European Journal of Molecular & Clinical Medicine

ISSN: 2515-8260, Volume 10, Issue 02, 2023

ORIGINAL RESEARCH

Assessment Of Increased First Trimester Serum Uric Acid As A Predictor Of Gestational Diabetes Mellitus

Chandersheikhar[1], Devinder Kumar[2*]

[1]Associate Professor, Department of Obstetrics & Gynaecology, Government Medical College, Rajouri, Jammu & Kashmir, India.
[*2]Assistant Professor, Department of Obstetrics & Gynaecology, Government Medical College, Rajouri, Jammu & Kashmir, India.

ABSTRACT

Background: To assess increased first trimester serum uric acid as a predictor of gestational diabetes mellitus.

Materials and Methods: Seventy- six antenatal women in first trimester were selected for the study. Approval from ethical review committee was obtained. Patients' consent was obtained before starting the study. 5 ml venous blood sample was taken from antenatal women of less than 12 weeks of gestation. Venous sample was measured after fasting, one hour and two hours and assessed for GDM using ADA criteria**.**

Results: Age group 20-25 years had 11, 26- 30 years had 34, 31-35 years had 20, 36-40 years had 6 and 41-45 years had 5 patients. The difference was significant (P< 0.05). Parity found to be primi in 46 and multi in 30. GTT was normal in 68 and positive in 8. Serum uric acid was elevated in 27 and normal in 49 cases. The difference was significant (P< 0.05). Out of 27 patients with elevated uric acid, 26 had normal GTT and out of 49 normal uric acid patients, 42 had normal GTT.

Conclusion: There was increase in the risk of development of GDM with increased levels of serum uric acid in the first trimester.

Keywords: Antenatal women, First trimester, GTT.

Corresponding Author: Dr Devinder Kumar, Assistant Professor, Department of Obstetrics & Gynaecology, Government Medical College, Rajouri, Jammu & Kashmir, India.
Email ID: dkkhajuria1981@gmail.com

INTRODUCTION

Gestational diabetes mellitus is one of the most important complications during pregnancy which is associated with both maternal and fetal morbidity and mortality.[1] World Health Organization and American Diabetes Association define GDM as "any degree of glucose intolerance with onset or first recognition during pregnancy". The prevalence ranges between 1 and 14 % of all pregnancies.[2] But studies conducted in different parts of the country averages the incidence of GDM in Indian population to be 16.55%.[3] Highest frequency of GDM among Indian women necessitates early diagnosis of GDM using glucose tolerance tests between 24 and 28 weeks of gestational age, though reports claim that about 40 to 66% of women with GDM can be diagnosed even earlier during pregnancy.[4,5]

Normal value of serum uric acid is between 2 to 6.5 mg/dl. In early pregnancy, there is decreased serum uric acid due to increased GFR. Uric acid is a product of metabolism of purines and is formed by xanthine oxidase enzyme.[6] Hypoxia and ischemia of the placenta and

cytokines such as interferon induce the expression of xanthine oxidase and therefore, increase the production of uric acid and also reactive oxygen species. Serum uric acid is interlinked with hypertension, obesity, hyperinsulinemia and dyslipidemia indicating that it could be a part of the group of factors of metabolic syndrome.[7] We performed this study to assess increased first trimester serum uric acid as a predictor of gestational diabetes mellitus.

MATERIALS & METHODS

Seventy- six antenatal women in first trimester were selected for the study. Approval from ethical review committee was obtained. Patients' consent was obtained before starting the study.

Data such as name, age, gender etc. was recorded. 5 ml venous blood sample was taken from antenatal women of less than 12 weeks of gestation. The samples were centrifuged and serum uric acid was measured by colorimetric assay. After overnight fasting of 8-10 hours, blood sugar in the fasting state was collected. Venous sample was measured after fasting, one hour and two hours and assessed for GDM using ADA criteria. The results were compiled and subjected for statistical analysis using Mann Whitney U test. P value less than 0.05 was set significant.

