Original Research Article

Uric acid as an important biomarker in hypertensive disorders in pregnancy

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ABSTRACT

Background: Hypertension in pregnancy is a global problem and complicates approximately 10-17% of pregnancies. The incidence of PIH in India ranges from 5% to 15%. Uric acid is a marker of oxidative stress, tissue injury and renal dysfunction and therefore might be helpful in the prediction of complications of PE. Literature on serum uric acid as a predictor of complications of PE is conflicting. The present is intended to study uric acid as an important biomarker in hypertension in pregnancy.

Methods: This was prospective observational analytical case control study of 180 individuals done at JSS Hospital, Mysore, India from January 2015 to July 2016.

Results: A positive correlation was observed between rise in uric acid and severity of hypertension in pregnancy (p <0.01). Hypertensive mothers with uric acid levels >6.0mg/dl shows 100% maternal deaths, 79.4% with eclampsia and 71.9% with preterm delivery.

Conclusions: A positive correlation was observed between rise in uric acid and severity of hypertension in pregnancy. Hyperuricemia in patients with hypertensive disorders of pregnancy is a strong risk factor for several maternal and perinatal complications.

Keywords: Eclampsia, Maternal outcome, Pre-eclampsia, Perinatal outcome, Uric acid

INTRODUCTION

Preeclampsia is defined as a multisystem disorder occurring in pregnancy and the puerperium which is characterized by development of hypertension of 140/90 mmHg and above after the 20th week in a previously normotensive patient. It is a global problem and complicates approximately 10-17% of pregnancies. The incidence of PIH in India ranges from 5% to 15%. PIH is responsible for 14% of maternal deaths in the world. Uric acid is a marker of oxidative stress, tissue injury and renal dysfunction, and therefore might be helpful in the prediction of complications of PE.

Hypoxia and ischemia of the placenta and cytokines such as interferon induce the expression of xanthine oxidase and therefore increase the production of uric acid and also reactive oxygen species. Literature on serum uric acid as a predictor of complications of PE is conflicting.

Several studies have demonstrated a correlation between elevated maternal serum uric acid levels and adverse maternal and neonatal outcome, where as other studies showed that serum uric acid is a poor predictor of PE. In a recent systematic review on the subject, a raised serum uric acid was associated with an almost doubled risk of severe complications, such as eclampsia, severe hypertension, and perinatal death. The present is intended to study uric acid as an important biomarker in hypertension in pregnancy.
Aim of the study was to compare the uric acid in pre-eclampsia and eclampsia patients with normal pregnancies and to correlate the perinatal maternal and outcome with uric acid in pre-eclampsia and eclampsia.

METHODS

A prospective observational antenatal cases control study was done at JSS Medical College and Hospital, Mysore, India from January 2015 to July 2016. Healthy normotensive pregnant females in the third trimester of pregnancy, without any signs and symptoms of pregnancy induced hypertension were considered as controls.

Pregnant females in the third trimester with symptoms and signs of pregnancy induced hypertension, admitted in antenatal care ward were selected and grouped as per the criteria described in classification of hypertensive disorders of pregnancy according to the American College of Obstetricians and Gynaecologists. Total 180 cases were included in the study.

The study groups were divided as follows

- Healthy normotensive pregnant controls = 50.
- Patients with mild preeclampsia = 50.
- Patients with severe preeclampsia = 50.
- Patients with eclampsia = 30

Under all aseptic precaution samples were collected randomly for uric acid. All relevant clinical details were collected from patients.

Outcome measures

The maternal outcome was noted in terms of the mode of termination of pregnancy, maternal complications and maternal end result. Fetal outcome was assessed by perinatal morbidity and mortality, need for admission in NICU, and neonatal end result.

RESULTS

Table 1: Uric acid GP.

<table>
<thead>
<tr>
<th>Category</th>
<th>&lt;6</th>
<th>≥6</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normotensives</td>
<td>50</td>
<td>0</td>
<td>50</td>
</tr>
<tr>
<td>%</td>
<td>100.0</td>
<td>0.0</td>
<td>100.0</td>
</tr>
<tr>
<td>Mild pre-eclampsia</td>
<td>45</td>
<td>5</td>
<td>50</td>
</tr>
<tr>
<td>%</td>
<td>90.0</td>
<td>10.0</td>
<td>100.0</td>
</tr>
<tr>
<td>Severe pre-eclampsia</td>
<td>16</td>
<td>34</td>
<td>50</td>
</tr>
<tr>
<td>%</td>
<td>32.0</td>
<td>68.0</td>
<td>100.0</td>
</tr>
<tr>
<td>Eclampsia</td>
<td>5</td>
<td>25</td>
<td>30</td>
</tr>
<tr>
<td>%</td>
<td>16.7</td>
<td>83.3</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>116</td>
<td>64</td>
<td>180</td>
</tr>
</tbody>
</table>

Elevated uric acid levels had increased risk of premature delivery than pre eclamptic women whose uric acid levels were normal. Our findings are 100% maternal deaths, 79.4% with eclampsia, and 71.9% with preterm delivery in hypertensive mothers with uric acid levels >6mg/dl.

