



COMPARATIVE STUDY OF SERUM URIC LEVEL IN NORMAL PREGNANT WOMEN AND WOMEN WITH PREGNANCY INDUCED HYPERTENSION(PIH)

Syeda Ayesha
Fatima

Md Biochemistry Associate Professor, Gouri Devi Institute Of Medical Sciences, Durgapur

ABSTRACT

Background: : Abnormal uric acid levels in patients with preeclampsia and eclampsia affect both maternal and foetal outcome negatively. PIH increases the risk of maternal and perinatal morbidity and mortality. This study was done to know the alterations in these serum levels in comparison to normal pregnancy and also among various hypertensive disorders of pregnancies **Objective:** The present study was designed to compare serum uric acid is increased in pregnancy induced hypertensive (PIH) patients and normal pregnant women **Study period & Method:** Total number of 40 PIH patients admitted in GOURIDEVI INSTITUTE OF MEDICAL SCIENCES DURGAPUR were included in this study and 40 normal healthy pregnant ladies served as control. Serum uric acid levels were estimated using fully automated instrument. **Results:** In group A (cases), 10 patients had raised uric acid levels, 5 were severe preeclampsia, 3 were eclampsia and 2 cases of chronic hypertension superimposed preeclampsia. P value is 0.001 (highly significant). Mean and standard deviation of group A (cases) are 5.18 and 1.64 respectively. Mean and standard deviation of group B (controls) are 3.52 and 0.54 respectively. increase in uric acid can be detected earlier than the diagnosis of hypertension, proteinuria and preeclampsia. In the present study, the levels of uric acid were found to be significantly increased in group A (cases) when compared with group B (controls) ($p=0.001$). **Conclusion:** Serum uric acid level could be used as a biochemical indicator of PIH and its complications

KEYWORDS : Preeclampsia, Uric acid, Mortality

INTRODUCTION

Hyperuricemia is a common finding in preeclamptic pregnancies evident from early pregnancy. Abnormal uric acid levels in patients with preeclampsia and eclampsia affect both maternal and foetal outcome negatively. Hypertensive disorders of pregnancy (HDP) is the most significant problem in obstetrics¹. The incidence of preeclampsia in hospital practice in India varies from 5% to 15% and that of eclampsia about 1.5%. The incidence of hypertensive disorders of pregnancy varies in the range of 1 to 35%². Increased serum uric acid is associated with hypertension, renal disease and adverse cardiovascular events in the non-pregnant population and with adverse foetal outcomes in hypertensive pregnancies.³ Preeclampsia is a multisystem and multifactorial disease and causes cellular death. Abnormal uric acid levels in patients with preeclampsia and eclampsia affect both maternal and foetal outcome negatively.⁴ Uric acid's ability to promote inflammation, oxidative stress and endothelial dysfunction will be highlighted with discussions of the potential impact on placental development and function and maternal vascular health.⁵ This study was done to know the alterations in these serum levels in comparison to normal pregnancy and also among various hypertensive disorders of pregnancies

METHODS

In the department of biochemistry in Gouri devi institute of Medical Sciences, durgapur. The study is comprised of 80 pregnant women. A total 40 patients with hypertensive disorders of pregnancy (group A) were included for the study and the results were compared with 40 normotensive patients (group B)

Sampling method

The type of sampling method used was purposive sampling.

Inclusion criteria

A total 40 pregnant women diagnosed with hypertensive disorders of pregnancy admitted under biochemistry department in Gouri devi Institute of Medical Sciences (group A). Results in group A were compared with 40 normotensive patients and they were selected according to the age of the patient and gestational age of the cases at the time of delivery for proper matching.

Exclusion criteria

In group A and group B patients with medical comorbidities like diabetes mellitus, liver disorder, renal disease, and cardiovascular disease were excluded from study.

Methodology

After taking informed written consent from all the patients' demographic features like age, gestation, parity etc. were recorder on structured data collection sheet. A detailed medical history of all participants was taken to ensure that they fulfill the inclusion criteria for study. This was followed by thorough physical examination of every case and control

Blood pressure of all participants was measured using manual mercury sphygmomanometer twice for each patient at an interval of 15 to 20 minutes and then after 2 hours of rest, before labeling them as normotensive or with hypertensive disorder of pregnancy. For all patients in group A and group B basic investigations were done along with uric acid. Estimation done using a fully automated biochemical analyser, COBAS c311

Ethical consideration

All the patients and legal guardians were given an explanation of this study and about the investigations with their own merits and demerits. If he/she agreed, then the case had been selected for this study. This study did not involve any additional investigation or any significant risk to the patient. It did not cause economic burden to the patients. The study was approved by the institutional ethical committee board prior to commencement of data collection. Informed consent was taken from all patients and their guardian

Statistical data analysis

The collected data were analysed with IBM statistical package for the social sciences (SPSS) statistics software 23.0 version. To describe about the data descriptive statistics frequency analysis, percentage analysis were used for categorical variables and the mean and standard deviation (SD) were used for continuous variables. To find the significant difference between the bivariate samples in independent groups the unpaired sample t-test was used. To find the significance in categorical data Chi-square test was used similarly if the expected cell frequency is less than 5 in 2×2 tables then the Fisher's exact was used. In all the above statistical tools the probability value 0.05 is considered as significant level.

