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Research Article

MATERNAL SERUM URIC ACID LEVELS AT DELIVERY AMONG GESTATIONAL HYPERTENSIVE WOMEN

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Abstract:

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. **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 Nishtar Hospital, Multan during January 2020 to June 2020. 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) ≥ 140 mmHg and diastolic blood pressure (DBP) ≥ 90 mmHg after 20 weeks of gestation. PE is GH with proteinuria – 1+ on dipstick or ≥ 300 mg/day or Pr:Cr ratio as ≥ 3.0 mg/g. **Results:** The data were collected from 100 randomly selected participants. The mean age for NP were 23.2 ± 2.9 and for GH 22.9 ± 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 obscure¹. 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 reabsorption². Serum uric acid is not only a marker of severity of disease but also contributes to the pathology of disorder³.

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 pre-pregnancy levels near term, which is related to a decrease in uric acid clearance due to post secretory reabsorption⁴.

Hyperuricemia in pregnancy is associated with adverse fetal outcome and preeclampsia. Uric acid directly inhibits amino acid transfer in the placenta and suppresses fetal growth⁵. Elevated levels of uric acid may have a proliferative and pro inflammatory effect on the small blood vessels of the placenta, resulting in small-for-gestational-age (SGA) fetuses⁶. Uric acid stimulates the production of vasoconstrictors and inflammatory agents, reduces nitric oxide production, and increases thromboxane generation in vascular smooth muscle cells⁷. 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 investigated⁸. 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 functions⁹.

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 Nishtar Hospital, Multan during January 2020 to June 2020. 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) ≥ 140 mmHg and diastolic blood pressure (DBP) ≥ 90 mmHg after 20 weeks of gestation. PE is GH with proteinuria – 1+ on dipstick or ≥ 300 mg/day or Pr:Cr ratio as ≥ 3.0 mg/g.

Biochemical analysis

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.

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

RESULTS:

The data were collected from 100 randomly selected participants. The mean age for NP were 23.2 ± 2.9 and for GH 22.9 ± 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.

Table 1: Demographic characteristics of selected patients

Parameter	NP	GH	P-Value
Age (years)	23.2 ± 2.9	22.9 ± 3.0	0.582
Gestation age (weeks)	36.4 ± 3.5	36.9 ± 2.9	0.373
SBP (mmHg)	113.2 ± 7.5	143.3 ± 8.0	<0.001*
DBP (mmHg)	75.2 ± 7.7	96.0 ± 7.2	<0.001*
Serum uric acid (mg/dL)	4.25 ± 0.80	4.27 ± 1.0	<0.001*
Serum creatinine (mg/dL)	0.63 ± 0.13	0.66 ± 0.19	<0.001*
Type of delivery			<0.001*
No. of vaginal deliveries	21	11	
No. of cesarean sections	10	19	
Birth weight (kgs)	2.8 ± 0.28	2.74 ± 0.58	<0.001*

The mean serum uric acid and creatinine levels were significantly elevated in GH (4.27 ± 1.0 mg/dL; 0.66 ± 0.19 mg/dL) and NP (4.25 ± 0.8 mg/dL; 0.63 ± 0.13 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 ± 0.5 kg) when compared with NP (2.74 ± 0.58 kg) and PIH (2.8 ± 0.28 kg) groups.

Table 2: Specificity and sensitivity of serum uric acid and creatinine in GH and PE

	Cutoff	Sensitivity (%)	Specificity (%)	AUC	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 mmol/l¹⁰). 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 growth¹¹.

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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