Original Article

"Study Of Liver Function Tests And Uric Acid Levels In Pregnant Women With And Without Preeclampsia"

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Abstract

Introduction: Hypertensive disorders of pregnancy (HDP) are among obstetrics' most intriguing and yet unsolved problem. HDP is blood pressure greater than or equal to 140/90 mmHg, with each measurement usually corroborating within 4 hours. Hyperuricemia indicates kidney dysfunction in preeclampsia because of decreased glomerular filtration, decreased tubular secretion, and/or increased proximal tubular reabsorption. It is also an independent risk factor for cardiovascular diseases as it has been suggested that it alters vascular function and mediates vascular inflammation. As such, hyperuricemia can perhaps predict the severity of pre-eclampsia. Pre-eclampsia is also the most common cause of liver dysfunction in 3% of pregnancies because of micro vesicular fat deposition and reduced blood flow to the liver potentially causing ischemia and peri-portal haemorrhage

Aim and Objectives: This aim and objectives of our study were to measure and compare the levels of uric acid and liver function tests in pregnant women with and without preeclampsia at our tertiary care hospital.

Materials and methods: Approximately 5 ml of venous blood was collected in a sterile plain vacutainer tube and properly labelled with a specific code of the patient. Blood collected in SST tubes was allowed to stand for 30 minutes at room temperature to allow complete clotting and clot retraction. It was then centrifuged at 3500 rpm for 15–30 min to extract serum. The serum was kept at -80°C refrigerators until biochemical analysis was carried out. The extracted serum was used to determine the biochemical levels (uric acid, aspartate aminotransferase (AST), and alanine aminotransferase (ALT)) using automated biochemistry analyser.

Results and Discussion: In the present study, we included a total of 100 pregnant women, out of 100, 50 were physician confirmed cases of preeclampsia and 50 were normal pregnant women, who had come for routine antenatal check-up at our tertiary care hospital. The mean age, gestational age (in weeks) in normal pregnant women were found to be 30.9±5.8 years, 33.6±5.8 and in pre-eclampsia were found to be 28.9±4.7 years and 34.6±3.98 weeks respectively. We measured total bilirubin, direct bilirubin, ALT, AST and uric acid levels in both the groups, we did not find statistically significant differences in the levels of total bilirubin and direct bilirubin levels between the two groups. We compared ALT, AST and uric acid levels between the two groups, we found elevated levels of ALT, AST and uric acid levels in preeclampsia patients compared to normal pregnancy group. This elevation was statistically significant.

In the present study, preeclamptic patients were positively and significantly associated with SUA, ALT, and AST levels. Preeclampsia was associated with a marked increase in SUA, AST, and ALT levels compared to controls. This was in line with other studies

Conclusion: In the present study, we found that the serum uric acid, ALT, and AST levels were higher in pre-eclampsia pregnant women compared to those of normotensive pregnant women, and the differences were statistically significant.

Key-words: pre-eclampsia, hypertension, alanine transaminase, aspartate transaminase and uric acid.

INTRODUCTION

Hypertensive disorders of pregnancy (HDP) are among obstetrics' most intriguing and yet unsolved problem. HDP is blood pressure greater than or equal to 140/90 mmHg, with each measurement usually corroborating within 4 hours [1].
The High Blood Pressure Education Program (2000) has classified HDP as gestational hypertension, preeclampsia, eclampsia syndrome, and superimposed preeclampsia on chronic hypertension [2]. The incidence of preeclampsia in hospital practice in India varies from 5% to 15%, and that of eclampsia is about 1.5%. In India, over the years, from 1976 to 2014, the risk of eclampsia ranges from 0.179 to 5%, with the average being 1.5%. Every year, over 5.2 million women die from pregnancy-related complications worldwide [3,4]. Pregnancy-induced hypertension is a major cause of maternal and fetal morbidity and mortality.
Pre-eclampsia is defined as new-onset hypertension (blood pressure ≥140/90 mmHg) in combination with proteinuria (24-hr urinary protein ≥ 0.3 g) or any sign of end-organ damage after 20 weeks of gestation. The presence of 300 mg or more of protein in a 24-hour urine collection or a urine dipstick protein of +1 is termed proteinuria [5]. Proteinuria, however, is not a requirement anymore to make a diagnosis of pre-eclampsia [6].

