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ORIGINAL ARTICLE

Fetal out comes in Pre-Eclampsia with raised Maternal Serum Uric Acid

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ABSTRACT

Aim: To compare adverse fetal outcome of hyperuricemic pre-eclamptic pregnancy with normouricemic pre-eclamptic pregnancy.
Study design: A Cohort Study
Methodology: In this study patients with serum uric acid level(SUA) >5.5mg/dl were included in group A and patients with SUA level <5.5mg/dl were included in group B. Patients with medical disorders like renal disease, hypertension, diabetes and currently using drugs affecting uric acid levels like thiazide diuretics were excluded. Both groups were followed until delivery. Intrauterine growth restriction, low birth weight was recorded. **Results:** A total of sixty patients were studied with age range from 18 to less than 40 years. The mean age in group A was 33.566± 4.19 years while 34.100± 3.46 years in group B. Mean Gestational age was 33.500±4.22 weeks in group A and 34.200±4.71 weeks in group B, while mean serum uric acid level was 7.416±1.04 in group A and 4.202±0.61 in group B. Intrauterine growth restriction was seen 93.3% in group A as compare to 60% in group B (P=0.002)(RRR=55.5%) while Low birth weight was 70% in group A and 10% in group B (P=0.000).
Conclusion: The pregnancies with pre-eclampsia and raised serum uric acid levels result in adverse fetal outcome. Significant increased number of IUGR and LBW fetuses were observed in babies born to pre-eclamptic mothers with raised serum uric acid levels in comparison with babies born to normo-uricemic pre eclamptic mothers.
Keywords: Pre-eclampsia, serum uric acid, fetal outcome

INTRODUCTION

Hypertensive disorders complicate approximately 8% to 10% of all pregnancies[1]. An overall increased trend in incidence is seen from 1990-2019[2].Pre-eclampsia is one of the entity in hypertensive disorders during pregnancy. It is characterized by a raised blood pressure in second half of pregnancy with proteinuria and with or without multisystem involvement[3]. Global incidence of pre-eclampsia is reported to be 4.6%[4]. The incidence is not uniform in different regions in developing world it ranges from 1.8-16.7%[5].

Pre-eclampsia is characterized by impaired endovascular syncitiotrophoblastic invasion resulting in incomplete uteroplacental circulation that leads to fetal syndrome and many features related to poor fetal outcome. The hypoperfused placenta in turn release some triggering factors in maternal circulation that impair endothelial function and cause maternal syndrome in the form of multiorgan failure[6,7].

Raised maternal SUA (hyperuricemia) is a distinctive feature of pre eclampsia. Uric acid is the degradation product of nucleotides which is filtered, reabsorbed and secreted by the kidneys. Raised uric acid levels in pre-eclamsia are proposed as increased production and decreased clearance from kidneys due to decrease in glomerular filtration rate[8]. In 1917, the association between raised SUA and pre eclampsia was described for the first time[9]. From that time, uric acid determination is considered to be an important laboratory parameter to monitor disease severity in pre-eclampsia.

Pre-eclampsia is associated with many adverse maternal outcomes such as placental abruption, ARDS, renal failure and PPH and many adverse fetal outcomes including low birth weight, IUGR and still birth[10]. These complications are seen more in patients with early onset preeclampsia[11,12].

It has been found that SUA > 6.5 mg/dl is associated with adverse perinatal outcome[13]. It is seen that high maternal uric acid superimposed on pre-eclampsia substantially increases the risk of small for gestational age fetuses[14]. The pregnancies complicated with pre-eclampsia and hyperuricemia are associated with intrauterine death (14.6%), low APGAR score(19.2%), preterm birth(26%) and intrauterine growth restriction (28.5%)[15].

Much work has been done related to epidemiology and complications related to pre-eclampsia. We need to know how to reduce these complications. Early detection can prevent these complications. Uric acid is seen to be raised as early as 10 weeks of gestation in patients with pre- eclemsia[8]. Its relation with perinatal outcome is not much studied in Pakistan.

The objective of this study is to compare the adverse fetal outcome of hyperuricemic pre-eclamptic pregnancy with normouricemic pre-eclamptic pregnancy.

MATERIAL AND METHODS

This cohort study was conducted in Department of Obs & Gyn of Shaikh Zayed Hospital Rahim Yar Khan after permission from Institutional Ethical Review Board. Sixty women were eligible for this study. Women with SUA level >5.5mg/dl were included in group A and patients with SUA level <5.5mg/dl were included in group B. Patients with medical disorders like renal disease, Diabetes, Hypertension, and currently using drugs affecting uric acid levels like thiazide diuretics were excluded. Patients were evaluated for basic demographics and Blood pressure. Obstetrical examination and investigations like SUA was noted on a predesigned proforma. Both groups were followed until delivery. Intrauterine growth restriction, low birth weight was recorded. Data was entered in SPSS version 21. Analysis was done to compare Group A or Exposed group (hyperuricemic pre-eclamptic group) and Group B or non-exposed group (normouricemic pre-eclamptic). Qualitative variables like age groups, parity, IUGR and low birth weight were described as frequency and percentages. Quantitative variables like age, gestational age, and SUA were presented as mean and SD ratio. Chi-square test was applied to compare outcomes in both groups. A p value of ≤0.05 is taken as significant. Relative risk reduction was also calculated.

