

## ALTERATIONS OF SERUM URIC ACID CONCENTRATIONS IN PREECLAMPSIA

Dr. T.Sharmila Krishna\*, Dr. M.Krishnamma\*, Dr.D.RajaRajeswari\*, Dr. E.Venkata Rao\*\*, Dr. J.N.Naidu\* and Mrs. R.R. Aparna\*

\*Department of Biochemistry, Narayana Medical College, Nellore-524003, A.P. India.

\*\*Department of Community Medicine, Institute of Medical Sciences and SUM Hospital, Bhubaneswar, Orissa.

Corresponding author: Email address: sharmilakrishna01@yahoo.in

**ABSTRACT:** Hypertensive disorders during pregnancy increase maternal and fetal risk. Preeclampsia is characterised by hypertension and proteinuria. Increased uric acid is a key clinical feature of preeclampsia; higher levels correlate with significant maternal and fetal morbidity and mortality. The present study was undertaken to estimate serum uric acid, the end product of purine catabolism, in clinically diagnosed preeclamptic women (n=30) and the values were compared with that of normotensive pregnant women (n=30), aged 18-30yrs. All of them were in their third trimester and primigravida. Serum uric acid levels were measured by spectrophotometry. We observed that serum uric acid levels were increased significantly when compared with that of normotensive pregnant women (p value < 0.000).

**Key words:** Uric acid, Preeclampsia, Xanthine oxidase

## INTRODUCTION

Hypertensive disorders during pregnancy complicates 7-10% of total pregnancies, out of which 70% are preeclamptic. It increases perinatal mortality by fivefold and kills 50,000 women worldwide (Roberts JM et al, 2005). Preeclampsia is a multisystem disorder characterised by hypertension to the extent of 140/90 mm of Hg or more, proteinuria ( $\geq 300$  mg /day ) and oedema induced by pregnancy after 20<sup>th</sup> week. Without intervention, preeclampsia progresses to eclampsia. Despite considerable research, the cause of preeclampsia remains unclear (Anjum Sayyed et al, 2013). The association of hyperuricemia with preeclampsia has been known since 1917; the relationship of the degree of hyperuricemia and severity of disease has been known since at least 1934 (Chum Lam et al, 2005). Slemons and Begort first observed an association between serum uric acid and the presence of pregnancy induced hypertension (PIH). Stander and Cadden were first to demonstrate a high correlation between the severity of PIH and serum uric acid concentrations (Ranjan Mustaphi et al, 1996). Several studies have shown a significant increase in serum uric acid levels in preeclamptics compared to normotensive pregnant women (Ranjan Mustaphi et al, 1996, Roberts JM et al, 2005, Mohd Suhail et al, 2008, Manjareeka Magna et al, 2012), while very few studies have shown insignificant change in serum uric acid levels in both preeclamptics and normotensive pregnant women (Salako BL et al, 2003, Dhananjaya BS et al, 2012). Hence, the present study was undertaken to measure and compare serum uric acid levels in preeclamptics with that of normotensive pregnant women.

## MATERIALS AND METHODS

Thirty cases of Preeclampsia and thirty Normotensive pregnant women attending antenatal clinic at Narayana General Hospital, Nellore were enrolled for the study after taking informed consent. Both cases and controls were primigravida, between 18 – 30 yrs of age and were in their third trimester.

### Inclusion criteria

Women with Preeclampsia diagnosed based on definition of American College of Obstetricians and Gynecologists (ACOG)s : 1) Systolic Blood Pressure greater than 140 mm of Hg or rise of at least 30 mm of Hg or 2) Diastolic Blood Pressure greater than 90 mm of Hg or rise of at least 15 mm of Hg ( manifested on two occasions at least 6 hrs apart) and 3) Proteinuria of 300 mg or greater in 24 hrs urine collection or protein concentration of 1 gm/litre (on two occasions at least 6 hrs apart) (Patil Sadanand B et al, 2012). Subjects with normal pregnancy were normotensive and had no proteinuria.

