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Prediction of Gestational Diabetes Mellitus by Serum Uric Acid Levels: Prospective Analysis at a Rural Tertiary Care Center

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ABSTRACT

Serum uric acid has been recommended to screen gestational diabetes during pregnancy.
Objective: Prediction of gestational diabetes by serum uric acid levels at 17-20 weeks.
Methods: Eighty pregnant women who reported to the antenatal OPD at 17-20 weeks of period of gestation were enrolled in the study over the period of one year from Jan 2018 to Dec 2018 at Department of Obstetrics & Gynaecology Dr Rajendra Prasad Govt. Medical College, Kangra at Tanda, Himachal Pradesh, India.
Results: Out of 8 patients, who developed GDM 4 (50%) had serum uric acid >3.5 mg/dl and 4 (50%) had serum uric levels <3.5 mg/dl**.** And the sensitivity of serum uric acid was 50% and specificity was 67%. Out of 8 patients, who developed GDM 4 (50%) had serum uric acid >3.5 mg/dl and 4 (50%) had serum uric levels <3.5 mg/dl**.** And the sensitivity of serum uric acid was 50% and specificity was 67%.
Conclusion: Serum uric acid can be used to predict gestational diabetes.

Key Words: Serum uric acid, gestational diabetes mellitus

INTRODUCTION

Gestational diabetes mellitus (GDM) is a relatively common disorder of pregnancy. The prevalence of GDM ranges from 1 to 6% depending on the studied population.[1,2] Prediction and diagnosis of GDM is important for ongoing pregnancy and has important implications for subsequent health of the mother. GDM is considered a significant risk factor for subsequent development of type II diabetes and is associated with a poorer cardiovascular risk profile compared with women without GDM.[3,4] The method of screening (one-step versus two-step), application of screening (broad versus risk-dependent), and diagnostic criteria of GDM have been the subject to debate. Risk-dependent screening is being abandoned world-wide after the recommendation of the American Diabetes Association for screening all women without prior known diabetes between 24 and 28th gestational week.[5] The recommendation was based upon the inefficiency of the current history-based risk assessment method. Uric acid has been investigated as a possible risk factor for the development of GDM. Several researchers reported an association of uric acid levels with development of GDM..[6-8] Aim of the current study was to investigate the association of first trimester serum uric acid levels with development of GDM in a population of low-risk pregnant women.

METHODS

Eighty pregnant women who reported to the antenatal OPD at 17-20 weeks of period of gestation and who fulfilled the inclusion criteria and were

willing to participate in the study were enrolled in the study.

For this study all women attending antenatal OPD between 17-20 weeks of gestation were enrolled upto the period of initial 7 months of the study and followup was continued upto next 5 months of the study period so that the last enrolled patient can complete the followup process as per methodology. Detailed obstetric and menstrual history, past history of hypertension, diabetes and family history of hypertension and diabetes was taken and detailed general physical examination was conducted. This was followed by serum uric acid levels. Rest of the investigation structure were as per the protocol. All the enrolled patients were followed up every month till 28 weeks of gestation and fortnightly after that upto 36 week and weekly thereafter until delivery. OGCT was done at first visit and repeated at 24-28 weeks.

Gestational diabetes mellitus GDM

Is defined as a positive 50-g oral glucose challenge test [with a venous plasma glucose level 1 h after glucose challenge of at least 7.8 mmol/l (140 mg/dl)] and a positive 75-g oral glucose-tolerance test at 24–28 weeks of gestation [with venous plasma glucose levels of7.8 mmol/l after an overnight fast and 7.8–11.0 mmol/l(198 mg/dl) at 2h.

NORMAL RANGE OF INVESTIGATION

Serum uric acid levels - 3.5 mg/dl

RESULTS

The mean age of the patient who developed GDM was 26.25 years. In present study out of 80 patients, 47 were primigravida and 33 were multigravida. Among the patients who developed gestational diabetes mellitus 4 were primigravida, 3 were second gravida and 1 was third gravida. The period of gestation on admission in patients with gestational hypertension was 38 weeks, with preeclampsia was 37.5 weeks, with GDM was 38 weeks.

Out of 8 patients, who developed GDM 4 (50%) had serum uric acid >3.5 mg/dl and 4 (50%) had serum uric levels <3.5 mg/dl. And the sensitivity of serum uric acid was 50% and specificity was 67%.

In the present study the serum uric acid in patients with GDM was 3.8 mg/dl and in unaffected patients p value was .0001 which was significant.

TABLE 1 BASELINE CHARACTERISTICS

	UNAFFECTED GROUP	GESTATIONAL DIABETES MELLITUS
MEAN AGE	27.10±3.16	26.25
POG (WEEKS)	38	38
Mean serum uric acid (mg/dl)	3.4	3.8

TABLE 2 RELATIONSHIP OF SERUM URIC ACID WITH GDM

GDM	SERUM URIC ACID>3.5	SERUM URIC ACID <3.5
8	4(50%)	4(50%)

DISCUSSION

Uric acid is the final product of the oxidation step of purine catabolism and is an important marker for insulin resistance and the future development of metabolic syndrome. The prevalence of GDM is rising across the globe and the benefits of broad screening for GDM has not yet been proven[7,8].

In present study out of eight patients who developed GDM four patients (50%) had serum uric acid >3.5 mg/dl and four patients (50%) had serum uric levels <3.5 mg/dl. In our study the mean uric acid in patients with GDM is 3.8 mg/dl. And the sensitivity of serum uric acid was 50% and specificity was 67%. In a study conducted by Laughon et al[7] total of 1570 samples were available for analysis with a mean gestational age at sampling of 8.9 ± 2.5 weeks and uric acid concentration of 3.08 (± 0.85) mg/dl. Using a cut point of 3.6 mg/dl yielded a positive predictive value (PPV) of 9.0% and negative predictive value (NPV) of 96.7% for development of GDM. In study conducted by Zhou et al[9] mean serum

uric levels was 3.8 mg/dl and study shows linear correlation between G DM and serum uric acid levels. While uric acid had a sensitivity and specificity of 28% and 85% .In a study conducted by Seda Şahin Aker et al[10] the mean serum uric acid levels were significantly higher in the GDM and IGT groups (5.95 mg/dL (±0.97 mg/dL) and 4.76 mg/dL (±1.51 mg/dL), respectively) compared with the control group (3.76 mg/dL (±1.07 mg/dL) ($p<0.001$). The area under the curve for uric acid levels was 0.92 (95% confidence interval 0.88-0.95) for diagnosis of GDM. At a diagnostic threshold of 3.95 mg/dL, uric acid levels predicted development of GDM with 60% specificity and 100% sensitivity. First trimester serum uric acid has a linear association with the development of GDM.

Therefore, women with UA level in the upper quartile of normal range during the first 20 weeks of pregnancy might deserve special attention, as they might be at an increased risk to develop GDM and preeclampsia during pregnancy. Further prospective studies should focus on this unique group of women in order to verify our results.

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