

Hyperuricemia: Increase Risk of Maternal & Fetal Complications (Outcome) in Preeclampsia

Dr Monali Rewatkar¹, Dr Kshama Kedar², Dr Arun Tadas³

¹Assistant Professor, Department of Biochemistry, IGGMC, Nagpur, Maharashtra, India

²Associate Professor, Department of OBGY, IGGMC, Nagpur, Maharashtra, India

³Professor & Head, Department of Biochemistry, IGGMC, Nagpur, Maharashtra, India

Abstract: Background: Preeclampsia is a multisystem disorder & most common cause of maternal & fetal death in India & all over the world [1]. Hypertension in pregnancy after 28 wks can cause poor perinatal outcome. Increased serum uric acid level (hyperuricemia) in Preeclampsia[2] further increases risk of complicated pregnancy like premature delivery, foetal distress, maternal & fetal death etc So, increase serum uric acid level is one of the prognostic factor for determination of perinatal outcome. Materials & Methods: 100 Preeclampsia women admitted in OBGY ward after 28 wks of pregnancy were selected as cases & 100 Normotensive pregnant women attending Biochemistry OPD were selected as control (>28 wks of pregnancy). Serum Uric acid level was estimated in Biochemistry clinical Laboratory on Autoanalyser in all cases and control & values was compared. Follow up study was taken of Preeclampsia women with hyperuricemia regarding their maternal & fetal outcome till delivery & its outcome was correlated with hyperuricemia. Result: Our study shows increase level of serum uric acid in Preeclampsia compared to Normotensive which is statistically significant (P value < 0.05) which shows association of hyperuricemia with Preeclampsia. Current study also shows that there is positive and statistically significant relationship between hyperuricaemia in Preeclampsia patients with maternal & fetal outcome. Preeclampsia with hyperuricemia shows increase risk of maternal & fetal complications like PPH, premature deliveries, IUGR, foetal distress etc, resp, which is statistically significant. Conclusion: Preeclampsia is a common cause of maternal death. Hyperuricemia progresses disease, Increase serum uric acid level in Preeclampsia increases risk of maternal & fetal complications & poor perinatal outcome. So early screening for Serum uric acid level must be advised in pregnancy to prevent further risk.

Keywords: Hyperuricaemia, Preeclampsia, Fetal outcome, Maternal outcome

1. Introduction

Preeclampsia, hypertensive disorder during pregnancy, increases the maternal and fetal risk [1] Serum uric acid level is one of the parameter used in early diagnosis of Preeclampsia[2]. Uric acid is a product of purine degradation catalysed by the enzyme xanthine oxidase. In normal pregnant women serum uric acid concentration initially falls 25-30% due to elevation in renal clearance secondary to increased GFR or reduced proximal tubular reabsorption due to changes in its production rate. Later in pregnancy the serum uric acid levels increase due to foetal production, decreased uric acid clearance and decreased binding to albumin[3]. Uric acid is filtered, reabsorbed and secreted by the kidney. So hyperuricemia in Preeclampsia is mainly due to increased reabsorption and decreased excretion of uric acid.[4] Williams et al, stated that in PIH there was impaired glomerular filtrate rate (GFR) and an increased tubular reabsorption of uric acid, leading to impaired uric acid clearance.[5]

Preeclampsia with hyperuricemia further increases risk of perinatal mortality by fivefold and kills 50, 000 women yearly worldwide [6]. Many clinical and biochemical parameters have been used to detect pregnancy induced hypertension (PIH) and to assess its severity. [10] Unfortunately most of the available parameters till date are neither specific nor always sensitive. Elevated serum uric acid is one of the earliest detectable changes in preeclampsia and has been cited as a better predictor of fetal risk than blood pressure [7, 8].

Preeclampsia with hyperuricaemia increases risk of adverse fetal outcome including preterm birth and small for gestational age (SGA) compared to women with gestational

hypertension or preeclampsia without hyperuricaemia [11]. In the present study we tried to find out whether raised serum uric acid has an adverse effect on perinatal outcome in preeclampsia with hyperuricemia.[13] We also tried to find out if serum uric acid concentration can be used as a screening test for the prediction of perinatal prognosis.[14, 17]

2. Objectives of the study

- To compare & correlate association of elevated serum uric acid level (hyperuricemia) in Pre-Eclampsia with normotensive pregnant women after 28th wks of gestation (in 3rd trimester)
- To study the maternal & perinatal outcome of pregnancy in Pre-Eclampsia with hyperuricemia.

