

Serum Uric Acid Level in Primigravidae with Pre-Eclampsia: A Case Control Study from Karnataka

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Abstract

Introduction: Pregnancy induced hypertension is an exclusive condition affecting 10% of pregnant women. The study of uric acid in serum is an interesting problem especially in normal pregnancy and pregnancy induced hypertension (PIH). **Objective:** To compare the changes of serum uric acid level in healthy non pregnant, PIH and normotensive pregnant women. **Methodology:** Cross sectional observational study conducted in the Obstetrics and Gynecology department, hospital, Navodaya medical college, Raichur, Karnataka involving 30 each pregnant, PIH and non-pregnant women. Serum uric acid levels were measured and analysed the data using SPSS 23 version software. **Results:** Comparison of mean serum uric acid level in pregnant normotensive (4.14±1.05) and in PIH women (6.03±1.61) was found significant. Comparison of mean serum uric acid level in pregnant normotensive women (4.14±1.05) and in non pregnant women (3.39±0.5) found significant. Mean serum uric acid level in PIH women was 6.03±1.61 whereas in non pregnant women was 3.39±0.5 (p<0.001). **Conclusion:** Serum uric acid level is at higher side in PIH women as compared to pregnant normotensives and non pregnant women in our study.

Key words: Serum uric acid, PIH, preeclampsia, pregnancy

Introduction

Quality of life of mother and newborn has become an important concern in today's era. Hypertensive disorders are amongst the most common medical disorders during pregnancy. It is also responsible for maternal and perinatal morbidity and mortality.¹ In developing countries 7-10% of all pregnancies complicated by some form of hypertensive disorder and lead to various maternal and fetal complications.² Pre-eclampsia and eclampsia is still reported as "a disease of theories" since its etiology is still obscured. The crux in the pathophysiology of pre-eclampsia appears to be endothelial cell dysfunction.³ Pre-eclampsia is a multisystem disorder characterized by hypertension to the extent of 140/90 mm Hg or more, proteinuria (≥300mg/day) and edema induced by pregnancy after 20th week.⁴ We know that serial changes

occur in serum uric acid level in normal pregnancy and pregnancy induced hypertension.^{5,6} The raised levels of uric acid in the pregnancy induced hypertension were considered to be due to its diminished destruction in liver. Stander and Cadden⁷ did not find impairment of uric acid excretion, but, Seitchik⁸ showed that there was excessive reabsorption of urate by renal tubules in toxæmic conditions. Reduced uric acid clearance secondary to reduced glomerular filtration rate, increased reabsorption, and decreased secretion may be at the origin of elevated serum levels in women with preeclampsia.^{9,10}

So, in view of the greater emphasis being placed on maternal and child health in present era, we want to revisit serum uric acid as a useful biomarker, which is extremely cheap & widely available and early screening will definitely help in prevention of medical emergency.

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Objectives:

- To compare the changes of serum uric acid level in healthy non pregnant women and healthy pregnant women

- To compare the changes of serum uric acid level in healthy pregnant women and pre-eclampsia patients
- To compare the changes of serum uric acid level in healthy non pregnant women and pre-eclampsia patients

Methodology

Study population: The study was conducted in the Obstetrics and Gynecology department, Navodaya medical college, Raichur, Karnataka. Total 90 women volunteers were selected out of which 30 healthy non-pregnant women, 30 pregnant women and 30 pregnant women with preeclampsia were considered as subjects. 30 healthy non-pregnant women were considered as control. 30 normal pregnant and 30 pre-eclamptic women were taken from the outpatients and inpatients wards of Obstetrics and Gynecology department. Ethical Clearance was taken from Institutional Ethical Committee.

Study duration: one year

Study design: Case control study

Inclusion criteria:

- Age >18 years, singleton pregnancy beyond the 20th week pregnancy was taken for the study
- 30 healthy pregnant women were considered for the study.
- 30 pregnant women with pre-eclampsia who fulfill above criteria was considered.

Exclusion Criteria: Patients with history of hyperuricemia, preexisting diabetes, hypertension, renal disease, thyrotoxicosis, liver disease, cardiovascular illness, and symptomatic infectious diseases were excluded.

