

ASSESSMENT OF SERUM URIC ACID LEVELS IN PRE-ECLAMPSIA PATIENTS - A HOSPITAL-BASED PROSPECTIVE OBSERVATIONAL STUDY

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Abstract

Background: Uric acid is frequently linked to cardiovascular disease. The elevated serum uric acid levels have been studied as one of the criteria for the detection of pre-eclampsia. Therefore, knowledge of the normal physiology of serum uric acid during pregnancy is essential for the appropriate interpretation of uric acid readings. **Methodology:** 100 patients 50 diagnosed with pre-eclampsia & 50 controls between the ages of 20 and 35 were studied at a tertiary teaching hospital & Research Centre in central India. The Uricase Peroxidase Method was used to estimate uric acid. **Results:** The data was statistically analysed by using an online student t-test calculator. A p-value of less than 0.05 was seen as significant. **Conclusion:** Serum uric acid levels were considerably greater in individuals with pre-eclampsia and PIH, and in hypertensive patients, they may serve as a helpful predictor of maternal and fetal complications.

Keywords: Uric acid, Preeclampsia, Pregnancy Induced Hypertension, Uricase peroxidase method

Introduction

Even though uric acid has antioxidant properties, high blood levels of uric acid are frequently linked to cardiovascular disease. It's uncertain if this is causative (by functioning as a pro-oxidant, for example) or a protective process that makes use of the antioxidant qualities of urate. The same could explain why uric acid may have a function in the genesis of stroke. In addition to acting as a pro-oxidant and as a sign of oxidative stress, uric acid may also serve as an antioxidant in therapeutic settings.¹ The development of proteinuria appears to be preceded by a rise in blood pressure and uric acid levels. The elevated serum uric acid levels have been studied as one of the criteria for the detection of pre-eclampsia. An important characteristic of preeclampsia is a significant decrease in uric acid elimination.²

As preeclampsia worsens, the serum level of uric acid increases to a level of more than 5.56 mg/dl is highly suggestive of the condition, and a level of more than 7.85 mg/dL is linked to substantial motherly mortality. The degree of renal pathological alterations, proteinuria, fetal death, and elevated uric acid are all correlated. According to recent research, hyperuricemia may potentially be harmful by causing vascular damage and elevated blood pressure.² In their 2012 study, Manjareeka et al. examined high blood uric acid and creatinine levels in preeclampsia patients. The study included 105 women of similar age groups from south India who were all singletons in their third trimester. Serum uric acid levels were found to be considerably higher in preeclamptics throughout pregnancy, which rules out its use as a reliable predictor of preeclampsia or pregnancy-related hypertension.³ H. Pasoaglu et al. (2004) examined the levels of lipid peroxides, uric acid (UA), and nitric acid (NO) in 40 pre-eclamptic and 25-eclamptic women. They found noteworthy values for all parameters, suggesting a direct correlation with disease severity and potential diagnostic utility.⁴

In case-control research with 30 preeclampsia and 30 healthy pregnant women, S.V. Chhabra et al. examined lipid peroxidation and the status of antioxidants in pre-eclampsia. They discovered a substantial increase in serum uric acid levels. ($p < 0.001$).⁵ Early in pregnancy, pregnancy-induced blood volume expansion and increased maternal renal blood flow cause a drop in serum uric acid.⁶ Thus, to investigate the pathogenic function of uric acid during pregnancy, we must exercise caution while scheduling uric acid measurements. Serum uric acid measures are frequently performed at presentation, at the beginning of preeclampsia, and at term in clinical medicine. Therefore, knowledge of the normal physiology of serum uric acid during pregnancy is essential for the appropriate interpretation of uric acid readings.^{7,8}

Aim

To determine if there is a substantial correlation between blood uric acid levels and both pre-eclampsia and pregnancy-induced Hypertension(PIH).

Objectives:

To assess whether the serum uric acid can be one of the most vulnerable markers of Pregnancy-induced hypertension disease and pre-eclampsia severity and can be very helpful in tracking the disease's origin.

Methodology

After obtaining their informed written consent, 100 patients, 50 diagnosed with pre-eclampsia & 50 controls between the ages of 20 and 35 were studied at a tertiary teaching hospital & Research Centre in central India. To estimate serum uric acid, blood samples were drawn into a simple vacutainer while adhering to aseptic procedures. Of the 50 patients, 22 individuals had PIH, 13 had severe preeclampsia (SPE), and 15 had moderate preeclampsia (MPE). Individuals with a past medical history of liver disease, kidney disease, chronic hypertension, cardiovascular disease, or thyrotoxicosis were excluded from the study. A semi-automated biochemistry analyser was used to examine serum samples for the aforementioned criteria.