Hyperuricemia indicates kidney dysfunction because of decreased glomerular filtration, decreased tubular secretion, and/or increased proximal tubular reabsorption [7]. It is also an independent risk factor for cardiovascular diseases as it has been suggested that it alters vascular function and mediates vascular inflammation. As such, hyperuricemia can perhaps predict the severity of pre-eclampsia [8].
Pre-eclampsia is also the most common cause of liver dysfunction in 3% of pregnancies because of micro vesicular fat deposition and reduced blood flow to the liver potentially causing ischemia and peri-portal haemorrhage [9, 10]. Alanine aminotransferase (ALT) and aspartate aminotransferase (AST) levels are usually normal, but when they become elevated and are accompanied by abdominal pain, it almost always suggests the severe end of the disease spectrum [11]. This present study was undertaken to measure and compare the levels of uric acid and liver function tests in pregnant women with and without preeclampsia at our tertiary care hospital.

AIM AND OBJECTIVES:

This aim and objectives of our study were to measure and compare the levels of uric acid and liver function tests in pregnant women with and without preeclampsia at our tertiary care hospital.

MATERIALS AND METHODS:

Source of data and place of study: The present study was conducted in the Dept. of OBG in our tertiary care hospital.

Type of study: cross-sectional comparative study.
Inclusion criteria: We included a total of 100 pregnant women, out of 100, 50 were physician confirmed cases of preeclampsia and 50 were normal pregnant women, who had come for routine antenatal check-up at our tertiary care hospital.
Exclusion criteria: we excluded the pregnant women had chronic hypertension, liver disease, kidney disease, gout, cardiac disease, diabetes mellitus, infections, a history of medication use (e.g., aspirin, phenytoin, tetracycline, sulphonamides, etc.), and those with substance abuse (eg smoking and alcohol consumption) as these factors may affect the outcome variables.

Data collection methods, blood sample collection, and processing: Trained nurses collected sociodemographic data after careful examination of the patients' histories. Four laboratory technicians were oriented on blood sample collection and storage. Questionnaires were filled out through face-to-face interviews with participants. Pre-pregnancy BMIs were calculated from pre-pregnancy body weight (kg) and height (meter) as follows: BMI = Weight (in kg)/ (Height in m^2). Approximately 5 ml of venous blood was collected in a sterile plain vacutainer tube and properly labelled with a specific code of the patient. Blood collected in SST tubes was allowed to stand for 30 minutes at room temperature to allow complete clotting and clot retraction. It was then centrifuged at 3500 rpm for 15–30 min to extract serum. The serum was kept at -80°C refrigerators until biochemical analysis was carried out. The extracted serum was used to determine the biochemical levels (uric acid, aspartate aminotransferase (AST), and alanine aminotransferase (ALT)) using automated biochemistry analyser.

Statistical analysis: All continuous data were expressed as mean ± standard deviation (SD). Two continuous numeric variables with a normal distribution were analyzed using an independent Student's *t*-test.

RESULTS:

We included a total of 100 pregnant women, out of 100, 50 were physician confirmed cases of preeclampsia and 50 were normal pregnant women, who had come for routine antenatal check-up at our tertiary care hospital.

Table 1: Shows the comparison of liver function tests and uric acid levels between the two groups

	Normal	Preeclampsia
Number of study subjects	50	50
Mean age in years	28.9±4.7	30.9±5.8
Gestational age (weeks)	33.6±5.8	34.6±3.98
Total Bilirubin (mg/dL)	0.98±0.78	0.97±0.65
Direct Bilirubin (mg/dL)	0.28±0.68	0.27±0.99
ALT (IU/L)	27.89±6.32	42.5±5.43*
AST (IU/L)	18.9±5.12	38.7±4.68*
Uric acid (mg/dL)	3.78±1.87	6.88±2.45*

It is evident from the table 1 that the mean age, gestational age (in weeks) in normal pregnant women were found to be 30.9±5.8 years, 33.6±5.8 and in pre-eclampsia were found to be 28.9±4.7 years and 34.6±3.98 weeks respectively. We measured total bilirubin, direct bilirubin, ALT, AST and uric acid levels in both the groups, we did not find statistically significant differences in the levels of total bilirubin and direct bilirubin levels between the two groups. We compared ALT, AST and uric acid levels between the two groups, we found elevated levels of ALT, AST and uric acid

levels in preeclampsia patients compared to normal pregnancy group. This elevation was statistically significant.

DISCUSSION:

In the present study, we included a total of 100 pregnant women, out of 100, 50 were physician confirmed cases of preeclampsia and 50 were normal pregnant women, who had come for routine antenatal check-up at our tertiary care hospital. It is evident from the table 1 that the mean age, gestational age (in weeks) in normal pregnant women were found to be 30.9±5.8 years, 33.6±5.8 and in pre-eclampsia were found to be 28.9±4.7 years and 34.6±3.98 weeks respectively. We measured total bilirubin, direct bilirubin, ALT, AST and uric acid levels in both the groups, we did not find statistically significant differences in the levels of total bilirubin and direct bilirubin levels between the two groups. We compared ALT, AST and uric acid levels between the two groups, we found elevated levels of ALT, AST and uric acid levels in preeclampsia patients compared to normal pregnancy group. This elevation was statistically significant.

