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ORIGINAL ARTICLE

Level of Uric Acid in Women Suffering from Pre-Eclampsia and its Comparison with Normal Pregnancy

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ABSTRACT

Objective: Current study is conducted to explore the variations in uric acid level in pre-eclamptic and normal healthy pregnancy in its third trimester in pregnant females.

Methods: This descriptive cross sectional study was conducted to measure the serum uric acid level in mg/dl by kit method. The cutoff value was kept at 5mg/dl. The 10 ml of midstream urine was collected for estimation of urinary protein by dipstick method and graded from +1 to +3. For comparison between two groups in terms of levels of uric acid, independent sample t-test was used. Pearson Chi Square test was used to compare qualitative variables.

Results: Raised levels of uric acid were obtained in 81.6% preeclampsia samples, and 13.1% found among normal samples, $p<0.01$ showed that level of serum uric acid has a significant relationship with preeclampsia. Independent sample t-test showed a significant mean difference for SBP, DBP, and SUA between two groups, ($p<0.01$)

Conclusion: Significant high level of serum uric acid level was found in pre-eclamptic females than normotensive women. The findings suggest that measurement of serum uric acid may be a suitable marker in diagnosis of pre-eclampsia.

Keywords: Pregnancy, Pre-eclampsia, Serum Uric Acid, Hypertension

INTRODUCTION

During pregnancy, hypertension related disorders are the most common problem which affects both maternal and prenatal morbidity and mortality. Complications due to these disorders are about 10%.[1] Hypertension during gestational period and pre-eclampsia are the disorders included in hypertensive disorders.[2]

Pre-eclampsia is a systemic disorder which is characterized with hypertensive condition of 140/90 mm of Hg or more after gestational period of 20 weeks with proteinuria >300 mg/day.[3] It may occur later in pregnancy and require emergency delivery in severe cases. It causes the risk of intrauterine growth restriction and premature delivery, prenatal and maternal mortality that can develop the inclination towards respiratory diseases, hepatic failure, diabetes, and cardiovascular problems[4] around the globe.[5]

Despite the emerging advances in medicine, pre-eclampsia is neither preventable nor fully curable. In 1917, for the first time elevated level of uric acid was reported in a laboratory report.[6] In pre-eclampsia, the cause of developing hyperuricemia is because of the decline in renal excretion in distal tubules of kidney. The pathogenic characteristics of Uric acid in hypertension is facilitated by numerous mechanisms which includes endothelial dysfunction, inflammation, activation of rennin- angiotensin-aldosteron system, vascular smooth muscle cell proliferation, and oxidative stress.[7]

Shannon A, also relate uric acid level with pre-eclampsia.[8] Production of uric acid is the end product of metabolizing purine and manufactured in the xanthenes oxidase enzyme's presence. Associated factors including are ischemia of placenta, cytokines, for instance, interferon which induced by xanthine oxidase's expression and hypoxia.[9]

Current study is conducted to explore the variations in uric acid level in pre-eclamptic pregnancy and normal healthy pregnancy in its third trimester in pregnant females attending outpatient department of obstetrics and gynecology in Sahiwal Teaching Hospital, Punjab. The study will explore the serum uric acid as a useful biomarker as it is exceptionally inexpensive and commonly accessible as well as it is helpful in initial diagnosis which will be helpful in preventing pre-eclamptic emergency.

METHODOLOGY

This descriptive cross-sectional research was directed in the Department of Obstetrics & Gynecology in cooperation with Department of Biochemistry at Sahiwal Teaching Hospital and Sahiwal Medical College, Sahiwal. All pregnant women with singleton pregnancy admitted in Gynea Dept at Sahiwal Teaching Hospital, Sahiwal during the above mentioned period were included. After the approval from the institutional ethical review board, total number recruited pregnant women were 250, out of which, 100 with normal pregnancy and 150 with pre-eclampsia.

The study population included normotensive pregnant women and women with preeclampsia. The pregnant women were selected by convenience sampling who met the inclusion criteria and had signed informed consent. The inclusion criteria for women who were normotensive were normal systolic and diastolic blood pressure. The inclusion criteria for pre-eclampsia group were who met the diagnostic criteria for preeclampsia as per ACOG criteria BP=> or = to 140/90mmHg at two occasions 6 hours apart after 20 weeks of gestation and protein urea > or= to 300mg/24 hours or 1+ by urine dipstick method.

The exclusion criteria were pre-existing high levels of serum uric acid, chronic diseases such as gout, arthritis, chronic renal disease, hyperuricemia due to metabolic disorder and unwillingness to participate in study. The obstetrical exclusion criteria were PPROM, twin pregnancy and severe anemia.

