https://doi.org/10.29309/TPMJ/2023.30.04.7440

The Professional Medical Journal
www.theprofesional.com
2023, Volume, 30 Issue, 04

ORIGINAL ARTICLE

Frequency of hyperuricemia and fetal outcome in preeclampsia.

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Article Citation: Shaheen S, Naseer K, Abid N, Abid F, Umer M. Frequency of hyperuricemia and fetal outcome in preeclampsia. Professional Med J 2023; 30(04):472-477. https://doi.org/10.29309/TPMJ/2023.30.04.7440

ABSTRACT… Objective: To determine the frequency of hyperuricemia and fetal outcome in pre-eclamptic pregnant patients. **Study Design:** Cross-Sectional Study. **Setting:** Department of OBG Allied Hospital Faisalabad. **Period:** January 15, 2022 to January 15, 2023. **Material & Methods:** Total 200 preeclamptic patients were enrolled and 5cc of blood was drawn for serum uric acid level. The normal values took 3.1-6.3 mg/dl. Fetal outcome were intrauterine death, premaurity, intrauterine growth restriction with low birth weight recorded. **Results:** Frequency of hyperuricemia was calculated as 42% (n=84) where normal uric acid levels were recorded in 58% (n=116). IUD in hyperuricemia was 8.33%(n=7) and 2.59%(n=3) in normal uric acid levels, p=0.06, preterm delivery in hyperuricemia was 52.38%(n=44) and 20.69%(n=24) in normal uric acid level, p=0.000, CS in 55.95%(n=47) in hyperuricemia and 22.41%(n=26) in normal uric acid levels whereas SVD was 44.05%(n=37) in hyperuricemia and 77.59%(n=90) in normal uric acid levels, p=0.000, low birth weight was recorded in 52.38%(n=44) in hyperuricemia whereas 14.66%(n=17) in normal uric acid levels, p=0.000. **Conclusion:** the frequency of fetal outcome is adverse in hyperuricemia in pre-eclamptic patients as compared to normal serum uric acid levels.

Key words: Hyperuricemia, Intrauterine Death, Low Birth Weight, Pre-Elampsia, Preterm.

INTRODUCTION

Hypertensive disorder of pregnancy particularly in preeclampsia maternal and perinatal morbidity and mortality is very high. In developing countries like in Pakistan our health facilities are limited during antenatal period and preeclampsia is one of the leading cause of maternal mortality as compare to developed countries. Perinatal complication with preeclampsia like Fetal growth restriction with low birth weight, intrauterine death as well as high number of preterm births. Although advances in the management of preeclampsia but still a leading cause of maternal and perinatal morbidity and mortality worldwide.[1]

Preeclampsia and hyperuricemia are related to each other. Hyperurecemia is inconsistent predictive factor in preeclampsia reported by some studies.[2] Uric acid is the end product of purine degradation by enzyme xanthene oxidase action and excretion is largely by kidneys.[3] Uric acid level is low (<3mg/dl) in healthy women due to its low solublity. However uric acid has role in biological functions. It is a marker of oxidative stress, tissue injury and renal dysfunctions.[4] The serum uric acid level is effected by high protein diet, increased cell turnover, purine metabolism pathway disturbance and changes in kidney functions. In pregnancy serum uric acid level initially decrease up to 3mg/dl due to the uricosuric effect of estrogen, expanded blood volume and increased glomerular filtration rate.[5,6] The serum uric acid level rises during third trimester up to 4 to 5mg/dl by term.

The increase uric acid level were first noted in preeclampia in late 1800s. Since that time many studies have done and found that Increased serum uric acid level often precedes clinical effects of preeclampsia. The reduce placental perfusion lead to fetal complications.[7]

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Article received on: 02/01/2023
Accepted for publication: 06/03/2023

Increased uric acid level leads to clinical manifestations of the disease including reduced glomerular filtration rate, reduced renal clearance and reduction in plasma volume.[8] The uric acid acts on placental vessels as vasoconstrictor in preeclampsia that would compromise placental perfusion and leads to fetal complications. Although many conflicting reports in the literature about uricemia and preeclampsia association and pregnancy outcome.[8,9,10] Therefore, frequency of serum uric acid level in preeclampsia is useful test to predict and prevent complications.

MATERIAL & METHODS

This cross-Sectional study was conducted In the Department of Obstetrics and Gynecology of Allied Hospital/ Faisalabad medical university Faisalabad, a tertiary care hospital deals with all types of high-risk pregnancies from January 15, 2022 to January 15, 2023.

