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Correlation of serum uric acid with renal function parameters in preeclampsia.

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ABSTRACT... Objectives: Study was designed to find out the Correlation of serum uric acid with renal function parameters in Preeclampsia. **Study Design:** Cross Sectional study. **Setting:** Sir Ganga Ram Hospital Lahore. **Period:** July 2016 to July 2017. **Material & Methods:** Level of serum uric acid, serum creatinine and blood urea of 40 Preeclamptic women and 30 gestation-matched normotensive controls were estimated. Their Demographic and clinical characteristics were noted. The blood sample was analyzed for biochemical parameters, blood urea, serum uric acid, serum creatinine and urinary protein. **Result:** Mean age and gestational age of women was 25 weeks with BMI 29 Kg/m². Level of serum uric acid and blood urea and serum creatinine were increased, but significant difference only observed with serum uric acid and blood urea with marked proteinuria. An inverse relationship of serum uric acid with urinary protein was observed. A direct relationship, of serum uric acid with serum creatinine was observed. **Conclusion:** it is concluded that estimation of parameters of renal function of preeclamptic women are important along with hyperuicaemia.

Key words: Preeclampsia, Renal Function, Serum Uric Acid.

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INTRODUCTION

Preeclampsia is a pregnancy related syndrome with raised blood pressure escorted by odema, proteinuria, or both. This obstetric disease may involve different organs and systems with a prevalence rate of 2-10 % of pregnancies and involvement of heritability is about 55%.¹ Preeclampsia is a complex polygenetic trait in which the genes of both of mother and fetus as well as the factors associated with environment are also involved.²

The etiology of disease is considered by development of blood pressure may be 140/90 mmHg or greater with the condition of proteinuria at 20th week of pregnancy.³ Increase blood pressure may be a cause of premature baby delivery, under-weight or in some cases intrauterine death of fetus. About 16-20 % maternal deaths are observed in both developing and developed countries.⁴

Uric acid is a well-known marker of tissue injury,

oxidative stress, and renal dysfunction. The level of uric acid increases in the beginning of high blood pressure and proteinuria in women with preeclampsia⁵ (Majed 2017). It is suggested that hypoxia, interferon and ischemic placenta may be the factors that induced xanthine oxidase.^{6,7} Increased expression of uric acid produces adverse effect on blood pressure.⁸ Therefore, raised values of uric acid may shows the severity in the state of preeclampsia and it is observed before clinically evidence of syndrome.^{7,9}

A multifactor etiology of increased uric acid is observed in preeclampsia with the involvements form reduced secretion of renal tubules, raised oxidative stress due to ischaemic placenta and reduction of GFR of mother, angiogenic imbalance and an inflammatory response.¹⁰ Additionally Angiotensin 11 motivates reabsorption of urate, resulting in reduced excretion of urate and preeclampsia results in the increased sensitivity to angiotensin.¹¹

Alteration of renal function with increased level of serum creatinine and blood urea was reported in many studies but increased level of serum uric acid in preeclampsia is controversial. Increased level of serum uric acid in women with preeclampsia is secondary to decrease the clearance of urate not only due to renal dysfunction but also due to increased activity of Xanthine oxidase.¹²

It is not cleared as yet that some women at the initial state of pregnancy develop gestational hypertension, which may lead to preeclampsia while others women face no problems. In spite of strong relationship of uric acid and renal parameters with the pathogenesis of preeclampsia, it is still contradictory.

A cross sectional study was designed to compare and correlate renal parameters along with serum uric acid in women with preeclampsia and normotensive women and if possible correlate with severity of preeclampsia.

MATERIAL & METHODS

Study was conducted with preeclamptic women visiting Obs and Gyne unit of Sir Ganga Ram Hospital Lahore. Level of serum uric acid, serum creatinine and blood urea of 40 preeclamptic women and 30 gestation-matched normotensive controls were estimated. Their Demographic and clinical characteristics were noted. The blood sample was analyzed for biochemical parameters, blood urea, serum uric acid, serum creatinine and urinary protein. Letter of consent was taken from each patients and normal subjects. Study was approved by Ethical Committee of Post Graduate Medical Institute Lahore.

Data was analyzed SPSS20. The comparisons between two groups were analyzed by student's t-test. All parameters were given as mean \pm standard deviation. Pearson Correlation was used to correlate study parameters. The criterion for significance was $p < 0.05$.

RESULTS

Demographic profile of women with pre-eclampsia is tabulated as Table-I. Mean age and gestational age of women was 25. Their BMI was 29 Kg/m².

Most of the women belong to poor class with a mix diet mainly consist of vegetable /chicken. In most of the women the obstetric complication is abortion.

Level of circulating uric acid and urea was increased significantly ($P < 0.05$) in women with preeclampsia in comparison with control. Level of serum creatinine was insignificantly increased in patients in comparison with controls. A marked proteinuria was observed in women with preelampsia (Table-II).

An inverse relationship of circulating uric acid with systolic blood pressure and urinary protein was observed. A direct relationship, of circulating uric acid with diastolic blood pressure, serum creatinine, with BMI and gestational age of pregnant women was observed (Table-III).

