

Study of Serum Lipid Profile and Uric Acid Levels in Preeclampsia

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ABSTRACT

Introduction: Pre-eclampsia is common medical complications of pregnancy. Pregnancy is a physiological state associated with many alterations in metabolic, biochemical, physiological, haematological and immunological processes. Women with preeclampsia have a significant difference in lipid parameters and uric acid compared to normal pregnancy. **Materials and Methods:** The present study was conducted on 50 normal pregnant women (Group-I), 50 Pre-eclamptic pregnant women (Group-II). The blood samples collected from all the women and analyzed for serum lipid profile and uric acid. **Results:** Mean serum uric acid and triglyceride levels ($p < 0.001$ and $p < 0.05$ respectively) were significantly higher in pre-eclamptic group compared to control group. Total cholesterol and LDL-C was increased and HDL-C was decreased in pre-eclampsia group as compared to normal pregnant group but the results were not statistically significant. **Conclusion:** The assessment of serum lipids and uric acid are very useful markers to identify the occurrence of the complications of pre-eclampsia, which may reduce the risk of occurrence of disease.

Keywords: Preeclampsia, Normal pregnancy, Dyslipidemia, lipid profile, uric acid.

INTRODUCTION

Preeclampsia is a disorder of widespread vascular endothelial malfunction and vasospasm that occurs after 20 weeks' gestation and can present as late as 4-6 weeks postpartum. It is clinically defined by hypertension and proteinuria, with or without pathologic edema.^[1] Without intervention, preeclampsia may progress to eclampsia.^[2] Family history of

hypertension is a known risk factor in the development of preeclampsia.^[3] Despite considerable research, the etiology of preeclampsia still remains unclear. Many theories have been proposed to explain the pathophysiology of preeclampsia. Endothelial dysfunction is a central feature in preeclampsia.^[4] This injury leads to various biochemical alterations. Among various biochemical changes, the association of alteration of serum lipid profile in preeclampsia is well documented. An abnormal lipid profile is known to be strongly associated with atherosclerotic cardiovascular diseases and has a direct effect on vascular endothelial dysfunction as seen in preeclampsia.^[5] Maternal symptoms seen in preeclampsia are thought to be secondary to vascular endothelial dysfunction.^[2] Increased levels of triglycerides and oxidized low density lipoproteins have been reported to be linked to increased risk of preeclampsia.^[6] Elevated serum uric acid is another most consistent and earliest detectable parameter of preeclampsia. Hyperuricemia is a common finding in preeclamptic pregnancies. Abnormal renal function, increased tissue breakdown, acidosis and increased activity of the enzyme xanthine oxidase/dehydrogenase may be the reason for elevated serum levels of uric acid in women with preeclampsia.^[7] Considering various biochemical changes that occur in preeclampsia, it is very important to identify biochemical markers that aid in early diagnosis of preeclampsia avoiding the costly investigations. Thus, in the present study we evaluated the serum lipid profile and uric acid in preeclampsia women and

compared them with normal pregnant women.

MATERIALS AND METHODS

The present study was carried out in the Department of Biochemistry in collaboration with the Department of Obstetrics and Gynecology of S P Medical College & PBM hospital Bikaner. It was a cross sectional comparative study. A total number of 100 participants of ages between 16-35 years and gestational age between 20-38 weeks were chosen and they were divided into 2 groups , Group-I : Normal pregnant women (n=50) and Group-II: Pre-eclamptic women (n=50). Women with concomitant disease such as diabetes or a history of gestational diabetes, chronic hypertension, and kidney disease or coagulation were excluded. All pregnant women were taken in the third trimester. Informed consent was taken from all

individuals included in the study. Fasting blood samples (5 ml) were collected by venepuncture and analyzed for total cholesterol (TC), serum triglycerides (TGs), high-density lipoprotein-cholesterol (HDL-C), low-density lipoprotein-C (LDL-C), very low-density lipoprotein-C (VLDL-C) and uric acid were estimated in the both groups. The serum lipid profile was estimated by the enzymatic CHOD-POD method for TC, by the GPO-PAP method for TG and by the CHOD-POD/ Phosphotungstate method for HDL-C. Calculated of VLDL-C and LDL-C using Friedewald's formula (Friedewald et.al.1972). serum uric acid was estimated by uricase method. The estimations carried out of semi autoanalyzer. Data were statistically analyzed by unpaired t test and expressed in terms of P value (p < 0.05, considered).

RESULTS

Table: 1 Baseline characteristics of control and Preeclampsia groups.

Clinical characteristics	Control group (n=50) Mean ±SD	Pre-eclamptic group (n=50) Mean ±SD	t-test	P -value
Age (years)	21.86± 3.12	22.86 ± 2.80	1.6867	0.0948
Gestational age (wks)	35.04 ± 2.43	34.44 ± 2.27	1.2759	0.2050
Body mass index (BMI)	23.17 ± 2.83	25.42 ± 4.09	3.1989	0.0019
Systolic BP (mmHg)	117.36 ± 8.22	144.52 ± 16.02	10.6660	<0.0001
Diastolic BP (mmHg)	78.44 ± 6.74	95.28 ± 12.26	8.5112	<0.0001

P<0.05 = Significant, p< 0.0001 = Highly Significant

Table: 2 Comparison of serum lipids & UA in both groups.

