IJABR

International Journal of Advanced Biotechnology and Research (IJABR)
ISSN 0976-2612, Online ISSN 2278–599X,
Vol-10, Issue-2, 2019, pp545-548
http://www.bipublication.com

Research Article

Comparative Evaluation of Maternal Serum Uric Acid Levels at Delivery among Gestational Hypertensive Women and Its Effect on Fetal development

Munawar Afzal[1], Salma Zaman[2]

and Anosha Khan[3]

[1]Sahara Medical College Narowal
[2]University of Lahore, Lahore
[3]Fatima Memorial Hospital College of Medicine and Dentistry Lahore

Corresponding author: Dr Munawar Afzal, Assistant Professor in obstetrics and Gynaecology, Sahara Medical College Narowal. munawarfarid78@gmail.com

[Received: 02/02/2019; Accepted: 26/05/2019; Published: 30/05/2019]

ABSTRACT

Introduction: Hypertensive disorders complicating pregnancy are the most commonand serious medical disorder and constitute up to 2–10% of all pregnancies. Pregnancy induced hypertension, 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 Obstetrics and Gynecology department, Sahara medical College during February 2018 to November 2018. The data wascollected 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 was(5) 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.

Key words: Gestational, Hypertension, Fetal, Growth, Pregnancy

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 pre-pregnancy 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[9].

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 Obstetrics and Gynecology department, Sahara medical College during February 2018 to November 2018. 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.(6)

Exclusion criteria

Pregnant women with recurrent abortions, bad obstetric history, twins, pre-existing medical disorders such as diabetes mellitus, essential hypertension, renal disorders, cardiovascular, thyroid disorders, and liver disease were excluded from the study.

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.

Statistical analysis

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

RESULTS

The data was collectedfrom 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 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)(9) 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(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 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.

REFERENCES

1. Jeyabalan A, Conrad KP. Renal function during normal pregnancy and preeclampsia. Front Biosci. 2007;12:2425–2437.
2. Bainbridge SA, Roberts JM. Uric acid as a pathogenic factor in preeclampsia. Placenta. 2008;22:S67–S72.
3. Manjareeka M, Sitikantha N. Elevated levels of serum uric acid, creatinine or urea in preeclamptic women. Int J Med Sci Public Heal. 2013;2(1):43–47.
4. Padma Y, Aparna VB, Kalpana B, Ritika V, Sudhakar PR. Renal markers in normal and hypertensive disorders of pregnanacy in Indian women: a pilot study. Int J ReprodContraceptObs Gynecol. 2013;2:514–520.
5. Monteiro G, Subbalakshmi NK, Anupama N, Kini RD, Pai SR. A comparative study on renal function parameters and age in females with and without pre-eclampsia in a tertiary health care setup. Int J Biomed Adv Res. 2013;4(10):735–737
6. Taefi A, Jamal AS. The role of serum uric acid in preeclampsia. J FamReprod Heal. 2008;2(3):159–162.
7. Manjareeka M, Sitikantha N. Elevated levels of serum uric acid, creatinine or urea in preeclamptic women. Int J Med Sci Public Heal. 2013;2(1):43–47.
8. Barton JR, Sibai BM. Prediction and prevention of recurrent preeclampsia. *Obstetrics & Gynecology*. 2008;112(2):359–372
9. Essiben, F, Itembe, O, Foumane, P, Nguefack, MT, Eko, FE. Blood uric acid level as a marker of increased risk of eclampsia in severe pre-eclamptic patients: A cross-sectional study in two tertiary hospitals of Yaoundé, Cameroon. *Health Sci Dis*. 2016; **17**: 7– 11.
10. Tejal, P, Astha, D. Relationship of serum uric acid level to maternal and perinatal outcome in patients with hypertensive disorders of pregnancy. *Gujarat Med J*. 2014; **69**: 45– 47.
11. Rajalaxmi, K, Radhakrishna, N, Manjula, S. Serum uric acid level in preeclampsia and its correlation to maternal and fetal outcome. *Int J Biomed Res*. 2014; **5**: 22– 24.
12. Powers RW, Bodnar LM, Ness RB, Cooper KM, Gallaher MJ, Frank MP, et al. Uric acid concentrations in early pregancy among preeclamptic women with gestational hyperuricemia at delivery. Am J Obstet Gynecol. 2006;194:160.e1–160.e8.
13. Hawkins T, Roberts JM, Mangos GJ, Davis GK, Roberts LM. Plasma uric acid remains a marker of poor outcome in hypertensive pregnancy: a retrospective cohort study. BJOG