eclampsia? Persons with the metabolic syndrome, of which hypertriglyceridemia is a major feature, display evidence of chronic inflammation, hypercoagulability and endothelial dysfunction. Different studies have proved that women with pre-eclampsia have higher levels of both circulating serum-free fatty acids. Others have observed higher concentrations of total cholesterol, phospholipids and lipid peroxides in placental decidua basal is tissue derived from women with pre-eclampsia, the layer of the placenta that contains the spiral arteries and where the process of atherosis may heighten the risk of placental vascular disease. If pre-eclampsia is multi-causal disease, then TG-related vasculopathy may be one plausible etiologic factor.[5] Clearly, there is a need to establish whether preconception dietary modification can reduce the future risk of pre-eclampsia and other placenta-mediated diseases, including placental abruption and fetal intrauterine growth restriction.

Study conducted by Kashinakunti et al concludes that there is a positive correlation between serum triglycerides and systolic blood pressure and diastolic blood pressure in preeclampsia cases.[4]Elevated maternal triglyceride levels measured during early pregnancy are associated with pregnancy complications and adverse pregnancy outcomes. These results suggest that future lifestyle programs in women of reproductive age with a focus on lowering triglyceride levels (i.e. diet, weight reduction, and physical activity) may help to prevent hypertensive complications during pregnancy and adverse birth outcomes.[6] Gohil et al quoted that dyslipidemia in the form of significantly decreased HDL concentration and significantly increased total cholesterol, LDL, VLDL and Triglycerides concentration is conspicuously evident in subjects of preeclampsia as compared to non-pregnant, normotensive pregnant and postpartum subjects.[1] Study conducted by Muslehetal Mean triglycerides and LDL levels were significantly higher in pre-eclamptic as compared to normal.[7] In our study there is significant increase in total cholesterol, triglycerides, LDL and VLDL increase in subjects with preeclampsia than in subjects without preeclampsia. In our study there was no significant change in high density lipoprotein in both the subjects in contrast to the study conducted by Gohilet al.[1]

## Conclusion

Considering the results in this study correlating with the various other studies, it can be concluded that dyslipidemia is significantly evident in preeclampsia and plays an important role in its pathogenesis. The preventive measures taken to avoid dyslipidemia like dietary control, weight reduction and physical activity and its positive effect on pregnancy needs to be further studied.

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