The Uricase Peroxidase Method was used to estimate uric acid. To rule out renal and liver disease, Serum electrolytes (Na^+ & K^+), albumin, total, ALT, AST, serum urea and creatinine, and direct bilirubin were measured. Serum electrolytes (Na^+ & K^+), albumin, total, ALT, AST, urea and creatinine, and direct bilirubin were measured.

Observations & Results

Serum uric acid levels are assessed in 50 patients with age-matched controls. There were 50 patients in the 20–35 age range who had PIH and pre-eclampsia. The data was statistically analysed by using an online student t-test calculator. A p-value of less than 0.05 was seen as significant.

Table 1: Highlights the Mean age of Case and Control Group

Group	Case Group	Control Group
Mean Age (yr)	27.09 ± 2.4	28.39 ± 2.98
Number (no)	50	50

Table 1: It shows the mean age in the case group as 27.09 ± 2.4 and the Control Group as 28.39 ± 2.98 with a number as 50 in both groups.

Table 2: Highlights the mean serum Uric acid levels (mg/dl) in patients and controls

Group	Case Group	Control Group
Number (no)	50	50
Serum uric acid level (mg/dl)	7.39± 0.59	4.10 ± 0.64
P Value	< 0.01	

Table 2: It shows the mean serum uric acid level of 7.39± 0.59 in case group and 4.10 ± 0.64 in the control group with a significant p-value.

Table 3: Highlights the serum uric acid levels in different patient groups

Cases	Mild preeclampsia (MPE)	Savour preeclampsia (SPE)	PIH
Number	15	13	22
Serum uric acid level (mg/dl)	7.24± 0.83	8.58± 0.59	6.53± 0.52

Table 3: It shows the serum uric acid level of 7.24± 0.83 in 15 MPE patients, 8.58± 0.59 in 13 SPE patients and 6.53± 0.52 in 22 PIH patients.

Discussion

One possible way that uric acid may contribute to the development of preeclampsia is by intensifying endothelial dysfunction to disrupt spiral artery formation, which causes hypoxia in the placenta. Uric acid also causes trophoblast shedding, which aids in the formation of aberrant placentation.⁹ these data suggest that uric acid may have a role in the pathogenic process during the first stages of placentation. Indeed, it has been shown in recent research that uric acid levels during the first and second trimesters are likely to predict the development of preeclampsia later on.^{10,11} Later in pregnancy, however, a decrease in the mother's glomerular filtration rate and an increase in the synthesis of uric acid by the foetus allow blood uric acid levels to climb to those of non-pregnant women.¹² Thus, to investigate the pathogenic role of uric acid during pregnancy, we must exercise caution while scheduling uric acid measurements.

In our study, 75% were prim gravidas and 25% were multigravidas. The mean age of our patients was 27.09 ± 2.4 year with a range of 20-35 years and the mean gestational age was 35.29± 3.54 weeks. The serum uric acid levels in normal pregnancies gradually decline until roughly 16 weeks of gestation as a result of plasma volume expansion, greater renal clearance, and the uricosuric impact of estrogen. The uric acid level stays constant for most of the second trimester before rising in the third due to increased production and catabolism.

When it comes to pregnancy-induced hypertension diseases, uric acid is the most vulnerable marker of the disease's severity and can be very helpful in tracking the disease's origin.

Uric acid is elevated in preeclampsia and has been linked to both maternal and fetal morbidity; however, it has always been thought of as a reflection of the illness rather than a cause. Though its antioxidant qualities help shield the body from oxidative stress but it also seems to have a direct role in endothelial dysfunction which is due to its pro-inflammatory effects resulting in hypertension during preeclampsia. Serum uric acid levels were estimated in both normal pregnant women and patients with pregnancy-induced hypertension and preeclampsia in the current investigation. Patients with preeclampsia and PIH were found to have considerably higher serum uric acid levels than the control group. ($p < 0.0001$). The mean serum uric acid values in patients with moderate preeclampsia, severe preeclampsia, and PIH were observed to be 7.24 ± 0.83 mg/dl, 8.58 ± 0.59 mg/dl and 6.53 ± 0.52 mg/dl respectively as compared to controls which were 4.10 ± 0.64 mg/dl.

There was a significant difference between Mild and severe preeclampsia and PIH which suggests that the uric acid is a good marker of disease severity.

Conclusion

Serum uric acid levels were considerably greater in individuals with pre-eclampsia and PIH, and in hypertensive patients, they may serve as a helpful predictor of maternal and fetal complications.

Conflict Of Interest: The authors declare no conflict of interest.

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