RESULTS

Table I Patients distribution based on age group

Age group (years)	Number	P value
20-25	11	0.05
26-30	34	
31-35	20	
36-40	6	
41-45	5	

Age group 20-25 years had 11, 26- 30 years had 34, 31-35 years had 20, 36-40 years had 6 and 41-45 years had 5 patients. The difference was significant (P< 0.05) (Table I).

Table II Assessment of parameters

Parameters	Variables	Number	P value
Parity	Primi	46	0.05
	Multi	30	
GTT	Normal	68	0.01
	Positive	8	
Serum uric acid	Elevated (>4.2)	27	0.02
	Normal (<4.2)	49	

Parity found to be primi in 46 and multi in 30. GTT was normal in 68 and positive in 8. Serum uric acid was elevated in 27 and normal in 49 cases. The difference was significant (P< 0.05) (Table II).

Table III Association between the serum uric acid level categories and GTT

Serum uric acid	GTT		Total
	Normal	Positive	
Elevated	26	1	27
Normal	42	7	49
Total	68	8	76

Out of 27 patients with elevated uric acid, 26 had normal GTT and out of 49 normal uric acid patients, 42 had normal GTT (Table III).

DISCUSSION

Serum uric acid is associated with insulin resistance in nonpregnant women.[8] It has been proven that, higher uric acid levels correlate with insulin resistance in women with hypertensive disorders of pregnancy and also higher levels of uric acid levels were noted at 24 to 28 weeks of gestation in women with GDM when compared to women without GDM.[9] Normally during pregnancy, the serum uric acid levels decrease significantly from 8th week of gestation up to 24 weeks due to increased glomerular filtration rate and decreased re absorption of uric acid from the renal tubules.[10] In the first trimester, it likely approximates preconception uric acid level and elevated levels may identify women who are predisposed to metabolic syndrome with an increased risk of developing GDM.[11] We performed this study to assess increased first trimester serum uric acid as a predictor of gestational diabetes mellitus.

Our results showed that age group 20-25 years had 11, 26- 30 years had 34, 31-35 years had 20, 36-40 years had 6 and 41-45 years had 5 patients. Sivasarupa et al[12] in their study all pregnant women less than 12 weeks showed that the mean age of pregnant women was 29.84 ± 4.94 years. The mean height and weight was 151.52 ± 7.49 cms and 50.60 ± 6.88 kg respectively. The body mass index of patients was 22.13 ± 3.31 kg/m2..The mean gestational age of pregnant women was 11.14 ± 1.30 weeks. The mean uric acid level was 3.81 ± 1.24 mg/dl.

We observed that Parity found to be primi in 46 and multi in 30. GTT was normal in 68 and positive in 8. Serum uric acid was elevated in 27 and normal in 49 cases. Rasika C et al[13] in their study a total of 70 pregnant women were included and parameters like age, parity, BMI, history of DM, serum uric acid at <15 weeks and at 24 to 28 weeks and one step test at 24 to 28 weeks were noted and compared. There was no significant correlation between the demographic variables and GDM, but a moderate significance noted between the family history of DM and one step test. Though there was a proportional increase in the serum uric acid with increase in the BMI, it was not statistically significant. A significant correlation was seen between BMI and risk of development of GDM. Though there was a significant correlation between serum uric acid at <15 weeks and at 24 to 28 weeks, serum uric acid at <15 weeks of gestation is a better predictor of GGI and GDM.

Our results showed that out of 27 patients with elevated uric acid, 26 had normal GTT and out of 49 normal uric acid patients, 42 had normal GTT. Ganta et al[14] investigated the association between elevated uric acid levels in the first trimester of pregnancy with gestational diabetes. Three hundred and twelve (312) pregnant women of gestational age less than 12 weeks who attended the OBG outpatient department within this time of period for regular antenatal check-up were enrolled in the study. Along with the other antenatal investigations serum uric acid levels were estimated before 12 weeks and also between 24-28 weeks. At 24-28 weeks

screening for GDM was done by OGCT using 75 gms of glucose. Other parameters like age, parity, BMI, family history of diabetes was noted and compared. Among the 312 pregnant women, 88 (28%) developed GDM. Of these 74 Women (84%) with GDM had uric acid levels above 3.5 mg/dl and 14 women (15.9%) with GDM had uric acid levels below 3.5 mg/dl. Women with higher BMI showed high uric acid levels.

