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**The significance of serum uric acid levels in predicting intrauterine growth restriction: Prospective analysis at a rural tertiary care center**

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**Abstract**

Serum uric acid has been recommended to screen intrauterine growth restriction during pregnancy.

**Objective:** The significance of serum uric acid levels in predicting intrauterine growth restriction: Prospective analysis at a rural tertiary care center.

**Methods:** Eighty pregnant women who reported to the antenatal OPD at 17-20 weeks of period of gestation were enrolled in the study over the period of one year from Jan 2018 to Dec 2018 at Department of Obstetrics & Gynaecology Dr Rajendra Prasad Govt. Medical College, Kangra at Tanda, Himachal Pradesh, India. IUGR is diagnosed when the birth weight was below the tenth centile for the gestational age.

**Results:** Out of the 18 patients, who developed IUGR 11 (61.1%) had serum uric acid levels more than 3.5mg/dl and 7 (38.8%) had serum uric acid levels less than 3.5mg/dl.

And the sensitivity of the serum uric acid to predict IUGR was 55.17 %, the specificity was 66.00%, the positive predictive value was 48.48, the negative predictive value was 71.74% and accuracy was 62.03%.

**Conclusion:** Serum uric acid is useful in predicting IUGR.

**Keywords:** serum uric acid, IUGR

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**Introduction**

Uric acid is the end product of purine metabolism catalysed by the enzyme xanthine oxidase/dehydrogenase. This bifunctional enzyme in its dehydrogenase form produces uric acid and reduced nicotinamide adenine dinucleotide and in the oxidase form produces uric acid and superoxide. The enzyme is upregulated and the oxidase form increases proportionally with hypoxia. Thus increased uric acid production occurs in the setting of hypoxia, local acidosis or increased tissue breakdown or with reduced renal function as seen in hypertensive pregnancies particularly preeclampsia and can increase oxidative stress. The currently favoured concept is that increased circulating uric acid is secondary to reduced renal urate clearance as can be seen in hypovolemia also evident in hypertensive pregnancies. Whereas serum uric acid usually falls to well below 4mg/dl during early to mid pregnancy, in patients with preeclampsia levels often rise to >4.5mg/dl.

Because maternal uric acid passes freely into the placenta, a rise in uric acid could lead to an inhibition of angiogenesis in the third trimester, which might lead not only to a small infant but also inhibition of kidney growth with a reduction in nephron number. It is therefore not surprising that adverse fetal manifestations in the form oligohydramnios, intrauterine growth restriction, intrauterine fetal death, intrapartum fetal distress/demise and birth asphyxia have been observed in the absence of maternal

manifestations of severe disease. Abnormal umbilical artery Doppler velocimetry, reduced resistance flow in the middle cerebral artery and abnormal waveforms in the ductus venosus which are indicators of fetal compromise have also been demonstrated in the presence of hyperuricaemia without proteinuria [1, 2, 3].

**Methods**

Eighty pregnant women who reported to the antenatal OPD at 17-20 weeks of period of gestation and who fulfilled the inclusion criteria and were willing to participate in the study were enrolled. For this study all women attending antenatal OPD between 17-20 weeks of gestation were enrolled upto the period of initial 7 months of the study and followup was continued upto next 5 months of the study period so that the last enrolled patient can complete the followup process as per methodology. Detailed obstetric and menstrual history, past history of hypertension, diabetes and family history of hypertension and diabetes was taken and detailed general physical examination was conducted. This was followed by serum uric acid levels at 17-20 weeks. Rest of the investigation structure were as per the protocol. All the enrolled patients were followed up every month till 28 weeks of gestation and fortnightly after that upto 36 week and weekly thereafter until delivery. All the neonates born to the mothers

were enrolled and given essential newborn care. A detailed neonatal examination, APGAR score, perinatal morbidity and mortality, neonatal morbidity and mortality was recorded. All the details of mother and neonate were recorded in a prescribed precoded performa (annexure).

#### Normal range of investigation

Serum uric acid levels: 3.5 mg/dl

#### Intrauterine growth restriction

IUGR is diagnosed when the birth weight was below the tenth centile for the gestational age.

#### Results

In the present study out of 80 patients 18 (22.5%) developed IUGR. The mean birth weight in patients with serum uric acid more than 3.5 mg/dl was 2557.93±403.482 g and the mean birth weight in patients with serum uric acid less than 3.5 mg/dl was 2613g, and p value was .508 which was not significant.

Out of the 18 patients, who developed IUGR 11 (61.1%) had serum uric acid levels more than 3.5mg/dl and 7 (38.8%) had serum uric acid levels less than 3.5mg/dl.

And the sensitivity of the serum uric acid to predict IUGR was 55.17 %, the specificity was 66.00%, the positive predictive value was 48.48, the negative predictive value was 71.74% and accuracy was 62.03%.

Table 1

Table 13 relationship of birth weight with serum uric acid		
birth weight	Serum uric acid >3.5	serum uric acid <3.5
<2500G	11(61.1%)	7(38.8%)

#### Discussion

There are limited studies conducted to predict the intrauterine growth restriction by serum uric acid levels in second trimester of pregnancy.

In present study out of the eighteen patients who developed IUGR eleven (61.1%) had serum uric acid levels more than 3.5mg/dl and seven patients (38.8%) had serum uric acid levels less than 3.5mg/dl. And the sensitivity of the serum uric acid was 55.17 %, the specificity was 66.00%, the positive predictive value was 48.48, the negative predictive value was 71.74% and accuracy was 62.03% to predict IUGR. In a study conducted by Laughon *et al* [4] 7% patients had serum uric acid >3.5 mg/dl. The study shows that the patients who have small for gestation infants have higher value of serum uric acid. The findings are in correlation the studies conducted by Verma *et al* [5], in which patients with normal serum uric acid levels had birth weight of 3.88 kg and women with raised serum uric acid had birth weight of 2.8kg.

#### Conclusion

In present study we found correlation between serum uric acid levels and fetal birth weight. However additional studies and cost– benefit analysis are required to confirm these finding before recommending this test for screening purpose.

#### Conflict of interest

All authors declare they have no conflict of interest.

#### Financial disclosure

Nil

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