All subjects included in our study were subjected to detail history regarding age, parity, gravidity and gestational age on a predesigned proforma. General physical examination with special reference to blood pressure measurement was performed. The investigation included measurement of proteinuria and serum uric acid.

The level of serum uric acid among all women was checked. Under aseptic conditions, the 2ml of venous blood sample was collected from all subjects. The serum uric acid level was measured in mg/dl by kit method. The cutoff value was kept at 5mg/dl. The 10 ml of midstream urine was collected for estimation of urinary protein by dipstick method and graded from +1 to +3.

For statistical analysis, data was entered in SPSS version 25.0. For comparing the level of uric acid among both groups, Independent sample t-test was used. Comparison of both groups was done with baseline characteristics using Chi-square test.

RESULTS

Among preeclampsia samples 69.3% found with multi gravid, 40.7% with primi gravid, 90.7% were singleton pregnancy, 72.7%

were hypertensive, 12.7% were diabetes, 16% were drug intake, 0.7% were cardiac disease, 2 gm urinary protein was found among 50.8% patients. Whereas from the patients who were not suffering from preeclampsia,72.7% found with multi gravid, 36% with primi gravid, 90% were singleton pregnancy, 9% were hypertensive, none was diabetics, 2% were drug intake, 2% had cardiac disease, 16.7% were having urinary protein (2 gm). The findings of Chi square test revealed a significant difference in terms of hypertension, drug intake, diabetes, and urinary protein in patients suffering from preeclampsia (p<0.01).

Table 1: Reference point data (n=250)

Characteristics		Preeclampsia				Sig.
		Yes (n=150)		No (n=100)		
		N	%	n	%	
Parity	Primary Gravida	43	30.7	27	27.3	0.56
	Multi Gravida	97	69.3	72	72.7	
Primi Gravida	Yes	61	40.7	36	36.0	0.45
	No	89	59.3	64	64.0	
Singleton pregnancy	Yes	136	90.7	90	90.0	0.86
	No	14	9.3	10	10.0	
HTN	Yes	109	72.7	9	9.0	<0.01*
	No	41	27.3	91	91.0	
DM	Yes	19	12.7	0	0.0	<0.01*
	No	131	87.3	100	100.0	
Drug intake	Yes	24	16.0	2	2.0	<0.01*
	No	126	84.0	98	98.0	
Cardiac disease	Yes	1	0.7	2	2.0	0.34
	No	149	99.3	98	98.0	
Urinary protein	1 gm	39	33.1	5	83.4	<0.01*
	2 gm	60	50.8	1	16.7	
	3gm	19	16.1	0	0.0	

Raised uric acid levels were obtained in 81.6% patients of preeclampsia group, whereas 13.1% found among normal samples, p<0.01 showed that level of serum uric acid has a significant relationship with preeclampsia.

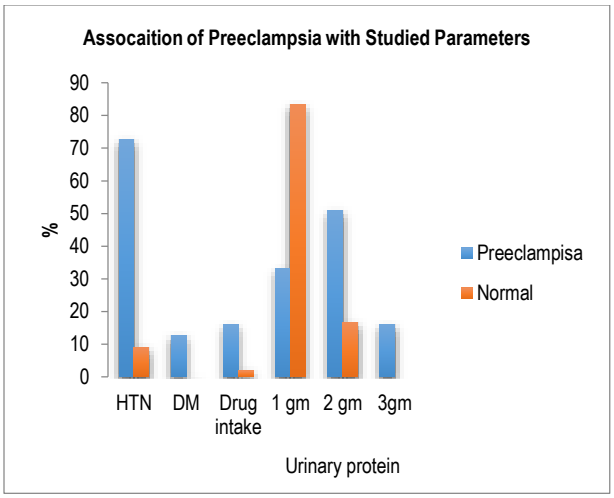
Table 2: Comparison of levels of Serum uric acid among both groups

Level of Uric acid	Preeclampsia				Sig.
	Yes (n=150)		No (n=100)		
	n	%	n	%	
Normal	27	18.4	86	86.9	<0.01*
Raised	120	81.6	13	13.1	

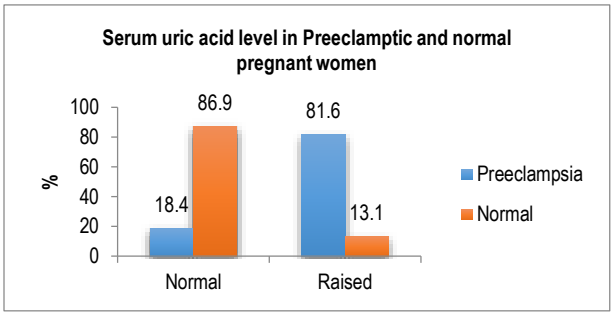
Among pregnant females with preeclampsia condition, mean value for age was 27.67±4.54 years, mean value for gestational period was 35.87±3.82 weeks, SBP mean value was 150.47±17.54, mean DBP 99.07±9.64, and mean serum uric acid was 5.92±1.42. Among patients with healthy pregnancies, the mean value of age was 26.87±4.21 years, mean value of gestational period was 36.12±3.68 weeks, SBP mean value was 118.59±16.17, DBP mean value was 76.40±12.69, and serum uric acid mean value was 3.54±1.15, independent sample t-test exhibited a significant mean difference for SBP, DBP, and SUA between two groups, (p<0.01).