Method of collection of data & selection of subjects:

100 pre-eclampsia patients were selected for study from OBGY wards of Indira Gandhi Government Medical College & Hospital, Nagpur(tertiary care centre) & 100 Normotensive pregnant women in last trimester was taken as control from Clinical Biochemistry OPD, IGGMC, Nagpur. Study was approved by Institutional ethical committee, IGGMC, Nagpur. All details of study were explained to the subject and informed consent was taken & clinical examination & history was taken as per the proforma.

Selection of the Subject:

Inclusion Criteria

- 100 diagnosed Pre-Eclampsia patients admitted in OBGY wards of IGGMC, Nagpur was taken as cases and their

follow up was taken till their delivery to know outcome of fetal as well as mother.

- b) 100 age matched normotensive pregnant (ANC) women in 3rd trimester of pregnancy, attending Biochemistry OPD were selected as control & blood investigations was done
- c) All Pregnant women included in study were of 20-40 years of age

Exclusion Criteria

- a) Pregnant women with gestational diabetes mellitus
- b) Pregnant women with pre-existing hypertension, renal failure, heartdisease,
- c) Pregnant women of less than 20 years and more than 40 years of age
- d) Past history of hyper uricemia, Renal dysfunction, Liver Dysfunction, Chronic Hypertension., Gout., History of Drug and alcohol abuse.

Collection of Sample

Informed consent of each patient (cases & control) taken.

About 2/3 ml venous blood sample required from each patient and control from antecubital vein for the estimation of serum uric acid. It was taken easily by disposable syringe and needle with all aseptic precautions. For estimation of serum uric acid - venous blood sample (2/3 ml) was collected in plain bulb.

Invasive Procedure: Venous blood sample was obtained by venipuncture & about 2/3 ml was drawn during investigation.

Ethical clearance obtained from Institutional Ethics committee.

Patients Consent form was taken & Uric acid level was estimated & compared in Normotensive pregnant women with Preeclampsia age matched women.

Methods

For Serum Uric acid Estimation -Kit based on Uricase method

Analysis was carried on Autoanalyser EM – 460 in clinical Biochemistry lab, IGGMC

Also hyperuricemia & pregnancy outcome (maternal as well as fetal) was correlated.

Outcome was studied as -

a) Maternal Outcome–

- Normal delivery –Spontaneous/ Induced
- LSCS delivery – Elective/Emergency
- Convulsions - PPH –

b) Fetal (Perinatal)–

- Baby weight - IUGR - Sex –
- Preterm Stillbirth/Live birth –
- Other Complications – NICU

3. Results

Table 1: Serum Uric acid level in Preeclampsia & Normotensive pregnant women (>28 wks of pregnancy)

Group	Total No	Serum Uric acid (mg%)	SD	P Value	Significance
		Mean			
I Cases	Preeclampsia (100)	6.413	1.2690	0.000	Significant
II Control	Normotensive Pregnant women (100)	4.482	0.8027		

Table 2: Association of Hyperuricemia in Preeclampsia & Preterm deliveries

Preeclampsia (>28 wks)	Serum Uric acid level (mg%)	Total No (100)	Preterm Delivery	Normal Delivery	P Value	Significance	% of Preterm
	> 6mg %	63	27	36	0.00006	Significant < 0.05	42.86%
	< 6mg %	37	2	35			5.41%
Total		100	29	71			

Table 3: Association of Hyperuricemia in Preeclampsia & IUGR

Preeclampsia (>28 wks)	Serum Uric acid level (mg%)	Total No (100)	IUGR Wt of Baby (<1.5 kg)	Wt of Baby (>1.5 Kg)	P Value	Significance	% of Preterm
	> 6mg %	63	29	34	0.00008	Significant < 0.05	46.03 %
	< 6mg %	37	3	34			8.11 %
Total		100	29	68			

Table 4: Association of Hyperuricemia in Preeclampsia & Foetal Distress

Preeclampsia (>28 wks)	Serum Uric acid level (mg%)	Total No (100)	Foetal Distress	No Foetal Distress	P Value	Significance	% of Preterm
	> 6mg %	63	29	34	0.0000	Significant < 0.05	46.86%
	< 6mg %	37	0	37			0 %
Total		100	29	71			

Table 5: Association of Hyperuricemia in Preeclampsia & PPH

Preeclampsia (>28 wks)	Serum Uric acid level (mg%)	Total No (100)	PPH	No Foetal Distress	P Value	Significance	% of Preterm
	> 6mg %	63	15	48	0.006	Significant < 0.05	23.81%
	< 6mg %	37	2	35			2.70 %
Total		100	16	83			

Table 6: Association of Hyperuricemia in Preeclampsia & Maternal Death

Preeclampsia (>28 wks)	Serum Uric acid Level (mg%)	Total No (100)	Maternal death	No Death	P Value	Significance	% of Preterm
	> 6mg %	63	2	61	0.3976	>0.05	3.174 %
	< 6mg %	37	0	37		NS	0 %
Total		100	2	98			

4. Discussion

Preeclampsia is a multisystem disorder occurring in pregnancy and the puerperium which is characterised by development of hypertension of 140/90 mmHg and above after the 20th wk in a previously normotensive patient.[1] Uric acid is the end product of purine metabolism.

