

A Study of Serum Lipoproteins and Serum Triglycerides in Normal Pregnancy and Pregnancy Induced Hypertension and Eclampsia

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ABSTRACT

Introduction: In India it was found that 9.89 % of maternal deaths were directly due to preeclampsia and eclampsia. Preeclampsia and eclampsia are the major health problems encountered in obstetrics practice. It is mandatory that preeclampsia of pregnancy must be evaluated at an early stage. The study was done with the objective to see the association between pregnancy serum lipid concentrations and risk of preeclampsia.

Material and Methods: A cross sectional study on 50 non pregnant, pregnant and PIH cases each. Serum cholesterol, lipoproteins and triglyceride levels were evaluated for each of the three groups.

Results: Mean total cholesterol in Preeclampsia was 247.08 mg/dl and normal pregnancy was 358.72 mg/dl. Mean HDL in preeclampsia was 40.1 mg/dl and normal pregnancy was 46.16 mg/dl. Mean LDL in preeclampsia was 173.14 mg/dl and normal pregnancy was 281.64 mg/dl. Mean VLDL in preeclampsia was 29.48 mg/dl and in normal pregnancy was 46.76 mg/dl. Mean Triglycerides in preeclampsia was 152.7 mg/dl and normal pregnancy was 175.44 mg/dl. Total cholesterol, HDL, LDL, VLDL, triglycerides were decreased in preeclampsia when compared to normal pregnancy, which is not statistically significant.

Conclusion: Pregnancy induced hypertension is a frequent complication during pregnancy which if advanced may be fatal for both mother and foetus. There are no statistical significant differences in serum lipid concentrations between pre-eclampsia women and normal pregnant women.

Keywords: Lipid profile, preeclampsia, pregnancy

INTRODUCTION

Preeclampsia is the commonly observed complication of pregnancy, its incidence has increased worldwide. Preeclampsia is associated with significant maternal morbidity and mortality, it accounts for about 50,000 deaths worldwide annually.^{1,2} Risk of preeclampsia is very high in Indian women.³ It is more frequent in young nulliparous women and older multiparous women.⁴ Preeclampsia is typically characterized by the new onset of hypertension and proteinuria observed from 20 weeks of gestation.⁵ There is no clear distinction between normotensive and preeclampsia pregnancies in terms of pathogenic factors and disease mechanisms.⁶ Many factors are indirectly involved in the pathogenesis of preeclampsia that includes vascular, immune, genetic and oxidative stress.⁷

Maternal serum lipids are significantly elevated during pregnancy.^{8,9} Preeclampsia women experience more significant lipid changes. Many studies have shown dyslipidemia in preeclampsia women that includes increased total cholesterol, low density lipoprotein cholesterol, triglycerides and decreased high density lipoprotein cholesterol concentrations.^{10,11}

Presently there are no clinically useful screening tests for early detection of preeclampsia.¹² Serum lipids have a direct effect

on endothelial function based on the findings of different studies in cardiovascular research. Endothelial dysfunction is associated with abnormal serum lipids.¹³ Some research works have suggested that a role of abnormal lipid profile in maternal pre-disposition to preeclampsia, but the reported findings so far are inconsistent.^{14,15} Therefore, the present study was planned with the aim to investigate the change in serum lipid profile in normal pregnant women and preeclampsia women. Objective of the present study was to investigate the relationship between pregnancy serum lipid concentrations and risk of preeclampsia, the use of which would contribute to the proper management of pregnancy induced hypertension.

MATERIAL AND METHODS

Patients attending the antenatal out patient department and the in-patients admitted to the Rajiv Gandhi Institute of Medical sciences, Srikakulam with a diagnosis of preeclampsia and eclampsia were selected for the study.

Sample size: 50 subjects each from the three groups were selected by convenience sampling.

Study groups:

1. 50 non pregnant normotensive patients,
2. 50 pregnant normotensive patients,
3. 50 cases of preeclampsia /eclampsia patients

All the subjects studied were the age group of 20-30 years.

