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Role of Serum Uric Acid as a Predictor of Maternal and Prenatal Outcome in Women with Hypertensive Disorders of Pregnancy

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Abstract:
Introduction*: Hypertensive disorders of pregnancy is a broad spectrum entity complicating pregnancy from 2nd trimester onwards with increasing prevalence leading to unfavourable maternal & foetal outcome*
Aim*: 1. To study the accuracy of elevated S.uric acid levels as a predictor of hypertensive disorders of pregnancy& its complications.*
2. To evaluate the maternal & perinatal outcome in relation to raised S. uric acid levels in women with PIH.
Methodology*: Hundred pregnant women in the age group of 20-40 yrs, in the 3rd trimester of pregnancy, diagnosed as cases of pre ecclampsia, were included in the study after prior informed consent. The patients were investigated & followed up. Records of maternal & foetal outcome and the complications arising due to pre ecclampsia were maintained. The results were correlated with levels of S.uric acid and statistically analysed.*
Results*:The study was conducted in two groups of sample size 50 each with S. uric acid≥ 6.0mg/dl in group A &<6.0 mg/dl in group B. Maternal complications developed in 78.5% of cases in group A (p value 0.01) 21.4% cases in group B.IUGR was found in 84.4% cases in group A as compared to 15.5% in group B. Perinatal mortality 80% in group A & 20% in group B. APGAR at 1 min <5/10 in 83.9% cases in group A & 16.1% in group B. APGAR at 5min <5/10 in 72.9% cases in group A & 27.1% cases in group B.*
Conclusion*: S. uric acid is a significant biochemical predictor of maternal & perinatal complications & mortality.*
Key Words*: Pre ecclampsia, Ecclampsia, HELLP syndrome, IUGR, Pre term birth, DIC, APGAR score*

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I. Introduction

Hypertensive disorders of pregnancy is a group of disorders including pre ecclampsia, ecclampsia, chronic hypertension, chronic hypertension with super imposed preeclampsia & transient hypertension. It leads to significant maternal & perinatal morbidity & mortality. In a normal uncomplicated pregnancy, blood pressure is maintained within normal limits by various physiological mechanisms. Hypertension is a sign of an underlying pathology which may be pre existing or manifests for the first time during pregnancy, more commonly from 2nd trimester onwards.

Various complications such as ecclampsia, HELLP syndrome, abruptio placentae, DIC, multi organ failure,IUGR,IUFD, pre term birth, low APGAR score, foetal distress, can be attributed to hypertension. Also there is an increased rate of caesarean section. Early diagnosis is not only essential for better management, but also for reducing the complications & lowering the incidence. In India,the incidence of pre ecclampsia is 8-10% among the pregnant women, it differs depending upon the criteria of hypertension & population under study.

Serum uric acid is a biochemical predictor of preeclampsia. The basic underlying pathology in hypertension is endothelial dysfunction & intense vasospasm affecting blood vessels of various organs. When the renal blood vessels are affected it leads to decreased renal perfusion & GFR, also impaired tubular reabsorption. The hypoxic damage to tubular epithelium results in oxidative stress, production of lipid peroxidases, free radicals & reactive oxygen species, leading to further tissue damage.Serum uric acid is a marker of oxidative stress & renal ischemia, ultimately renal dysfunction. In normal pregnancy,uric acid levels fall due to increased GFR & renal clearance. There have been several studies which have reported a positive correlation between elevated serum uric acid levels & poor maternal & foetal outcomes.

II. Aims and Objectives

Aims:

1. To study the accuracy of elevated S.uric acid levels as a predictor of hypertensive disorders of pregnancy & its complications.
2. To evaluate the maternal & perinatal outcome in relation to raised S. uric acid levels in women with PIH.

Objectives:

1.To estimate S. uric acid level in diagnosed cases of pre ecclampsia& find a correlation between S. uric acid levels & maternal complications & mortality.
2. To establish an association between S. uric acid level & foetal outcome.
3. To correlate S.uric acid levels & severity of hypertension.

