

Clinical Study of Serum Uric Acid Level on Outcome of Pregnancy in Cases of Pregnancy Induced Hypertension (PIH)

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ABSTRACT

Background: Hypertensive disorder is one of the commonest medical complications of pregnancy. It is assumed that serum uric acid elevation is a specific laboratory finding for the disease.

Objectives: To assess the effect of raised Serum uric acid level on outcome of pregnancy in cases of PIH (Pregnancy Induced Hypertension).

Methods: A Prospective study was conducted to pregnant patients (between 28-40 weeks of pregnancy with PIH). Total 100 patients were selected, who were separated into two groups. Those who had Serum uric acid level more than 6mg/dl (67 participants) are classified as Group A and those who had Serum uric acid level less than 6mg/dl (33 participants) are classified as Group B.

Results: Age of PIH patients were within 16-40 years. The serum uric acid was significantly elevated in all the patients. Concentration of Serum uric acid is much higher in Eclampsia groups, which is 4.5-12.0 mg/100ml (7.36 ± 2.17), in comparison to Preeclampsia patients, which is 2.6-9.6 mg/100ml (6.28 ± 1.64). Comparing maternal outcome with Serum uric acid level between group A and group B patients, percentage of PPH and Abruptio placenta was higher in group A than group B. In addition, Postpartum eclampsia, HELLP syndrome and Pulmonary oedema were present in group A (each 2 in number); but these complications are not found in

group B. In perinatal outcome, the better consequence was observed in group B in case of birth weight, intrauterine growth retardation, still birth and neonatal death rate. There was statistical significant association between Serum uric acid and birth weight of group A & B ($p= 0.32$).

Conclusion: The degree of hyperuricemia increases with the severity of preeclampsia. Perinatal mortality was markedly increased when maternal serum uric acid concentration were raised. Serum uric acid was an important indicator for maternal complications and prognosis of fetus.

Key words: Serum Uric Acid, Pregnancy Induced Hypertension (PIH), Preeclampsia.

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INTRODUCTION

One of the most anticipated and blessed episode for a woman is safe delivery of a healthy child. At the same time, it imposes greater risk of life. WHO estimates that approximately 500000 women die each year from pregnancy related causes.¹ The incidence of pregnancy-induced hypertension is 6-8% of all pregnancies and 20% of preterm births.² Hypertensive disorder is one of the commonest medical complications of pregnancy, and the major cause of maternal and infant disease and death. They comprise two different entities: Pregnancy-induced hypertension (PIH) and Chronic hypertension, which is a preexisting condition and does not resolve with delivery.³

In normal pregnancy Glomerular filtration rate increases and therefore the serum concentration of creatinine, urea, and uric acid decrease. In preeclampsia, vasospasm and glomerular endothelial swelling lead to a reduction of glomerular filtration rate of 25% below that of normal pregnancy. Serum uric acid levels normally decrease at the beginning of the pregnancy, remain low during the 2nd trimester and slowly increase during the 3rd trimester nearly reaching non-pregnant level at term. Marked elevation of uric acid occurs with preeclampsia. Many investigators have postulated serum uric acid elevation is a specific laboratory finding for the disease.⁴ In some studies, uric

acid levels of more than 5mg/dl have been associated with poor fetal outcome.⁵

Due to limited availability and affordability of our patients and hospitals, it is not possible to assess the fetal and maternal outcome. So, it is very important to find out few investigations, which are specific and also sensitive in assessing the condition of both mother and fetus. The current study was performed with an objective to find out the effect of raised Serum uric acid level on outcome of pregnancy in cases of PIH.

MATERIALS AND METHODS

A Prospective study was conducted to pregnant patients (between 28-40weeks of pregnancy with PIH patients), from inpatient department of Obstetrics and Gynaecology, DMCH. Total 100 patients were selected for this study. The study was conducted from March to August, 2006. While considering the study population, all the pregnant patients were between 28-40weeks of

pregnancy with PIH. Patients with pre-existing hypertension, pregnancy with Diabetes Mellitus or chronic renal disease or heart disease, diagnosed patient of hepatic dysfunction, gout or psychotic illness were not considered.

All data were collected in preformed questionnaire as a randomized selection and was analyzed by using the Statistical Package for Social Science (SPSS). After admission, diagnosis was made mostly on the basis of history and clinical presentation, with available laboratory investigations. Serum uric acid was measured in all patients on admission.

Grouping of the patients - The selected 100 patients were grouped as follows (grouping was done according to Redman et al.⁵ Study.)

Group A: Consisted of 67 patients, with uric acid level more than 6mg/ dl.

Group B: Consisted of 33 patients, with uric acid level less than 6mg/ dl.

