



Research Article

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The Role of Uric Acid in Predicting Preeclampsia Women

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ABSTRACT

Preeclampsia is a clinical disorder which happens only through pregnancy and a postpartum period, it affects approximately 5-8% of all pregnancies women worldwide and it is recognized by high blood pressure and the presence of protein in the urine. Uric acid has been used for early diagnosis of preeclampsia. Hyperuricemia is one of the earliest and most steady observations well-known in preeclamptic pregnancies. Severity of preeclampsia increases with increasing uric acid. The present study was achieved to investigate uric acid level in serum of preeclampsia pregnancy woman and to predict the severity of preeclampsia. The study involves 30 cases of preeclampsia of age group between 20-42 years with mean \pm SD of (32.7 \pm 6.2) years and 30 of healthy pregnant women of age group between 19-41 years with mean \pm SD of (31.1 \pm 6.2). Serum uric acid was determined from all subjects by an enzymatic method (uricase). The noticed mean serum uric acid levels in preeclampsia was 7.68 \pm 0.79 mg/dl as compared to 4.18 \pm 1.17 mg/dl in control group. The difference between them is significant because p-value is less than 0.05. The routine estimation of uric acid level in serum can be valuable as a diagnostic indicator to predict the severity of preeclampsia.

Key words: Preeclampsia, Uric acid, Blood Pressure, Proteinuria, Severe preeclampsia

INTRODUCTION

Preeclampsia is a common gestational disorder that complicates 5-8% of the pregnancies women and it is associated with maternal, fetal and neonatal morbidity and mortality [1], it occurs after 20 weeks of gestation though it can occur earlier [2-4].

Numerous theories with regard to the etiology of preeclampsia: abnormalities in the immune system, insufficient blood supply to the placenta and maternal endothelial cell dysfunction are suspicious to be implicated [5].

Although many researches about the mechanism and etiology of preeclampsia happened, its accurate pathogenesis stays unclear, some studies support concepts of inadequate blood supply to the placenta making it liberate specific hormones or chemical agents that, in pregnancies susceptible to the condition, leads to alterations in metabolism, injury of the endothelium, inflammation and other possible reactions [6], the cause however, is still considered to be unknown.

Preeclampsia is associated with atherosclerosis and abnormalities of renal, hepatic and coagulatory function [7]. It is characterized by high blood pressure (systolic blood pressure \geq 140 mm Hg and diastolic blood pressure \geq 90 mm Hg) and significant amounts of protein in the urine of a pregnant woman; proteinuria \geq +2 (100 mg/dl) after 20 weeks of gestation [8-9].

In addition to that, many researches have confirmed a relationship between uric acid concentrations and severity of preeclampsia [10-11].

Uric acid is the final breakdown products of purin metabolism [12], hyperuricemia is an abnormally high level of uric acid in the blood [13-14]. Also hyperuricemia is considered a risk factor for hypertension, cardiovascular and renal disease [15]. Severity of preeclampsia increases with increasing uric acid [16].

Hyper uricemia is a common finding in preeclamptic pregnancies, high level of uric acid in preeclamptic women frequently exceed hypertension and proteinuria, the clinical manifestations used to diagnose the disorder [17].

This study seeks to investigate the level of uric acid in sera of preeclampsia pregnancy woman and to predict the severity of preeclampsia.

EXPERIMENTAL SECTION

Subjects:

Sixty pregnant women in the third trimester (more than 28 weeks) were enrolled in the present study from August 2015 until December 2015. Women with preexisting chronic hypertension, diabetes mellitus, multiple pregnancies, chronic renal disease, chronic liver disease, and those with history of hyperuricemia were excluded from the study. The subjects were divided into two groups:

1. Normotensive pregnant women group:

Thirty healthy pregnant women, the aged ranged between (19-41) years with mean \pm SD of (31.1 \pm 6.2) years and with mean of blood pressure 120/78mmHg

2. Preeclamptic women group:

Thirty preeclampsia pregnant women, the aged ranged between (20-42) years with mean \pm SD (32.7 \pm 6.2) years. This group was subdivided into two groups:

A -Mild preeclampsia group which included nineteen preeclamptic women with mean blood pressure 147/97mmHg, accompanied by protein urine of at least 0.5-1g per 24h, or at least +2 on dipstick testing.

