



EVALUATION OF SERUM URIC ACID LEVEL AMONG PREGNANT WOMEN IN WARRI, NIGERIA

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Received: 2nd June, 2022

Accepted: 22nd June, 2022

Published: 30th June, 2022

ABSTRACT

Background: Uric acid is the end product of purine metabolism and has been implicated in preeclampsia and hypertension in pregnant women.

Aim: The aim of this study is to evaluate the uric acid level among pregnant women in Warri, Nigeria.

Materials and Methods: A total of one hundred (100) women were recruited which comprises eighty (80) pregnant and twenty (20) non-pregnant women. Five milliliters (5ml) of blood was collected aseptically into a plain container which was allowed to clot and serum harvested for uric acid estimation. Uric acid was evaluated enzymatically using standard method. Statistical package for social sciences was employed with the mean \pm SD of the variables compared using student t test.

Results: Pregnant women show significantly ($p < 0.05$) higher uric acid when compared to apparently healthy non - pregnant women. Pregnant women in first trimester show a significantly ($p < 0.05$) lower uric acid than second and third trimester but no significant ($p > 0.05$) difference observed between second and third trimester when compared.

Conclusion: It is therefore pertinent to state that uric acid should be included as a routine antenatal test in order to curb development of preeclampsia in pregnancy during second and third trimester.

Keywords: Uric acid, Preeclampsia, Pregnant women, Hyperuricemia, Hypouricemia

INTRODUCTION

Uric acid is the excretory end product of purine metabolism in humans. It is removed from the blood by filtration through the kidneys and excreted in urine. The excretion and poor solubility of uric acid ensure that it is normally present in only small concentrations in the plasma. However, some conditions can lead to decreased or increased concentrations, which are called hypouricaemia and hyperuricaemia respectively (Agbecha and Anwana, 2019). Hyperuricaemia is a condition that occurs when serum uric acid (SUA) levels are $\geq 420 \mu\text{mol/L}$ in men and $\geq 360 \mu\text{mol/L}$ in women. Hyperuricaemia constitutes elevated uric acid above its physiologic levels in the plasma and is enhanced either by increased uric acid production or impaired renal uric acid excretion or both (Maiuolo *et al.*, 2016).

A metabolic disorder that accompanies excess serum uric acid level is known as Gouty Arthritis, in which excess uric acid is deposited in the joints, causing painful swelling, especially in the toes and feet (Lin *et al.*, 2016, Ding *et al.*, 2016). Ultimately this may lead to persistent attacks, chronic pain, and in some patients, joint damage (Lin *et al.*, 2016, Ding *et al.*, 2016). Hyperuricemia has also been associated with increased morbidity in patients with hypertension, cardiovascular disease, dyslipidemia, osteoarthritis, and decline in renal function in women and the elderly (Kim *et al.*, 2008, Lin *et al.*, 2016, Ding *et al.*, 2016, Yang *et al.*, 2016). High uric acid is considered as an independent risk factor for developing hypertension and diabetes (Adlija *et al.*, 2010).

Gestational hypertension and preeclampsia are diseases that increase foetal and maternal obstetric risk (Oluwole *et al.*, 2018). Preeclampsia is a multisystem disorder that results in maternal and foetal mortality and morbidity. In healthy pregnancies, uric acid decreases from pregnancy to first trimester due to the uricosuric effect of estrogen and increase in renal blood flow which increases during gestation (Johnson *et al.*, 2011). There have been increase cases of preeclampsia among pregnant women in this locality and are sources of serious concern which need to be investigated. There is paucity of data on uric acid level among pregnant women in this locality hence this study aim to evaluate the uric acid level among pregnant women and by extension among the various trimesters.

MATERIALS AND METHODS

This study was undertaken in Warri, the commercial epicentre of Delta State, Nigeria. A total of one hundred (100) individuals were randomly selected and recruited for this study. This comprise of eighty (80) pregnant women and twenty (20) apparently healthy non-pregnant women. Participants were informed of the research and their consent taken while ethical clearance was obtained from the state ministry of health ethics committee.

Collection and analysis of Sample

After an overnight fast five (5) milliliters of blood was collected into plain container, allowed to clot and spun to obtain the serum which was kept frozen until ready for use. Uric acid estimation was evaluated using colorimetric method of Kageyama (1971) and according to manufacturer’s instructions. Blood pressure was measured according to Onwubere and Kadiri (2005).

Statistical analysis

All data generated were analyzed statistically using Statistical Package for Social Sciences (SPSS) version 20. The student “t” test and ANOVA were used and mean ± standard deviations were evaluated and significant difference is at ≤0.05.

RESULTS

The result of this study as presented in Table 1 shows that there was no significant difference (P<0.05) observed in the ages of both pregnant and non-pregnant women when compared. There was a significantly higher systolic blood pressure in pregnant women when compared with non- pregnant women. In the same vein, pregnant women had a significantly higher diastolic blood pressure than non-pregnant women when compared. However, there was a significantly higher (P<0.05) uric acid observed in pregnant women than non-pregnant women when compared.