Inclusion Criteria

A total of 200 pregnant women with preeclampsia were included after fulfilling the criteria of diagnosis that was blood pressure>140/90 and protienuria300mg in 24hrs collection of urine. Patients with chronic hypertension, chronic kidney disease and gestational diabetes were excluded. using all aseptic precautions, 5ml of venous blood was drawn for measurement of serum uric acid level. The normal values used for reference in the 3rd trimester range between 3-5 mg/dl. Serum uric acid level recorded. For fetal outcomes preterm delivery, growth restricted and intra uterine death (IUD) and condition of baby after birth were noted. All the women were delivered according to institutional protocol.

Data Analysis

All the data obtained was collected with the approval of the ethical committee No.48.ERC/FMU/2022-23/335 and analyzed through SPSS version 23. Mean and standard deviation was calculated for quantitative variables like age, gestational age, serum uric acid level and birth weight (grams). The categorical variables like hyperuricemia, mode of delivery and low birth weight were showed as frequency and percentages. The data was stratified on age groups, gestational age and parity to determine the effect on frequency of hyperuricemia p-value ≤ 0.05 was taken as significant. The fetal outcome association between hyperuricemia and normal uric acid patients were compared by chi-square test p-value ≤ 0.05 were taken as significant.

RESULTS

A total of 200 cases fulfilling the selection criteria and different variables were assessed. Among these patients age distribution shows 64.5% (n=129) cases between 18-30 years of age and 35.5% (n=71) were between 31-35 years of age, mean age was calculated as 28.7+3.40 years (Table-I). Gestational age shows that 87.5% (n=175) were between 32-35 weeks of gestation whereas 12.5% (n=25) were between 36-40 weeks of gestation, mean gestational age was computed as 33.88+1.27 weeks. (Table-II) Parity distribution shows that 84.5% (n=169) had parity <2 while 15.5% (n=31) had >2 parity. (Table-III). Mean serum uric acid levels were calculated as 5.81+0.73mg/dl. (Table-IV) Mean birth weight was calculated as 2458.63+259.80 grams. (Table-V) Frequency of hyperuricemia was calculated as 42% (n=84) where normal uric acid levels were calculated in 58% (n=116). (Table-VI)

Comparison of fetal outcome in normal uric acid levels versus hyperuricemia shows that Intrauterine death (IUD) in hyperuricemia was 8.33% (n=7) and 2.59%(n=3) in normal uric acid levels, p value was 0.06, preterm delivery in hyperuricemia was 52.38% (n=44) and 20.69% (n=24) in normal uric acid level, p value was 0.000, cesarean delivery was recorded in 55.95% (n=47) in hyperuricemia and 22.41% (n=26) in normal uric acid levels whereas SVD was 44.05% (n=37) in hyperuricemia and 77.59% (n=90) in normal uric acid levels, p value was 0.000, low birth weight was recorded in 52.38% (n=44) in hyperuricemia whereas 14.66% (n=17) in normal uric acid levels, p value was 0.000. (Table-VII) The data was stratified on age groups, gestational age and parity to determine the effect on frequency of hyperuricemia. Post-stratification chi-square test was applied and p-value ≤ 0.05 was taken as significant. The fetal outcome (preterm, IUD

and low-birth weight) between hyperuricemia and normal uric acid groups were compared by chi-square test p-value ≤ 0.05 were taken as significant. (Table-VIII,IX,X)

Age (in years)	No. of Patients (%)
18-30	129 (64.5%)
31-35	71 (35.5%)
Total	200 (100%)
Mean+SD	28.7+3.40

Table-I. Age distribution (n=200)

G. Age (in weeks)	No. of Patients (%)
32-35	175 (87.5%)
36-40	25 (12.5%)
Total	200 (100%)
Mean+SD	33.88+1.27

Table-II. Gestational AGE (n=200)

Parity	No. of Patients (%)
1-2	169 (84.5%)
>2	31 (15.5%)
Total	200 (100%)
Mean+SD	1.91+0.63

Table-III. Parity distribution (n=200)

Serum uric acid levels (mg/dl)	Mean	SD
	5.81	0.73

Table-IV. Mean serum uric acid levels (n=200)

Birth Weight (grams)	Mean	SD
	2458.63	259.80

Table-V. Mean birth weight (n=200)

Hyperuricemia	No. of Patients (%)
Yes	84 (42%)
No	116 (58%)
Total	200 (100%)

Table-VI. Frequency of hyperuricemia (n=200)