Table I: Comparison of maternal outcome with Serum uric acid level between group A and group B patients

Group	Group A (n=67)	Group B (n=33)	P value
PPH No. (%)	7 (10.44)	5 (15.15)	0.5
PPE No. (%)	2 (2.98)	0	1.0
Abruptio placenta No. (%)	5 (7.4)	2 (6.06)	1
HELLP Syndrome No. (%)	2 (2.98)	0	1
Pulmonary oedema No. (%)	2 (2.98)	0	1

Group A: Uric acid levels > 6mg%; **Group B:** Uric acid level < 6mg%

PPH: Post-Partum Haemorrhage; PPE: Post-Partum Eclampsia

Table II: Comparison of perinatal outcome with serum uric acid level between group A and group B

Group	Group A (n=67)	Group B (n=33)	P value
Uric acid (mg/dl) Mean ± SD	7.872 ± 1.76	5.057 ± 1.02	0.000
Birth weight (kg) Mean ± SD	1.897 ± 0.439	2.11 ± 0.507	0.032
IUGR No (%)	15 (22.38)	07 (21.21)	0.8
Still Birth No (%)	24 (35.82)	10 (30.30)	0.85
Neonatal Death No (%)	06 (8.95)	02 (6.06)	0.91

Group A: Uric acid levels > 6mg%; **Group B:** Uric acid level < 6mg%

RESULTS

The objective of the study was to find out the effect of raised serum uric acid level on outcome of pregnancy in cases of PIH; to determine the maternal and fetal/neonatal outcome and to correlate the level of serum uric acid with the outcome of pregnancy in PIH.

Age and Parity: The study showed that the age of the participants ranged from 16 to 40 years. 35 percent patients belong to the age group of 21-25 years. In preeclampsia and eclampsia patients, the percentage of primigravida was 46.15 percent and 49.62 percent respectively; and gravida two or more were 53.84 percent and 50.81 percent respectively.

Systolic and Diastolic Blood Pressure in Group A and Group B Patients: The mean (± SD) systolic blood pressure of group A and group B were 151.34 ± 16.87 mm of Hg and 149.70 ± 18.62 mm of Hg respectively. The mean (± SD) diastolic blood pressure of group A and group B were 121.04 ± 109.5 mm of Hg and 100.00 ± 9.35 mm of Hg respectively.

Concentration of Serum Uric Acid in Preeclampsia and Eclampsia Patients: The value in patients with preeclampsia was 2.6-9.6 mg/100ml (Mean ± SD 6.28 ± 1.64 mg/100ml) and in eclampsia was 4.5-12.0 mg/100ml (Mean ± SD 7.36 ± 2.17mg/100ml).

Comparison of Gestational Age Between Group A and Group B Subjects: In group A, mean (± SD) gestational age was 33.77 ± 4.265 weeks and in group B mean (± SD) was **34.48 ± 3.41** weeks.

Comparison of Maternal Outcome with Serum Uric Acid Level Between Group A and Group B Patients: In group A, Post-partum hemorrhage were 7 (10.44), Post-partum eclampsia were 2 (2.98), Abruptio placenta were 5 (7.4), HELLP syndrome were 2 (2.98), Pulmonary oedema 2 (2.98). In group B, Post-partum hemorrhages were 5 (15.15), Abruptio placenta were 2 (6.06).

Comparison of Live Birth and Still Birth Between Group A and Group B Subjects: In group A, live birth was 37 (55.21) and

number of death was 30 (44.78). In group B, live birth was 21 (63.64) and number of death was 12 (36.36%). The difference of fetal outcome between the groups is not significant ($P=0.42$).

Comparison Of Perinatal Outcome With Serum Uric Acid Level Between Group A And Group B: Table II shows that, In group A, mean (\pm SD) serum Uric acid level was 7.872 ± 1.76 mg/100ml; Birth weight of the babies was 1.897 ± 0.439 (kg); Incidence of IUGR was 22.38 %; Still birth 35.82 % and Neonatal death 8.95 %. In group B, mean (\pm SD) serum Uric acid level was 5.057 ± 1.02 mg/100ml; Birth weight of the babies was 2.11 ± 0.507 (kg); Incidence of IUGR was 21.21 %; Still birth 30.30 % and neonatal death 6.06 %. There was significant association between the groups (A and B) and birth weight (P value 0.032).

DISCUSSION

The study was designed with the view to see the effect of raised Serum uric acid level on outcome of pregnancy among these participants. From 1st March 2006 to 31st August 2006, a six months study period in DMCH, total 100 cases were selected purposively in this study. To evaluate age distribution, the range of the age was found within 16-40 years. 35 % patients belong to the age group of 21-25 years. Most women with pregnancy-induced hypertensive disorders are symptom less, which is an important point for frequent antenatal visit particularly in late pregnancy. Laboratory test are used for prediction, diagnosis and monitoring of disease progress. There is no test that reliably indicates who will develop this polymorphic disease. The diagnosis of preeclampsia is based on a laboratory test. Treatment is restricted to symptomatic management and expedited delivery is the only way to resolve the disease. Severe pre-eclampsia usually develop in the 3rd trimester of pregnancy and accompanied by proteinuria.