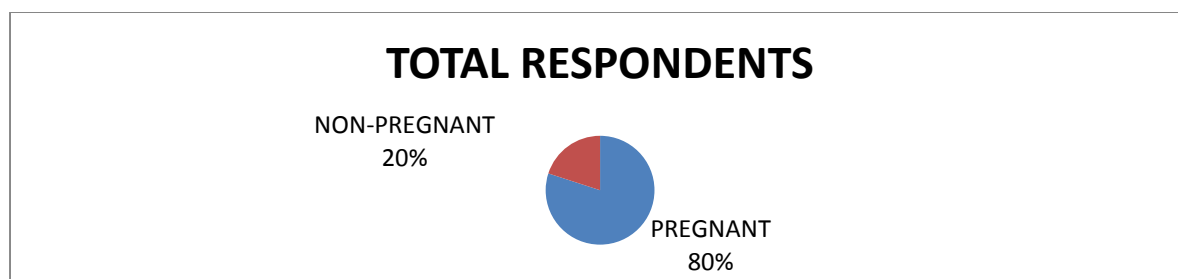


Figure 1.Total number of respondent in the study

Table 1: Mean ± SD of uric acid among pregnant women (test) and apparently healthy non-pregnant women (control).

Parameter	Test (n=80)	Control (n=20)	t value	P value
Age (Years)	30.23±1.24	29.67±2.01	0.46	1.032□
SBP (mmHg)	150.72±11.79	114.16±9.86	14.659	0.048*
DBP mmHg)	88.28±8.06	68.84±8.86	11.002	0.034*
Uric acid (mg/dl)	5.65±1.42	3.92±1.08	5.02	0.020*

*Significant, □Not Significant, Key: SBP = Systolic blood pressure, DBP=Diastolic blood pressure

Table 2 shows the parameters in the different trimesters. There was no significant ($p>0.05$) differences observed in the ages of the three trimesters when compared. There was no significant ($p>0.05$) differences observed in the systolic blood pressure between first trimester and second trimester. This is also same when second trimester was compared with third trimester but there was significantly ($p<0.05$) higher systolic blood pressure observed in first trimester when compared with third

trimester. There was no significant ($p>0.05$) difference observed in the diastolic blood pressure in the three trimester when compared. First trimester show significantly ($p<0.05$) lower uric acid than second trimester when compared. This is also same when first and third trimester was compared. However, there was no significant ($p>0.05$) difference observed in the uric acid of both second and third trimester when compared as shown in Tables 2 and 3.

Table 2: Mean \pm SD of uric acid among pregnant women on different trimester

Parameters	1 st Trimester =A	2 nd Trimester= B	3 rd Trimester =C
Age (Years)	30.16 \pm 1.00	30.00 \pm 0.96	29.94 \pm 1.16
SBP (mmHg)	147.28 \pm 10.93	148.98 \pm 15.91	142.83 \pm 19.09
DBP (mmHg)	87.28 \pm 11.99	85.38 \pm 11.11	83.67 \pm 12.52
Uric acid (mg/dl)	3.6 \pm 0.96	5.5 \pm 1.43	5.3 \pm 1.07

Key: SBP = Systolic blood pressure, DBP=Diastolic blood pressure

Table 3: Comparison of different trimesters with level of significance

Parameters	AvsB	AvsC	BvsC
Age (Years)	t=40.00,p=2.031 \square	t= -0.26,p=1.031 \square	t= -0.75,p=0.061 \square
SBP (mmHg)	t=-0.423,p=1.032 \square	t=2.048,p=0.042*	t=0.958,p=0.062 \square
DBP (mmHg)	t=0.620,p=0.204 \square	t=0.848,p=1.005 \square	t=1.132,p=0.064 \square
Uric acid (mg/dl)	t=4.04,p=0.038*	t=15.45,p=0.041*	t=0.55, p=0.072 \square

*Significant, \square Not Significant, Key: SBP = Systolic blood pressure, DBP=Diastolic blood pressure

DISCUSSION

Uric acid is a product of purine metabolism which has received attention recently due to its involvement in the development of hypertension, diabetes mellitus and chronic kidney diseases (Li *et al.*, 2014). This has prompted this study to evaluate the serum uric acid among pregnant women. This study observed a significantly ($p<0.05$) higher uric acid in pregnant women when compared with non-pregnant women. This is in tandem with previous work by earlier authors Abbassi- Ghanavati *et al.*; (2009), Agbecha and Anwana (2019) that did similar work on uric acid. Akahori and colleagues (2012) in their work observed that serum uric acid reduces by 25-35% in early pregnancy, but later increases throughout the pregnancy as a result of altered renal handling. Johnson and colleagues (2011) attributed these differences in uric acid to

the uricosuric impact of estrogen and increase renal blood flow at the early pregnancy. During urine formation about 98-100% of uric acid is reabsorbed at the proximal convoluted tubules while secretion takes place at the distal tubules with subsequent reabsorption to give a uric acid concentration of 6-12% in the plasma. There was significantly ($p<0.05$) lower uric acid level in first trimester when compared with second and third trimesters. This is in agreement with Akahori *et al.*, (2012) Agbecha and Anwana (2019) who did similar work on uric acid. However, there was no significant ($p>0.05$) difference observed when second and third trimesters were compared. This is in tandem with observation of Akahori *et al.*, (2012) earlier that serum uric acid decreases at early pregnancy and then increases as the pregnancy progresses.

Evaluation of Serum Uric Acid

Lind *et al.*; (1984) in their work observed that the increase in plasma concentration of uric acid at mid and last trimesters of pregnancy is as a result of secondary elevated tubular reabsorption with decrease renal clearance of the uric acid.

CONCLUSION

Having examined the serum uric acid of pregnant women in relation with their non-

pregnant counterparts it is pertinent to state that uric acid is higher in pregnant women especially during second and third trimesters which may lead to hypertension and subsequently, preeclampsia. In order to curb or arrest this situation, uric acid should be added to routine test done for pregnant women during routine antenatal visits.

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