Fetal Outcome		Hyperuricemia (n=84) No. of Patients (%)	Normal Uric Acid Levels (n=116) No. of Patients (%)	P-Value
IUD	Yes	7 (8.33%)	3 (2.59%)	0.06
	No	77 (91.67%)	113 (97.41%)	
Preterm delivery	Yes	44 (52.38%)	24 (20.69%)	0.000
	No	40 (47.62%)	92 (79.31%)	
Mode of delivery	CS	47 (55.95%)	26 (22.41%)	0.000
	SVD	37 (44.05%)	90 (77.59%)	
Low birth weight	Yes	44 (52.38%)	17 (14.66%)	0.000
	No	40 (47.62%)	99 (85.34%)	

Table-VII. Comparison of fetal outcome in normal uric acid levels versus hyperuricemia (n=200)

Fetal Outcome	Age (in years)	Group	Yes N (%)	No N (%)	P-Value
IUD	18-30	Hyperuricemia	5(9.8%)	46(90.2%)	0.025
		Normal uric acid	1(.3%)	77(98.7%)	
	31-35	Hyperuricemia	2(6.1%)	31(93.9%)	0.884
		Normal uric acid	2(5.3%)	36(94.7%)	
Preterm delivery	18-30	Hyperuricemia	26(51%)	25(49%)	0.001
		Normal uric acid	18(23.1%)	60(76.9%)	
	31-35	Hyperuricemia	17(51.5%)	16(48.5%)	0.003
		Normal uric acid	7(18.4%)	31(81.6%)	
Cesarean section	18-30	Hyperuricemia	30(58.8%)	21(41.2%)	0.000
		Normal uric acid	17(21.8%)	61(78.2%)	
	31-35	Hyperuricemia	17(51.5%)	16(48.5%)	0.015
		Normal uric acid	9(23.7%)	29(76.3%)	
SVD	18-30	Hyperuricemia	21(41.2%)	30(58.8%)	0.000
		Normal uric acid	61(78.2%)	17(21.8%)	
	31-35	Hyperuricemia	16(48.5%)	17(51.5%)	0.015
		Normal uric acid	29(76.3%)	9(23.7%)	
Low birth weight	18-30	Hyperuricemia	30(58.8%)	21(41.2%)	0.000
		Normal uric acid	10(12.8%)	68(87.2%)	
	31-35	Hyperuricemia	14(42.4%)	19(57.6%)	0.027
		Normal uric acid	7(18.4%)	31(81.6%)	

Table-VIII. Stratification for comparison of fetal outcome in normal uric acid levels versus hyperuricemia with regards to age (n=200)

Fetal Outcome	G.Age (in weeks)	Group	Yes	No	P-Value
			N (%)	N (%)	
IUD	32-35	Hyperuricemia	7(9%)	71(91%)	0.040
		Normal uric acid	2(2.1%)	95(97.9%)	
	36-40	Hyperuricemia	0(%)	6(100%)	0.566
		Normal uric acid	1(5.3%)	18(94.7%)	
Preterm delivery	32-35	Hyperuricemia	38(48.7%)	40(51.3%)	0.000
		Normal uric acid	19(19.6%)	78(80.4%)	
	36-40	Hyperuricemia	5(83.3%)	1(16.7%)	0.026
		Normal uric acid	6(31.6%)	13(68.4%)	
Cesarean section	32-35	Hyperuricemia	44(56.4%)	34(43.4%)	0.000
		Normal uric acid	21(21.6%)	76(78.4%)	
	36-40	Hyperuricemia	3(50%)	3(50%)	0.278
		Normal uric acid	5(26.3%)	14(73.7%)	
SVD	32-35	Hyperuricemia	34(43.4%)	44(56.4%)	0.000
		Normal uric acid	76(78.4%)	21(21.6%)	
	36-40	Hyperuricemia	3(50%)	3(50%)	0.278
		Normal uric acid	14(73.7%)	5(26.3%)	
Low birth weight	32-35	Hyperuricemia	44(56.4%)	34(43.6%)	0.000
		Normal uric acid	16(16.5%)	81(83.5%)	
	36-40	Hyperuricemia	0(%)	6(100%)	0.566
		Normal uric acid	1(5.3%)	18(94.7%)	

Table-IX. Stratification for comparison of fetal outcome in normal uric acid levels versus hyperuricemia with regards to g.age (n=200)

