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Serum Uric Acid Level in Relation to Severity of Preeclampsiain Rural Women in Bangladesh

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Abstract **Original Research Article**

Hyperuricemia has received much attention and debate recently with regard to its utility as a marker for preeclamspia and as a predictor of adverse materno-fetal outcome. ***Objective:*** In this study our main goal is to detect the relationship between serum uric acid level and preeclampsia. ***Method:*** this cross sectional study was directed at the Department of Obstetrics and Gynaecology in Ad-din Akij Medical College, Khulnaduring the period of June 2017 to May 2018 among selected 80 preeclamptic patients where 40 were mild (Group A) and 40 were severe (Group B) preeclamtic patients. Data was collected in preformed data collection sheet by interviewing the patients or their attendants during the study. ***Results:*** In this study group-1 52.02% pregnant women were in their first pregnancy, where as in group-2 it was 61%.Both group A and group B proteinuria and serum uric acid were significant , P value = 0.001.***Conclusion:*** We can conclude that the high serum uric acid concentration correlates with the degree of severity of preeclampsia. Further study and analysis is needed for better outcome.

Keywords: Hyperuricemia, preeclampsia, serum uric acid.

INTRODUCTION

Preeclampsia, the syndrome of hypertension and proteinuria that heralds the seizures of eclampsia, remains one of the great mysteries in the field of obstetrics. Preeclampsia is still one of the leading causes of maternal mortality in the world [1]. Preeclampsia is a multisystem disorder that occurs after 20 weeks of gestation with the hypertension and proteinuria which disappear after delivery. Occasionally, women present with severe complications of preeclampsia, such as eclampsia or haemolysis, elevated liver enzymes and low platelets (HELLP) syndrome [2].

Preeclamsia is a common pregnancy related disorder in Bangladesh that originate in the placenta and causes variable maternal and fetal problems [1]. Increased serum uric acid concentration is characteristic feature of preeclampsia and the hyperuricemia correlates with the degree of severity of preeclampsia .Preeclampsia was first recognized almost 2000 years ago.

In 1917 Slemons and Bogert first observed an association between serum uric acid (SUA) concentration and the presence of either preeclampsia (PE) and/or eclampsia. They showed that hyperuricemia is a characteristic biochemical feature of preeclampsia. Uric acid is the final product of purine metabolism. Since most uric acid is derived from the metabolism of endogenous purine, eating foods rich in purines contributes only a small portion of the total pool of uric acid.

Hyperuricemia is often seen in hypertensive diseases of pregnancy. In some pregnant patients, hyperuricemia is thought to be due to contracted plasma volume and local release of angiotensin II by the kidneys. Serum uric acid levels of 5.5 mg/dL or higher may indicate an increased likelihood of preeclampsia in hypertensive pregnant patients. Women with only hypertension and hyperuricemia have similar or greater risk as woman with only hypertension and proteinuria. Those with hypertension, proteinuria and hyperuricemia have greater risk than those with hypertension and proteinuria alone. The risk of these outcomes increase with increasing uric acid [3].

Fig-1a and 1b: shows side effectsof preeclampsia severity in baby and mother

Hyperuricemia is usually considered secondary to altered kidney function. Increased serum uric acid is associated with hypertension, renal disease and adverse cardiovascular events in the non-pregnant population and with adverse fetal outcomes in hypertensive pregnancies. It can be hypothesis that an elevated concentration of uric acid in preeclamptic women is not simply a marker of disease severity but rather contributes directly to the pathogenesis of the disorder. The level of uric acid above 4.5 mg/dl is indicative of preeclamptic process and in such cases; the subjects deserve careful and close clinical follow up[4].

In this present study our main aim is to identify the relationship between serum uric acid level and preeclampsia.

OBJECTIVE

General Objectives

- To find out the relationship between serum uric acid level and preeclampsia.

Specific Objectives

- To detect Gestational age distributions of the patients
- To identify proteinuria and serum uric acid level of the patients

METHODOLOGY

Study type

- This study was a cross-sectional study.

Place and period of the study

- This was conducted at the Department of Obstetrics & Gynaecology in the Institute of Ad-dinAkij Medical College Hospital, Khulnafrom June 2017 to May 2018.

Sampling method

- During the study Purposive sampling method was used.

Sample Size

- In the study the sample size was 80.Among them 40 were mild and 40 were severe preeclamtic patients.