RESULTS

Total 80 cases were studied of which, group A (cases) included 40 patients with hypertensive disorder of pregnancy, and group B (controls) included 40 normotensive pregnant women. In my study group, majority of the patients belong to 21 to 25 years age group (age was matched with group A and group B for proper matching). The youngest being 18 years and the oldest is 37 years

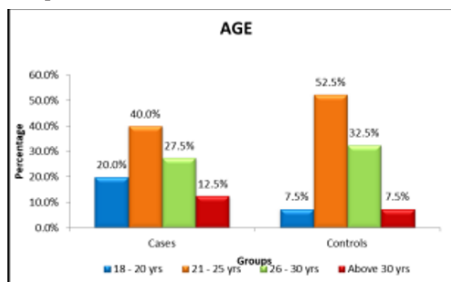


Figure 1: Age distribution.

In group A (cases), majority were primigravidas constituting 52.5%. In group B (controls), majority were multigravidas constituting 67.5%. Controls were selected according to the gestational age of cases for proper matching. Majority of the patients were between the gestational age of 37 and 39+6 weeks gestation in both group A and group B.

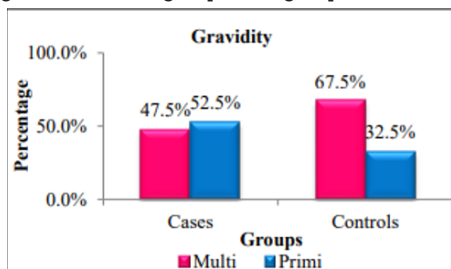


Figure 2: Gravidity distribution.

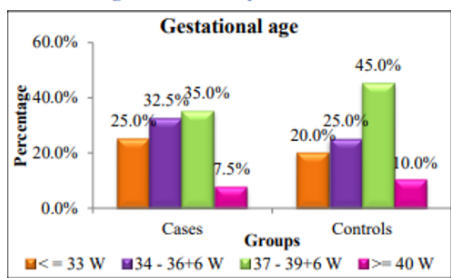


Figure 3: Gestational age distribution.

In group A (cases), 10 patients had raised uric acid levels, 5 were severe preeclampsia, 3 were eclampsia and 2 cases of chronic hypertension superimposed preeclampsia. P value is 0.001 (highly significant).

Mean and standard deviation of group A (cases) are 5.18 and 1.64 respectively. Mean and standard deviation of group B (controls) are 3.52 and 0.54 respectively

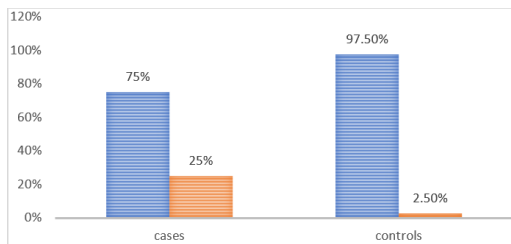


Figure 4. Uric acid concentration

Table.1-comparison Of Uric Acid Concentration In Cases And Control

		MEAN	Standard deviation
1	Group A Cases	5.18 mg/dl	1.64
2	Group B Control	3.57 mg/dl	0.67

increase in uric acid can be detected earlier than the diagnosis of hypertension, proteinuria and preeclampsia. In the present study, the levels of uric acid were found to be significantly increased in group A (cases) when compared with group B (controls) (p=0.001). Uric acid is considered as biochemical marker of preeclampsia. In preeclampsia it is raised beyond the normal levels. This may be due to either decreased renal urate excretion or increased oxidative stress. The hyperuricemia of preeclampsia has been variably suggested to be associated with lactic acidosis, altered renal functions or oxidative stress.

DISCUSSION

There are numerous pathophysiological abnormalities in hypertensive disorders of pregnancy. These changes occur in large extent and are translated into a full clinical presentation of preeclampsia, during late pregnancy.

