



SERUM URIC ACID IN PATIENTS WITH PRE ECLAMPSIA

Biochemistry

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ABSTRACT

Background : Pre-eclampsia is one of the major causes of maternal and perinatal morbidity and mortality. There are various parameters to evaluate pre-eclampsia. S.uric acid levels is one of the important biochemical markers in pre-eclampsia. The objective of current study is to compare the levels of S.uric acid in pre-eclamptic patients and normotensive patients.

Methods: A total of 250 antenatal patients, consisting of two groups, 125 patients in each group diagnosed with pre-eclampsia (either earlier or during examination) and 125 control antenatal patients in their third trimester were considered. Blood sample (venous blood) of about 3ml was drawn from the ante cubital vein of the patient under all aseptic precautions to estimate serum uric acid levels.

Results: The observation of present study shows that the level of serum uric acid is significantly higher in the cases of pre-eclampsia.

Conclusion: It is concluded from this study that high levels of uric acid are found in the serum of pre-eclamptic cases as compared to normotensive cases of the study population.

KEYWORDS

Hypertensive disorders in pregnancy, Pre-eclampsia, serum uric acid levels

INTRODUCTION

Hypertensive disorders are common medical problems encountered during pregnancy with reported incidence between 5-10%. Pre-eclampsia, along with the other hypertensive disorders of pregnancy, complicates around 2-8% of total pregnancies (Martin JA, *et al.* 2002)

Hypertensive disorders are third on the list of causes leading to maternal mortality as per the current numbers, preceded by infection (sepsis) and haemorrhage. (WHO 2016)

Almost half the pregnant patients with hypertension have pre-eclampsia. Preeclampsia is defined as the triad of gestational or chronic hypertension, proteinuria and oedema occurring after 20 weeks gestation in a previously normotensive woman. It is a multiorgan pregnancy-specific syndrome that can affect virtually every organ system (Cunniffham FG *et al.* 2018). The etiology of pre eclampsia remains unexplained.

Uric acid is a component of non-protein nitrogenous substances. A small fraction of urates is loosely bound to plasma proteins. It is the final product of purine metabolism oxidation which is mainly excreted in the urine. It is important to identify women who are high risk of developing the disease early developed nations (Watanabe S, Kang DH *et al.* 2002). Since increased uric acid is the first and earliest laboratory presentation of preeclampsia as a result of reduced clearance of uric acid due to decreased glomerular filtration clearance, increases tubular reabsorption, and reduced secretion, some investigators use serum uric acid as criterion for preeclampsia (Burrow, Duffy & Copel 2004).

The elevated uric acid level in maternal blood, presumably due to decreased renal excretion, is frequently found in women with preeclampsia. Of the several hypothesized factors for elevated uric acid in patients with preeclampsia, the following appear to be most intriguing: Abnormal renal function, increased tissue breakdown, acidosis, and increased activity of the enzyme xanthine oxidase/dehydrogenase (Johnson RJ *et al.* 2003)

Uric acid is a potent mediator of inflammation. Uric acid stimulates monocytes to produce pro-inflammatory cytokines IL-1 β , IL-6, TNF- α . Uric acid promotes endothelial dysfunction per se which could promote hypertension, vascular disease and renal disease.

Therefore, the present study was designed to assess the association of uric acid levels in pre-eclampsia.

AIM & OBJECTIVE:

The aim and objective of this study was to find out the association between serum uric acid and pre-eclampsia.

MATERIAL AND METHOD:

The present case control study was conducted in the Department Of Biochemistry and Obstetrics and Gynecology RNT Medical College, Udaipur. A total of 250 pregnant women were taken as study subjects Out of which 125 were taken as case and 125 as control. Pregnant women with pre-existing hypertension, diabetes mellitus and renal disease were excluded from the study by the history, clinical examination and relevant laboratory investigations. After obtaining informed written consent from all the study subject's relevant data were documented in a predefined data sheet and blood samples were collected from study subjects for estimation of serum uric acid levels.

Blood sample (venous blood) of about 3ml was drawn from the ante cubital vein of the patient under all aseptic precautions. The samples were sent to Biochemistry laboratory for the estimation of serum Uric Acid. Serum uric acid was estimated by the uricase method.

Uric acid in the presence of uricase enzyme is converted to allantoin and H₂O₂. 4- aminophenazone is converted to quinoid pigment in the presence of H₂O₂ and enzyme peroxidase. The pigment gives violet colour to the solution which is then measured by photometry.

