Association of Maternal and Perinatal Mortality with Hyperuricemia in Females Presenting With Pre-Eclampsia

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ABSTRACT

Background: Preeclampsia is hypertensive disorder, develops during pregnancy and usually accompanied by high proteins in urine. Hyperuricemia is an unusual increase in the serum uric acid level. Among females with preeclampsia, adverse neonatal and maternal outcomes have been reported including maternal and perinatal mortality.

Aim: To assess the association of maternal and perinatal mortality with hyperuricemia in pregnant females having preeclampsia

Methodology: This Cohort study was conducted at the Department of Obstetrics & Gynecology, Aziz Bhatti Shaheed Teaching Hospital, Gujrat for 6 months. Females were divided into two groups. During delivery, alive fetal conditions were noted. After delivery female and neonate were shifted in post-delivery wards for 2 days. Maternal and perinatal outcome was noted. Data was entered in SPSS version 20.

Results: In this study the maternal death occurred in 20 cases and the perinatal death occurred in 21 (23.33%) patients. 3.25 times more risk of perinatal death was found in hyperuricemia group, similarly 1.93 times more risk of maternal death was found in hyperuricemia group.

Conclusion: There is significantly higher risk of perinatal and maternal mortality with hyperuricemia in females presenting with preeclampsia.

Keywords: Perinatal Outcome, Maternal, Mortality, Hyperuricemia, Preeclampsia

INTRODUCTION

During early pregnancy serum uric acid levels fall, often to 3mg/dl or below, related to the uricosuric effects from estrogen and from the increase in renal blood flow. Uric acid levels then increase during the third trimester, reaching levels of 4–5 mg/dl by term. However, it is known that subjects destined to develop preeclampsia show slightly higher serum uric acid levels during the first trimester in association with a relative reduction in urine urate excretion.1 Serum uric acid is one of the parameters used in early diagnosis of pregnancy induced hypertension. It has been reported that hyperuricemia correlates with the severity of the hypertension and distinguishes reliably between pregnancy induced hypertension and chronic hypertension. Hyperuricemia in pregnant females with pregnancy induced hypertension develops due to reduced clearance of uric acid via urine. This reduction occurs more, then the glomerular filtration and creatinine clearance rate also reduced2.

Pregnancy hypertension with hyperuricemia was associated with an excess of adverse fetal outcomes3,4,5. Association of hyperuricemia with preeclampsia and its impact on pregnant females and her neonate may offer substitute approach to reduce the feto-maternal morbidity and mortality rate through attempts to decrease the concentration of uric acid in blood during pregnancy complicated with preeclampsia5. About 86.4% of perinatal deaths have been observed in patients with serum uric acid was >5.5mg/dl with preeclampsia6.

One study showed that maternal mortality was 80% in hyperuricemia while 20% in normal uric acid level and perinatal mortality was 72% with hyperuricemia and 28% with normal uric acid level in preeclampsia females (P<0.05)7. But another study showed that maternal mortality was 2% in hyperuricemia while 0% in normal uric acid level (p=0.49) but perinatal mortality was 16% with hyperuricemia and 0% with normal uric acid level in preeclampsia females (P=0.04)8.

So this study aimed to assess the association of maternal and perinatal mortality with hyperuricemia in females presenting with preeclampsia. Literature has reported that preeclamptic females with hyperuricemia has more mortality rate as compared to preeclamptic females with normal serum uric acid level. This shows that hyperuricemia plays important role in survival of a pregnant women as well as her baby. But there is no local evidence available in this regard. So we want to conduct this study to confirm the previous evidence available, as controversial results have been found in literature. So that in future we may implement the results of this study in local setting. This will help us to improve our practice as well as we will be able to implement the screening and preventive measures to prevent the hazardous consequences of hyperuricemia in preeclampsia.

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MATERIALSAND METHODS

This Cohort study was done at Department of Obstetrics & Gynecology, Nawaz Sharif Medical College/ Aziz Bhatti Shaheed Teaching Hospital, Gujrat for 6 months i.e. from 1st June to 30th November 2019. Sample size of 90 females; 45 females in each groups wasestimated by using 80% power of test, 5% significance level and taking proportion of perinatal mortality i.e. 16% with hyperuricemia and 0% with normal uric acid level in preeclamptic females.

All the patients were included by applying Non probability, consecutive sampling technique. Females aged 20-40 years, parity <5 presenting at gestational age ≥37 weeks presenting in active labour for delivery (>3 contractions in 10 minutes, >3cm cervical opening, bishop score >4) were included. Group I: females with hyperuricemia (serum uric acid level ≥5.5mg/dl) and Group II: females with normal serum uric acid level (<5.5mg/dl). Females with twin or multiple pregnancy, gestational or chronic diabetes, chronic hypertension before conception, renal problem, liver problem, anemia were not included in the study.

Data Collection Procedure: 90 cases fulfilling inclusion criteria were enrolled in study form labour room of the Department of Obstetrics & Gynecology. Informed consent was taken. Demographics were also recorded. Then females was divided in two groups i.e. group I females with hyperuricemia and group II females with normal serum uric acid level. Then females were followed-up till delivery. During delivery, alive fetal conditions were noted (on CTG, active fetal heart rate), otherwise still birth was noted. If fetus was born alive but fetus or mother dies within 2 days of delivery, then mortality was labeled. After delivery female and neonate was shifted in post-delivery wards for 2 days. If female or neonate was dying within 40 days of delivery, then maternal mortality or perinatal mortality was labeled.

Analysis: Data analysis was done in SPSS 20. Age, BMI and gestational age were presented as mean±S.D. Mode of delivery, parity, pre natal and maternal deathwere presented as frequency and percentage. Parity was also presented as frequency. Relative risk (RR) was calculated to measure association between hyperuricemia and maternal or perinatal mortality keeping RR>1 as significant risk.