III. Materials and Methods

A cohort of 100 pregnant women, in the age group of 20-40 yrs, in the third trimester of pregnancy ,diagnosed with pregnancy induced hypertension were admitted in the Department of Obstetrics &Gynaecology,MGM MCH, Jamshedpur, East Singhbhum, Jharkhand. A prospective study was carried out over a period of one year from May 2017 . The patients ,who fulfilled the criteria of diagnosis, after giving informed consent, were studied & followed until delivery.

Criteria of diagnosis:

Hypertension- Systolic blood pressure $\geq$140 mm Hg
Diastolic blood pressure $\geq$90 mm Hg

Significant proteinuria- Total protein excretion of 300mg/24hrs

Elevated S. Uric acid levels- Values $\geq$6mg/dl (Normal range in females 2.4-5.4 mg/dl)
Oedema is not included in the criteria.

Criteria of inclusion:

Patients diagnosed as cases of pre ecclampsia after giving written informed consent.

Criteria of exclusion:

1. History of chronic hypertension
2. Family history of hypertension, diabetes mellitus or heart disease.
3.Pre-existing conditions like gout, cardiovascular disorders, renal disease, thyroid disorders.
4. Hypertension before 20 weeks of pregnancy
5. Multiplepregnancy
6. Patients not willing to participate in the study.

STUDY DESIGN: Prospective study

METHODOLOGY: 100 cases, who fulfilled the inclusion criteria,were selected for the study. Detailed antenatal history & complete general & obstetric examination was done. BP measurement was done in semi recumbent posture in the right brachial artery by syphgmomanometer.S.uric acid was estimated by modified Trinders test using a semi autoanalyzer from blood samples drawn from ante cubital vein in plain tubes in the Department of Clinical Pathology,MGM MCH.