**Exclusion criteria**

Illness like anemia, diabetes mellitus, essential-hypertension, renal insufficiency, cardiovascular disease, liver diseases, history of urinary tract infection were excluded.

5 ml of random venous blood sample was collected from preeclamptics and normotensives pregnant women. Serum uric acid was estimated by Automated Chemistry Analyser [HUMASTAR 300 (Human Gm BH, Germany)] using available commercial kit.

**Statistical analysis:** Data was analysed using statistical software SPSS version 20. Values are expressed as mean  $\pm$  SEM. Comparison of values between cases and controls was done using Student's t test. A p value of less than 0.05 was considered statistically significant.

**RESULTS AND DISCUSSION**

In the present study, we observed that the mean values of serum uric acid were significantly elevated in preeclamptics compared to that of normotensive pregnant women (p value < 0.000). Similar observations were noted by others (Kashinakunti SV et al, 2010, Cristina Catarino et al, 2012, Magna Manjareeka et al, 2012, Habibunnisha B. Sirajwala et al, 2013, Aparna A. Sagare et al, 2012, Dr. Simmi kharb et al, 2010). In normal pregnancy, serum uric acid level slowly decreases until about 16 weeks of gestation, secondary to plasma volume expansion, increased renal clearance, and the uricosuric effect of estrogen. For most of the 2nd trimester, the uric acid level remains stable, and then increases during the 3<sup>rd</sup> trimester because of increase catabolism/-production (Habibunnisha B. Sirajwala et al 2013). The cause of hyperuricemia in preeclampsia has not been established definitely. But one of the most commonly accepted explanation for increased serum uric acid levels is decreased renal clearance. However, the increase in uric acid levels is too great to be attributed to the decrease in glomerular filtration rate alone, thus there must be decreased secretion or increased tubular reabsorption. (Chum Lam 2005). An elevated serum uric acid level reflects the degree of placental cell destruction as well as severity of preeclampsia. Abnormal trophoblast invasion is said to occur in preeclampsia because of placental ischemia. Subsequently placenta becomes hypoxic leading to its tissue breakdown which provides an additional source of purines. Thus, damaged placental tissues are the richest source of purines for generation of uric acid by xanthine oxidase (Bargale A et al, 2011, Anjum Sayyed et al, 2013). Also foetuses exposed to hypoxia because of decreased placental perfusion, have been shown to have increased serum levels of purine metabolites. In preeclampsia, therefore, it is conceivable that these metabolites can cross into the maternal circulation to be degraded by maternal xanthine -oxidase / xanthine dehydrogenase. It also is possible that fetal xanthine oxidase / xanthine dehydrogenase could act on both fetal and maternal substrate (Chum Lam et al, 2004).

**Table-1: Comparison of Serum Uric acid levels between Preeclamptics and Normotensive pregnant women:**

Parameter	Preeclamptic Women (n =30) Mean $\pm$ SEM	Normotensive pregnant Women (n =30) Mean $\pm$ SEM	p value
Serum uric acid (mg/dl)	7.2 $\pm$ 0.25	3.9 $\pm$ 0.14	*0.000

\*P value < 0.05 statistically significant, n = number of subjects

**CONCLUSION**

There have been conflicting reports regarding the usefulness of serum uric acid estimation in preeclampsia. Though uric acid is not a consistent predictive factor for development of preeclampsia, but its level generally increases once the disease manifests and serum levels of uric acid may often correlate with disease severity. In preeclampsia, uric acid level has been known to be increased and to correlate with maternal and fetal morbidity and mortality, but always has been assumed to be a reflection of disease rather than a cause. Thus, serum uric acid estimation is an useful parameter in the management of preeclampsia.

