

Fetal Outcome in Women of Pre-Eclampsia with High Serum Uric Acid Levels

Hazooran Lakhan¹, Fouzia Raheem², Bushra Noor³, Kousar Jahan Abro⁴

¹Assistant Professor, Department of Obs & Gynae, Ghulam Muhammad Mahar Medical College Sukkur

²Assistant Professor, Department of Obs & Gynae ISRA University Hospital Hyderabad

³Assistant Professor, Department of Obs & Gynae, Khairpur Medical College Khairpur

⁵Consultant gynaecologist, Department of Obs & Gynae, Ghulam Muhammad Mahar Medical College Sukkur

Correspondence: Dr Hazooran Lakhan
Assistant Professor, Department of gynae
Ghulam Muhammad Mahar Medical College Sukkur
Email: hazooranlakhan@yahoo.com

Abstract

Objective: To determine the fetal outcome in pre-eclamptic women with high serum uric acid levels.

Methodology: This descriptive, cross section study was conducted at Obs & Gynae department of Ghulam Muhammad Mahar Medical College Sukkur from November 2016 to April 2017. All the patients of age from 15 to 45 years having pre-eclampsia with serum uric acid concentration >6mg/dl, gestational age 32 weeks or more were enrolled in the study. Information regarding fetal outcome was collected by self-made proforma.

Results: A total of 130 women of pre-eclampsia were enrolled. Out of all 33.0% of patients were booked and 66.9% were un-booked. Over half of the study participants, i.e. Level of uric acid in 56.6% was 7.1-8 mg/dl and in 9.2% cases, it was >8 mg/dl. The overall mean of serum uric acid concentration was 7.09±0.60 mg/dl. According to the fetal outcome, intrauterine death occurred in 14.6% neonates, low Apgar score (>7) was in 19.2% patients, preterm birth was 26% and intrauterine growth restriction was in 37 (28.5%).

Conclusion: Pre-eclamptic females with uric acid concentration >7mg/dl having more risk of adverse fetal outcomes.

Keywords: Pre-eclampsia, Serum Uric Acid, Fetal outcome.

Cite this article as: Lakahn H, Raheem F, Noor B, Abro KJ. Fetal Outcome in Women of Pre-Eclampsia with High Serum Uric Acid Levels. J Soc Obstet Gynaecol Pak. 2020; Vol 10(1):9-12.

Introduction

Preeclampsia is a serious pregnancy complication. It is a multi-system medical condition defined by hypertension, proteinuria with or without pathological edema, beyond 20th week of gestation in previously normotensive and non-proteinuric women.¹ Preeclampsia is a frequent obstetrical problem responsible for adverse effects on pregnancy outcome.² In preeclampsia, hyperuricemia is among the distinctive findings. Cases of Preeclampsia represent around 22% and 18% of maternal fatalities and preterm births respectively and raised risk of the upcoming cardiovascular condition among new mothers.³

Eclampsia, the occurrence of one or more convulsions superimposed on the syndrome of preeclampsia, occurs less frequently, complicating between 1 in 100–1700 pregnancies in the developing world and about 1 in 2000 pregnancies in Europe and other developed countries.⁴ Determination of uric acid is known to be an aspect of the screening pre-eclampsia females to monitor the severity of the disease. and aid management of these women.² Perinatal morbidity and mortality was increased in women with raised uric acid level.⁵ In preeclampsia, the uric acid concentration within the body changes due to purine metabolism, which under normal circumstances, is generally excreted from kidneys. Kidney function modifications can

Authorship Contribution: ¹ Conceived and planned the idea of the study, did part of data collection and wrote the manuscript, ²Supervised the study all along, planned, analyzed and corrected the article and provided the references, ³⁻⁶Collecting the data, carrying out the study and reviewing the literature.