RESULTS

In the current study the age range was 18 to less than 40 years. The mean age was 33.566±4.19 years in group A while 34.100±

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3.46 years in group B. Majority of the patients were between 31-40 years in both groups as shown in Table I & II.

Table- I: % age according to Age distribution in Group A (n=30)

Age Groups (years)	n	%age
18-30	8	26.7%
31-40	22	73.3%

Mean ± SD = 33.566± 4.19 years

Table- II: %age according to Age distribution in Group B (n=30)

Age Groups (years)	n	%age
18-30	4	13.3%
31-40	26	86.7%

Mean ± SD = 34.100± 3.46 years

Intrauterine Growth Restriction was seen 93.3% in group A as compare to 60% in group B (P=0.002) (RRR=55.5%) while Low Birth Weight was seen 70 % in group A and 10% in group B (P=0.000)(RRR=600%) as shown in Table III.

Table III: Comparison of Outcomes in both groups (n=60)

Outcome	Group A	Group A	P Value	RRR
Intrauterine	28(93.3%)	18(60%)	0.002	55.5%
Growth restriction				
Low birth weight	21(70%)	3(10%)	0.000	600%

DISCUSSION

The ultimate goal of an Obstetrician in managing high risk pregnancies is to have an optimal fetomaternal outcome. Unfortunately the fetal outcome in pregnancies with preeclampsia is not satisfactory and results in many adverse features such as preterm birth, LBW, IUGR and these all problems are more common in pre-eclamsia with raised maternal serum uric acid [16]. Although the exact pathophysiology which leads to a rise in maternal SUA in preeclampsia is not very clear but its unwanted effects on fetus are well documented[8].

In the current study we try to find out the relation of high SUA in pre-eclamptic women with poor fetal outcome (LBW fetus and IUGR). In hyperuricemic subjects, the mean SUA concentration was 7.09±1.09mg/dl and in normouricemic group it was 4.62±0.76mg/dl. It was noted that there was significant difference of the uric acid levels between the two groups. Nair A et al. compared the perinatal outcome in patients with pre-eclampsia and normotensive pregnancies. The study showed mean uric acid value 6.37mg/dl in preeclamptic women and 3.6mg/dl in normotensive women[17]. In another prospective study, the SUA was found to be 7.29mg/dl in pre-eclamptic women with poor fetal outcome[13].In our study it was noted that newborns with LBW were 70% in hyperuricemic subjects whereas in normo-uricemic subjects it was 10%, which is very negligible in contrast to hyperuricemic group. Similar relation of hyperuricemia with low birth weight is shown in other studies[16, 17,18]. Nair et al demonstrated that with increase in maternal SUA a decrease in birth weight was seen which was 88%(26% VLBW and 56% LBW)[17]. Another study showed similar results, increase in the trend of LBW was seen with rise in SUA above 6mg/dl [18]. In a study conducted on normotensive pregnant women, it was reported that hyperuricemia in the third trimester of pregnancy is an independent risk factor for LBW delivery[25].

With hyperuricemia another feature of poor fetal outcome was preterm birth[17]. It was seen that with every 1mg/dl rise of maternal SUA there was 1.54 fold increased risk of pre-term birth [19]. In our study intrauterine growth restriction (IUGR) was seen 93.3% in hyperurecemic pre-eclamptic subjects as compared to 60% in normourecemic pre-eclamptic ladies. Here again poor fetal outcome is more associated with hyperurecemia. The similar association of hyperurecemia with IUGR is shown in other studies[17,15] . It was seen that in pregnancies with raised SUA and pre-eclampsia the risk of small for gestational age babies were 12 folds as compared to those with normotensive and normourecemic pregnancies[14]. Increased serum uric acid is related to many adverse maternal and fetal outcomes[20]. The hyperurecemic preeclamtic mother is more likely to deliver by cesarean section[21]. In another study it was seen that as the uric acid level increase it results in severity of hypertension and hence increases the risk of poor fetomaternal outcome[22].

From above findings it is seen that hyperurecemic pre-eclamptic mothers are at more risk of adverse fetal outcome than normourecemic pre-eclamptic mothers.

CONCLUSION

The pregnancies complicated with pre-eclampsia and raised SUA levels result in adverse fetal outcome. Significant increased number of IUGR and LBW fetuses were observed in babies born to pre-eclamptic mothers with raised SUA levels in comparison to preeclamptic mothers with normal levels of serum uric acid.

Conflict of interest: Nil

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