

## Comparison of Fetal Outcome in Pre-eclampsia with Hyperuricemia and Normal Uricemic Patients

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### ABSTRACT

**Background:** Pre-eclampsia with hyperuricemia is a complication of pregnancy associated with fetal mortality and morbidity. The main complications are preterm delivery, low birth weight and intrauterine demise of the fetus along with higher rate of cesarean section.

**Objective:** To compare fetal outcome in pre-eclampsia with hyperuricemia and with normal uricemic control

**Material and Methods:** Study was conducted at department of the Gynecology "B" Hayatabad Medical Complex Peshawar from 1<sup>st</sup> August 2016 to 31<sup>st</sup> July 2017. Patients with pre-eclampsia were divided in two groups "A" and "B". In group "A" patients with serum uric acid level  $\geq$  6mg/dl and in group "B" patients with uric acid level of  $\leq$  6mg/dl were included. The low birth weight, preterm birth, rate of cesarean sections and intrauterine death were observed in the two groups.

**Results:** Among the 60 patients with hyperuricemia 34 (56.66%) babies born with low birth weight, rate of cesarean section was 53.33% (32), pre-term delivery 48.33% (29) and intrauterine deaths 6.66% (4). While in 60 patients with normal uricemic control 7 (11.66%) babies born with low birth weight, rate of cesarean section was 13 (21.66%), pre-term delivery 16 (26.66%) and intrauterine deaths 0 (0.00%).

**Conclusion:** Increased uric acid level is a poor predictor for fetal outcome in terms of low birth weight, preterm birth, rate of cesarean sections and intrauterine death.

**Key words:** Pre-eclampsia, hyperuricemia, fetal outcome.

This article may be cited as: Ayub S, Begum S, Ayub N, Karim R, Rasheed N. Comparison of fetal outcome in pre-eclampsia with hyperuricemia and normal uricemic patients. J Saidu Med Coll Swat 2020;10(2): 124-127

### INTRODUCTION

Pre-eclampsia is a common complication of pregnancy that greatly affects fetal and maternal mortality and morbidity throughout the world<sup>1</sup>. Overall pre-eclampsia rank second to anemia and complicate 3-14% of pregnancies worldwide and is responsible for 35 per thousand live birth perinatal mortality reaching to 160 per thousand live births in severe cases<sup>2,3</sup>. The complications of pre-eclampsia include stillbirths or death within one week after birth, small for gestational age, low birth weight and birth asphyxia etc<sup>4</sup>.

The outcome of pregnancy is further complicated if pre-eclampsia is associated with hyperuricemia<sup>5</sup>. Hyperuricemia is defined as serum uric acid more than 6mg/dl in woman<sup>6</sup>. Uric acid is an end product of purine metabolism, filtered through the glomeruli and mostly reabsorbed through the proximal tubules<sup>7</sup>. High level of uric acid in maternal circulation in pre-eclampsia may be due to the decreased urate excretion. It is a low molecular weight substance, hence passes freely through the fetal circulation and halt glomerular endothelial cells proliferation<sup>8</sup>.

A rise of uric acid level in the third trimester of pregnancy has a negative effect on the development of nephrons as renal system develop late in pregnancy and ultimately the fetus born with low number of nephrons in renal system. Mostly mothers who give low birth weight fetus are pre-eclamptic with associated elevated serum uric acid level<sup>9</sup>. Maternal hypertension, even in its severe form, without hyperuricemia is associated with a good prognosis for the fetus<sup>10</sup>.

Several studies have shown the relationship between hyperuricemia and pre-eclampsia and as a consequence on fetal mortality<sup>11</sup>. The results of this study will help to know about the fetal risk factors and to plan the delivery along with proper management of hyperuricemia in pre-eclamptic patients and to reduce fetal and maternal morbidity and mortality.

The purpose of the study was to compare fetal outcome in pre-eclampsia with hyperuricemia and with normal uricemic control

### MATERIAL AND METHODS

This was a comparative cross-sectional study conducted on indoor patients admitted in the department of the Gynecology unit "B" Hayatabad Medical Complex Peshawar from 1<sup>st</sup> August 2016 to 31<sup>st</sup> July 2017. Patients with pre-eclampsia having a blood pressure of more 140/90 mm of Hg were included in the study. Patients with gestational diabetes, previous history of

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Received: August 20, 2019, Accepted: July 20, 2020

hypertension, renal and cardiovascular diseases, eclampsia, gout, multiple pregnancies or other comorbidities were excluded from the study to avoid bias in the results. Written informed consent was taken from all patients. A total of 120 patients with pre-eclampsia between 32-40 weeks of gestation were included in the study. In these patients pre-eclampsia was diagnosed on the basis of their blood pressure level. These patients were divided in two groups "A" and "B". In group "A" patients with serum uric acid level more than 6mg/dl and in group "B" patients with uric acid level of less than 6mg/dl were included. Low birth weight, preterm birth, intrauterine deaths and rate of cesarean section for fetal indications or maternal obstetric complications were observed in the two groups.

#### Operational Definitions:

**Pre-Eclampsia:** Pregnancy of more than 20 weeks of gestation, proteinuria of 2<sup>+</sup> or more than 300mg/24 hours and arterial blood pressure  $\geq$  140/90 mm of Hg

**Low Birth weight:** An infant less than 2500 grams measured in the first hour after birth as per WHO criteria<sup>12</sup>.