Normal Serum Uric Acid level – 3-6 mg%

Hyperuricemia is increased in blood levels of uric acid that is greater than 7 mg% in men and more than 6 mg% in women. Uric acid is filtered through the glomeruli and reabsorbed in the proximal tubules.

In last trimester of pregnancy in PIH, there is impaired glomerular filtrate rate (GFR) & increased reabsorption and decreased excretion of uric acid which result in increased level of serum uric acid (hyperuricemia) [2]. So hyperuricemia is due to decline in renal uric acid clearance. In our study **Table No 1** shows increased Serum uric acid level in preeclampsia compared to normotensive age matched pregnant women (control) which is statistically significant (P value < 0.05) These results are comparable to those of Lim et al, Williams et al. Lim et al study shows the mean serum uric acid values for women with preeclampsia (6.2±1.4 mg/dl) and were significantly higher than those of controls (4.3±0.8 mg/dl, p <0.05) which is comparable to our study.[2, 5]

- Preeclampsia with hyperuricemia is one of the most potential complications contributing to preterm labour/delivery, perinatal mortality, maternal mortality, intra-uterine growth retardation, low birth weight and many such related problems[11, 13].
- The maternal outcome was noted in terms of the mode of termination of pregnancy, maternal complications (PPH) and maternal death.
- Fetal outcome was assessed by perinatal morbidity and mortality, preterm delivery, IUGR, foetal distress.
- Results of our study shows significant correlation of Hyperuricemia with Maternal & Foetal outcome like Preterm delivery, PPH, IUGR & foetal distress.

Table 2 shows hyperuricemia in preeclampsia women ie Uric acid level >6mg% is seen in 63 preeclampsia patients of which 27 have preterm deliveries. So 42.86%

preeclampsia patients with hyperuricemia shows preterm deliveries which is statistically significant (P value 0.0006)

Table 3 shows increased uric acid level (hyperuricemia) in 63 preeclampsia women of which about 29 mothers give birth to low birth wt babies (IUGR, wt < 1.5 kg) So about 46.03% preeclampsia with hyperuricemiapts have IUGR babies which is statistically significant (P value 0.00008)

Table 4 shows increased uric acid level (hyperuricemia) in 63 preeclampsia women of which 29 babies suffer from fetal distress while 34 were normal So about 46.03% preeclampsia with hyperuricemiapts have babies suffering from fetal distress which is statistically significant (P value < 0.05)

Table 5 shows increased uric acid level (hyperuricemia) in 63 preeclampsia women of which about 15 mothers suffer from PPH. So about 23.81% preeclampsia with hyperuricemiapts have PPH babies which is statistically significant (P value 0.006)

Table 6 shows association of hyperuricemia in preeclampsia is not statistically significant with maternal death in our study.

Results of this study shows adverse perinatal outcomes were more in hyperuricemia. Therefore, estimation of serum uric acid does help to identify fetus at risk of developing adverse perinatal consequences and to assess severity of the disease. A laboratory investigation of serum uric acid is simple test and can be easily performed in any laboratory.

Krishna S et al, Thanna et al, Yalamati P et al, [8, 16, 18] concluded that high serum uric acid level could be a useful indicator of the maternal and fetal complication which is comparable to our study. Hawkins TL et al, studied of hypertensive pregnant women (those with pre-eclampsia or gestational hypertension) the risk of adverse maternal outcome and adverse fetal outcome increased with increasing concentration of uric acid which is compared[13].Maximum number of adverse outcomes belonged to serum uric acid level >6 mg/dl compared to < 6 mg/dl. Similar observation was made by Yassae [8].

5. Conclusion

Hyperuricaemia a marker for preeclampsia and as a predictor of adverse maternal and fetal outcome [14, 17]. Results of our study shows correlation between elevated

maternal serum uric acid and adverse maternal and foetal outcome.

There is no screening test reliable enough to diagnose pre-eclampsia. Uric acid is one of the most sensitive indicators of disease severity in pregnancy induced hypertensive disorders and can be of great help in monitoring the cause of disease process and helpful in preventing complicated pregnancy specially improving perinatal outcome. [20] So estimation of Serum uric acid level in maternal blood can be a useful indicator of maternal and foetal complication in hypertensive pregnancies & helpful in preventing further risk

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