Original Research Article

Comparative study of serum uric acid and lactate dehydrogenase in preclampsia and normal pregnancy

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Abstract

Objectives: To compare serum levels of uric acid and lactate dehydrogenase in preeclampsia and normal pregnancy and to determine association of serum uric acid and lactate dehydrogenase with severity of preeclampsia. **Study design:** This study include 60 pregnant women diagnosed with preeclampsia and 60 normal pregnant women. **Result:** Serum levels of Uric acid and LDH were significantly increased in preeclampsia as compared to normal pregnant women. **Conclusion:** We conclude that serum Uric acid and LDH level in preeclamptic women increases as disease severity increases.
Key Word: preclampsia, normal pregnancy.

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INTRODUCTION

Preeclampsia is the most frequently encountered hypertensive disorder of pregnancy and is major cause of maternal, fetal and neonatal mortality and morbidity [1]. The Worldwide incidence of preeclampsia is 4-8 % [2,3] while in India it is 5-15%.[4] According to WHO's World Health Report 1998, Preeclampsia is defined as "the development of hypertension (>140/90 mm of Hg) after 20 weeks of pregnancy in a woman with proteinuria with or without edema and without previous history of hypertension".[5] Preeclampsia called as "disease of theories''[6] as various hypothesis [7,8] like immune, genetic, placental abnormalities and endothelial cell dysfunction have been put forward in the pathogenesis of preeclampsia, but exact pathogenesis still remain unclear. Delivery of placenta resulted in the resolution of this condition,[9] hence it indicate that placenta is involved in the pathogenesis of preeclampsia. Preeclampsia is characterized by the failure of trophoblastic invasion of the spiral arteries leading to maladaptation of maternal spiral arterioles which may be associated with increased vascular resistance of the uterine artery and decreased perfusion of placenta.[10] Poorly perfused placenta releases an unknown substance that is toxic to endothelial cells, causing endothelial dysfunction and damage, ultimately leading to the clinical syndrome of pre-eclampsia.[11] Endothelial dysfunction sets in as early as 8-18th week [12]. However, the signs and symptoms of preeclampsia appear after 20 week of pregnancy, to overcome this "diagnostic delay," many tests have been endeavoured to establish the diagnosis of preeclampsia as early as possible, before the patient presents with advanced complications. The association of increased uric acid concentration with preeclampsia has been noted since 1917 [13]. In women who are likely to develop preeclampsia, uric acid concentration is elevated as early as 10 weeks of gestation and the elevation of uric acid precedes onset of clinical manifestations of the disease, including decrease in glomerular filtration rate.[14] Increased oxidative stress and renal involvement in preeclampsia may cause alteration in

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serum uric acid level. Lactate dehydrogenase is an intracellular enzyme and it is often estimated to indicate tissue damage.[15] In severe preeclampsia ,the multiorgan dysfunction caused by vascular endothelial damage lead to excessive leakage of lactate dehydrogenase in serum, so it is hypothesized that serum LDH levels can be used to assess the extent of cellular death and thereby the severity of disease. In the view of above finding, present study conducted to estimate serum uric acid and lactate dehydrogenase in preeclampsia and to find association of preeclampsia with serum uric acid and LDH.

MATERIAL AND METHODS

This cross sectional study consisted of 60 cases diagnosed with preeclampsia and 60 normotensive pregnant women in age group of 18- 30 yrs from obstetrics and gynecology department govt medical college Nagpur. All were primigravidae, aged matched and in the third trimester of pregnancy. Pregnant women with renal disease**,** diabetes mellitus, thyroid disorder, liver disorder, dyslipidemia, Family history of preeclampsia, Patients with history of convulsions were excluded from study. After explaining all details, informed consent was taken from each subject for participation in this study. The study was approved by institutional ethics committee for research work. Blood pressure was measured by mercury sphygmomanometer in sitting as well as supine position. Mean blood pressure was calculated from both the readings. 2 ml of freshly voided urine specimen is collected in a bulb with aseptic precaution and tested with urinary strip for proteinuria. the test strip is dipped in urine sample and colour changes in specific reagent pad noted and compared with reference colour chart on testing strip container. The diagnosis of Preeclampsia based on the definition given by American college of obstetrics and gynaecology[5], i.e Systolic blood pressure > 140 mm Hg or rise of > 30 mm Hg and diastolic blood pressure >90 mm Hg or rise of 15 mm Hg over first trimester of prepregnancy values (manifested on two occasion at least 6 hrs apart) and proteinuria ≥300 mg or greater in 24 hr urine collection or dipstick protein ≥ 1+ (on two occasion at least 6 hrs apart) is preeclampsia. 5 ml of blood was collected in clean plain bulb by venepuncture. The serum was separated by centrifugation. Serum Uric acid, Lactate dehydrogenase levels were estimated in the study by colorimetric kit methods on semiautoanalyser.