Characteristics	Patients (40 cases)
Mean age (yrs)	25.06 \pm 2.08
Blood Pressure (mm Hg)	143.55/93.87 3.41 \pm 2.8
Gestational age (weeks)	25.55 \pm 0.68
BMI	28.82 \pm 0.98
Socioeconomic status	22 Poor class 09 Middle class
Obs complications	14 Abortions 01 PE/CS

Table-I. Demographic profile of women with pre-eclampsia

Variables	Patients (40 cases)	Controls (30 cases)
Serum Uric acid (mg/dl)	6.16 \pm 1.54*	3.68 \pm 0.67
Blood Urea (mg/dl)	33.52 \pm 6.38*	23.59 \pm 3.56
Serum creatinine (mg/dl)	1.01 \pm 0.17	0.62 \pm 0.20
Urinary Protein (mg/dl)	470.76 \pm 142.04	-

Table-II. Comparison of the levels of uric acid, blood urea and serum creatinine in patients with controls.
* $P < 0.05$ = Significant difference

Correlation b/w variables	r-value	Level of Significance
Serum uric acid with systolic blood pressure	-0.14	N.S
Serum uric acid with diastolic blood pressure	0.018	N.S
Uric acid with serum creatinine	0.056	N.S
Serum uric acid with urinary protein	- 0.058	N.S
Serum uric acid with BMI	0.165	N.S
Serum uric acid with gestational age	0.234	N.S

Table-III. Correlation of Uric acid with Gestational age, BMI, diastolic and systolic blood pressure

DISCUSSION

Increase level of uric acid in serum may show increase risk of progression of pregnant women to preeclampsia and adverse maternal / fetal condition in women with initial stage of gestational hypertension.¹³ Early preterm state of preeclampsia is strongly related with many renal disorders in later ages.¹⁴

We found high BMI of preeclamptic women. However some studies are stated that obesity of mother is not related with the progression of women to preeclampsia.¹⁵ The reason is that most of the women experience abortion is explained by a study that unprompted abortion may be related with infertility and may enhance the risk of development of preeclampsia.¹⁶

Level of uric acid in serum and blood urea was significantly increased in women with preeclampsia in comparison with control. Increased uric acid in women with preeclampsia may be due to its increase synthesis by damage of cells of trophoblast and reduced excretion due to low GFR and enhance reabsorption. Study found that the value of uric acid > 4.6 mg / dl is an early biomarker of disease at 18 to 25 weeks of gestation. Uric acid not only helps to correct diagnosis, it may be an indicator of cesarean section, which may terminate pregnancy. Uric Acid pays about 61% of scavenging action of free radical in human. It stated that increased uric acid may show a defense against oxidative stress. It also encourages oxidative stress, inflammation and endothelial dysfunction and may be a marker for the progression to preeclampsia.¹⁷

We found an insignificant increased level of serum creatinine in women with preeclampsia. Some

studies also found insignificant variation in the level of serum creatinine in preeclamptic women and stated serum creatinine is not a sensitive marker of progressive state of preeclampsia.^{18,19}

We observed a significant increase level of blood urea in women with preeclampsia in comparison with normotensive pregnant women. However a study observed small changes in the level of blood urea in Preeclamptic women (Mohammad). On the other hand a study found decreased level of blood urea in preeclampsia.²

A marked proteinuria was observed in women with preeclampsia. It is thought that from ill perfused placenta the factors secreted into the circulation of mother along with abnormal expression of antiangiogenic, proinflammatory and angiogenic factors. These factors activate the endothelium of mother and cause dysfunction of endothelium, glomerular endotheliosis and increased permeability of glomeruli results in proteinuria and hypertension.²⁰

An inverse relationship of uric acid with systolic blood pressure and urinary protein was observed. A direct weak relationship, of uric acid with diastolic blood pressure, serum creatinine, with BMI and gestational age of pregnant women was observed. A study found that increased level of uric acid is not related with increased both phases of blood pressure.¹²

A study stated that weak correlation of uric acid with creatinine and blood urea is not considered as a predictive indicator of gestational hypertension.²¹ However another study found that serum creatinine and serum uric acid is highly correlated and hyperuricemia link with gestation is related

with increased incidence of premature baby.¹⁹ A correlation of elevated serum uric acid with gestation, 3 to 4 fold enhance the risk of maternal dysfunction.²² A study observed that elevated values of uric acid is associated with gestation time and predict the risk of hypertension.⁸

Limitation of study: Relatively poor specificity and sensitivity in study subject, limited the clinical importance of uric acid.

CONCLUSION

it is concluded that estimation of parameters of renal function of preeclamptic women are important along with hyperuricaemia. However further research is need to find the role of cytokines and angiogenic factors in predicting disease.


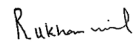

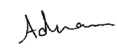
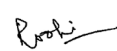
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AUTHORSHIP AND CONTRIBUTION DECLARATION

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2	Rukhshan Khurshid	Formulation of tables reviewed and approved the manuscript.	
3	Uzma Jabbar	Statistical analysis, Interpretation of results.	
4	Adnan Riaz	Formulation of tables Reviewed and approved the manuscript.	
5	Roohi Jabbar	Statistical analysis, Interpretation of results, Reviewed the manuscript.	
6	Sumera Saghir	Manuscript writing and revising it critically for important, intellectual content.	