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**Research Article** 

# ANALYSIS OF MATERNAL SERUM URIC ACID LEVELS AT DELIVERY AMONG GESTATIONAL HYPERTENSIVE WOMEN

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Abstract:		
Introduction: Hypertensive disorders con	uplicating pregnancy are the most com	nmon and serious medical disorder
and constitute up to 2-10% of all pregnam	cies. Pregnancy induced hypertension	, preeclampsia (PE), and eclampsia
are a part of a spectrum of hypertensive di	sorders that complicate pregnancy as s	specified by the National High Blood
Pressure Education Program (NHBPEP)	working group.	

*Aims and objectives:* The basic aim of the study is to analyze the maternal serum uric acid levels at delivery among gestational hypertensive women and its effect on fetal growth.

**Material and methods:** This cross sectional study was conducted in Allied Hospital Faisalabad during January 2019 to July 2019. The data was collected from 100 pregnant female patients with gestational age above 32 weeks. The selected participants were divided into 2 groups, one with GH and second group with NP. All the participants were age matched. GH is defined as denovo hypertension with systolic blood pressure (SBP)  $\geq$ 140 mmHg and diastolic blood pressure (DBP)  $\geq$ 90 mmHg after 20 weeks of gestation. PE is GH with proteinuria 1+ on dipstick or  $\geq$ 300 mg/day or Pr:Cr ratio as  $\geq$ 3.0 mg/g.

**Results:** The data was(5) collected from 100 randomly selected participants. The mean age for NP were  $23.2 \pm 2.9$  and for GH  $22.9 \pm 3.0$ . The mean age and gestational age among both groups were not statistically significant. SBP, DBP, and urinary proteins were significantly different in the both groups.

**Conclusion:** It is concluded that Serum uric acid and creatinine are elevated in GH whereas no significant difference was observed between PE and NP. Serum uric acid had better specificity and sensitivity for GH and also correlated negatively with fetal birth weight.

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### **INTRODUCTION:**

Hypertensive disorders complicating pregnancy are the most common and serious medical disorder and constitute up to 2-10% of all pregnancies. Gestational hypertension (GH), preeclampsia (PE), and eclampsia are a part of a spectrum of hypertensive disorders that complicate pregnancy as specified by the National High Blood Pressure Education Program (NHBPEP) working group. Though studies have mentioned various parameters in etio-pathogenesis of hypertensive disorders of pregnancy, still it remains obscure [1].Serum uric acid and creatinine levels are a part of work up for the pregnant women with hypertension. The elevated levels of these parameters were due to decreased urinary clearance secondary to reduced GFR and increased reabsorption [2].Serum uric acid is not only a marker of severity of disease but also contributes to the pathology of disorder [3].

During pregnancy, circulating uric acid levels are regulated by alterations in renal handling. Maternal serum uric acid levels decrease by 25–35% during the first trimester due to an increase in glomerular filtration rate and a decrease in reabsorption in the proximal tubule. There is a subsequent rise to prepregnancy levels near term, which is related to a decrease in uric acid clearance due to postsecretory reabsorption [4].

Hyperuricemia in pregnancy is associated with adverse fetal outcome and preeclampsia. Uric acid directly inhibits amino acid transfer in the placenta and suppresses fetal growth [5]. Elevated levels of uric acid may have a proliferative and proinflammatory effect on the small blood vessels of the placenta, resulting in small-for-gestational-age (SGA) fetuses [6]. Uric acid stimulates the production of vasoconstrictors and inflammatory agents, reduces nitric oxide production, and increases thromboxane generation in vascular smooth muscle cells [7]. Thus, hyperuricemia is strongly associated with endothelial cell dysfunction, and elevated serum uric acid levels usually precede hypertension.

In patients with preeclampsia, the association between maternal uric acid levels and birth weights has been investigated [8]. Furthermore, in normotensive pregnant women, uric acid concentrations in the second trimester correlated with insulin resistance and lower birth weights. Presently, there are no reports describing the association between hyperuricemia and birth weight with respect to renal functions<sup>9</sup>.

#### Aims and objectives:

The basic aim of the study is to analyze the maternal serum uric acid levels at delivery among gestational hypertensive women and its effect on fetal growth.

## **MATERIAL AND METHODS:**

This cross sectional study was conducted in Allied Hospital Faisalabad during January 2019 to July 2019. The data were collected from 100 pregnant female patients with gestational age above 32 weeks. The selected participants were divided into 2 groups, one with GH and second group with NP. All the participants were age matched.GH is defined as denovo hypertension with systolic blood pressure (SBP)  $\geq$ 140 mmHg and diastolic blood pressure (DBP)  $\geq$ 90 mmHg after 20 weeks of gestation.PE is GH with proteinuria – 1+ on dipstick or  $\geq$ 300 mg/day or Pr:Cr ratio as  $\geq$ 3.0 mg/g.