Fetal Outcome	Parity	Group	Yes	No	P-Value
			N (%)	N (%)	
IUD	1-2	Hyperuricemia	7(9.7%)	65(90.3%)	0.071
		Normal uric acid	3(3.1%)	94(96.9%)	
	>2	Hyperuricemia	0	12(100%)	---
		Normal uric acid	0	19(100%)	
Preterm delivery	1-2	Hyperuricemia	37(51.4%)	35(48.6%)	0.000
		Normal uric acid	20(20.6%)	77(79.4%)	
	>2	Hyperuricemia	6(50%)	6(50%)	0.179
		Normal uric acid	5(26.3%)	14(73.7%)	
Cesarean section	1-2	Hyperuricemia	41(56.9%)	31(43.1%)	0.000
		Normal uric acid	22(22.7%)	75(77.3%)	
	>2	Hyperuricemia	6(50%)	6(50%)	0.093
		Normal uric acid	4(21.1%)	15(78.9%)	
SVD	1-2	Hyperuricemia	31(43.1%)	41(56.9%)	0.000
		Normal uric acid	75(77.3%)	22(22.7%)	
	>2	Hyperuricemia	6(50%)	6(50%)	0.093
		Normal uric acid	15(78.9%)	4(21.1%)	
Low birth weight	1-2	Hyperuricemia	40(55.6%)	32(44.4%)	0.000
		Normal uric acid	15(15.5%)	82(84.5%)	
	>2	Hyperuricemia	4(33.3%)	8(66.7%)	0.117
		Normal uric acid	2(10.5%)	17(89.5%)	

Table-X. Stratification for comparison of fetal outcome in normal uric acid levels versus hyperuricemia with regards to parity (n=200)

DISCUSSION

The hypertensive disorders of pregnancy are associated with hyperurecemia in preeclampsia and this increase the risk of intrauterine growth retardation, preterm delivery and intrauterine death.[11]

The frequency of Hyperuricemia is significantly high in preeclampsia in our study group. As frequency of hyperuricemia was 42%. This hyperuricemia may be due to decrease uric acid excretion, increase reabsorption and decrease glomerular filtration rate in preeclampsia.[12] It was also noted that level of uric acid >5.5mg/dl the severity of preeclampsia also high. The uncontrolled severity of preeclampsia is highly related with increase level of serum uric acid. Similar results were quite comparable to other resent studies by Komar N[13], Vyakaranam S[14], Toshniwal et al.[15] These all studies showed high frequency of hyperurecemia in preeclampsia.

In this study most of the preeclamptict patients were between age 18 years to 30 years and similarly gestational age was mostly less than 35 weeks. A study by Hasan S et al most of preeclampsia patients were primigravida and were of less than 25 years age.[16]

In our study fetal outcome in terms of intrauterine death was 8.33% (n=7) and 2.59% (n=3) in normal uric acid levels, p value was 0.06, preterm delivery in hyperuricemia was 52.38% (n=44) and 20.69% (n=24) in normal uric acid level, p value was 0.000. This was statistically significant. This was quite comparable with the results of recent study.[16] As other biochemical markers in preeclampsia, increase serum uric acid level related with poor fetel outcome.

In our study cesarean delivery was noted in 55.95% (n=47) in hyperuricemia and 22.41% (n=26) in normal uric acid levels whereas vaginal delivery was 44.05% (n=37) in hyperuricemia and 77.59% (n=90) in normal uric acid levels, p value was 0.000. It was also statistically significant. This was quite comparable with study results of Ayub S et al. that showed abnormal levels of biomarkes particularly hyperurecemia cesarean section rate increased as compare to vaginal delivery.[17]

It was noted in our study the low birth weight was in 52.38% (n=44) in hyperuricemia whereas 14.66% (n=17) in normal uric acid levels, p value was 0.000. That was quite comparable with the resent studies.[18,19] The poor fetal outcome was also reported by other recent meta analytic studies that hyperuricemia in preeclampsia associated with low birth weight and growth restriction as the level increase from 5.5gm/dl. During antenatal period level of serum uric acid may be considered as high weightage during management of preeclampsia in lowering the poor fetal outcome.[20,21,22]

The clinical usefulness of the presented results are limited by several factors are involved. As the sample size was relatively small and study patient group was recruited from single hospital. So larger prospective studies are required for confirmation of these results. Another factor is that all patients were unbooked and we could not determine the relationship between uric acid changes and severity of preeclampsia.

CONCLUSION

This study concluded that frequency of hyperuricemia in women presenting with pre-eclampsia is very high and also increases preinatal morbidity and mortality. As our country is third word and underdevelop and patients report late in antenatal period so proper screening and management of these high risk patients should be done to address their high risk needs in the management of hyperuricemia during pregnancy in order to reduce the perinatal morbidity and mortality.

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1	Shazia Shaheen	Subject study search, Abstract discussion writing, review.	
2	Komal Naseer	Data collection, Results.	
3	Noor Abid	Data collection.	
4	Fatima Abid	Data collection, Result.	
5	Muhammad Umer	Data collection.	