Inclusion criteria for Preeclampsia- previously normotensive women with two repeat diastolic blood pressure measurements of ≥ 90 mmHg at third trimester of pregnancy, plus proteinuria of more than 300 mg/l in 24 hour or $>2+$ protein with dipstick.

Exclusion criteria - 1. Women who were in labor, 2. Women presenting with ruptured membranes, 3. Women with multiple pregnancies, 4. Women with any known concurrent medical complications.

Normal Pregnant women were those with diastolic blood pressure ≤ 90 mmHg at third trimester of pregnancy, without any evidence of preeclampsia signs or proteinuria.

We explained about the study to those who agreed to participate in the study and were asked to sign the informed consent form. Institutional ethical committee permission was taken. Informed written consent was taken from the study participants.

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The blood samples were collected from the two groups for estimation of lipid profile.

For estimation of serum total cholesterol, triglycerides and HDL, LDL and VLDL Cholesterol the following precautions were taken while sampling the blood as far as possible:

- 1) It was made sure that the patient was not receiving any drug that interferes with serum lipid levels or their estimation.
- 2) The patient is afebrile for the last one week.
- 3) The patient is on near normal diet.
- 4) The patient was kept fasting for over night for atleast 12 hours.

All the above precautions could not be applied strictly to cases of eclampsia due to inherent difficulties associated in such cases.

STATISTICAL ANALYSIS

The data was analysed using Epi info version 7. The continuous data were summarized as mean and percentages.

RESULTS

It is observed that the total serum cholesterol was more in normal pregnancy (358.72

mg) when compared to non pregnant women (188.73 mg). In PIH cases (247.08 mgs) the serum cholesterol is significantly less than normal pregnancy. But serum cholesterol in PIH cases was significantly higher than normal non-pregnant women (Table 1).

In normal pregnancy HDL cholesterol was (46.16 mg) higher than the non pregnant (39.73 mg). In PIH cases HDL Cholesterol (40.1 mgs) was less when compared to HDL cholesterol in normal pregnancy (46.16 mg). Ratio of HDL to LDL cholesterol in non-pregnant group was 1:3 and in normal pregnancy group it was 1:6 which showed significant rise of LDL fractions in pregnancy. Similarly the rise of LDL (173.14 mg) fraction was significant in pregnancy induced hypertension subjects also when compared with non pregnant and normal pregnancy groups (Table 1).

In non-pregnancy LDL Cholesterol (128.46 mg) was less than normal pregnancy (281.64 mg) and PIH cases(173.14 mg). Triglycerides and VLDL levels were significantly higher in normal pregnancy (175.44mg, 46.74mg) than non pregnancy(98.73mg and 19.86mg) and PIH cases(152.7mg and

29.48mg%) (Table 1).

There was no marked difference in the levels of total serum cholesterol, HDL, LDL, VLDL, and triglycerides among primigravida and multigravida (Table 2).

DISCUSSION

Analysis of the above results show that the total serum cholesterol level in pre-eclampsia though elevated compared to non pregnant state, was very low compared to total cholesterol levels in normal 3rd trimester pregnancy (247.08 mg.% as compared to normal 3rd trimester level of 358.72 mg.%). The reasons for this wide difference in the total serum cholesterol level in preeclampsia and normal third trimester pregnancy was the insufficient rise of LDL cholesterol in preeclampsia-eclampsia (173.14 mg.% compared to a normal of 281.64 mg.%).

In the present study no significant difference in mean total cholesterol levels in the pre-eclampsia group was observed when compared with that in normal pregnant group in our study which is similar to the findings observed by Enquobahrie et al. and Clausen et al.^{16,17} Although serum cholesterol levels were raised in normal pregnant women, but in patients with PIH serum cholesterol levels were lower than in normal pregnancy although higher than non pregnant women.