The association between maternal uric acid and pre-eclampsia has been studied for almost a century, but there are still no firm conclusions about its role. The elevation of uric acid observed in pre-eclampsia has commonly been attributed to decreased uric acid clearance that occurs as a consequence of the reduced glomerular filtration rate due to pre-eclampsia itself. In this scenario, hyperuricemia is considered a marker of the disease as opposed to a causal factor. As a disease marker, uric acid has been studied as a predictor of pre-eclampsia and disease severity, with contradictory findings. NICE guidelines from 2019 (https://www.nice.org.uk/guidance/ng133) concluded that evidence was insufficient to advise routine uric acid screening in pregnancy for pre-eclampsia prediction. The magnitude of the association between pre-eclampsia and increased uric acid estimated in our study suggests that uric acid, in isolation, is not useful to identify women at high risk of pre-eclampsia.

Nevertheless, the recent re-evaluation of the role of uric acid in the pathogenesis of hypertension and endothelial and renal dysfunction, which are all characteristic features of pre-eclampsia, has renewed the interest in the role of uric acid in pre-eclampsia aetiology. Hyperuricemia is one of the earliest and most consistent observations noted in preeclampsia pregnancies. While elevated concentrations of circulating, uric acid are not uniformly seen in every woman with preeclampsia, they do appear to identify a subset of preeclamptic women who are at greater risk for maternal and fetal morbidities. Also, hyperuricemia in pregnant women without proteinuria is at least as good a predictor of fetal morbidity as hypertension and proteinuria. In the present study, preeclampsia patients were positively and significantly associated with SUA, ALT, and AST levels. Preeclampsia was associated with a marked increase in SUA, AST, and ALT levels compared to controls. This was in line with other studies.

CONCLUSION:

In the present study, we found that the serum uric acid, ALT, and AST levels were higher in pre-eclampsia pregnant women compared to those of normotensive pregnant women, and the differences were statistically significant.

REFERENCES:

1. Queensland Clinical Guidelines Hypertension and Pregnancy (2021) *Available* from: http://www.health.qld.gov.au/qcg

2. Report of the national high blood pressure education Program working group on high blood pressure in pregnancy Am J Obstet Gynecol, 183 (1) (2000), pp. s1-s22,

3. M. Upadya, S.T. Rao Hypertensive disorders in pregnancy Indian J Anaesth, 62 (9) (2018), pp. 675-681,

4. P.N. Nobis, A. Hajong Eclampsia in India through the decades J Obstet Gynaecol India, 66 (S1) (2016), pp. 172-176,

5. Airoldi J., & Weinstein L. (2007). Clinical significance of proteinuria in pregnancy. *Obstetrical & gynecological survey*, 62(2), 117–124.

6. Stepan H., Hund M., & Andraczek T. (2020). Combining Biomarkers to Predict Pregnancy Complications and Redefine Preeclampsia: The Angiogenic-Placental Syndrome. Hypertension (Dallas, Tex*:* 1979), *75(4), 918–926.*

7. Lam C., Lim K. H., Kang D. H., & Karumanchi S. A. (2005). Uric acid and preeclampsia. *Seminars in nephrology*, 25(1), 56–60.
8. Cunningham F. G., Leveno K. J., Bloom S. L., Hauth J. C., Gilstrap L. C., & Wenstrom K. D. (2005). Fetal abnormalities: inherited and acquired disorders. *Williams Obstetrics*, 22nd edition. New York; McGraw-Hill; New York, 663.

9. Minakami H., Oka N., Sato T., Tamada T., Yasuda Y., & Hirota N. (1988). Preeclampsia: a microvesicular fat disease of the liver?. *American journal of obstetrics and gynecology*, 159(5), 1043–1047.

10. Dani R., Mendes G. S., Medeiros J., Péret F. J., & Nunes A. (1996). Study of the liver changes occurring in preeclampsia and their possible pathogenetic connection with acute fatty liver of pregnancy. *The American journal of gastroenterology*, 91(2), 292–294.

11. Angel García A. L. (2006). Effect of pregnancy on pre-existing liver disease physiological changes during pregnancy. *Annals of hepatology*, 5(3), 184–186.