The diagnosis of preeclampsia was based on the definition of American College of Obstetrics and Gynaecologists.¹⁴ The criteria is as stated below:

1. Systolic blood pressure greater than 140 mm Hg or a rise of at least 30 mm Hg, and/ or
2. Diastolic blood pressure greater than 90 mm Hg or a rise of at least 15 mm Hg (manifested on two occasions at least 6 hours apart), and/ or
3. Proteinuria of 300 mg or greater in 24 hours

urine collection or protein concentration of 1gm/ L (on two occasions at least 6 hours apart).

30 normal, healthy non-pregnant female volunteers selected for control study. They were of comparable age, and physical activity. They were non-smoker, not taking tobacco and free from any other metabolic or organic disorders. We collected necessary information about subject in Performa.

Method of collection of data: Each subject taking part in the study was explained about the purpose of the study and procedure to be adopted in the study. Informed consent was taken from all the subjects. A detailed history followed by clinical examination was carried out for each one of the subject.

Procedure: The blood pressure of the participants were measured with a standard mercury sphygmomanometer. Three readings were taken at the interval of 10 minutes. Proteinuria analysis were performed using standard procedures. Blood samples of participants were taken from right or left cubital vein would be collected in plain tubes and serum levels of uric acid was measured.

Determination of uric acid was carried out by quantitative estimation on colorimetric method by enzymatic uricase method, which has many advantages like single reagent system, one step procedure, prevents protein precipitation. Highly sensitive and specific and the reagent was stable. It is a very speedy method and one can determine uric acid within 5 minutes and very small amount of serum was required.

Statistical analysis: Data was entered in MS excel sheet and analysed by using SPSS 23.0 version. The quantitative data was expressed as mean and standard deviation. Comparison of mean between two groups was done by using unpaired t test. A p value less than 0.05 was considered as significant whereas p<0.001 was considered as highly significant.

Results

Table 1 depicts distribution of study population according to age group. In our study we involved 30 women in each group. Commonly observed age group in our study was between 21 to 30 years in all three groups. 93.3% pregnant women, 63.3% PIH women and 60% non pregnant women belongs to this age group.

Table 2 shows distribution according to mean age group of study population. Mean age of pregnant normotensive women was 25.53± 3.16 years. Mean age of PIH women was 24.33± 4.70 years. Mean age of non-pregnant women was 21.53± 2.46 years.

Table 3 explains about comparison of mean serum uric acid level in pregnant normotensive and PIH women. Mean serum uric acid level in pregnant normotensive women was 4.14±1.05 whereas in PIH women was 6.03±1.61. When we compared the uric acid levels in both groups, it was found to be statistically significant (p<0.001). It means serum uric acid level in PIH group was considerably higher as compared to pregnant normotensive women in our study.

Table 4 explains comparison of mean serum uric acid level in pregnant normotensive and non pregnant

women. Mean serum uric acid level in pregnant normotensive women was 4.14±1.05 whereas in non pregnant women was 3.39±0.5. When we compared the uric acid levels in both groups, it was found to be statistically significant (p<0.001). It means serum uric acid level in pregnant normotensive group was at higher side compared to non pregnant women in our study.

Table 5 shows comparison of mean serum uric acid level in PIH and non pregnant women. Mean serum uric acid level in PIH women was 6.03±1.61 whereas in non pregnant women was 3.39±0.5. When we compared the uric acid levels in both groups, it was found to be statistically significant (p<0.001). It means serum uric acid level in PIH group was at higher side compared to non pregnant women in our study.

Table 1: Distribution according to age group of study population

Frequency		Pregnant		PIH		Non pregnant	
		Percent	Frequency	Percent	Frequency	Percent	Frequency
Age group in years	≤ 20	1	3.3	8	26.7	12	40.0
	21-30	28	93.3	19	63.3	18	60.0
	> 30	1	3.3	3	10.0	0	0
	Total	30	100.0	30	100.0	30	100.0

Table 2: Distribution according to mean age group of study population

	Mean	Std. Deviation
Pregnant	25.53	3.16
PIH	24.33	4.70
Non pregnant	21.53	2.46

Table 3: Comparison of mean serum uric acid level in pregnant normotensive and PIH women

	Group	N	Mean	Std. Deviation	t	p	Inference
Uric acid	Pregnant	30	4.14	1.05	-5.403	0.0001	Highly significant
	PIH	30	6.03	1.61		(<0.001)	

Table 4: Comparison of mean serum uric acid level in pregnant normotensive and non pregnant women