IV. Results and Distribution

Table 1: Values of S.uric acid in mg/dl & gestational age in weeks

Mean±2SD	4	8	12	16	24	32	36	38	Post partum
	5.4	5.5	4.4	4.7	4.6	5.3	5.7	6.3	6.4

Table 2: Age distribution of mothers

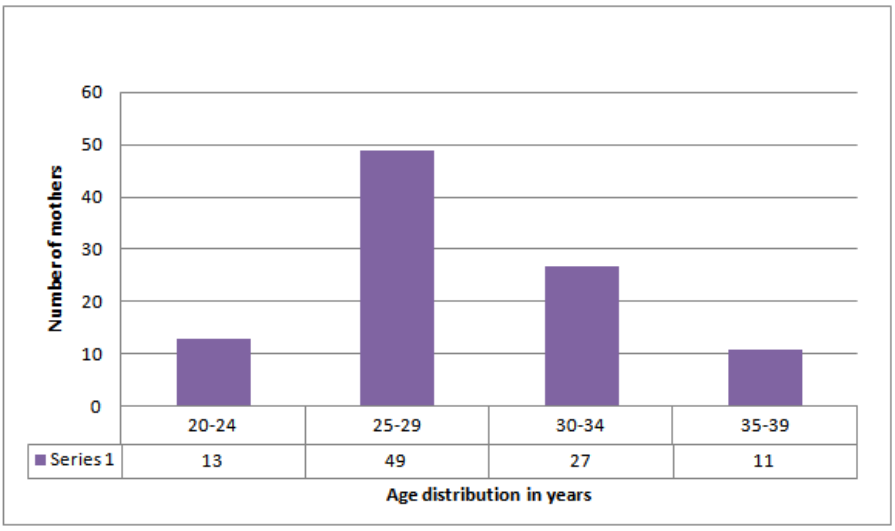

Table 3: Distribution of mothers according to gravidity

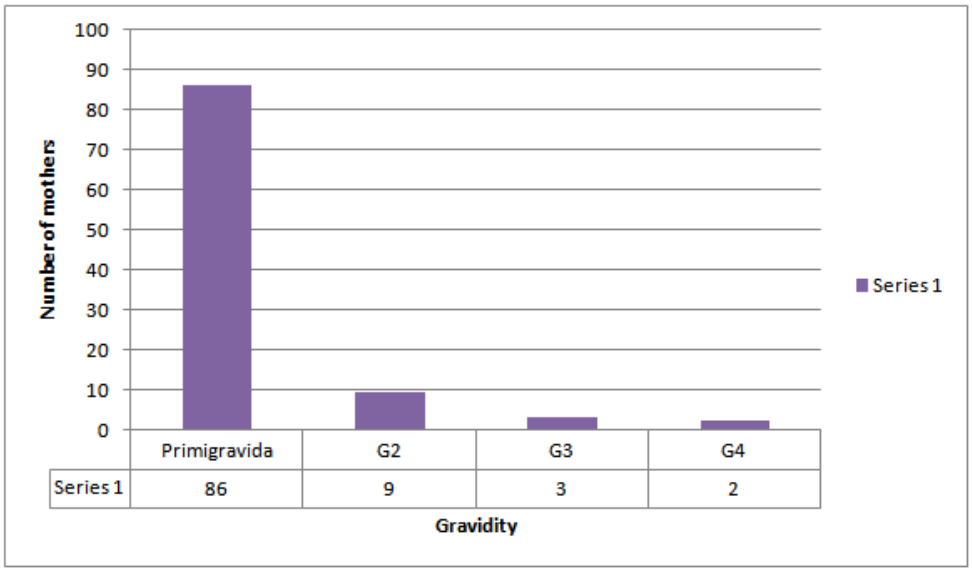

Table 4: Distribution of mothers according to period of gestation

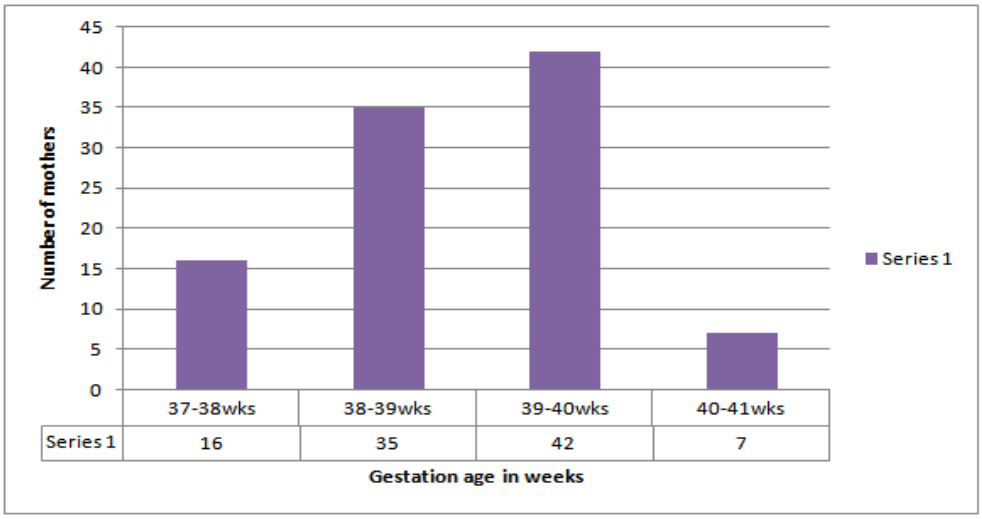

Table 5: Association between S.uric acid levels & maternal complications

Complications	Uric acid≥ 6.0mg/dl	Uric acid< 6.0mg/dl
Eclampsia(17)	15 (88.2%)	02 (11.7%)
Abruptio placentae(05)	04 (80%)	01 (20%)
PPH(08)	05 (62.5%)	03 (37.5%)
HELLP syndrome(06)	04 (66.6%)	02 (33.3%)
ARF(02)	02 (100%)	00
Maternal mortality(03)	02 (66.6%)	01 (33.3%)
DIC(01)	01 (100%)	00
Total	33	9