Funding Source: none
Conflict of Interest: none

Received: Aug 27, 2019
Accepted: April 03, 2020

arise when there is a decline in kidney blood, reduced glomerular filtration, and clearance of uric acid and resulting in the serum uric acid levels raised.^{3,6} Population-based studies have also demonstrated that the prevalence of hypertension rises with a rising percentile of uric acid in a graded and continuous manner.⁷ It has been reported that hyperuricaemia correlates with the severity of hypertension and distinguishes reliably between pregnancy induced hypertension and chronic hypertension.⁸ However it is reported that uric acid, LDH, and calcium could be considered as a supportive diagnostic tool in hypertension disorder in pregnancy.⁹ Studies reported that The association between Uric acid and the preeclampsia-severity is positive, and a significantly negative fetal outcome has been reported in pre-eclamptic cases with elevated MSUA, and further studies have been recommended on this association.^{1,5} However, other studies mentioned that among gestational hypertensive individuals, being Small for gestational age was not linked with raised uric acid levels and uric acid does not seem to be a good prognostic indicator for feto-maternal complications severity,¹⁰ and advocates that the raised serum urea, uric acid, or serum creatinine cannot be considered as a consistent predictive indicator for preeclampsia.¹¹ However this study has been conducted to assess the fetal outcome in pre-eclamptic women having elevated serum uric acid levels.

Methodology

This cross sectional, descriptive study was undertaken in the Obs and gynae department of Ghulam Muhammad Mahar Medical College Sukkur from November 2016 to April 2017. Pregnant woman with BP above 140/90 and urinary specimen with protein urea above + 1 in dipstick or proteinuria above 300mg/1 in 24 hours in addition to gestational age \geq 32 weeks and uric acid concentration greater than 6mg/dl were included. Women with multiple pregnancies, renal disease, glucose intolerance, fetus with congenital abnormality and use of drugs affecting uric acid levels were excluded. Patients were cautiously evaluated by detailed history, BP, pulse, edema, clinical examination and obstetrical assessment performed after taking informed consent. Relevant history, medical examination and uric acid investigation were documented using structured proforma and fetal outcome was noted at a time of delivery in terms of intrauterine death, Apgar score, IUGR and preterm birth. These data were collected by self-made proforma and analyzed by SPSS version 20.

Results

A total of 130 women of pre-eclampsia were enrolled; their mean age was 25.18 ± 5.95 years (18 to 41 years). 43 (33.0%) women were booked and 87(66.9%) were unbooked. Most of the women (46.9%) were primiparous followed by 57(43.8%) having parity of 2-4 and 12(9.2%) were grand multiparous (para 5 to 7). The mean gestational age was 35.88 ± 1.66 weeks (ranging from 32-39 weeks). 52.3% of women were delivered by cesarean section, 35.4% had a spontaneous vaginal delivery and 13.1% underwent instrumental. Over the half of the study participants i.e. 56.6% had their serum acid uric level 6.1-7 mg/dl followed by 44 (33.3%) had 7.1-8 mg/dl and 12 (9.2%) had serum uric acid > 8 mg/ dl. The mean serum uric \pm SD was 7.09 ± 0.60 mg/dl. Table I

Table I: Demographic characteristics of women (n=130)

Variables	Frequency (%)
Booking status	
Booked	43(33.0%)
Un-booked	87(66.9%)
Parity	
Primiparous	61(46.9%)
2 to 4	57(43.8%)
5 to 7	12(9.2%)
Mode of delivery	
NVD	47(35.4%)
C-section	69(52.3%)
Instrumental	14(13.1%)
Uric acid level	
6.1-7 mg/dl	74(56.9%)
7.1-8 mg/dl	44(33.8%)
> 8 mg/ dl	12(9.2%)
Age (mean+SD)	25.18 ± 5.95 years
Gestational age (mean+SD)	35.88 ± 1.66 weeks

Intrauterine death occurred in 19(14.6%) neonates, low Apgar score (<7) was in 25(19.2%), preterm birth was 35(26.9%) and intrauterine growth restriction was in 37 (28.5%) Table II

Table II: Frequency of fetal outcome (n=130)

Fetal outcome	Frequency (%)
IUD	19(14.6%)
Apgar score <7	25(19.2%)
Pre-term birth	35(26.9%)
IUGR	37(28.5%)
Normal	14(10.8%)

The majority of IUGR was found in the maternal age 15-25 years (26.5%) followed by 20% in 26-35 years and 8.3% in 36-45 years. The proportion of intrauterine death was higher in the 36 to 45 years of age group where the percentage of IUD was 25% followed by 26-35 years of age group (20%) and 10.8% IUDs in the age group 15-25 years.

