

Original Research Article

A STUDY ON EVALUATION OF EFFICACY OF SERUM URIC ACID LEVELS IN PREDICTING MATERNAL AND FETAL OUTCOMES IN HYPERTENSIVE DISORDERS OF PREGNANCY

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ABSTRACT

Background: Serum uric acid is a terminal metabolism product of protein degradation. Serum uric acid levels are low in early pregnancy but gradually rise in late pregnancy. Uric acid levels are observed to have a correlation between severity of pregnancy induced hypertension. This study has been conducted to evaluate the same in patients with pregnancy induced hypertension presenting to a tertiary care center in south India.

Materials and Methods: Out of the total of 760 patients who were admitted in the Department of Obstetrics, Kamineni institute of medical sciences, Narketpally, over a period of 1 year, 100 patients who had pregnancy induced hypertension were included in the study.

Results: The incidence of pregnancy induced hypertension in present study was 13.15%. Most of the cases had pre-eclampsia (62%). Only 55% of the patients were booked. Most of the patients were primigravida and belonged to low socio-economic groups. Most common maternal complication was development of pre-eclampsia. 30% had adverse perinatal outcomes. The mortality rate of present study was 2%.

Conclusion: Significant correlation between serum uric acid levels and severity of pregnancy induced hypertension severity has been observed in present study. obstetricians should be aware and alert while managing patients with pre-eclampsia so as to monitor the outcomes. Serum uric acid level estimation is a low cost biomarker which should be included in the routine hematological investigations to monitor any progression throughout pregnancy.

Keywords: Pregnancy induced hypertension, pre-eclampsia, eclampsia, serum uric acid levels, perinatal outcomes.

INTRODUCTION

Hypertension is the most common medical disorder occurring during pregnancy, complicating upto 5-10% of all pregnancies. It is the leading cause of poor perinatal, fetal and maternal outcomes, especially in developing countries.^[1-2]

Pregnancy is characterized by increase in hemodynamic and metabolic needs which gradually progress with each trimester, with the highest adaptations seen in last trimester.^[3] The increase in cardiovascular adaptations also brings about increase in arterial blood pressure. Thus accurate blood pressure measurement and its monitoring throughout

pregnancy are vital for on time detection and management of hypertensive disorders in pregnancy (HDP).

The American College of Obstetricians and Gynecologists (ACOG) defines maternal hypertension as when systolic blood pressure is > 140 mmHg and/ or diastolic blood pressure is > 90 mmHg on 2 or more occasions measured at least 4 hours apart.^[4,5]

The spectrum of HDP's includes chronic hypertension, chronic hypertension super-imposed with pre-eclampsia, gestational hypertension, pre-eclampsia and eclampsia. Maternal age > 40 years, maternal obesity, excess weight gain during

pregnancy, family history of hypertension and gestational diabetes are all associated with increased risks of maternal hypertension.^[6]

Over a century ago, high levels of uric acid in eclamptic women were reported by Slemmons et al,^[7] In early pregnancy, serum uric acid levels decline due to uricosuric action of estrogen, pregnancy induced plasma volume expansion and increase in maternal renal blood flow. However, due to increased fetal production of uric acid and decline in maternal glomerular filtration, an increase of serum uric acid levels is observed during late pregnancy.^[8,9]

Rising levels of serum uric acid is associated with endothelial dysfunction, one of the major pathological process by which pre-eclampsia develops.^[10,11]

Since then uric acid is considered to one of the many risk factors for pre-eclampsia. However, due to inconsistent data and scarcity of studies in South-Indian population, this study was conducted.

MATERIAL AND METHODS

This prospective observational study was conducted in the Department of Obstetrics, Kamineni institute of medical sciences, Narketpally, over a period of 1 year, i.e. from March 2023 to February 2024. All pregnant women who gave consent to participate in the study were included. Women with previous history of hyperuricemia, pre-existing medical conditions like diabetes, hypertension, obesity, renal disease, cardiovascular conditions, thyroid disorders or any other endocrine condition, malignancy or any hematological condition and any other infections were excluded from the study. Patients with history of substance use such as smoking, alcohol consumption were also excluded from the study. A detailed demographic, family and clinical history was taken. General physical examination was done. Blood pressure was measured after a rest of minimum 2 hours using mercurial sphygmomanometer in semi-reclined position over the right brachial artery. An average of 3 reading was taken with a gap of 10 minutes between each reading.

Apart from routine hematological investigations, serum uric acid levels, presence of urine protein using dipstick (graded as Trace, 0.1gm/L; 1+, 0.3gm/L; 2+, 1gm/L; 3+, 3.0gm/L; 4+, 10gm/L) were estimated.

Definitions:^[12-14]

Hypertension during pregnancy: defined as systolic blood pressure > 140 mmHg and/ or diastolic blood pressure is > 90 mmHg on 2 or more occasions measured at least 4 hours apart or a single measurement of diastolic blood pressure >110 mmHg.

Severe hypertension during pregnancy: defined as systolic blood pressure > 160 mmHg and diastolic blood pressure > 110 mmHg.

Gestational hypertension: new onset of hypertension with systolic blood pressure > 140 mmHg and diastolic blood pressure > 90 mmHg at > 20 weeks of gestation in absence of proteinuria or any signs of end-organ damage.