Table 3: Comparison of serum uric acid and other studied parameters among both groups

Parameters	Preeclampsia				Sig.
	Yes (n=150)		No (n=100)		
	Mean	SD	Mean	SD	
Age (years)	27.67	4.54	26.87	4.21	0.09
Gestational Age (weeks)	35.87	3.82	36.12	3.68	0.40
Systolic BP	150.47	17.54	118.59	16.17	<0.01*
Diastolic BP	99.07	9.64	76.40	12.69	<0.01*
Serum Uric Acid	5.92	1.42	3.54	1.15	<0.01*



Graph 1: Association of Preeclampsia with Studied Parameters



Graph 2: Serum uric acid level in Pre-eclamptic and normal pregnant women

DISCUSSION

The findings of current study revealed a significant difference of serum uric acid level between normotensive pregnant women and women with pre-eclampsia. Same observation was made by Dr. Ranjit. They found raised level of serum uric acid among pregnant females suffering from pre-eclampsia and normotensive pregnant ladies (6.42 ± 1.42).

Our findings were supported by Rukhshan, Adina and Fayyaz. They reported elevated level of uric acid in pre-eclamptic group than serum uric acid level in normotensive females during pregnancy. It showed significant difference in p value <0.001.[10] Sarah Pasyar investigated the diagnostic accuracy of uric acid and their findings revealed mean level of uric acid in pre-eclamptic gravid females was significantly high than the healthy gravid women.[11]

Our observation is closely related to A Shakarami findings. The mean value of uric acid among pre-eclamptic females was 6.51± 1.53 whereas it was 4.72±1.58 in normotensive females which was reported as statistically significant. So, according to them it can be one of the significant indicators of pre-eclampsia.[12]

One case control study conducted by sultana R found the mean concentration of serum uric acid in case group (7.01±1.9mg/dL) as well as control group(4.55±1.63mg/dL).[13] Our observations were supported by a prospective study with large sample size, i-e., 9522 females with moderate to minimal risk of developing pre-eclampsia. The mean volume of platelets and concentration of serum uric acid of all patients were measured in second trimester. They found serum uric acid as superlative predictor for pre-eclampsia development.[14]

B ioannis evaluated the predictive part of uric acid level in 190 studies comprising of 39540 women, they found elevated uric acid level significantly in pre-eclamptic women during first, second and third trimester. They proposed further prospective studies for

verification of their outcome.[15] In pre eclamptic women, researchers found high level of correlation among serum uric acid, abnormal serum creatinine level (R=0.505, P<.001), raised urinary protein level (p=.014) and high blood pressure(R=0.321, P=.014).[16]

Morino santillan et al., conducted a prospective study on 200 pregnant ladies .They found significantly raised level of uric acid in pregnant women with pre-eclampsia diagnosis.[17] An investigation from India confirmed a strong association between elevated level of uric acid as well as creatinine in eclamptic women (P=>0.0001) compared to pregnant women with normal pregnancy.[18] A case control study from Ajmer observed marked difference between serum acid level in pregnant patients had pre-eclampsia and females with healthy pregnancy respectively 7.65 [+ or -] 081 mg/dl and 3.21 [+ or -] 072 mg/dl, (p value 0.001).[19]

An outpatient department study was conducted at our fellow institution. They found significantly elevated level of serum uric acid in 63% pregnant women with pre-eclampsia in 3rd trimester.[20]

Despite the strong association of uric acid in the pathogenesis of pre-eclampsia, Khaliq suggested genetic and specialized laboratory investigations to clarify the role of serum uric acid as predictor of pre eclampsia because current data is still contradictory.[21]

The serum uric acid level found to be significantly higher among the women with pre-eclampsia so its level could be used to diagnose pre-eclampsia. We recommend the serum uric acid measurement in all women with hypertension in pregnancy and other risk factors to develop pre-eclampsia. Early detection might help in minimizing systemic complications however further studies are required in the future.

The limitation of our study that it is single centered.

CONCLUSION

The serum uric acid level was significantly higher in pre-eclamptic women than normotensive women. The findings suggest that measurement of serum uric acid may be a suitable marker in diagnosis of pre-eclampsia.

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