The proportion of preterm birth was higher in the age group 36-45 years where the proportion of preterm birth was 30.1% followed by age group 15-25 years (30.1%) and 17.1% preterm birth in the age group 26-35 years (Table II). The proportion of low Apgar score (score < 6) was found in age group 15-25 years followed by 17.1, age group 26-35 years and 16.7% in the age group 36-45 years. (Table III)

Table III: Fetal outcome according to serum uric acid level, parity and gestational age (n=116)

Variables	Fetal outcome			
	IUGR	IUD	Pre-term birth	apgar score <7)
Serum uric acid level				
6.1-7	12	04	24	18
7.1-8	23	08	11	04
>8	02	07	0	03
Parity				
Primi	21	10	13	08
2-4	14	08	20	04
5-7	02	01	02	03
Gestational age				
32-33	04	19	13	03
34-35	02	11	06	0
36-37	16	12	04	02
38-39	03	08	07	03

Discussion

Pre-eclampsia is a pregnancy-associated medical complication, which contributes greatly to perinatal and maternal mortality and morbidity, and it is also correlated with hyperuricemia.¹² Maternal hyperuricemia is linked significantly to poor fetal outcomes and preeclampsia progression.¹³ In our study, the mean age was 25.18±5.95 years. Over the half of the study participants i.e. 56.6% had their serum acid uric level 6.1-7 mg/dl followed by 44 (33.3%) had 7.1-8 mg/dl and 12 (9.2%) had serum uric acid > 8 mg/ dl. The mean serum uric was 7.09±0.60 mg/dl. In comparison to our results, a study conducted by et al¹⁴ reported an average gestational age of 36.8±0.6 weeks. At presentation, the patients' mean uric acid concentration was 5.07±1.7 mg/dl. The mean level of uric acid was 3.6±0.7 mg/dl in group A and 10±0.8 mg/dl in group B. In group A, 9.3 % of neonates were found to be small-for-gestational-age (SGA), while in group B, 23.3 % of neonates were SGA. The relative risk for the production of SGA during hyperuricemia was measured and it appeared to be significant. The average age for the participants in the study was 31.3±5 years.

In our study, Intrauterine death occurred in 19(14.6%) neonates, low Apgar score (<7) was in 25(19.2%), preterm birth was 35(26.9%) and intrauterine growth

restriction was in 37 (28.5%). On the other hand, Hussain S et al¹⁵ mentioned that in neonates of pre-eclamptic, hyperuricemic mothers there was a significant increase in the quantity of fetus with low birth weight as compared to neonates from pre-eclamptic normo-uricemic mothers.

Another study conducted by Hosna A et al¹⁶ reported that from a total of 100 cases, there have been 20 preterm babies. Thus, in hyper-uraemic, both of these irregular foetal outcomes remained 5.37 times greater than the group with a low level of serum uric acid. The average birth weight for eclampsia was recorded as 2.30 kg and 2.31 kg for preeclampsia as compared to 2.5 kg within chronic hypertension individuals. Similar results are also observed by Akter S et al¹⁷ who reported that in eclamptic group cases, 39(86%) cases had negative perinatal outcomes (stillbirth, IUGR, preterm), and healthy and term deliveries in 6 (13.3%) cases when levels of uric acid were greater than 6 mg/dl. Uric acid seems to be the final metabolite of nucleotide degradation. It is affected by diet (for example, high fructose and protein), intake of alcohol, raised turnover of cells, enzymatic abnormalities in purine metabolic processes, or abnormal function of the kidney. Because of the influence of estrogen, an elevated volume of blood, and raised glomerular filtration, levels of uric acid initially decrease by 25% to 35 % during pregnancy.¹⁸ Though, these levels gradually increase to the one noticed among nonpregnant females before term gestation (4-6mg/dl). However, Zangana JM et al¹² also stated that pre-eclamptic women having elevated level of uric acid, showed adverse perinatal outcome as IUGR 17.32%, intrauterine fetal death 14.17% and 11.81% early neonatal death.

In our study, there was a higher rate of preterm births in the 36 to 45 years of age group. The proportion of low Apgar score (score < 6) was seen in the 15 to 25 years of age group. In comparison to our results, a study conducted by Andrew L et al¹⁹ reported that 25.1% of cases were observed with perinatal mortality, 76% out of these (25.1%) were stillbirths and 24% were neonatal deaths, and out of those 25.1% perinatal deaths, uric acid concentration was greater than 5.5mg/dl in 72% cases.

Conclusion

Pre eclampsia is a high risk pregnancy still is a major obstetrical and perinatal challenge. Intrauterine growth restriction and preterm birth are common. Pre-eclamptic women with uric acid level >7mg/dl having more risk of adverse fetal outcome.