A rising serum uric acid is now recognized as an early feature of preeclampsia and its measurement greatly increases the accuracy of diagnosis. Slemon and Bogert⁶ first observed an association between the serum uric acid (SUA) and the presence of PIH.

Redman et al⁷ stated that high SUA levels were associated with high perinatal mortality rate. The use of SUA levels as a prognostic index of fetal well-being in pregnancies complicated by PIH, is neither clearly understood nor well evaluated. There is very little information in the literature regarding the value of SUA levels in identifying the fetus at risk in pregnancies complicated by preeclampsia and eclampsia.

Hence the study was planned to find out the effect of raised Serum uric acid level on outcome of pregnancy in cases of PIH.

The present study showed the range of serum uric acid (> 6 mg %) in group A patients was 6-12mg/dl (mean \pm SD: 7.87 ± 1.76) and group B patients was 2.6-5.9 mg/dl (mean \pm SD: 5.05 ± 1.02) and the difference was highly significant ($p= .000$). This study also showed that serum uric acid levels in preeclampsia and eclampsia group ranged 2.6-9.6mg/dl (mean \pm SD: 6.28 ± 1.64) and 6.0-12.00mg/dl (mean \pm SD: 7.36 ± 2.17) respectively and the difference was highly significant ($p= .01$).

In this study the range of age in PIH was found within 16-40 years. The highest incidence (35%) found belonged to the age group of 21-25 years. But in a study carried out by Masuda⁸ at Sir Salimullah Medical College and Hospital (SSMC &MH) the age range was (21-25). The percentage of primigravida in eclampsia was 49.18 % and gravida two or more were 53.84 % and 50.81 %, respectively. Similarly, in SSMC & MH Masuda⁸ study, it was

found 58 %, (as primigravida) and gravida (two or more) were 53 % and 50 % respectively. In this study 76% of the patients were from lower class, 24% of the patient from middle class.

In present study, in group A and group B, the percentage of urinary Albumin less than ++ were 17.91 and 39.39; and more than ++ were 82.08 and 60.6. P value is .05 (significant). In group A (>6 mg % SUA) the rate of Caesarean section was 50 % and in group B, (<6 mg% SUA) Caesarean section was 50 %.

In group A, 71.64 % patients have no complication. PPH occur in 10.44 %, PPE (Post-Partum Eclampsia) in 2.98 %, abruptio placenta 7.4 %, HELLP syndrome 2.98 % and pulmonary oedema 2.98 %. 1 maternal death due to cardio-respiratory failure due to hypoxic ischaemic encephalopathy with septicaemia. In group B 72.72 % patients have no complication. PPH occur in 15.15 % and abruptio placenta 6.06 %.

A study by Redman⁹ showed that women in the severe PIH group, the serum uric acid level was more than 6 mg/dl with low birth weight babies and associated with high perinatal mortality rate which correlate with this study. In the present study, the incidence of IUGR and stillbirth were not significantly high in patient with high serum uric acid which correlates with the findings of Suonio et al¹⁰ Study. It was found that, serial measurement of blood pressure and serum uric acid from 28 weeks of pregnancy could diagnose the development of mild pre-eclampsia, before the development of proteinuria. Maternal hypertension, even severe, without hyperuricemia, was associated with an excellent prognosis for the fetus. Conversely, when maternal hypertension was mild and hyperuricemia was severe, the prognosis for the fetus was poor. These findings suggest that, in terms of fetal health, changes in renal handling of uric acid may be a more important feature of pre-eclampsia than hypertension.

CONCLUSION

From this study it appears that increased Serum uric acid concentration is an early and characteristic feature of PIH. So, by serial measurements of blood pressure and estimation of Serum uric acid, it is possible to diagnose the development of PIH. The time at which the Serum uric acid level begins to rise is an approximate indicator of onset of PIH. The hyperuricemia correlates with the degree of severity of PIH. Since serum uric acid levels reflect the severity of PIH, inverse relationship is observed between fetal well-being and maternal serum uric acid. Thus serum uric acid seems to be a sensitive indicator to monitor the severity of the disease and also the fetal well-being.

Therefore, it can be concluded that, the level of serum uric acid can serve as a good laboratory test in PIH. Because, the test is simple and can be easily performed in any laboratory. Also the clinical screening of a pregnancy complicated by hypertension is an easy and inexpensive method for the detection of perinatal prognosis.

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