B-Severe preeclampsia group which included eleven preeclamptic women with blood pressure of at least 169/111mmHg and protein urine of at least 1-2g per 24h, or at least 3+ on dipstick testing

Sample:

3 ml of blood samples were collected from all subjects by vane puncture using a sterile disposable syringe in plain plastic tube. After coagulation, the blood was centrifuged at 3000 rpm for 10min; the serum was collected and frozen at -20 °C for estimation of uric acid. The sera of sample should be non-hemolyzed in order to avoid interference in the obtain results.

Serum uric acid was determined by an enzymatic method (Uricase) using Biomerieux Kit [18], while proteinuria is diagnosed by a simple dipstick test [19-20].

Bio statistical analysis:

Analysis of data was performed using statistically package for social science (SPSS) version 15.0. The differences between groups were tested by the student t-test and p-value was considered significant if it is <0.05, highly significant if <0.001 and non-significant if it is > 0.05.

RESULTS AND DISCUSSION

Table 1 demonstrates the results of serum uric acid, systolic and diastolic blood pressure as well as urinary protein for normotensive pregnant women group and preeclamptic women group. These results revealed non-significant differences in the age between normotensive pregnant women group and preeclamptic women group ($p > 0.05$), while the mean value of serum uric acid concentration significantly increased ($p < 0.05$) in women with preeclampsia as compared with normotensive pregnant women (7.68 mg/dl versus 4.18 mg/dl)

In addition to that, the systolic and diastolic blood pressure significantly higher in preeclamptic women as compared with normotensive pregnant women ($p < 0.05$).

On the other hand, the results of proteinuria revealed a significant increase in proteinuria for preeclamptic women as compared with normotensive pregnant women ($p < 0.05$).

Table 2 shows the comparison between parameters of severe and mild of preeclamptic women. The mean value of uric acid concentration, significantly higher in sera of women with severe preeclampsia as compared with mild preeclampsia ($p < 0.05$). Also there was a significant increase in systolic and diastolic blood pressure in severe

preeclamptic women as compared with mild preeclampsia ($p < 0.05$). While there was non-significant differences in proteinuria of both groups ($p > 0.05$).

The comparison studied of parameters among normotensive pregnant women, mild preeclampsia and severe preeclampsia show in table 3.

Table 3 displayed a significant increase in uric acid concentration in sera of women with severe preeclampsia as compared with normotensive pregnant women ($p < 0.05$). Also there was a significant increase in uric acid concentration in sera of women with mild preeclampsia as compared with normotensive pregnant women ($p < 0.05$). Systolic and diastolic blood pressure and proteinuria are significantly increase ($p < 0.05$) for women with severe preeclampsia as compared with normotensive pregnant women and also they are significantly increase ($p < 0.05$) for women with mild preeclampsia as compared with normotensive pregnant women.

Table 1: Biostatistical calculation of age, serum uric acid, systolic and diastolic blood pressure and urinary protein for normotensive pregnant women and preeclamptic women

Parameters	normotensive pregnant women n =30 mean \pm SD	preeclamptic women n =30 mean \pm SD	p-value
Age (years)	31.1 \pm 6.2	32.7 \pm 6.2	N.S
Uric acid (mg/dl)	4.18 \pm 1.17	7.68 \pm 0.79	$p < 0.05$
Systolic BP (mmHg)	120 \pm 8.96	155 \pm 11.7	$p < 0.05$
Diastolic BP (mmHg)	78 \pm 6.55	102 \pm 7.39	$p < 0.05$
Urine protein by dipstick	0	+ 2, +3	$p < 0.05$