References

1. Meena R, Pachori P, Chaudhary S, ChandraKanta. Level of serum uric acid in patients with preeclampsia compared to controls and its relation

- to fetomaternal outcome. *Int J Reprod Contracept Obstet Gynecol.* 2019;8:2471-2474.
2. Khurshid R, Shamsi A, Fayyaz I. Maternal serum uric acid level during pregnancy: a biomarker for preeclampsia. *Age (years).* 2016;28(4.11):29-07.
 3. Aswita A, Arsulfa A, Melania M, Nurmiaty N. Uric Acid Level as Predictor Preeclampsia in Pregnant Woman at Working Area of Public Health Centers in Kendari City, Southeast Sulawesi Province. *IJSBAR.* 2018;38;2:237-246.
 4. Ilanchezian T, Priya RS, Suganya S and Rajagopalan B: A study to evaluate the renal function parameters in preclampsia. *Int J Pharm Sci Res.* 2017; 8(1): 213-216.
 5. Singh A, Sharma P, Malla R, Singh S. Raised Uric Acid Level and Fetal Outcome in Hypertensive Disorders of Pregnancy. *Nepal Journal of Obstetrics and Gynaecology.* 2014;9(1):78-81.
 6. Giordano C, Karasik O, King-Morris K, Asmar A. Uric acid as a marker of kidney disease: review of the current literature. *Disease markers.* 2015 Oct;2015.
 7. Feig DI, Nakagawa T, Karumanchi SA, Kang DH, Johnson RJ. Uric acid, nephron number and the pathogenesis of essential hypertension. *American Journal of Hypertension.* 2004;17(5):S21.
 8. Diwan J, Shah C, Dixit R, Anand AK. A comparative study of serum uric acid level in normal pregnancy, and pregnancy induced hypertension. *International Journal of Medicine and Public Health.* 2011;1(1):39-41.
 9. Mehta M, Deokar P, Nagdeote A. A comparative study of serum uric acid, serum lactate dehydrogenase and serum calcium in hypertensive disorders of pregnancy and normal pregnancy. *International Journal of Clinical Biochemistry and Research.* 2019;6(1):90-94.
 10. Williams KP, Galerneau F. The role of serum uric acid as a prognostic indicator of the severity of maternal and fetal complications in hypertensive pregnancies. *Journal of obstetrics and gynaecology Canada.* 2002;24(8):628-632.
 11. Manjareeka M, Nanda S. Elevated levels of serum uric acid, creatinine or urea in preeclamptic women. *Int J Med Sci Public Health.* 2013;2(1):43-47.
 12. Zangana JM, Hamadamen AI. Serum uric acid as a predictor of perinatal outcome in women with pre-eclampsia. *International Journal of Medical Research & Health Sciences.* 2018;7(3):168-174.
 13. Ryu A, Cho NJ, Kim YS, Lee EY. Predictive value of serum uric acid levels for adverse perinatal outcomes in preeclampsia. *Medicine.* 2019;98(18): e15462.
 14. Khaleeq A. Hyperuricemia as a predictor of poor fetal outcome in pre-eclamptic women. *JRMC.* 2015;30;19(2):171-173.
 15. Hussain SS, Choudhury MB, Akhter J, Begum S, Mowsumi FR, Azad MK. Fetal outcome of pre-eclamptic mothers with hyperuricemia. *Journal of Dhaka National Medical College & Hospital.* 2011;17(1):41-43.
 16. Hosna A, Bhuiyan A, E-Ferdous N, Ahmed M, Siddique M, Salman M, Begum S, Rahman M, & Ahsa, M. Effects of hyperuricemia on perinatal outcome in hypertensive disorder of pregnancy. *University Heart Journal.* 2009; 4(2): 36-40.
 17. Akhter S, Sultana S, & Dabee S. Association of Hyperuricaemia with Perinatal Outcome in Pregnancy Induced Hypertension. *Journal of Bangladesh College of Physicians and Surgeons.* 2015; 32(3): 124-129.
 18. Akahori Y, Masuyama H, Hiramatsu Y. The correlation of maternal uric acid concentration with small-for-gestational-age fetuses in normotensive pregnant women. *Gynecologic and Obstetric Investigation.* 2012;73(2):162-7.
 19. Andrew L, Patel N. Uric acid levels in pregnancy induced hypertension (PIH) in relation to maternal and perinatal outcomes. *Int J Clin Biochem Res.* 2016;3(2):150-153.