RESULTS

Mean age of females in exposed group was 30.02±6.14 years and in unexposed group was 30.91±5.85 years. The mean gestational age of exposed group was 38.27±1.14 weeks and in unexposed group was 38.58±1.14 weeks. The mean BMI of the exposed group was 24.85±3.48kg/m² and in unexposed group was 25.61±3.31kg/m². Cesarean delivery was done in 49 cases in which 30 were from exposed group and 19 were from unexposed group, vaginal delivery was done in 41 cases in which 15 were from exposed group and 26 were from unexposed group (Table1). Accoding to our study the maternal death occurred in 20 cases in which 16 were from exposed group and 4 were from unexposed group. Statistically 1.93 times more risk of maternal death was found in exposed group than to unexposed group i.e. RR=1.93 (1.35-2.75). According to our study the perinatal death occurred in 21 cases in which 15 were from exposed group and 6 were from unexposed group. Statistically 3.25 times more risk of perinatal death was found in exposed group than to unexposed group i.e. RR=3.25 (1.12-2.41) (Table 2).

Table1: Demographics of females

<table>
<thead>
<tr>
<th>Study Group</th>
<th>Hyperuricemia</th>
<th>Normal uric acid</th>
<th>Total</th>
<th>RR</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age (years)</td>
<td></td>
<td></td>
<td>45</td>
<td></td>
</tr>
<tr>
<td>Gestational age (weeks)</td>
<td>30.02±6.14</td>
<td>30.91±5.85</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>24.85±3.48</td>
<td>25.61±3.31</td>
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<td></td>
</tr>
</tbody>
</table>

Table2: Association of maternal and perinatal death with hyperuricemia

<table>
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<tr>
<th>Study Group</th>
<th>Hyperuricemia</th>
<th>Normal uric acid</th>
<th>Total</th>
<th>RR</th>
</tr>
</thead>
<tbody>
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<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>16</td>
<td>4</td>
<td>20</td>
<td>1.93</td>
</tr>
<tr>
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</tr>
<tr>
<td>Perinatal death</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Yes</td>
<td>15</td>
<td>6</td>
<td>21</td>
<td>3.25</td>
</tr>
<tr>
<td>No</td>
<td>30</td>
<td>39</td>
<td>69</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>45</td>
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</table>

DISCUSSION

Preeclampsia is deliberated as the major factor causing severe obstetrical and postpartum complications and fetomaternal mortality. When a pregnant female developed preeclampsia associated with hyperuricemia, the perinatal outcomes may become poorer. Adverse maternal and perinatal outcomes are correlated with pregnancy induced hypertension. Asymptomatic hyperuricemia is common disorder. It effects about 20% females belong to general population. During pregnancy, high uric acid level or hyperuricemia is assumed to be a highly prevalent disorder regardless of the high glomerular filtration rate.

In our study the significantly increased risk of perinatal mortality and maternal mortality was found in hyperuricemia group than to normal uric acid group. According to our study the maternal death occurred in 20 cases in which 16 were from hyperuricemia group and 4 were from normal uric acid group. Statistically 1.93 times more risk of maternal death was found in hyperuricemic group than to normal uric acid group i.e. RR=1.93 (1.35-2.75). Similarly statistically 3.25 times more risk of perinatal death was found in hyperuricemic group than to normal uric acid group i.e. RR=3.25 (1.12-2.41).

Gaugler-Senden et al10 found that if preeclampsia develops before completion of 24 weeks of gestational age, it is associated with significantly higher maternal and perinatal complications and mortality. Many researches have observed the significant correlation of high serum uric acid level with high severity of preeclampsia. Though hyperuricemia cause high maternal morbidity, but there is also stronger correlation of high serum uric acid level with high risk of small or low birth weight neonates and perinatal mortality.11-13

Parrish et al14 found that the increase serum uric level in pregnant females is a better predictor of maternal adverse outcome than perinatal adverse outcome. Adverse maternal outcome rate was reported as 15.3% in a cohort.
study. The positive likelihood ratio for adverse maternal outcomes was 5.3 with uric acid level ≥76.3μmol/l and creatinine ≥1.0mg/dl. The positive likelihood ratio for adverse perinatal outcomes was around 1.0 with uric acid level ≥76.3μmol/l. Mean serum uric acid level was 363.4±291.0μmol/l versus 339.0±60.9μmol/l in females with or without adverse pregnancy outcomes (p=0.021).

Yassaee conducted a study in 2015 and found that hyperuricemia in pregnant females having severe preeclampsia, is a significant risk factor for numerous neonatal and maternal complications. Hussain et al. confirmed that hyperuricemia is significantly associated with preeclampsia and it is an important risk factor for adverse perinatal outcomes. A significantly higher percentage of low birth weight neonate has been observed in neonates delivered to the preeclamptic females with hyperuricemia as compared to the neonates delivered to the preeclamptic females having normal uric acid level.

In another study, done by Singh et al. it was established that morbidity and mortality of neonate after delivery was higher in pregnant females having increased serum uric acid level, while few neonates were resuscitated as they were admitted to neonatal care unit. One more study showed that maternal mortality was 80% in hyperuricemia while 20% in normal uric acid level and perinatal mortality was 72% with hyperuricemia and 28% with normal uric acid level in preeclampsia females (P<0.05). But another study showed that maternal mortality was 2% in hyperuricemia while 0% in normal uric acid level (p=0.04) but perinatal mortality was 16% with hyperuricemia and 0% with normal uric acid level in preeclampsia females (P<0.04).

CONCLUSION

This cohort study concluded that there is significantly increased risk of perinatal and maternal mortality with hyperuricemia in females presenting with preeclampsia.

REFERENCES