In this study, controls were selected after proper matching with the cases with respect to age of the patient and gestational age at the time of delivery. In group A and group B maximum percentage of patients were in the age group of 21 to 25 years, with the mean age of 25. According to Hazari et al mean age among cases was 23 and among controls were 25.3

In group A, primigravida were more compared to multigravidas, constituting 52.5% and 47.5% respectively, which is consistent with various other studies. Primigravida is a proven risk factor for hypertensive disorders of pregnancy. According to Sajith et al highest incidence of hypertension was occurred in primigravida patients (53.8%). Hansen reported a two to three fold increase in the incidence in primigravida and this was supported by Chesley. Sibai and his association that elevated concentrations of circulating uric acid are not uniformly seen in every woman with preeclampsia, they do appear to identify a subset of preeclamptic women who are at greater risk for maternal and foetal morbidities. Also, hyperuricemia in pregnant women without proteinuria is at least as good a predictor of foetal morbidity as hypertension and proteinuria.

CONCLUSION

The present study insists on the importance of serum levels uric acid on the management of hypertensive disorders of pregnancy and to significantly reduce the morbidity and mortality of the mother and foetus. On the basis of our results, we conclude that uric acid is a sensitive indicator of severity in hypertensive disorders of pregnancy.

REFERENCES

- Kang DH, Finch J, Nakagawa T, Karumanchi SA, Kanellis J, Granger J, et al. Uric acid, endothelial dysfunction and preeclampsia: searching for a pathogenetic link. *J Hypertens.* 2004;22:229-35.
- Bainbridge SA, Roberts JM, von Versen-Hoynck F, Koch J, Edmunds L, Hubel CA. Uric acid attenuates trophoblast invasion and integration into endothelial cell monolayers. *Am J Physiol Cell Physiol.* 2009;297:C440-450
- Laughon SK, Catov J, Powers RW, Roberts JM, Gandy RE. First trimester uric acid and adverse pregnancy outcomes. *Am J Hypertens.* 2011;24:489-95.
- Yue C, Ying C, Li X. Association of first trimester serum uric acid with preeclampsia: observational cohort study with propensity score matching. *Hypertens Res.* <https://doi.org/10.1038/s41440-022-01115-8>.
- Seval MM, Karabulut HG, Tukun A, Koc A. Cell free fetal DNA in the plasma of pregnant women with preeclampsia. *Clin Exp Obstet Gynecol.* 2015;42:787-91.
- Bellomo G, Venanzi S, Saronio P, Verdura C, Narducci PL. Prognostic significance of serum uric acid in women with gestational hypertension. *Hypertension* 2011;58:704-8
- Boyle JA, Campbell S, Duncan AM, Greig WR, Buchanan WW. Serum uric acid levels in normal pregnancy with observations on the renal excretion of urate in pregnancy. *J Clin Pathol.* 1966;19:501-3.
- Amini E, Sheikh M, Hamtoushadeh S, Shariat M, Abdollahi A, Kashanian M. Maternal hyperuricemia in normotensive singleton pregnancy, a prenatal

- finding with continuous perinatal and postnatal effects, a prospective cohort study. *BMC Pregnancy Childbirth*. 2014;14:104.
9. Nakagawa T, Mazzali M, Kang DH, Sanchez-Lozada LG, Herrera-Acosta J, Johnson RJ. Uric acid-a uremic toxin? *Blood Purif*. 2006;24:67-70.
 10. Carter J, Child A. Serum uric acid levels in normal pregnancy. *Aust N Z J Obstet Gynaecol* 1989;29:313-4.
 11. Powers RW, Bodnar LM, Ness RB, Cooper KM, Gallaher MJ, Frank MP, Daftary AR, Roberts JM. Uric acid concentration in early pregnancy among preeclampsia women with gestational hyperuricemia at delivery. *Am J Obstet Gynecol*. 2006;194:160.
 12. Lindheimer MD, Conrad K, Karumanchi SA: Renal physiology and disease in pregnancy. In Alpern RJ, Hebert SC, editors. *Seldin and Giebisch's the kidney: physiology and pathophysiology* (4th ed.). New York: Elsevier 2008a: 2339
 13. Pramanik T, 1 Khatiwada B 2, Pradhan P. Serum uric acid level in normal pregnant and preeclamptic ladies: a comparative study. *Nepal Med Coll J* 2014;16(1):30-32
 14. Patel T, Dudhat A. Relationship of Serum Uric Acid Level to Maternal and Perinatal Outcome in Patients with Hypertensive Disorders of Pregnancy. *Gujarat Medical Journal*-2014 Vol. 69 No. 2:45-47
 15. Lim KH, Friedman SA, Ecker JL, Kao L, Kilpatrick SJ. The clinical utility of serum uric acid measurements in hypertensive diseases of pregnancy. *Am J Obstet Gynecol* 1998;178:1067-71