Table 2: Uric acid mean values.

<table>
<thead>
<tr>
<th></th>
<th>Obs.</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normotensives</td>
<td>50</td>
<td>3.5244</td>
<td>0.2396</td>
</tr>
<tr>
<td>Mild pre-eclampsia</td>
<td>50</td>
<td>5.5040</td>
<td>0.3404</td>
</tr>
<tr>
<td>Severe pre-eclampsia</td>
<td>50</td>
<td>6.2590</td>
<td>0.3398</td>
</tr>
<tr>
<td>Eclampsia</td>
<td>30</td>
<td>7.4300</td>
<td>1.1653</td>
</tr>
</tbody>
</table>

Table 3: Maternal outcome.

<table>
<thead>
<tr>
<th>Uric acid</th>
<th>&lt;6</th>
<th>≥6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abruption (8)</td>
<td>1 (0.9%)</td>
<td>7 (87.5%)</td>
</tr>
<tr>
<td>ARF (6)</td>
<td>1 (16.7%)</td>
<td>5 (83.3%)</td>
</tr>
<tr>
<td>Eclampsia (34)</td>
<td>7 (20.6%)</td>
<td>27 (79.4%)</td>
</tr>
<tr>
<td>HELLP (11)</td>
<td>1 (9.1%)</td>
<td>10 (90.9%)</td>
</tr>
<tr>
<td>Mortality (1)</td>
<td>0</td>
<td>1 (100%)</td>
</tr>
</tbody>
</table>

Table 4: Perinatal outcome.

<table>
<thead>
<tr>
<th>Uric acid</th>
<th>&lt;6</th>
<th>≥6</th>
</tr>
</thead>
<tbody>
<tr>
<td>IUGR (36)</td>
<td>19.40%</td>
<td>80.60%</td>
</tr>
<tr>
<td>Still birth (7)</td>
<td>0</td>
<td>100%</td>
</tr>
<tr>
<td>Alive (165)</td>
<td>65.50%</td>
<td>34.50%</td>
</tr>
<tr>
<td>NICU (41)</td>
<td>29.30%</td>
<td>70.70%</td>
</tr>
<tr>
<td>Preterm (32)</td>
<td>28.12%</td>
<td>71.90%</td>
</tr>
</tbody>
</table>

DISCUSSION

In our study, the uric acid was very significantly higher in severe preeclampsia (P <0.01) and eclampsia (P <0.01) than that in normal healthy pregnant controls. Whereas the uric acid in mild preeclampsia was not significantly higher than the healthy pregnant control. In our study, trend of increasing uric acid with increasing severity of pregnancy induced hypertension is consistent and this results are comparable to those of Lim et al, Williams et al. Lim et al study shows the mean serum uric acid values for women with preeclampsia (6.2±1.4 mg/dl) and were significantly higher than those of controls (4.3±0.8 mg/dl, p <0.05) which is comparable to our study. Williams et al concluded uric acid levels significantly elevated in women with gestational hypertension and preeclampsia as compared to normotensive pregnant women which is similar to our study.

According to Mustaphi et al, mean uric acid levels in normotensive women in the antenatal period were 4.65±0.33 and in mild PIH were 5.42±0.55 respectively. Level of serum uric acid in mild PIH was significantly higher than normotensive women. In severe PIH, the mean serum uric acid levels were 6.65±0.60 in antepartum which was significantly more than control
group and mild PIH group women which is compared to our study. In our study, elevated uric acid levels had increased risk of premature delivery than pre-eclamptic women whose uric acid levels were normal. These finding are in agreement to our findings showing 100% maternal deaths, 79.4 % with eclampsia and 71.9% with preterm delivery in hypertensive mothers with uric acid levels >6.0mg/dl.

Krishna S et al, Thanna et al, Yalamati P et al, concluded that high serum uric acid level could be a useful indicator of the maternal and fetal complication which is comparable to our study. Hawkins TL et al, studied of hypertensive pregnant women (those with pre-eclampsia or gestational hypertension) the risk of adverse maternal outcome and adverse fetal outcome increased with increasing concentration of uric acid which is compared to our study.

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**Conflict of interest: None declared**

Ethical approval: The study was approved by the Institutional Ethics Committee

**REFERENCES**


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