**Pre-term birth:** Birth of infant before 37 completed weeks of gestation<sup>13</sup>.

**Intrauterine death:** A baby born with no signs of life at or after 28 weeks of gestation as per WHO criteria.

#### Data Analysis:

Descriptive statistics like mean, standard deviation and maximum and minimum values had calculated for quantitative variables and

descriptive statistics like percentage had calculated for qualitative variables. P-Value had generated using student t-test for comparison of mean and chi-square test for comparison of percentages. P-Value < 0.05 had considered significant.

#### RESULTS

The mean age of patients in group "A" and "B" was  $29.3 \pm 4.6$  years and  $26.6 \pm 4.7$  years respectively whereas the mean duration of gestation was  $35.5 \pm 2.4$  and  $37.6 \pm 3.2$  weeks respectively (Table No 1.).

Mean systolic and diastolic blood pressure in group A and group B is shown in Table No 2.

Mean uric acid level in group A was  $8.48 \pm 2.18$  and in group B was  $5.26 \pm 0.73$  as shown in Table No 3.

Among the 60 patients with hyperuricemia 34 (56.66%) babies born with low birth weight, rate of cesarean section was 53.33% (32), pre-term delivery 48.33% (29) and intrauterine deaths 6.66% (4).

While in 60 patients with normal uricemic control 7 (11.66%) babies born with low birth weight, rate of cesarean section was 13 (21.66%), pre-term delivery 16 (26.66%) and intrauterine deaths 0 (0.00%).

Comparison of fetal outcome between group A and B is shown in Table No 4.

**Table No. 1. Age, Gestational age**

	Group "A" Mean + SD	Group "B" Mean + SD	P- Value
Age of patients (Years)	$29.3 \pm 4.6$	$26.6 \pm 4.7$	< 0.05
Gestational Age (Weeks)	$35.5 \pm 2.4$	$37.6 \pm 3.2$	< 0.05

**Table No. 2. Blood pressure (n=120)**

	Group "A" (n=60)	Group "B" (n=60)	P- Value
Systolic BP (mm of Hg) Mean + SD	$154.47 \pm 16.52$	$149.42 \pm 14.29$	< 0.05
Diastolic BP (mm of Hg) Mean + SD	$104.36 \pm 17.27$	$99.73 \pm 15.63$	< 0.05

**Table No. 3. Serum Uric acid level**

Groups	Number of patients (n)	Mean serum uric acid level	P- Value
Group A	60	$8.48 \pm 2.18$	0.045
Group B	60	$5.26 \pm 0.73$	0.042

**Table No. 4. Comparison of complications in Group "A" and "B" in term of fetal outcome**

Complications	Group "A" (n=60)	Group "B" (n=60)	p-value
Low birth weight	34 (56.66%)	7 (11.66%)	0.013
Rate of Cesarean section	32 (53.33%)	13 (21.66%)	0.021
Pre-term delivery	29 (48.33%)	16 (26.66%)	0.027
Intrauterine death	4 (6.66%)	0 (0.00%)	0.00

## DISCUSSION

Our study showed that there is a significant relationship between fetal outcome and serum uric acid level in pre-eclampsia. Hyperuricemia is a bad prognostic factor for the fetal outcome.

In study done by Zangana and Hamadamen showed the prevalence of hyperuricemia in 63.50% of the patients with pre-eclampsia<sup>15</sup>.

Our study showed a strong relationship of hyperuricemia in pre-eclampsia with fetal outcome. This association of pre-eclampsia with uric acid has been proved in many studies<sup>16</sup>. Chen et al concluded in his study that serum uric acid level increases along with clinical signs of pre-eclampsia but it should not be taken as a predictive factor of pre-eclampsia. In other words, pre-eclampsia is responsible for hyperuricemia but the reverse relationship is not there<sup>17</sup>.

Hawkins et al reported that in pregnancy hyperuricemia and increased blood pressure is associated poor maternal and fetal outcome<sup>18</sup>. Gianni et al concluded in his study showed that uric acid is a reliable indicator of fetal complications in pre-eclamptic women<sup>19</sup>.

We observed in our study that the risk of low birth weight in hyperuricemic patients is 56.66%, which is lower than the study by Hussain SS et al who observed that 72% of the newborn were of low birth weight in patients with serum uric acid level of more than 6 mg/dl<sup>20</sup>. This association of low birth weight with hyperuricemia is due to the reason that increased serum uric acid level is responsible for intrauterine growth retardation leading to low birth weight.

Regarding mode of delivery in hyperuricemic patients, 53.33% of babies were born through cesarean section for fetal indications or maternal obstetric complications and the remaining were delivered through normal vaginal delivery. In a study from India 80% of neonates were born through cesarean section, which is higher than our study may be because of the demographic

reasons with different severity of disease<sup>21</sup>.

Lisa et al also proved from her study that high uric acid in pre-eclampsia is associated with pre-term delivery<sup>22</sup>. In our study 48.33% of babies were delivered preterm.

Out of 60 patients with hyperuricemia and pre-eclampsia intrauterine death were 4 (6.66%). In a study carried out in Vietnam the figures for intrauterine death in hyperuricemia with pre-eclampsia was less (4%) than what we observed<sup>23</sup>.

The limitation for our study were preconception maternal risk factors for complicated pregnancy were not considered. Secondly it was a single center study so multicenter study with larger sample size with different demographic regions should be included.

## CONCLUSION

Measurement of serum uric acid level is important in pre-eclampsia patients. Increased uric acid level is a poor predictor for fetal outcome in terms of low birth weight, preterm birth, rate of cesarean sections and intrauterine death.

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