INCLUSION CRITERIA

- 24-40 weeks of singleton pregnancy
- Blood pressure >140/90 mm Hg
- (Taken on two occasions 6 hours apart)
- Urinary protein of 0.3 gm/L or more

EXCLUSION CRITERIA

- Any associated medical disorders like diabetes mellitus, renal disease, chronic hypertension, liver disease.
- Those who were on medications (such as diuretics, corticosteroids, aspirin which could alter serum uric acid level.
- All the pregnant women enrolled in the study and their attendants were explained about the nature and purpose of the study and only those who gave informed written consent were included in this study.

METHOD

Data was collected in preformed data collection sheet by interviewing the patients or their attendants. After thorough clinical examination and measuring of proteinuria patients were grouped into mild and severe preeclampsia.

Relevant biochemical investigations were done where two milliliter of random venous blood was collected from antecubital vein of the subjects taking all aseptic precautions. Blood was drawn single time from each subject and submitted within half an hour to the laboratory for analysis. During laboratory for analysis estimation of serum uric acid concentration was done by enzymatic colorimetric method.

DATA ANALYSIS

Statistical analyses of the results were obtained by using window based computer software devised with Statistical Packages for Social Sciences (SPSS-15).

Suitable table and figure were used to present observation and result of the study. During analysis frequency distribution for all the variables was worked out and produced in tabular form. After compilation the data were presented in the form of tables. Student's 't' test, Chi-square (x2) test and correlation- coefficient (r) test were used for determining the difference and relationship. P value <0.05 was taken as minimum level of significance.

RESULTS

In figure-1 shows age distribution of the patients where most of the patients. In group A (77.3%) And group B (70.5%) most of the patients were in 21-30 age group. In group A and group B mean age was 24.63 ±3.86 and 24.52±4.44. Also p value was 0.899. The following figure is given below in detail:

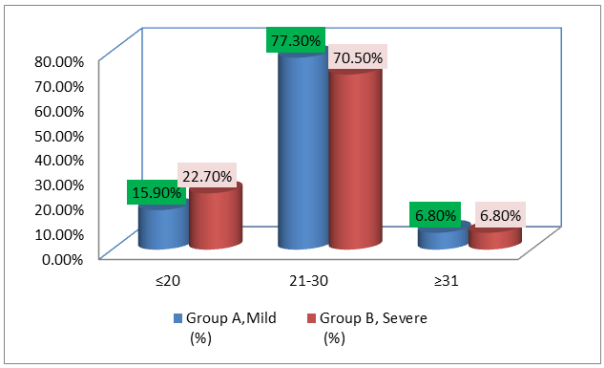

Fig-1: Age distribution of the patients

In table-1 shows gestational age distributions of the patients where in group A and group B most of the patients belongs to 32-40 weeks. The following table is given below in detail:

Table-1: Gestational age distributions of the patients

Gestational age group	Group A, Mild %	Group B, Severe, %
<32	15%	10%
32-40	85%	90%

In table-2 shows parity distribution of the pregnant women were among 80 pregnant women in group-1 52.02% pregnant women were in their first pregnancy, where as in group-2 it was 61%. The following table is given below in detail:

Table-3: Parity distribution of the pregnant women

Parity	Group-1, %	Group-2, %
Primigraida	52.02%	61%
2nd pregnancy	28.28%	29%
Multi graida	19.70%	9%

In figure-2 shows residential area of the patients where in group-1 56% pregnant women lived inrural area, where as in group-2 it was 60%. The following figure is given below in detail:

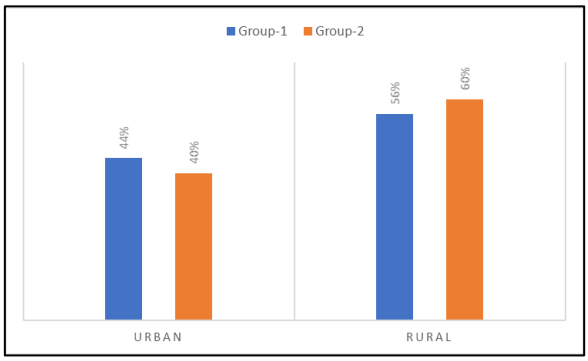

Fig-2: Residential area of the patients

In table-2 shows distributions of the patients according to proteinuria and serum uric acid where in both group A and group B proteinuria and serum uric acid were significant , P value = 0.001. The following table is given below in detail:

Table-2: Distributions of the patients according to proteinuria and serum uric acid

Variable	Preeclampsia Group A, mild	Preeclampsia Group B, severe	P value
Proteinuria			
Mean ± SD	2.90±3.32	6.73±4.05	
Range	0.32-10	0.32-10	0.001
Serum uric acid			
Mean ± SD	4.53±0.97	7.15±0.62	
Range	3.00-6.00	6.00-9.30	

DISCUSSION

The high serum uric acid concentration correlates with the degree of severity of preeclampsia. In this context, maternal serum uric acid level is reported to be one of the predictive factors for determination of severity of preeclampsia.