	Group	N	Mean	Std. Deviation	t	p	Inference
Uric acid	Pregnant	30	4.14	1.05	3.500	0.001	Highly significant
	Non pregnant	30	3.39	.50		(≤ 0.001)	

Table 5: Comparison of mean serum uric acid level in PIH and non pregnant women

	Group	N	Mean	Std. Deviation	t	p	Inference
Uric acid	PIH	30	6.03	1.61	8.571	0.0001	Highly significant
	Non pregnant	30	3.39	.50		(<0.001)	

Discussion

In our study we involved 30 women in each group. Commonly observed age group in our study was between 21 to 30 years in all three groups. 93.3% pregnant women, 63.3% PIH women and 60% non-pregnant women belong to this age group. (table 1)

Mean age of pregnant normotensive women was 25.53 ± 3.16 years. Mean age of PIH women was 24.33 ± 4.70 years. Mean age of non-pregnant women was 21.53 ± 2.46 years (table 2).

Ajay kumar Singh et al¹¹ conducted the study in Uttar Pradesh and reported the mean age 27.40 ± 3.55 years in Normotensives and 27.03 ± 3.91 years in PIH women in his study.

Mean serum uric acid level in pregnant normotensive women was 4.14 ± 1.05 whereas in PIH women was 6.03 ± 1.61 . When we compared the uric acid levels in both groups, it was found to be statistically significant ($p < 0.001$). It means serum uric acid level in PIH group was considerably higher as compared to pregnant normotensive women in our study. (table 3)

Ajay kumar Singh et al¹¹ found that mean serum uric acid level in normotensives was 4.94 ± 0.83 whereas in PIH it was 7.63 ± 0.59 . The difference was significant.

Jasmin Diwan et al¹² from Jamnagar, Gujrat reported that mean serum uric acid level was 4.6 ± 0.42 in normal pregnancy and it was 7.6 ± 0.76 in PIH women. They

also found the difference between two groups serum uric acid significant.

Patel Tejal et al¹³ determined the mean serum uric acid level in the last trimester of pregnancy for the normal women to be 3.5 ± 0.6 mg% and in preeclampsia group it was 6.4 ± 1.7 mg%.

There are couple of previous studies that highlights on the uric acid level in preeclampsia and its significant rise.¹⁴⁻¹⁶

Serum uric acid is one of the parameters used in early diagnosis of pregnancy induced hypertension. It was reported that there is positive correlation between hyperuricaemia and hypertension which distinguishes between pregnancy induced hypertension and chronic hypertension.

Mean serum uric acid level in pregnant normotensive women was 4.14 ± 1.05 whereas in non-pregnant women was 3.39 ± 0.5 . When we compared the uric acid levels in both groups, it was found to be statistically significant ($p < 0.001$). It means serum uric acid level in pregnant normotensive group was at higher side compared to non-pregnant women in our study. (table 4). Mean serum uric acid level in PIH women was 6.03 ± 1.61 whereas in non pregnant women was 3.39 ± 0.5 . When we compared the uric acid levels in both groups, it was found to be statistically significant ($p < 0.001$). It means serum uric acid level in PIH group was at higher side compared to non pregnant women in our study. (table 5)

Shah C J et al.¹⁷ stated that serum uric acid levels are significantly raised in pre eclampsia than normal pregnancy and there is a high positive correlation with the disease severity in relation to hypertension and proteinuria. Lim KH et al.¹⁸ also stressed on the clinical utility of serum uric acid measurements in hypertensive diseases of pregnancy.

In non-pregnant women, hyperuricemia is an independent predictor of cardiovascular and renal disease in general population and in chronic hypertension. Elevated uric acid level in maternal blood, presumably due to reduced renal urate excretion is frequently noted in preeclampsia.

Conclusion

Serum uric acid level is at higher side in PIH women as compared to pregnant normotensives and non pregnant women in our study. Present study shows that uric acid is one of the important laboratory tests for screening of pre-eclampsia. The importance of continuous antenatal surveillance and thereof uric acid by laboratory test in early identification of suspected and established cases of hypertension in pregnancy is thus evident. The disease can be identified early and its deterioration prevented by proper management.

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Ethical Clearance : Obtained from ethical clearance obtained from Human Ethical committee of Navodaya Medical College and Research center, Raichur.

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