N.S= Non Significant

BP= Blood Pressure

Table 2: Comparison between parameters of severe and mild of preeclamptic women

Parameter	Sever preeclampsia	Mild preeclampsia	P- value
Uric acid (mg/dl)	7.64	5.96	$P < 0.05$
Systolic BP (mmHg)	169	147	$P < 0.05$
Diastolic BP (mmHg)	111	97	$P < 0.05$
Urine protein by dipstick	3	2	N.S

N.S= Non Significant

BP= Blood Pressure

Table 3: Comparison between parameters for normotensive pregnant women, mild preeclampsia and severe preeclampsia

Parameters	Normotensive pregnant women	Severe preeclampsia	p-value	Mild preeclampsia	p-value
Uric acid (mg/dl)	4.18	7.64	$P < 0.05$	5.96	$P < 0.05$
Systolic BP (mmHg)	120	169	$P < 0.05$	147	$P < 0.05$
Diastolic BP (mmHg)	78	111	$P < 0.05$	97	$P < 0.05$
Urine protein by dipstick	0	3	$P < 0.05$	2	$P < 0.05$

BP= Blood Pressure

Uric acid is one of the most critical indicators of the severity in hypertensive disorders of pregnancy and can be of good assistance in monitoring the cause of this disorder [21]. Also measurement of serum uric acid is important in preeclampsia pregnancy woman as it predicts the severity of preeclampsia [21].

This study was found that the mean value of uric acid concentration was significantly higher in sera of preeclamptic women as compare with healthy pregnant women ($p < 0.05$). Renal plasma flow and glomerular filtration rate are decreased for women with preeclampsia as a result of increased an afferent arteriolar resistance and/or reduced ultra filtration coefficient [22].

Jeyabalan, et.al. [22] revealed that there was an increase in concentrations of serum uric acid generally as a result of a reduced renal clearance.

Recently, because of the role of uric acid in vascular damage and in a oxidative stress, hyperuricemia has been induced as a supplier to the preeclampsia pathogenesis [16,23]. The cause of a hyperuricemia in preeclampsia has not been established definitively. Most suggestion assumes that decreased renal clearance is the most remarkable mechanism. However, high level of uric acid is so great to be contributor to the decrease in glomerular filtration rate alone; thus there must be a decreased secretion or increased reabsorption. This a phenomenon seems to be identical to the decrease in urate clearance produced by the infusion of vaso constrictors, such as nor epinephrine [24], and to the increase of uric acid level in blood and decrease in uric acid clearance observed in glomerulo nephritis [25].

The mechanism of how uric acid in progress of hypertension in humans has yet to be explained, but evidence suppose that uric acid plays as significant role because uric acid levels associate with plasma renin activity [26]. Recent studies assume that hyperuricemia may also play a pathogenic role by attributed to the vascular damage and hyper-tension [27].

The present study show the mean value of serum uric acid concentration a significantly increased ($p < 0.05$) in women with severe preeclampsia as compared with normotensive pregnant women also it is significantly increased ($p < 0.05$) in women with mild preeclampsia as compared with normotensive pregnant women.

The results revealed significant difference between the two groups of preeclampsia i.e. mild and severe preeclampsia and normotensive pregnant women (5.96, 7.64, 4.18mg/dl) respectively proposing uric acid to be a good marker of severity of disease.

Shah C J, et.al [28] announced that serum uric acid levels are significantly elevated in preeclampsia than normal pregnancy and there is a high positive correlation with the disease severity as regards to hypertension and proteinuria.

The raised concentration of serum uric acid in preeclamptic women is not simply a marker of disease severity but rather participates directly to pathogenesis of the disease was presented by SA Bainbridge, et.al [29].

CONCLUSION

This study discovered a significant increase in the serum level of uric acid in preeclampsia i.e. mild and severe preeclampsia women compared to normotensive pregnant women and also we conclude from this study that hyperuricemia is significantly associated with preeclampsia and its level differs with the severity of the disease process.

Routine estimation of serum uric acid level can be valuable as diagnostic indicator to predict the severity of preeclampsia.

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