**REFERENCES**

- Anjum Sayyed, Alka Sontakke (2013). Study of lipid peroxidation and antioxidant status in preeclampsia. Journal of Krishna Institute of Medical Sciences University, vol.2, No.2, 69-76.
- Aparna A. Sagare, Dr. Jayashree V. Ganu, Dr. Dhiraj J. Trivedi, Pramod S. Kamble, Anil B. Bargale(2012). Effect of traditional biochemical markers on endothelial dysfunction in preeclampsia. International Journal of Pharma and Biosciences, July 3(3): B 16-21.

- Bargale A , Ganu J , Trivedi D , Nagane N , Mudaraddi R , Sagare A (2011). Serum Hs –CRP and uric acid as indicator of severity of preeclampsia. *IJPBS*, 2 (3): 340-345.
- Chum Lam, Kee –Hak Lim, Duk –Hee Kang, S. Ananth Karumanchi (2005). Uric acid and Preeclampsia. *Semin Nephrol* 25:56-60.
- Cristina Catarino, Alice Santos-Silva, Luis Belo, Petronila rocha –Pereira, Susana Rocha (2012). Inflammatory disturbances in preeclampsia: Relationship between maternal and umbilical cord blood. *Journal of Pregnancy*, volume 2012, article ID 684384, 10 pages.
- Dhananjaya BS, Venkatesh G, Sendil Kumaran D (2012). Study of correlation between oxidative stress parameters and severity of preeclampsia. *International Journal of Biological and Medical Research*, 3(1):1260-1262.
- Dr. Habibunnisha B. Sirajwala, Dinesah Sharma, Ashishkumar M. Agravatt (2013). A study of serum total calcium and uric acid levels in preeclampsia. *Indian Journal of Basic and Applied Medical Research*, volume 3, issue -1, P 50-56.
- Dr.Simmi Kharb (2010). Uric acid and ascorbic acid levels in pregnancy with Preeclampsia and Diabetes. [http://www.medcentral.com/article\\_view/718](http://www.medcentral.com/article_view/718).
- Manjareeka Magna, Sitikantha Nanda (2012). Elevated levels of serum uric acid, creatinine or urea in preeclamptic women. *Int J Med Sci Public Health*, 2(1):43-47.
- Mohd Suhail , Mohd Faizul Suhail, Hina Khan(2008). Role of vitamins C and E in regulating antioxidant and prooxidant markers in preeclampsia. *J. Clin. Biochem Nutr.*, 43, 210-220.
- Patil Sadanand B , Kodliwadmath Mallikarjun V, (Mrs) Kodliwadmath Sheela M , Patil Mamatha B (2012). Lipid Peroxidation and NonEnzymatic Antioxidants Status in Preeclampsia and Postpartum Preeclamptic Women. *National Journal of Basic Medical Sciences*, volume III, issue 1, 39- 43.
- Ranjan Mustaphi, Sarala Gopalan , Lakhbir Dhaliwal , AK Sarkar (1996). Hyperuricemia and pregnancy induced hypertension –reappraisal. *Indian J Med Sci*, 50:68-71.
- Roberts JM, Bodnar LM, Lain KY, Hubel CA, Markovic N, Ness RB, Powers RW (2005). Uric acid is as important as proteinuria in identifying fetal risk in women with gestational hypertension. *Hypertension*, 46 (6): 1263:1269.
- Salako BL, Odykogbe AT, Olayeni O, Adedapo KS, Aimakhu CO, Alu FE, Ola B (2003). Serum albumin, creatinine, uric acid and hypertensive disorders of pregnancy. *East Afr Med J*. 80:42-428.
- S.V. Kashinakunti, Sunitha H, K. Gurupadappa, D.S. Shankar prasad, G. Suryaprakash and J.B. Ingin (2010). Lipidperoxidation and antioxidant status in preeclampsia. *Al Ameen J Med sci*, 3(1): 38-41.

ISSN : 0976-4550

# INTERNATIONAL JOURNAL OF APPLIED BIOLOGY AND PHARMACEUTICAL TECHNOLOGY



Email : [ijabpt@gmail.com](mailto:ijabpt@gmail.com)

Website: [www.ijabpt.com](http://www.ijabpt.com)