#### **Data collection:**

5 mL of blood sample was collected from all the participants by venous puncture, into properly labeled plain polystyrene tubes. For urine protein analysis, 10 mL mid-stream urine was collected. Blood samples were centrifuged at 10,000 rpm for 10 min and the serum was separated. Serum uric acid and creatinine were estimated immediately. Serum uric acid was measured by modified uricase method. The normal serum reference range for females was 2.6–6.0 mg%. Serum creatinine was estimated by modified kinetic Jaffes method.

#### Statistical analysis:

The data was collected and analyzed using SPSS (version 21.0). All the values were expressed in mean and standard deviation.

#### **RESULTS:**

The data was collected from 100 randomly selected participants. The mean age for NP were  $23.2 \pm 2.9$  and for GH  $22.9 \pm 3.0$ . The mean age and gestational age among both groups were not statistically significant. SBP, DBP, and urinary proteins were significantly different in the both groups.

Parameter	NP	GH	<b><i>P</i>-Value</b>
Age (years)	$23.2\pm2.9$	$22.9\pm3.0$	0.582
Gestation age (weeks)	$36.4 \pm 3.5$	$36.9 \pm 2.9$	0.373
SBP (mmHg)	$113.2\pm7.5$	$143.3\pm8.0$	< 0.001*
DBP (mmHg)	$75.2 \pm 7.7$	$96.0 \pm 7.2$	< 0.001*
Serum creatinine (mg/dL)	$0.63\pm0.13$	$0.66\pm0.19$	< 0.001*
Type of delivery			< 0.001*
No. of vaginal deliveries	21	11	
No. of cesarean sections	10	19	
Birth weight (kgs)	$2.8 \pm 0.28$	$2.74\pm0.58$	< 0.001*

Table 1: Demographic characteristics of selected patients

The mean serum uric acid and creatinine levels were significantly elevated in GH ( $4.27 \pm 1.0 \text{ mg/dL}$ ;  $0.66 \pm 0.19 \text{ mg/dL}$ ) and NP ( $4.25 \pm 0.8 \text{ mg/dL}$ ;  $0.63 \pm 0.13 \text{ mg/dL}$ ).In NP group, 67% women had full-term

normal vaginal delivery (FTNVD). The fetal birth weight was significantly low in GH (2.31  $\pm$  0.5 kg) when compared with NP (2.74  $\pm$  0.58 kg)(9) and PIH (2.8  $\pm$  0.28 kg) groups.

Table 2: Specificity and sensitivit	y of serum uric acid and	creatinine in GH and PE
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	Cutoff	Sensitivity (%)	Specificity (%)	AUC(8)	95% CI
GH					
Uric acid (mg%)	≤3.9	36.7	58.1	0.536	0.404– 0.665
Creatinine (mg%)	>0.6	70	29.9	0.544	0.412– 0.672

### **DISCUSSION:**

Elevated uric acid levels were negatively correlated with fetal growth. However, the variations in uric acid levels were within the reference range measured in healthy human serum  $(0.12-0.39 \text{ mmol/l}^{10})$ . Hyperuricemia is associated with components of metabolic syndrome. The difference in serum uric acid levels between patients with metabolic syndrome and controls can be as low as 0.03–0.06 mmol/l, and the average serum uric acid concentration of patients with metabolic syndrome is 0.35 mmol/l. These data indicate that the fluctuations in serum uric acid levels between the SGA (0.29 mmol/l) and the AGA (0.24 mmol/l) group in our study are similar to the difference between metabolic syndrome and normal controls, suggesting that this variation might be significant for fetal growth [11].

Hypertensive disorders of pregnancy are GH and PE, increase obstetrics risk, such as abruption placenta, preterm labor, eclampsia, and HELLP syndrome. Renal dysfunction in these disorders is due to glomerular endothelial injury causing decrease in GFR. Various studies have mentioned elevated levels of renal markers, such as serum uric acid, creatinine, and urea in PE [12].

Serum creatinine is a marker of GFR and renal dysfunction. In our study, we observed elevated levels of serum creatinine in PE when compared with GH and NP. A cutoff of 0.7 mg/dL of serum creatinine had 80% sensitivity and 77.4% specificity [13].

#### **CONCLUSION:**

It is concluded that Serum uric acid and creatinine are elevated in GH whereas no significant difference was observed between PE and NP. Serum uric acid had better specificity and sensitivity for GH and also correlated negatively with fetal birth weight. Serum uric acid and creatinine levels vary with gestational age.

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