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A Comparative Study of Serum Uric Acidin Gestational Hypertension, Preeclampsia and Normal Pregnancy

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Abstract:*A study was undertaken to compare the serum uric acid level in gestational hypertension, preeclampsia and normal pregnancy. The hospital based study consisted of three groups – case groupI(n=50),with women having gestational hypertension, case groupII (n=50),with women having preeclampsia and control group(n=50), with normal pregnant women. The subjects in the three groups were of more than 20 weeks of gestation and age group 20-35 years. Serum level of uric acid was measured by fully automated analyser Vitros 250 using Vitros reagent pack. Statistical analysis was done by using student's t test and p value calculated. A significant increase in serum uric acid level was observed in gestational hypertension and preeclampsia compared to normal pregnancy. The results were comparable to the findings obtained by other researches. Therefore, a close monitoring of serum uric acid level during the period of pregnancy may help in the early detection and intervention of gestational hypertension and preeclampsia and in preventing maternal and fetal complication that may arise due to the disease.*

Keywords: *Endothelial dysfunction, Gestational hypertension, Glomerular endotheliosis, Preeclampsia, Uric acid.*

I. Introduction

Hypertensive disorder in pregnancy is one of the major causes of maternal and fetal morbidity and mortality. It complicates about 5% to 10% of pregnancies in India. 8% -9% of maternal death in India occurs due to this disorder[1].

Gestational hypertension is the new onset of hypertension with blood pressure more than or equal to 140/90 mm of Hg at mid pregnancy (greater than 20 weeks of gestation) without proteinuria. Preeclampsia is gestational hypertension with proteinuria (at least 300mg/24hours). Gestational hypertension is transient in nature and usually resolves after 12 weeks postpartum. Gestational hypertension may progress to preeclampsia[2.3].

Preeclampsia may be associated with certain complications in fetus like intrauterine growth restriction, prematurity, and may also lead to death of the fetus. In case of preeclamptic women there may be development of hepatic and renal failure, pulmonary oedema and even stroke. Pre-eclampsia may also progress to eclampsia, which is a form of hypertensive disorder of pregnancy with convulsion [4]. Therefore early screening of gestational hypertension and preeclampsia may reduce the maternal and fetal complications.

The association of increase in serum uric acid level and preeclampsia was first reported in 1917[5]. After that, several studies[6,7] suggested that increase in serum uric acid level occurs with preeclampsia and its level correlates with maternal and fetal morbidity.However, some studies [8,9,10] suggested that hyperurecimia is not a consistent predictive factor for diagnosing and assessing the prognosis of preeclampsia and gestational hypertension.

Therefore, the present study was undertaken to compare the changes in serum uric acid level in gestational hypertension, preeclampsia and normal pregnancy.

II. Materials And Methods

The study was carried out in the Biochemistry wing of the Central Clinical Laboratory ofTezpur Medical College,Tezpur. The subjects for the study were selected from the Department of Obstetrics and Gynaecology, Tezpur Medical College after taking proper history, clinical examination and screening of 24 hours urinary protein.

The subjects were divided into 3(three) groups – Case group I ,Case group II and Control group. Case group I included 50 (fifty) diagnosed cases of gestational hypertension of the age group 20-35 years. Case group II included age matched 50(fifty) diagnosed and confirmed cases of preeclampsia and control group included age matched 50(fifty) healthy normotensive pregnant women with more than 20(twenty) weeks of gestation.

The inclusion criteria for the study were – pregnant women with more then 20(twenty) weeks of gestation with blood pressure more than 140/90 mm of Hg noted for the first time during pregnancy in 2(two) occasions at least 6(six) hours apart without proteinuria in case group I.Pregnant with more than 20(weeks) of gestation with blood pressure more than 140/90 mm of Hg noted for the first time during pregnancy in 2(two)

occasions at least 6(six) hours apart with proteinuria(at least 300mg/24 hours) in case group II and normal healthy normotensive pregnant women with more than 20(twenty) weeks of gestation in the control group. The subject considered had singleton pregnancy and were of the age group of 20-35 years.