Pre-eclampsia: defined as blood pressure above 140/90 mmHg or more measured on more than two occasions, six hours apart; or presence of proteinuria of at least 300 mg in 24 hours; or presence of at least 1+ on dipstick testing for urine protein estimation.

Severe pre-eclampsia: defined as blood pressure of 160/110 mmHg or more measured on >2 occasions, 6 hours apart.

Eclampsia: defined as pre-eclampsia complicated by seizures.

A total of 760 women got admitted during this period, of which 100 women had an average blood pressure of >140/90 mmHg. 50 normotensive pregnant women were kept as controls. All the pregnancies were singleton.

The 100 women were categorized into mild pre-eclampsia, severe pre-eclampsia and eclampsia. All the study participants were observed throughout the pregnancy and outcomes were evaluated.

All the statistical data was analyzed using SPSS software. Un paired t test was used for comparing mean serum uric acid levels with maternal and perinatal outcomes. P value of < 0.05 was considered statistically significant.

RESULTS

A total of 100 patients with pregnancy induced hypertension along with 50 normotensive pregnant women were recruited into this prospective study. The incidence rate of pregnancy induced hypertension in this study is 13.15%. The mean age of study participants was 25.6 years with the majority belonging to the age group of 21-30 years (76%).

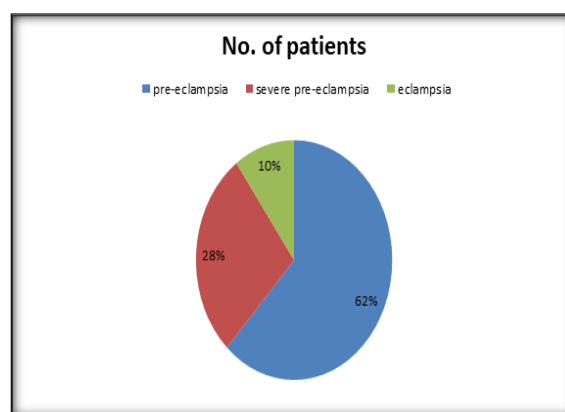


Figure 1: Majority of the study participants had pre-eclampsia (62%)

Table 1: Demographic details of study cases

Variable	No. of study cases	
	Booked	Not booked
Antenatal visits	55%	45%

Socio-economic status	Low	75%
	Middle	15%
	High	10%
Gravida	Primigravida	64%
	2 nd gravida	28%
	3 rd and above gravida	8%
Time of deliveries	Pre-term delivery	41%
	Term delivery	59%

Table 2: Mean serum acid levels

	No. of patients	Mean serum uric acid levels	No. of patients with serum uric acid levels < 5.5 mg/dL	No. of patients with serum uric acid levels > 5.5 mg/dL	P value
Control group	50	4.23 ± 1.05	50	0	0.027 - significant
Pre-eclampsia	62	5.56 ± 0.36	32	30	
Severe-pre-eclampsia	28	6.78 ± 0.45	12	16	
Eclampsia	10	8.24 ± 1.87	3	7	

Table 3: Maternal outcomes in hypertensive pregnant women

complication	No. of patients with serum uric acid levels > 5.5 mg/dL	No. of patients with serum uric acid levels < 5.5 mg/dL	Total
Eclampsia	14	4	18
Abruption placentae	10	2	12
Post- partum hemorrhage	7	2	9
HELLP	6	1	7
Acute renal failure	3	1	4
Maternal mortality	2	0	2

The most common maternal complication was development of eclampsia. The mortality rate of study cases in present study was 2%.

Table 4: Perinatal and fetal outcomes

Outcome	No. of patients with serum uric acid levels > 5.5 mg/dL	No. of patients with serum uric acid levels < 5.5 mg/dL	Total
Still birth	14	3	17
Intra-uterine deaths	5	0	5
Neo-natal deaths	6	2	8
Low birth weight (<2.5 kg)	30	10	40

DISCUSSION

In this prospective study involving 100 patients with pregnancy induced hypertension, the serum uric acid levels have been observed to be rising significantly with increase in severity of PIH; preeclampsia (5.56 + 0.36 mg/dL), severe eclampsia (6.78 + 0.45 mg/dL) and eclampsia (8.24 + 1.87 mg/dL). Similar such significant correlation was observed in studies done by Kondareddy et al¹⁵ and Hawkins et al.^[16]

The mean age of study participants 25.6 years with a majority of patients with PIH belonging to 21-30 years of age group. Similar such observation was made by Chaturvedi et al.^[17]

Majority of the study population were primigravida women (64%). Rani et al,^[18] observed that the majority of patient with eclampsia were primigravida (62.26%).

In present study, 41% had pre-term deliveries which is similar to study done by Kumar et al (44%).^[19]

The incidence of adverse perinatal deaths in this study is 30%. The higher rates of adverse perinatal outcomes in patients with higher serum uric acid levels as seen in present study is similar to studies done by Yalamati et al,^[20] and Patel et al.^[21]

CONCLUSION

Hypertensive disorders in pregnancy are associated with adverse maternal and fetal outcomes. Early identification using markers such as serum uric acid levels, aid in the assessing the prognosis and implement appropriate therapy to minimize the adverse outcomes.

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Conflict of Interest: Nil

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