

## A PROSPECTIVE STUDY TO EVALUATE THE ROLE OF URIC ACID FOR PROGRESSION TO PREECLAMPSIA IN GESTATIONAL HYPERTENSIVE PREGNANCIES IN THE DEPARTMENT OF OBSTETRICS AND GYNECOLOGY, SMS MEDICAL COLLEGE

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### Abstract

**Background:** The purpose of this study was to study the role of serum uric acid level in progression to preeclampsia in gestational hypertensive pregnancies.

**Methods:** Hospital based comparative study was conducted at Department of Obstetrics and Gynaecology, SMS medical college, Jaipur.

**Results:** Uric acid level was significantly higher in with PIH ( $6.68 \pm 0.36$  mg/dl) as compared to without PIH ( $4.92 \pm 0.57$  mg/dl). Receiver-operator characteristic curve showed relatively poor sensitivity and specificity performance (area under the curve = 1.00) of serum uric acid level at the initial presentation of gestational hypertension for predicting the progression to preeclampsia. The best cut-off revealed from the curve was 6.18 mg/dl.

**Conclusion:** In conclusion, higher serum uric acid levels at the initial presentation of gestational hypertension may indicate heightened risk of progression to preeclampsia and development of adverse maternal/ infant conditions.

**Keywords:** Eclampsia, Uric acid, Hypertension

### Introduction

Pre-eclampsia is a progressive, multisystemic disorder characterized by triad of high blood pressure to the extent of 140/90 mm Hg or more, edema and proteinuria, developing after 20 weeks of pregnancy.<sup>1</sup> It is one of the most common complications during pregnancy and the leading cause of both maternal and perinatal morbidity and mortality worldwide.<sup>2</sup>

Incidence of preeclampsia worldwide is around 5-10% of all pregnancies,<sup>5</sup> and in developing countries around 4-18%.<sup>3-4</sup> It is much more common in women who are pregnant for the first time,<sup>9</sup> and its frequency drops significantly in second pregnancies. Despite active research for many years, the etiology of this disorder remains unknown, although contributory factors including obesity, diabetes, older maternal age and job stress have been observed and studied.<sup>5-7</sup>

Uric acid is a product of purine degradation catalysed by the enzyme xanthine oxidase/xanthine dehydrogenase. Unlike in most other mammals, in humans, uric acid is the final oxidation product of purine metabolism and is chiefly excreted in the urine. Renal pathway accounts for up to 70% of daily uric acid excretion. Increased uric acid concentration is one of the most pronounced clinical findings in preeclampsia. Hyperuricemia in preeclamptic women is primarily due to a reduction in glomerular filtration rate due to endothelial dysfunction. Several studies have reported elevated uric acid concentrations to be

positively correlated with adverse maternal and fetal outcomes. However, others propose that an increased uric acid level is a poor predictor of maternal and fetal outcomes.<sup>8</sup>

The purpose of this study was to study the role of serum uric acid level in progression to preeclampsia in gestational hypertensive pregnancies.

### Materials and Method

**Type of Study:** Hospital based comparative study.

**Study Design:** Cross sectional

**Place of Study:** Department of Obstetrics and Gynaecology, SMS medical college, Jaipur.

**Type of Study Design:** Observational study.

**Duration:** From February 2019 to February 2020 and compilation of two month for data collection and analysis for study.

**Study Participants:** Pregnant women  $\geq 20$  weeks of gestation

### Methodology

All eligible pregnant women (n= 90) fulfilling inclusion criteria were explained about nature and purpose of the study.

- After taking their informed written consent, detail history, general and systemic examination was done.
- Blood samples was collected in plain vial and then sent for routine antenatal investigations (complete blood count, liver function test, renal function test, ABO Rh, viral markers).
- Then serum uric acid levels by biochemical testing at lab were estimated.
- All information and reports were recorded on a pre-designed Proforma and were entered in Microsoft excel sheet to prepare master chart.

### Inclusion Criteria

- Women with singleton pregnancy With gestational hypertension.
- Patients giving consent to participate in study.

### Exclusion Criteria

- Medical disorders of pregnancy.
- Abnormal serum creatinine level (>1.5mg/dl).

### Result

**TABLE 1: Distribution of study population according to maternal age**

Age in Yrs	GH without PIH	GH with PIH	p-value
Mean	25.10	25.38	0.726
SD	3.74	3.37	

Above table shows that the mean age in GH without PIH was 25.10±3.74 years and mean age in GH with PIH was 25.38±3.37 years (p value >0.05). This shows that the age of subjects were comparable in the two groups. This age group reflects the peak of reproductive period.

**TABLE 2: Distribution of study population according to uric acid**

Uric acid (mg/dl)	GH without PIH	GH with PIH	p-value
Mean	4.92	6.68	0.001
SD	0.57	0.36	

Table no 2 shows that uric acid level wise distribution of study patients.

Uric acid level was significantly higher in with PIH (6.68±0.36 mg/dl) as compared to without PIH (4.92±0.57 mg/dl).