During early pregnancy serum uric acid levels fall, often to 3 mg/dl or below, related to the uricosuric effects from estrogen and from the increase in renal blood flow. Uric acid levels then increase during the third trimester, reaching levels of 4-5 mg/dl by term (Kang DH *et al.* 2004)

STATISTICAL ANALYSIS:

The comparisons between two groups were analyzed by student's t-test. All parameters were given as mean $\pm$ standard deviation. The criterion for significance was $p < 0.05$. Data analysis was performed with the statistical package for the social sciences version 16.00 (SPSS, Chicago, Ielinos USA).

RESULTS

In the present study, 74% were primigravidas and 26% were multigravidas. The mean age of our patients was 28.09 $\pm$ 2.3 year with range of 20-35 year and the mean gestational age 34.48 $\pm$ 3.52 weeks.

Table 1: Mean age of cases and control group

Group	Mean Age(year)	Number(n)
Cases	28.09 $\pm$ 2.3	125
Control	27.39 $\pm$ 2.9	125

Table 2: Mean serum Uric Acid levels (mg/dl) in cases and control

Group	Number (n)	S. Uric acid level (mean SD)	P-value
Case	125	7.48± 0.59	<0.01
Control	125	4.12 ± 0.65	

In the present study, estimation of serum uric acid levels were measured in patients with pre eclampsia and in normal pregnant women. Serum uric acid levels in preeclampsia patients were found to be significantly higher as compared to controls group ($p < 0.0001$). The observed mean serum uric acid levels in preeclampsia patients were 7.48 ± 0.59 mg/dl as compared to controls which was 4.12 ± 0.65 mg/dl.

DISCUSSION

Although uric acid can act as an antioxidant, excess serum accumulation is often associated with cardiovascular disease. It is not known whether this is causative (e.g., by acting as a prooxidant) or a protective reaction taking advantage of urate's antioxidant properties. The same may account for the putative role of uric acid in the etiology of stroke. Uric acid can act as a prooxidant and it may thus be a marker of oxidative stress, but it may also have a therapeutic role as an antioxidant (Franklin H *et al.* 2005).

The observed mean serum uric acid levels in preeclampsia patients was 7.48 ± 0.59 mg/dl as compared to controls which was 4.12 ± 0.65 mg/dl. which was compatible with Ahmed A *et al.*, found in preeclampsia 7.35 mg/dl as compare to 4.47 mg/dl in control group, Pramanik T *et al.*, in Nepal (2012-2013) [6.27 ± 1.37 vs 4.27 ± 0.61 mg/dl] in pre-eclamptic patients compared to their healthy counterparts and AlZuabidi ZFM *et al.*, in Iraq in preeclampsia was 7.68 ± 0.79 mg/dl as compare to 4.18 ± 1.17 mg/dl in control group. 10-12 (Abdulmunem MA 2005; Pramanik T *et al.* 2014 and Alzuabidi ZFM 2016).

In normal pregnancy, serum uric acid level slowly decrease 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 3rd trimester (Kanak KM *et al.* 2005). Interestingly, women with a history of preeclampsia also have higher risk for cardiovascular disease and hypertension later in life (Ingec M *et al.* 2001 and Powers RW *et al.* 2005). Uric acid is minimally soluble and its concentrations is maintained relatively low in healthy individuals (< 6.0 mg/dL). However even low concentrations of uric acid possess biological function. The third- trimester rise in uric acid may be related to an increase in foetal uric acid production or a decrease in uric acid clearance (Dunlop W *et al.* 1977). Elevated serum uric acid levels due to decreased renal urate excretion are frequently found in women with preeclampsia (Kang DH *et al.* 2004). Soluble uric acid impairs nitric oxide generation in endothelial cells inducing endothelial dysfunction (Khosla UM *et al.* 2005). Besides the reduced clearance hyperuricemia in pre-eclampsia may be due to increased uric acid production caused by trophoblast breakdown, cytokine release and ischaemia. Their increased levels might have led to endothelial dysfunction which eventually results in preeclampsia. So, preeclampsia, which is characterized by widespread endothelial dysfunction and inflammation, might be propagated by uric acid (Martin AC *et al.* 2010). It has also been reported that rise in uric acid level in preeclampsia is secondary to placental damage leading to purine catabolism and production of uric acid.

CONCLUSION

The results of this study confirm the hypothesis that hyperuricemia is correlated with preeclampsia being indirect risk factors for placental vasculopathy predating clinical preeclampsia. Thus it can be concluded that hyperuricemia can be used as biomarker for identifying women at risk of preeclampsia and its complications with adverse effects.

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