Table 6: Association between S.uric acid levels & foetal outcome

Complications	Uric acid≥ 6.0mg/dl	Uric acid< 6.0mg/dl
Pre term delivery(14)	12 (85.7%)	02 (14.2%)
Birth weight< 2.5kg(62)	47 (75.8%)	15 (24.1%)
Birth weight>2.5kg(19)	06 (31.5%)	13 (68.4%)
Perinatal mortality(05)	04 (80%)	01 (20%)

Table 7: Association between S.uric acid & 1min APGAR score

APGAR SCORE	Uric acid≥ 6.0mg/dl	Uric acid< 6.0mg/dl
<5/10 (56)	47 (83.9%)	09 (16.1%)
>5/10 (39)	21 (53.8%)	18 (46.1%)

Table 8: Association between S.uric acid & 5min APGAR score

APGAR SCORE	Uric acid≥6.0 mg/dl	Uric acid<6.0 mg/dl
<5/10 (48)	35 (72.9%)	13 (27.1%)
>5/10 (47)	15 (31.9%)	32 (68.1%)

Table 9: Association between S.uric acid & IUGR

IUGR	Uric acid≥ 6.0mg/dl	Uric acid< 6.0mg/dl
58	49 (84.4%)	9 (15.5%)

Table 10: Distribution of mothers according to urine albumin

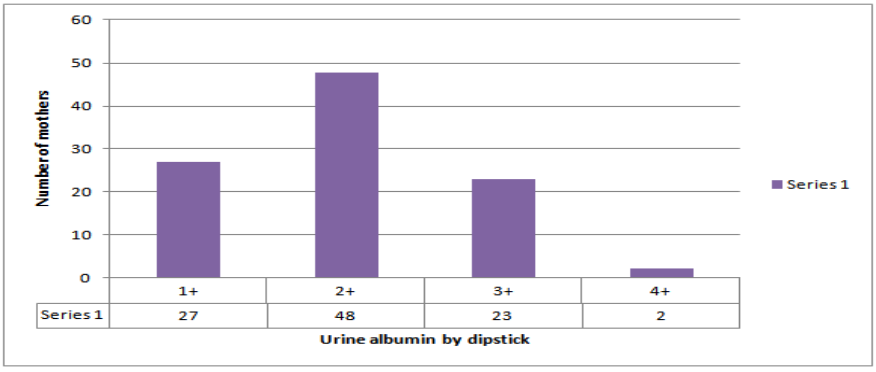

Table 11: Distribution of mothers according to mode of delivery

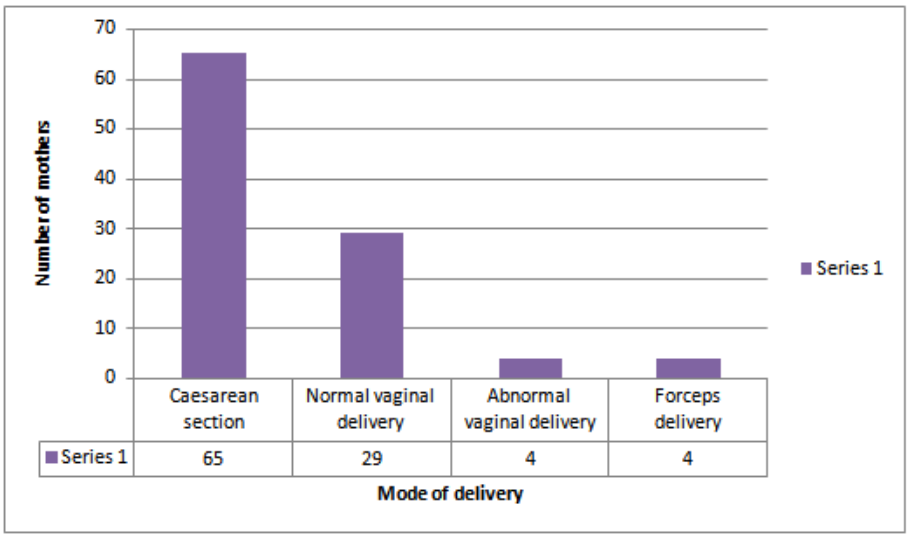

Table 12: Mean values of Blood Pressure, S.uric acid &foetal outcome

Variable	Number of mothers	Mean
Systolic BP	100	142.4
Diastolic BP	100	98.6
S. uric acid	100	6.89
APGAR 1min	100	4.7
APGAR 5min	100	7.6