Parameters	Control group (n=50) Mean ±SD	Pre-eclamptic group (n=50) Mean ±SD	t-test	P -value
TC (mg/dl)	199.80 ± 45.09	231.14 ± 52.41	0.9590	0.3399
TG (mg/dl)	154.40 ± 30.81	238.56 ± 62.34	4.4329	<0.0001
HDL-C (mg/dl)	48.94 ± 10.11	38.22 ± 9.76	5.3942	<0.0001
VLDL-C (mg/dl)	30.88 ± 7.97	47.71 ± 12.44	4.4441	<0.0001
LDL-C (mg/dl)	119.98 ± 32.74	145.21 ± 67.78	1.6527	0.1016
Serum UA (mg/dl)	4.79 ± 1.13	6.54 ± 1.67	6.1369	<0.0001

P<0.05 = Significant, p< 0.0001 = Highly Significant

Table 1 shows the Baseline characteristics of both control and preeclampsia groups. Both the groups were comparable with respect to age and gestational age. As depicted in the table systolic and diastolic BP was statistically significant in the pre-

eclamptic group compared to normotensive pregnant women.

Serum uric acid, triglycerides and VLDL-C were significantly increased (p<0.0001) and HDL-C was significantly decreased in preeclampsia group compared to control

group. Total cholesterol and LDL-C were increased in preeclampsia group as compared to normal pregnant group but the results were not statistically significant (Table: 2).

DISCUSSION

In this study we investigate the role of lipid profile in the occurrence of preeclampsia. There was a positive relation between pre-eclampsia and lipid parameters as show in Table 1. Serum triglycerides concentration rise more significantly in preeclampsia in our study which corroborated with the findings of many studies.^[8,9] The major modulator of this hypertriglyceridemia is estrogen as pregnancy is linked with hyperestrogenemia. Hypertriglyceridemia may be linked to hypercoagulability.

We also found increased total cholesterol and LDL-C levels in preeclampsia women the difference between the groups was not significant. Our findings are in accordance with most of the previous studies.^[6,10] Abnormal lipid metabolism in preeclampsia may not be a manifestation but may also be involved in the pathogenesis of disease. Hyperlipidemia during preeclampsia is transient, therefore its pathological role in these women have been ignored. Hypoestrogenemia, seen in preeclampsia, leads to decreased expression of VLDL/apoE receptors resulting in reduced transport of VLDL to fetal compartment and so there is maternal hypertriglyceridemia.^[10] Elevated triglycerides may compromise vascular functions in several ways. For example, triglyceride rich lipoprotein has a prothrombotic effect.^[6] We found decrease in serum HDL-C concentration compared to normal pregnant women. This is in consistency with the results of several other studies. Gohil J.T et al demonstrated significant fall in HDL-C in preeclampsia than in non-pregnant and normal pregnant women.^[6] Increased triglycerides play a role in increased atherogenic small dense LDL and reduced HDL.^[10,11] A low level of

HDL-C hinders reverse cholesterol transport, which may be a reason for the atherosclerosis like features in preeclampsia mentioned in some studies.^[6] In the present study, we also found increased serum uric acid level in preeclamptic women which was statistically significant. Our result is in agreement with other studies.^[2,3,7] Elevated serum uric acid often precedes clinical manifestations of the disease. S.A. Bainbridge et al observed hyperuricemia in 75% of women with clinically diagnosed preeclampsia.^[7] Uric acid, an end product of purine catabolism catalyzed by xanthine oxidase, is filtered, reabsorbed and secreted by the kidney. In preeclampsia, glomerular endothelial lesions lead to diminished renal blood flow and glomerular filtration rate and also impaired tubular reabsorption. Hyperuricemia in preeclampsia is thus primarily due to decreased renal clearance and increased tubular reabsorption, because of the reduction in glomerular filtration rate.^[2] On the other hand, an elevated level of uric acid reflects the increased uric acid production. In preeclampsia due to placental hypoxia, degree of placental cell destruction increases, which are the rich sources of purine for the production of uric acid by xanthine oxidase.^[9] This could also explain the increased uric acid concentration.

CONCLUSION

The assessment of serum lipids and uric acid are very useful markers to identify the occurrence of the complications of preeclampsia, which may reduce the risk of occurrence of disease. Therefore simple estimation of serum lipid profile and uric acid may be helpful in the early diagnosis and prevention of maternal and fetal complications avoiding costly investigations.

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How to cite this article: Bishnoi L, Vyas RK, Soni Y. Et al. Study of serum lipid profile and uric acid levels in preeclampsia. *Galore International Journal of Health Sciences & Research*. 2019; 4(3): 47-50.