Table 1: Parameters were estimated with methods as follows

Sr no	Parameter	Method
1	Serum Uricacid	Uricase method
2	Serum LDH	Mod, IFCC Method

LDH: Lactate dehydrogenase

Statistical analysis: All the values were expressed as mean ± SD. p value <0.05 was considered as statistically significant and <0.001 was considered as highly significant. Data was analysed by using SPSS version 15.0.

RESULT

Demographic characteristic of cases and control shown in table no 2. mean age and gestational age show no significant difference between two groups. Systolic and diastolic blood pressure were significantly (p<0.05) increased in preeclamptic patients than normal pregnancy.

Table 2: Comparison of demographic character in cases and control

Parameters	cases	Control	P value
Age (years)	23.33±2.61	23.14±2.49	>0.05
Gestational age (wk)	34.77±2.53	34.369±2.60	>.0.05
Systolic BP	157.2±1.2	119.23±8.79	<0.001
Diastolic BP	103±8.2	77.56±5.72	<0.001

BP: Blood Pressure, <0.001: Highly significant

Table 3: comparison of parameters in cases and control

Parameters	cases	control	P value
Serum uric acid(mg/dl)	5.94±1.42	5.4±0.57	<0.001
Serum LDH (U/L)	375.27±87.86	169.44±31.74	<0.001

Serum uric acid and serum lactate dehydrogenase levels were increased in preeclamptic patient as compared to normal pregnancy and this increased was highly significant as shown in table no3. Highly significant positive correlation of systolic and diastolic blood pressure with serum uric acid and serum LDH was found. (table no 4)

Table 4: Correlation of serum uric acid and LDH with systolic and diastolic blood pressure

parameters	r value for systolic BP	r value for diastolic BP
Serum Uric acid	0.695	0.567
	P<0.001	P<0.001
Serum LDH	0.581	0.498
	P<0.001	P<0.001

DISCUSSION

Preeclampsia is a multifactorial, multi sysyem disorder of pregnancy. It is characterized by maternal widespread endothelial dysfunction and vasospasm leading to ischemia and oxidative stress. In our study we observed significant increase in serum uric acid and serum lactate dehydrogenase level. Hyperuricemia is said to be one of earliest manifestation of preeclampsia and present in 75% of women with clinically diagnosed Preeclampsia. Degree of uric acid elevation has been correlated with severity of proteinuria, maternal morbidity and fetal demise[9,16,17,]. Several mechanisms are proposed for elevation of uric acid in the preeclampsia such as[18] 1.Reduced renal clearance of uric acid due to decreased glomerular filtration rate and increased absorption secondary to hypovolemia 2. Overproduction of uric acid due to increased breakdown of purines in placenta secondary to ischemia 3. Increased xanthine oxidase activity leading to increased uric acid level and increased oxidative stress in preeclampsia. So, the elevated uric acid in preeclampsia may be a protective response, capable of opposing harmful effects of free radical activity and oxidative stress[19] Many studies indicated that uric acid reduces production of nitric oxide(NO) in endothelial cell[20,21] which is a vasodilator. Uric acid also increases the production of vasoconstrictors like thromboxane and angiotensin II.[22,23] Thus, uric acid lead to hypertension by increasing the concentration of vasoconstrictors and by decreasing concentration of vasodilators. Impaired nitric oxide production in endothelial cell lead to endothelial dysfunction. So, preeclampsia, which is characterized by widespread endothelial dysfunction and inflammation, might be propagated by uric acid.[24] increased serum uric acid level in present study is in accordance with Sonagra *et al*[25] ,Mandal *et al*[26], Seerla *et al* [27], Pramanik *et al*[28]. Lactate dehydrogenase is an intracellular enzyme which convert lactate to pyruvate. In placenta, glycolysis is the major energy pathway [29]. There is evidence that Lactate dehydrogenase activity and gene expression are higher in placentas from preeclamptic pregnancies compared to normal pregnancies.[30] It has been found that acute clinical symptoms that endangers life in pre-eclampsia correlate with the distinct activity of the lactate dehydrogenase.[31] Thus, the pre-eclamptic patients with higher levels of lactate dehydrogenase suggests severity of preeclampsia. result of our study corroborated with studies conducted by Gandhi *et al*[32], Sonagra *et al* [25], Sarkar *et al*[33]. In this study we also found significant positive correlation of systolic and diastolic blood pressure with uric acid and LDH in preeclamptic women. this suggest strong association of increased serum level of uric acid and LDH with progression of preeclampsia.

CONCLUSION

In present study, elevated serum uric acid level in pre-eclampsia was considered as a marker of oxidative stress and renal dysfunction and Increased Serum Lactate dehydrogenase levels indicates celluar damage in pre - eclampsia. We also observed Positive correlation of increased serum uric acid and LDH with both systolic and diastolic blood pressure. Thus serum uric acid and lactate dehydrogenase indicated severity of disease and occurrence of complications of preeclampsia. Regular monitoring of serum uric acid and LDH may reduce severity of manifestation and complication of preeclampsia.

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