Another interesting feature noticed was the insignificant elevation of absolute level of HDL cholesterol in cases of preeclampsia-eclampsia as compared to non pregnant state(40.1 mg.% as compared to the non pregnant level of 39.73 mg.%). But since the LDL cholesterol also did not rise as much as in normal pregnancy the LDL/HDL ratio was low (1.4 compared to 1.6 or normal 3rd trimester pregnancy). Probably this failure of rise in HDL cholesterol level may have some relation with preeclampsia-eclampsia. We are not very certain whether it is a cause or effect of preeclampsia-eclampsia, but it certainly seems to serve as an indicator of preeclampsia-eclampsia.

In the present study there is decrease in serum HDL levels in the preeclampsia group. Similar findings were reported by Bayhan et al. They studied 25 pregnant women with mild preeclampsia, 28 pregnant women with severe preeclampsia and 25 normal pregnant women as controls, during the third trimester of pregnancy and found a significant decrease in HDL levels in patients with pre-eclampsia.¹⁸ In contrast in a study conducted by Kaaja et al. serum lipid levels in 31 pregnant women that developed preeclampsia and 21 normal pregnant controls was compared and there was no significant difference in the HDL levels in both the groups.¹⁹

In this study, there is no rise in LDL concentration in preeclampsia women, similar findings were observed by Chappell et al.²⁰ Some studies showed significant rise in LDL levels in women with preeclampsia than in healthy pregnant women.^{16,21} Amandeep Singh Kaloti et al²², Josephine Latha P et al²³ reported that association of HDL, VLDL and Triglyceride level among normal pregnant women and preeclampsia cases were statistically significant (p<0.05).

Serum Lipids	Normal non pregnant women	Normal pregnancy	Pregnancy Induced Hypertension
Total serum cholesterol	188.73	358.72	247.08
HDL Cholesterol	39.73	46.16	40.10
LDL Cholesterol	128.46	281.64	173.14
VLDL Cholesterol	19.86	46.76	29.48
Triglycerides	98.73	175.44	152.70
Ratio of HDL:LDL	1:3	1:6	1:4

Table-1: Summary of results obtained by the estimation of serum cholesterol, triglycerides and lipoprotein fractions in non pregnant women, normal pregnancy and pregnancy induced hypertension.

Subjects	Total Serum Cholesterol	HDL Cholesterol	LDL in mg %	VLDL in mg%	Triglycerides in mg %
Primigravida	237.7	34.8	173.1	28.8	138
Multi Gravida	234	35.4	171	28.4	142

Table-2: Estimation of serum cholesterol triglycerides and lipoprotein fraction in primigravida vs multigravida

In the present study serum triglyceride levels were significantly raised during pregnancy. The serum triglyceride level though elevated in preeclampsia above the non pregnant level was less than the rise seen in normal pregnancy (152.7 mgs.% as against 175.44 mgs. % in normal pregnancy). In previous studies, significantly higher concentrations of serum triglycerides in preeclampsia were found out than in the normal pregnant women.^{6,24-26} In a study conducted by Enquobahrie et al.¹⁶ serum lipid profile in 57 patients with preeclampsia and 510 healthy pregnant women were assessed and found significantly higher levels of triglycerides in preeclampsia. In a study conducted in the United States the association between hypertriglyceridemia and preeclampsia at 28-37 weeks gestation was studied, pregnant women with preeclampsia had a significant increase in the plasma triglyceride levels than in controls.²⁷ In a study conducted in Spain, triglyceride levels were significantly more in women with pregnancy induced hypertension than in controls.⁸ However few previous studies, have not reported any differences in lipid parameters in both groups.^{28,29}

Since preeclampsia-eclampsia is associated with placental ischemia, it is quite possible that the placental production of cholesterol and triglycerides is impaired leading to lower serum levels as compared to normal pregnancy. This may be an explanation for the low values observed in our cases.

CONCLUSION

Pregnancy induced hypertension is a frequent complication during pregnancy which if advanced may be fatal for both mother and foetus. There are no statistical significant differences in HDL, LDL and total cholesterol between preeclampsia women and normal pregnant women. Endothelial damage might involve elevated serum triglycerides which may have a value that can be used as screening markers in early stages of pregnancy leading to preeclampsia in future. Therefore, further studies are needed, to be done at multiple centers and higher numbers of cases to confirm our findings.

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