Urate and other biochemical markers as prognostic indicators of adverse maternal and fetal outcomes in preeclamptic women: a retrospective cohort study

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BACKGROUND:

Preeclampsia is a major cause of perinatal morbidity and mortality affecting 5% of pregnancies worldwide.[1,2] This life-threatening hypertensive disorder is formally defined as new onset hypertension (SBP ≥140 mm of Hg or DBP ≥90mm of Hg) and multiorgan dysfunction after 20 weeks gestation in a previously normotensive woman.[3] Current screening for preeclampsia consists of antenatal bp monitoring which neither predicts nor prevents the condition. The analysis of a range of biochemical markers such as urate may enrich our ability to predict maternal and fetal complications of preeclampsia. Ultimately, such tests can provide clinicians with an accessible, affordable, and easy screening option and subsequently initiate interventions to improve patient outcomes.[4]

AIM:

To explore if elevated serum urate and other biochemical marker levels (Calcium, AST, ALT) in preeclamptic women in early pregnancy (20 weeks gestation) are useful prognostic indicators of adverse maternal and fetal outcomes. To establish a predictive threshold value that indicates an increased risk of maternal and fetal complications.

METHODS:

A retrospective cohort study performed at Gold Coast University Hospital, Australia involving 105 women who delivered at the hospital between January 2019 to December 2020. Preeclampsia was diagnosed based on local hospital guidelines. Serum levels of urate, calcium, AST and ALT were extracted from the initial blood tests performed at booking visit prior to 20 weeks gestation and were analysed against maternal and fetal outcomes.

RESULTS:

Serum uric acid at cut off 0.255 mmol/L was found to be a statistically significant predictor of general maternal complications (AUC 0.625, P=0.032) with a 52.3% sensitivity and 72.5% specificity. Women with high urate levels at booking visit are 2.9 times more likely to experience an adverse outcome (OR 2.89, 95% CI 1.24,6.75; P = 0.014). Serum urate at a cut-off of 0.255 mmol/L was found to be a statistically significant predictor of general fetal complications (AUC 0.621) with 50.7% sensitivity and 76.7% specificity however, when compared individually with the adverse fetal outcomes, did not prove to be statistically significant. High serum calcium, AST and ALT at booking did not reveal a significant association with adverse maternal and fetal outcomes in women with preeclampsia (P > 0.05).

CONCLUSION:

Maternal serum urate at booking is not a reliable predictor of maternal and fetal outcomes in women who develop pre-eclampsia/eclampsia but may play a role in establishing a global increase in risk. A larger cohort study is required to validate the reliability of these biomarkers.

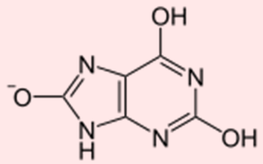

Table 1. Relationship between maternal outcomes and uric acid threshold of 0.255 mmol/L

Outcomes	Uric acid <0.255 mmol/L	Uric acid ≥0.255 mmol/L	OR (95% CI)	P value
PPH	15 (42.9)	20 (57.1)	2.4 (1.05, 5.50)	0.038*
Instrumental	32 (71.1)	13 (28.9)	0.36 (0.16, 0.81)	0.013*
Tears	32 (72.7)	12 (27.3)	0.32 (0.14, 0.73)	0.007*
Total C/S	26 (46.4)	30 (53.6)	2.62 (1.17, 5.84)	0.019*
Emergency C/S	20 (44.4)	25 (55.6)	2.5 (1.13, 5.54)	0.024*
Total maternal complications	31 (47.7)	34 (52.3)	2.89 (1.24, 6.75)	0.014*

Table 2. Relationship between fetal complications and urate threshold of 0.255 mmol/L

Outcomes	Urate <0.255 mmol/L	Urate ≥0.255 mmol/L	P value	OR (95% CI)
Fetal complications *(occurrence of at least one of the following: Apgar <7, NICU/SCN, Preterm, IUGR, Resuscitation)*	37 (49.3%)	38 (50.7%)	0.013	3.38 (1.29,8.81)
No fetal complications	23 (76.7%)	7 (23.3%)		

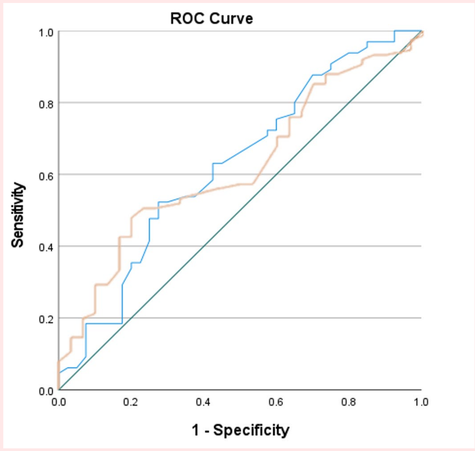

Figure 1: Receiver operating characteristic curve of serum uric acid concentration in cases of general maternal (blue) and fetal (orange) complications among women with pre-eclampsia

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