The present cross-sectional study was conducted at the Department of Obstetrics and Gynecology in the Institute of Ad-din Akij Medical College Hospital, Khulna during the period of June 2017 to May 2018. Purposively selected 80 preeclamptic patients were included in this study where

40 patients had mild preeclampsia (Group A) and 40 patients had severe preeclampsia (Group B).

This study showed that most of the patients, 34 (77.3%) patients in group A and 31 (70.5%) patients in group B were in age group 21 -30 years. The mean ± SD of age in group A was 24.63 ± 3.86 years with a range of 18-34 years and the mean ± SD of in group B was 24.52 ± 4.44 years with a range of 18-36 years. One study stated that preeclampsia is a frequent syndrome and its cause has been linked to multiple factors. One of the suggested risk factors for preeclampsia is advanced maternal age[5].

Another study of 100 patients found that most of the study subjects were within 21-30 years of age group and mean age ± SD was 24.06±3.71 [6].

Most of patients gestational age, 38 (86.4%) in group A and 39 (88.6%) in group B was in 32-40 weeks. Mean ± SD of gestational age was 36.00±4.31 in group A whereas 36.40 ± 3.29 in group B.

One study stated in his study that the risk of preeclampsia recurrence increases with earlier gestational age at the first delivery complicated by preeclampsia [7].

Another study of 100 pregnant women in third trimester of pregnancy showed that the mean ± SD of gestational age was 33.50±2.55 weeks [6].

The mean ±SD of proteinuria in group A was 2.89 ±3.32 and in group B was 6.83±4.09. The difference between these two groups is statistically significant (p=0.001) in proteinurea. Preeclampsia is a medicalcondition characterized by high blood pressure and significant proteinuria of a pregnant woman.

Preeclampsia is a pregnancy-specific, multisystem disorder that is characterized by the development of hypertension and proteinurea after 20 weeks of gestation [8].

One study showed that the significant correlations among the levels of uric acid and proteinuria [9]. The mean ± SD of SUA was 4.63 ± 0.95 mg/dl with a range of 3.00 - 6.00 mg/dl in group A and the mean ± SD of SUA was 7.17 ± 0.61 mg/dl with a range of 6.00-9.30 mg/dl in group B. The difference between these two groups is statistically significant (p=0.001). (Table II). Sultana R *et al*. in her study showed the mean ± SD SUA was 7.01± 1.90 mg/dl. One cross-sectional study compared serum uric acid in mild preeclamptic, severe preeclamptic and normal pregnant women. In their study the serum uric acid in severe preeclamptic women was significantly higher (7.01±1.93 mg/dl) than in normal pregnant women and mild preeclamptic women [10]. Another reported that SUA level of 5.5 mg/dl is best cutoff point for thediagnosis of preeclampsia [11]. Another case control study reported that the SUA level in women with preeclampsia was 5.9 ± 0.60 mg/dl, significantly higher than in the normal pregnant women (4.4 ± 0.69 mg/dl) [12]. One report said that to assess the utility of SUA in preeclampsia diagnosis and its correlation with some maternal and fetal outcomes and in their study the mean level of plasma uric acid was 5.8(±2.0) mg/dl in preeclamtic patients **[**13].

In a retrospective cohort study of 249 singleton pregnant women, assessed which routinely available clinical risk factors are associated with the progression to preeclampsia and the development of adverse maternal or infant conditions. In their study the mean serum uric acid level at the initial presentation of gestational hypertension was significantly higher comparing patients who later progressed to preeclampsia to those who did not (5.06 vs. 4.59 mg/dl, P<0.01). Lower gestational age and higher serum uric acid level at the initial presentation of gestational hypertension and subsequent need for antihypertensive drug treatment for blood pressure control were associated with significantly increased risks of progression to preeclampsia, and development of adverse maternal or infant conditions [14].

Another study showed that the mean SUA concentration in preeclamtic women were 7. 01 ±1.90 mg/dl. It was highly significant in statistical point of view. They concluded that hyperurecemia is associated with preeclamsia [6].

CONCLUSION

After many examination and analysis from this study we found significant relationship between elevated serum uric acid level and severe preeclampsia. The level of uric acid above 4.5 mg/dl is indicative of preeclamtic process and in such cases; the subjects deserve careful and close clinical follow up. So, it is appropriate and useful to estimate the serum uric acid level in women at risk of preeclampsia and ensure appropriate management to reduce complications of preeclampsia.

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