The exclusion criteria for the study were – pregnant women with the history of chronic hypertension, diabetes mellitus, liver, kidney and cardiovascular diseases, gout, haematological disorders,urinary tract infection, smoking, alcoholism and any other major illness.

Under all aseptic and antiseptic care3 ml of venous blood sample were collected in the vacutainerafter obtaining informed consent from the subjects under study. The blood samples were kept aside for 30 minutes and allowed to clot. The clotted samples were then centrifuged at 2000rpm for 10 minutes and clear supernatant serum obtained.The blood investigation for serum uric acid was done in fully automated analyser,Vitros 250 using Vitros reagent pack.Statistical analysis was done by finding out mean ± standard deviation for the parameter under study. The values of the parameter of the case groups I and II and control group were compared by using student's t test and the level of significance were determined by p value. p value < 0.05 was considered significant.

III. Results

The findings of the statistical analysis done for serum uric acid in the different study groups are given in the tabular form below(**Table I)**:

Table I: the Mean ± Standard deviation(SD) Of Serum Uric Acid In Different Study Groups

Parameter under study	Control group Mean ± SD	Case group I Mean ± SD	Case group II Mean ± SD
Uric acid (mg/dl)	3.66 ± 0.49	5.63 ± 0.64	7.30 ± 2.71

Student's t test showed significant difference in mean serum uric acid level when control group compared with case group I and with case group II and case group I compared with case group II. The p value obtained were<0.0001 in each case.

IV. Discussion

In this study an increase in serum uric acid levelwas observed in gestational hypertensive case group I (5.63±0.64 mg/dl) and preeclamptic case group II(7.30 ± 2.71 mg/dl) compared to normal pregnant control group (3.66± 0.49 mg/dl). Highly significant pvalue(<0.0001) was observed when mean serum uric acid level was compared between normal pregnant women and gestational hypertensive cases, normal pregnant women and preeclamptic cases, gestational hypertensive cases andpreeclamptic cases. Similar type of results were also obtained by Wu Y et al[11], R Mustaphi et al[12]. Studies[11] also reported that the mean serum uric acid level at the initial presentation of gestational hypertension (5.06mg/dl)was significantly higher in patients who later progressed to preeclampsia.

In human being, uric acid is the end product of purine catabolism catalysed by Xanthine oxidase and Xanthine dehydrogenase . Kidney accounts for 70% of daily excretion of uric acid in urine. It is freely filtered by the glomeruli, reabsorbed and secreted by the proximal convoluted tubule [13].

During normal pregnancy the serum uric acid level is low in early period of gestation due to increased plasma volume, increased renal clearance and due to uricosuric effect of estrogen. In the third trimester because of increased catabolism/production there is increase in serum uric acid level [14,15].

Various studies[16.17] suggested that increase in serum uric acid level in preeclampsia is due to reduced renal urate clearance. Placental ischemia occurred in preeclampsia that leads to glomerular endotheliosiscausing renal arteriolar spasm, reduced glomerular filtration and impaired tubular functions. Placental ischemia also causes increased placental production of uric acid and increased trophoblastic shedding that leads to further breakdownof purine nucleotides. Fetuses exposed to hypoxia also increases serum level of purine metabolites that may cross the maternal circulation to be degraded by maternal xanthine oxidase/xanthine dehydrogenase. These factors also contribute to the increase in serum uric acid level in preeclampsia. Uric acid normally acts as an antioxidant in preventing oxidative stress in preeclampsia but increased serum uric acid level causes maternal endothelial dysfunction and hypertension due to its proinflammatory role, thus contributing to the pathogenesis of preeclampsia [15].

V. Conclusion

In this study, significant increase in serum uric acid level was observed in gestational hypertension and preeclampsia compared to normal pregnant women. Therefore, a close monitoring of serum uric acid level during the period of pregnancy may help in the early detection and intervention of gestational hypertension and preeclampsia and thereby help in preventing the maternal and fetal complications due to preeclampsia.

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