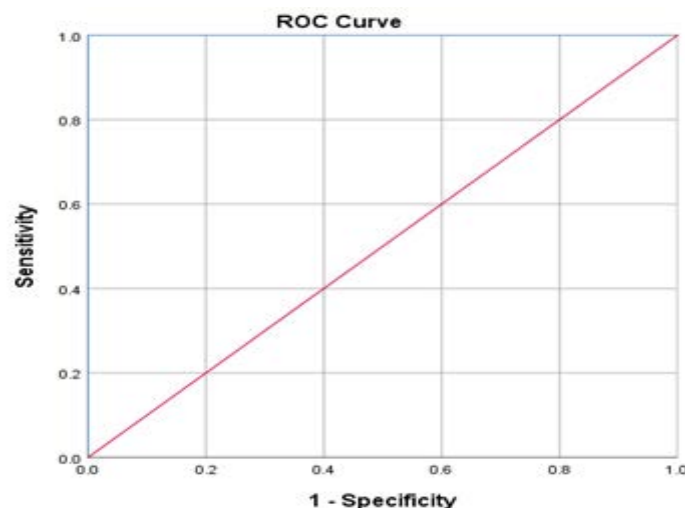
**TABLE 3: Diagnostic value of uric acid**

Area	Std. Error <sup>a</sup>	Asymptotic Sig. <sup>b</sup>	95%CL	
			Lower	Upper
1.0	0.0	0.0	1.00	1.00

Cut off value of uric acid= 6.18 mg/dl

Receiver-operator characteristic curve showed relatively poor sensitivity and specificity performance (area under the curve= 1.00) of serum uric acid level at the initial presentation of gestational hypertension for predicting the progression to preeclampsia The best cut-off revealed from the curve was 6.18 mg/dl.

**TABLE 4: Diagnostic value of uric acid**



**TABLE 5: Diagnostic Accuracy**

Sensitivity	64.29
Specificity	100.00
PPV	100.00
NPV	86.11
Diagnostic accuracy	88.89

The best cut-off revealed from the curve was 6.18 mg/dl, with sensitivity = 64.29%, specificity = 100.00%, positive predictive value = 100.00%, negative predictive value = 86.11%.

### Discussion

Hospital based comparative Cross sectional study was conducted on Pregnant women  $\geq 20$  weeks of gestation at Department of Obstetrics and Gynaecology, SMS medical college, Jaipur from February 2019 to February 2020 and compilation of two month for data collection and analysis for study.

Uric acid level was significantly higher in with PIH ( $6.68 \pm 0.36$  mg/dl) as compared to without PIH ( $4.92 \pm 0.57$  mg/dl). Receiver-operator characteristic curve showed relatively poor sensitivity and specificity performance (area under the curve = 1.00) of serum uric acid level at the initial presentation of gestational hypertension for predicting the progression to preeclampsia. The best cut-off revealed from the curve was 6.18 mg/dl, with sensitivity = 64.29%, specificity = 100.00%, positive predictive value = 100.00%, negative predictive value = 86.11%.

Which was compatible with Ahmed A *et al*<sup>9</sup> found in preeclampsia 7.35 mg/dl as compare to 4.47 mg/dl in control group, Pramanik T *et al*,<sup>10</sup> in Nepal (2012-2013) [ $6.27 \pm 1.37$  vs  $4.27 \pm 0.61$  mg/dl] in pre-eclamptic patients compared to their healthy counterparts and ALZuabidi ZFM *et al*,<sup>11</sup> in Iraq in preeclampsia was  $7.68 \pm 0.79$  mg/dl as compare to  $4.18 \pm 1.17$  mg/dl in control group.

The associations between higher uric acid levels and preeclampsia,<sup>12-13</sup> or between higher uric acid levels and poorer perinatal outcomes among preeclamptic patients,<sup>14,15</sup> have been well documented. More recently, elevated uric acid levels at as early as the 1st trimester of pregnancy have been associated with the development of preeclampsia.<sup>16</sup> Only one recent study has examined the association between uric acid and progression to preeclampsia among patients with an initial presentation of gestational hypertension—Bellomo and colleagues reported that each 1mg/dl increase in serum uric acid level at the onset of gestational hypertension was associated with a large aOR of 7.1 (3.2, 15.7) for the progression to preeclampsia (effective  $n = 163$ ; 45% progressed to preeclampsia) in a prospective cohort. Uric acid levels were not adjusted for gestational age in their analyses. If uric acid levels were not adjusted for gestational age, the effect size was slightly smaller (aOR = 2.1, detailed results not shown). These findings suggest that serum uric acid level may be a risk marker of progression to preeclampsia among patients with an initial presentation of gestational hypertension, even though most serum uric acid levels were within the normal range. We

could not confirm the excellent sensitivity and specificity of serum uric acid in predicting the progression to preeclampsia reported by Bellomo and colleagues.<sup>17</sup> The relatively poor sensitivity and specificity in our cohort suggest limited clinical utility of uric acid alone in predicting the progression to preeclampsia. Larger multicenter prospective studies are required to elucidate the clinical utility of uric acid in predicting the progression to preeclampsia and the development of adverse conditions.

### Conclusion

In conclusion, higher serum uric acid levels at the initial presentation of gestational hypertension may indicate heightened risk of progression to preeclampsia and development of adverse maternal/ infant conditions.

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