Singh et al[15] analyzed the relationship between first trimester uric acid levels and risk of development of gestational diabetes mellitus (GDM). A total of 300 pregnant women up to 14 weeks of pregnancy were enrolled. GDM complicated 2.66% (8/300) of the pregnancies. All the women with serum uric acid > 5 mg/dl (n=6) had deranged blood sugar screening and out of this 5 developed GDM.

CONCLUSION

There was increase in the risk of development of GDM with increased levels of serum uric acid in the first trimester.

REFERENCES

1. Kappaganuthu A, Jyothisachan, Shailaja G. Hyperuricemia in early pregnancy: a marker for gestational diabetes mellitus. IOSR Journal Dent Med Sci. 2014;13(12):51-4.
2. Nader A, AboHassan, Rezk AY, Salama KM. Early detection of gestational diabetes via measurement of first trimester maternal serum uric acid. Med J Cairo Univ. 2016;84(2):151-8.
3. Ratnakaran R, Connelly PW, Sermer M, Zinman B, Hanley AJG. The impact of family history of diabetes on risk factors for gestational diabetes. Cln Endocrinol. 2007;67:754-60.
4. El-Gharib M, Mahfouz AE, Morad MA. Prediction of gestational diabetes by measuring first trimester maternal serum uric acid concentration. J Basic Clin Reproduct Sci.2013;2:27-31.
5. Rao CN, Uthraraj K. Elevated 1st trimester serum uric acid - a risk for gestational diabetes mellitus among South-Indians: a prospective observational, longitudinal study. Int J Reprod Contracept Obstet Gynecol. 2017;6:4923-7.
6. Seshiah V, Balaji V, Balaji MS, Sanjeevi CB, Green A. Gestational diabetes mellitus in India. J Assoc Physicians India. 2004;52:707-11.
7. Nahum GG, Wilson SB, Stainslaw. Early pregnancy glucose screening for GDM. J Reprod Med. 2002;47(8):656-62.
8. Swami SR, Mehetre R, Shivane V, Bandgar TR, Menon PS, Shah NS. Prevalence of carbohydrate intolerance of varying degrees in pregnant females in western India. J Indian Med Assoc. 2008;106:712-4.
9. Kamana KC, Shakya S, Zhang H. Gestational diabetes mellitus and macrosomia: a literature review. Ann Nutr Metab. 2015;66:14–20.
10. Das M, Borah NC, Ghose M, Choudhury N. Reference ranges for serum uric acid among healthy Assamese people. Biochem Res Int. 2014;2014.
11. Soltani Z, Rasheed K, Kapusta DR, Reisin E. Potential role of uric acid in metabolic syndrome, hypertension, kidney injury and cardiovascular diseases: is it time for reappraisal? Curr Hypertens Rep. 2013;15(3):175–81.
12. Sivasarupa I, Gopalan U, Kumarapillai S. Increased first trimester serum uric acid as a predictor of Gestational diabetes mellitus. Indian J Obstet Gynecol Res 2021;8(3):292-295.
13. Rasika C, Samal S, Ghose S. Association of elevated first trimester serum uric acid levels with development of GDM. Journal of Clinical and Diagnostic Research: JCDR. 2014 Dec;8(12):01.
14. Ganta SJ, Kulkarni SR. First trimester uric acid level: A reliable marker for gestational diabetes mellitus. Int J Reprod Contracept Obstet Gynecol 2019;8:2358-62.

15. Singh U, Mehrotra S, Singh R, Sujata, Gangwar ML, Shukla B. Serum uric acid: A novel risk factor for GDM. Int J Med Res Rev. 2015;3(1):10-5. 7. Davison JM, Dunlop W. Renal hemodynamics and tubular function normal human pregnancy. Kidney Int. 1980;18:152-61.