V. Observations and Discussion

The study was conducted on 100 pregnant women, diagnosed with preeclampsia, fulfilling the criteria of inclusion. According to age distribution,13% of mothers were between the age group 20-24 years, 49% between 25-29 years, 27% between 30- 34 years, and 11% between 35-39 years. Maximum number of cases of PIH belonged to the age group of 25-29 years (Table 2). Out of the total,86% cases were primigravida,rest of the 14% of cases were distributed in the higher gravidity distribution (Table 3).

According to period of gestation, 16% were 37-38 weeks, 35% were 38-39 weeks, 42% were 39- 40 weeks, 7% were 40-41 weeks. Hence, it can be observed that pregnancies complicated with PIH do not tend to prolong. (Table 4)

According to S.uric acid levels, 100 women were divided into two equal groups, comprising of 50 cases each. Group A consisted of women with values of S. uric acid $\geq$6.0 mg/dl & group B comprised of women with values of S. uric acid < 6.0 mg/dl. Both the groups were compared with each other on different parameters. 42 out of 100 patients developed complications. 33 out of these 42 (78.5%) belonged to group A in which S. uric acid was more than 6.0mg/dl with a statistically significant(p value of 0.01)& 21.4% cases in group B. Eclampsia in 88.2%, abruptio placentae 80%, PPH 62.5%, HELLP syndrome 66.6%, maternal mortality in 66.6% cases in group A. Whereas, eclampsia in 11.7%, abruptio placentae 20%, PPH 37.5%, HELLP syndrome 33.3%, maternal mortality 33.3% in group B.(Table 5)

Foetal outcome is adversely affected when levels of S. uric acid are high. In group A, 85.7% were pre term deliveries as compared to 14.2% in group B. In group A, 75.8% were low birth weight babies, 31.5% with birth weight > 2.5 kg& 80% perinatal mortality at a statistically significant (p value of 0.01).In group B, LBW 24.1%, birth weight >2.5kg 68.4%, perinatal mortality 20%.(Table 6).

APGAR at 1min in high risk group was found to be <5/10 in 83.9% cases& 16.1% in low risk group. APGAR >5/10 in 53.8% in group A & 46.1% in group B. (Table 7).

APGAR score at 5 min was still <5/10 in 72.9% cases in group A & 27.1% cases in group B. APGAR score >5/10 in 31.9% in group A & 68.1% in group B. (Table 8).

84.4% cases in group A were IUGR as compared to 15.5% in group B which is statistically significant (Table 9).

Distribution on the basis of urine albumin was found to be 1+ in 27% mothers, 2+ in 48%, 3+ in 23% & 4+ in 2% (Table 10).

Rate of caesarean section was found to be considerably high (65%) as compared to normal vaginal delivery (29%),abnormal vaginal delivery (4%) & forceps delivery in 2% cases. (Table 11)

VI. Conclusion

On the basis of results obtained in the present study, it can be concluded that S. uric acid is a predictor of adverse maternal and foetal outcomes. It has been positively correlated with various maternal complications & mortality. It is a better marker of foetal complications than blood pressure measurement alone. Early diagnosis of preeclampsia is of great significance in lowering complication & mortality rate, estimation of S. uric acid can predict early onset of the disorder. It is a useful guide in outlining the management of cases that whether immediate termination is required or expectant monitoring alone is sufficient. Thus S.uric acid has both diagnostic & prognostic significance in predicting maternal & perinatal outcome in hypertensive disorders of pregnancy.

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